1011

95-4
Ap 6/1
I 22 8/6
S.hrg. 95-1
pt. 6

DEPARTMENT OF THE INTERIOR AND RELATED AGENCIES APPROPRIATIONS FOR 1978

GOVERNMENT
Storage

DOCUMENTS

JUL 13 1977

DOCUMENTS

JUL 13 1977

FARRELL LIBRARY
KANSAS STATE UNIVERSITY

KSU LIBRARIES
A11900 223541

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS HOUSE OF REPRESENTATIVES

NINETY-FIFTH CONGRESS

FIRST SESSION

SUBCOMMITTEE ON THE DEPARTMENT OF THE INTERIOR AND RELATED AGENCIES

SIDNEY R. YATES, Illinois, *Chairman*

GUNN McKAY, Utah
CLARENCE D. LONG, Maryland
FRANK E. EVANS, Colorado
JOHN P. MURTHA, Pennsylvania
ROBERT B. DUNCAN, Oregon
NORMAN D. DICKS, Washington
JAMIE L. WHITTEN, Mississippi
JOSEPH M. McDADE, Pennsylvania
RALPH S. REGULA, Ohio
WILLIAM L. ARMSTRONG, Colorado

FREDERICK G. MOHRMAN and BYRON S. NIELSON, *Staff Assistants*

PART 6

	Page
Mining Enforcement and Safety Administration	1
Bureau of Mines	55
Federal Energy Administration	188
Naval Petroleum Reserves	588
Geological Survey	608

Printed for the use of the Committee on Appropriations

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

DEPARTMENT OF THE INTERIOR AND RELATED AGENCIES APPROPRIATIONS FOR 1978

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS HOUSE OF REPRESENTATIVES

NINETY-FIFTH CONGRESS

FIRST SESSION

SUBCOMMITTEE ON THE DEPARTMENT OF THE INTERIOR AND RELATED AGENCIES

SIDNEY R. YATES, Illinois, *Chairman*

GUNN McKAY, Utah
CLARENCE D. LONG, Maryland
FRANK E. EVANS, Colorado
JOHN P. MURTHA, Pennsylvania
ROBERT B. DUNCAN, Oregon
NORMAN D. DICKS, Washington
JAMIE L. WHITTEN, Mississippi
JOSEPH M. McDADE, Pennsylvania
RALPH S. REGULA, Ohio
WILLIAM L. ARMSTRONG, Colorado

FREDERICK G. MOHRMAN and BYRON S. NIELSON, *Staff Assistants*

PART 6

	Page
Mining Enforcement and Safety Administration	1
Bureau of Mines	55
Federal Energy Administration	188
Naval Petroleum Reserves	588
Geological Survey	608

Printed for the use of the Committee on Appropriations

U.S. GOVERNMENT PRINTING OFFICE

87-591 O WASHINGTON : 1977

COMMITTEE ON APPROPRIATIONS

GEORGE H. MAHON, Texas, *Chairman*

JAMIE L. WHITTEN, Mississippi
ROBERT L. F. SIKES, Florida
EDWARD P. BOLAND, Massachusetts
WILLIAM H. NATCHER, Kentucky
DANIEL J. FLOOD, Pennsylvania
TOM STEED, Oklahoma
GEORGE E. SHIPLEY, Illinois
JOHN M. SLACK, West Virginia
JOHN J. FLYNT, Jr., Georgia
NEAL SMITH, Iowa
ROBERT N. GIAIMO, Connecticut
JOSEPH P. ADDABBO, New York
JOHN J. McFALL, California
EDWARD J. PATTEN, New Jersey
CLARENCE D. LONG, Maryland
SIDNEY R. YATES, Illinois
FRANK E. EVANS, Colorado
DAVID R. OBEY, Wisconsin
EDWARD R. ROYBAL, California
LOUIS STOKES, Ohio
GUNN McKAY, Utah
TOM BEVILL, Alabama
BILL CHAPPELL, Florida
BILL D. BURLISON, Missouri
BILL ALEXANDER, Arkansas
EDWARD I. KOCH, New York
YVONNE BRATHWAITE BURKE, California
JOHN P. MURTHA, Pennsylvania
BOB TRAXLER, Michigan
ROBERT B. DUNCAN, Oregon
JOSEPH D. EARLY, Massachusetts
MAX BAUCUS, Montana
CHARLES WILSON, Texas
LINDY (MRS. HALE) BOGGS, Louisiana
ADAM BENJAMIN, Jr., Indiana
NORMAN D. DICKS, Washington

ELFORD A. CEDERBERG, Michigan
ROBERT H. MICHEL, Illinois
SILVIO O. CONTE, Massachusetts
JOSEPH M. McDADE, Pennsylvania
MARK ANDREWS, North Dakota
JACK EDWARDS, Alabama
ROBERT C. McEWEN, New York
JOHN T. MYERS, Indiana
J. KENNETH ROBINSON, Virginia
CLARENCE E. MILLER, Ohio
LAWRENCE COUGHLIN, Pennsylvania
C. W. BILL YOUNG, Florida
JACK F. KEMP, New York
WILLIAM L. ARMSTRONG, Colorado
RALPH S. REGULA, Ohio
CLAIR W. BURGENER, California
GEORGE M. O'BRIEN, Illinois
VIRGINIA SMITH, Nebraska

KEITH F. MAINLAND, *Clerk and Staff Director*

Staff Assistants

Donna M. Brother
Gordon E. Casey
Nicholas G. Cavarocchi
Donald L. Denton
Jimmy R. Fairchild
Robert B. Foster
John M. Garrity
Aubrey A. Gunnels
Margaret J. Hansen
Charles G. Hardin
F. Michael Hugo
Thomas J. Kingfield
Robert L. Knisely
Edward E. Lombard
Richard N. Malow
William A. Marinelli
Americo S. Miconi
Dempsey B. Mizelle
Frederick G. Mohrman
James A. Morrill
Enid Morrison
Peter J. Murphy, Jr.
Henry A. Neil, Jr.
Robert C. Nicholas III
Byron S. Nielson
David R. Olson
John G. Osthaus
Frederick F. Pfluger
John G. Plashal
Edwin F. Powers
Samuel R. Preston
Donald E. Richbourg
Earl C. Silsby
C. William Smith
Donald P. Smith
Charles W. Snodgrass
Hunter L. Spillan
Michael A. Stephens
Paul E. Thomson
George A. Urian
Derek J. Vander Schaaf
Michael S. Weinberger
J. David Willson

Surveys and Investigations

C. R. Anderson, *Chief*
David A. Schmidt, *Director*
James B. Hyland, *Assistant Director*
Anthony J. Gabriel, *Assistant Director*

Note.—The Surveys and Investigations supervisory staff is supplemented by selected personnel borrowed on a reimbursable basis for varying lengths of time from various agencies to staff up specific studies and investigations. The current average annual full-time personnel equivalent is approximately 65.

Administrative Support

Gerard J. Chouinard
Paul V. Farmer
Sandra A. Gilbert
Robin A. Harrold
Patricia A. Kemp
Valrie L. Lake
Jeni L. Leasor
Anna L. Manning
Marcia L. Matts
Frances May
Genevieve A. Mealy
Lawrence C. Miller
Toni Perla
Kitty L. Ray
Dale M. Shulaw
Austin G. Smith
Christine Stockman
Ann M. Stull
Bettilou Taylor
Randolph Thomas
Jane M. Winters
Ellen C. Zacofsky

DEPARTMENT OF THE INTERIOR AND RELATED AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1978

THURSDAY, FEBRUARY 24, 1977.

MINING ENFORCEMENT AND SAFETY ADMINISTRATION

WITNESSES

ROBERT E. BARRETT, ADMINISTRATOR
THOMAS J. SHEPICH, DEPUTY ADMINISTRATOR
JOSEPH O. COOK, ACTING ASSISTANT ADMINISTRATOR, COAL MINE HEALTH AND SAFETY
ARTHUR P. NELSON, ASSISTANT ADMINISTRATOR, METAL AND NONMETAL MINE HEALTH AND SAFETY
DONALD P. SCHLICK, ASSISTANT ADMINISTRATOR, TECHNICAL SUPPORT
MICHAEL G. ZABETAKIS, SUPERINTENDENT, NATIONAL MINE HEALTH AND SAFETY ACADEMY
GILBERT O. LOCKWOOD, ASSISTANT ADMINISTRATOR, PLANS, ASSESSMENTS, AND MANAGEMENT
RICHARD L. BAKER, CHIEF, DIVISION OF BUDGET AND FINANCE
WILLIAM BETTENBERG, ACTING ASSISTANT SECRETARY, ENERGY AND MINERALS
FRANCIS M. WILES, DIRECTOR OF BUDGET, OFFICE OF THE SECRETARY
L. WAITE WALLER, BUDGET ANALYST, OFFICE OF THE SECRETARY

Mr. YATES. The meeting will come to order.

We are privileged again today to have our friends from the Mining Enforcement and Safety Administration appear before us in support of an appropriation, this time for fiscal year 1978.

Appearing in support of that appropriation are Mr. Robert E. Barrett, Administrator; Mr. Thomas Shepich, the Deputy Administrator; Joseph Cook——

Mr. BARRETT. Joe Cook is not here. He is at a mine fire today.

Mr. YATES [continuing]. Arthur Nelson, the Assistant Administrator; Mr. Schlick, Administrator for Technical Support; Mr. Zabetakis, Superintendent; Mr. Lockwood; Mr. Baker; and Frank Wiles. We will enter Mr. Barrett's statement into the record at this point.

[The statement follows:]

STATEMENT OF ROBERT E. BARRETT, ADMINISTRATOR, MINING ENFORCEMENT AND SAFETY ADMINISTRATION, U.S. DEPARTMENT OF THE INTERIOR, BEFORE THE HOUSE SUBCOMMITTEE ON APPROPRIATIONS FOR THE DEPARTMENT OF THE INTERIOR AND RELATED AGENCIES.

Mr. Chairman:

I appreciate this opportunity to appear before you and members of your Committee to present MESA's program plans for fiscal year 1978 and to review with you our current activities and accomplishments. I would also like to thank you and the Committee for your strong support of our mine health and safety programs.

Before addressing our detailed budget request, I would like to comment on a number of items which are of significant value for improved mine health and safety.

1976 Injury Experience

If we look at the cold calculus of last year's statistics, the overall record shows a definite improvement over 1975. Fourteen fewer deaths were recorded in the coal mining industry in 1976 as compared to the previous year, and fatalities in metal/nonmetal mining reached an all-time low. According to preliminary figures, 141 fatalities were recorded in coal mining last year, compared to 155 in 1975. In metal/nonmetal mining, 113 deaths were recorded in 1976, compared to 123 in 1975.

Improved technology and enforcement have undoubtedly helped reduce the number of injuries associated with mining. In coal alone, fatalities have been reduced from almost 1,000 miners killed each year in the 1940's to 155 in 1975 and 141 in 1976. Nonfatal injuries have been reduced from about 38,000 in 1950 to about 10,000 annually today.

The rate of these injuries has also been significantly reduced since the enactment of the 1969 Coal Act. The rate of fatalities in coal mines has been reduced from 1.00 per million man-hours of exposure in 1970 to 0.41 in 1975 and 0.35 through December of 1976.

As inspector presence increases at metal/nonmetal mines, the miner's health and safeness of his working conditions have constantly improved. Accordingly, as enforcement activity has increased, the number and rate of fatalities have declined. The number of fatalities has decreased from 234 in 1972 to 113 in 1976. While the program expansion has helped bring about better mine health and safety conditions, we must continue to marshall our metal and nonmetal inspection resources to strike a prudent balance between covering as many mines and mills as possible and yet provide greater attention to special "problem" areas, such as mines with high injury frequency rates or significant health hazards.

Current Program Initiatives

Since my appearance before this Committee a year ago, MESA has initiated a mine profile rating system which rates mines on an individual basis for their performance over the past twelve months. Under this system, each mine is rated on the basis of three criteria: the disabling injury frequency rate; the record of compliance with mandatory Federal health and safety standards; and the individual mine's health and safety management system. The results of this rating system help us in determining several courses of action to be taken, among them the type and frequency of inspection for that particular mine. In addition, this system helps us determine how our resources in education and training and technical support can be used in the most beneficial and effective manner.

Another program initiated during the past year is our impact inspection program. In such inspections, a team of inspectors is dispatched throughout a mine to ensure that the entire mine is inspected simultaneously. This is especially important with respect to mine ventilation and permits us to ensure that air is not diverted from one section to another while air checks are being made. In addition, such a program reduces the opportunity for "cleanup operations," which often can precede the inspector as he travels throughout the mine area.

As much as we would like to forget, we must also recall the pitfalls we experienced and build from our mistakes. After a period of 39 months without a disaster, MESA's enforcement program was marred by the Scotia mine disaster, which occurred in March of 1976. Although much has been speculated, it still will be several months before state and Federal officials complete their fact finding investigation.

Improving the health conditions of the Nation's coal miners became increasingly more difficult last year. Certification of the personal dust sampling devices used in about 40 percent of the country's mines was revoked because of manufacturing defects. As a result, dust monitoring and enforcement programs were temporarily affected in mines where these devices were being used until a "composite" unit was developed as an acceptable replacement.

In December, MESA faced another challenge when the Department's Board of Mine Operations Appeals made a ruling that in effect could have nullified and prevented enforcement of current dust standards. The Board upheld a challenge by the Eastern Associated Coal Corporation, which had been cited for respirable dust violations. Relief was received when the Secretary stayed the Board's order, which allows us to continue sampling and enforcing the dust standards.

MESA's Role in the Energy Program

Most indicators point to an expanding role for the coal industry. The use of coal--its mining, research and conversion to synthetic fuels--plays a large role in energy programs in the budget now before the Congress, and indications are that coal will play an even bigger role in the future.

In the next decade, uranium and oil shale are also expected to play an increasingly important role in our overall energy supply picture. According to a Bureau of Mines projection, by 1985 nuclear power will supply approximately 12 percent of the Nation's energy requirements. In addition, oil shale will account for about 1 percent.

Now--what does this have to do with MESA?

First, any increase in mining operations must be achieved without compromise on the health and safety of the miners.

Secondly, since we all foresee a government policy that recognizes coal, uranium, and oil shale as tremendous resources; one that commits more research and development money to better extraction, better safety, and a cleaner burning, more economical, and dependable fuel supply, let us look at how MESA fits into this scheme.

It is virtually certain that a strong effort will be made in the Congress to make significant changes in the existing Federal Metal and Nonmetallic Mine Safety Act and the Federal Coal Mine Health and Safety Act of 1969. A major thrust of this legislative activity seems to be to transfer MESA from the Department of the Interior to the Department of Labor.

It is my intention as Administrator of MESA not to become embroiled in the question of whether or not MESA should be transferred from the Department of the Interior to the Department of Labor. The real issue, which must be of concern to all of us, is that mine health and safety not be diminished by either administrative or legislative action.

Another legislative effort, surface mining reclamation legislation--H.R. 2 and S. 7--seems likely to be enacted into law. This legislation is of interest to us because many of the performance standards for reclamation contained in the legislation must be viewed in light of the way they impact on mine health and safety. For example, the reclamation bills contain performance standards for the construction and reclamation of coal refuse piles and impounding structures which are somewhat different than the safety standards for such structures promulgated under the authority of the Federal Coal Mine Health and Safety Act of 1969.

Program Goals

Our major goal is to pull mining off the top of the list of the Nation's most dangerous occupations. This can be accomplished only if we fully implement our recent program initiatives, strengthen our standards and legal mandates, and continue to establish effective management throughout MESA.

More specifically in the following areas our goals are:

- Make the strongest use of existing legislation.
- Improve the quality of inspections and of inspectors.
- Upgrade the capabilities of management through management training and uniform management practices at both headquarters and in the field.
- Increase emphasis on occupational health.
- Better identify problem mines.
- Implement mandatory training regulations.
- Develop better methods to focus MESA's resources on specific problems such as interfacing enforcement programs with education and training efforts.
- Establish guidelines and implement a special assessments program aimed at operators who have a history of chronic violations of health and safety regulations.

Our FY 1978 budget program is built on these as well as other goals designed to continue this reduction in fatalities and injuries and to improve the working conditions that miners are subjected to on a daily basis. I believe that the modest budget request that we have presented to you will allow us to expand on these improvements.

Coal Mine Health and Safety

The primary objectives of the coal mine inspection program are to eliminate fatalities and reduce the frequency and severity of accidents as well as to minimize health hazards in the coal mining industry. The Act requires that a minimum of four complete health and safety inspections be made yearly in each underground mine and in addition, one spot inspection at each hazardous mine shall be made every five working days and as many

additional inspections as necessary to assure compliance. Although the Act does not specify the number of inspections for surface mines, experience dictates at least three complete health and safety inspections each year.

In FY 1978 major effort will be directed toward improving our current program and management information systems. Presently all data connected with inspection events are recorded and retrieved through a manual information system. This system is time consuming and subject to the usual range of arithmetic and production errors. The system that we are proposing will allow for the computerization of this data. Once this is accomplished, we will have the ability to quickly recover all information pertaining to inspections, analyze this data accurately on a more timely basis and incorporate our findings into the inspection process.

We are also proposing to design and implement an effective computer processing system for health regulations contained in the Code of Federal Regulations, Parts 70, 71, and 90. This program will utilize the same computer network as the management information system and will allow us to enter information into the system at the original source. The current system requires that this information be handled at several different points and relies on the mail for delivery from our field installations to our central computer facilities. If an operator is in violation of these standards, he must continue sampling until our process is completed. The revised procedure will speed this process up, enable us to assure more accurate data, and be more effective in enforcing our health standards.

Metal and Nonmetal Mine Health and Safety

MESA has made significant progress in identifying conditions and practices contributing to the disabling injuries and occupational illnesses in the metal and nonmetallic mineral industry. Considerable effort has been devoted to the development of health and safety standards as a basis of preventing the occurence of these injuries and illnesses.

In FY 1978 we are proposing to expand two special programs in metal and nonmetal. Last year we initiated a special accident prevention program of concentrated inspection effort of operations having a high injury frequency rate. This program has proven successful in reducing injuries at these operations and we are requesting additional resources to expand this program from 25 to 40 operations in FY 1978.

We also initiated a comprehensive health program designed to provide greater health inspection efforts at those metal and nonmetal operations most likely to be in violation of established health standards. The resources requested in our FY 1978 budget will allow us to expand this program from 600 to 1,000 operations.

Education and Training

Although the funding remains relatively unchanged, MESA's Education and Training programs will undergo significant changes. Mandatory training regulations currently at the public hearing stage will become law, guaranteeing for the first time every coal miner not only occupational training, but training in identifying and avoiding health and safety hazards.

In attempting to fulfill Government responsibilities in the education and training areas, MESA is moving from the role of platform teaching to a role of assisting in developing training plans and monitoring training programs. Problem areas pinpointed by using the mine profile rating system and accident frequency rates will receive special emphasis and assistance.

Formalized academic training will be continued through residential, seminar, and correspondence programs conducted by the National Mine Health and Safety Academy.

Technical Support

In the area of Technical Support we are requesting increases in several areas that will have a positive impact on health and safety.

One way to improve health and safety in the mines is to make sure that the equipment utilized in the mining process is safe. During 1976, 26 fatalities in coal and 32 fatalities in metal/nonmetal were directly attributed to machinery. With increased approval and certification of the mining equipment, a reduction can be made in these fatalities.

Mandatory illumination regulations for coal mines have been promulgated and there is a need for similar regulations in metal and nonmetal mines. These regulations will be proposed by FY 1978. Our proposed increase will give us the resources to develop different methods and procedures to test and evaluate these illumination systems for compliance with the proposed regulations.

Although there has been a significant reduction in roof falls, I believe further improvement is imperative. In 1976, 48 lives were lost because of falls of roofs and ribs. The increase requested in FY 1978 will improve our capability for investigating roof and ground fall fatalities and increase our technical assistance to the enforcement activities in approving plans submitted by mine operators.

Improvement is also needed in mine ventilation. Monitoring ventilation on a section-by-section basis does not ensure that all sections are in compliance. I am proposing increased staffing in the budget for the purpose of ensuring adequacy of, and compliance with, mine ventilation plans by establishing teams to conduct simultaneous ventilation surveys of all sections of an entire mine.

The final area in Technical Support where we are requesting an increase is mine emergency operations. We are requesting resources to improve the capability of MESA's seismic equipment for locating trapped miners by acquiring and field-testing research-developed equipment and techniques.

Summary

I will now briefly summarize our budget request for FY 1978. We are requesting a total of $105,766,000. After adjusting for current year supplementals totaling $4,441,000, the net increase is $7,585,000. Nonrecurring decreases totaling $1,392,000 are offset against our requested increases. Activity increases as well as FY 1978 program totals are as follows:

	Increase 1978	Total Programs
Coal Mine Health and Safety.....	$3,522,000	$57,170,000
Metal/Nonmetal Mine Health and Safety.....	1,844,000	19,271,000
Education and Training.....	181,000	10,894,000
Technical Support.....	1,690,000	15,895,000
Program Administration.....	348,000	2,536,000
Total.....	7,585,000	105,766,000

This concludes my prepared statement. Members of my staff and I welcome this opportunity to answer any questions you or the Committee have regarding our budget request.

The committee has an expert member in the field. I propose to let our expert in the field, Mr. Murtha, from Pennsylvania, begin the questioning.

Mr. Murtha?

Mr. MURTHA. Thank you very much, Mr. Chairman.

PURCHASE OF MOTOR VEHICLES

Mr. Director, in your administrative provisions you are requesting funds for the purchase of 75 passenger motor vehicles, a reduction of 120 motor vehicles. How many vehicles do you now own?

Mr. BARRETT. Up until last year, we obtained all our vehicles from GSA. Then GSA began to have difficulty in supplying us with the vehicles we need.

As a result, we have asked for some additional funds to buy vehicles, which GSA still purchases for us. It is primarily because they have not been able to supply the additional vehicles we need.

Mr. MURTHA. You need a special kind of a vehicle, is that the idea?

Mr. BARRETT. No, in general, they just cannot supply regular sedans for us. However, we do have special purpose vehicle needs. We use four-wheel drive vehicles, for example, to inspect strip mines. We use a few pickup trucks. But primarily we use the standard sedan automobiles.

Mr. MURTHA. Do you use the GSA interagency motor pool at all?

Mr. BARRETT. Oh, yes, we use the pools at all of our various locations. I think in Pittsburgh, for example, we draw about 100 vehicles or so from that pool. We draw from Charleston. We do draw from the GSA pools, yes.

POSITION LAPSE

Mr. MURTHA. Throughout your justification you indicate that you lapsed new positions 3 months. That is through delays in hiring. You expect them to work only 9 months during the fiscal year. But, on page 74, your increase in permanent positions is 103, but there is no change in equivalent of other positions.

A 9-month employment pattern would mean that the employees are working 75 percent of the year and would generate 77 man-years, not 93. How do you account for the other 16 man-years?

Mr. BARRETT. Where are we—page what?

Mr. MURTHA. Page 74.

Mr. LOCKWOOD. I think I may be able to speak on that. We had the same problem the prior year of hiring for partial year, phasing people in, if you will. So, it is part of that—the quarter that was left over from last year——

Mr. MURTHA. This is an overlap between the 2 years.

Mr. BARRETT. That is correct, sir.

ACTUAL EMPLOYMENT

Mr. MURTHA. What is your actual employment as of January 30, 1977?

Mr. LOCKWOOD. I have that. Right about 3,100—3,169 as of February 12, to be exact.

Mr. MURTHA. How many vacancies do you have?

Mr. LOCKWOOD. 161, sir.

Mr. MURTHA. Why aren't they filled?

Mr. LOCKWOOD. Because the end of January was one-quarter into the year, and we are again budgeted to phase in our new hires throughout the year. The other is just replacement and attrition.

Mr. MURTHA. Do you have enough people over there in MESA?

Mr. BARRETT. Yes. We have enough right now; yes. We will have when we reach our ceiling.

VO-TECH SCHOOLS

Mr. MURTHA. Let me ask you a question at this point. A vo-tech school in my district proposed additional facilities for the training of coal miners. I have been to Ohio and found that in a school they have going there, the miners that are trained in their school are much safer, they do a better job, and they have many fewer accidents compared to a miner that comes in off the street and is trained by the individual mine itself.

They are proposing that they get involved, not only in the basic training, but in auxiliary proposals. Are you involved in something like that, and could you get involved in a specific proposal like that?

Mr. BARRETT. Well, sir, we are involved to some degree in the vo-tech programs. As a matter of fact, this year, for the first time, through our state grants program we have allocated some funds, I believe to Tennessee for a vo-tech program. It was more or less a pilot program. I believe that we should and could train miners at the vo-tech level.

Mr. MURTHA. We train welders and we train every other kind of industry; why don't we train miners at the vo-tech level?

Mr. BARRETT. I guess primarily because of the fact that the enthusiasm hasn't been generated in the communities. It would seem to me in a district that has a high density of mining operations, that those programs should be made available.

Mr. MURTHA. Can't you get involved in a project like that with a vo-tech school?

Mr. BARRETT. We are through one of our programs, our State grant program, yes, sir.

Mr. MURTHA. In other words, you can get involved in proposals like that.

Mr. SCHLICK. Just recently we had an opinion from our Solicitor that allowed us to get involved with a vo-tech school, without using section 503 funds to go through the State enforcement agency.

We signed a grant with the State of Tennessee to start doing this.

Mr. BARRETT. That is a direct grant.

Mr. SCHLICK. It is a direct grant between MESA or the Secretary of Interior and that vo-tech school system, which is the first one. That is going forward now. So, this opens the door to do this.

Now, there are no existing funds, programed funds, to do this. But, we are allowed to reprogram a certain small percentage of State grant money.

Mr. MURTHA. So, if you had the existing funds you would feel it would be no problem under your charter to get involved in a project like this?

Mr. SCHLICK. Yes, sir, that is correct.

GROWTH IN APPROPRIATIONS

Mr. MURTHA. In 1975, the year in which you first came before this committee, your appropriations were $67,913,000. Your request this year is $105,766,000. This represents a healthy program growth.

Mr. Director, what do you think this program ought to be 5 years from now?

Mr. BARRETT. I think it depends a lot on where we go energywise. For example, getting away from the coal programs for a moment, we are talking about development of oil shale in the West. I would see that the oil shale health and safety programs, or the health and safety programs that relate to that development, would come under our jurisdiction. That, of course, would cause a need for growth in people and dollars.

We also inspect uranium mines. If there is a growth in that area, of course we must grow accordingly. But, I think the way it looks now, unless we all forget very quickly what has happened in the last several months, that coal should—and we have been talking about this for years—you can go back 3 or 4 years ago, back to 1973, and we talked about doubling production of coal.

Now, that was supposed to have been by 1985, but that keeps being pushed ahead. I don't see this year as any giant forward movement insofar as coal is concerned. That is, a great increase in production. It will probably hold steady this year, but if we get an energy policy that says coal is going to be one of our base fuels, then we take off and double the production; then, of course, our growth will rise accordingly.

Mr. MURTHA. You have had a 40-percent increase in your budget since 1975. Have you had a commensurate increase in the safety standards, in the supervision of the mines?

GROWTH IN MINES

Mr. BARRETT. Just to give you an example of the number of mines, we are averaging about in the neighborhood of 1,000 new mines per year. In 1973 we had 3,117 mines. In 1974 we had 4,107. In 1975 we had 5,126. Our latest figures indicate we have about 5,300 mines—coal mines we are talking about—5,300 versus 1973, when we had 3,117.

We keep projecting that upward, so that within about 5 years we would say we probably will have in the neighborhood of about 7,000 mines.

So, again, there is more to it than just multiplying numbers of mines, or adding new mines.

INCREASED SAFETY

Mr. MURTHA. But is it safer in the coal mines today with the increased production and the increased number of people that you have working for you?

Mr. BARRETT. I think it is. If we can relate some of our experiences back just several years, as late as World War II, for example, we killed an average of 1,000 miners per year. We are down now around 100.

Mr. MURTHA. You are down to 100 and yet you have increased the amount of mines by 25 or 30 percent—the number of coal mines.

Mr. BARRETT. 3,100 or 5,300, whatever that is—00 percent, 70 percent, yes, sir. Last year was the highest production year in history for coal.

Mr. YATES. To what do you attribute that safety record?

Mr. BARRETT. Our frequency rates—last year we didn't have the lowest number of fatalities, but the lowest fatality frequency rate in the history of coal mining.

Mr. MURTHA. So as we understand it, you are saying that per man-hour worked, you have less accidents than you have ever had before?

Mr. BARRETT. Not necessarily as far as accidents are concerned.

Mr. MURTHA. Fatalities?

Mr. BARRETT. Yes. As far as accidents are concerned, we had about 10,000 in coal and roughly the same number for metals.

CAUSES OF INCREASED SAFETY

Mr. MURTHA. The chairman's question is to what do you attribute that increased safety?

Mr. BARRETT. We can draw direct correlations in our programs now between inspector hours; that is, time conducting inspections to decreases in frequency rates.

We found in pulling out mines of certain sizes that we can relate presence of inspectors versus downward trend in frequency rates. We can track that very, very easily.

BLACK LUNG

Mr. MURTHA. Of course, Mr. Chairman, the thing I have talked about over and over again is the incidence of black lung. He tells me our incidence is half of what it is in the European coal mines.

Mr. BARRETT. Let me qualify that. The standards are half what they are in European mines.

Mr. MURTHA. Eventually then the incidence of black lung in generations will be half that of Europe. Explain the standards to the chairman.

Mr. YATES. If I understand that answer, if the standards are half, that means that their standards are better.

Mr. BARRETT. No, milligrams per cubic meter of dust exposure is 2 in this country.

Mr. YATES. I thought you meant the standards that are established for the protection of miners are half of what they are in other countries. But you are just talking about the amount of particulate that is allowed in the air.

Mr. BARRETT. Right. We were discussing this just prior to today's hearing. The Congressman asked me how we compare to other countries. We were discussing that aspect.

The British and the Germans—the British are probably the leaders as far as defining pneumoconiosis and the isolation of the dust and so forth, particulate size. Their standard right now I think is 4. The German's is 4.6, if I remember correctly—milligrams per cubic meter.

The Australians have been making a big pitch that they have eliminated the disease in Australia. I was over there last fall, and I found that to be untrue. They don't have near the standards we have. They don't have the collection systems we have. They don't have the numbers of people involved in the health aspect that we do. They don't categorize black lung as we do, either. You have to presently be totally disabled—by that I mean bedfast—before they consider a miner having the disease.

And add to that the socialistic type of government they have over there. It is almost a welfare-type State. There is no need for a black lung program because you can be in any industry and draw roughly the same benefits as what our miners would draw here in this country for a disability of any type.

Anyway, our program has really come under fire. Every time we turn around there is a lawsuit or something, some legal implication associated with our program. But, I still feel, and I think it can be borne out by any kind of figures we have available, that we do have the best program in the world.

DUST STANDARDS

Mr. YATES. Because of the standards?

Mr. BARRETT. Yes; the standards have required—the 2-milligram standard has required the operating people to take a whole new look at ventilation systems, dust control devices and equipment.

Mr. YATES. One of the things that I was told by several former coal miners that now live in my district is that, at least in some of the mines in which they work, they didn't follow your regulations—not the employers, but the miners themselves. They would not wear the safety gear. They would not follow the requirements that you had.

When the inspector was there, they would do it, and when the inspector went away, they would disassociate themselves from it.

What is your reaction to that?

Mr. BARRETT. Part of our request for additional funds addresses itself to that very problem. I get the letters your people send to me regarding the miners in your district, and I am aware of a couple of the problems, preparation plants, for example.

We are asking for additional funds and people in our coal health program.

Mr. YATES. How would that bear on this? How can you have enough people to be present at the time that the miners take their safety gear off?

PERSONAL SAMPLER

Mr. BARRETT. Well, we can't. That is part of the problem. I guess we have collected around 5 million dust samples since the program began, and there is no way we can ramrod each sample. What we are trying to do—and we address this in the proposal we are giving you—is to take the personal sampler of the miner himself.

We get into all kinds of problems with the individual miners. Right now we are requiring that they would wear the personal sampler periodically, the high-risk man every month, and the non-high-risk miner—for example, the miner without black-lung wear them every 90 days.

87-591 O - 77 - 2

What we are trying to do is get the sampler off the miner and do more area sampling—that is sample an area which would be roughly representative, I guess you might say, for a particular section, and put the sampler at a given point and the operating people would be required to watch that sampling device.

Mr. YATES. Would that give you as good a coverage?

Mr. BARRETT. We think so. We are going to couple that with a requirement for a dust control plan. What we have done is gone out to almost every mine in the country—I think the survey is probably completed now at this point in time—and we have taken a mine section for example and analyzed it, and if there were 3,000 cubic feet of air at the mine curb, and the air was going into the section at the velocity of 60 feet per minute, there was 50 gallons of water being delivered to the machine, 50 pounds per square inch through sprays, and those conditions all existed at a certain point in time, we take a sample, and if the operator is below the 2-milligram standard, then we say if you continue to operate within these parameters, that you are in compliance with the dust standard, without having to sample.

Then instead of putting the sampler on each individual miner during our own verification programs, or their verification programs, we can come back and test the representative area, and will then reduce the number of samples collected.

Mr. MURTHA. I might add, Mr. Chairman, one of the problems is that individual miners feel that these devices, which are for their own benefit, are used against them later on as evidence that they were not in an area where they were receiving much dust, which creates a tremendous psychological counterproductive effort.

Mr. BARRETT. We have been reassurred by the people that administer that program that the results of the samples will not be used against the miner in their disability hearings, and that there has to be proof that there are lung impairments before the money will be awarded to the person.

PREVENTION OF DISASTERS

Mr. YATES. One of the questions that comes to my mind is, of course, the question of the possibility of another terrible accident happening, such as occurred at the Scotia mine.

Can you tell us what efforts you are making? Can you tell us what you are doing in order to prevent a recurrence of a terrible catastrophe of that kind?

Mr. BARRETT. First, let me say this: The condition for an explosion could, let's be quite candid, exist at this very moment in a number of mines. Some mines have gobs that are filled with gas, 80 or 90 percent methane, and of course they are being ventilated and some of it may be tapped but most of it is vented into the atmosphere.

But, if you have fresh air at point A and 80 percent methane at point B, somewhere you have 5 to 15 percent methane. What we are trying to do is keep that 5 to 15 percent back in the mined-out areas where it is not possible—and I am going to qualify that a little—but not probable to have it ignited.

We have had instances—very rare, but there were some of where rock falls have ignited methane. So, the potential does exist. To

remove that potential completely would mean to shut down two-thirds of the production of this country.

Mr. YATES. There is no way of clearing it out?

Mr. BARRETT. It is being vented, but there is no way to clear all areas down to less than 5 percent.

Mr. YATES. What you are saying is it is impossible to clear it out completely?

Mr. BARRETT. Yes, sir.

Mr. MURTHA. In addition to that, what are you doing in the field of research to eliminate that problem—anything at all?

Mr. BARRETT. Yes. Let me finish my answer first, Mr. Chairman.

BLITZ INSPECTIONS

We are conducting what we call blitz inspections, which are impact inspections, where rather than have 1 man in a mine that takes 15 days to inspect, we will put 15 men into that mine at one time so we can get a picture of the total mining environment.

This eliminates the potential for cleaning up or keeping ahead of the inspector, or changing ventilation, changing regulators, which can be done very easily.

We are getting a picture of the entire mine during one inspection, by a large number of inspectors going in different directions.

MINING IN THE PRESENCE OF METHANE

Mr. YATES. What you are saying is that miners are going into mines and are mining coal where there is methane?

Mr. BARRETT. Absolutely.

Mr. YATES. You are saying yes to that?

Mr. BARRETT. Yes, sir.

Mr. YATES. And there is no way of avoiding it. Is that what you are saying?

Mr. BARRETT. That is right.

Mr. YATES. You are trying to minimize it?

Mr. BARRETT. Yes, sir.

Mr. YATES. How are you trying to minimize it?

Mr. BARRETT. Well, as I say——

Mr. YATES. Do the miners know they are doing this?

Mr. BARRETT. Oh, yes.

Mr. YATES. Is there a condition where miners should not be operating—is there a condition where there is so much methane that miners should not be operating?

Mr. BARRETT. Those conditions exist.

Mr. YATES. Do the miners know that?

Mr. BARRETT. Yes, sir.

METHANE MONITORS

Mr. YATES. How would the miners know there is too much methane in a particular location?

Mr. BARRETT. We require on every mining machine a methane monitor. This alerts the operator at 1.5 percent of methane, and then at 2

percent it automatically shuts off the equipment, that is unless it is tampered with.

The miners are also supposed to make gas tests every 20 minutes.

Now, if there are extreme amounts of gas we require them to be accelerated—that is, increase the number of tests and decrease the time between tests.

Mr. YATES. You require the test to be accelerated? As of what point, then, do you require stopping mining in an area?

Mr. BARRETT. The law says in effect when it reaches 2 percent, that they have to pull out, that is stop mining. In excess of 1.5, they remove the power from the equipment and make changes or adjustments.

Mr. YATES. If it is 2 percent. I had the impression that they don't do it in enough cases.

Mr. BARRETT. Well, that is possible.

Mr. YATES. Now, when you talked about 15 percent a few moments ago, this is 15 percent as compared to the 2 percent you are talking about?

Mr. BARRETT. Yes, sir.

Mr. YATES. So 15 percent is extremely dangerous; is that right?

Mr. BARRETT. Well, above 15 you don't have to worry because the explosive range is 5 to 15.

CAUSES OF EXPLOSIONS

Mr. YATES. What touches it off? You said a rockfall might.

Mr. BARRETT. Any kind of an arc or spark. The spark of a bit striking a pyritic inclusion, for example, in a coal seam wall can put forth enough energy to ignite methane.

Mr. YATES. Are miners mining coal when they find they are over 2 percent? The law says they are not supposed to. Can you tell the committee whether they are still doing it nevertheless?

Mr. BARRETT. I would say not. If they are aware of the 2 percent, they will not mine.

Mr. YATES. They will not mine?

Mr. BARRETT. Yes, sir.

Mr. YATES. OK.

Now, is 2 percent a dangerous condition?

Mr. BARRETT. No, but 2 percent—if you have 2 percent at a given location, you may have 5 percent coming out of a little streamer or a bleeder.

Mr. YATES. But the problem I have is reconciling your present statement with what you said before. You said before that there are areas in the country where the possibility of an explosion still exists. What you are now telling me is that where there is 2 percent, it is not dangerous, and the miners are supposed to stop.

Therefore, how can you reconcile the two statements?

Mr. BARRETT. OK, I can do that.

Mr. YATES. OK, let's hear you do that.

Mr. BARRETT. We will have to go through a whole learning curve here, maybe.

Mr. YATES. I am not from the mine country, so I don't grasp all of these things. What I am trying to do—as you are—is trying to prevent recurrences of the accidents.

Mr. BARRETT. The overwhelming number of explosions are caused at the workplace. That is as coal is being extracted. Now, that is where we have all these precautionary measures. Incidentally, the water sprays help to cool down the bits which in turn cut down on the possibility of the bits igniting the gas. Gas is being emanated as coal is mined in all of northern West Virginia, southwestern Pennsylvania. The Congressman from Pennsylvania has a mine in his district that liberates the most gas of any mine in Pennsylvania. Ten million cubic feet of gas is thrown into the air from those mines daily.

I don't know how you would relate the amount—probably heat all of Washington here for a day.

Those gases are confined in bleeder systems which are more or less pipelines that take the gas from the mined out areas, where it collects, isolated from the work areas, and transport it through ventilation systems to the surface, where it is inerted into the atmosphere.

Those areas are isolated by seals, concrete block stoppings, pipes or whatever it takes to keep it away from where the men are actually mining. Those high concentrations are not where the ignition sources would be.

Mr. YATES. What you are saying is that the miners do not mine in any area which is 2 percent or over?

Mr. BARRETT. That is correct, sir.

Mr. YATES. Those areas that have 15 percent methane or over are not peopled by miners. Is that what you are saying?

Mr. BARRETT. Yes, sir.

Mr. YATES. Miners are not working there.

Mr. BARRETT. That is right. The coal has been extracted and there are giant caves of rock and falls of rock, and the methane will accumulate up on top of these gobs or mined out areas it may accumulate on top of those falls in the amount of maybe 95 percent.

Mr. YATES. Are any of those mined out areas ever ignited?

Mr. BARRETT. Rarely. I can't remember any, but it is possible.

Mr. YATES. Do your inspectors go in there?

Mr. BARRETT. No. You can't get in because it is solid rock, it has fallen in.

Mr. YATES. I see. These are patched-off places that have the accumulations of methane?

Mr. BARRETT. Yes, sir.

Mr. YATES. How do you know they exist, if you cannot get in?

Mr. BARRETT. The gas will eventually build up to the point where it will pour down into the bleeders. The bleeder entries are like pipelines that are driven primarily for bleeding off the gas. They are travelable.

Now, when they get to 2 percent, the operator either has to put more air in there, or drill holes from the surface and vent to the surface.

Mr. YATES. What happens when it reaches 2 percent? The equipment stops working?

Mr. BARRETT. At the face where they are mining? Yes. It should automatically shut off.

Mr. YATES. Do you know of any instances where it does not?

Mr. BARRETT. I have been told of them.

Mr. YATES. By miners?

Mr. BARRETT. Yes.

Mr. YATES. Requested by the owners to continue mining, even though there is more than 2 percent?

Mr. BARRETT. I don't know. It might have been a joint effort on the part of the miners and the operators to do that.

Mr. YATES. There are places where they would rather not pay attention to the requirements of the law?

Mr. BARRETT. Some places they are paid by the ton. That is the incentive to keep on mining.

Mr. YATES. So the accident may happen again?

Mr. MURTHA. But they are breaking the regulations?

Mr. BARRETT. Yes.

Mr. YATES. And the accident may happen again?

Mr. MURTHA. How about this fire in mine 32 or mine 33 that is still burning? What started that fire?

Mr. BARRETT. That was started 2 weeks ago Monday by a fall of rock—there had been a fall there previously, and the roof was supported with wooden cross timbers. It was 18 feet of fall, so they put what they call cribs above the crossbars. These were all wooden. There were probably several tons of wooden material. It fell again on a Sunday night, and it brought down with the trolley wire which crossed the rail, causing a short circuit that ignited the wooden timbers.

The timbers are burning and there is some gas coming out of a rider seam that overlays the particular seam of coal being mined. I would think the gas coming from that rider seam is helping to keep the fire burning.

Mr. MURTHA. Is there no way to get that fire extinguished?

Mr. BARRETT. They had probes in behind the fire monitoring the explosive gases. Whenever the gases approached the explosive range, like 4 percent, they withdraw the men.

But, now it is to the point where the gas is in by the fire itself—they have drilled boreholes down, and one hole shows 3 percent, another shows 18 percent, which means somewhere in between those two holes there is 5 to 15 percent of methane, plus a fire, plus oxygen.

So, we have withdrawn all the men from the mine.

Mr. Cook, who is our Acting Assistant Administrator for Coal, our district manager and subdistrict manager are up there now working with the company on a plan to seal it remotely; that is, from the surface, through boreholes, using fly ash and nitrogen.

Mr. MURTHA. How long do you think it will take to extinguish the fire if it can be extinguished?

Mr. BARRETT. The last I heard they had four holes down. They want to put holes in by and out by the fire. Put fly ash down by the holes to make a sort of seal, and put nitrogen into the fire area to try to snuff out the fire.

Mr. MURTHA. How soon would you open it up after you extinguished the fire?

Mr. BARRETT. We keep the boreholes open where we are sampling. The samples show, say, zero CO—CO indicates carbon monoxide—indicates fire, and the gases are below the explosive limit. Then we would consider going back in.

Mr. MURTHA. They could be out a couple of months?

Mr. BARRETT. Yes. The bottom line, as far as the company is concerned, is to flood that section of the mine, that part of the mine. If they flood it, then they could go to work, but they are reluctant and hesitant to flood it for any number of reasons.

It takes a lot of time to pump the water back out, takes time for the fire to cool. They are hoping through remote sealing and the introduction of nitrogen that that will be the quickest way to get back to work.

PIECEWORK MINING

Mr. YATES. I am interested in this piecework example that you gave, and the possibility that there may be cooperation between the miners and the owners to disregard the regulations and continue to mine.

What portion of the industry is piecework?

Mr. BARRETT. I would say a small part of it, the nonunion mines for the most part; that is, non-U.M.W. of A. affiliated are on piecework for the most part. U.M.W. of A. accounts for approximately 140,000 of the 210,000 miners.

Underground mines that are not U.M.W. of A. affiliated, not all of them, but a good number of them are on a certain base scale plus so much money per ton over a certain number of tons produced.

NON-COAL-MINING HAZARDS

Mr. YATES. What are the hazards in mines other than coal mines?

Mr. BARRETT. Well, the ground control problems—supporting roof and ribs—the same type of problems as in coal.

Mr. YATES. Structural?

Mr. BARRETT. Yes, sir, also machinery-type accidents.

Mr. YATES. Do you have gas problems in them?

Mr. BARRETT. With some mines, we do, sir.

Mr. YATES. What are those?

Mr. BARRETT. Well, there was an ignition recently in a limestone mine in Pennsylvania, where three men were burned. The causes on the metal and nonmetal side—machinery accidents, there were 32 fatalities last year. Haulage accidents—and that can be locomotive haulage, trucks, diesel power equipment—31. Fall of ground was 10; that is the top fell in. Slips or falls, seven; handling materials, a dozen; sliding material, seven; explosives, eight; electricity, three; suffocation, two; and others, one.

Mr. YATES. So that your big problem of mine safety really is with the coal mines, isn't it?

Mr. BARRETT. Not necessarily. We have a tremendously large number—we had 113 fatalities in the metal-nonmetal industry, most of which are in the underground mines.

Mr. YATES. Those are the accidents you just described?

Mr. BARRETT. No; those were totals. One of the biggest problems—37 fatalities were underground; 11 in open pit mines; 18 fatalities in quarries; sand and gravel had 24 and mills had 23.

Mr. YATES. That all appears on page 35 of the justification?
Mr. BARRETT. Yes, sir.
Mr. YATES. Thank you.
Mr. Murtha?

PROGRAM EXPANSION

Mr. MURTHA. We were talking about examples of program expansion. How much do you think it would cost in order to administer your projected increased program—can you tell yet before you have gotten the energy bill over from the administration?

Mr. BARRETT. You are talking about——

Mr. MURTHA. We are going to have increased mines and increased dependence on coal. So what do you project in the future? We have had a 40 percent increase in the last several years. What do you project in the future?

Mr. BARRETT. Well, we would have to project accordingly because the numbers of miners and the number of mines are in direct relationship to the numbers of people that we need to inspect those operations.

Mr. MURTHA. The next question—give me a 5-year plan. What do you expect to happen in the next 5 years?

Mr. BARRETT. Metal-nonmetal we are projecting about a 3-percent-per-year growth in the industry. So, we would need 3 percent at least for our inspection programs. Coal, we are talking about doubling production. If that production comes from surface mines, it will take much lesser numbers than it does from underground mines.

I think the President has said that he is looking to Appalachian coals. Now, if you go to Appalachian coals, and double the production from Appalachia, we are going to have to have an increase of about 50 percent. If we talk about Western coals, large tonnages from large pits, we are talking a lesser number of people.

We also have technical supportive activities in education and training groups that grow accordingly. We have asked for some people for ground control and ventilation, because they are a primary problem in the underground mining scene.

We are projecting more people in the health aspect. We have these figures projected, if you would like them. We can send them over.

Mr. YATES. Put them in the record.

Mr. BARRETT. The only thing is, if we come back you might hold us to them.

Mr. YATES. We probably will.

Mr. BARRETT. Then we may have to go a little higher than what we are saying here.

[The information follows:]

HEALTH PROGRAMS

DUST CONTROL PROGRAM

In fiscal year 1978 MESA is requesting an increase of $900,000 and 45 positions to implement a new dust control program. We have revised our old program to incorporate the knowledge and experience we have gained over the last 6 years. The increase requested in fiscal year 1978 will allow this program to operate at approximately 50 percent. Over the next several years we would hope to expand this program to its full extent in an effort to provide working condi-

tions sufficiently free of respirable dust to prevent any disability from black lung.

COMPREHENSIVE HEALTH PROGRAM

In the metal and nonmetal program we have instituted a comprehensive health program to provide greater health inspections at those operations most likely to be in violation of established health standards. The increase requested in fiscal year 1978 will allow us to cover approximately 1,000 of 4,000 targeted operations. In the next several years we would like to expand this program to the 4,000 operations to provide the metal/nonmetal workers a reasonable protection against occupational illness and disease.

Incidentally, our people have projected the last 4 or 5 years the numbers of new mine openings, about 2 or 3 years ahead. We have been within 25 in each case, which is pretty good.

HEALTH PROGRAM

We also would like to expand our health programs.

We are starting to make an impact I think in the fatalities that we have, which is quite obvious. I can tell you at any given time, I can tell you right now, the number of fatalities that have occurred up until the moment that have been reported to us. This is not a problem. But, how many people are dying from health impairments, how many people have—for example, working in a stoke, with four of five jackhammers going, how many people have suffered ear impairment that has caused them to be involved in an automobile accident or an accident where they could not hear what was going on?

How many people are dying from silicosis, asbestosis, pneumoconiosis? There are things that we cannot get a handle on. I have seen some figures and projections ——

Mr. MURTHA. Let me add, we are doing very little research in that area. It is costing the Government tremendous amounts of money, particularly in pneumoconiosis, and we don't seem to be doing enough.

I would like to see a proposal before this committee so we could get some universities involved in research to eradicate black lung in particular, and the other diseases in nonmetal and metal mining.

Mr. BARRETT. That is probably going to be the next step, the red lung, the white lung. You go with black lung.

Mr. YATES. What is red lung?

Mr. BARRETT. Coke ovens and blast furnaces.

Mr. YATES. What is white lung?

Mr. MURTHA. Garment factories.

Mr. BARRETT. In our proposals, we have asked in the metal-nonmetal side for more people and more dollars to expand our programs in the health aspect. You are familiar with the Rockville, Md., incident not too long ago. We are finding that those conditions can exist in other quarries.

So, we have accelerated our health inspection programs.

Mr. MURTHA. What kind of acceleration?

Mr. BARRETT. We are doing more inspections and getting a better handle on the types of dust that are being emanated at different operations. I am not a geologist by trade. but I understand that the rock at Rockville that either overlies or underlies—that type of rock is predominant in other areas. We just have not had it called to our attention yet.

We are now involved in a program with NIOSH, and the Bureau of Mines, on a very extensive research program as to the effects of diesels, for example, the compounding of the lung problems—when you have diesels working in very dusty locations, metal and nonmetal mines. We are expanding that over into the coal side, so that we can get a handle on whether or not diesels do enhance the possibility of contracting black lung because of the adherence of the particles on the dust.

ADDITIONAL RESEARCH FUNDING

Mr. MURTHA. What I am asking is, can you use any more money in the research field to work toward the elimination and prevention of any of these diseases?

Mr. BARRETT. We don't have research programs or research money. I would think in research programs that there could be additional dollars well spent.

Mr. MURTHA. Who has the research programs in this field?

Mr. BARRETT. The Bureau of Mines is responsible for the health and safety research funds, and NIOSH.

AREAS OF POSSIBLE REDUCTIONS

Mr. MURTHA. Are there any areas in your program where you feel significant reductions can be made to offset additional costs?

Mr. BARRETT. We are trying to become more efficient with our computer. We are trying to computerize some of our information systems. We have computerized our assessment program. We are moving our dust program into the computer, computerizing it, and we have asked for money to computerize our management information systems.

We are not asking for people. We would like to get these systems on a computer so we can have almost instantaneous response to questions in this area.

ACCIDENT PREVENTION IN METAL/NONMETAL MINES

We have asked for funds to expand our accident prevention program. We are charged in the Metal and Nonmetal Act to inspect each underground mine once per year. In the accident prevention program for the metal-nonmetal, we found that 50 percent of our accidents occur——

Mr. SHEPICH. Fifty percent of the disabling injuries occurred in 150 mines. One of the proposals in this budget request for metal and nonmetal is to expand our special accident prevention program that will allow us to focus more attention on those mines that have the majority of the accidents and injuries.

We think this not only will be effective in accident reduction, but it will be a cost-effective program. We have had a very small pilot effort in this, and we are asking for funds to expand this effort.

Mr. MURTHA. Fifty percent of the accidents happen in 150 mines, metal and nonmetal?

Mr. SHEPICH. Yes, sir.

Mr. MURTHA. Out of how many mines?

Mr. SHEPICH. Roughly 15,000 mines operating at any one given time in a year.

Mr. BARRETT. That is a lot of mines.

Mr. MURTHA. That is a lot of accidents in a few mines, and a very few accidents in a lot of mines.

Mr. BARRETT. Yes, sir, we are selecting those particular mines, and putting a lot of our resources into those mines.

Mr. MURTHA. That makes sense.

COAL INSPECTION REQUIREMENTS

Mr. BARRETT. We can do that in the metal-nonmetal side. But in coal we are pretty much bound to a very rigid inspection system. Four inspections per year of every underground mine. Certain mines have to be inspected each week. That is mandated in the law.

Mr. MURTHA. Do you have enough people to provide this type of coverage for the coal mines, for instance?

Mr. BARRETT. Yes, we can make all our underground inspections.

As a matter of policy, we have established three inspections per year in strip mines. We don't make all those. We don't make three per our policy. But we do make at least one, and sometimes three, depending on the size of the operation.

COORDINATION WITH STATE OFFICIALS

Mr. MURTHA. What about coordination with the State officials?

Mr. BARRETT. Well, we have a fairly good relationship overall. With some States we have very good relationships. In others it can be a little frustrating at times—but nothing that we have not worked out yet.

Mr. MCDADE. Would you yield?

STATE SAFETY LAWS

How many of the States that are coal producers have their own mine safety laws?

Mr. BARRETT. Nearly every State in the country does have some kind of inspection program.

Mr. MCDADE. Which ones do not have any?

Mr. BARRETT. Arizona has coal, but they don't inspect coal mines. They inspect just metal-nonmetal. They have a State plan with us.

Mr. MCDADE. Does Kentucky have coal?

Mr. BARRETT. Yes, sir.

MINE PROFILE SYSTEM

Mr. MCDADE. You used to have a system—you are doing a fine job with a lot of places to cover—what about that hotspot system you used to use? Do you still utilize that? There was a system I recollect where you monitored mines, and you began to have a profile of accidents or injuries that one might conclude would lead to some kind of problem because of lax attention to safety. You used to have a hotspot system.

Mr. BARRETT. We had a hot line, but that was for phone calls. We have a profile rating system, where we rate mines.

Mr. MCDADE. When you get a mine that falls below your general criterion, don't you give it more attention?

Mr. BARRETT. Yes, sir.

Mr. MCDADE. That is what I am trying to focus on.

SPECIAL INSPECTION PROGRAMS

Mr. BARRETT. There are two different programs. One program is that every mine liberating in excess of a million cubic feet of gas we are inspecting once a week. That is one area. Also, if a mine has a fatality, we inspect once a week. As long as they have had a fatality, we inspect once a week on an accelerated inspection program. If they have hazards that we have identified—for example, water impounded in adjacent mines, extreme problems with the roof—we also inspect those mines once a week.

We do that as a matter of policy. We have also identified 150-plus miner mines. That is mines that employ over 150 miners underground, that have higher than the national average frequency rates, we inspect those mines on a daily basis.

That is on the coal side. On the metal-nonmetal side we have identified 40 mines of the 150 we were talking about before that have an incident of frequency.

We try to inspect those mines as often as we can—about once a month. We also utilize education and training personnel in these mines. If they have a particular ground problem, we utilize technical support people, who are experts, on ground control.

So, we do accelerate and pinpoint on mines in the metal-nonmetal side. But recognizing again the difference in the two laws, the coal account requires about two-thirds of all our people. That is, we have about 2,000 people in the coal program, whereas in the metal-nonmetal program we have about 600.

Even though we have many more mines in the metal-nonmetal side than we do in coal, the nature of the two acts more or less dictates a difference in ratio of inspection personnel.

So, the two programs are quite different.

Mr. MCDADE. Yes; if you want to amplify the profile you use to pick out the coal mines for additional inspections in the record, I would be very pleased to have it.

[The information follows:]

MINE PROFILE SYSTEM

The mine profile rating system is utilized to identify problem coal mines. The rating system is based on three major factors: disabling injury frequency rate; record of compliance with mandatory Federal health and safety standards; and the health and safety management system of the mine. This system rates each mine on an individual basis for its performance over the preceding 12 months. The results of this rating are then utilized to make a determination on the several courses of action to be taken, such as the type and frequency of inspections for a particular mine.

Mr. MCDADE. I remember when you instituted that program, it sounded like a very useful tool for you to use.

Mr. BARRETT. We use three criteria: the accident frequency rate, the density of violations, and then the mine safety management program.

MINE CLOSURE ORDERS

Mr. MCDADE. Have you had many occasions where you have to stop an operation? You have the authority to stop an operation, don't you?

Mr. BARRETT. About 5,000 times in coal last year, and metal-nonmetal about the same.

Mr. MCDADE. What was the average duration of the stop order? How long did it last?

Mr. BARRETT. Closures can last anywhere from half an hour, an hour, up to—Scotia has been under closure now for a year. The mine at Evansburg has been down for two weeks.

Mr. MCDADE. Is it your most effective enforcement tool?

Mr. BARRETT. Yes, sir.

Mr. MCDADE. Does it provide for general miner, or operator, or both, compliance with your regulations?

ASSESSMENT SYSTEM

Mr. BARRETT. More so than our current penalty system. The penalty system is horrendous.

Mr. MCDADE. It has been a morass, I guess?

Mr. YATES. What does that mean?

Mr. MCDADE. The assessment of fines.

Mr. YATES. Why is it horrendous?

Mr. BARRETT. Do you have a week?

Mr. YATES. Well——

Mr. BARRETT. We have a couple of areas where we are highly criticized by all concerned, and probably the most criticism comes on the penalty system. The law states in effect every violation that is cited on the coal side—the metal doesn't have this—has to have a penalty associated with it. We cited 138,000 violations last year, which means that there has to be a dollar value attached to each of those 138.000 violations.

We have about 120 people who devote full time to assessment of penalties. If the penalty is too low, that is, say, $100, or whatever, $125, $150 or $200, or $300, there is a question on the part of the operator as to whether or not he wants to comply.

A coal mine, for every minute it is down, it loses $20. So, theoretically for 5 minutes you would have $100.

Now, there is a question, you as an operator, whether you want to comply or whether you want to continue operating. It gets into that kind of thing. Anyway, as a result, if we make the penalties too low, the operators will pay them. Incidentally, you are helping to pay by that fuel adjustment clause that is on your electric bill which is fired by coal for the most part.

Mr. YATES. You mean it is a passthrough?

Mr. BARRETT. Yes. It can be passed on to the consumer.

Mr. YATES. Why shouldn't they just pay it, then?

Mr. BARRETT. That is what I am saying. Our collections have gone up considerably since the coal industry has become so lucrative.

PASS-ON OF PENALTIES

Let me qualify that. In other words, they don't pass the cost on directly. It is through the cost of operation, and is passed on in that manner. It becomes a cost of doing business. Anyway, if you make

the penalty low, they will pay. It's a part of the cost of operating. If you make it extremely high there are numerous judicial steps and appeals they can go through. We have had some cases go to the Supreme Court. This is the right of the operators and the right of individuals or companies to go through this system. We have literally thousands of penalty cases somewhere in the judicial system that are being appealed. I believe in one of the areas there is a backlog of some 5,000 cases.

CLOSURE ORDERS

Mr. MURTHA. What is the most effective tool you have, and are there any changes we can make in order to give you a better tool to make it safer for the miner?

Mr. BARRETT. The closure order is the ultimate tool. You just say, "You don't do anything until you take care of this situation."

Mr. MURTHA. Are you saying it is not necessary or counterproductive to assess the penalties?

Mr. BARRETT. I won't say that, no. I believe a penalty system is useful, yes.

Mr. MURTHA. If the consumer is paying the penalty in the end, what is the point?

Mr. BARRETT. The point is, for example, there are—that is a good question. I don't know how to answer that really.

COST OF OPERATING VERSUS MARKET PRICE

Mr. BETTENBERG. If I might intersperse a comment here. Many coal mines are fairly profitable operations and sell their coal at market prices. To the extent that they have additional costs caused by penalties in those cases at least the penalty is a part of operations and wouldn't increase the price and does cut into profits.

Mr. MURTHA. You are saying in an unsafe mine where you assess penalties they still have to sell at market price and if they are competing with somebody else who doesn't have penalties, actually the company you assessed penalties is bearing the burden?

Mr. BETTENBERG. Yes; however, if you get into a long-term contract for the sale of coal that may be related directly to the cost of mining the coal, then it does get passed along.

INCREASED IMPACT ON THE INDUSTRY

Mr. BARRETT. I think ultimately a real impact on the industry lies through education and training programs and accident prevention programs. These are the things we are trying to do. If you look at our education and training effort you will find we are trying to integrate accident prevention with our inspection programs to make our people safety conscious rather than cops on the job. The policeman philosophy is great, it is a great thing to have a 2 by 4 but that doesn't always work. I think by training our inspectors to be able to relate to the miner is the right approach, hazard analysis, job safety looking more toward preventing accidents rather than going around citing hazards.

The thing that disturbs me is the fact that we cited more violations last year than ever in history. That could indicate a couple of things: One, our people are better able to identify violations or there are in fact more violations occurring.

If there are more violations occurring, then we are not getting our message across.

Mr. MURTHA. Is it safer in the mines today than 10 years ago?

Mr. BARRETT. I think so.

Mr. MURTHA. Then you are getting your message across. Because that is the bottom line.

Mr. BARRETT. That is the bottom line. But we are still not satisfied with what we have. We won't be satisfied until we get below the national frequency. We still have one of the highest frequency rates in any industry, and that bothers me.

ROOF FALL FATALITIES

Mr. MCDADE. Just directing your attention to page 20, it had always been an unfortunate generalization that roof falls cause most of the injuries in the mines. You can see a nice decline in those injuries, fatalities, in 1976. Is that because of the new technology that is being employed?

Mr. BARRET. Yes, sir. If you go back a little further, we had 84 fatalities in 1970 and 61 in 1971, 51 in 1972, 45 in 1973, and then we pick it up here with 49.

CABS AND CANOPIES

We attribute much of the decrease to the use of cabs and canopies. We had a lot of problems selling this program to the industry. Every piece of face equipment has to have some kind of a canopy to protect the miner. Forty lives saved were recorded last year, people who were in a position where they would have been killed had they not been under a canopy.

Mr. MCDADE. This is still the No. 1 cause of fatalities in the industry?

Mr. BARRETT. It still is.

Mr. MCDADE. You have really reduced the number. It looks as though you are making a lot of progress. It is primarily canopy. What about the bolting system?

ROOF BOLTING SYSTEMS

Mr. BARRETT. Another thing that I think that was contributory was the use of resin grouted bolts. This has recently come on the market. Mines that are being mined today could not have been 15 years ago.

Mr. MCDADE. What does it do?

Mr. BARRETT. Rather than have a mechanical device where you bind layers of rock together using an expansion-type affair, you use resin cartridges. These are just what they are—resin.

Mr. SCHLICK. It spikes it together.

Mr. MCDADE. Who developed the technology?

Mr. BARRETT. The technology has been around for a long time but it has been recently developed by Dupont.

Mr. SCHLICK. It has been around for a long time. The past problem was that it took a long time to do it. The innovation has come in having chemical materials with a quick setup time which allow the bolt in and not wait a long time for setup. This is where the advantage came in where it could be used in the mining cycle.

Mr. MCDADE. So you have a canopied system and a new bolting system protecting miners from falls. Is there anything else?

Mr. BARRETT. We have required a narrowing of workplaces. I can show you areas that have been mined that are 50 or 60 feet wide. We have required a cutdown on the width of entries.

Mr. MCDADE. What do you average now?

Mr. BARRETT. Most of the continuous mining units cut about 20 feet wide.

Mr. MCDADE. Is that the maximum tolerance?

Mr. BARRETT. We will allow some in what we call rooms, where they widen out and take the pillars out. We are doing a better job of approving roof control plans. Each mine operator has to have his own roof control plan, and we are holding them to it.

Mr. MCDADE. Is there anything else we should have in the record with respect to your efforts in roof falls? If there is, we would appreciate it.

[The information follows:]

EFFORTS TO CONTROL ROOF FALLS

The Mning Enforcement and Safety Administration has been and is making a concerted effort to prevent injuries and fatalities due to roof falls in underground mines. One primary example is work done on resin grouted bolts, a relatively new type of roof support. Although the manufacturers—Celtite, Dupont—worked out the chemical and manufacturing problems involved, MESA personnel played a major role in expediting its use by assisting the manufacturers and mine operators in adapting the system to the mining cycle and demonstrating its effectiveness. As a result, resin grouted bolts have not only improved roof conditions in existing mines, they have also made it possible to safely mine some coalbeds that were abandoned in prior years because of inability to control the roof. Latest estimates indicate that approximately 20 million of these bolts are being installed every year.

One of the major improvements in underground mine safety in many years has been the utilization of cabs and canopies on electric face equipment to protect the operators from falls of roof, face and rib. Regulations requiring these structures were promulgated by MESA in October 1972 (30 CFR 75.1710–1) and the first canopies or cabs were required to be installed by January 1, 1974. MESA again played the major role in assisting the industry in developing the necessary technology to comply with these regulations, and the potential benefits foreseen are now being realized. Documented records indicate that during the past 3 years (1974–1976), at least 111 miners have been saved from death or serious injury because they were protected by cabs or canopies when involved in a roof fall.

One of the most hazardous jobs in underground coal mines is that of setting temporary roof supports after the coal is removed. MESA has been working very closely with mine operators and manufacturers in developing the technology necessary to automate these supports so they can be set remotely from under permanent support (roof bolts). The ultimate goal is to eliminate the need for anyone to go under an unsupported roof for any reason. At present, at least five manufacturers offer these automated temporary support structures on some of their roof bolting machines. Also, several mine operators have incorporated their own designs with MESA assistance.

Mr. YATES. We will vote and be right back.

[Short recess.]

Coal Mine Inspections

ASSESSMENT OF VIOLATIONS

Mr. Murtha. On page 11 of your justifications, under Assessments, you say that approximately 140,000 violations will be reviewed and assessed in 1978. How many violations were reviewed and assessed in fiscal year 1976? How many have been reviewed and assessed in fiscal year 1977 to date?

Mr. Barrett. We had 137,000 in 1976. That is round figures. As of the moment—Mack, could you give us a rundown? How many have we assessed so far this year? Calendar year?

Mr. Murtha. Fiscal year.

Mr. Barrett. I don't have it broken down on fiscal year.

Mr. Murtha. Get it for the record, if you can.

[The information follows:]

Violations reviewed and assessed

Violation notices assessed:	
Fiscal year 1976	120,000
Fiscal year 1977 to date, (Mar. 2, 1977)	[1] 51,822
Fiscal year 1977 estimate	140,000

[1] The Office of Assessments converted to an automated assessment function during the first 3 months of fiscal year 1977. All of the assessed violations have not yet been processed and served upon the coal mine operators. This function should be current within the next 3 months.

ASSESSMENT CONFERENCE PROCEDURES

Mr. Murtha. In addition, before miners or operators are assessed penalties, they are provided with an opportunity to confer with assessment officials for the purpose of reviewing the proposed assessments. How many assessment officials are there and how does this conference take place?

Mr. Barrett. We have assessment offices at four locations: Uniontown; Charleston; Tri-Cities area; and Lexington. We assess all of the penalties at Wilkes-Barre. We go back to the field offices for conferences with the operators. You have to remember the violation is cited by our people, and we have a one-sided opinion when we assess the violation. So we have the operator bring forth his case. If he has a good case, we can amend or change the penalty accordingly.

Most of the cases we have are worked out at that level, that is, the ones that are paid without going through the judicial system. We are collecting I believe about 85 percent of the total assessed penalties at that level.

COMPUTERIZATION OF THE HEALTH PROGRAM

Mr. Murtha. You are requesting an increase of $600,000 for computerization of the health programs. Basically this proposal will provide for establishment of a new information system with particular emphasis on data entry and retrieval. This new system is alleged to save time in that the analyses will be made much faster and results of examinations will be known much sooner. How many employees are now involved in data entry and retrieval with the current system?

Mr. Barrett. We are talking about our ADP system, computerization of the dust program. How many people do we have in that shop now?

Mr. LOCKWOOD. I believe we are talking about computerization of the new system. We have several clerks in each field office that are doing that manually. It is not computerized, and we are trying to shift over to the automated system.

Mr. MURTHA. So you are saying in data entry you have two employees in each of the coal districts gathering the data, right?

Mr. LOCKWOOD. Probably more than two. Two to five in each coal district, who are entering that data into a manual file.

Mr. MURTHA. How many will you need when the system is actually established?

Mr. LOCKWOOD. We will be using some of those same people and I believe the requests——

Mr. BARRETT. We are not asking for any more positions.

Mr. MURTHA. When will the savings resulting from the efficiency of the new system be realized?

Mr. BARRETT. As soon as we get all the data into the system we should be able to retrieve it in the matter of time it takes to clear the computer. After the Scotia disaster we had requests from congressional committees, and from the press for information as to the numbers of violations that were cited at Scotia, the types of violations, how many violations had not been at that moment abated, specific information of that type.

We have all that information available to us, but each mine has a file, almost a complete drawer file. When you consider the Scotia mine, we cited over 1,000 violations. Each one is in that file manually filed, manually retrieved, and it just takes an awful lot of effort to go through one of these files on a particular mine operation.

If you were to call for some information, how many violations were cited for 1967, 5,301, we can get that for you. It will take a little time. If someone called and asked how many citations for violation, 7,400, that takes, again, some retrieval time. What we are saying now, if we can get all that information into our computer which we have available to us, we can query that computer and just in a matter of seconds get information as current as we have it in the computer. We are required to keep these records. At one time we kept them for 3 years and later for 5 years. Now because of the penalty assessment program, the fact we billed from past history, we almost have to keep all the citations back to time zero. These files just keep growing. We try to get rid of that.

USE OF TERMINALS

Mr. MURTHA. How many terminals will you have in the direct data system?

Mr. BARRETT. Ultimately we would like to have a terminal in each of our district offices and some of the larger subdistricts. We have 10 coal districts, 26 subdistricts. We are talking in the neighborhood of 15 to 18 terminals.

Mr. MURTHA. On page 14 you indicate that $444,000 is for equipment, terminals and line charges. Will you purchase this equipment or lease it?

Mr. LOCKWOOD. That depends on the price and the competition at the time. We will have to make a determination then. That is one of the requirements of those acquisitions.

MANAGEMENT INFORMATION SYSTEMS

Mr. MURTHA. You are requesting an additional $500,000 for a management information system. On page 14 of the justifications you indicate the purpose of this request is to develop and implement procedures to convert existing nonautomated information systems to a computerized system. You identify four sets of documentation related to coal mine health and safety enforcement effort.

For the record, identify the workload associated with each of these sets of documentation and the manpower associated with each set. The manpower should be broken down in terms of data entry, data processing, data retrieval, and data analysis.

In total, how many employees are now involved in stacking and maintaining these files?

Mr. BARRETT. We will furnish that as part of this total package.

Mr. MURTHA. Who will do the work? Will the contract be let on a competitive basis? How long after you get the money will they be able to let the contract?

Mr. BARRETT. We will put that all together in the same package.

[The information follows:]

MANUAL INFORMATION SYSTEM

The workload associated with all four sets of documentation is tied directly to the number of inspections made during a year. In 1976 there were 46,737 underground inspection events and 18,357 surface inspections. Each of these actions results in notices and orders which are recorded into the manual system. Preliminary figures for 1976 show 137,605 notices and 6,005 orders issued.

It is rather difficult to present the manpower associated with each set of documentation since they are subsets of the overall system where one employee could work on more than one and possibly all four sets. The total number of employees involved in establishing and maintaining this file is 66 at 18 different recording locations. The manpower associated with this documentation in terms of data entry, data processing, data retrieval, and data analysis, presented in percentages, is as follows:

	Percent
Data entry	23
Data processing	34
Data retrieval	27
Data analysis	16

The work requested will be contracted on a competitive basis in accordance with Government regulations. It is presently projected that the contract could be let in 120 to 180 days from enactment of the appropriation.

DUST CONTROL PROGRAM

Mr. MURTHA. You are requesting an additional $900,000 and 45 positions for improvement in the dust control program. This new dust control program is being developed based on experience gained in the last 6 years. How effective is the old program?

Mr. BARRETT. The old program is the one I was talking about earlier where we have the samplers on each individual miner. We are trying to get them off the miner using the plan and also in the high-risk area.

Mr. MURTHA. What assurance do you have under the new system that the mine operator will not circumvent it?

Mr. BARRETT. It lessens the numbers of samples and therefore I think we should get better quality samples from the operators. As

I say, we collect in the neighborhood of one-half million samples a year. If we can cut that down by one-half, our inspectors will have a better handle on the dust collection program and should have a better quality program. You won't get the numbers maybe, but we should have quality.

Mr. MURTHA. These samples will be taken by qualified people. What does that mean?

Mr. BARRETT. They are operating people.

Mr. MURTHA. They will be operators, employees? Who presently takes the samples?

Mr. BARRETT. The employees themselves, but they are not being monitored continuously. But there are two programs. We have a program and the operator has a program. The operator collects samples at certain times on certain people. Then we follow up with a sampling program to see if there is a correlation between the operator's program and what we get.

Mr. MURTHA. What does he do with his samples?

Mr. BARRETT. It is a very complicated process. The miner is given his cassette at the beginning of his shift. It is operated for 8 hours. At the end of the shift the operator fills in the section sampled, the miner's social security number, and the tonnage. The initial weight of the cassette has been predetermined when it was manufactured at the plant. That cassette is put into a box which is shipped to Pittsburgh. It is weighed there, the weight again is noted.

Mr. MURTHA. When you say sent to Pittsburgh; to whom is it sent?

Mr. BARRETT. MESA. It is weighed on a balance to the nearest 1/100th of a milligram. The difference is noted.

Mr. MURTHA. Is there a qualified person at the collection point to monitor?

Mr. BARRETT. Yes, sir.

Mr. MURTHA. They have trained individuals collecting the samples and forwarding them to you?

Mr. BARRETT. Yes, sir.

MANIPULATION OF SAMPLES

Mr. MURTHA. Can there be a manipulation of the samples at that point?

Mr. BARRETT. There could be, but the miner has to sign the card at the end of the shift. If he signs yes, I wore this sample during the 8-hour shift, that pretty much ties it down. There can be some manipulation or fudging, sure. The sample is then weighed in Pittsburgh, the conversion takes place, that information is transmitted to our computer in Denver, and the samples are banked. We don't issue notices on one sample. There has to be a collection of 10 samples. If the total dust is 10 milligrams per cubic meter on 10 samples, we issue a citation.

Mr. MURTHA. As I understand it, a major benefit of the new system, using the data processing techniques discussed earlier, is that the samples will be sent to the MESA field office instead of through the MESA central laboratory.

Mr. BARRETT. Right. Some of those samples can be weighed at the field office location.

Mr. MURTHA. This will speed up the analysis process?

Mr. BARRETT. That is correct.

Mr. MURTHA. Instead of 20 days it will be 2 days?

Mr. BARRETT. Correct. A timelag exists in that the sample sent to Pittsburgh can take several days in the mail, they are processed, and then sent to Denver and then of course the mail process and the weighing process——

Mr. MURTHA. When do you anticipate this changeover will occur?

Mr. BARRETT. As soon as we get the money and the people.

SPECIAL INSPECTIONS

Mr. MURTHA. On page 17 your justifications indicate that the new program provides for special inspections during which five full-shift samples are taken, instead of the single part-shift samples which were taken during regular inspections under the old program. What verification do you have that this new sampling technique is valid?

Mr. BARRETT. We have already done this. This is what I talked about before. We have taken these samples. The key again is the dust control plan. We verified through our inspector the viability of collecting samples like this as injected into the plan as well as the sample location.

Mr. SCHLICK. Mr. Yates brought up the fact that the miners when we started this program several years ago would try to get out of this situation, not wearing the samples. It is just getting too heavy now. What we are saying is, let's look at this and take the sample off the fellow and start to get some engineering parameters. We started to do that. About that time we were under a GAO audit, and they also said that is a great idea. We went out and tried this all around the procedure. We are confident in our own mind as administrators of the law that we can do this without any diminution of health to the miners.

ADDITIONAL VEHICLES

Mr. MURTHA. Part of the cost of this increase is $180,000 for purchase and operation and maintenance of additional vehicles. How many vehicles are involved in this procedure?

Mr. LOCKWOOD. Forty-five.

Mr. MURTHA. Why does this increase require additional vehicles?

Mr. BARRETT. When we get additional people we also need additional transportation for them. Since the GSA motor pools cannot provide additional vehicles we must purchase them.

Mr. MURTHA. You need additional inspectors to monitor this program and those inspectors need vehicles?

Mr. BARRETT. That is correct.

Mr. MURTHA. What will be the cost in 1979 for the annualization of these 45 inspectors?

Mr. LOCKWOOD. About a third more than the request, Congressman.

ANNUALIZATION COSTS

Mr. MURTHA. Under the item "Annualization costs' you indicate that $647,000 is requested to provide for promotions and within-grade raises of the inspection force. How much is for promotion and how much is for within-grade promotions?

Mr. LOCKWOOD. We will have to break that down and supply it for the record.

[The information follows:]

Promotions and within-grade raise

Cost of promotions	$360,000
Cost of within grade	287,000
Total	647,000

ABSORPTION THROUGH IMPROVED EFFICIENCY

Mr. MURTHA. Why can't promotions be absorbed as a result of improved efficiency?

Mr. LOCKWOOD. We hire our inspectors at the GS–9 level.

Bob, you may want to speak to that specifically, but, the journeyman level is GS–12. So there is a natural progression from GS–9 to GS–12 that we must allow for in funding our inspector program.

Mr. BARRETT. We hire people at the GS–9 level. We put them through an accelerated program. After the first year if they perform satisfactorily they go to GS–11. Then they are interim career conditional types. After that second year they become GS–12's. This is an increase of approximately $3,000 to $4,000 per man per year as they progress through the system.

Mr. SHEPICH. We are always striving for improved effectiveness of our inspector. Through our education and training programs we work toward that improved efficiency. But as long as we still have problems in health and safety, we would put those efficiencies to work toward that problem.

Mr. MURTHA. Do most of these inspectors have a college education?

Mr. BARRETT. No, sir, they do not.

Mr. MURTHA. Do most of them have coal mine training?

Mr. BARRETT. Yes; they all do.

Mr. MURTHA. Is this a requirement?

Mr. BARRETT. Yes; 5 years of experience showing some progression within their career is required by the act.

AVERAGE SALARY OF INSPECTORS

Mr. MURTHA. What is the average salary of the inspector out in the field?

Mr. BARRETT. Just recently we got a breakthrough with the Civil Service Commission. We had brought new inspectors in as GS–9, step 1. We had difficulty in attracting people because the average coal miner was making much more.

As a result we got clearance from the Commission to bring them in at a step 7 of the GS–9, which make it a little more attractive.

Once we get the man aboard, the GS–12 is comparable to the industry salaries for section foreman, assistant foreman, and some mine foremen, but the entrance has been so low that we had problems attracting well-qualified individuals. Also, correspondingly, we have increased the GS–11 step, but ultimately when they become a journeyman inspector at the GS–12 level they are at the first step. We have made it a little more attractive.

INSPECTOR ATTRITION

Mr. MURTHA. What was the planned attrition for your inspection force and what was the actual attrition?

Mr. BARRETT. That has been varying over the last several years. Do you want current attrition?

Mr. MURTHA. Yes.

Mr. BARRETT. We talked about that yesterday. It is rather low right now because the industry has gone soft. But as soon as the industry picks up—we have had up to 9 percent in 1973.

Mr. LOCKWOOD. Our latest figures look about 7 percent.

Mr. MURTHA. What was your planned attrition?

Mr. LOCKWOOD. Nine. It is lower than that.

Mr. MURTHA. Do you have a dollar difference resulting from your planned and actual attrition? Provide it for us for the record.

[The information follows:]

Planned versus actual attrition

	Amount
Estimated fiscal year 1976 personnel costs	$51,482,000
Actual fiscal year 1976 personnel costs	52,869,000
Attrition	—1,387,000

MINE PROFILE RATING SYSTEM

Mr. MURTHA. On page 21 of your justifications you discuss the successful study to develop a mine profile rating system. You describe this as a tool to better manage coal mine health and safety inspection programs. You indicate that refinement and expansion of this tool is proposed during fiscal year 1978.

What refinement and expansion do you propose?

Mr. BARRETT. We have audited all the mines that have over 100 people underground. We are going to continue that audit to include all mines. Right now the criterion we have whereby we accelerate the inspection rate is based on the disabling accident frequency rate. That is the only criterion we have, plus the number of people in the mine. We feel that is not enough information and the parameters aren't broad enough to include all the mines that should be in that program.

We have pulled out the 150-plus mines that have an injury frequency rate higher than the national average. We have found that is not enough criteria. We have found some mines that have a lesser number of accidents or a lesser frequency rate also have high potential for a disaster, for example.

You can fudge on the reporting. We made a concerted effort to get everybody to report all accidents that occur, but the potential exists for disaster-type accidents in mines that have less than the average frequency rate.

Mr. MURTHA. You say you can fudge on the miner accidents. You can't fudge on the time-lost accidents and fatalities.

Mr. BARRETT. You can even in lost time if you so desire.

Mr. MURTHA. In other words if they put the people in there and pay them and actually don't work them?

EXPANSION OF CRITERIA FOR MINE PROFILE SYSTEM

Mr. BARRETT. Right. The only criterion we are using is the disabling accident frequency rate. We are expanding that to include the violation density, the number of violations the mine has had. Part of this was from the Scotia experience in that they had a very low-frequency rate, something like an 8; the national average was 41, but they had a high violation density rate. So under our old system we would——

Mr. MURTHA. I don't understand that. Would you explain to me. I don't understand what the situation was in the Scotia mine.

Mr. BARRETT. Their accident frequency rate was less than 40, and 40 was the national average at that particular time. It was about 8 or 12. So we would not have gone into that mine under our accelerated inspection program because they didn't meet the requirements, the single criterion we had been using. We have expanded that criterion to include the violations per inspection.

Mr. MURTHA. So you are saying although they didn't have the accidents, the inspectors noted a number of violations. But you didn't take the violations into consideration and you will do that now?

Mr. BARRETT. Yes, sir.

Mr. MURTHA. What will this new modification cost?

Mr. BARRETT. This is just a change in our current program. We are just identifying different areas. There is a cost but it is back through the management information system we talked about a little bit ago. We should have the material that we need for the mine profile rating system in the computer so that we can query the computer prior to an inspection.

WINTER ALERT PROGRAMS

Mr. MURTHA. Discuss the winter alert program which you mention on page 21.

Mr. BARRETT. The winter alert is something that was started several years ago.

Winter is the season when most explosions occur because of the drying out of the mines and the barometric changes, temperature changes, and the drying out of the mine surfaces. A number of things occur during the winter that causes a mine to be more hazardous generally. What we do is curtail our vacations for inspectors. We put men into the mines on a more accelerated rate, in the mines that are more gassy. We also watch the barometers in our offices and if there is a sudden drop in barometric pressure or temperature changes, we notify the mine operators and they in turn keep very close watch on their fans, monitor their gasses, monitor their bleeders.

Mr. MURTHA. In how many mines do you practice this?

Mr. BARRETT. These are the extremely gassy mines.

Mr. MURTHA. How many of them are in the system?

Mr. BARRETT. I think a little over 1 million.

Mr. YATES. What does that mean?

Mr. BARRETT. A million cubic feet of gas during a 24-hour period.

Mr. MURTHA. How many of them in Pennsylvania?

Mr. BARRETT. All of them.

Mr. MURTHA. How about in Appalachia?

Mr. BARRETT. I think we have about 360 that we consider as extremely gassy underground mines.

CAPTURING METHANE GAS

Mr. YATES. Has there been any attempt to capture the methane gas that is in all these mines?

Mr. BARRETT. There has been some in the past, yes. One of the most successful projects is the one known as Eastern Associated, at Federal No. 2, where they have drilled a large diameter hole into the coal seam and then bored holes into the coal bed itself. They are capturing a large amount of gas. I don't know the exact amount—600,000 cubic feet a day—and it is in the pipeline.

Mr. YATES. Does this gas keep regenerating?

Mr. BARRETT. It keeps coming out from the seam. What is happening, the gas keeps coming out further and further in the coal.

Mr. MURTHA. The cost is about $3 an MCF isn't that the problem?

Mr. BARRETT. The cost, of course, was boring the hole, but now the gas is free.

Mr. MURTHA. They have a number of systems that they are trying to develop in western Pennsylvania. Mr. Duncan is involved in one and the end result is $3 gas versus current prices. The price is really the thing. Until natural gas gets up to $3 they can't sell it.

Mr. YATES. Why is it so expensive?

Mr. MURTHA. The procedure in capturing it, I guess.

Mr. BARRETT. There is a question also as to who owns the gas rights. I can give you an example up in your district, Mr. Murtha, where they bored a hole into a mine and put a pump on the hole.

The pump was operated by the gas that was coming out of the hole, perpetual motion. Then the gas company wanted to charge the coal company for the gas coming out of their mine, so the company just shut it off.

Mr. BETTENBERG. The Bureau of Mines has a research program on that particular area. I don't recall the exact amount that is involved, but they are working with a number of mines in demonstration projects and research and so forth.

Mr. YATES. Let us stop now and come back at 1:30.

AFTERNOON SESSION

IMPACT INSPECTIONS

Mr. YATES. On page 23 of the justification you talk about the impact inspection program, and you say there have been 452 inspections. What has been the result of the inspections? What have they shown you?

Mr. BARTLETT. We made 452 as of the 1st of January. We have made 54 since then.

We are finding that we are issuing more violations per inspection. Over the period of a year we average about 1.1 violations per inspection day. During the impact inspections, we have been averaging about 20 citations per inspection, and at least one closure order. In other words, we have closed a sector of a mine or the total mine, during each of these impact inspections.

Again, the impact inspections were a result of some things that we have been concerned about, in that the operators have the opportunity to prepare ahead of our inspector. So, with this inspection technique, we just flood the mine with inspectors, depending on the size of the mine, and make an inspection at one particular period of time, or one particular day or shift.

Mr. YATES. Would you place in the record the number of violations you have discovered as a result of utilizing this procedure?

Mr. BARRETT. Yes, sir.

Mr. YATES. And also the number of violations which occurred during the 12-month period prior to implementation of this new technique? Can you do that?

[The information follows:]

IMPACT INSPECTIONS

As of March 4, 1977, there has been 523 impact inspections with 10,133 notices issued and 519 closure orders issued.

For the 12-month period prior to implementation of the impact inspections, there were 116,476 notices issued and 5,999 closure orders issued.

Mr. BARRETT. The number of citations last year, we made 452 impact inspections, 8,890 citations, 462 closure orders. Totally, we issued 137,000 citations in all our programs.

Mr. YATES. For the year?

Mr. BARRETT. Yes, sir.

Mr. YATES. That doesn't separate the impact program from your regular inspection program?

Mr. BARRETT. No; this is in addition to.

Mr. YATES. We were interested in seeing how many were derived from the impact program.

Mr. BARRETT. But we would count those in the total number of inspections.

Mr. YATES. All right.

STATE GRANT PROGRAM

You don't want any increase in the State grant program. Is there a reason for that? How many States participate in the program now?

Mr. BARRETT. There are currently 16 States participating.

Mr. YATES. Should there be more?

Mr. BARRETT. I believe there are about 32 coal-producing States. The major producers are in the State grant program. They have submitted budgets totaling $4 million. We have $2.5 million in the program. We can utilize the $2.5 million very easily.

Mr. YATES. You talk about the accomplishments for Kentucky, West Virginia, Alabama, and Pennsylvania. Why do you talk about only four States?

Mr. BARRETT. Those are the States that get the majority of the State grant funds. Kentucky gets $919,000, Pennsylvania $212,000, West Virginia $154,000, and Alabama requested $229,000.

Mr. YATES. Has any other State submitted applications for the program?

Mr. BARRETT. You mean recently?

Mr. YATES. Within the last fiscal year.

Mr. BARRETT. The latest grant we made was to Idaho.

Mr. YATES. Why do you smile? You mean there are no coal mines in Idaho?

Mr. BARRETT. Yes; there are some mines in Idaho.

Mr. YATES. What is so funny?

Mr. BARRETT. Our new Secretary is from Idaho?

Mr. YATES. Oh, oh.

Mr. BARRETT. That wasn't—he is not even aware——

Mr. YATES. I assume your grant was made before he was appointed?

Mr. BARRETT. Yes; definitely so. I assure you.

Mr. YATES. OK.

NEW STATE GRANT APPLICATIONS

What is the cost associated with funding the applications? Wait a minute. I don't know that I have gotten an answer to my question. You said there were 16 States under the program. Are there any others that have filed applications than the 16?

Mr. BARRETT. No; these are the 16.

Mr. YATES. Apparently the other coal-producing States are not interested in it.

Mr. BARRETT. Some of them are.

Mr. YATES. Would it cost them money?

Mr. BARRETT. We fund 80 percent of all programs.

Mr. YATES. So they have to come up with 20?

Mr. BARRETT. Yes, sir.

GSA SPACE COSTS

Mr. YATES. You want $137,000 for GSA space costs, and of this amount, $92,000 is to provide for a 6-percent adjustment factor. What is the basis for the 6-percent increase? Have you any idea?

Mr. BARRETT. I defer that question to my budget expert.

Mr. YATES. What is the reason for that?

Mr. WALLER. That was the inflation factor put in by GSA.

Mr. YATES. Is that governmentwide?

Mr. WALLER. Yes; it is.

METAL AND NONMETAL MINE HEALTH AND SAFETY

Mr. YATES. Now, let's turn to the metal and nonmetal mine health and safety. That appears on page 28. The total request for the next fiscal year is $18,590,000. This represents a request for 37 additional positions over the 1977 level, of which 12 positions and $270,000 is made for the metal and nonmetal inspection program. The increase will permit an expansion of a special inspection program for 40 mines, 40 mines which have a total of about 1,700 disabling injuries.

How many mines are presently included in the program?

Mr. BARRETT. That is the special accident prevention program. We are requesting resources to accelerate this program to 40 mines.

Mr. NELSON. We have right around 33 mines.

Mr. YATES. And you have 20 positions?

Mr. NELSON. It is actually 30 at this point.

Mr. YATES. Thirty people?

Mr. NELSON. Thirty mines on the list.

Mr. YATES. And covered by 20 people, right?

Mr. NELSON. Yes, sir.

Mr. YATES. How many injuries have been reported for the mines that are covered?

Mr. SHEPICH. On the top of page 30 is a tabulation of injuries at those mines for fiscal year 1975 compared with fiscal year 1976.

Mr. YATES. 1976 is a lesser number, by 500.

Mr. BARRETT. Right. This program was just a pilot program we started last year.

Mr. YATES. If you now have 20 people covering 30 mines, why do you need 12 additional positions for a coverage of only an additional 10 mines?

Mr. NELSON. Well, sir, as Mr. Barrett pointed out, we have just begun this program, and the reason for the difference in the number is that our plans for this coming year are to give more attention, spend more time in the mines, add more emphasis to it than we did in our pilot program. We think this additional emphasis is going to pay off.

Mr. YATES. Do you feel that the present inspections have not been adequate?

Mr. NELSON. We think that we can improve them by spending more time in the mines. We have information from our management control system that shows that the time spent in the mines does have an impact on the reduction of injuries.

Mr. YATES. OK.

Mr. NELSON. And we want to broaden the program.

Mr. BARRETT. Incidentally, I mentioned before that half the accidents occurred in 150 mines; 40 of those 150 are in this program. That is where we plan to put our emphasis.

Mr. YATES. I see. And the additional 10 mines are going to be in this program, too?

Mr. BARRETT. Yes, sir.

Mr. NELSON. Of the 150, they are the ones that are on the top of the list.

Mr. YATES. You propose to cover all 150 of the mines—of those mines?

Mr. BARRETT. Not in a special program.

Mr. YATES. You are going to cover 40 of them?

Mr. BARRETT. Yes, sir.

Mr. YATES. What happens to the other 110?

Mr. BARRETT. We will inspect those quarterly.

SELECTION PROCESS FOR ACCIDENT PREVENTION PROGRAM

Mr. YATES. How do you go about selecting the 40 out of the 150?

Mr. BARRETT. It is based on the frequency rates at the mine, accident frequency rate.

Mr. YATES. In other words, the mines with the worst safety records get the most inspections?

Mr. BARRETT. That is right.

Mr. YATES. How do you cover the other mines?

Mr. BARRETT. We have a regular inspection procedure. We are mandated again by law to inspect every underground mine. We try to get to every underground mine four times a year. Of the 15,000 around 900 are underground. So, we put our emphasis on the underground operations.

INDUSTRY FREQUENCY RATE

Mr. YATES. I notice from the justifications you want to bring the frequency rate down to the industry average. But, is that a good enough goal? Don't you think you ought to reduce the industry average?

Mr. NELSON. This will.

Mr. YATES. This will reduce it if you can bring it down to the industry average. But, I would think the goal should be reducing the industry average. Of course, the reduction of injuries from the worst offenders is a desirable goal. But, I think we ought to concentrate as well on reducing the industry injury average.

Mr. BARRETT. If we can make an impact on these mines that have an extremely high injury rate, that in turn will bring the all-industry rate down.

Mr. NELSON. And also, Mr. Chairman, our basic inspection program that we are carrying on, in addition to this, has been impacting on the industry, too. We have been bringing them down.

Mr. SHEPICH. I think it would be erroneous to let the record show that we would be satisfied with the current industry average. It is our goal to push the industry average down as far as possible.

Mr. YATES. Good.

Mr. SHEPICH. This is the impact of that special program.

Mr. YATES. Let the record show that. What would it cost you to reduce the present injury average by 50 percent? Have you any idea?

Mr. BARRETT. I don't know costwise.

Mr. YATES. You would have to hire a significant additional number of inspectors?

Mr. BARRETT. Yes, sir.

Mr. YATES. Maybe that is the thing to do. At any rate, let's see how you make out with the new inspectors.

COMPREHENSIVE HEALTH PROGRAM

You want $600,000 and 25 positions to expand comprehensive health inspection. That is almost twice the amount of employees you have now.

Mr. BARRETT. Yes, sir.

Mr. YATES. Are you going to be able to hire that number of employees?

Mr. NELSON. Yes, sir.

Mr. YATES. With difficulty?

Mr. BARRETT. No difficulty.

Mr. YATES. This will permit you to expand the coverage to about 1,000 targeted metal and nonmetal operations.

Mr. NELSON. Yes, sir.

Mr. YATES. You have 24 positions now and how many mines are covered with the 24 people?

Mr. NELSON. 600 mines.

MESA/OSHA TRAINING RELATIONSHIP

Mr. YATES. Is there a relationship with OSHA as far as training of the inspectors is concerned?

Mr. NELSON. No, sir.

Mr. BARRETT. No; we have our own special training program for our inspectorate.

Mr. YATES. Wouldn't it be helpful if you teamed up with OSHA?

Mr. BARRETT. We have agreements with OSHA in certain areas, for example, inspection areas. We would like to attract them down to our academy to better utilize that facility.

Mr. YATES. They could learn there?

Mr. BARRETT. Yes, sir.

Mr. YATES. Rather than the other way around. OK.

ANNUALIZATION COST

You want $450,000 to annualize last year's program increases?

Mr. BARRETT. Yes, sir.

Mr. YATES. You want it for supplies, materials and miscellaneous costs. Why should full-year costs for such items be so much?

Mr. BARRETT. Do we have a breakdown on that?

Mr. LOCKWOOD. Again, it is partial year funding each year, trying to catch up on that, Mr. Chairman.

ATTRITION RATES FOR METAL/NONMETAL

Mr. YATES. You want $550,000 to maintain the current authorized staff. What is your expected attrition rate for the 127 inspectors?

Mr. BARRETT. In metal-nonmetal it is less than in coal.

Mr. NELSON. It is 7 or 8 percent.

Mr. YATES. Can the loss of inspectors due to attrition in any way take care of the costs of promotions?

Mr. BARRETT. It could, but it would be purely speculative to budget that way.

Mr. YATES. I suppose it would be.

Mr. BARRETT. We can go a year without losing anyone.

Mr. YATES. That is right. That is not to be expected, though, is it really? The point is, you don't know how many you will lose.

Mr. BARRETT. Right.

1977 PAY INCREASE

Mr. YATES. How long a time period does the annualization for the 1977 pay increase cover?

Mr. BAKER. The annualization covers two items. First, it was not in effect for 6 days in fiscal year 1977. Second, program increases were ap-

proved by OMB at the old salary rates. Pay cost was added at the end and is reflected in the annualization amount.

NUMBER OF AUTOMOBILES AND REPLACEMENT STANDARDS

Mr. YATES. How many automobiles do you presently have in the inspection program?

Mr. BAKER. We have 1,500 on long-term lease.

Mr. YATES. Is there an order respecting the replacement of those automobiles to promote the subcompacts and the saving of gasoline?

Mr. BAKER. I think it is 18 miles per gallon.

Mr. LOCKWOOD. Yes; there is.

Mr. YATES. What does this require you to buy?

Mr. BAKER. Mostly subcompacts with standard shift.

Mr. YATES. Are these Americans cars?

Mr. BAKER. Yes, sir.

Mr. YATES. Are there American cars that qualify?

Mr. BARRETT. AMC—American Motors. But I don't know whether it is American made.

Mr. YATES. What is it, a Gremlin?

Mr. BARRETT. No; it is the small Hornet.

Mr. YATES. The smallest Hornet?

Mr. BARRETT. Yes, sir.

Mr. YATES. And it makes the mileage goal?

Mr. LOCKWOOD. That is what the EPA report tells us.

Mr. YATES. Have you had any operating experience with them yet?

Mr. BARRETT. Very little. We have been using GSA automobiles, many of which are really antiquated, to be quite frank with you. We are using Fords that are about 1971 vintage.

GSA MOTOR POOLS

Mr. YATES. When you say operating GSA automobiles, are they out of a pool?

Mr. BARRETT. Yes, sir.

Mr. YATES. Do you have any trouble getting them?

Mr. BARRETT. Yes. GSA has been rather restricted in their ability to purchase additional automobiles. That is why we have asked for our own automobiles. Replacements are very difficult to get fom GSA. In other words, when one of their cars breaks down on us, we can't get a replacement from them.

Mr. YATES. How do you maintain your automobiles?

Mr. BARRETT. We use GSA services as much as possible.

Mr. YATES. You have a planned replacement rate?

Mr. LOCKWOOD. Yes; we do, according to the GSA standards.

Mr. BARRETT. I believe the standard is 60,000 miles or 6 years.

Mr. YATES. With your inspectors, you are going to get a lot more than 60,000 miles, aren't you?

Mr. BARRETT. We try to put our people in high density areas. But in the metal-nonmetal side, those inspectors travel extreme distances.

Mr. YATES. That is out West.

Mr. BARRETT. Right.

Mr. YATES. All right.

INSPECTION OF EXPLOSIVE STORAGE FACILITIES

On page 34 of the justification, you want to continue to make inspections of explosive storage facilities on behalf of the Bureau of Alcohol——

Mr. BARRETT. Yes, sir.

Mr. YATES. What is your estimate of the cost of the program?

Mr. SHEPICH. That program is a cooperative program with the BATF, and it is done during the course of our regular inspection activities. There is a little additional time. But, we don't have a budgeted number.

Mr. YATES. Would you place it in the record?

Mr. SHEPICH. I don't know that we can obtain that. I think it is an integral part of our inspection cost.

Mr. BARRETT. It is an inspection we would normally make.

Mr. YATES. Do you get repaid by the Bureau?

Mr. SHEPICH. No, sir, we do not.

Mr. YATES. Just another item added to your inspection charge?

Mr. SHEPICH. That is right.

Mr. LOCKWOOD. If we didn't do this, Mr. Chairman, it would probably add to the problem Mr. Duncan was asking about when we were here last time, of having duplicate inspections onsite.

Mr. YATES. How many others can you take on?

Mr. SHEPICH. One of the key reasons that MESA got into this program was that such a large share of the explosives consumed in industry are consumed in the mining industry, and that it was very logical for our inspectors to assume this added responsibility.

Mr. BARRETT. Of all the explosive used in this country 80 percent are used in the mining industry.

Mr. YATES. Are you satisfied with the progress this program is making?

Mr. BARRETT. Yes. The only difference between our regular inspection of explosive magazines and the use and storage of explosives underground is that we follow their regulations, rather than the ones we had promulgated previously.

INSPECTION/FATALITIES

Mr. YATES. Is there any correlation between the decrease in fatalities and the number of inspections, do you think?

Mr. BARRETT. Yes. We can draw a definite——

Mr. YATES. You can?

Mr. BARRETT. Yes, sir.

Mr. YATES. Would you place what you consider to be your most significant accomplishments in this program during the last two years in the record?

Mr. BARRETT. The metal-nonmetal program?

Mr. YATES. Yes.

[The information follows:]

ACCOMPLISHMENTS IN METAL/NONMETAL PROGRAM

Fatalities in the metal and nonmetal mining industry reached a record low in 1976 for the second consecutive year. The 113 fatalities that occurred during the year was an 8 percent reduction from the record low of 123 fatalities in 1975, and 28 percent below the total of 158 fatalities in 1974.

Continued reduction also has been made in disabling injuries in the last two years. Preliminary data indicate that the overall disabling injury frequency rate in the metal and nonmetal mining industry in 1976 decreased to 15.27 per million man-hours worked, which is a reduction from the rate of 18.07 in 1975 and 19.40 in 1974.

Important as the above records are, of equal if not greater significance, has been the reduction of health hazards which produce long-term crippling effects on workers in the metal and nonmetal mines and mills. In the past 2 years, roughly 36,000 full-shift personal industrial hygiene samples have been taken at about 2,500 selected mines. Results show that about 30 percent of the workers sampled were overexposed to such health hazards as silica dust, asbestos and other mineral fibers, radiation, and noise. Of the more than 11,000 notices of violation issued against these overexposures, about 7,000 have been abated through the installation of engineering controls, special administrative procedures, or the interim use of personal protective equipment. As a result of these measures and through inspections to assure continued compliance with established standards, workers in the metal and nonmetal mining industry are now better protected against crippling health hazards than they were only 2 years ago.

An important contributing factor for the improved conditions has been the successful operation of computerized management information systems covering metal and nonmetal mines. Information from the management control system provides current data on inspection activities on a mine-by-mine basis, including outstanding violations of specific health and safety standards. Information from the mine injury system provides up-to-date data on injuries as they occur on a mine-by-mine basis. The operation of these systems, therefore, allows the assignment of inspectors to mines that require immediate or special attention and the most efficient use of limited manpower resources.

NIOSH STUDY

Mr. YATES. I notice on page 36 you have a study with NIOSH. You prefer NIOSH to OSHA?

Mr. BARRETT. NIOSH does OSHA's work, also.

Mr. YATES. And you are doing OSHA's work?

Mr. BARRETT. No. We probably could—if you want to transfer OSHA to us—we could probably handle it.

EDUCATION AND TRAINING CHANGES

Mr. YATES. Now, as far as education and training are concerned, you are going to change some of the programs that are in existence. How are you going to fund the changes? You don't want any increases?

Mr. BARRETT. What we have planned to do is integrate our special accident prevention programs and education and training. We have the special accident prevention program in metal-nonmetal. We devote quite a number of man-years in these programs. In the special accident prevention program, when we have a mine with an extremely high frequency rate, we deploy a lot of our resources into that particular mine. We still have the enforcement responsibility but, we would like to get more involved in job safety analysis programs, hazard identification programs. They are education and training as opposed to enforcement type programs.

We want to integrate these programs more than we have in the past into our enforcement activities.

Mr. YATES. You don't need additional funds, then, right?

Mr. BARRETT. Right.

87-591 O - 77 - 4

MATRIX MANAGEMENT PROGRAM

Mr. YATES. All right. Now you have got a matrix management system.

Mr. BARRETT. That is what I was describing.

Mr. YATES. Thay are going to move in and out of training field offices, your inspectors, on a scheduled and critical emergency basis.

Mr. BARRETT. Right.

Mr. YATES. No additional costs anticipated?

Mr. BARRETT. Right.

Mr. YATES. And you don't know yet what the impact of the program will be, do you?

Mr. BARRETT. No, sir.

Mr. YATES. We would be interested in knowing what your experience is.

Mr. BARRETT. We have about 100 people in the training group, and we thought we would work those people in and out of the inspection programs.

Mr. YATES. Has this concept been developed with any industrial educational organization?

Mr. BARRETT. This particular program? I think this is pretty much our own idea.

Mr. SCHLICK. The concept is not new. It is new to the Government, but it is not a new industrial program.

Mr. YATES. Are you following——

Mr. SCHLICK. It is based on the high technology areas of our country, making airplanes, space type things.

COMPREHENSIVE TRAINING PLANS

Mr. YATES. On page 40, you say each mine will have and follow a comprehensive training plan, meeting its own needs after being reviewed and approved by MESA. Do you have any estimate of the cost to the mines of developing that plan?

Mr. BARRETT. We have already promulgated in the register mandatory training regulations for coal mine operations. Presently we have gone through the public hearing processes. We are putting together the comments, and they are numerous, on mandatory training.

Mr. YATES. Comments from whom?

Mr. BARRETT. The industry, unions, labor unions, State Departments.

Mr. YATES. They were all enthusiastic about commenting on it.

Mr. BARRETT. Yes, enthusiastic about commenting.

Mr. YATES. Not about the regulations?

Mr. BARRETT. Well, to be against training is like being against motherhood, apple pie and Chevrolets, or whatever. They agree we need training but then we disagree from there.

Mr. YATES. Your justifications say the new regulations do not reduce your workload?

Mr. BARRETT. No, sir, they do not.

Mr. YATES. Is there any way you can issue regulations that reduce your workload?

Mr. BARRETT. No, sir.

Mr. YATES. If you didn't have as many regulations you wouldn't have as many comments, would you?

Mr. BARRETT. That is true, yes. But we are not promulgating regulations——

Mr. YATES. Just to make regulations?

Mr. BARRETT. No.

Mr. YATES. They all have a purpose.

REVIEW OF UNDERGROUND AND SURFACE REGULATIONS

Mr. BARRETT. Yes, definitely. As a matter of fact, we are redoing our underground and surfacing regulations to make them more compact, compatible.

Mr. YATES. How often do you redo your regulations?

Mr. BARRETT. This will be the first time we have done a complete review on underground and surfacing regulations since 1970.

TRAINING MODELS

Mr. YATES. Now, you have training models to develop to help mine operators comply with the new regulations. What do you mean when you say you have a model? What is a model in this sense? This is on page 41.

Mr. BARRETT. Simulators.

Mr. SCHLICK. In our proposed regulations we say you should have maybe 4 hours of a specific type of training in first aid. The model is how we think that should be done in an optimum manner. It ends up as a booklet of instructions.

TELEVISION AND RADIO MESSAGES

Mr. YATES. Then you say there were 10 television safety messages produced and six radio messages produced and distributed to 94 television stations and 183 radio stations throughout the United States. Did they get used by the stations?

Mr. BARRETT. Yes, sir. Most of them have been on prime time. Some of them on Johnny Carson.

Mr. YATES. All for safety, right?

Mr. BARRETT. All free, too. Public service announcements.

Mr. YATES. That is good.

NATIONAL MINE HEALTH AND SAFETY ACADEMY

Now we turn to the pride and joy of MESA, the National Health and Safety Academy, and you want an increase in your operating expenses of $210,000. Of that amount $10,000 is to annualize the 1977 pay increase. The balance of $200,000 is associated with awarding of operation and maintenance contracts.

Mr. BARRETT. Yes, sir.

ACADEMY CONTRACTS

Mr. YATES. Are these contracts awarded on a competitive basis?

Mr. BARRETT. Yes, every one of them.

Mr. YATES. What criteria do you use in making the award?
Mr. LOCKWOOD. We follow contract law and award them——
Mr. YATES. To the lowest bidder?
Mr. LOCKWOOD. Lowest bidder generally.
Mr. YATES. Once a contractor has won an award, does he keep that year after year?
Mr. LOCKWOOD. No, only for the period of the contract.
Mr. YATES. How often do you make awards?
Mr. LOCKWOOD. Generally annually.
Mr. YATES. OK.

STUDENT ENROLLMENT

You expect to have 3,000 students in short courses, seminars, and resident programs. How does that compare with your experience in 1976 and 1977? Is 3,000 students the maximum that the academy will take?
Mr. BARRETT. No, sir. Mike?
Mr. ZABETAKIS. Last year we had approximately 1,500. We anticipate at least 3,000 this year. We can handle approximately 400 students at a time at the academy. We are running about half that rate right at the moment.
Mr. YATES. You have dormitories?
Mr. ZABETAKIS. Yes.
Mr. YATES. How long are your courses—3, 6, and 9 months?
Mr. ZABETAKIS. We have them as short as 1 day up to 9 months.
Mr. YATES. Is there a graduation ceremony? Do you have such things as graduation?
Mr. ZABETAKIS. We do on the longer programs. Not on the shorter ones.
Mr. YATES. What happens to your students when they graduate? Do you ever follow them to see where they go and who hires them and what they do?
Mr. ZABETAKIS. Most of our students are our own inspectors.
Mr. YATES. How long do they stay with you—indefinitely? Are they part of the attrition rate?
Mr. BARRETT. Ultimately they may be.
Mr. YATES. How do they work out? Do you find they are pretty well trained?
Mr. BARRETT. We think they are very well trained. Probably the best trained in the world.

OUTSIDE ATTENDANCE AT ACADEMY

Mr. YATES. Now you say that MESA, the Department of Interior and various mining groups have attended training programs. Can you tell us for the record, how many of each has attended your Academy?
Mr. ZABETAKIS. Yes, we can get that.
Mr. BARRETT. Roughly, last year we had 3,050 student-days outside of MESA.
[The information follows:]

Attendance at Academy

Mining and explosives companies	78
U.S. Treasury (Alcohol, Tobacco, and Firearms)	14
U.S. Bureau of Mines	12
Forest Service, Department of Agriculture	4
State representatives	13
Canadian representatives	1
NIOSH	18
MESA	1,377
Total	1,517

OPERATION OF ACADEMY

Mr. YATES. What problems have you had in the operation of your Academy?

Mr. BARRETT. Some contractors have been on strike down there.

Mr. ZABETAKIS. They are now working.

Mr. YATES. Who was on strike?

Mr. ZABETAKIS. We still have two contractors working at the Academy building. We just now have really become fully operational.

Mr. YATES. Why are they striking?

Mr. BARRETT. Nonunion versus union problems.

Mr. ZABETAKIS. But I think we have those all resolved.

Mr. YATES. Are they going to finish construction by your target date?

Mr. ZABETAKIS. They are already 1 year behind schedule.

Mr. YATES. It would be very tough to finish by the target date.

Mr. Regula?

PRIVATE INDUSTRY TRAINING

Mr. REGULA. Do you train individuals for private industry to be safety supervisors on an in-house basis?

Mr. BARRETT. Yes, sir. Primarily, as Dr. Zabetakis has said, we train our own people, our in-house inspectorate. However, we also have trained mine safety commiteemen. The contract between the United Mine Workers and the mine operators says, in effect, that all safety committeemen must be trained.

So, we, MESA, have provided the facility and, out of the 5 days of instruction, we provide 3 man-days of instruction. The others are on contract procedures, grievance procedures, et cetera.

This week, for the first time, we have had a coal company send their supervisors down for training. We are trying to do an extremely good job in this training effort so that it will become attractive to other industry people.

Mr. REGULA. How long does this particular program last, the in-service for coal mine personnel?

Mr. BARRETT. The safety committeemen—that is the miners.

Mr. REGULA. What length is it for the miners?

Mr. BARRETT. Five days, and 10 days for supervisors.

Mr. REGULA. And the companies that send their people pay you a fee?

Mr. BARRETT. Yes, sir.

OPERATIONS AT ACADEMY

Mr. YATES. Are you operating at the Academy?

Mr. BARRETT. Fifty percent of capacity right now. I might take this opportunity to invite you down personally. I think it would be very worthwhile for you and the committee members to come down and visit us.

Mr. YATES. I think it would be fine for us to visit there sometime, but we have to check with Senator Byrd first.

Mr. BARRETT. You and Senator Byrd are paying for it.

Mr. YATES. The American people are paying for it. We are merely a conduit.

Now let's turn to technical support. Any other problems with the Academy, other than the fact they are on strike there?

Mr. ZABETAKIS. No, sir; we have had very little problem, really.

Mr. YATES. No problems with instructors, or dormitories—no problems with supplies? Adequate funding?

Mr. ZABETAKIS. Yes, it has been adequate.

Mr. YATES. Not too much?

Mr. ZABETAKIS. No, sir.

Mr. YATES. All right.

TECHNICAL SUPPORT

You want $15,895,000 for technical support. In that amount, you want 21 positions. You also want $150,000 for approval and certification, together with two positions. All of this relates to a 28-percent workload increase in the next fiscal year. Did you have a workload increase in fiscal years 1975, 1976, and 1977?

Mr. BARRETT. Yes, we have had a continuing increase because of the expansion of the coal industry in the last few years. This expansion causes a need for more mining equipment, and all mining equipment that is used underground in the face areas is approved through our approval and certification system.

CERTIFICATION OF COAL MINING EQUIPMENT

Mr. YATES. Who makes coal mining equipment?

Mr. BARRETT. There are hundreds of them.

Mr. YATES. Is that equipment required to be certified by MESA?

Mr. BARRETT. Yes, sir. If it is used in the face areas—just as a rule of thumb, any place there is gas emitted.

Mr. YATES. You have to approve the design?

Mr. BARRETT. We approve it for its ability or inability to cause a mine fire or mine explosion; that is, it would correspond to the watertight equipment.

Mr. YATES. How do you go about inspecting it, or passing on it?

Mr. BARRETT. The manufacturer sends to us a prototype of a compartment or a piece of equipment. We approve individual compartments, motors, panel boxes, leads into panel boxes, the conduits, the trailing cables—all those electrical components that will be used in the ultimate—those components combined, end up as a continuous mining machine.

We don't approve, for example, the conveyor chain or the hardware. But we do approve electrical components. We certify the canopies

that we talked about, to see that they withstand 18,000 lbs. for example. We approve dust collectors.

Mr. YATES. Where do you do this?

Mr. BARRETT. In Pittsburgh.

Mr. YATES. You have your own facilities for inspection there?

Mr. BARRETT. That is right. We also do a little work for the Navy.

Mr. YATES. Do they pay you for it?

Mr. BARRETT. Yes, sir.

Mr. YATES. OK.

USER FEES

Mr. BARRETT. We charge a fee also to those manufacturers for that approval.

Mr. YATES. Do you ever reject any?

Mr. BARRETT. Yes, sir, quite often.

Mr. YATES. How much do you collect by way of inspection charges?

Mr. SCHLICK. I don't know exactly how much.

Mr. YATES. Does that go to the Treasury?

Mr. SCHLICK. Yes, sir.

Mr. YATES. Would you put in the record how much you collected for the last fiscal year of which you have a record?

[The information follows:]

FEE COLLECTIONS

Fiscal year 1976, $112,004; 19TQ, $4,245; fiscal year 1977 (through January), $33,349.

OTHER SUPPORT COSTS

Mr. YATES. You talk about $48,000 for other support costs. What is that for? What does other support costs mean in that context?

Mr. BAKER. Supplies, equipment, training, miscellaneous health services. It is the normal routine costs of keeping an employee on the job.

Mr. YATES. Would you itemize them?

Mr. BAKER. Yes, we will.

[The information follows:]

Other support costs

Transportation of things	$5,000
Rent, communication, and utilities	2,000
Printing, reproduction	1,000
Other services	37,000
Supplies, materials	3,000
Total	48,000

ELECTRICAL SYSTEMS LABORATORY

Mr. YATES. You want $100,000 and two jobs to expand the electrical systems laboratory's capability for accepting illumination systems, to include metal and nonmetal mines.

What is the nature of the communications testing equipment you want to buy?

Mr. SCHLICK. Last year new illumination regulations were promulgated, which in essence means there will be lights in the mines. We have to approve those lights under rigid specifications for two reasons.

One of them is the permissibility of the light, so it won't explode and cause a disaster. The second one is if the light emits enough foot candles of light.

So, we built ourselves a large black box to turn on the lights, and measure the emittance. That is the approval mechanism.

If you read on pages 47 and 48 here, it tells you how many pieces of equipment have to be measured, and it is just a tremendous workload there. We are asking for two more people to help us out, as these machines come on line, and come into operation.

Mr. YATES. You don't think you have the ability to handle retrofitting of your lighting systems in-house? You are going to an outside contractor, aren't you?

Mr. SCHLICK. Well, that is part of the workload.

If we do it ourselves, that is one unit of work. Yet, if we certify an outside testing laboratory to do it, it can get done, and they pay us and it goes to the general treasury, or they pay a certified testing laboratory and get the work done a lot faster.

We feel if we do some ourselves and certify testing laboratories to do it, it will get done a lot faster.

ROOF AND GROUND CONTROL

Mr. YATES. Now, you want $300,000 and eight positions to restore capability for investigating roof and ground control failures. What is the best solution for avoiding these—the deaths and injuries that result from roof and ground falls?

Mr. SCHLICK. What we are saying here, Mr. Chairman, is that ground control, and the following item, ventilation, are really our bread and butter, to insure safety in mines. Over the past years, the growth in the number of mines, as we have heard testimony here today, has been on the increase, yet our ground control groups, our ventilation groups, have stayed at a constant level, and we find ourselves falling behind.

So, we need an additional eight positions, both in ventilation and ground control, to bring us up to the mark.

You recall this morning we made the point that the canopies are one of the best devices we have now to reduce fatalities, and you heard our Administrator say 40 were saved last year. If you go back several more years, it adds up to more than 100 lives. This roof control group was largely responsible for developing and approving this type of equipment.

Mr. YATES. Is that a short- or long-term solution?

Mr. SCHLICK. Long term.

VENTILATION

Mr. YATES. You want $400,000 and eight positions for ventilation?

Mr. SCHLICK. A similar thing.

Mr. YATES. How many mines can be surveyed annually now?

Mr. SCHLICK. We don't do that annually now. We think what we can [do] if we have eight more positions, we can survey one mine at a time, with several people, and keep on going. It is a problem like you mentioned before. When an inspector leaves, something else happens in the mine. We would like to have our people all over the mine at one time. This will help us do this. We feel we can do a hundred problem mines a year with this.

MINE EMERGENCY OPERATIONS EQUIPMENT

Mr. YATES. You want $200,000 for seismic equipment. How successful are your seismic location techniques?

Mr. SCHLICK. Our seismic location technique, which is shown in figure 4 here on page 54, is probably the best test in the world. The good points are that if a trapped miner signals, and he is less than 1,000 feet below the ground, there is a good probability that we will get that signal.

If he is below 1,500 feet, then we run into problems that we cannot now cope with. We are trying to overcome that.

This has gone from an experimental mode into an operational mode. But, yet, it is still on the fringes of research development.

Mr. YATES. Is it being improved annually?

Mr. SCHLICK. Yes, very much so. We have had a marked improvement in the last year in tests we conducted. Each year we try and set aside a certain amount of money to conduct tests. It is sort of like playing a war game, where you have a certain disaster and you respond to it. Of course, that uncovers both good and bad things about our operation.

Mr. YATES. Did you try this technique at the Scotia mine?

Mr. BARRETT. No, we had already located the bodies without any problems.

Mr. YATES. How often do you encounter situations where you don't know where the miners are located?

Mr. BARRETT. Not too often. But when it happens——

Mr. YATES. You should know how to do it.

Mr. BARRETT. Yes, sir.

ANNUALIZATION COSTS

Mr. YATES. You want $1,023,000 to annualize 1977 increases and to maintain current levels of operation. What do you mean when you say you want to maintain the current level of operations at a cost of $397,000? What is involved in that?

Mr. LOCKWOOD. I believe this is a repeat—if you allow me to, that we were dealing with on annualization—the last year phased in hiring and phased operation.

Mr. YATES. I see. It is in a different part of the justification.

You want $435,000 for other support services. Would you place in the record what you include in other support services?

Mr. LOCKWOOD. Yes, sir, we will.

[The information follows:]

Other support costs

Rent, communications, utilities	$39,000
Printing, reproduction	17,000
Other services	274,000
Supplies, materials	105,000
Total	435,000

The above figures include program annualization costs for 30 positions approved in fiscal year 1977. These figures also included increased funding to annualize the operating costs of facilities for illumination testing and waste impoundment testing which was approved in fiscal year 1977 and funded for only half-year

operations. Additionally, these amounts include the full year costs of providing office support services such as telephone, copy reproduction and miscellaneous office supplies.

Mr. YATES. Is there anything else you want to tell us that we have not covered?

Mr. BARRETT. I think we have covered things pretty well.

Mr. YATES. Any problems that you have that you have not told us about we ought to know about?

Mr. BARRETT. Problems—up to here.

Mr. YATES. I know. You have problems up to there.

Mr. BARRETT. Nothing we can't overcome.

REQUEST TO OMB

Mr. YATES. How much money did you ask for of OMB? Did OMB give you enough to operate?

Mr. LOCKWOOD. The answer to your second question is yes, they gave us enough money to operate.

Mr. YATES. Did they give you enough money to operate in the manner which you think is essential to carry out the functions and responsibilities of MESA?

I will put it another way. How much did they cut?

Mr. BAKER. We requested $112.5 million, sir.

Mr. YATES. And what were you allowed?

Mr. BAKER. $105.8 million.

Mr. YATES. So they cut you almost $6 million; right?

Mr. BAKER. Yes, sir.

Mr. YATES. Which doesn't seem an awful lot offhand.

I have a chart here. That shows the functions. I think this chart may go into the record at this time.

[The information follows:]

DEPARTMENT OF THE INTERIOR—MINING ENFORCEMENT AND SAFETY ADMINISTRATION, BUREAU OR OFFICE: COMPARISON OF FISCAL YEAR 1978 ANNUAL DEFINITE AND INDEFINITE APPROPRIATIONS PROPOSALS

[In thousands of dollars]

Appropriation/Activity	Proposals to the Department, May 15, 1976				Departmental submission to OMB total through Nov. 4, 1976	Subsequent request for pay raise requirements	Total submission to OMB	President's budget submission to Congress January 1977
	Priority A	Priority B	Priority C	Priority D				
Coal mine health and safety:								
Coal mine inspections	45,500	45,800	49,500	53,100	49,971	2,136	52,107	51,126
Assessments	3,200	3,300	3,800	3,800	3,849	101	3,950	3,544
State grants	2,500	3,500	5,000	5,000	2,500	.....	2,500	2,500
Subtotal	51,200	52,600	58,300	61,900	56,320	2,237	58,557	57,170
Metal and nonmetal mine health and safety	17,400	19,100	21,800	22,800	21,478	683	22,161	19,271
Education and training:								
Training centers	6,000	7,300	7,500	7,500	7,331	188	7,519	6,222
National academy	4,600	4,600	4,600	4,600	4,568	104	4,672	4,672
Subtotal	10,600	11,900	12,100	12,100	11,899	292	12,191	10,894
Technical support	14,100	15,000	16,700	18,100	16,086	439	16,525	15,895
Program administration	2,200	2,300	3,700	4,700	2,988	48	3,036	2,536
Total	95,500	100,900	112,600	119,600	108,771	3,699	112,470	105,766

Mr. BAKER. It is pretty well across the board.

Mr. YATES. Will you be hurt by any of the cuts?

Mr. BARRETT. I don't think so. I think we can operate effectively.

Mr. YATES. All right. Good enough. I know you think you can operate, but we don't want you just to operate because you have men's lives and health and safety in your keeping.

We want to make sure you get an adequate appropriation.

Mr. McDade?

Mr. MCDADE. I have no questions.

Mr. YATES. Gentlemen, thank you very much.

THURSDAY, MARCH 24, 1977.

BUREAU OF MINES

WITNESSES

DR. JOHN D. MORGAN, JR., ACTING DIRECTOR
DR. THOMAS A. HENRIE, CHIEF SCIENTIST
DR. JOSEPH J. YANCIK, ASSISTANT DIRECTOR—MINING
RALPH C. KIRBY, ASSISTANT DIRECTOR—METALLURGY
ALFRED WEISS, ASSISTANT DIRECTOR—PROGRAM DEVELOPMENT AND EVALUATION
WILLIAM D. OYLER, CHIEF, DIVISION OF BUDGET
FRANCIS M. WILES, DIRECTOR OF BUDGET, OFFICE OF THE SECRETARY

OPENING REMARKS

Mr. YATES. The hearing will come to order.

This is the hearing on the appropriation for fiscal year 1978 of the Bureau of Mines. Appearing in support of that appropriation is Dr. John D. Morgan, Jr., Acting Director; Dr. Thomas A. Henrie, Chief Scientist; Dr. Joseph J. Yancik, Assistant Director—Mining; Ralph C. Kirby, Assistant Director—Metallurgy; Alfred Weiss, Assistant Director—Program Development and Evaluation; William D. Oyler, Chief, Division of Budget; and Francis M. Wiles, Director of Budget, Office of the Secretary.

We have a statement by Dr. Morgan which may be made a part of the record at this point.

[The statement follows:]

STATEMENT OF DR. JOHN D. MORGAN, JR., ACTING DIRECTOR, BUREAU OF MINES, U.S. DEPARTMENT OF THE INTERIOR, BEFORE THE HOUSE SUBCOMMITTEE ON APPROPRIATIONS FOR THE DEPARTMENT OF THE INTERIOR AND RELATED AGENCIES--MARCH 16, 1977

Mr. Chairman:

Thank you for this opportunity to discuss the programs of the Bureau of Mines and to present our budget request for Fiscal Year 1978.

The Bureau of Mines has served as the principal mineral science and technology arm of the Federal Government since its establishment in 1910. Bureau developed technology has helped to assure an abundance of minerals and materials in the past. The Bureau's mission seeks to ensure the continued viability of the domestic minerals and materials economy and the maintenance of an adequate minerals base, so that the Nation's economic, social, strategic, and environmental needs can be better served.

Let me briefly review the basis for the Bureau of Mines strategy in carrying out its mission.

The Bureau of Mines Strategy

The U.S. Government faces unprecedented obstacles and uncertainties in its efforts to help assure the domestic economy an adequate supply of minerals at reasonable costs. These stem from the increasingly complex and unsettled nature of issues surrounding the whole subject of minerals and fuels acquisition and utilization, exacerbated by the critical energy situation. Although our energy problems have been well publicized, those involving other minerals are not as widely or as well known. In addition to investigations undertaken by the Department of the Interior, recent major studies and analyses by the National Commission on Materials Policy, the National Commission on Supplies and Shortages, the National Academies of Science and Engineering, and the National Science Foundation, to name a few, have indicated that a minerals availability problem has emerged that is not only national, but international in scope. Drawing upon these studies in addition to its own work, the Bureau of Mines continually undertakes comprehensive assessments of the overall minerals, metals, materials and fuels situation as the foundation for its program strategy.

In developing our budget for Fiscal Year 1978, we have emphasized those programs promising maximum returns on the Government's investment. Moreover, we are stressing efforts which promise significant near-term benefits, address critical minerals availability considerations, and involve areas where the Bureau has demonstrated capabilities.

The strategic approaches of the Bureau of Mines range from scientific research on minerals and materials properties to large-scale demonstrations of innovative mining and metallurgical technology to the analysis and dissemination of minerals supply/demand information. These activities are performed by a cadre of highly-trained and experienced mining, minerals, and materials, scientists, engineers and economists.

The overall strategy proposed for Fiscal Year 1978 by the Bureau of Mines addresses three basic themes or problems that continue to adversely impact upon the domestic minerals economy. These are: (1) domestic minerals availability, (2) worker health and safety and environmental protection; and (3) improving our national energy posture.

Budget Request

The Fiscal Year 1978 budget request for Mines and Minerals totals $160,529,000, a decrease of $5,968,000 from FY 1977. The decrease generally reflects substantial non-recurring costs last year to relocate the College Park Metallurgy Research Center and for pilot plant construction for the Anthracite Conversion Demonstration Plant. Additional reductions for Advancing Coal Mining Technology and Advancing Oil Shale Mining Technology are somewhat offset by increases for Information Collection and Dissemination systems, Wilderness and Public Land Assessments, Coal Preparation Research, and Metallurgy Research to develop technology for the utilization of critically important low-grade domestic ores.

Metallurgy Research--$25,579,000

The Bureau's strongly mission oriented program of metallurgy research has provided and continues to provide credibility to Government's concern for assuring the Nation an adequate supply of minerals and metals. The research program addresses technological constraints that restrict production from domestic resources. In the past, the program has made major contributions to blast furnace technology for the production of iron, to the metallurgy of lightweight titanium for the aerospace industry, and to the extractive and physical metallurgy of zirconium for critical applications in nuclear reactors. These historic examples of accomplishment are well known and well documented.

More recent accomplishments are not as well known. Major increases in the Nation's iron ore reserves are the result of technology for processing non-magnetic taconite ores. A research breakthrough in gold metallurgy has made it possible to treat the carbonaceous gold deposits of Nevada. Processes developed for urban refuse are approaching commercial reality. Sophisticated technology for scrubbing sulfur dioxide from stack gases will help reduce industrial air pollution.

Improved recovery, better efficiency, and lower costs in mineral processing continue to be goals of the metallurgy research program. However, research must now give full attention to the environment. Arrows drawn on the metallurgical flowsheet can no longer just merely point to the stack, to discharge, or to tailings. The total mineral processing system must be considered. All emissions, effluents, and solid wastes must be accounted for in an environmentally acceptable manner. The best method is to provide control within the processing system. In addition, the heat or energy balance has become critical. The way natural gas, oil, and even metallurgical coke are used in the minerals industry must be carefully examined. Technology must be developed to eliminate energy waste, and to substitute non-premium and abundant fuels such as coal for natural gas and oil.

The proposed program for FY 1978 will continue research for recovering minerals and metals from domestic resources, using low-grade coal to replace premium fuels, reducing pollution, improving recycling technology, and utilizing abundant resources instead of scarce imported minerals. While laboratory scale operations can be conducted at relatively modest funding levels, development of new technologies to the point where they can be demonstrated to be commercially feasible often requires a significant investment of resources. Among the programs to be expanded in FY 1978 are research, development and demonstration of technology for the extraction and processing of four critical minerals--chromium, platinum, nickel and cobalt.

Aluminum is one of the most widely used metals with a broad range of industrial applications, yet the Nation is highly dependent on imports of bauxite to supply domestic alumina and aluminum needs. Mini-plants have been funded in previous years to demonstrate the raw material/process technology for recovering alumina from abundant domestic clays and other non-bauxitic resources. Several technologies should be available for evaluation and comparison by early FY 1978.

The existing metallurgy iron ore program will continue in 1978, refining the development and demonstration of technology for processing low-grade iron ores. In cooperation with industry and ERDA, research and development work will continue to substitute lignite and coal for natural gas which is now used to process iron ore into blast furnace feed.

The Bureau's technology for controlling sulfur-dioxide emissions from industrial processes continued to progress this year. The pilot plant operation of the citrate process was successfully completed with removal efficiencies ranging from 95 to 99 percent. Fiscal Year 1978 plans call for completing construction and initial operation of a demonstration research facility to permit evaluation of the citrate process as a low-cost and effective method of removing sulfur dioxide from powerplant flue gases.

The domestic demand for materials continues to place a serious drain on our minerals and metals resource base and increases the need to develop longer-lasting, higher-performance materials. Bureau research is directed to improving the chemical and mechanical properties of alloys, ceramics, and composite materials.

Another means of alleviating mineral shortage lies in recycling. Among the promising resource recovery activities conducted is a method for upgrading the mixed metal-nonmetal conglomerate of electronics scrap into rich fractions of copper, ferrous metals, and precious metals for recycling.

These are just a few of the projects conducted by the Bureau's Metallurgy Research team.

Mining Research--$105,405,000

The Bureau of Mines Mining Research activity is focused on the development of improved technology for the extraction of minerals and for the disposal of related waste products with a minimum of environmental degradation and with maximum protection of worker health and safety. The problems addressed by Mining Research include those of helping to meet technologic needs in light of foreseeable marked increases in demand for coal, metals and minerals, current and future environmental constraints, the outlook for more adverse natural conditions to be overcome in future mining, and related health and safety problems.

In response to these problems, the coal mining research program is oriented to the following goals: to advance mining technology by improvement of present surface and underground mining practices and automation of the most promising present-day systems; to develop and demonstrate new mining systems that promise substantially improved production, productivity, and safety; to develop the necessary technology to reduce safety and health-related hazards in mines to a minimum and to provide adequate protection to the miners; to develop and demonstrate solutions for major environmental problems associated with mining and mineral processing; and to develop and demonstrate improved or new coal beneficiation technology which will permit maximum and efficient utilization of the Nation's vast reserves of coal to meet our energy needs.

The Bureau's long-term commitment to mine health and safety will continue in FY 1978. In both coal and metal mine health and safety, the Bureau pursues short-range health and safety improvements that can be quickly transferred to the mine and also more enduring, long-term health and safety benefits obtained from research and development aimed at designing the hazards out of the mining system, thus minimizing the threat of accidents due to human error. Among the safety efforts underway are projects to prevent falls of mine faces, ribs and roofs, to predict hazardous geologic conditions and imminent falls, and to provide improved support installation equipment. Efforts are also being devoted to reduce industrial hazards, safer electrical, communications, lighting and haulage equipment. Work is also underway to eliminate mine fires and explosions by developing gas and fire detection equipment and systems for suppressing fires in their early stages.

The Bureau is also working to reduce health hazards of noise, dust, radiation, and toxic gas in mining. A major recent development has been a technique for degasifying coalbeds prior to mining, which not only reduces hazards in mining the coal, but recovers pipeline quality methane gas in advance of the mining operations. Continued efforts in health and safety research can be expected to produce substantial dividends, not only in terms of human well being, but improved efficiency and economies effected by reducing lost time accidents and costs of repairing damages caused by mining accidents.

The success of the Nation's drive for an improved energy supply posture depends upon ample supplies of clean fuels at acceptable economic, environmental, and social costs. In support of this national effort, the Bureau's Mining Research activity has responded with a major technological effort in improving the extraction of coal--our most abundant and most readily available energy resource for at least the near- and mid-term. Moreover, the mining of oil shale and the beneficiation of coal are important Bureau efforts aimed at increasing national energy self-sufficiency.

For FY 1978, the Bureau's major energy related priority is its coal preparation research program which would be substantially expanded to permit early attainment of the projected benefits from much greater direct firing of coal in the Nation's boilers and furnaces and from increased, environmentally safe use of abundant domestic high-sulfur coals. A major barrier to increased coal use is the high sulfur content. Processes to remove the pyritic sulfur and reduce the ash constituents increase the water content of the coal. Bureau programs will be accelerated to develop and demonstrate coal cleaning technology and improved dewatering processes.

Advanced mining technology will be the major field of concern at the new Mining Research Center located at Carbondale, Illinois. The center, purchased in late 1976, will allow the Bureau to improve the efficiency of its mining research by consolidating at Carbondale some projects now scattered among other Bureau research centers. Close proximity to the many bituminous coal mines and mineral operations in the surrounding states, offers ample opportunity for cooperative research and on-site demonstrations.

Research to advance metal and nonmetal mining technology will continue to focus on the development and demonstration of improved practical equipment and methods for extracting minerals, the continued evaluation and testing of explosives, blasting agents, etc. Examples of recent activities include the demonstration of improved cutting devices, blasthole bits and critical frontend components of continuous spiral drill and blast tunnelling equipment.

Mining research projects continue to produce major benefits. For example, one of the key elements in the Bureau's mine development research program is shaft sinking. If increased coal production is to be realized, new mines will have to be opened, and established mines expanded. Mine expansion is time-consuming and costly. A major factor in this expenditure of time and money is shaft and entry development. The design of a Blind Shaft Borer has been completed. The project was undertaken to accelerate shaft construction through mechanization. The objective is to provide a system that will construct a 24-foot diameter shaft at a rate of 25 feet/day. The conventional method utilized today averages approximately 60 feet per month.

Mined Land Demonstration--$4,138,000

The Bureau's Mined Land Demonstration activity deals with the resolution of environmental problems associated with past mining and mineral processing activities.

Demonstration projects and studies conducted principally in the anthracite region of northeastern Pennsylvania provides an important testing ground. The area is a microcosm of the diverse environmental problems common to all coal-producing areas, including subsidence of underground mines, abandoned and unrestored strip mines, uncontrolled underground fires, and others. Consequently, the area serves as an ideal laboratory for developing mined land control and protection technology that holds promise for permanent solutions to environmental problems.

Some specific projects planned for FY 1978 include the evaluation of methods for the disposal of spent mine processing refuse and the recovery and use of anthracite coal from mine refuse banks.

Data Collection and Analysis--$17,174,000

The Bureau of Mines is the principal Government source for mineral information needed by business and Government. Such information, made available on a timely basis, is increasingly essential in the formulation of administrative and policy decisions by Government and industry. The Bureau's Data Collection and Dissemination activities are devoted to meeting this need. Recognizing the need to maintain the quality of the data, and improve the timeliness in its delivery to the ultimate users, the Bureau has been moving increasingly toward automated data systems. The automated Minerals Availability System (MAS) and Fuels Availability System (FAS) are steps in this direction, and efforts are constantly underway to improve the utility of these systems. Efforts are also underway to improve the delivery time of the Bureau's comprehensive annual minerals publications.

In FY 1978 the Data Collection and Analysis activity will be expanded to focus greater attention on providing mineral policy, investment, supply and demand information on a more timely basis, to more end users, and in greater detail particularly on those critical commodities for which the United States is largely dependent on foreign sources of supply. The Automated Minerals Information System that was begun in FY 1977 as a pilot project to gather, merge and automate basic mineral information will be extended to cover two additional commodities (chromium and platinum). Domestic and foreign deposit evaluation for the 18 critical minerals will also be accelerated under the Minerals Availability System (MAS) for completion by the mid-1980's. Continued improvements have been made to enhance the Fuels Availability System (FAS). This is part of a growing awareness of the need to share energy data with other government agencies as well as with the private sector.

The dissemination of specific kinds of information on a regular and current basis continues to be an important function of the Bureau. Each year Bureau professionals author some 115 publications with a distribution of nearly 250,000 copies. The Bicentennial edition of Minerals Facts and Problems resulting in a 1,366 page volume was expanded to respond to increasing national concern over adequacy of minerals, materials, and fuel supplies.

87-591 O - 77 - 5

The new edition contains more definitive information on United States and world reserves and resources of all major minerals, current and future smelting capacities for nonferrous metals, current and future production capacities for all other major minerals, recycling diagrams, forecasts and projections of domestic and world requirements for all mineral commodities to 1985 and 2000.

The conduct of mineral problem studies and assessments is basic in formulating mineral policy. In this regard, the analysis of mineral data collected through the various information systems has been given increasing emphasis by the Bureau. An increase of funds in FY 1978 will be used to conduct studies related to ocean mining of minerals that will contribute toward the early development of these resources while minimizing the disruption of onshore mineral supplies. Other analytical studies are planned for mineral supply access, transportation needs, mineral tax laws, mineral industry financial position, etc.

Mineral Land Assessments--$5,403,000

Regional mineral assessments are made on potential wilderness and other public lands. These assessments serve as invaluable inputs for land use planning and decisions. Assistance in resolving environmental and engineering problems associated with maintaining adequate supplies of minerals is provided through technical and economic information and analysis. These are accomplished through investigations, study projects, review of formal and informal environmental impact statements, and serving on inter-agency committees and land use planning groups. A national core repository is maintained, and various public and private individuals and groups are provided advice, consultation, and technical assistance.

Within the Mineral Lands Assessment activity, a substantial increase is budgeted for wilderness and public lands assessment. The increase will be used to provide the major Federal land management agencies with mineral information that is basic to making single or multi-use designations. This will insure that future restrictions on mineral exploration and development will be made only after a balanced and informed consideration of the benefits and costs of such restrictions.

Of special concern in the assessment of publicly owned lands are the 40.6 million acres of public land identified for inclusion in the National Wilderness Preservation System. Some 16.8 million acres of the total have been evaluated for their mineral value (through September 1976). Under the Wilderness Act, Congress called for the Bureau and the Geological Survey to evaluate the lands prior to 1983 and to recommend which acres with high mineral potential should be excluded from the Wilderness System.

Program Administration--$2,830,000

This activity provides funds for: Executive direction and administrative services for the Bureau of Mines; initiating an Employee Workplace Health and Safety Program, which is to upgrade Bureau-owned and maintained facilities in order to comply with Occupational Safety and Health Administration standards and administrative directives; and reimbursement to the Department of Labor for employee compensation payments.

The Bureau is requesting funds in FY 1978 to initiate a program to correct the more severe safety and health deficiencies in all its laboratories. Protecting Bureau employees from accidental injury or job-related illness is a continuing concern of Bureau management. Many of the Bureau's research activities involve possible hazardous operations, such as working with toxic, corrosive, or flammable chemicals, explosives, hot metal, or radiation sources. Prudent management has continually emphasized maintenance of conditions and work procedures which reduce these risks to a minimum. Passage of Federal Occupational Safety and Health legislation and the issuance of Executive Order 11807 has prompted increased emphasis on these health and safety questions. Most Bureau research facilities were constructed and equipped long before the enactment of the most recent standards, and all experience some conditions which are not fully in compliance with the stringent standards.

Helium Fund

The Bureau continues to conduct a helium conservation and storage program pursuant to P.L. 86-777 (Helium amendments of 1960). We have terminated contracts originally entered into for the purchase of helium under permanent budget authority provided by P.L. 87-122. Litigation ensued which is still active. Since there is no current requirement, we have again proposed rescission of the permanent contract authority of $47.5 million for FY 1977. We favor this approach in light of all current considerations including the outstanding litigations.

Mr. Chairman, this concludes my statement. I will do my best now to answer any questions that you or other members of the Subcommittee may have.

Mr. YATES. Dr. Morgan, I notice you have a series of charts for the purpose of enlightening us on the general operation of your Bureau; is that correct?

Dr. MORGAN. Yes, sir.

We have prepared a number of large charts and we have given the members of the committee a set of small charts for their reference. I can run through the charts very quickly if you wish.

Mr. YATES. Which do you think will serve the committee's purpose better, to do it all at the start or to relate to them as we go through the justifications?

Dr. MORGAN. I think if we took just a minute or two so you saw what they were, we would be in shape to go further.

Mr. YATES. Let's do that. And insert the charts in the record.

[The information follows:]

BUREAU OF MINES

ALIGNMENT OF FUNCTIONS

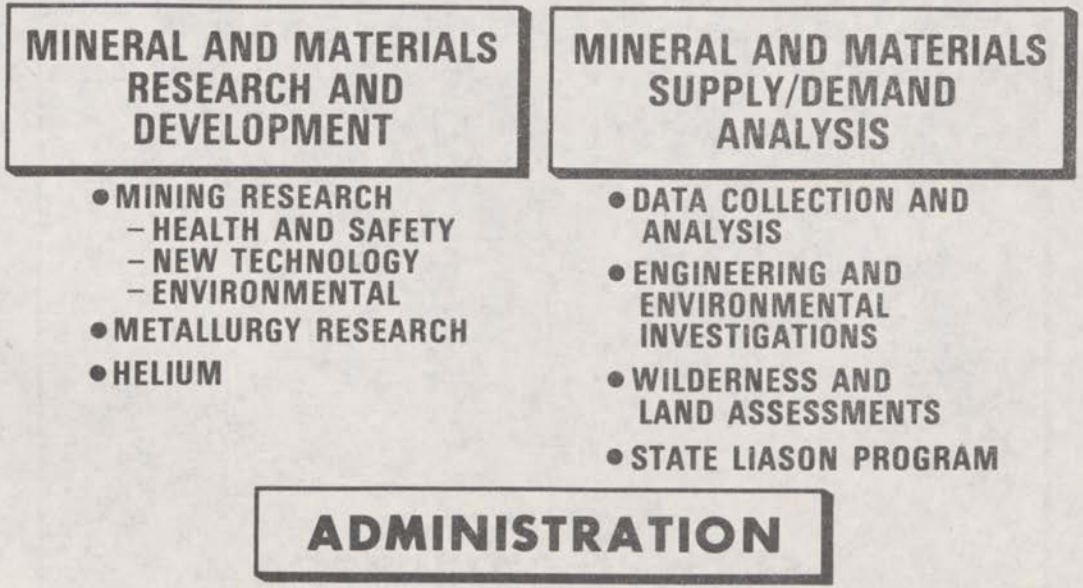


FIGURE 1

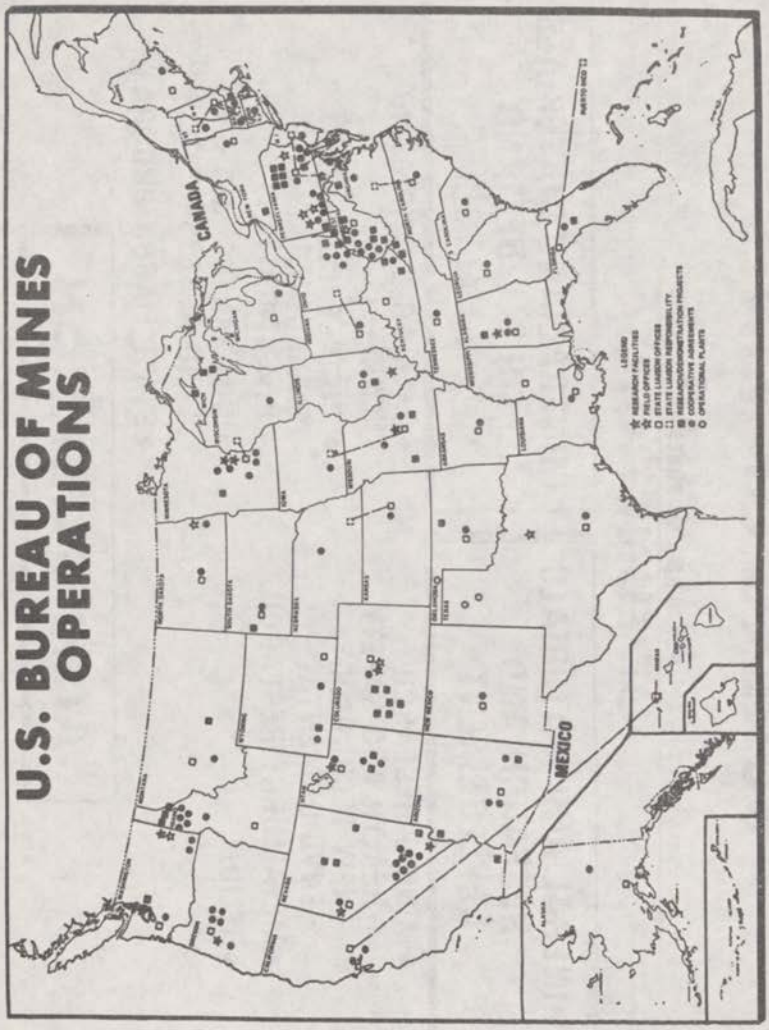

U.S. BUREAU OF MINES
OPERATIONS
CANADA
MEXICO
LEGEND
RESEARCH FACILITIES
FIELD OFFICES
STATE LIAISON OFFICES
STATE LIAISON RESPONSIBILITY
FEDERAL-STATE PROJECTS
COOPERATIVE AGREEMENTS
OPERATIONAL PLANTS

FIGURE 2

THE BUREAU OF MINES ROLE IN THE MINERAL CYCLE

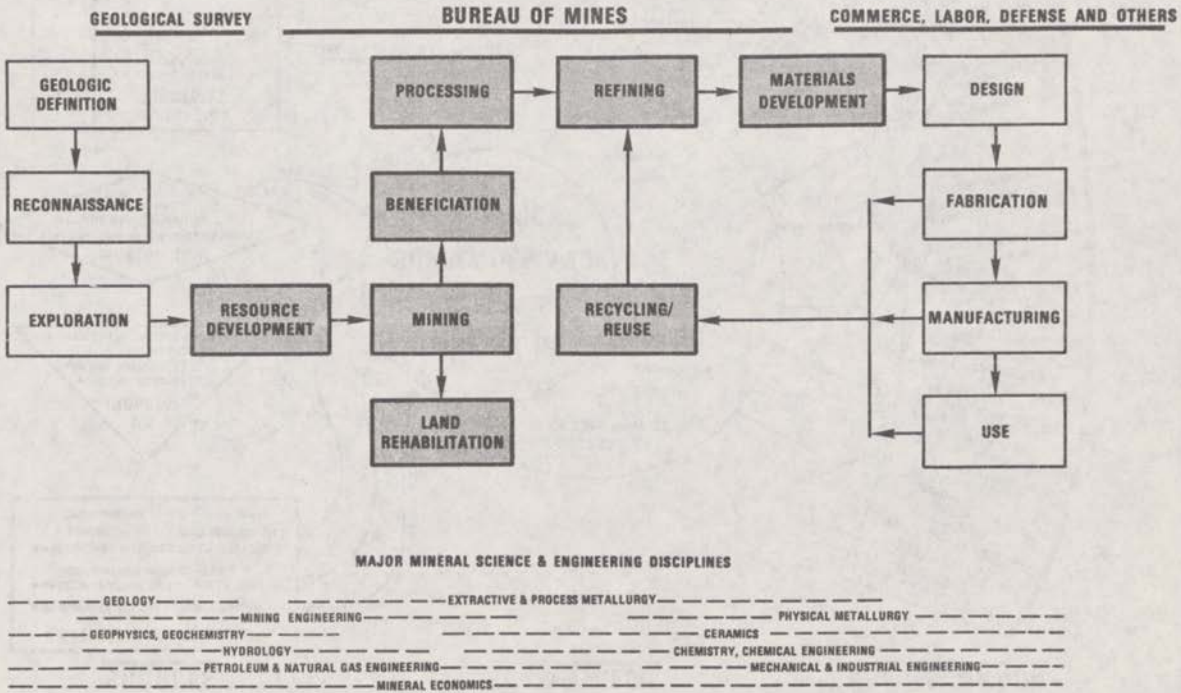


FIGURE 3

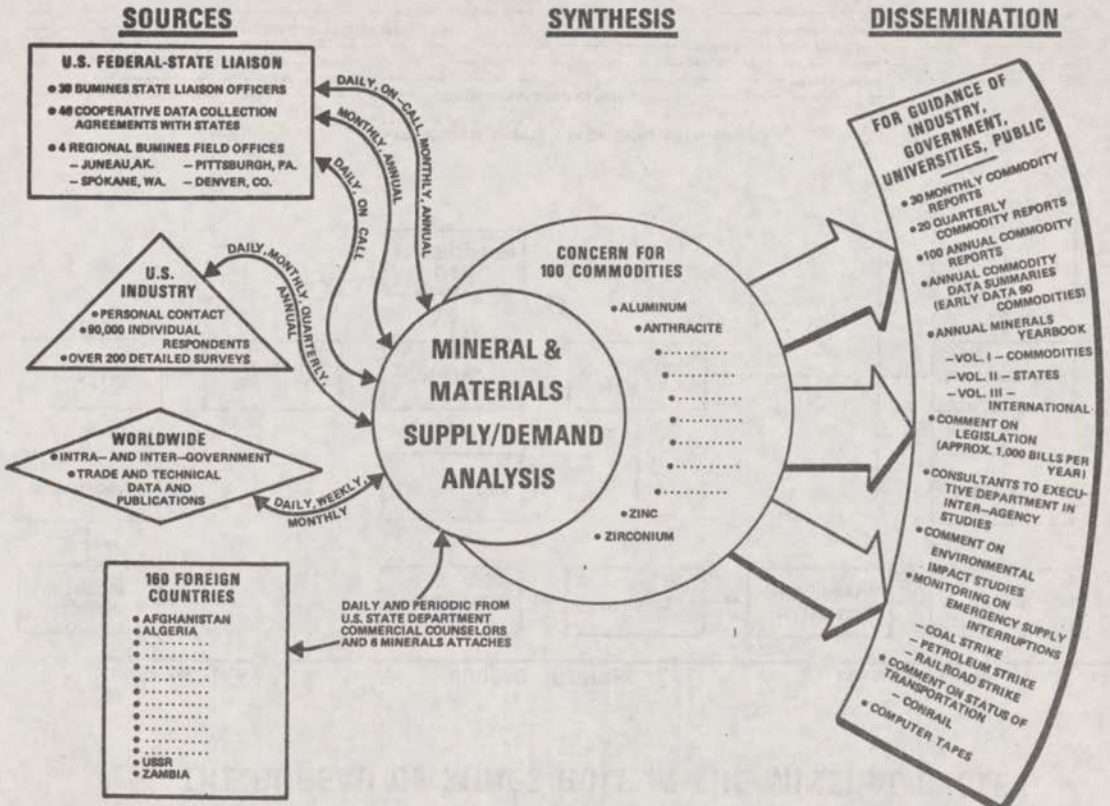

SOURCES
SYNTHESIS
DISSEMINATION
U.S. FEDERAL-STATE LIAISON
• 38 BUMINES STATE LIAISON OFFICERS
• 46 COOPERATIVE DATA COLLECTION AGREEMENTS WITH STATES
• 4 REGIONAL BUMINES FIELD OFFICES
– JUNEAU, AK. – PITTSBURGH, PA.
– SPOKANE, WA. – DENVER, CO.
DAILY, ON–CALL, MONTHLY, ANNUAL
MONTHLY, ANNUAL
DAILY ON CALL
U.S. INDUSTRY
• PERSONAL CONTACT
• 90,000 INDIVIDUAL RESPONDENTS
• OVER 200 DETAILED SURVEYS
DAILY, MONTHLY, QUARTERLY, ANNUAL
WORLDWIDE
• INTRA– AND INTER–GOVERNMENT
• TRADE AND TECHNICAL DATA AND PUBLICATIONS
DAILY, WEEKLY, MONTHLY
160 FOREIGN COUNTRIES
• AFGHANISTAN
• ALGERIA
• .....
• .....
• .....
• .....
• .....
• .....
• .....
• .....
• .....
• .....
• .....
• USSR
• ZAMBIA
DAILY AND PERIODIC FROM U.S. STATE DEPARTMENT COMMERCIAL COUNSELORS AND 6 MINERALS ATTACHES
MINERAL & MATERIALS SUPPLY/DEMAND ANALYSIS
CONCERN FOR 100 COMMODITIES
• ALUMINUM
• ANTHRACITE
• .....
• .....
• .....
• .....
• .....
• .....
• .....
• ZINC
• ZIRCONIUM
FOR GUIDANCE OF INDUSTRY, GOVERNMENT, UNIVERSITIES, PUBLIC
• 30 MONTHLY COMMODITY REPORTS
• 20 QUARTERLY COMMODITY REPORTS
• 100 ANNUAL COMMODITY REPORTS
• ANNUAL COMMODITY DATA SUMMARIES (EARLY DATA 90 COMMODITIES)
• ANNUAL MINERALS YEARBOOK
– VOL. I – COMMODITIES
– VOL. II – STATES
– VOL. III – INTERNATIONAL
• COMMENT ON LEGISLATION (APPROX. 1,000 BILLS PER YEAR)
• CONSULTANTS TO EXECUTIVE DEPARTMENT IN INTER–AGENCY STUDIES
• COMMENT ON ENVIRONMENTAL IMPACT STUDIES
• MONITORING ON EMERGENCY SUPPLY INTERRUPTIONS
– COAL STRIKE
– PETROLEUM STRIKE
– RAILROAD STRIKE
• COMMENT ON STATUS OF TRANSPORTATION
– CONRAIL
• COMPUTER TAPES

FIGURE 4

FREQUENCY OF REGULARLY ISSUED BUREAU OF MINES COMMODITY REPORTS

(W WEEKLY. M MONTHLY. Q QUARTERLY. A ANNUALLY)

MINERAL INDUSTRY SURVEYS:

ABRASIVE MATERIALS (A)
ALUMINUM (M,A)
ANTIMONY (Q,A)
ASBESTOS (A)
BARITE (A)
BAUXITE (Q)
BERYLLIUM (A)
BISMUTH (Q,A)
BORON (A)
BROMINE (A)
CADMIUM (Q,A)
CALCIUM-MAGNESIUM CHLORIDE (A)
CARBON BLACK (Q,A)
CEMENT (M,A)
CESIUM AND RUBIDIUM (A)
CHROMIUM (M,A)
CLAYS (A)
COAL, BITUMINOUS (W,A)
COAL, BITUMINOUS DISTRIBUTION (Q)
COAL, ANTHRACITE (W,A)
COAL, ANTHRACITE DISTRIBUTION (A)
COBALT (M,A)
COBALT REFINERS (Q)
COKE AND COAL CHEMICALS (M,A)
COKE DISTRIBUTION (A)
COKE PRODUCERS (A)
COLUMBIUM AND TANTALUM (A)
COPPER INDUSTRY (M,A)
COPPER PRODUCTION (M)
COPPER SULFATE (Q)
DIATOMITE (A)
FELDSPAR (A)
FERROALLOYS (SEMIANNUAL)
FERROSILICON (Q,A)
FLUORSPAR (Q,A)
GEM STONES (A)
GOLD AND SILVER (M,A)
GRAPHITE (A)
GYPSUM (M,A)
IODINE (A)
IRON AND STEEL (A)
IRON AND STEEL SCRAP (M,A)
IRON ORE (M,A)
KYANITE AND RELATED MATERIALS (A)
LEAD INDUSTRY (M,A)
LEAD, PRIMARY PRODUCTION (M)
LIME (M,A)
LIQUEFIED PETROLEUM GASES & ETHANE SALES (A)
LITHIUM (A)
MAGNESIUM, PRIMARY (Q,A)
MAGNESIUM AND MAGNESIUM COMPOUNDS (A)
MANGANESE (M,A)
MERCURY (Q,A)
MICA (A)
MINERAL PRODUCTION, WORLD (A)
MINOR NONMETALS (A)
MOLYBDENUM (M,A)
NATURAL GAS (M,A)
NATURAL GAS LIQUIDS (M)
NATURAL GAS PRODUCTION, WORLD (A)
NICKEL (M,A)
NITROGEN (A)
PEAT (A)
PEAT PRODUCERS (A)
PERLITE (A)
PETROLEUM AND PETROLEUM PRODUCTS:
- ASPHALT SALES (A)
- CRUDE OIL PRODUCTION, WORLD (A)
- CRUDE OIL AND PRODUCTS PIPELINE MILEAGE (TRI-ANNUALLY)
- DISTRICT V PETROLEUM STATEMENT (M,A)
- FUEL OIL AND KEROSINE SALES (A)
- FUEL OILS BY SULFUR CONTENT (M)
- PETROLEUM REFINERIES IN U.S. (A)
- PETROLEUM STATEMENT, ADVANCE RELEASE (M)
- PETROLEUM STATEMENT (M,A)

PHOSPHATE ROCK (M,A)
PLATINUM GROUP METALS (Q,A)
POTASH (A)
PUMICE AND VOLCANIC CINDER (A)
RARE EARTH ELEMENTS AND THORIUM (A)
RHENIUM (A)
SALT (A)
SAND AND GRAVEL (A)
SELENIUM (Q)
SELENIUM AND TELLURIUM (A)
SLAG, IRON AND STEEL (A)
SODIUM COMPOUNDS (A)
STONE (A)
SULFUR (M,A)
TALC, SOAPSTONE, AND PYROPHYLLITE (A)
TIN (M,A)
TITANIUM (Q,A)
TUNGSTEN (M,A)
URANIUM (A)
VANADIUM (M,A)
VERMICULITE (A)
ZINC INDUSTRY (M,A)
ZINC PRODUCTION (M)
ZINC OXIDE (M)
ZIRCONIUM AND HAFNIUM (A)

OTHER REPORTS:

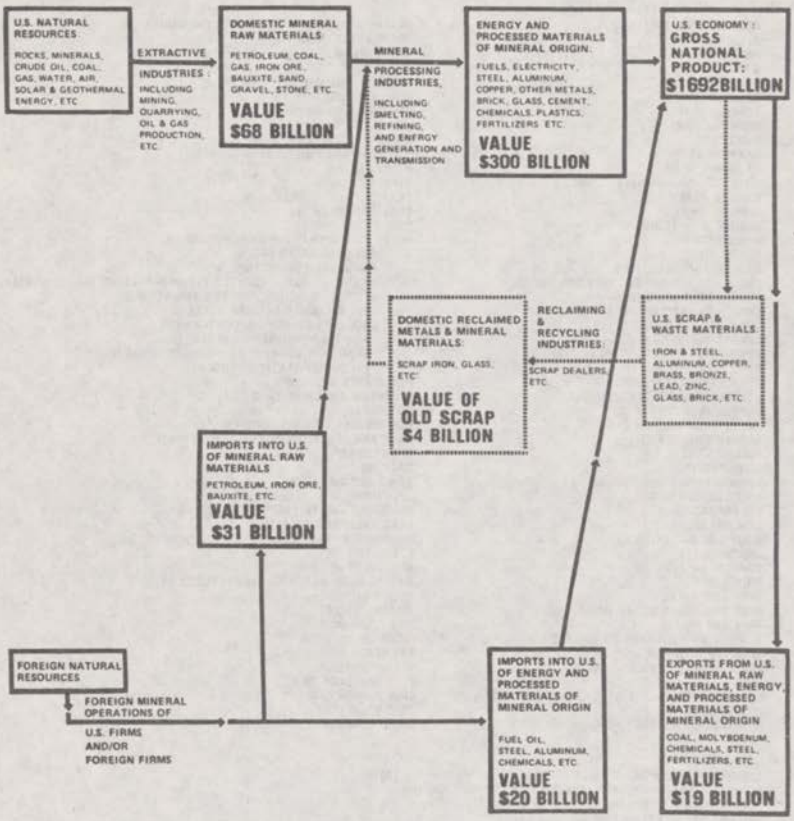
COMMODITY DATA SUMMARIES (COVERS 95 COMMODITIES) (A)
MINERALS AND MATERIALS (COVERS 17 COMMODITIES) (M)
INTERNATIONAL COAL TRADE (M)
INTERNATIONAL PETROLEUM ANNUAL (A)
MINERAL TRADE NOTES (M)
MINERALS YEARBOOK, VOL. I (COVERS 92 COMMODITIES) (A)
MINERALS YEARBOOK, VOL. II (COVERS 50 STATES) (A)
MINERALS YEARBOOK, VOL. III (COVERS 157 COUNTRIES) (A)
MINERAL FACTS & PROBLEMS (COVERS 89 COMMODITIES) (EVERY 5 YEARS)

07075

FIGURE 5

THE ROLE OF MINERALS IN THE U.S. ECONOMY

(ESTIMATED VALUES FOR 1976)



BUREAU OF MINES, U.S. DEPARTMENT OF THE INTERIOR (Based in part on U.S. Department of Commerce data)

FIGURE 6

U.S. IMPORTS AND EXPORTS OF RAW AND PROCESSED MINERALS

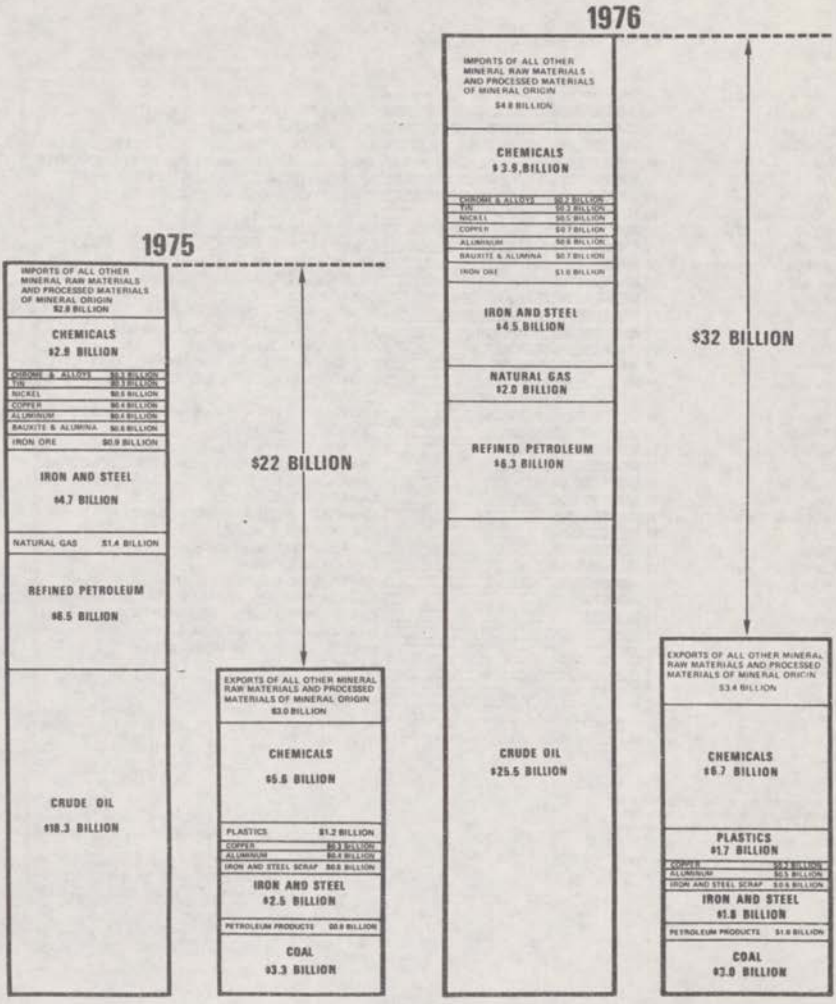
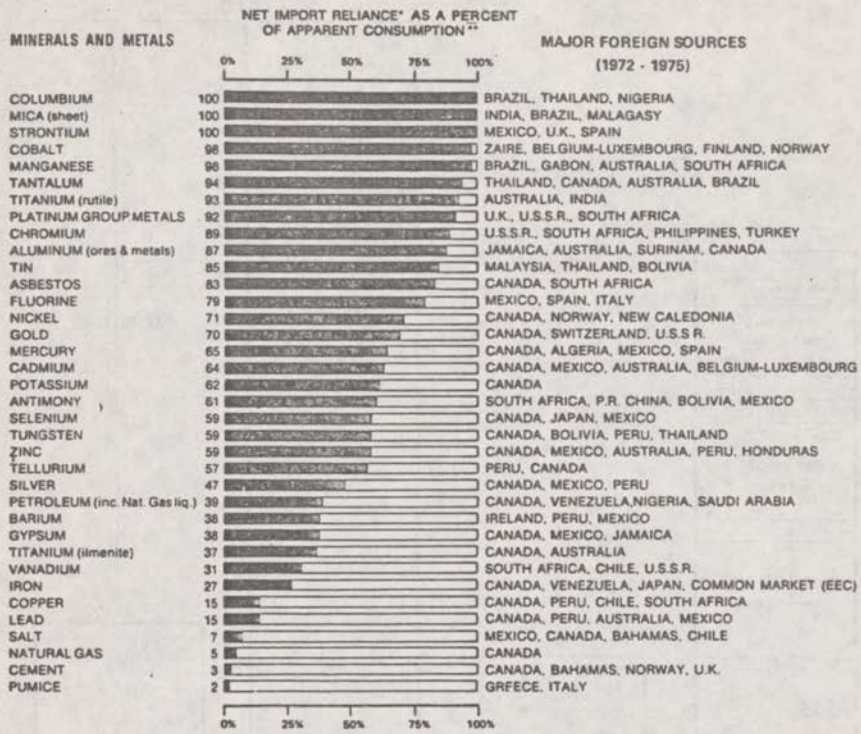


FIGURE 7

BUREAU OF MINES, U.S. DEPARTMENT OF THE INTERIOR (data from Bureau of the Census)

NET IMPORT RELIANCE OF SELECTED MINERALS AND METALS AS A PERCENT OF CONSUMPTION IN 1976



* NET IMPORT RELIANCE = IMPORTS-EXPORTS + ADJUSTMENTS FOR GOV'T AND INDUSTRY STOCK CHANGES (EXCEPT FOR PETROLEUM AND NATURAL GAS).

** APPARENT CONSUMPTION = U.S. PRIMARY + SECONDARY PRODUCTION + NET IMPORT RELIANCE

BUREAU OF MINES, U.S. DEPARTMENT OF THE INTERIOR (import-export data from Bureau of the Census)

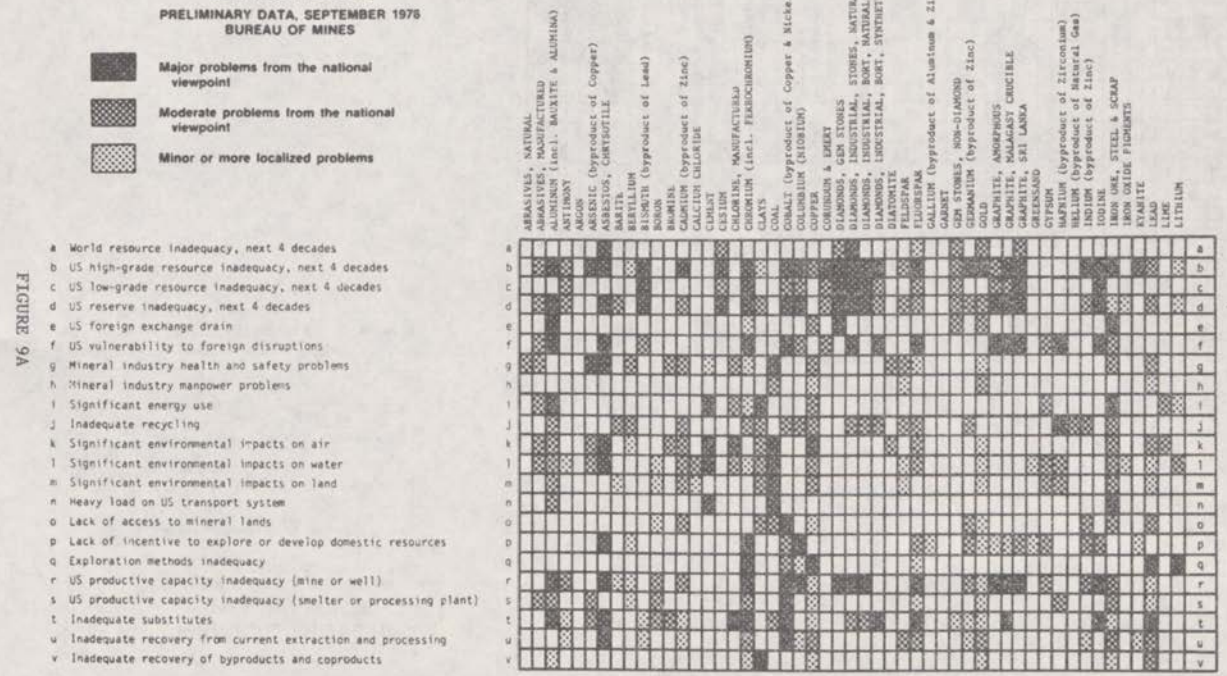

MINERAL PROBLEMS
1976 AND BEYOND
PRELIMINARY DATA, SEPTEMBER 1976
BUREAU OF MINES
Major problems from the national viewpoint
Moderate problems from the national viewpoint
Minor or more localized problems
a World resource inadequacy, next 4 decades
b US high-grade resource inadequacy, next 4 decades
c US low-grade resource inadequacy, next 4 decades
d US reserve inadequacy, next 4 decades
e US foreign exchange drain
f US vulnerability to foreign disruptions
g Mineral industry health and safety problems
h Mineral industry manpower problems
i Significant energy use
j Inadequate recycling
k Significant environmental impacts on air
l Significant environmental impacts on water
m Significant environmental impacts on land
n Heavy load on US transport system
o Lack of access to mineral lands
p Lack of incentive to explore or develop domestic resources
q Exploration methods inadequacy
r US productive capacity inadequacy (mine or well)
s US productive capacity inadequacy (smelter or processing plant)
t Inadequate substitutes
u Inadequate recovery from current extraction and processing
v Inadequate recovery of byproducts and coproducts
ABRASIVES, NATURAL
ABRASIVES, MANUFACTURED
ALUMINUM (incl. BAUXITE & ALUMINA)
ANTIMONY
ARSON
ASBESTOS (byproduct of Copper)
ASBESTOS, CHRYSOTILE
BARITE
BERYLLIUM
BISMUTH (byproduct of Lead)
BORON
BROMINE
CADMIUM (byproduct of Zinc)
CALCIUM CHLORIDE
CEMENT
CESIUM
CHLORINE, MANUFACTURED
CHROMIUM (incl. FERROCHROMIUM)
CLAYS
COAL
COBALT (byproduct of Copper & Nickel)
COLUMBIUM (NIOBIUM)
COPPER
CORUNDUM & EMERY
DIAMONDS, GEM STONES
DIAMONDS, INDUSTRIAL, STONES, NATURAL
DIAMONDS, INDUSTRIAL, BORT, NATURAL
DIAMONDS, INDUSTRIAL, BORT, SYNTHETIC (Pyrophyllite)
DIATOMITE
FELDSPAR
FLUORSPAR
GALLIUM (byproduct of Aluminum & Zinc)
GARNET
GEM STONES, NON-DIAMOND
GERMANIUM (byproduct of Zinc)
GOLD
GRAPHITE, AMORPHOUS
GRAPHITE, MALAGASY CRUCIBLE
GRAPHITE, SRI LANKA
GREENSAND
GYPSUM
HAFNIUM (byproduct of Zirconium)
HELIUM (byproduct of Natural Gas)
INDIUM (byproduct of Zinc)
IODINE
IRON ORE, STEEL & SCRAP
IRON OXIDE PIGMENTS
KYANITE
LEAD
LIME
LITHIUM

FIGURE 9A

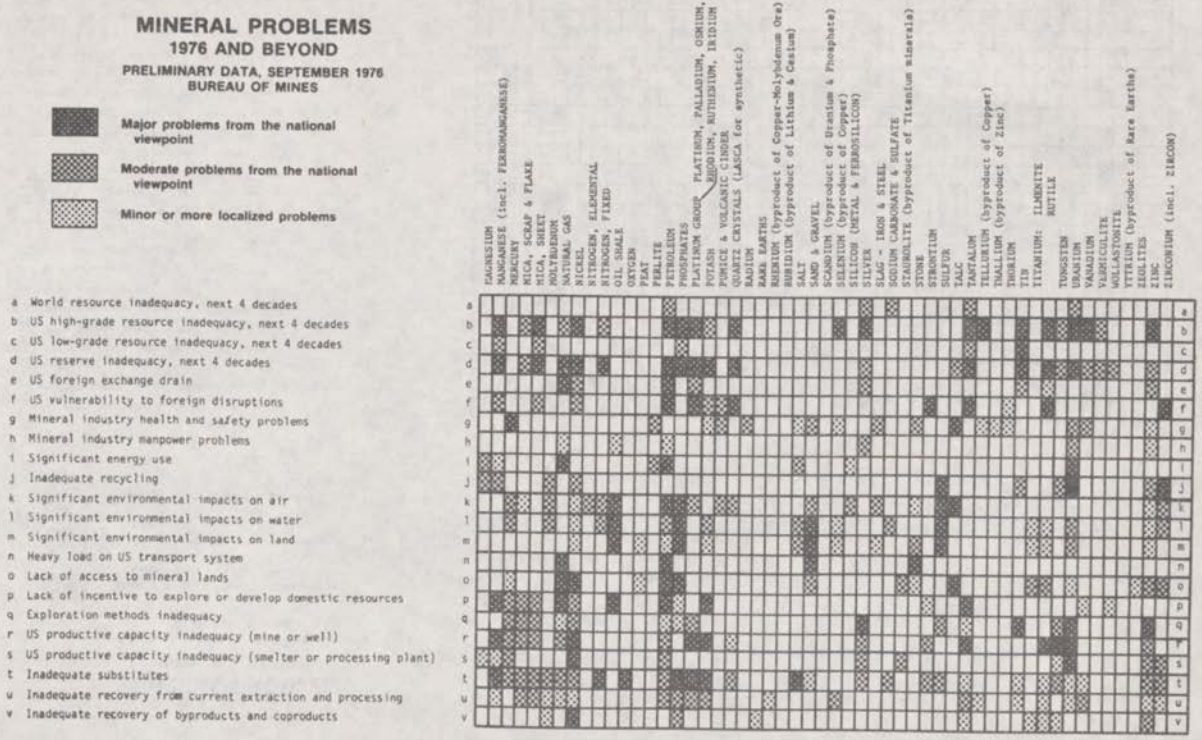

MINERAL PROBLEMS
1976 AND BEYOND
PRELIMINARY DATA, SEPTEMBER 1976
BUREAU OF MINES
Major problems from the national viewpoint
Moderate problems from the national viewpoint
Minor or more localized problems
a World resource inadequacy, next 4 decades
b US high-grade resource inadequacy, next 4 decades
c US low-grade resource inadequacy, next 4 decades
d US reserve inadequacy, next 4 decades
e US foreign exchange drain
f US vulnerability to foreign disruptions
g Mineral industry health and safety problems
h Mineral industry manpower problems
i Significant energy use
j Inadequate recycling
k Significant environmental impacts on air
l Significant environmental impacts on water
m Significant environmental impacts on land
n Heavy load on US transport system
o Lack of access to mineral lands
p Lack of incentive to explore or develop domestic resources
q Exploration methods inadequacy
r US productive capacity inadequacy (mine or well)
s US productive capacity inadequacy (smelter or processing plant)
t Inadequate substitutes
u Inadequate recovery from current extraction and processing
v Inadequate recovery of byproducts and coproducts
MAGNESIUM
MANGANESE (incl. FERROMANGANESE)
MERCURY
MICA, SCRAP & FLAKE
MICA, SHEET
MOLYBDENUM
NATURAL GAS
NICKEL
NITROGEN, ELEMENTAL
NITROGEN, FIXED
OIL SHALE
OXYGEN
PEAT
PERLITE
PETROLEUM
PHOSPHATES
PLATINUM GROUP: PLATINUM, PALLADIUM, OSMIUM, RHODIUM, RUTHENIUM, IRIDIUM
POTASH
PUMICE & VOLCANIC CINDER
QUARTZ CRYSTALS (LASCA for synthetic)
RARE EARTHS
RHENIUM (byproduct of Copper-Molybdenum Ore)
RUBIDIUM (byproduct of Lithium & Cesium)
SALT
SAND & GRAVEL
SCANDIUM (byproduct of Uranium & Phosphate)
SELENIUM (byproduct of Copper)
SILICON (METAL & FERROSILICON)
SILVER
SLAG - IRON & STEEL
SODIUM CARBONATE & SULFATE
STAUROLITE (byproduct of Titanium minerals)
STONE
STRONTIUM
SULFUR
TALC
TANTALUM
TELLURIUM (byproduct of Copper)
THALLIUM (byproduct of Zinc)
THORIUM
TIN
TITANIUM: ILMENITE
RUTILE
TUNGSTEN
URANIUM
VANADIUM
VERMICULITE
WOLLASTONITE
YTTRIUM (byproduct of Rare Earths)
ZEOLITES
ZINC
ZIRCONIUM (incl. ZIRCON)

FIGURE 9B

FISCAL YEAR 1978 BUDGET REQUEST
(Thousands)

	FY 1977	FY 1978	INCREASE (+) OR DECREASE (−)
METALLURGY RESEARCH	$ 26,535	$ 25,579	−$ 956
MINING RESEARCH	107,881	105,405	− 2,476
MINED LAND DEMONSTRATIONS	10,109	4,138	− 5,971
DATA COLLECTION AND ANALYSIS	16,121	17,174	+ 1,053
MINERAL LAND ASSESSMENTS	4,306	5,403	+ 1,097
PROGRAM ADMINISTRATION	1,545	2,830	+ 1,285
TOTAL, MINES AND MINERALS	**$166,497**	**$160,529**	**−$5,968**

FIGURE 10

02107

FISCAL YEAR 1978 BUDGET INCREASES AND DECREASES

	FY 1978 CHANGE (THOUSANDS)
PROGRAM INCREASES	
METALLURGY RESEARCH—CRITICAL MINERALS	+$3,133
COAL PREPARATION RESEARCH	+ 2,900
DATA COLLECTION AND ANALYSIS	
CRITICAL MINERALS	+ 768
OCEAN MINING STUDIES	+ 300
MINERAL LAND ASSESSMENTS	+ 1,097
EMPLOYEE WORKPLACE HEALTH AND SAFETY	+ 1,000
EMPLOYEE COMPENSATION FUND PAYMENTS	+ 285
SUBTOTAL	+ 9,463
PROGRAM DECREASES	
ALUMINA PILOT PLANT STUDIES	− 500
REDIRECTION OF TOXIC MATERIALS RESEARCH	− 820
COLLEGE PARK METALLURGY RESEARCH CENTER	− 2,800
COAL MINE HEALTH AND SAFETY RESEARCH	− 179
ADVANCING COAL MINING TECHNOLOGY	− 2,835
ADVANCING OIL SHALE MINING TECHNOLOGY	− 2,442
ANTHRACITE MINED LAND DEMONSTRATIONS	− 1,971
ANTHRACITE CONVERSION DEMONSTRATION PLANT	− 3,080
BITUMINOUS MINED LAND DEMONSTRATIONS	− 1,000
ENERGY MODEL DEVELOPMENT	− 100
SUBTOTAL	−15,647
SPACE INCREASES	+ 216
NET DECREASE	−$5,968

02107

UPGRADING COALS BY BENEFICIATION

COAL SEAM	AS MINED	ANALYSIS (DRY BASIS)	BENEFICIATED
UPPER FREEPORT	17.8	% ASH	8.1
	2.45	% SULFUR	1.08
	12535	BTU/LB	13998
SOUTHERN APPALACHIA (COMPOSITE)	11.0	% ASH	5.0
	1.04	% SULFUR	0.89
	13314	BTU/LB	14211
ALABAMA	9.5	% ASH	5.6
	1.33	% SULFUR	1.06
	13696	BTU/LB	14294
EASTERN "MIDWEST" REGION (COMPOSITE)	14.7	% ASH	6.9
	3.88	% SULFUR	2.59
	12052	BTU/LB	13150
WESTERN REGION (COMPOSITE)	8.9	% ASH	5.5
	0.68	% SULFUR	0.54
	12437	BTU/LB	12967
LIGNITE BAUKOL-NOONAN	8.7	% ASH	7.2
	1.39	% SULFUR	0.76
	11031	BTU/LB	11241

COAL RECOVERY RANGES FROM 91.3 PERCENT FOR UPPER FREEPORT TO 98.8 PERCENT FOR LIGNITE.

U.S. BUREAU OF MINES

FIGURE 12

87-591 O - 77 - 6

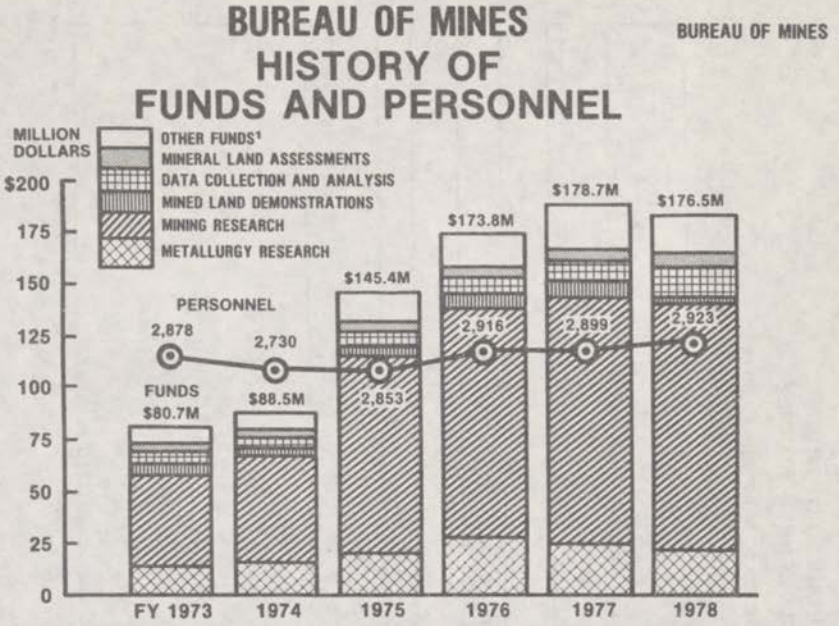
BUREAU OF MINES

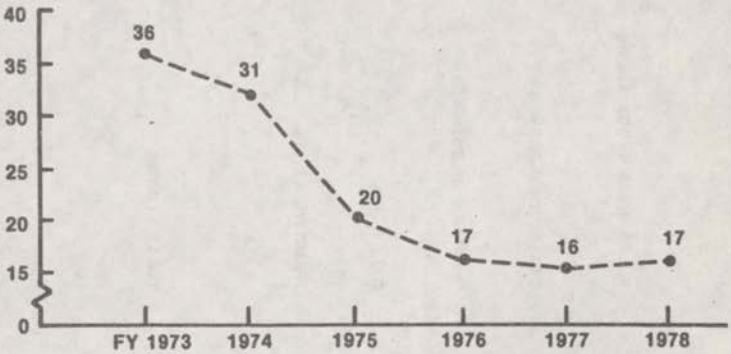
FISCAL YEAR 1978 BUDGET REQUEST
COAL EXTRACTION AND
COAL PREPARATION
(Millions)

PROGRAM	FY 1977	FY 1978
COAL MINE DEVELOPMENT	$ 9.0	$ 8.5
LONGWALL AND SHORTWALL MINING	12.9	12.3
CONVENTIONAL AND CONTINUOUS MINING	13.8	13.6
ADVANCED MINING SYSTEMS	10.0	9.5
SURFACE COAL MINING	11.0	10.1
SUPPORTING STUDIES	1.2	1.0
COAL PREPARATION	2.1	5.0
SPACE INCREASE	—	0.1
TOTAL	$60.0	$60.1

FIGURE 13

02107





[1] INCLUDES OBLIGATIONS FOR PROGRAM ADMINISTRATION, MISCELLANEOUS APPROPRIATIONS, HELIUM FUND, CONSOLIDATED WORKING FUND, AND CONTRIBUTED FUNDS

FIGURE 14

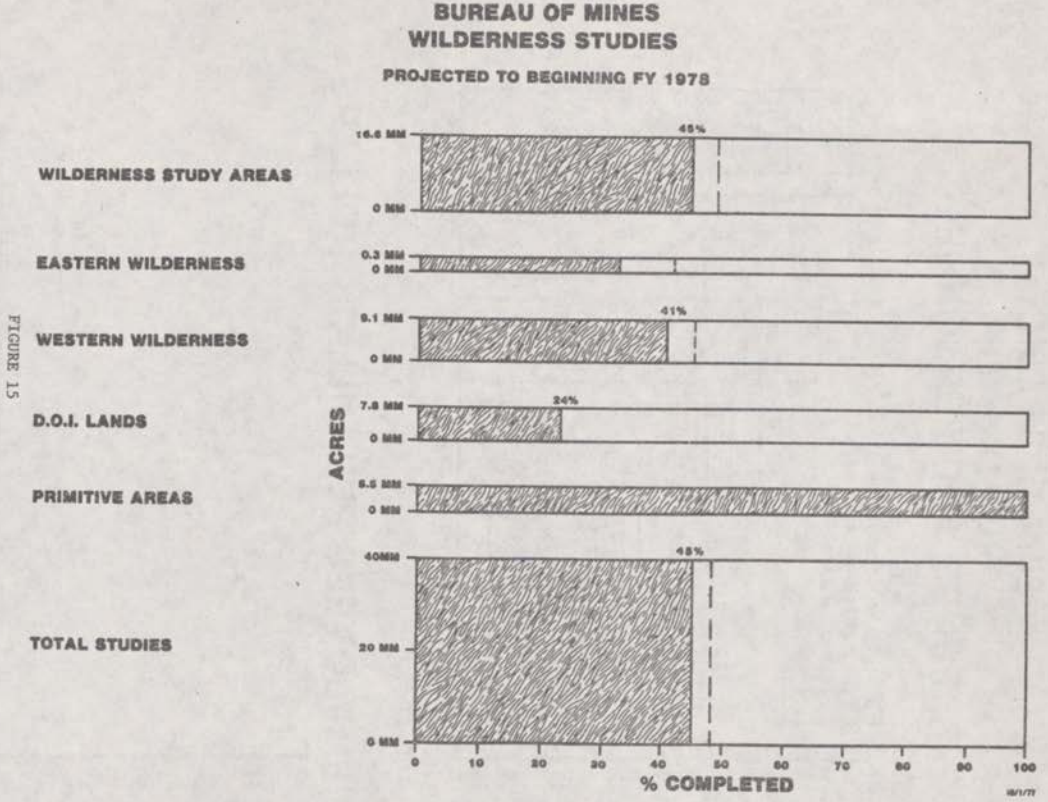

BUREAU OF MINES
WILDERNESS STUDIES
PROJECTED TO BEGINNING FY 1978
WILDERNESS STUDY AREAS
EASTERN WILDERNESS
WESTERN WILDERNESS
D.O.I. LANDS
PRIMITIVE AREAS
TOTAL STUDIES
16.6 MM
0 MM
45%
0.3 MM
0 MM
9.1 MM
0 MM
41%
7.8 MM
0 MM
24%
5.5 MM
0 MM
40MM
20 MM
0 MM
45%
ACRES
0
10
20
30
40
50
60
70
80
90
100
% COMPLETED
10/1/77

FIGURE 15

OVERALL ORGANIZATION OF BUREAU

Dr. MORGAN. Figure 1 shows in summary the overall organization of the Bureau of Mines, with two main Divisions—Research and Development, in particular mining and metallurgy, along with the helium function and supply/demand analysis, where we are the Government's main source of information on mineral material.

BUREAU FIELD LOCATIONS

Figure 2 shows that the Bureau of Mines covers every State. We have 23 field installations, including 5 mining research centers. 8 metallurgy research centers, and 4 mineral supply field operation centers.

We have State liaison officers covering every one of the 50 States. We also have research projects in many States, so we are covering the entire country.

BUREAU MINERALS ROLE

Figure 3 on the role of minerals the Bureau in the cycle shows that we work closely with the Geological Survey, which is responsible for geologic, topographic, hydrologic work, which are essential to mineral development.

The Bureau's prime concerns are mining, beneficiation, processing, refining, recycling, land rehabilitation, and materials development, and then we interface closely with the Department of Defense, the Department of Commerce, the Federal Preparedness Agency, and other such groups on the uses of material.

FLOW OF INFORMATION INTO BUREAU

Figure 4 shows the flow of information into the Bureau from our field offices, from industry where 90,000 firms report generally monthly, some quarterly, all annually, on detailed surveys. We are also in touch with a number of foreign governments. The United States has, of course, State Department people in every foreign country. In the more important mineral-producing areas we have mineral attaches, and we are working with the State Department in the training of resource attaches who spend a little while in the Geological Survey and in the Bureau of Mines before going overseas.

DEPARTMENT OF STATE ATTACHES

Mr. YATES. You have attaches in Afghanistan?

Dr. MORGAN. No, sir, that is just an attempt to list all the 160 countries.

Mr. YATES. Do you have an attache with every embassy?

Dr. MORGAN. In smaller countries the commercial attache serves as the resource man. There will be a number of resource attaches and of these, several are mineral attaches per se, in that they are geologists or mining engineers and they are the mineral-producing areas. They would cover more than one country. They would cross the borders and go into other ones. We can supply for the record a list of where the present attaches are located.

[The information follows:]

CURRENT MINERAL AND RESOURCE ATTACHES AND COUNTRY ASSIGNMENTS

Location	*Regional responsibility*
Canberra	Australia, New Zealand, Fiji and Papua, New Guinea.
La Paz	Argentina, Bolivia, and Chile.
Rio de Janeiro	Brazil.
New Delhi	India, Iran, Pakistan, and Afghanistan.
Johannesburg	Republic of South Africa, Territory of Southwest Africa, Lesotho, Botswana, Swaziland, Rhodesia, Angola, Mozambique, Malagasy Republic, and Malawi.
Mexico City [1]	Mexico.
Tokyo	Japan, South Korea, Taiwan, and Peoples Republic of China.
Caracas	Venezuela, Guyana, Jamaica, Haiti, Surinam, Trinidad and Tobago, Costa Rica, Panama, Dominican Republic.
Jakarta	Indonesia and the Philippines.
Brussels	European community and the Scandinavian countries.
Bangkok	Thailand, Burma, and Malaysia.

[1] Mineral officer.

REPORTS OF BUREAU

All of this information flows into the Bureau. We put out reports that I am sure you are familiar with, for example "Mineral Facts and Problems," and reports on Russia, China, Africa, and on different commodities. Figure 5 shows that we cover about 100 different commodities, some monthly, some quarterly, all annually. And in time of any emergency like a coal strike or an embargo on a material or a disaster, we can report weekly or even daily.

BUREAU RELATIONSHIP TO STRATEGIC STOCKPILE

Mr. YATES. What is your relationship to the strategic stockpile?

Dr. MORGAN. The strategic stockpile is the prime responsibility of the Federal Preparedness Agency, which is presently headed by General Bray. Ninety-three materials are strategic and critical under that act, and 79 of the 93 are metals and minerals, for which our people supply the basic technical information on supply and demand worldwide for these materials. In addition, the Bureau has very specific responsibilities under section 7(a) of the Stockpiling Act of 1946, which says that the Secretary of the Interior, acting through the Geological Survey and the Bureau of Mines, is to undertake all sorts of investigations on extending supplies of materials in this country which are not adequate for defense or industrial purposes.

So much of our research work in mining and metallurgy actually draws on the authority of section 7(a) of the Stockpiling Act.

ROLE OF MINERALS IN THE ECONOMY

Figure 6 shows the role of minerals in the U.S. economy. We follow them "raw" as they come out of the mine. We follow them "processed" where they are upgraded into aluminum or steel, or other forms. We follow the imports and the exports, the scrap recycled, the entire flow of minerals.

MINED IMPORTS AND EXPORTS

Figure 7 shows the dollar values of imports and exports. Besides just keeping track of the information, our mission, if we were to state it simply, is to either try to reduce the imports or to increase the exports in the mineral area. You will note, sir, that in 1976 the country had a deficit of $32 billion in the mineral balance of trade.

Mr. YATES. That includes petroleum?

Dr. MORGAN. That is right. Petroleum and natural gas are the big import items, followed by iron and steel, and then a variety of strategic materials.

Mr. YATES. Why did we have that deficit in iron and steel?

Dr. MORGAN. This is a current problem with the iron and steel industry in this country. If you recall, for a number of years the Government has been seeking to have limitations placed upon the imports of steel products from abroad. In fact, a few years ago the Government negotiated a limitation of some 15 million tons a year of steel to be imported. It is essentially a question of competition, largely from the European Community and Japan.

Mr. YATES. What is the nature of chemicals that are imported?

Dr. MORGAN. This is a basket category, sir, which we could break out. These are a variety of mineral-based chemicals. In constructing this chart we have tried to pick out any which run over $200 million a year, so those that are over $200 million we have identified individually, in contrast to a whole group of miscellaneous items such as the chemicals.

Mr. YATES. Mr. McDade.

Mr. MCDADE. Doctor, this chart of our imports doesn't select any of what we refer to many times as critical minerals, does it?

Dr. MORGAN. That, sir, we have on the next chart.

Mr. MCDADE. Thank you.

In response to the question of the chairman as to iron and steel do you mean finished products?

Dr. MORGAN. Yes, sir.

REFINED PETROLEUM IMPORTS

Mr. MCDADE. What about refined petroleum; what is that?

Dr. MORGAN. That would be fuel oil or gasoline.

Mr. MCDADE. These are the distillates in that form?

Dr. MORGAN. Yes, sir, not just crude oil.

Mr. MCDADE. Thank you.

Is that the imports that come from the Caribbean factory plants?

Dr. MORGAN. The dollar import data include material from all offshore sources, including the Virgin Islands, Puerto Rico, and the Hawaiian foreign trade zone.

Mr. MCDADE. There are other in the Caribbean?

Dr. MORGAN. It would also include Venezuela, Trinidad, Aruba, and places like that.

Mr. MCDADE. Is all of it Caribbean?

Dr. MORGAN. No. In addition some comes from abroad.

Mr. MCDADE. If you would find that figure for us to show how much of it emanates from plants in the Caribbean or relatively close and how much comes from very distant areas. I would appreciate that.

Dr. MORGAN. Yes, sir, we have that information and we would be delighted to put it together.

[The information follows:]

REFINED PETROLEUM IMPORTS—CARIBBEAN AND OTHER COUNTRIES

Imports of petroleum products (including plant condensate and unfinished oils) totaled 734,787,000 barrels in 1976 compared to 712,154,000 barrels in 1975. This was an increase of 3.2 percent. Imports from Central American and Caribbean countries accounted for 45.1 percent of these imports during 1976 compared to 51 percent during 1975.

MINERAL IMPORT DEPENDENCE DATA

Dr. MORGAN. Figure 8 shows a number of critical materials. We follow materials not only in terms of their dollar importance but also their relative strategic importance, and here we have charted our degree of dependence on imports for a number of critical materials and show the main foreign sources in recent years. It is this sort of data that we are working back and forth with day to day with the Federal Preparedness Agency.

Mr. YATES. What do you mean you have listed them in their strategic importance? Is that because of the shortages or because of the importance of the metal?

Dr. MORGAN. They are not in importance per se from top to bottom, but rather they are listed in order of degree of dependence upon imports. The 100-percent dependence ones are at the top of the chart and then it reduces down as the degree of dependence shrinks. However, I wouldn't want to say because columbium is the top one on the chart it is strategically more important than chromium, which is 89 percent imported. Actually the chromium at 89 percent may be more important than the columbium at 100 percent.

COLUMBIUM IMPORTATION AND DOMESTIC RESOURCES

Mr. YATES. We don't have any columbium in this country, is what you are saying?

Dr. MORGAN. That is right. There are no active mines in this country.

Mr. YATES. Is there columbium in this country that is not actively being produced?

Dr. MORGAN. There are some very low grade disseminated deposits which contain columbium. but actually we draw considerably on Brazil. There is some lower grade material in Canada. There is really practically none in this country, therefore stockpiling is the answer to the problem.

Mr. YATES. What is the difference between the columbium we have in this country and that which we import from Brazil or other places?

Dr. MORGAN. In past years, sir, columbium was largely a byproduct of tin mining. They dredged the tin up and some of the coumbium came up as columbium-tantalium minerals along with the tin oxide. In more recent years they found a lower grade in so-called pyrochlore deposits, which are in Brazil and in Canada, and they have developed methods of treating those.

I suppose if we were to look very hard there would be some very low-grade domestic materials—it depends on what percent of the material.

Mr. YATES. That is what I am asking.

What percent do we have in this country as opposed to the percent that comes from Brazil?

Dr. MORGAN. Offhand I do not know, sir, but we can supply that for the record.

[The information follows:]

UNITED STATES AND FOREIGN COLUMBIUM DEPOSITS

There was an insignificant quantity of columbium minerals mined in the United States in 1976. The two highest grade columbium deposits in the United States, as shown in the attached table, were not considered to be economic at current prices of $1.75 to $1.85 per pound of contained columbium pentoxide (Cb_2O_5). In 1976, U.S. imports of columbium concentrates came from Brazil, 58 percent; Canada, 27 percent; Nigeria, 7 percent; and others, 8 percent. In addition, the United States imported an estimated 2 million pounds of columbium in the form of ferrocolumbium from Brazil. In 1976, Brazil supplied approximately 75 percent of the world's demand for columbium; the remaining 25 percent was supplied mainly by Canada. Virtually the entire quantity of Brazil's exports of columbium came from the Araxá deposit in the State of Minas Gerais . This deposit is considered to be the largest and to contain the highest grade of pyrochlore (columbium) in the world. Canadian exports of columbium came from the St. Honore and Oka pyrochlore deposits in Quebec.

GRADE OF COLUMBIUM IN THE UNITED STATES AND FOREIGN DEPOSITS

Country and deposit	Quantity of ore (million tons)	Average grade of Columbium contained (percent)	Thousand tons of Columbium contained
United States: Bear Valley, Idaho	270	0.003	5.6
United States: Iron Hill, Colo	40	.175	69.9
Brazil: Araxá, Minas Gerais	381	2.4	9,144.0
Brazil: Tapira, Minas Gerais	41	.23	94.3
Brazil: Catalão, Goia	126	.21	264.6
Brazil: Pegmaties, Minas Gerais	128	10.5	13.0
Canada: St. Honore, Chicoutimi, Quebec	100	.50	349.5
Canada: Oka, Quebec	225	.30	447.9
Canada: James Bay, Ontario	40	.36	145.4
Canada: Lakner Lake, Ontario	50	.18	90.9
Canada: Chapleau, Ontario	20	.35	69.9
Canada: Lake Nippissing, Ontario	5	.49	24.5

MICA IMPORTS AND SUBSTITUTES

Mr. YATES. Is mica the same situation? I seem to remember mica installations in various parts of this country. Tennessee perhaps?

Dr. HENRIE. Yes; we have the capability of making synthetic mica and the Bureau of Mines has done research on a variety of mineral synthetics.

Dr. MORGAN. If I might just illustrate, sir, here is an old mica toaster element. Mica is high temperature resistant. If you bought a toaster 20 years ago, that is what it looked like.

Mr. YATES. That is the kind we are using now in my house.

Dr. MORGAN. In contrast, here is a new element.

On this old one they stapled little pieces of mica together. That mica probably came from India, where they split it apart with their

fingernails, packed it neatly in little boxes and shipped it over here. The new one is reconstituted mica.

Mr. YATES. Is it synthetic?

Dr. MORGAN. It is actual mica but a lower grade material. Instead of large natural pieces it has been prepared with a plastic binder almost the way one would make paper, resulting in a single sheet which is a lot easier to handle and more uniform in composition.

Mr. YATES. Where does that come from?

Dr. MORGAN. That comes from this country. Therefore, the ability to take the lower grade material, reconstitute it, and make an acceptable substitute for the natural material, has reduced our dependence on large natural film mica.

Mr. YATES. What is the difference in cost?

Dr. MORGAN. In the past natural mica probably was cheaper.

Mr. YATES. Referring to Indian mica?

Dr. MORGAN. That is right.

But one couldn't produce film mica cheaply in this country. There were high-grade mica mines, largely in North Carolina, but they have shut down.

Mr. YATES. Why?

Dr. MORGAN. They can't afford to pay the labor to pick it out with a pick and carefully sit there and put pieces 2 inches by 3 inches or so in a pile. It is too costly. It is easier to take a low-grade deposit, float out the mica, mix it with a binder and make it like paper.

Mr. YATES. What company does that?

Dr. MORGAN. Offhand I don't know, sir, but we can supply it for the record. They report to us.

[The information follows:]

MICA PROCESSORS

Reconstituted mica or mica paper is manufactured by the following companies in the United States: General Electric Co., Schenectady, N.Y.; U.S. Samica Corp., Rutland, Vt.; Kirkwood-Acim Paper Co., Hempstead, N.Y.; Essex Group United Technologies, Inc., New Market, N.H.; and Corona Films, Inc., W. Townsend, Mass.

MICA SUBSTITUTION TECHNOLOGY DEVELOPMENT

Mr. MCDADE. Who developed that technology, Doctor?

Dr. MORGAN. Largely private industry, although the Bureau of Mines has done work on substitutes or alternate methods of processing all of these highly strategic materials.

Mr. MCDADE. Did Bureau of Mines metallury research contribute to the reconstitution of that mica?

Mr. YATES. Say "yes," even if you haven't.

Dr. HENRIE. I have visited places where they do extract the mica—a former bureau station at Norris, Tenn.

Mr. YATES. That qualifies.

Mr. MCDADE. It is a patented process, isn't it?

Dr. HENRIE. I would think so.

STRONTIUM IMPORTS

Mr. YATES. I notice you have strontium. Does that include strontium-90?

Dr. MORGAN. They would be strontium in any form. The main uses of strontium are in color TV tubes and in red flares that you see when a truck breaks down on a highway and it burns bright red; or for military purposes in tracer bullets where every fifth bullet has a red tracer behind it. That is a strontium compound.

Mr. YATES. We don't have any in this country?

Dr. MORGAN. There are deposits of the strontium mineral, celestite, here but it doesn't pay to mine it. In fact, there was a fairly good mine in Canada which shut down a year ago, and we now get most from Mexico and some from Spain. Again it is a matter of competition.

CANADIAN IMPORTS AND TRADE RELATIONS

Mr. YATES. How many of these metals are imported from Canada?

Dr. MORGAN. We have shown here on this chart the relative importance of the sources. So where we listed, such as columbium, Brazil as the first country that is the main supplier. Then as we go further down the chart you will see there are a number like nickel, 71 percent, where Canada is listed first, so it is our main source.

Mr. YATES. Canada is in there a great deal.

Dr. MORGAN. That is right, sir.

Mr. YATES. You don't have anything to do with the question of trade relations with this country?

Dr. MORGAN. Yes, sir, we do. The Secretary of the Interior works very closely with the special representative for trade negotiations on the trade agreements when it comes to matters of metals or minerals or materials within the purview of Interior.

Mr. YATES. For that purpose are you the Secretary of Interior?

Dr. MORGAN. The Bureau of Mines provides representation on the Trade Policy Staff Group and the Trade Policy Review Group.

Mr. YATES. All right.

REPORTS ON CRITICAL MINERALS SITUATION

Dr. MORGAN. We follow all of these materials very closely. We put out monthly reports on them all, and then for 17 of the most critical ones we put out a monthly pamphlet, Minerals and Materials, that shows domestic use, production, imports, exports, industry stocks, Government stocks, and so on, so anybody can follow the situation and see any relative developing vulnerability.

Mr. MCDADE. Would the gentleman yield?

Mr. YATES. Sure.

Mr. MCDADE. You don't go into the critical minerals on this chart. Would you address yourself to that. There is an enormous difference between dependence and importance of chromium and columbium. I guess the same is true of cobalt and the others.

Dr. MORGAN. Yes, sir, there are 19 officially designated really critical materials, 18 of which are metals and minerals. Those were designated a couple years ago by an interagency committee of the Council of International Economic Policy and the Council issued a special report on critical imported materials in December 1974.

The 18 critical minerals are: Columbium, cobalt, manganese, titanium, platinum, chromium, aluminum, tin, fluorspar, nickel, mercury,

tungsten, zinc, vanadium, iron, copper, and lead, plus one that doesn't show on figure 8 that we also identified as critical in the CIEP report, and that is phosphate.

The reason phosphate does not show on figure 8 is that we are a major exporter of phosphate but in the CIEP listing of critical materials they took into account the needs of Western Europe and Japan, with which we are closely associated within our defense responsibilities. We are an important source of phosphate to Europe and Japan; therefore, phosphate, while not critical to us, is critical to them.

The 19th material that does not show on figure 8 is natural rubber. We are still dependent upon a small quantity of imports of natural rubber, largely for airplane tires and for heavy off-the-road tires such as in construction equipment or giant trucks used in the copper and coal mines. Natural rubber has a resistance to heat and abrasion that the synthetic does not.

Mr. YATES. I seem to remember another category of either feathers or down as having been in the critical stockpile.

Dr. MORGAN. You have a very good memory, sir. Years ago there were a number of nonmineral commodities and some still may be on the list. Feathers and down from waterfowl were critical for military purposes for sleeping bags and lightweight flying jackets.

Mr. YATES. We had difficulty getting it because it came essentially from the People's Republic of China or from the Eastern bloc countries?

Dr. MORGAN. That is right, sir.

Mr. YATES. 1950, I think.

Dr. MORGAN. That is right, sir. They always asked about the hog bristles, too.

Mr. YATES. That is right.

Dr. MORGAN. That was another one on the list.

STOCKPILE LEGISLATION AND PLANNING

Mr. YATES. About a year or year and a half ago, Congress was given legislation to sell minerals from the strategic stockpile including some narcotics, I think. That is another substance in the strategic stockpile; at least it was one of the subjects of the bill. I think it was cocaine or morphine.

Dr. MORGAN. Opium and morphine.

Mr. YATES. Were those sold upon your recommendation? I know I opposed them when the bill came to the floor. They were selling a number of minerals that were in short supply in this country, and I think we are starting to buy them back again.

Dr. MORGAN. Let me tell you the history of that. Very briefly, the basic Stockpiling Act was passed in 1939. It was restated and amended in 1946. From 1946 to 1958 the Government planned on a 5-year war period. In 1958 the planning period was cut from 5 years to 3 years. In 1973 the planning period was cut from 3 years to 1 year.

Now, all other things being equal, while it doesn't work out exactly that way, the stockpile size wouldn't be nearly as big if one planned for a 1-year war than if one planned for a 5-year war.

The wisdom of the reduction from 3 years to 1 year was questioned at the time it was made and an extensive review of stockpile planning

was undertaken a year or two thereafter, culminating in September of 1976 by the President approving a return to the 3-year planning period.

The disposals that you refer to took place largely as a result of the lowered objectives from the 1-year period, and now with the return to the 3-year period, fortunately not all was disposed of. The President now, I understand, has ordered a moratorium on any stockpile activity until there is a review in this administration of the basic planning process.

Mr. YATES. Continue, Dr. Morgan.

Dr. MORGAN. Here we have diagrammed, then, our strategic importance.

URANIUM SITUATION

Mr. MCDADE. I don't see uranium on that chart.

Dr. MORGAN. Uranium is not on because while we import a little bit, when you look at the whole picture we are virtually self-sufficient at the present time.

Mr. YATES. Until what date? I have seen some articles that say we are self-sufficient until 2000. But, of course, that depends on the number of reactors that are built and there seems to be a slowing down in that.

Dr. MORGAN. That is right, sir.

The U.S. reserves of uranium, according to ERDA at $30 are of the order of 640,000 tons of U_3O_8. There has been a sharp increase in the price of uranium. A few years ago the price was so low it was $6 to $8 and more recently some sales have been at the $20–$30 range and I have heard of even a spot sale several times that price. That was a very small quantity.

Mr. YATES. Why would they pay so much for it?

Dr. MORGAN. They had to have it to deliver on a contract.

Mr. YATES. Continue, Doctor.

CATALOG OF MINERALS PROBLEMS

Dr. MORGAN. Figures 9A and 9B, which look like a crossword puzzle—and it really looks better in color——

Mr. YATES. Who selects your colors?

Dr. MORGAN. We have a chart over there with red, yellow, and so forth.

Mr. YATES. I just wondered who your artistic expert was.

Dr. MORGAN. Why not hold up the colored one.

Mr. YATES. Let's get some color for the record.

Dr. MORGAN. What we have done is to analyze more than 100 mineral commodities with respect to 22 major problems such as world resource inadequacy, the U.S. resource inadequacy, reserve inadequacy, production capacity, the dollar import value, the strategic importance, the environmental impact, et cetera. For example: does it have a serious impact on land, air, or water? What about the load on the transportation system? Is it a major energy user?—all these questions. For every one of the more than 100 mineral materials that we are concerned with, we have tried to say: is it a real serious problem, is it a fairly serious problem? Is it a mild one, or localized one, or don't we have any problem really that we can identify?

Therefore, by studying this matrix, not only do we assess the national situation for actions that should be taken by the State Department or the stockpiling people or the Defense Department or someone else, but this then becomes the guide for our Bureau of Mines research program which seeks to alleviate or abate serious problems in the mineral field.

Further, a mineral material with no identified problems is therefore possibly an acceptable substitute or alternate for one of the other materials. So our research is directed in one way or another at such materials also.

Mr. YATES. Where you have the white spaces, does that mean you have no problem because we have the supplies in this country or because we are in a position to import them?

Dr. MORGAN. Largely because we have them in this country and there are no serious environmental problems associated with them of a general nature.

INDUSTRIAL DIAMOND STONES

Mr. YATES. For example, I look at the question of industrial diamond stones. Most of those come from South Africa.

Dr. MORGAN. That is correct.

Mr. YATES. So if there is some kind of sanction voted for South Africa by the U.N., as was done in the case of Rhodesia, that supply might be cut off? There is a possibility—I am not saying it would happen—just as chrome from Rhodesia was cut off by the passage of recent legislation. The Soviet Union has some?

Dr. MORGAN. They have some but South Africa is the main source. For small industrial diamonds we can make synthetic ones in this country for cutting and drilling. In fact, last year we made 26 million carats for industrial purposes. It is the larger ones which they use for dies where they drill a hole through and draw a wire through that which are the more critical ones. I would not want to contemplate a South African sanction when we look at South Africa and see platinum, manganese, chromium, diamonds, gold, and a number of other materials.

Mr. YATES. We may have to do it heavily.

Dr. MORGAN. I hope they ask us the importance of these things.

CHROME IMPORTS AND USAGE

Mr. YATES. What happens if they are cut off? What do we do about chrome from Rhodesia?

Dr. MORGAN. Again, that is where the strategic stockpile could play an important role.

Mr. YATES. Do we rely on our strategic stockpiling exclusively in the case of chrome?

Dr. MORGAN. Let's just take chrome as a case in point.

Mr. YATES. Yes, let's take chrome.

Dr. MORGAN. Here is our latest "Minerals and Materials" report dated February 1977. What it says here is that last year, 1976, we used 347,000 tons of chromium—the metal content of several chromium materials. This could be the chromium content of ore, in which case it would actually be about three times as many tons of ore, and it in-

cludes the chromium content of ferrochromium and other forms in which chromium is used.

Here is a specimen of chromium ore from South Africa and here is ferrochromium—the latter consisting of iron and chromium. All told, then, we used 347,000 tons in 1976. At the present time we are producing only a very small quantity from a small mine in California that recently reopened. For 15 years we didn't produce any in the United States.

We are importing at the present time about 40,000 tons a month, and last year we got 9 percent of our chromium from Rhodesia, 10,000 tons of chromium in ore and 38,000 tons of chromium in ferrochrome, and, counting possible indirect imports, maybe about 5 percent more, so we can look to about a 14- or 15-percent cutback. We are exporting a little bit, about 5,000 tons a month. The private inventories in the hands of users as reported to the Bureau of Mines are 400,000 tons of chromium content. Comparing that in round numbers to the 347,000 tons that we used in 1976, there is now about a 1-year supply in the hands of private users of chromium.

Mr. MURTHA. Are you talking about the same quality? For instance, the Rhodesian chrome is very high quality as I understand.

Dr. MORGAN. That is among the very best. But what they have in stocks varies in grade but it would be commercially acceptable.

The Government has in its stockpile 1,829,000 tons of chromium contained in various materials, so compared to the 347,000 tons that we use a year, that would be easily a 3- or 4-year supply. Again you have to look at the grade—all of the strategic stockpile might not be readily usable in all applications. Further, we wouldn't want to draw the stockpile all the way down in advance of a war. That would be a great mishap.

BUREAU CHROMIUM RESEARCH PROGRAM

Mr. YATES. So if I may take a moment more, what is the good old Bureau of Mines doing about all this?

Dr. MORGAN. What we do is to take the domestic chrome ore [presenting a sample to the chairman] which runs about half the grade of foreign ore.

Mr. YATES. It looks like oil shale.

Dr. MORGAN. That is right. We devise processes whereby it is crushed down real fine, and the iron-chromium compound, which is the material of interest, is extracted from the other rocklike minerals, so here (presenting a sample) is a result of Bureau of Mines research—the chrome concentrates.

The question is: Can we make from that extracted product a ferrochromium just as acceptable as the Rhodesian or South African?

Mr. YATES. That is the question before the House.

Dr. MORGAN. Here are samples of ferrochromium made by the Bureau of Mines.

Mr. YATES. It looks very good.

Dr. MORGAN. It is identical to South African material.

Mr. YATES. What is the difference in cost? That is of some importance.

Dr. MORGAN. Yes, it probably would cost two or three times as much by the time we are finished.

Another major use of chromium is in chromium refractories. They don't convert it all into metal; they grind some of it and use it as a high-temperature lining in a furnace. Here is a refractory brick made by the Bureau of Mines which stands up in temperature and resistance to hot slag just as well as that from imported refractory chromite.

Mr. YATES. What is it used for?

Dr. MORGAN. For the lining of high-temperature metallurgical furnaces.

Mr. YATES. Does that brick cost three times as much as the bricks made from imported chrome?

Dr. MORGAN. It probably would by the time the domestic ore is mined and concentrated since one would be working with a lower grade material and under more severe environmental conditions, and with higher paid labor, and higher transportation costs to normal points of use.

Mr. YATES. All right.

Dr. MORGAN. Another use is pure chromium metal such as they might use to plate onto bumpers. Here is an example of pure chromium metal produced by the Bureau of Mines.

Mr. YATES. One side polished and one side not.

Dr. HENRIE. It is arc-melted on a cold plate and it just comes out that way.

Dr. MORGAN. You could polish both sides.

As an interesting byproduct, when we developed this hard chromium metal we also developed a ductile chromium metal that bends. One of the uses of this is to irradiate it and to implant it in tumors to have a source of precisely controlled radiation within the tumor. So we have had a medical spinoff from our research work that was unanticipated.

Mr. YATES. That is very good.

HISTORY OF CHROMIUM RESEARCH PROGRAMS

I read your news release and it is dated September 26, 1966. What have you done lately?

Dr. MORGAN. That is a very good point. We haven't done too much lately for the simple reason this illustrates how the Bureau of Mines works.

Mr. YATES. You mean slowly?

Dr. MORGAN. No, sir. We knew in World War I that chromium was critical. It was on the list of critical materials from the War Industry Board in World War I. We knew it was critical in World War II. It was on the stockpile list. Therefore, the Bureau did this research work over many years, proved the processes, and put them on the shelf. Nobody takes the process and uses it unless there is an economic crossover point for them to do it or a dire strategic situation that forces them to do it. But we have shown that for the major uses of chromium: Chromium metal, chromium chemicals, ferrochromium for the steel industry, or chromium refractories, the domestic material can be used.

There are at least 6 million tons of identified low-grade marginal chrome ore in the country. More is contained in beach sands and laterites.

Here is a computer printout from our Minerals Availability System of every chrome deposit in the country and what is there, where it is located, its grade and everything else, so if we really have to move to develop our domestic resources we know where they are; they have been found by industry, the U.S. Geological Survey, or the Bureau, and we have provided the technology to use them.

This type of activity is what we try to do for every one of those hundred materials.

Mr. YATES. Who finds those deposits for you, Geologic Survey?

Dr. MORGAN. They were found partly by private industry, partly by the U.S. Geological Survey and Bureau of Mines working together in World War I, in World War II, and in the Korean war.

HISTORY OF DOMESTIC CHROME MINING

Mr. YATES. We have deposits throughout the country. Until recently when the sanction was placed on Rhodesia, were those deposits being mined?

Dr. MORGAN. The history of that, sir, is interesting. They were mined a little bit in World War II. There was a chrome purchase program in World War II. They stopped at the end of World War II. The Korean war started on June 25, 1950. In 1948 we were dependent on the U.S.S.R. for 40 percent of our chromium for metallurgical use and a third of our manganese. When the Berlin blockade started in late 1948, the U.S.S.R. began cutting back the shipments to this country of both manganeses and chrome. When the Korean war started in mid-1950, the U.S.S.R. cut off shipments of both completely.

Shortly thereafter the Government, under the Defense Production Act of 1950, which was passed in September of 1950, announced a chrome-purchase program whereby ore that before had been bought from foreign countries ranging in price from $20 to $38 a ton was bought domestic at buying stations for up to $159 a ton. These stations took delivery from small miners who beneficiated their product in accordance with the processes that the Bureau had devised.

They had to bring it up to a certain standard in order to get paid this $125–$135 price. There was a big deposit out in Montana, known as the Mouat Mine. They wanted to participate in the program but they wanted a much longer guarantee, and they couldn't come up to the specification of the high quality purchase program. So the Government under the Defense Production Act, negotiated a specific contract as distinct from running a buying station, whereby the Government bought 900,000 tons of lower grade chromium concentrates, 38 percent chrome instead of about 48 or 50 of the high quality.

They operated from early 1950's to 1961, and then that mine shut down when the Government purchase contract reached its end. So until very recently there was some 900,000 tons of low-grade—not counted toward the strategic stockpile objective because it did not

87-591 O - 77 - 7

need the specifications—out there in Montana. Here again, if the chrome situation gets worse, that mine can be reopened. It is one of the main possible producers on our computerized list. People, we understand, are actively looking at that possibility right now.

SOURCE OF CHROME IMPORTS

Mr. MURTHA. I notice on your chart you don't have Rhodesia listed for chromium. I assume this chart was made up after the law passed by Congress to repeal the Byrd amendment.

Dr. MORGAN. We didn't list every source. Proportionately, it was a smaller source. Last year we only received 9 percent from Rhodesia.

Mr. MURTHA. What percentage came from South Africa?

Dr. MORGAN. Much higher. It was about 36 percent.

Mr. MURTHA. Then a much higher percentage comes from the Soviet Union also?

Dr. MORGAN. Last year on a total chrome basis, ore and ferro combined, but taking into account the content, our dependence was: South Africa, 36 percent, a little more than a third; Turkey, 12 percent; U.S.S.R., 12 percent; Southern Rhodesia came in at 9 percent; Finland, 7 percent; Philippines, 7 percent; and several other minor sources accounted for the remainder.

Mr. YATES. Is that an old chart if you talk about Southern Rhodesia?

Dr. MORGAN. I guess, legally, that is what we still call it.

Mr. YATES. Legally they call it Rhodesia. Northern Rhodesia is now Zambia.

Dr. MORGAN. Yes, sir. The State Department uses the title Southern Rhodesia, and we follow their usage.

CHROMIUM STOCKPILE AND IMPORTS

Mr. MURTHA. One other thing. You said there were 3 or 4 years' supply in the stockpile. Obviously if we had a war we would cut back substantially on civilian production of many of these items. Does that still take into consideration 3 or 4 years, for instance, with increased war production? Is more chrome needed in a mobilzation in war production? Is this 3 or 4 years' supply under a war situation or under the circumstances that you are talking about of the civilian type?

Dr. MORGAN. It actually might be less than that number of years in a war because war materiel would be a heavy user of stainless steel and chromium in all forms. So while there would be some cutback, you could have a black-painted steel bumper instead of a chrome plated, for example. But the military uses would probably exceed what you would save.

Mr. YATES. Onward, Dr. Morgan.

Dr. MORGAN. Thank you, sir, for letting us tell you about our good work, because what we try to do on chromium was an illustration.

CONGRESSIONAL ACTION ON RHODESIAN CHROME IMPORTS

Mr. YATES. It is a very important explanation. I think the Congress wants to know the consequences of its actions in the passing of resolu-

tions like those that bar importation of chrome from Rhodesia. Your explanation is helpful. I think it shows we do have additional sources of supply other than Rhodesia. As a matter of fact, if I recall your testimony, only 9 percent of the imports came from Rhodesia?

Dr. MORGAN. That is right, last year.

Mr. YATES. At a time when there was no barrier to such imports; is that correct?

Dr. MORGAN. That is right. So what we have done there is really typical of what we do with many other materials. It is what we are doing with nickel, with cobalt, with manganese, with tungsten.

Mr. YATES. Let me interrupt you. Nine percent came from Rhodesia. What percent came from the Soviet Union? If I recall the letters I received urging opposition to the Byrd resolution, we would be required to import our chrome from the Soviet Union if we did not import it from Rhodesia; is that correct?

Dr. MORGAN. In the past the U.S.S.R. has been an important supplier to the United States. However, the quality of the Russian ore has dropped off very much in recent years. The furnaces prefer heavy lumpy ore like that big chunk I showed you there. In recent years the Russians have shipped far more fines, which is more difficult to handle.

Mr. YATES. Like the chrome we have in our own country?

Dr. MORGAN. Yes, sir. Also they have raised the price. So you get a poorer quality material at a much higher price from the U.S.S.R. As a result, they have cut back. Last year the U.S.S.R. only supplied 12 percent.

Furthermore, the Russian steel industry is growing, and we understand they have more use for the high-quality-ore in their own steel industry, and therefore they are even more reluctant to sell chrome ore.

The big deposits of chromium in the world are in South Africa and Rhodesia. These are the main deposits.

Mr. MURTHA. Is there a difference in quality between those deposits?

Dr. MORGAN. The low-iron, high-chromium ores seem to predominate in Rhodesia, and the South African ores are nearly as good but they are higher in iron content, and of lower quality, although suitable for metallurgical use. Of course if they look very hard they may find deposits in a lot of other places. Nobody has gone out and drilled all of the world looking for everything, and we haven't even done it in the United States.

SOURCE OF IMPORTED MINERALS

Mr. YATES. Let's look at the chart of net imports of metals and minerals again. A quick glance indicates that the U.S.S.R. furnishes only the platinum group metals and chromium, and they are third for gold and third for vanadium. That is about all. I had the impression they were supplier for many more metals.

Dr. MORGAN. No. sir. Traditionally chromium, manganese, and platinum have been the big ones, and I guess the gold is more of a way that they pay for other manufactured articles that they want to buy. So whether it is a monetary movement rather than a metal use would be hard to distinguish.

Mr. YATES. I notice none of the bloc countries are listed. Do we not import metals from the Eastern Bloc countries?

Dr. MORGAN. There may be some dribbles here and there but by and large they are not important suppliers.

Mr. YATES. We do import coal from Poland?

Dr. MORGAN. Yes, sir.

Mr. YATES. Is that the only country we import coal from?

Dr. MORGAN. We also import some from South Africa, Western Germany, and some other places, but the total quantities are very small in proportion to our own exports.

Mr. YATES. South Africa must have a considerable supply of minerals, then?

Dr. MORGAN. I think one of their assets is that much of it is dry, mountainous country and therefore it is easy to find what they have sticking out on the surface, as in the early days here in the west they found the gold and silver and lead and zinc, because the minerals outcropped on the surface.

Mr. YATES. Very well.

Continue, Doctor.

FISCAL YEAR 1978 BUDGET REQUEST

Dr. MORGAN. That really brings us to the end of our general presentation and gets us down to the budget per se.

Figure 10 shows for the Bureau of Mines in millions of dollars that in 1977 we got $166 million and our fiscal 1978 request is $160 million, which is a net decrease of the order of $6 million, much of which, however, is in nonrecurring costs, and therefore our request represents in effect more or less a level effort in total.

The details of increases or decreases are shown on figure 11, where on top we have listed program increases, reflecting reprioritization of our work, of some $9.4 million and below decreases of $15.6 million, which, then by subtraction yields the overall figure of minus $6 million.

COAL PREPARATION RESEARCH

Mr. YATES. Let us stop there for a moment and take a look at metallurgy research on critical minerals. That has been increased, and rightly so. Coal preparation research is increased by almost $3 million. What is meant by coal preparation research?

Dr. MORGAN. Coal preparation, sir, is sometimes called mineral beneficiation. The ordinary coal as mined contains sulfur, some of which is present as pyrite or iron sulfide.

Mr. YATES. Mostly in Illinois, I guess?

Dr. MORGAN. They have more than enough there, yes, sir, but sulfur is present in almost all coals. Some is pyritic sulfur and some sulfur is also present in other forms actually bound up in the coal molecule. Coal also contains silicon dioxide, calcium and magnesium oxides, calcium carbonate, rock, in other words, which is called generally ash because it ends up, when you burn it in the furnace, as ash. Coal also contains a certain amount of moisture.

The heating value of the coal depends on whether it is anthracite or bituminous or semibituminous or lignite. But a pretty good steam coal might run 12,000 or more Btu's per pound and it could have several

percent of sulfur and it could have as much as or more than 10 percent of ash and several percent of moisture.

So what we try to do in coal preparation is to crush it down as fine as you can and still handle it, physically separate out as much of the sulfur in that which is present as pyrite and fairly easy to separate out, but the organically bound sulfur does not separate out readily. We also want to separate out as much of the ash as we can. Then, at the same time, by taking these things away, the Btu, or heat content, is increased, so therefore what was maybe 11,000-Btu-per-pound coal could be raised about 1,000 Btu's per pound. The sulfur can generally be cut in half fairly simply and the ash probably more than half, so the product which then goes forward has less of the deleterious material and more of the heating material.

MAGNETOHYDRODYNAMICS RESEARCH

Mr. YATES. Where does MHD come into this?

Dr. MORGAN. Magnetohydrodynamics is an attempt to have a very hot gas flowing between electrical contact points. And just as ordinary electricity is generated by having a wire passed between magnets, so here instead of passing a wire they would pass an ionized hot gas between magnets and generate current that way.

The coal would be burned to generate the hot gas and then it would be seeded with some material, probably potassium, or possibly cesium, which would make it capable of carrying an electric charge. Then this potassium or cesium would be stripped out of the hot gas after it has passed through the magnets and recirculated. It is an advanced concept.

Mr. YATES. How advanced is it? Have you done any research in it?

Dr. MORGAN. The Bureau of Mines did some when we had our six energy labs. But back in January 1975 our six energy labs were transferred to the ERDA, so the MHD per se is done there. We would be doing some work on corrosion resistance of materials to be used in such generators because if they are going to have a hot gas of 4,000 or 5,000 degrees Fahrenheit passing before giant electrodes in a magnetic atmosphere, this is a condition of intense corrosion and how that is going to stand up and what kind of electrodes would be used is a metallurgical problem.

Mr. YATES. I wondered whether that fell within the category known as coal preparation research.

Dr. MORGAN. MHD would not, no, sir. This coal preparation research that we are doing now—and we are going to do more of—involves crushing, grinding, probably multistage flotation, as is used for copper preparation, and so on, in order to separate the material in plant.

COAL SLURRY PIPELINE

Mr. YATES. Does transportation of coal by slurry method fall within this?

Dr. MORGAN. Yes, sir, I am glad that you asked that question.

Mr. YATES. How does this relate to chrome?

Mr. MCDADE. You are batting a 1,000 so far, doctor.

Dr. MORGAN. If we put our coal through a flotation process and grind it down real fine like that, then the question is, how do you dewater it, and what do you do with it after you purify it? At that point, when you get it ground down this fine—displaying a glass of powered coal—certainly a logical solution would be to put in a coal slurry pipeline and ship it somewhere because that is about the consistency of the material that is moving through the one main slurry line now, the Black Mesa line, some 275 miles long.

Mr. YATES. I suppose the railroads are interested in that research?

Dr. MORGAN. Yes, sir. Actually, I don't know why it couldn't be moved by railroad. You can move cement in a covered railroad car and put it in through hoses and take it out; there is no reason you couldn't do that for coal.

Mr. YATES. Which is cheaper?

Dr. MORGAN. It would depend entirely on the circumstances. Coal powders could also be briquetted with a little binder and shipped.

Mr. MCDADE. When you grind it this fine you have to reconvert it at the other end, don't you?

Dr. MORGAN. If you got it there in the fine power form it could be blown right into the furnace and it would burn in the powdered form.

Mr. MCDADE. Utility generation?

Dr. MORGAN. Yes, sir. At the Black Mesa Pipeline where they ship it in water, they dewater it down to a certain point and, still fairly wet, they put it right in the furnace.

Mr. MCDADE. Where is that?

Dr. MORGAN. It runs across most of the State of Arizona and the powerplant is in Nevada.

Mr. MCDADE. What is the end use? Is it electrical generation?

Dr. MORGAN. Yes, sir. They are shipping 5 to 6 million tons a year through a pipeline which is 18 inches over much of its length and 12 inches toward the end.

Mr. MCDADE. Do we know about the transportation costs for shipping it that way?

Dr. MORGAN. For them it is cheaper than rail.

SLURRY PIPELINE WATER REQUIREMENTS

If water is really critical, then the water gets to be a problem. It takes about 1 ton of water to 1 ton of coal for a slurry pipe line. It takes about 2 tons of water to gasify coal and it takes as much as 5 tons of water per ton of coal to generate electricity. When you cool the turbines and so forth, there is an evaporative loss of as much as 5 tons of water per ton of coal.

Mr. MURTHA. You are saying this is much more efficient than any of the other processes?

Dr. MORGAN. In terms of water, it would really be better in my opinion to ship the coal by slurry pipeline to a water surplus area, may be along the coast, where they then have powerplants that use a lot of water. When I give you that figure of 5 tons of water per ton of coal, a powerplant located on a big river uses far more water but they don't evaporate much; they will pull the river in and raise

the water 1° or 2° and put the same water out downstream. So if they took coal from a water-deficient area— this is one of the proposals; the 1,000-mile pipeline through Wyoming down to Arkansas is such a proposal——

Mr. YATES. Will they use salt water for slurry?

Dr. MORGAN. You could, but I would be concerned about the corrosive effects of the salt.

Mr. YATES. Let us vote.

[Short recess taken.]

COSTS OF PIPELINE VERSUS RAIL

Mr. MCDADE. Mr. Morgan, the chairman and I were discussing the interesting exhibit that you presented us, the very fine coal, and we are very interested in the trade-offs which we really hadn't heard discussed before.

When one decides to go by rail or slurry, what are the water costs in power generation; what are the transportation costs? I did not get the difference in transportation costs on that pipeline that you mention that is in operation. Do you know what the differences are between the pipeline and the rail transportation costs in that system?

Dr. MORGAN. I do not know, sir, but we could inquire to see. Of course, it depends on whether they run unit trains or whether they have a special rate.

Mr. MCDADE. If you can give us some kind of guidance about the differential cost.

Dr. MORGAN. We will get some figures on that, yes, sir.

[The information follows:]

COMPARISON OF ECONOMICS OF SEVERAL SYSTEMS FOR PROVIDING COAL-BASED ENERGY TO USERS 1,000 MILES SOUTHEASTERLY FROM EASTERN WYOMING COAL FIELDS—FOUR MODES OF ENERGY TRANSPORTATION AND ELECTRICITY VERSUS GAS AS THE END-USE ENERGY FORMS

INTRODUCTION

The purpose of this study was to develop economic comparison among five systems for delivering energy contained in eastern Wyoming coal to users 1,000 miles distant. In general the report does not address other issues such as those related to water, rights-of-way, et cetera, that would have to be considered in arriving at a composite judgment as to the optimum or most acceptable energy transportation and conversion system. It does, however, show an energy accounting for each system, allowing comparison to be made of overall energy utilization efficiencies.

The cost estimates presented herein are based largely on published information. In some instances, however, information was obtained by telephone from experts in specific areas, for example, extra-high-voltage electrical transmission systems, railroad rates, et cetera. The basic data thus obtained are believed to be reliable. The source cost estimates were usually for earlier years, so they were escalated to early 1975 levels. Since costs have increased both rapidly and unevenly over the past 2 years, the 1975 estimates of this report are approximations.

As is usually the case in estimating requirements and costs in the conceptual or proposal stages of projects, the estimates represent best judgments, but it is recognized that in actual practice cost may prove to be somewhat higher or lower than the estimates. By necessity, this study was completed in a very short time. Consequently, it was not possible to tie down some of the cost components as precisely as would be possible with a longer, more detailed study. For example, an author of an article giving costs for a particular year may have escalated costs that had been estimated for some previous year without showing in the inflation factors and original estimates. Those inflation factors might not be entirely

consistent with the ones in this report. Another example is offsite costs, which can vary appreciably, depending on the particular site chosen for an industrial facility. One estimator's assumptions in this regard may differ from those of another.

Notwithstanding these imperfections, it is believed that the results of the study as presented herein portray a representative picture of the relative economics of the five systems—except that the small difference between the unit train and coal-water slurry pipeline unit delivered energy costs should not be regarded as significant. The estimates are not precise enough to warrant a conclusion that one of those two is more economic than the other.

SUMMARY

This report compares the economics of five systems of supplying energy obtained from eastern Wyoming coal to users at a location 1,000 miles southeasterly from the coal mines. Mining of the coal is common to all these systems and the cost associated therewith is the same for all five cases. The coal may then be transported by unit train or pipeline (as a coal-water slurry) to the 1,000-mile distant destination. In these two cases the coal would be used as fuel for steam-electric plants located at the destination location. A third option would be to locate steam-electric plants near the mines and transmit the electricity over the 1,000-mile distance via EHV (extra high voltage) lines. Alternately, the coal could be converted to high-Btu gas near the mines, and the gas would be pipelined to the destination. The gas then could be utilized in that form for domestic heating and for other purposes (a fourth case), or it could be used as fuel for gas-fired steam-electric generating facilities (fifth case). Electricity available for distribution by a utility company is the final energy form in four cases. In the other one gas is the end-use energy form.

In each case it is assumed that 25 million tons of coal per year are produced by the mines in eastern Wyoming and the energy therein (after losses in conversion, transmission, and drying, as applicable) is made available to customers 1,000 miles away. Also, it is assumed that the heating value of the coal is 10,000 Btu per pound.

The prices required for the end-use energy in all the systems, under consideration would depend to some extent on the type of financing. Estimates were therefore developed for all equity financing and for part debt, part equity financing of the components of systems that probably, or at least conceivably, would be largely debt financed. These two cases should represent the extremes of the form of financing which might actually be used.

A discounted net cash flow return of 12 percent on total investment was assumed for the "all equity" cases, except for the strip mine where a 15-percent return was assumed. For each facility except mining a case was calculated assuming 75-percent debt at 9⅔-percent interest and a 15-percent return on the remaining 25-percent equity. A leveled cost was estimated by calculating the 11-percent discounted net cash flow return on total investment and allocating it between interest and profit.

The estimated end-use energy prices in 1975 dollars that would be charged to consumers in the five cases, on a comparative basis, and the amounts of energy that would be delivered to them, are as follows:

	Unit train	Slurry pipeline	Gas used as gas	Gas converted to electricity	EHV
Dollars per million end use Btu: All equity	6.23	6.18	2.87	11.28	8.20
75 percent debt on all facilities except mining	4.56	4.43	2.21	8.39	5.74
Trillion Btu delivered to users:					
As electricity	190	184		95	157
As gas			272		

Information and data that were used as the basis for estimating the costs of the several components of the five systems were obtained from several sources. Wherever such source cost information was developed earlier than 1975, and most of it was, it has been escalated so as to approximate present costs. However, future in-

flation is not reflected in the cost estimates in this report. If one of the systems becomes a reality during the next few years, it can be expected to cost more in terms of the dollars then being spent than these 1975-dollar estimates.

From one case to another there are appreciable differences, some rather great, in the amounts of end-use energy delivered to users. These differences are due to losses and the resulting overall efficiencies. The amounts are given in subsequent parts of the report. Of these losses the conversion losses are by far the greatest—conversion of coal, and in one case gas, to electricity and conversion of coal to gas. In the gasification plant the bulk of coal is fed to gasifiers, but some is used to generate steam for process use and heating. In the case of coal slurry pipeline, the coal after dewatering is wet and a nominal amount of energy is consumed in vaporizing this water when it is burned in the steam-electric plant. Some energy is consumed in each transportation system. These do not all affect the amount of energy delivered, but they do show up as costs. Some of the gas is removed from the gas pipeline to run the compressors; there is a line loss in the EVH case; the pumps on the coal slurry pipeline are electrically driven; and the unit train locomotives consume diesel fuel.

Bureau of Mines study.—Comparison of economics of several systems for providing coal-based energy to users, 1,000 miles southeasterly from eastern Wyoming coalfields, four modes of energy transportation and electricity versus gas as the end-use energy forms—Hearings before the Committee on Interior and Insular Affairs, House of Representatives, May 5, 1975, pp. 127–354.

FINE COAL CHARACTERISTICS AND USE

Dr. MORGAN. A consideration there was the circuitous route also, that the pipeline was pretty direct, and they either would have had to build a railroad or a route that was very circuitous.

Mr. MCDADE. We are very interested too in the impact. You said that material, that fine material, did not have to be reprocessed. It could be just blown right into the combustion chamber and utilized. We are very much interested in the question of the combustibility of that. Is that fine material much more combustible than the larger grades and higher grades of coal? It would seem to us it would have to be.

Dr. MORGAN. Well, the furnaces and boilers have to be designed to burn powdered coal, other than lump coal. In other words, instead of grates and everything where you would actually have a fire with the lump coal, this is blown in like natural gas or fuel oil. In an oil burner, for example, the oil arrives in liquid form, and then there is a blower and spray device that throws it in as a fine spray, and it's ignited just as it comes in. So if a boiler were designed for powdered coal feed, it would come in under pressure, and once the fire started, it would continue to ignite from the heat, and the very fine ash would be drawn off the bottom of the furnace occasionally as a slag.

In fact, they have experimented with adding powdered coal to fuel oil, and up to a certain percentage you can use some coal in an oil burner by adding a relatively small percent—but in tonnage it could be significant—of powdered coal to fuel oil. That is being done in some places right now.

Mr. MCDADE. Is this powdered coal presently being used in that form in the utility that you mentioned?

Dr. MORGAN. Not exactly, sir, the Black Mesa pipeline moves coal in a water slurry: 6 million tons a year.

Mr. MCDADE. They just blow into a specially designed combustion chamber?

Dr. MORGAN. Yes, sir.

Mr. McDade. We talk about coal preparation; we have to experiment to try to get better burning coal, to try to get more Btu impact out of it. That is the whole purpose of that coal preparation money, isn't it?

Dr. Morgan. That is right, sir.

FINE COAL COMBUSTION EFFICIENCY

Mr. McDade. My question really is what is the impact in terms of Btu efficiency in using that very fine powdered coal as opposed to the larger grades of coal, and if you can, as opposed to the combustion efficiency with respect to other derivatives whether it be coal or natural gas or whatever.

Is there any way to tell us about the efficiency of that material?

Dr. Morgan. A real good coal is 14,000 Btu's per pound. That is real good coal.

Mr. McDade. Anthracite?

Dr. Morgan. Yes, sir. You would have less than 1-percent sulfur in much of that. Good bituminous coal also can have 14,000 Btu's per pound.

So here is a table from our research laboratories showing how representative coals can be beneficiated.

For example, here is one the chairman was concerned about, the midwest coal. Here is a coal as mined, 14.7 percent ash, and by modest beneficiation, the ash was of 6.9 percent. That cut it in half.

The sulfur was 3.88 percent, and by modest beneficiation went down to 2.59, so that didn't quite cut it in half but cut it down a fair amount. And as mined, the coal was 12,000 Btu's per pound, and after beneficiation was 13,000 Btu's, so it upped it a thousand Btu's.

Furthermore, if one were going to ship this anywhere there is no point shipping the deadweight of the ash, and then the ash would not be in the furnace to make a problem and there is no point shipping the sulfur and then having to take the sulfur out with the sulfur dioxide scrubber or some other device at the powerplant.

So our whole belief, which is why we have made a real effort to greatly enlarge our coal beneficiation or coal preparation work, is that if we are really going to burn the coal and meet the environmental standards—in a study by the Bureau of Mines had made for it several months ago, "Effects of Air Quality Requirements on Coal Supply—May 1976," it showed that of about 400 million tons of coal, used in utilities, that nearly 200 million of it is in noncompliance with the national air quality standards.

In other words, they have a variance or something like that permitting them to burn higher sulfur coal.

So if we are now burning about 440 million tons of combustible coal and if we are going to up the burning of coal to 700 or 800 million tons a year by 1985 in order to reduce the use of petroleum, or if not even to reduce the use of it to limit the increase in the imports of petroleum, then the clearest and simplest and most intelligent way is to prepare the coal before you burn it, and that is why we had made this major increase in our coal preparation program here.

CLEAN AIR ACT STANDARDS

Mr. McDade. It, of course, makes excellent sense, and are you talking about this model being done under the Clean Air Act without amendment or with the amendments that have been proposed but not enacted? I believe there have been amendments proposed to the Clean Air Act, haven't there?

Dr. Morgan. Yes, sir, there are all kinds of amendments floating around.

Mr. McDade. There was an administration proposal and I am wondering whether those figures you are using concerning compliance and noncompliance coal refer to the Clean Air Act as written, or as proposed to be amended some years ago.

Dr. Morgan. No, sir, the Clean Air Act as written, the one on the books.

IMPROVEMENTS FROM COAL PREPARATION

Mr. McDade. Can you trace the impact of that powdered coal from the same standpoint, what increase in Btu's you got by doing that and how much ash you got rid of and how much sulfur? Is there any way that can be done?

Dr. Morgan. Yes, sir. In fact, I have this table here we can put in the record that shows for a number of the sample coals. Now, these were not beneficiated to the extent of this fine powdered.

Mr. Yates. Is that a part of the charts you have given us?

Dr. Morgan. No, sir, this is another one, figure 12.

Mr. Yates. Do you have copies of that?

Dr. Morgan. Yes, sir, for you.

Mr. Yates. Give that to Mr. McDade.

Dr. Morgan. Let me just say in the past coal preparation, or coal beneficiation, has been a relatively primitive art. It hasn't really been a science. Essentially they depended on differences in weight or specific gravity, lighter material went over the top, and heavier material sunk down. Sometimes they stirred up a heavy liquid using magnetite to accomplish that, or they had a water with a rotating cone.

Now, in copper—which has nothing to do with coal at all at the moment, but it shows how technology interacts with other technologies—today we are mining a half percent copper in this country, one-half of 1 percent copper in the ore. We are mining nearly 2 million tons of copper in this country, which means we have to handle in the copper flow sheet over 400 million tons of feed, throwing away 99½ percent, and keeping one half of 1 percent, which is copper, so if you get 10 pounds of copper out of a ton of rock and the copper sells for roughly 60 cents a pound in finished form, it is at $6 a ton per ton of rock.

Now, we are also mining 440 million tons of coal, which are used for utility purposes. We are actually mining 670-odd million tons counting the other for coke and export and so on, but 440 million tons is for electric generation. It certainly ought to be possible at coal prices which last year averaged $20, that includes metallurgical coals which are higher grade, it certainly ought to be possible to grind it down fine, treat it somewhat as you would treat a copper ore, but keep 85 percent of it and throw 15 percent of it away; namely, the ash and sulfur that you don't want anyway, and then go ahead and use the 85 percent.

Therefore, what we want to do is get some of our coal preparation people who have done a good job in the past, but it has an art rather than a science, and get them working with our metallurgy people who know how large tonnages of material can be handled in flow sheets and ground real fine and so on, and see what they can come up with for the coal that is innovative.

ECONOMICS OF COAL PREPARATION

Mr. McDADE. Have you had a chance to do the economic side of that too, or are you just looking at the technological side? For example, we constantly hear we ought to burn more coal but we have to put all kinds of equipment in to clean the stack gases so we don't violate the Clean Air Act, and people often use that as an impediment to burning coals. That often is suggested as a reason why coal becomes unattractive economically. Are you saying that if you use this process at the front end of the extraction process, that economically you will avoid the problem downstream of attempting to clean up stack gases and things of that type?

Dr. MORGAN. That is precisely so, sir. The more you take out before it's burned in the furnaces the cheaper and the fewer problems you are going to have compared to trying to take deleterious substances out after burning.

Mr. McDADE. Are you also saying the economics are such to show it's far cheaper to do it that way?

Dr. MORGAN. We have no definitive economic studies and that is why we have to do a certain amount of research, but not with just the little equipment in a lab but what we want to do now is to build a facility that will take small sizes of commercial equipment. Since coals are different from different areas, we want to be able to run 15, 25, maybe even 50 tons of coal an hour through a plant and actually show people from the industry what can be done.

Now, let me say this: I talked about handling that coal. If you are going to handle 400 million tons of coal and you mention stack gas cleanup, it takes roughly 3 tons of oxygen to burn a ton of coal, and it takes roughly 5 tons of air to give you a ton of oxygen.

So while people don't normally think of air in tonnage it takes about 15 tons of air to burn 1 ton of coal, and, therefore, when we are talking about stack-gas cleanup we are talking about handling 6 to 7 billion tons of hot corrosive gas per year right now, which somehow is going to have to be handled, something sprayed through it, something removed from it, and if one is going to take it out in the form of a calcium sulphate slurry or something, there are going to be 20 or 30 or 40 million tons of calcium sulphate, and what do you do with that? Another of our projects in here is an actual demonstration of the Bureau of Mines' developed citrate process to remove sulphate from stack gases, by a process which does not create a waste product but instead reclaims elemental sulphur. Elsewhere in our research efforts right now, at Monaca, Pa., we are engaged with the St. Joe Mineral Company at their powerplant there, in a demonstration, which will take form on a large scale using citrate processing.

Mr. McDADE. Jack?

ADEQUACY OF FUNDING FOR COAL PREPARATION

Mr. MURTHA. Yes. My question is are you spending enough money? For instance, that is a very minimal amount of money for coal preparation or an increase in the cost of coal preparation in view of your overall budget.

I am concerned that you are not spending enough money.

Dr. MORGAN. Well, it is, sir, a major scale-up from prior activity. Just a few years ago it was of the order of a couple of hundred thousand dollars. Last year it was about $2 million.

Mr. MURTHA. Can you spend more money cost effectively?

Dr. MORGAN. I believe that the program we have set out here represents a balanced and a very doable program. I think this is in accordance with the priorities as we see them.

Mr. MURTHA. But, Doctor, can you spend more money cost effectively? This seems like a very important program, and I know as a priority in this country we are interested in production of coal.

Dr. MORGAN. We have looked at this very carefully. We have actually cut back some of our other coal mining technology in order to free up the money for coal preparation because we think it's a high priority, but, what can be done? There is only a very limited number of people in this field, there is not any extensive university research.

In fact, just yesterday Dr. Henrie and I met with Dr. Charmbury, who is one of the leaders in fuel technology in the country. He is a professor emeritus from Penn State, and we were looking into this area with him and we asked what other universities and what groups are doing research in this field? And there are only a very limited number of people doing it, and we think this is the place to start right now.

As we go down the road, if we saw any opportunity to increase beyond what we have asked here, I am sure that with the importance of coal and the interest in it that a supplemental request would be entertained if we saw an opportunity.

COAL RESEARCH FUNDING PRIORITIES

Mr. MURTHA. Well, Doctor, you said you cut down on coal research in other areas. Where did you cut down in order to make money available here?

Dr. MORGAN. If you look at figure 4, sir, under program decreases, you will notice there that the 5th item down is labeled "Advancing Coal Mining Technology."

Mr. MURTHA. How could you possibly cut down that program at a time when we are trying to increase production of coal? I would have thought you would have come in asking for millions of dollars more in funding for that type of program.

Dr. MORGAN. This is certainly a substantial increase over what it was a few years ago, and this represents a balanced program that has been tied in to the overall mining research program, and has been discussed with ERDA and the other people like that that are going to use the coal that is produced.

We did a little reprograming, not changing the program, but changing perhaps some dates of accomplishments in order to free up that $2,835,000 which you will recognize is virtually the same as the

$2,900,000 for coal preparation. It was our clear determination that the coal preparation offered the best short-term payoff, whereas the mining research will go ahead substantially on the same schedule as before.

Mr. MURTHA. I understand that. But it still seems almost irresponsible to me to cut back in coal mining research of any type when we are in a position where the President has said that it's going to be a priority in this country to utilize more coal, and we are all trying to at least, as you said before, keep our dependence on the Middle East or foreign oil at a minimum. Has there been pressure from OMB to do this? What is the reasoning for cutting back in coal mining technology?

Dr. MORGAN. Well, sir, you mentioned the President's program and OMB, of course, is an agent directly responsible for carrying out the President's instructions.

Mr. MURTHA. That is right.

Dr. MORGAN. They have reviewed our budget submission in the current administration and this is the administration's submission. They have made no changes in the prior one, so we understand this is the program.

ENERGY FUNDING PRIORITIES

Mr. MURTHA. Mr. Chairman, let me tell you, I am on the Military Construction Subcommittee and they cut there, too.

Mr. YATES. Who is they?

Mr. MURTHA. OMB cut out $120 million in energy conservation programs which were of direct benefit to this country to replace facilities, moving them from oil to coal. But I am running into the same thing. The President is saying one thing and yet the agencies are saying another thing, and I can't understand why the message hasn't filtered down, that coal is a priority, and we want to decrease our dependence, if possible, on foreign oil. Yet we keep getting indications in the only two committees I am involved in that the opposite is happening.

Dr. MORGAN. Well, first, sir, the Bureau of Mines has been engaged in coal research for many, many years. The Bureau was created in 1910 and coal was one of its fundamental charges ever since then.

So it's not something new and there isn't any magic solution out there, as though if we only had a little more, suddenly the whole problem would be solved.

Mr. MURTHA. You are saying you couldn't use any more money; is that it?

Dr. MORGAN. What I am saying is it's always tempting, sir, for a bureaucrat to be asked if he or she could use more money.

Mr. MURTHA. Right.

Dr. MORGAN. And I think in all honesty we would have to say that in research and demonstration programs, that it would be possible to do more. I am sure there is always more that can be done.

However, the President has the responsibility of taking all of us bureaucrats and putting us all together, probably all of whom could do more, and he has sorted it out and this is his approved program, and this is the program that we are fully committed to, and are prepared to say represents, in our best judgment, a balanced program, given the facilities, the money, the people, the situation and so on.

CONGRESSIONAL FUNDING RESPONSIBILITY

Mr. MURTHA. But we have an equal responsibility to see that money is spent properly.

Mr. YATES. As a matter of fact, the Constitution places a greater responsibility on the Congress in allocating the funds.

Mr. MURTHA. And I get the impression that someplace in the administration the message is not getting across.

Now, I understand exactly what you are saying, and I think we should have any increases that you feel could be beneficial to this country, and a recommendation.

For instance, if these cuts are cuts in programs that are important, I believe we ought to know that, and this committee should be able to consider whether these cuts are important so that we could recommend reinstating them.

Dr. MORGAN. Sir, I believe that the Department of Interior has submitted to the committee a list showing the earlier budget requests of the Bureau of Mines, and other agencies to the Department, and the progress of those requests through channels.

Mr. YATES. We have that. You will see he asked for more for mine research and OMB cut them down.

Dr. MORGAN. This would be an indication of where other activities——

Mr. MCDADE. If you will yield, Jack, last year we found a substantial cut in metallurgy. People go through every year the exercise of our growing dependence on critical minerals, and other metals, and we found OMB had cut metallurgy substantially. We restored that cut. I think what my colleague is asking is really to kind of signal us, in your responsibilities to this committee too, to tell us if we have equivalent areas like we did in metallurgy research where we were told time and again we were coming up short, but the way to bridge the gaps was through technology. We demonstrated today some of the terribly important technological processes that are in place because of our metallurgy research program. Yet, as I recall, last year—I forget what the cut was, between your request and what OMB granted—this committee restored several millions of dollars to keep the metallurgy program on track, to get at the critical minerals to make sure that the Bureau's expertise going back to 1910 wasn't wasted

I think what my colleague is saying, and I would echo, is that we do want to know if the Bureau feels that there are areas where there can be dollars effectively spent. We don't want to see anybody not using money properly. If there are areas of concern that worry the people in the Bureau we want to know about it in order to exercise our responsibilities and we must rely on our expertise when we ask a question like Mr Murtha asked you.

Dr. MORGAN. Well, sir, as I indicated, in the table that I understand the Department has submitted, there are indications of what our budget would have on several priority levels. We prepared our budget as normally, givent minimum levels, and then we had I believe an A, and a B, and C and D level, and obviously at the higher levels we asked for more money in coal research than we have in this table here.

Since you have that table that would be an indication of where this might be done.

Mr. McDade. It isn't just a wish list now? Every Bureau in town has a wish list.

PROJECTED FUNDING FOR COAL EXTRACTION RESEARCH

Mr. Yates. Would you yield on that for a minute?

Didn't you publish a program report in 1975 calling for a funding level of about $70 million in 1978, and also a report in 1976 calling for a level of about $74 million?

Dr. Morgan. I believe at least one of them was the blue covered Dixie Lee Ray report, was it not?

Mr. Yates. No.

Dr. Morgan. Oh, this one.

Mr. Yates. It might be called a self-serving document because it's put out by the Bureau of Mines. But what you decided to do or what you hoped to do according to this report was have a level of funding that was about $20 million more.

Dr. Morgan. That, sir, was our draft strategic plan and that——

Mr. Yates. That sounds very impressive.

Dr. Morgan. Yes, sir. But that was withdrawn sometime ago and has no official status.

Mr. Yates. Who withdrew it?

Dr. Morgan. The Director of the Bureau of the Mines.

Mr. Yates. Why did he withdraw it?

Dr. Morgan. I believe they endeavored to make in it 5-year budget projections, which are not normally to be made.

Mr. Yates. Why? Why wouldn't you want to know where you should be 5 years from now?

Dr. Morgan. We would like to know, but not to quantify it specifically in just so many dollars.

Mr. Yates. How can you go someplace when your going depends on the amount of money you have, without recommendations with respect to that money?

Dr. Morgan. I think if it had been hedged with the appropriate qualifications and so forth, it might have been all right. But it was not a document to be generally released.

Mr. Yates. You mean you should have pussy-footed more in the draft?

Dr. Morgan. Yes, sir.

COAL EXTRACTION FUNDING PROJECTIONS

Mr. Murtha. I think, Mr. Chairman, this goes right back to our basic problem. Here we are trying to take advantage of the tremendous experience and technology of Bureau of Mines and a report comes out looking ahead 5 years. It has to be withdrawn because obviously it is recommending more money than somebody decides is possible to spend.

The President and the former President recommend that coal production be increased and every place I look the opposite is happening, and I don't blame you, Doctor. I realize——

Mr. Yates. Let's blame him. You've got to blame somebody.

Mr. Murtha. You have to blame somebody. This is so frustrating to me to see, instead of increasing production of coal, what we have

done is decrease our goal from 1.2 billion to less than 1 billion tons now, and it seems to me that you are the agency to be the catalyst for the type of increase in production we need, and you are cutting back funds in the very area where we need an increase in funds, it seems to me.

Dr. MORGAN. We have made a slight readjustment in the total cost program. The totals are the same.

FISCAL YEAR 1978 BUDGET CHANGES

Mr. MURTHA. Doctor, your overall budget is less this year. That doesn't even take into consideration inflation, isn't that true? Isn't your budget less than it was last year?

Dr. MORGAN. That is a factor, sir, but if you look at figure 10 one of the big decreases is in nonrecurring expenses.

For example, we spent last year some $2 million to buy the De LaSalle College facilities, to move the College Park, Md. station. Obviously we don't need another $2 million to buy it again, we bought it once, and we are in the process of moving in. There are some other items like that in there. Some of the mine land demonstration we show here minus $5.9 million, we have gone through the phase that is necessary to show that it can be done, which was the initial target.

I would like to speak to that.

RESEARCH, DEVELOPMENT, AND DEMONSTRATION CYCLE

When we do research, our scientists or engineers have ideas that they think will work. If we didn't think it would work we wouldn't try it. But if we think it will work, then we have to try it.

Now mining, by its very nature, is something that cannot easily be done in a laboratory, with men in white suits, and air-conditioning and all of that sort of thing. The place you really have to do mining research is in mines. So, we go in and we try the idea, once we have it, in a mine. That is research, when we try it once, and we find it works. Sometimes we try something and we find it doesn't work. We hope we don't try too many negatives, but it is equally important in scientific research to try something and find out that it doesn't work and to write that report and put it on the shelf so people don't mess around with that anymore.

As I say, I hope we don't find too many of those.

Now, once we have done it, then the question is, well, it worked over here in place A, would it maybe work over here or over there where the geology is different, the rocks are different, the coal is different, the climate is different, maybe it's a land restoration, maybe the water table is different. So what we know worked at point "A" we try in points "B" and "C" and "D." These then become demonstrations, and we find, hopefully, that what worked in "A" also works in "B," "C," and "D."

Now, having shown it works in several places, the question is should we keep on doing it? Well, at some point we get into what might more properly be called public works.

In other words, there are any number of places with subsidence; there are any number of orphan mine lands to be restored. They have been mining coal in this country for 200 years.

MINED LAND DEMONSTRATIONS

Mr. YATES. Is mine subsidence a part of this appropriation or rather mine antisubsidence?

Dr. MORGAN. Yes, sir. But I am trying to point out where we save the money; $5,971,000 is a reduction in mine land demonstrations. Now, this is because we have reached the target of those demonstrations. But there is no end to that. We could just as easily spend $100 million on mined land demonstrations. In fact, Bureau of Mines estimates are that it would take more than $20 billion to restore all of the subsided places and the orphan lands, and clear up the acid mine drainage and so on. So we could spend any number from a couple of million up to $20 billion.

FISCAL YEAR 1978 COAL MINING BUDGET REQUEST

Mr. MURTHA. Doctor, I don't like to interrupt, but you are getting away from my point. I understand that. But take Defense. Defense always seems to be able to find ways to always have to increase the budget. I think this is more important than Defense right now. I think this is the most important thing in the country today, and you are not saying you are cutting subsidence, you are saying to us that you have decreased advanced mining technology by $2 million, and I am saying that is counterproductive, that we no longer have the luxury of looking to the future in doing research.

We need to do that research immediately to produce coal as quickly as possible, and I think those cuts that OMB has made are irresponsible.

Dr. MORGAN. Sir, let us turn to figure 13 on fiscal year 1978 coal extraction and coal preparation.

Mr. YATES. All right. We have turned. What are you trying to tell us?

Dr. MORGAN. If you look at the different programs there you will notice the total is $60 million in fiscal 1977, and $60.1 million in fiscal 1978.

Mr. MURTHA. That doesn't even take care of inflation.

Dr. MORGAN. Well, that came in with the space increase, I guess. That is where the additional $100,000 came from. So that didn't really do anything except pay for additional space costs.

Now, if we look at that further, coal preparation, which is the next to the bottom item, goes up from $2.1 million to $5 million, and the others then go down by an equivalent $2.9 million, scattered over several of the programs in such a way that is not uniform but which depended on a certain amount of judgment. Surface coal mining took the biggest cut proportionately, apparently, because it went from $11 million down to $10.1 million, so that is where $0.9 million came from.

Mr. MURTHA. But getting back to Mr. McDade's and my question, you obviously could use more money in this particular field because in your original budget you had more money requested to OMB.

Dr. MORGAN. We could use more money.

Mr. MURTHA. Effectively?

Dr. MORGAN. Effectively, yes, sir.

Mr. YATES. Do you mind if I supplement that question and ask you whether or not this is your No. 1 priority where you could use more money?

Dr. MORGAN. In coal mining? Or do you mean in the entire Bureau of Mines program?

Mr. YATES. In your budget. If you had your druthers on where to put more money, where would you put it, knowing the needs of the country for improvements in ways of getting coal to the consumer?

Dr. MORGAN. May I consult?

Mr. YATES. Let's come back at 1:30 this afternoon. In the meantime you can think about that.

Dr. MORGAN. Thank you, sir.

AFTERNOON SESSION

BUDGET REQUEST FOR COAL MINING RESEARCH

Mr. MURTHA. Doctor, I wanted to make one more point on our discussion this morning. I know you have a question yet to answer. I notice, if you take the coal development and everything except the coal preparation, you took $2.8 million out of coal development and put $2.9 million in coal preparation. You juggled the budget. What it amounts to, in order to get an increase for coal preparation you had to reduce these other items; isn't that accurate?

Dr. MORGAN. There was no real indication they had to be exactly the same as they were in fiscal 1977. We have endeavored to compare fiscal 1977 with fiscal 1978, since the total is essentially the same—$60 million. And since the one went up, the others went down. There was no underlying reason why they should all be identical with fiscal 1977. They didn't go up and down in exact proportions. Some were more and some were less.

Mr. MURTHA. I think we understand that you could use more money effectively. Now that you have had a chance to consult, would you give us an answer to the chairman's question?

PRIORITY AREAS FOR ADDED FUNDING

Dr. MORGAN. Yes, sir, I have thought about it over the noon hour and talked with our staff here, and I would like to extend our range beyond the $60 million for coal in fact, beyond the entire mining program, and look at the whole Bureau of Mines program.

I am mindful that the question started in the area of coal, but I would like to point out that some of the work that goes on in areas that are not specifically under the coal budget line could also affect coal.

MINERAL LAND ASSESSMENTS

Without attempting to put down any specific numbers, which would be hard to do without a little better look than we have had time for, I think one area that we probably will need to make a greater effort in, as time goes along, is in the area of land examination.

I point out that we were talking this morning of research for coal but the key to increased coal usage in this country hinges on more than

research. In fact, often research does not have a short-time payoff, and the leasing of coal lands and the approving of environmental impact statements and everything like that incident to the use of coal lands may have a shorter payoff in terms of use of coal than some of the research that is underway.

For example, we have been asked just the past month to do much more work than we had been doing on helping Indians make alternative evaluations of possible coal leases. You know, the Secretary of the Interior has a very unique and special trustee responsibility for the Indians. Therefore, when the new administration came to us and asked us to give them a hand, we have been working day and night, literally, turning out computer printouts for the Crow Indian tribes, the Mole Lake Indian tribe, the Navajo Indian tribe, helping them to analyze return under different royalty schemes. Should there be advance payments, should they have a percent royalty, should it be so much per person, should it be so much of the selling price—all kinds of considerations like that.

We have been asked to examine lands for them. All of this would help to speed up coal production. Some of it involves assessment of uranium, which is essential for energy. So the entire gamut of land-evaluation activities, I think, is going to be an area requiring more attention.

PROGRAMS FOR IMPLEMENTING STRIP-MINING LEGISLATION

I can't put any costs on it, but you are aware, I know, of the strip-mining legislation that is pending before the Congress at the present time. In the last couple of months we have had in the Bureau of Mines a greatly increased workload in supplying information on how to analyze the different clauses in the strip-mine bill. Once that bill is passed, the Secretary will have terrific responsibilities for administering it. I would certainly hope that he would want to call upon the Bureau of Mines for its areas of expertise, its technical knowledge and so forth, for assistance. How much that will be and how to quantify, it, I dont' know, but I can clearly see a greatly increased workload on the Department and surely on the Bureau of Mines, incident to strip mining, which is essentially 100-percent coal at this time, even though a little further down the road they are going to look at surface mining of other minerals also.

MINING HEALTH AND SAFETY RESEARCH

I think another area where very clearly we could use more effort is in the area of coal mine health and safety. We are, as you know, constrained by the $30-million limitation in the Coal Mine Health and Safety Act of 1969 on research and development. That $30 million was put in the act of 1969, and earlier we discussed here inflation. We are asking for the full amount of $30 million.

Mr. YATES. We did increase that to $30 million in this committee last year?

Dr. MORGAN. $30 million right up to the top, so it is right at the ceiling.

There is one way that more could be done which would have a pretty close effect on coal mine health and safety, that is if we were to do more work under the heading of metal and non-metal mine health and safety. If I could just take a minute and explain why that is so, even though it may sound strange, much of the work that is done in mine health and safety is of some application in both—coal mines, and metal and non-metal mines.

Let me give you an illustration. A system has been recently developed by the Bureau of Mines to warn of fire in the mine and to take action to quell the fire. A very rugged ionization detector which would detect very small concentrations of smoke particles similar to what they are selling for houses and garages, but much more rugged to stand up on continuous duty in the mine atmosphere has been developed as one sensor.

A sensitive carbon monoxide detector is also a part of the system. Any fire in a confined space is going to put out carbon monoxide, which is colorless, odorless, tasteless and yet highly poisonous. Another part of the system involves a specially developed long wire which melts at 165° F, very similar to the little fusible plugs like they have in a fire extinguisher system, only this is a long wire strung through the mine. If there is a fire at any point, the smoke particles will activate the ionization detector, or the carbon monoxide will activate the carbon monoxide detector, or the temperature will activate the wire which melts when the temperature hits it.

Not only does the system sound an alarm on the surface, but it is also connected electrically to large automatic closing doors which close down below keeping the ventilating current from the area where the fire is, and water standpipes are activated to inundate the area and put out the fire.

This system has been developed by the Bureau of Mines and is available for commercial use. It wouldn't make any difference if that were developed with metal and nonmetal funding or if it were developed with coal mine funding; it is of application in metal mines, nonmetal mines, and coal mines. I would say very clearly in view of health and safety problems in all mining, and the transferability of this technology more could be done—and recognizing that there is going to be an increase in coal mining, particularly underground coal mining, there are going to be younger, inexperienced labor force, and so forth—therefore the health and safety problems are probably going to be greater than they were before with experienced labor force.

One thing clearly, if we had more funding in the area of metal and nonmetal health and safety we would advance the programs in both.

TRAINING OF MINERS

Mr. MURTHA. Does that include the training of miners? I have visited one school in Ohio that seemed to be very effectively run by MESA purely for safety, certainly under their jurisdiction, but with a combination of CETA and the State grant program funds.

If we want to increase production we have to do it safely. I have read we will need an increase of 200,000 miners to reach a billion tons of coal production.

Is your charter broad enough to encompass something like that, the training of miners and perhaps schools to increase efficiency under Bureau of Mines demonstration projects or even technical schools?

Dr. MORGAN. Yes, sir. You have a very important point there. Training per se is more the responsibility of MESA, and they have an Assistant Administrator in charge of Education and Training. They have a recently dedicated academy at Beckley, W. Va., where they are training foremen, shift bosses, mine inspectors, all sorts of people.

The Bureau is not directly involved in training efforts for miners per se. I think that really should be the MESA responsibility. But we are involved in developing training devices; for example, automated ways of training a man to handle a giant strip shovel. Nobody wants to take a $25 million or more shovel and take an inexperienced man and put him on that expensive shovel to learn how to use it. So therefore, just as they have developed for the Air Force trainers right on the ground that simulate how the pilot flys the airplane, we are working with industry developing training devices for miners which would both deal with productivity and, of course, how does he do it safely, which, once they are developed, then will be turned over to MESA or industry.

BUREAU SUPPORT FOR UNIVERSITY RESEARCH

There is another aspect of our work which impinges on this. We have a long history of association with mining and metallurgical colleges throughout the country. In fact, most of the early Bureau of Mine research stations were built on college campuses where they were concerned with mining.

Mr. YATES. Including the University of Utah?

Dr. MORGAN. Yes, and Carbondale, Ill.

Mr. YATES. Is that staffed yet?

Mr. YANCIK. We have five full-time people at the present time.

Dr. MORGAN. So we are helping to support the mining colleges in this country. Last year, of our $160-odd million in the Bureau of Mines, over $7 million was spent at universities in cooperative programs, research activities, and so forth.

This isn't directly training but in addition to the product we desire it helps to support the university, it helps to maintain the professors, and it helps to train undergraduate or graduate students who are doing the research work, who in turn will go out into industry. I think this aspect of our work is very important.

Mr. MURTHA. Could you use more money in that field, do you think?

Dr. MORGAN. I haven't heard of any mining school which said they didn't need more money. In fact, they have introduced legislation that has been vetoed three different times now, the so-called S. 635 of a couple of years ago. In similar form it is in one of the strip mine bills.

Mr. MURTHA. Mr. Chairman, since the question you requested before the break, Dr. Morgan has answered in the thrust of his remarks that they could use more money in land examination, the aspect of trying to increase examination of land.

Mr. YATES. These are his priorities.

Mr. MURTHA. Yes. This is what he suggested.

The second was he would like to see an increase of the authorization in the metal and nonmetal health and safety. You remember last year we increased coal to $30 million, which was the authorization for safety. It was from 29 to 30.

Now this is the third area, mining school technicians, et cetera.

I had asked him the question. Obviously in the $60 million we had appropriated to them last year, in the 1977 request, they had juggled the figures and reduced the mining technology to increase the coal preparation area. It is obvious to me they could use 2.8 there to put it back in the budget. It is obvious to me, though he won't admit it, they can use it.

Dr. MORGAN. Actually, sir, we could use even more than we have described so far.

Mr. MURTHA. Proceed.

TRACE ELEMENTS IN MINERAL PROCESSING

Dr. MORGAN. I have said, sir, that I was going to go beyond coal, to look at the entire program of the Bureau of Mines, because I think we have to have a balanced program and there may be some other areas with a more serious problem than just coal. We can't only look at coal.

We are very concerned with the question of the trace elements and particulates in mining and mineral processing and in the mineral flowsheet.

Mr. YATES. What does trace elements mean?

Dr. MORGAN. In the past the mining and metallurgical industries have always been concerned about the main product. Say it was a copper mine; they were concerned about the copper—no question. They also were concerned about byproducts. The byproducts were something else that could be recovered that might have a sale value. For example, some molybdenum, selenium, a little bit of gold and silver and platinum and other things like that are recovered along with copper in the copper flowsheet.

ASBESTOS FIBER PROBLEMS

On the other hand, what we are finding now is that there are all sorts of other things present in minerals and in coal at parts per million or parts per billion. One example that you are reading about in the daily newspaper now right in this area is the asbestos in the Rockville quarry and the asbestos on the road. They didn't even know there was much of it, but——

Mr. YATES. I am sure everybody in this district is concerned about what they are talking about.

Dr. MORGAN. We are doing identification studies and there are a few trace fibers there which are identified as an asbestos-type material but they are well below the standards that MESA would establish for a mine. The standard is five fibers per cubic centimeter of air, and they are contemplating dropping it to two.

Mr. YATES. If you don't call it a mine, what do you call it?

Dr. MORGAN. A quarry.

We have two problems. We have to determine first in any place around the mineral industry, the mine, the processing plant, or wherever, what is the particulate or solute that is present in parts per million or parts per billion. This is the trace.

Mr. YATES. I see.

Dr. MORGAN. Then we have to determine, if we can clearly identify what it is, how much of it is there. Is it enough to be harmful or is it below some minimum level.

Mr. YATES. Do you have to do that or does EPA do that?

Dr. MORGAN. EPA establishes the standards. They say how much is dangerous. But then it is up to the Bureau of Mines to identify where it may be in the flowsheet from mining through beneficiation, smelting, refining, use, recycling, and if it is there, if it is present in more than the harmful amount, what can be done to modify that flowsheet to contain it so it isn't there in a harmful amount or what can we do to the man in the way of a mask or a current of air or a special collection, or whatever, to protect the man from the trace element if it is there.

Mr. YATES. I have to go to another subcommittee; I will be back.

Dr. MORGAN. In our metallurgical processing where we have been doing some of that work, more can and should be done. This would have impact on the entire mineral industry and it would have some impact on coal because when you start looking at coal at parts per million you are going to find virtually every one of these trace elements in coal. When you burn 400 million tons of coal, even if something is there only one part per million, there is going to be 400 tons of it somewhere.

MINERALS AVAILABILITY SYSTEM

I will come to the coal-mine technology in just a moment. The chairman earlier asked us about chromium and others asked about cobalt, and other materials. With the current problems in Africa which have arisen since the time this budget was formulated, I would say that an increase would be appropriate for our work on the minerals availability system, which is the computerized evaluation system whereby we are keeping a list of all the deposits in the country (and in the World as a whole) what their content is, what could be mined from them, and other significant parameters.

We are going to have more and more calls for that type of information than we were having before the current problems in Africa.

I have covered several areas which are important from the point of view of the entire program, and I have left for last but not necessarily the least by any means the coal-mine technology we started out with. Since Dr. Yancik, our Assistant Director for Mining, is here and he has lived with that major program day and night, I would like to ask him to tell us what more could be done on coal-mine technology.

COAL MINING TECHNOLOGY RESEARCH

Mr. YANCIK. I would have to agree with Dr. Morgan that we saved the best for last.

If we were to look at some of the technology projects that would be deferred under the present budget, I could describe a number of specific types of research, development, and demonstration activities in our various programs. However, the activities I describe will of course extend beyond this particular budget just to represent the full level implementation of the technology program.

COAL MINE DEVELOPMENT

In the area of coal-mine development, we have a very real need for developing rapid techniques for opening up a mine. One technology that is still limited in this country is a means for driving the main entries. On page 96 in the budget is one type of development that is underway. It is called an in-seam mining machine—tunneling—in contrast to the civil works, which is usually a circular-driven entry which, of course, means you take part of the coal seam and the adjacent strata. This has great promise for providing immediate and continuous roof support as you drive the tunnel. It also provides for controlling on a permanent basis—by coating the tunnel with some type of impervious material, to reduce the amount of methane that would be liberated into the air.

Mr. MURTHA. This is longwall mining?

Mr. YANCIK. This miner would be used to drive the entries that you would use in order to create a panel of coal which would then be mined by a machine such as a drum shearer, which is the longwall method.

Mr. MURTHA. This is the machine to get to the coal?

Mr. YANCIK. To open up that panel which could be anywhere from 500 feet in width to 1,000 feet in length.

Mr. MURTHA. Because it takes a great period of time to get this machine inside and set up and even shifted from one area to another?

Mr. YANCIK. Yes.

Mr. MURTHA. I guess they have to break it down to take it in?

Mr. YANCIK. It has to be taken in in two pieces. It could take as long as 3 months to set it up. Generally they accomplish it in 2 to 6 weeks.

Another example of coal mine development is illustrated on page 92, which is for drilling shafts, very large diameter shafts that are required to gain access to the seam. At the present, the largest shafts drilled are 12 feet in diameter. There is an urgent need for a capability to drill production-size shafts which are 24 to 27 feet in diameter.

We have a major program in this area in which the activities could be accelerated.

There are many others but I just use these as principal examples.

In the area of longwall and shortwall——

Mr. MURTHA. How much money could you use in that development? Do you have a figure at this stage?

Mr. YANCIK. No, I do not, Mr. Chairman. Of course, if additional funds were made available we would try to put them in the areas where the greatest progress had been made so we could keep a balanced program.

Mr. MURTHA. Could you give us for the record as you go through these—and I realize it is short notice—figures that, if we decide we can increase this budget, you could use effectively.

Mr. YANCIK. Mr. Chairman, we have those figures but I do not have them with me. Rather than try to take a guess at them if we could supply them for the record.

Mr. MURTHA. That would be fine.

[The information follows:]

PROBABLE USES OF ADDITIONAL FUNDS FOR EXPANDED ADVANCING COAL MINING TECHNOLOGY PROGRAM

The proposed activities are identified at two levels. The first is a level of example projects and requirements associated with a $10 million addition (level 1). The second is additional activities and requirements associated with an additional $10 million over and above the base $10 million (level 2). The specific form of the projects which would be implemented depend on the results of ongoing research and detailed cost-effectiveness analyses.

LEVEL 1

Requirements: $10 million; 104 people.

Underground mining

Accelerated design of lower cost easily transported tunnel boring machine which can be erected with a minimum set up time.

Additional trial of vertical boring machine with improved hoisting and shaft lining techniques.

Fabrication and testing of high capacity longwall conveyor for low-medium-height coal.

Parallel field tests of production lots of greater than seam height drills.

Accelerated development of miner-bolters with third generation automated on-board bolters.

Development of hydraulic waste transport system for tunnel boring machines.

LEVEL 2

Requirements: Additional $10 million; additional 38 people.

Surface mining

Demonstration of modified area mining for moderate slope Appalachian surface mines.

Accelerated trials of cross pit conveying systems.

Underground mining

Accelerated development of large shaft drilling techniques.

Intensive field studies of underground multiple-seam mining systems.

Advancing longwall mining demonstration.

Trial of longwall caving system for thick-seam western coal.

Development of alternate method for injecting run-of-mine coal at the face for an underground hydraulic transport system.

Expanded development effort for high availability continuous miner.

Development of panel sealing techniques to minimize acid drainage.

Development of subsidence control procedures for pillar-extraction panels.

LONGWALL AND SHORTWALL MINING

Mr. YANCIK. In the longwall and shortwall mining there is an urgent need to expand the demonstration program. We have to take the existing state of the art and show that it has a wider application in our coal seams than we presently have. There are many advantages for longwall mining in this country similar to the advantages which have been demonstrated in Western Europe.

Today only 4 percent of our coal mined underground comes from longwall units. We have a number of demonstrations. We are in the midst of a major shield support long-wall demonstration in southern Illinois in the No. 6 seam.

Mr. MURTHA. I don't understand. In Europe the production per man is much lower than our production; isn't that true?

Mr. YANCIK. That is correct, and that is exactly why we feel that we have to approach this in a very analytical and engineering way, because we want to import the technology here but we don't want to import their productivity.

Mr. MURTHA. Isn't it possible to mine all these seams simultaneously? I am thinking they are parallel in most cases. Isn't it true in Europe the seams that are accessible and the coal that is cheap and now they are down very deep, as deep as a mile I guess, and this is one of the problems. Couldn't we possibly mine these at the same time? Wouldn't that eliminate a lot of your mapping problems and channeling problems or tunneling problems?

Mr. YANCIK. Depending on the area, of course in this country we do very little what we call multiple-seam mining because it is not necessary. We generally open up a seam close to the surface and in many cases mine from the top down although it has been proven in Europe in some cases it is more advantageous to mine from the bottom up.

It is a matter of economics. As long as we do not sterilize a seam by mining in such a way that you create undue stresses on the seam below it, and typically if I were to generalize, room and pillar mining is perhaps the worst type of mining system because it has the greatest impact on affecting the state of stress in lower coal seams. As you go deeper, that mining will not be acceptable because you get less than 25 or 30 percent recovery. So there is a real need to import the best of the European technology into this country, develop that which we need specific to our geologic conditions, and to demonstrate this to the industry because there is a substantial risk involved.

Mr. MURTHA. Are you doing any work with techniques of mining the seams simultaneously?

Mr. YANCIK. We have a number of engineering studies and design contracts underway which, if the product from these studies is what we consider to be worthwhile, we will then have a demonstration in this country within 18 months.

Just summing up, there are considerable advances in this country that control technology, much of it developed in the aerospace program which we think has application to longwall applications, such as providing automatic controls to control the mining machine so that we can control its depth of cut into the coal seam, which is in this direction, maintaining a horizon automatically, and maintaining the cut along the floor so you don't go into the fire clay or into the shale floor. The miner operator is in a very difficult position to control the miner, plus being in a position in which there are certain safety hazards.

CONVENTIONAL CONTINUOUS MINING

In the area of conventional continuous mining, one need is to develop continuous mining machines, the third or fourth generation machines not presently available from commercial manufacturers in which is married the roof-bolting system with the system in which you are mining the coal at the same time. This is the ISMs or first-generation miner bolter in which there are four automatic remote control bolters, two on the front, two on the rear, operated from this cab.

We learned from this initial experiment that it is feasible—and we have underway with all of the continuous mining manufacturers today—experimental programs in which they are developing specialized bolters that are designed to fit with their type of continuous miner because each manufacturer turns out a different type miner. This program could then be accelerated to bring these along in a parallel fashion.

Mr. DUNCAN. For those who don't know much about mining, is that bolting an alternative means of roof support, what you call room and pillar? What are you bolting together?

Mr. YANCIK. You are bolting the immediate layers of the roof. You are tying these layers together with a steel pin. You are drilling a hole and putting in a steel pin which has an expanding anchor. And when you tighten up the bolt it expands this anchor.

Mr. DUNCAN. It makes the room more self supporting. Does it enable you to eliminate some of the pillars?

Mr. YANCIK. No; it does not. With a machine such as this you would mine in what is known as a room-and-pillar system.

Mr. DUNCAN. I went down in one of those mines in Pennsylvania. It seemed to me they told me they were intentionally——

Mr. MURTHA. That was the longwall.

Mr. YANCIK. In the longwall operation such as we have shown here, there are hydraulic self-advancing support systems that look like a steel shield with a base and hydraulic cylinders. And as it moves forward as the coal is cut, the roof is caved.

Mr. DUNCAN. Then that presents serious subsidence problems on the surface. Isn't that a primitive way to operate?

Mr. YANCIK. No, sir. It is dealing with one of the major problems with mining. It has been shown by actual extraction of the seam you have 95 percent of a subsidence that is going to occur within a very short period of time, generally about half of the thickness of the seam of coal you have mined. Through proper planning and mine layout it is done routinely in Europe. The countryside is literally lowered in some cases as much as 15 or 20 feet when there are multiple seams.

In contrast, to take room-and-pillar mining, in which you leave 50 percent of the coal in place, in the years to come if those pillars fail, then you are going to have unplanned subsidence. This of course creates a severe problem and this is presently the kind of damage that is very extensive in the anthracite region in Pennsylvania, in many of the bituminous mining areas of the past such as Wyoming, Illinois, and Indiana.

Mr. DUNCAN. With your planned subsidence do you permit that land to lower so gently that you don't even crack the masonry?

Mr. YANCIK. We haven't advanced our state of the art to that degree yet. However, it has been demonstrated both in Great Britain and in Western Germany that major surface structures such as harbors, tunnels, railroad tracks, schools, and hospitals can be successfully mined beneath and be lowered in a very gentle way so that with some special precautions there would be limited damage to the structure. We would certainly advocate that we should mine the coal first and then build the expensive structure after it has subsided.

SURFACE COAL MINING

In the area of surface coal mining, just to continue on briefly, there is a very real need to demonstrate some alternative mining systems. In the East, for example, we have been working on two which look quite promising. One is called cross-ridge mountain-top removal. Another is the haulback method using conveyors rather than trucks. The first of these you would be utilizing some modern earth-moving technology to create a flat top but minimizing the amount of material that would have to be put into the valley fill.

In the haulback method this is restoring the area back to the aproximate original contour.

Mr. MURTHA. Do you have demonstration projects involving these techniques?

Mr. YANCIK. We have a number of contracts in which very shortly we will physically have a mine that will be demonstrating these techniques.

Mr. MURTHA. In what State will you do that?

Mr. YANCIK. These, of course, will be done in Appalachia coalfields. We have put out a request for bid, which is a competitive request.

Mr. MURTHA. I want to mention Pennsylvania not only because it is the State I represent but because of the coal mine law there. Even if you didn't have it in Pennsylvania, I think it is important that they comply with the provisions of the Pennsylvania law since the national law will be patterned after that, even though it might cost more than to do it someplace else. I think you will find if you did it in West Virginia with their very lax law compared to Pennsylvania, you would find a vast difference in the price. Maybe I am wrong but I think that is something you should take into consideration.

Mr. YANCIK. Yes. We would hope through these demonstrations we could get an accurate accounting of the costs of restoring the land back to not just reclamation, but something that would be a permanent reclamation. That is one of the purposes of carrying out such projects.

Moving to the Midwest and to the West, one of the major needs is to be able to reclaim the land at a faster rate in very large open pit mines. An example of the kinds of mining systems utilizing the crosspit bridge conveyor system we have in a photograph on page 69. These systems, utilizing essentially some type of conveyor with associated crusher and multiple very large span bridge conveyors, could be utilized with the very large draglines and shovels which are presently used in the Midwest and Western field. This would give you greater latitude in being able to stack the material selectively and to essentially reclaim the land to some planned contour as part of the mining process which would substantially reduce the cost and improve the reclamation process.

We have had a number of contracts in which engineering designs have been completed, and we are in the process of making a determination now as to which of these designs will be carried out through the demonstration phase. Additional funds, of course, would enable parallel demonstration to take place.

ADDITIONAL PERSONNEL REQUIREMENTS

Dr. MORGAN. Mr. Chairman, one thing I would like to add to that, we talked so far about what could be done if additional funds were available. I think another item we have to look at across the board is illustrated by figure 14 which deals with the relationship between funding and personnel. Not only does it take money to do these good things, but it would take, if more money were made available, more people. What has happened is shown in figure 14.

In the Bureau of Mines several years ago, before these large contract programs came along, we had 36 employees per $1 million. In recent years it has been running less than 20 employees per $1 million, which in a way you might say is greater efficiency, fewer people spending more money—but we can't carry this to the extreme bottom line. We have to have supervision of these contracts, they have to be modified from time to time as they uncover unusual situations. We want to be sure that people visit the sites in order to have technology transferred to industry so that anything useful is picked up promptly. We have to arrange meetings to discuss what has happened with people, and so on. All of this takes people. You can't contract it out and then have contractors supervising our contractors and the Government lose control of the expenditure of Government money.

PROGRAM TRANSFERS TO PROPOSED DEPARTMENT OF ENERGY

Mr. MURTHA. Has Dr. Schlesinger contacted the Bureau of Mines in his reorganization plan? Do you have any idea what he has projected or expects?

Dr. MORGAN. Yes, sir. We have been in touch with the new Department with respect to what will be transferred to the Department of Energy, and that is contained in the administrative bill, which is S. 826, in which they are going to transfer to the Department of Energy certain elements of the Bureau of Mines which will continue to function in the Department of Energy.

If I may just finish this one thought.

Mr. MURTHA. Go right ahead.

PERSONNEL AND FUNDING RELATIONSHIP

Mr. MORGAN. Therefore, if any additional funds were to be made available, I think as a minimum we should consider approximately 20 employees per $1 million as additional personnel ceilings that we would need in order to make effective use of the funds. That is not quite the 16 or 17 we have reached now, and it is certainly not the 36 that prevailed a few years ago. But in order to do the work properly and make sure that funds are not wasted or misused, there must be Government supervision.

Mr. MURTHA. What you are saying is if there is an increase in the appropriation, there should also be enough of an increase so that you will have at least 20 people per $1 million for proper supervision?

Dr. MORGAN. Yes, sir.

As a general rule, I think this is a number to talk about, and I think we should keep that before us.

Mr. MURTHA. I very much appreciate your statement and I know very well I will have some other questions once we analyze this and see if we can't come up with an appropriate figure for the Bureau. I am going to talk to Dr. Schlesinger about it and I am also going to talk to the chairman of the authorizing committee, with Chairman Yates' permission.

All morning we developed that just as the cuts they make in the forest are counterproductive, the same thing is true in the Bureau of Mines. Here the Department has been cut by OMB or they have been forced into a restricted budget, which has the same impact. There is a priority for coal and we are not finding that kind of emphasis, and we are trying to rectify it by pulling information out of them we feel is necessary in order to increase the budget.

METHANE RECOVERY RESEARCH

Mr. DUNCAN. Did you discuss methane recovery in the course of your presentation?

Dr. MORGAN. No, sir, we did not, but we would be glad to.

Mr. DUNCAN. I am somewhat interested because there is an Oregon corporation, a subsidiary of a Canadian corporation my former law firm told me about, apparently proceeding entirely with private capital, having abandoned their request to ERDA. I think it is in West Virginia.

Mr. MURTHA. It is in Roanoke, Va.

Mr. DUNCAN. It seems to me it has so much potential not only from the standpoint of use of a heretofore unutilized fuel but from the standpoint of safety in the mines. I wish you would discuss it.

RECOVERY OF METHANE IN ADVANCE OF MINING

Dr. MORGAN. Yes, sir. We have successfully demonstrated already in one or more locations, methane recovery in advance of mining, the idea being as you indicate, that if we remove as much of the methane as possible before the coal seam is actually entered for mining purposes, then there is less need for ventilation and there is increased safety for the miner.

Mr. DUNCAN. Ventilation is absolutely required, is it not?

Dr. MORGAN. Yes, sir.

Mr. DUNCAN. That requires drilling holes and tapping off the methane and wasting it to the atmosphere, and this is an unproductive cost of extracting coal?

Dr. MORGAN. That is absolutely right. Furthermore, as they mine into the virgin coal there are likely to be outbursts of methane of an explosive concentration unless the air is kept absolutely up at the face where the machine is working, which is a very hard thing to do.

Mr DUNCAN. You mean a blast of air or current of air?

Dr. MORGAN. That is right.

Mr. DUNCAN. How does that control it, by dilution?

Dr. MORGAN. That is right. Just having a big enough quantity of cubic feet of air passing by there to dilute it below the explosive limit.

Mr. DUNCAN. Do they drill, maybe slant drill, and after they reach the seam of coal they can change the direction and parallel the seam?

Dr. MORGAN. That is right. The drill can come down, bend, and go off into the coal seam.

Mr. DUNCAN. Does the methane not migrate readily into the coal seam? Am I correct?

Dr. MORGAN. Actually, the coal has fractures in it. There are systems of little cracks and fractures. What we have been working on are ways of either further cracking the seam to permit the methane to escape or putting a water drive on the fractures to drive the methane with this water pressure toward a collecting point.

Mr. DUNCAN. Is it true generally that it does not migrate well in a coal seam?

Dr. MORGAN. That is correct, unless there is a well-developed fracture system.

Mr. DUNCAN. So, by artificially fracturing it and sometimes even pushing it out with water, you can free it and at least reduce substantially the concentrations you expect to find when you mine it?

Dr. MORGAN. That is correct.

LOCATION OF METHANE IN THE COAL SEAM

Mr. DUNCAN. Am I to assume most of these concentrations are above the seam?

Dr. MORGAN. No, sir, they are actually in the seam but you see, if you were sucking it out, as it were, you would bring it out in a much greater concentration, and in fact it could be then put into a pipeline in some cases and used as pipeline gas. But when you are trying to blow it out with enough air to reduce it below the explosive limit, then you have more than 99 parts of air to 1 part of methane, so you have completely diluted it and it is of no commercial use.

Mr. DUNCAN. What do you do, put a vacuum on it when you suck it out?

Dr. MORGAN. Yes, sir.

Mr. DUNCAN. These people tell me what comes up is generally contaminated. I never heard a figure as high as you mentioned. They have a process of heat. Is it vaporized at different temperatures?

Dr. MORGAN. Let me ask Dr. Yancik.

Mr. DUNCAN. They are able to put it in there by cryogenic trucks?

Dr. MORGAN. Cryogenic; yes, sir.

Mr. DUNCAN. In pipeline quality, they claim. LNG Systems—have you heard of them?

Mr. YANCIK. We have heard of them. The experiments Dr. Morgan referred to are in the Morgantown area and we have had two demonstrations that have been running, one for 5 years and one for 4. Both of these are draining the gas out of boreholes in the coal seam in advance of mining, but these are bored from the bottom of the shaft and are horizontal holes.

Mr. DUNCAN. Is there a vacuum or anything?

Dr. YANCIK. It is just coming out by the reservoir pressure in the coal. Both of these experiments have been successful. One has been proven. We are driving entries and approaching the area that has been degasified by what we call vertical shafts with horizontal holes. The methane level in the entries that is being emitted is 70 percent less than what it would be normally if we hadn't degasified the seam.

Mr. DUNCAN. Is that a safety precaution?

Dr. YANCIK. Well, sir, it is not totally safe but it certainly reduces the level of hazard you are dealing with.

The gas that is coming out is going into a commercial pipeline.

Mr. DUNCAN. That must be pipeline quality?

Mr. YANCIK. It is; it is about 98 percent methane gas. It needs to be cleaned. It is a simple separation to take out a small amount of light oil and a small amount of water.

CRYOGENIC PROCESSING OF METHANE

Dr. HENRIE. He asked the question about cryogenic processing. If your gas was a much lower grade, the impurity gases would be nitrogen, carbon dioxide, or something like this. If you compress the gas and cool it, the methane liquefies. When you cool these down to the liquid temperatures, this is called the cryogenic temperature. You compress it, it makes it hot, and then you cool it while it is under pressure. This gives you your liquid.

Mr. DUNCAN. So it will vaporize off?

Dr. HENRIE. Then you let it boil off and it becomes gas again. This cold boiling mixture then has a tendency to cool the other gases so you get a fairly good heat balance. That is the cryogenic method.

Mr. DUNCAN. Those trucks apparently make it economical to pick it up?

Dr. HENRIE. That is right. If you kept it at a liquid, you could transport nearly a thousand times as much equivalent volume as if it were a gas.

Mr. DUNCAN. Do you weaken the structures by tapping that gas out?

Dr. MORGAN. No, sir.

Mr. DUNCAN. You don't consider that to be a hazard?

Dr. MORGAN. No, sir.

Dr. HENRIE. You want to remember this gas is only 1 or 2 percent of the total energy value of the coal.

Mr. DUNCAN. But they tell me we waste as much every day as we turn in natural gas so it is a phenomenal total amount. Is that a fair statement?

Dr. HENRIE. There is as much gas in the total coal seams as we have reserves of gas. I would have to make a calculation.

Mr. DUNCAN. We are wasting a lot?

Dr. HENRIE. Yes; we are.

Mr. DUNCAN. There is a double advantage. It seemed to me to be very impressive when they said forget about ERDA; we have $1 million of private money to go into this.

Dr. MORGAN. The Bureau demonstrated this in our research work years ago. Then once the process becomes commercial or borderline commercial we would back off and let them continue on their own.

MINE FIRE CONTROL PROGRAMS

Mr. MURTHA. In the same area he is talking about, recovery, we have the fire problem in a mine in my area which has been burning for 3 or 4 weeks. Do you do any research once a fire has started in putting a fire out?

Dr. MORGAN. Oh, yes, sir. There is a Mine Fire Control Act. Ever since its formation in 1910 the Bureau of Mines has been going around putting out fires either in mines or in waste banks on the surface from spontaneous combustion. We have been asked to put out fires on western lands where lightning has struck and ignited a lignite bed or an oil shale bed. We have done extensive research on whether you should smother the fire, block off the air to the fire or whether you should squirt water on it or both. We have developed parachutes which seal a mine entry and cut off the air current on an emergency basis and for that mine fire—I think the same one you are referring to—I signed an agreement just a couple of weeks ago that our bore hole instrumentation could be taken from one place to the site of that mine fire and we have lowered special Bureau-designed instruments down into the area of the fire to take samples of the gases, see if it is being put out; special TV equipment to see what the situation is in the sealed-off area, and so on.

Mr. YANCIK. We have provided to Bethlehem through one of our contractors who has developed a system for us to seal an area in which a fire has occurred using a combination of flyash and cement with some special placement tools and a specially formulated foam-type seal that is applied on top of this barrier that is constructed in the entry areas of the mine.

We have been providing some technical advice to the company in their efforts to control the mine fire.

Mr. MURTHA. The one you went down in has the highest metallurgical content of any mine in the country. It got started when the mine was vacant because of the cold weather. There was a spark at a cave-in and it broke a wire and the wire started the methane, and they haven't been able to get it out. They are going to try to flood one section, I think. But that is the only method that they have. There is nothing else you can do. You can't smother it. You have to let water in.

Mr. YANCIK. At the present time that is the best technique available. We have a number of experimental projects in which we are looking at using inert gases to inject into a sealed area. As Dr. Morgan said, you have two principal concerns here. One is to protect the men—if this is an underground fire—to protect the men from the noxious gases in the fire and the possibility of an explosion while they are constructing these permanent seals in order to control the area. So the project that I described is being done from the surface—building, you might say, interim seals from the surface so that subsequently when men go underground to build the permanent seal prior to flooding with inert gas they can do this in a relatively safe area.

WILDERNESS AREA MINERAL SURVEYS

Mr. DUNCAN. Do you have some justifications you are going to go through?

Mr. MURTHA. Yes; but go ahead.

Mr. DUNCAN. I have a couple of other things of just a general nature I was wondering about. Maybe you have touched on them already in my absence, and if so tell me.

When we passed the Wilderness Act back in the 1960's I think there was about a 25-year moratorium, was there not, on mining exploration in those wilderness areas?

Dr. MORGAN. There was a 20-year period in which people had the right to locate mining claims and then at the end of that 20-year period the area should have passed into the wilderness system; right.

Mr. DUNCAN. Did your organization have obligations to survey those areas for mineral content?

Dr. MORGAN. Yes, sir. We have a program with the Geological Survey where we are surveying the wilderness areas to identify possible mineralization of commercial value or strategic importance.

STATUS OF WILDERNESS MINERAL SURVEYS

Mr. DUNCAN. Are you making interim reports or are you all through? Have you already surveyed the wildernesses?

Dr. MORGAN. No, sir. There is more to go, and let me call on Mr. Dare, our chief wilderness man, who has a chart which will tell you about that.

Mr. DUNCAN. Have you gone into this before?

Dr. MORGAN. No, sir. Here is a chart (fig. 15).

Mr. DUNCAN. Make a duplicate and give each Member of the committee one.

Dr. MORGAN. All right. This is Mr. Will Dare who is in charge of that land examination work.

Mr. DUNCAN. How many of the 20 years are still to go?

Mr. DARE. On December 31, 1983, it is closed, the original area is closed.

Mr. DUNCAN. Any discoveries or locations completed prior to that time may be developed theoretically; is that correct?

Mr. DARE. Right. It's an established right, so theoretically they ought to be able to develop a mine.

Mr. DUNCAN. Is that true for the common minerals as well as the metallic minerals? I am thinking of pumicite and gravel.

Mr. DARE. No, since they came under a different law they are not open to entry.

Mr. DUNCAN. So we are talking about things like chromium and molybdenum and titanium.

Mr. DARE. Locatables. They are located on the 1872 law.

Mr. DUNCAN. Go ahead.

Mr. DARE. The original 54 wilderness areas are about 45 percent or they will be 45 percent at the end of this year, completed.

Mr. DUNCAN. Is that 83?

Mr. DARE. That is 54. The mineral entry deadline is December 31, 1983.

Mr. DUNCAN. We only have 6 years to go, so you have been 14 years and you have done 47 percent.

Mr. DARE. Right. But, of course, the first job was to complete the primitive areas, the Wilderness Act provided for 54 areas and 9.1 million acres they put into the system with the act. It provided for the addition of 5.5 million acres more that were then identified as being primitive and Congress one by one was going to consider those when they were studied, and of course, we made a mineral study of those 5.5 million acres and that went into the Forest Service reports.

ADDITION OF NEW WILDERNESS STUDY AREAS

One of the big problems, of course, is that while we have tried to do as many of these wilderness areas as possible, there has been a large influx of study area identified by Congress, Sierra Club and others, and the Forest Service that they want studied for possible inclusion in the system.

So what we have had to do is put quite a bit of our effort into the so-called study areas that were not considered in the original act.

MINERAL DISCOVERIES IN WILDERNESS AREAS

Mr. DUNCAN. I am not asking these questions to be critical of the rate of progress, even though you might deserve it if I knew more about it. The purpose of my asking these questions is what kind of position the Nation is going to find itself in. Tell us if you can about the results of the surveys, both of the primitive areas and study areas and wilderness areas, insofar as locatable minerals are concerned in those lands.

What are you finding?

Mr. DARE. We have made some significant discoveries. A major copper porphyry deposit was found in the Wilson Mountains. There are some other indications of potential porphyry copper, low grade disseminated coppers in south Absanoka. We have the Umcomphagre area in Colorado, so minerals that had hard surface were proposed for declassification rather than proposing it for wilderness.

Mr. MURTHA. What is a primitive area?

Mr. DARE. Going back to the 1930's, the Forest Service established a primitive classification for their lands in 1931. It was just an administrative classification which we were going to try to manage the lands in a certain way.

Mr. MURTHA. Does that mean where people don't live?

Mr. DARE. Primarily there is nobody there. There might have been some mining in the past. There is no road. Roadless, of course, is the major criteria.

Mr. DUNCAN. 5,000 acres or more?

Mr. DARE. Five thousand acres or more. But then in 1939 the Forest Service created again administratively a wilderness classification, and now they are in the process of converting most of the primitive areas they identified in the 1930's to a wilderness classification, administratively, when the Wilderness Act was passed in 1964. So these primitive lands were still primitive under the Forest Service administrative classification when the act was passed and Congress essentially said to go on with your studies, tell us the results and we will decide if they should be put into the system.

Mr. DUNCAN. So you found low grade copper in several sites.

Mr. DARE. The Umcomphagre in southern Colorado.

Mr. DUNCAN. The Forest Service is considering declassification. Any others?

Mr. DARE. Yes; in addition there was a large number of acres—we don't remember what they were—which we found to be relatively highly mineralized in the proposed wilderness in small parts of what they asked us to study. I made a check about 2 years ago and Forest

Service, as of then, had proposed boundary pull-backs or declassifications of about 7 percent of the lands that we looked at.

Mr. DUNCAN. Based on the mineralization?

Mr. DARE. Based on the mineralization.

Mr. DUNCAN. If this is done, then the limitation of December 31, 1983, will not apply to those lands.

Mr. DARE. No, if they are not put into the system, they won't apply.

ADEQUACY OF MINERAL SURVEYS

Mr. DUNCAN. Are you satisfied with the completeness or the thoroughness of surveys insofar as the presence of minerals is concerned in this?

Mr. DARE. I think we are doing a good phase one job. We are doing a job that industry would do before they would look at an immediate target area to do more. We wish we could do more ourselves, certainly. We don't want to get into drilling unless we really have to; that normally is best done by the private sector, and without drilling, you can't really tell what is at depth.

However, with good geophysics interpretation, you can get some real good ideas of what potentially is there. That is basically what we are doing.

Mr. DUNCAN. There are no gross manifestations of the presence of minerals, at least that you think you have not discovered?

Mr. DARE. I would say that is so.

Mr. DUNCAN. Is this low grade copper uneconomical to mine and process at this time?

Mr. DARE. There is drilling going on or at least I heard there was drilling going on at that place, and I really don't know the results of the tests.

Mr. DUNCAN. What percentage, do you know?

Mr. DARE. I saw some drill-hole logs a year ago or maybe more, and they were somewhere between a half percent and 1 percent. These were from the first two holes.

Mr. DUNCAN. Have you spent a zillion dollars developing a process to beneficiate that ore?

Mr. DARE. No; that belongs to the private sector.

PENDING INSTANT WILDERNESS BILLS

Mr. DUNCAN. You haven't done any of that? What about—there are a couple of instant wilderness bills before the Congress right now. Are you aware or familiar with that?

Mr. DARE. I am glad you asked that.

Mr. DUNCAN. You are aware of that?

Mr. DARE. Yes.

Mr. DUNCAN. Have you had an opportunity to study any of those from the standpoint of their mineral content?

Mr. DARE. Yes; H.R. 3454 has 14 areas going to be made instant wilderness, and I think there are 8 more that are going to be made study wildernesses. We have looked at one. That is the Lone Peak area. There is a low grade, submarginal molybdenum deposit in the Lone Peak area right outside of Salt Lake City, and there is some question of whether

or not it would ever be developed, even with this drilling because it's in the immediate vicinty of the Salt Lake City water supply system, so that is the only area we have looked at of the 14 that are identified in the bill.

Mr. DUNCAN. Does that bill, the number of which you have given us, have a common name, is that known as the Udall bill?

Mr. DARE. I think it's the Endangered Wilderness.

Mr. DUNCAN. Congressman Udall has a bill too.

Mr. DARE. That is it.

Mr. DUNCAN. It is the same one?

Mr. DARE. That is it.

Mr. DUNCAN. Isn't there still another bill? There is one setting aside, as Don Young tells me, the State of Alaska.

Mr. DARE. That is another bill by Congressman Udall.

Mr. DUNCAN. That is the second bill. Have you had a chance to study that at all from the standpoint of its mineral content?

Mr. DARE. No; we haven't made comments on that bill as yet.

Mr. DUNCAN. Is that 183,000 miles or something?

Mr. DARE. Well, over 100.000 acres, and part of it includes a number of wilderness areas within the existing Tongass National Forest.

Mr. DUNCAN. Square miles we are talking about. You said acres.

Mr. DARE. It's over 100 million acres.

[A short recess was taken:]

Mr. MURTHA. Mr. Duncan:

WILDERNESS MINERAL SURVEY WORKLOAD

Mr. DUNCAN. What are we going to do about that 53 percent between now and the end of 1983? Have you fellows got enough people, money, skill, talent, knowledge, and enthusiasm to get all of the rest of that surveyed?

Mr. DARE. We think we have enough knowledge and enthusiasm.

Mr. DUNCAN. Let the record show, by implication at least, he hasn't got enough of any of the rest.

Mr. DARE. We are going to get to these areas, at least a year before the mineral entry deadline. This is an objective we are going to reach. We are going to complete these. We have been held up from doing as many of these wilderness areas as we would like because of the stress being placed on new areas like those in 3,454 which have a deadline themselves or which Forest Service has a lot of pressure on it requiring us to go in there and do a hurried study and it takes us out of these areas, the wilderness areas.

Mr. DUNCAN. Is there a time limit provision in the Udall bill for a survey of mineral content?

Mr. DARE. Of course, the 14 wilderness, instant wilderness areas——

Mr. DUNCAN. It's irrelevant.

Mr. DARE. Yes; and when you think about the West Chichagof-Yakobi area in which the nickel study was recently made, where they have been drilling holes over the past 5 or 6 years.

Mr. DUNCAN. Can you put in the record on a location by location basis any information you have on the mineral content of those so-called instant wilderness areas?

Mr. DARE. We sure can.

[The information follows:]

Available mineral information on the 14 instant wilderness areas proposed in H.R. 3454

West Chichagof-Yakobi Island

This area has a high potential for copper, nickel-copper, gold-silver and gold-tungsten deposits. Two mines in the Chichagof mining district produced over $20 million in gold between 1905 and 1938. Several mining companies have been actively exploring the area for base and precious metals in recent years.

Inspiration Development Company has committed $1.8 million in drilling 21,000 feet of holes in the nickel-copper-cobalt deposit at Bohemia Basin, Yakobi Island, and that at Mirror Harbor, West Chichagof Island. Present phase of exploration will be completed in 1977. To date, combined reserves are estimated at about 24 million tons of sulfide ores containing 0.28-.32% nickel, 0.12-.15% copper, and 0.045% cobalt. These deposits could represent a major domestic source of nickel and our first important source of domestic cobalt.

Pusch Ridge

There are three mining districts in the vicinity of Pusch Ridge study area: The Canada del Oro to the northwest, the Catalina (Santa Catalina) to the south, and the Oracle to the northeast. Production from the three districts dates from the early 1900's. For instance, the total base and precious metal production from the mines of the Pima section of the Oracle district, up through 1972, has been some 136,000 tons of lead, 25 tons of zinc, 118,000 ounces of silver, and 287 ounces of gold. Some 100 ounces of placer gold came from small operations along Alder Canyon and about 100 tons of tungsten ore containing about 3 tons of WO_3 has been shipped from the Pima section of district.

Known copper mineralization in the Catalina district is mainly chalcopyrite, minor bornite, and oxidized copper minerals associated with quartz, pyrite, and minor molybdenite. The mineralization was discovered and located in 1906 and developed and mined in 1907 to 1910 and in 1917 and 1918. One mine, the Pontatoc, one-fourth mile south of the study area accounted for the total production of some 5,000 tons of hand sorted ore containing about 207 tons of copper, 2,200 ounces of silver, and 1 ounce of gold. There is a new mine proposed for Oracle Ridge where drilling has been going on since 1970. Reportedly there is a sizable orebody of good grade copper.

The study area, consisting of Pusch Ridge and Canada del Oro roadless areas, appears to have an excellent potential for metallic mineral resources because of the nearby occurrences of copper, lead, zinc, gold, silver, tungsten, bismuth, and rare earths.

Golden Trout

The inactive Mineral King mining district is just northwest of the proposed wilderness. A pendant of metamorphic rocks in the mining district is host for contact and fissure vein deposits of tungsten, lead, zinc, copper, molybdenum, and antimony. The pendant extends 15 miles into the proposed wilderness, and is geologically favorable for the deposition of ore deposits.

Santa Lucia

Although there is no record of mineral production from within the proposed wilderness area, the Rinconoda mine, one mile to the east, has produced some mercury. Occurrences of chromite and manganese have been found west of the proposed area.

Ventana Wilderness additions

In the Ventana Wilderness additions there are occurrences of lead, zinc, copper, molybdenum, and mercury. The extent of mineralization is unknown, but it is probably minor. Oil and gas is present 20 to 30 miles east and southeast of the proposed additions, but structural and stratigraphic conditions are not known.

Goose Creek

About 1 1/2 miles southwest of Spar City, which is adjacent to the northwest part of the Goose Creek, are old mine workings, mainly those of the Denver tunnel, Bird Creek mine, and Emma mine, driven to explore some of the exposed veins in the district. Vein fragments contain sphalerite, barite, manganese oxides, and jaspery to amethystine quartz. The vein exposures may represent the upper rather than the lower parts of the original range of ore deposition, and somewhat deeper levels may be favorable for the discovery of ore deposits. Near the north central part of the additions and about 1 1/4 miles south of Wagon Wheel Gap are old mine workings from which fluorspar has been produced. From 1911 to 1921, about 40,000 to 45,000 tons of fluorspar were produced. Colorado Fuel and Iron Corp. purchased the property in 1924 and operated the Wagon Wheel Gap mine until the company closed the mine in 1950 with the last reported production of 20,436 tons of ore averaging 42% calcium fluoride. There is a good possibility that part of the Goose Creek east of the Wagon Wheel Gap mine may also contain similar veins.

Manzano Mountain

The northern portion of the Manzano Mountains, outside of the proposed area, contain low-grade gold-bearing quartz fissures and replacement veins in Precambrian greenstone schist. Small copper, fluorspar, and lead prospects also occur in this area but are of no known economic importance. Several fluorspar prospects are located in the Manzano Mountains, but no reported prospects are within the proposed wilderness

area. The closest fluorspar mine of note is several miles north of the area. The mine reportedly produced between 5,000-20,000 tons of crude fluorspar annually. A cement plant in Tijeras Canyon north of the Manzano Mountains uses the same limestone and dolomite formations that occur within the proposed wilderness.

The Estancia Basin on the east flank of the Manzano Mountains is considered structurally favorable for oil and gas. Wells drilled along anticlinal folds in the basin have encountered small amounts of oil and gas and wells drilled on the west edge of the basin, at the base of the Manzano Mountains, have encountered "shows" of oil. The Middle Rio Grande Valley, bordering the Manzano Mountains on the west, is also a structurally favorable area. Uranium and vanadium occur in the southern portion of the proposed wilderness area and near this area. Two particular deposits in the area have been reported by the AEC. Preliminary investigation indicates a uranium/vanadium potential for the Manzano Mountains.

Sandia Mountain

There are two mining districts close to the proposed Sandia Mountain Wilderness, the Tijeras Canyon district in the southeast portion of the Sandia Mountains and the Placitas district in the northeast portion. Both districts have reported occurrences of gold, silver, lead, and copper. Reported production of gold in Tijeras Canyon through 1964 was 34,500 ounces gold and is primarily a byproduct of lead-silver ore. The Placitas district, east of Bernalillo, has a total production of nearly 10,000 ounces gold. Placer production in these areas has been minor and located several miles from the proposed wilderness area. "Red Bed" copper deposits have been reported in the Placitas district. Molybdenum occurring in quartz stingers in shattered and silicified Precambrian schist has been prospected in Hell Canyon in the Tijeras mining district but there has been no production.

Several fluorspar prospects of unknown value are located in the northern portion of the Sandia Mountains. There are also several barite deposits there, some occurring within the proposed wilderness area. The Landsend barite deposit close to Osha Springs has been explored by drilling to determine the distribution of ore reserves. Other deposits similar to the Lansend deposit occur to the north, east, and south of the proposed wilderness area and all should be considered potentially economic. Barite and flourite offer the best potential. There is also some uranium petroleum and coal potential close to the proposed wilderness area.

French Pete Creek

There is no record of past mining activity in this area, and its geology indicates little potential for the occurrence of metallic deposits.

Middle Santiam

In the northwest corner of this proposed wilderness a 1-square mile boundary protusion contains the southeast portion of the Quartzville mining district. The dominant trend of veins in the Quartzville district is eastward into the study area. Until more is known of Middle Santiam River basin it should be considered a favorable exploration target for deposits for gold, silver, copper, lead, and zinc.

Wild Rogue

In this area are four small underground gold mines, more than ten gold prospects, and numerous gold placer deposits along the main Rogue River Canyon and Mule Creek. Recorded gold and silver production from the underground mines totals over $100,000 but actual production was probably greater. The quantity of gold and silver from the placers probably exceeded production from underground mines. Additional lode gold resources may exist, and gold placer resources may also exist in the gravel bars along the main river course and on the branches of Mule Creek. Copper deposits are adjacent to the north boundary near Mt. Boliver and may extend into the area. Chromite may occur in ultramafic rock exposed in Secs. 25 and 35, T. 33 S., R. 11W.

Lone Peak

Minerals in the area include those of molybdenum, silver, lead, tungsten, zinc, and copper. A part of [illegible]rea in the White Pine Fork drainage contains submarginal resourc[illegible] of molybdenum that have been tested in recent years by drilling. These reserves may represent a future resource but additional exploration would be necessary to fully determine the molybdenum potential. The other metals have little economic potential.

Wenaha-Tucannon

Gold, uranium, and mercury claims are known to occur in this proposed wilderness.

Kalmiopsis Wilderness additions

The Bureau of Mines/Geological Survey field study is presently underway in the Kalmiopsis Wilderness and about 17,400 acres of additions. This proposal would expand the instant wilderness additions to 136,000 acres. Our study is not complete but gold, silver, chromium, copper, iron, manganese, cobalt, nickel, vanadium, and platinum minerals occur in the proposed additions. There has been some production of gold and silver. In or adjacent to the proposed additions but mainly from the extreme southern extensions, more than 1,000 long tons of chromite ores has been mined. Although only a few tens of tons of copper ore have been produced from the proposed additions, more exploration is needed to evaluate the full

potential of these occurrences. Copper might also be economically recoverable as a coproduct of laterite mining. Known iron resources, adjacent to the proposed north addition, occur near Tincup Peak. The laterites, in the proposed additions, probably contain no less than 12 million tons with a nickel content of approximately 0.8% in addition to cobalt and chromite. The Bureau has important research underway to find metallurgical processes to make recovery of these critical metals economically feasible.

RECURRING MINERAL SURVEYS

Mr. DUNCAN. Then there are no provisions there because it would be irrelevant for studies of those areas.

Mr. DARE. We would assume if they were put into the system, as Congress intended, recurring surveys, that was the language in the act, that with improved technology somebody ought to go back in there and look at them over some years to find out what more can be found out, if, in fact, the lands needed to be reopened in case of an emergency.

Mr. DUNCAN. That is in the 1963 basic Wilderness Act. But if there can't be any entrance, what difference does it make if we make a study and find something there? The entries are cut off period, aren't they?

Mr. DARE. Yes.

Mr. DUNCAN. But even though the entries are cut off there is still authority for you to continue studies, so presumably that might lead to a modification of law that would permit entry.

Mr. DARE. I guess if an emergency arose.

Mr. DUNCAN. Have there been any—you say there was a discovery of nickel?

Mr. DARE. Yes.

Mr. DUNCAN. Have there been any other locations in the wilderness areas under this moratorium act that you know of?

Mr. DARE. Yes. We have tried to keep up with many mineral activities in the wilderness areas, and we have a pretty good listing in the office of what is going on. Relatively speaking, though, there hasn't been that much activity because I think, by and large, the mining companies hate to go in there with the public pressures.

Mr. DUNCAN. Theoretically, they have that right. As a practical matter, it would be very difficult?

Mr. DARE. Yes.

Mr. DUNCAN. You might insert in the record at this point, if you can, what you have available with respect to mineral activity in the wilderness areas or in any of these other areas and sundry designations of restricted areas, if you will.

[The information follows:]

KNOWN MINERAL RESOURCES IN WILDERNESS AREAS

A list of mineral values in lands within the wilderness system would be long and involved. Significant discoveries or active exploration on significant deposits of copper, lead, zinc, nickel, molybdenum, and tungsten are probably the most important. Significant deposits or significant exploration is underway for tungsten in the John Muir Wilderness; molybdenum and tungsten in the Flint Creek Range Wilderness; molybdenum, zinc, and lead in the Sawtooth National Recreation Area; uranium in the Weminuche Wilderness; copper, zinc, lead, and silver in the Hells Canyon National Recreation Area; copper in the Alpine Lakes National Recreation Area; copper in the Cougar Lakes study area; copper in the Washakie Wilderness; silver in the Indian Peaks study area; molybdenum and silver in the Ruby Anthracite study area; copper in the Superstition Wilderness; copper in the Glacier Peak Wilderness; and copper, nickel, and molybdenum in Absaroka Wilderness addition.

DISCOVERY OF SPECIFIC MINERALS

Mr. DUNCAN. You have said there is low grade copper, marginally economic if economic at all today, and no beneficiation process to

upgrade that ore. Anything else? I know you are over at that Strawberry Mountain area in Oregon where you have some chrome. I don't know whether there is any nickel out there or not.

Are you familiar with the Strawberry Mountain area?

Mr. DARE. Yes. We don't have the report. I think we are about to get the report out, at least an open file. But I don't believe I have received the report yet.

Mr. DUNCAN. Are there other metals that you can think of besides the copper that you mentioned, the nickel and chrome that we have just mentioned at Strawberry Mountain. Are there other minerals?

Mr. DARE. If you are talking about 3454 they want to increase the size of the Kalmiopsis area in southern Oregon about four times. I think it's 134,000 acres that are instant wilderness to be added to the original wilderness area, and then another 136,000 acres of study area that would again be added, and while we don't have positive numbers on what the laterite deposits consist of there, we believe there are at least 12 million tons of laterites that have nickel, cobalt, and chromium in them.

Mr. DUNCAN. Copper.

Mr. DARE. Some byproduct copper for which the Bureau of Mines is carrying out metallurgical research.

RESEARCH PROJECT AT ALBANY, OREG.

Mr. DUNCAN. I would like a little summary in the record too of the present state of the research project at Albany, and a prognostication of what you hope or believe it will establish, will you, because I think that is important.

[The information follows:]

RESEARCH ON WESTERN LATERITES FOR CRITICAL MINERAL EXTRACTION

At the Albany (Oregon) Metallurgy Research Center, the Bureau of Mines is conducting research on a method for recovering nickel, cobalt, and copper from low grade laterites found in southwest Oregon and Northwest California. The method incorporates a series of unique steps (special roasting, ammonia solution leaching, solvent extraction, and electrowinning) to recover the valuable metals in pure form. The advantages of the method are low energy requirements, recycling of reagents and offgas, and more than 90 percent recovery of the nickel and cobalt. Presently, the process steps are being demonstrated on a semi-continuous development-unit scale to optimize the method for further scale-up to pilot-plant size. To determine the chances of success, the Bureau funded a feasibility and cost estimate study based on a 5,000 ton-per-day commercial plant which would produce 30 million pounds of nickel and 6 million pounds of cobalt annually. Estimated capital costs for this conceptual plant provided for 15 to 20 percent return on invested capital. Potential environmental pollution problems were assessed. No air pollution problems were apparent which can not be controlled. Liquid effluents can be impounded without presenting a pollution problem. If the Bureau's research effort is successful and the technology is transferred to commercial practice, 10 percent of United States nickel requirements could be obtained from one nickel laterite plant using the new Bureau of Mines technology.

Another advantage of the Bureau of Mines method is that it may be possible to recover chromite from the leach residues which contain 2 to 3 percent of the critical mineral. This developing technology for recovery chromium from the laterite residues from nickel/cobalt processing is a new technique which makes use of a material that would normally not be considered a source of

chromium because of its low-grade. Since the material will be already mined and available as a residue, the effort to develop the technology to recover chromite as a byproduct is warranted.

BENEFICIATION OF LATERITIC ORES

Mr. DUNCAN. I went down and looked at it and it was impressive, and they appeared to be getting some results, and that is where I learned this marvelous word "beneficiate."

My wife started using it the other day. She is going to try to beneficiate her husband, but I thought that was a misuse of the word. Do you think it is?

Dr. MORGAN. Sir, with respect to that, I think that with regard to those low-grade coppers that Mr. Dare described, we do know how to beneficiate them. The research has been done. But they would not be necessarily economic at the present time.

Now if the price goes a little higher or if we can improve the process then they would become economic as well as technologically possible.

IMPORT DEPENDENCE FOR CERTAIN MINERALS

Mr. DUNCAN. If I don't misread your chart that you handed out, all of those metals that you mentioned in those laterites, we are importing in excess of 70 percent of our current needs of those metals today.

I noticed that nickel is at 71 percent, chrome is at 89 percent. What else did you mention?

Dr. MORGAN. Cobalt is up high in the chart.

Mr. DUNCAN. Cobalt 98 percent, and then, for my own information what is the name of that mineral that produces mercury?

Dr. MORGAN. Cinnabar.

Mr. DUNCAN. Is there any cinnabar down there?

Dr. MORGAN. Mercury is at 65-percent imported; yes, sir.

Mr. DUNCAN. Isn't there cinnabar in the Kalmiopsis area?

Mr. DARE. I am not sure.

Mr. DUNCAN. We used to get a bunch of mercury out of southern Oregon.

Dr. HENRIE. Southern Oregon.

Mr. DUNCAN. Yes; that is where Kalmiopsis is. And that is a valuable product too; isn't it?

Dr. MORGAN. Yes, sir.

Mr. DUNCAN. I guess that is all. Go ahead.

PRESENCE OF MINERALS IN WILDERNESS AREAS

Mr. DARE. You did ask me if there were any other minerals in some of these areas we had examined.

When we were looking at the Sawtooth NRA which included the old Sawtooth Primative Area, we found out, well, the area was made a national recreation area at the time our study was still ongoing, we found that area to be one of the most highly mineralized areas in Idaho.

There is tin, molybdenum, copper, tungsten.

Mr. DUNCAN. Tin?

Mr. DARE. Yes; largely unexplored.

Mr. DUNCAN. Do you think it's going to be necessary for the Congress to consider extending the time for completing the mineral surveys in any of these wilderness areas?

Mr. DARE. Well, Congress in one of the accompanying House reports on the Wilderness Act of 1964 said that they expected that the primitive areas, when they were taken into the wilderness system would be withdrawn effectively the date they were enacted. This would be in compliance with the act.

Mr. DUNCAN. You have those completed?

Mr. DARE. The primitive areas, yes. But what is happening is that the new study areas, some of which now have gone into the system, that were down here not identified in 1964 have the identical language that puts them in to the wilderness system, and closes them off in 1983. So this large mass of land that was not identified in the Wilderness Act, some of which is now going into the system, is being withdrawn effectively on the same date as the lands that were placed into the system in 1964.

Mr. DUNCAN. Well, if you have a statement that you could put into the record about the impact of proceeding under the present system of laws, I would like to have you do it. I don't want to embarrass you at all, but if that is possible for you to do I would like you to do it.

If you can't I want to have you sit down with my staff and myself sometime and go into this before 1983.

That is all I have at the moment.

[The information follows:]

WILDERNESS LEGISLATION

The 14.7 million acres of national forest land considered in the Wilderness Act of 1964 was at that time a massive shift of public lands from multiple use. The acreage in the national forests now under consideration has more than doubled and will probably reach 35–40 million acres. In addition, there are about 90 million acres of roadless areas or roadless islands known to exist in the public domain under the management of BLM, that will be considered for wilderness suitability. An unknown but large additional acreage is potentially available for inclusion in the system.

At the same time that new acres are being considered for the system there is no provision in the Wilderness Act that would permit a 20-year review time by the public prior to final withdrawal of such new areas. All wilderness study areas, not considered on the 1964 act, that have been enacted into the system have been made subject to the mineral entry deadline of the act. This means that in the years remaining before final withdrawal on December 31, 1983, the lands being added will not receive an equivalent review time equal to that given to the areas considered in 1964. More importantly, if no provision is made to extend the review time for new areas, those added after the deadline will be withdrawn with enactment.

By and large, the industry has not attempted to explore the wilderness areas or those under immediate consideration. Public pressures are such that ultimate development would at best be difficult.

LOCATABLE MINERALS

Mr. MURTHA. Would you also put in the record what are the locatable minerals that you talked about. List them.

Dr. MORGAN. Yes, sir.

[The information follows:]

COMMON LOCATABLE MINERALS

The more common mineral commodities locatable under the Mining Law of 1872 are:

Gold	Chromium	Vermiculite
Silver	Mercury	Fluorite
Iron	Nickel	Quartz
Platinum	Tin	Feldspar
Copper	Uranium	Jade
Lead	Vanadium	Gypsum
Zinc	Garnet	Magnesite
Molybdenum	Barite	Talc
Antimony	Bentonite	Tungsten
Cobalt	Pumice	

LOCATABLE VERSUS LEASABLE MINERALS

Mr. MURTHA. Are coal and oil two of the locatable minerals?

Dr. MORGAN. Generally, sir, the distinction has been that if it were a metal or a metal ore and it occurred in rocky like deposits and it stuck out on the surface where you came along and hit it with a pick and saw what it was, that was locatable.

On the other hand if it were a bedded, underground deposit involving a much bigger area like a coal or an oil shale. The bigger bedded deposits that didn't stick out on the surface were to be leased when on public lands so the area could be mined more effectively.

Mr. DUNCAN. Does boron fit in there?

Mr. DARE. One type is locatable and the other is leasable.

Mr. MURTHA. Is coal under this law then, coal or oil?

Dr. MORGAN. Coal and oil are leasable. They are not locatable.

Mr. MURTHA. So they wouldn't be in this category, so consequently they aren't in this study, so in the possible wilderness areas you don't know whether there is oil there or not.

Mr. DARE. We do assess the oil and gas potential. Of course, that is most difficult. We assess the coal potential, try to determine what the reserves are for all minerals resources.

Mr. MURTHA. Was this law written with the idea that it's a lot easier to locate certain minerals and a lot less expensive and consequently you locate them if you can, and the others you just estimate if they are there or not, is that the idea?

ORIGIN OF MINERALS PATENT LAWS

Mr. DUNCAN. These definitions go back to the old laws, don't they?

Dr. MORGAN. I think the basic idea, sir, goes back to California and the Gold Rush. They first found the gold in the streams and then the question was how big an area could a man claim. They decided in the mining camps of the West that a fair single claim in placer gold was 20 acres. If somebody took 22 they might shoot him, and if he took 19 it was all right.

Mr. DUNCAN. Sometimes they did when it was 19.

Dr. MORGAN. That's right, and they wondered then where the gold came from, and they scrambled up the sides of the hills and saw the quartz veins sticking out and so they made a claim on where the quartz veins stuck out on the side of the hill, so that led to the lode claim, which is about——

Mr. DARE. About 20.7 acres.

Dr. MORGAN. And where it stuck out on the ground the man could stake his claim with the greatest length over the vein. Then when Congress came along in 1872 they took these accepted rules of the mining camps, and enacted them into law.

The idea was they didn't want to give anybody too big an area, too great an advantage, but they wanted to encourage the individual prospector to use his initiative, to go out and find something, and if he found it and if he developed the deposit he could get a clear title. They had the assessment requirements—$100 a year for 5 years—he should do $100 a year of work for 5 years on his claim.

Now if you look back to 1872, $100 worth of work a year was a lot of work. It isn't much today, but it was a lot of work then. So what it meant was the man had to diligently invest his time and effort in developing that deposit. If he then found an economic mineral, one that could be mined at a profit and if he put in the 5 years, then he got a patent, which was another name for title to that deposit from then on.

He didn't have to mine it but he had title to it. And if sometime in the future the market improved then he went into the business.

ORIGINS OF MINERAL LEASING LAWS

Now, on the other hand only in a few places where they outcropped did the coal deposits stick out on the surface. Instead you have to come along and drill down and find how thick it is, and where it is and what quality it is, and so forth. The mineral leasing law was enacted in 1920 to give the fellow who needed to develop coal or oil or natural gas or some other leasable mineral, a method of dealing with the Federal Government, and then he would get a much bigger area than the mining claim and proceed to develop and pay the Government a royalty on production.

AVAILABILITY OF MINERALS IN WILDERNESS AREAS

Mr. MURTHA. Well, we are going to have to go on with some technical questions, but I think what Mr. Duncan and I are concerned about is the possibility of this wilderness area taking strategic minerals or vital minerals out of accessibility.

Mr. DUNCAN. What I want to know is what the facts are so we can make an intelligent decision on the tradeoffs. It may be we will end up saying no, the wilderness is more important, but I think we ought to do it knowing what the facts are.

Today, of course, many people don't realize that that was a very critical compromise in getting a wilderness bill through this Congress in the first place, and I doubt if it would have gone through whenever it did without that compromise.

I am darn sure it wouldn't have, because I remember Mr. Aspinall was chairman of the committee at the time. But nevertheless, it was a very effective operation of democracy to get that bill out and everybody supported it.

VULNERABILITY TO MINERAL EMBARGOES

Mr. MURTHA. Dr. Morgan, do we have vulnerability to embargo on minerals as well as oil? Which ones? What is the likelihood of embargoes?

Dr. MORGAN. Yes, there is a vulnerability, and, in fact, that is why back in 1974, right after the oil embargo, that the highest levels of Government between the Office of Management and Budget and the Council on International Economic Policy, both of which are Presidential offices, set up an interagency study team to identify possible really critical materials, and that is why the 19 critical materials, 18 of which are minerals, were identified in the December 1974 CIEP special report.

Since then the Department of Interior, with the Bureau of Mines and Geological Survey working closely with the Office of Mineral Policy and Research Analysis, the OMPRA of the Assistant Secretary for Energy and Minerals staff, has looked in even more detail at these materials.

INTERNATIONAL BAUXITE ASSOCIATION

It is clear in the case of bauxite, the ore of aluminum, that there is an International Bauxite Association, a cartel which has as its objective raising the price, and for that reason the Bureau of Mines has embarked on a research program in which we are working with nine major aluminum companies each of which is putting in $50,000 a year, so that is roughly $500,000.

The Bureau itself is putting in about $700,000 a year, so it's more than a $1 million program in total, to develop methods of using lower grade bauxite in this country, which are noneconomic high alumina clays and other materials like alunite, anorthosite, and dawsonite as sources of aluminum. Our work has proven thus far to be technologically feasible and in some processes bordering economical feasibility as well, has put a damper on the aspirations of the International Bauxite Association and their ability to cartelize their operations.

OTHER POSSIBLE AREAS FOR CARTELS

Clearly, a material like chromium, which comes from a very limited number of countries, Rhodesia now being eliminated, and South Africa and the U.S.S.R. being major sources, there is a real possibility of such action in chromium.

In diamonds there is already a diamond cartel as such with South Africa being the major source.

For Platinum, we are virtually dependent on South Africa and the U.S.S.R., and platinum is a clear candidate.

There are a variety of other important materials where the countries involved have attempted to set up cartellike arrangements.

A number of iron ore producing countries have an iron ore association. But here the United States has large deposits of iron. Again the Bureau of Mines has done extensive work on how to produce iron from the magnetic taconites and the nonmagnetic taconites, so we are really not that concerned about iron.

There is the International Tin Agreement where the tin producing countries want a higher price for tin. And the U.S. Government agreed to join the International Tin Agreement, the first international agreement in the metals field that the Government has joined.

Our objective is to try to have assured supplies at reasonable prices.

We cooperate with the United Nations lead-zinc study groups which are attempting to stabilize prices.

There is an alleged mercury cartel involving Spain and Italy which hasn't been very successful because the price has been down.

It's possible we might have some vulnerability in fluorspar because Mexico is a major producer of fluorspar for the supply of this country. And wherever we see these possibilities, these are prime candidates then for research work on the part of the Bureau.

Mr. DUNCAN. Do we have any tin production in this country?

Dr. MORGAN. There is a very small quantity, sir, but it is negligible. Secondary tin, through, scrap tin; that is recycled secondary tin, runs around 20,000 tons a year, about one-third of the supply.

OMB REDUCTIONS IN BUDGET REQUEST

Mr. MURTHA. You requested $187,799,000 of OMB for all of your areas. Please provide for the record the details of what OMB cut. What is the impact of the OMB cut? How badly does it hurt you?

Dr. MORGAN. Yes, sir, I guess that is the table and we will amplify on what the implications are.

Mr. DUNCAN. Which table?

Dr. MORGAN. This is the table supplied separately, sir, by the Department of the Interior to the committee at its request.

Mr. DUNCAN. OK.

[The information follows:]

FISCAL YEAR 1978 REQUEST TO OMB AND OMB ALLOWANCE

[In thousands]

	Request to OMB	OMB allowance	Reduction
Metallurgy research	$28,999	$25,579	−$3,420
Mining research	119,226	105,405	−13,821
Mined land demonstrations	7,109	4,138	−2,971
Data collection and analysis	23,317	17,174	−6,143
Mineral land assessments	5,918	5,403	−515
Program administrations	3,230	2,830	−400
Total	187,799	160,529	−27,270
The reductions impacted the following program areas:			
Metallurgy Research:			
Advancing minerals technology			−1,500
Effecting pollution abatement			−1,520
Secondary resource recovery			−200
Minimizing mineral and metal needs			−200
Subtotal			−3,420
Mining research:			
Coal mine health and safety research			−179
Metal and nonmetal health and safety research			−4,700
Advancing coal mining technology			−5,300
Advancing oil shale mining technology			−2,442
Advancing metal and nonmetal mining technology			−1,200
Subtotal			−13,821
Mined land demonstrations:			
Mined land investigations and demonstrations– anthracite area			−1,971
Mined land investigations and demonstrations– bituminous area			−1,000
Subtotal			−2,971
Data collection and analysis: Information collection and dissemination		−6,143	−6,143
Mineral land assessments: Wilderness and public land assessments		−515	−515
Program administration: Employee workplace health and safety		−400	−400
Total			−27,270

EFFECT OF MINING RESEARCH BUDGET REDUCTION ON COAL PRODUCTION

Mr. MURTHA. The largest portion of the cut was in mining research. What effect does that have on the Nation's ability to increase the production of coal to meet energy demands in the future?

I think we have gone into great detail about that.

Dr. MORGAN. Yes, sir. I believe the material that Dr. Yancik has described and will further supply for the record will parallel that question.

ADDITIONAL FUNDING AND PERSONNEL REQUIREMENTS

Mr. DUNCAN. Well, even with this information which we have here, with respect to your request to the Office of Management and Budget, we also have your proposals to the Department, do we not?

Dr. MORGAN. Yes, sir, under priorities A, B, C, and D in the table, yes, sir.

Mr. DUNCAN. With respect to that decision I wish you would supply for the record any needs you might have with respect to additional funding and personnel requirements on any of the programs you have discussed during my colloquy with you. Will you, particularly these studies, because in addition to changes of law to extend the time, we might be able to accomplish our purpose with a more intensive effort, and I wish you would give us something on that too.

Dr. MORGAN. Yes, sir, on those things we discussed we will supply that.

[The information follows:]

Additional Resource Requirements for Priority Areas of Effort

If additional resources were made available, they would be applied to priority areas as follows:

Metallurgy Research

Past metallurgical processing practice has paid attention only to the recovery of ore constituents having immediate economic value to the processor. Understanding and control of other constituents has been ignored. Environmental factors are requiring a reassessment of these constituents in order to reduce discharges of gaseous, liquid and solid wastes, to reduce disturbance of natural areas, and to conserve minerals.

What is needed to advance minerals technology is an information base which will lead to the control of toxic or potential polluting substances within the mineral processing and metallurgical system, and not through post operational controls after the substances leave the system. A comprehensive understanding should be developed of the physical chemistry of mineral and metal processing operations, particularly in regard to the trace and accessory elements and compounds previously disregarded because of their low value, small concentration, or unsuspected detrimental effects.

The Bureau presently is applying $800,000 of its metallurgy funding to a series of research projects for developing technology for characterizing and controlling arsenic compounds present during the smelting of sulfide ores; identification of trace, minor, and major elements of environmental concern found in the combustible fraction of urban refuse; identification of asbestos-related minerals present in metallurgical processing and waste operations; development of techniques to manage the amount of organic reagents and trace metals in solution streams; and to study methods to minimize the release of particulate emissions from active and inactive mineral processing tailings areas. There are 29 permanent positions associated with these projects.

An expanded program involving an additional $2,000,000 in funding and 45 more permanent positions would permit the Bureau of Mines to broaden and accelerate its study of mineral processing on a case-by-case, process-by-process basis, from the standpoint of determining where and in what form potentially hazardous materials have their origin in the metallurgical processing system, determining their path through the sequence of operations, and identifying where they can best be removed and recovered while still in the system. We propose to concentrate on three approaches.

The initial approach would involve the development of improved analytical techniques for the complete identification of the chemical species of trace and accessory elements present in minute quantities in mineral processing and metallurgical systems. Initial investigations would be centered about potentially toxic metals such as cadmium and mercury often associated with mineral processing operations. The research would be conducted by Bureau of Mines research personnel, augmented by contract and grant studies.

The second approach involves a series of detailed studies aimed at defining the flow and distribution of the minor constituents in ferrous and nonferrous mineral processing systems. Particular attention would be placed on iron, steel, and base-metal systems. This work would include engineering studies designed to devise new or alternative techniques to remove and recover these constituents from the process streams. The investigations would be undertaken within Bureau of Mines research facilities and would be augmented by contract and grant research.

The third approach is an expansion of the present Bureau of Mine's Particulate Mineralogy Unit (PMU). Studies of microscopic mineral particles such as asbestos are being performed in an effort to distinguish it from thousands of other mineral species to help provide the information base to determine environmental and health implications. The unit is supportive, not duplicative, of research being conducted by the Environmental Protection Agency. The PMU has been described by representatives of EPA as being a vital and much needed reference center to provide the basic scientific expertise needed to assure the validity of the measurement methods developed by EPA and others for particular applications.

The Bureau of Mines seeks to prevent potential environmental problems in minerals processing before they develop and become of concern to the EPA. The research addresses potentially harmful mineral constituents while they are still in the metallurgical system, whereas EPA's responsibility begins when the substances leave the system and enter the environment.

Data Collection and Analysis

The Automated Mineral Information System and the Minerals Availability System (MAS) are critical, high priority programs of this activity. The development of these complementary systems will provide analysts and decisionmakers with current, rapidly retrievable mineral information. If additional resource were made available in the area of Data Collection and Analysis, they would be applied to priority areas as follows:

- Automated Minerals Information System - $600,000, 18 positions. This increase would accelerate information input for 18 minerals, critical because of dependence on imports, by one year (1980 to 1979). The positions would insure the validation of information, the continual monitoring of output needs, the preparation of analytical reports, and the development and maintenance of the system itself.

- Minerals Availability System (MAS) - $2,500,000, 20 positions. This increase would accelerate the development of a systematic mineral-reserve information base and computerized supply analysis system on the 18 critical minerals and would insure its completion by the end of 1981. Over 75% of the increase would fund contracts with a strong emphasis on foreign information. The additional personnel would conduct mine and deposit evaluations, prepare evaluation reports, periodically update the evaluations and reports, monitor contracts, and develop and maintain the system.

Selected priority areas for Metal and Nonmetal Mine Health and Safety Research and additional funding and personnel requirements consist of:

Metal and Nonmetal Mine Health and Safety Research

o Noise Control — +$500,000; total $950,000
+ 4 positions; total 9 positions

Since enforcement of noise control regulations began, over 900 active notices have accumulated on violations in metal and nonmetal operations. Effective technology for noise control is urgently needed to preclude future violations in beneficiation plants and underground working places. This work will complement ongoing work on coal but will address, for example, the particular problems of large scale metal mine processing plants and unique surface problems such as jet piercer drilling and channeling.

o Industrial Hygiene — +$700,000; total $1,022,000
+ 4 positions; total 9 positions

Techniques for controlling and measuring diesel exhaust fumes are inadequate. New funds will expand the ongoing work to pinpoint critical hazardous conditions and ways to avoid these problems until a permanent solution to scrubbing diesel exhaust fumes can be developed. Solutions found here would be applicable if diesels gain wider usage in coal mines.

o Radiation Hazards — +$100,000; total $ 800,000
No change; total 11 positions

As mines go deeper, radiation problems increase in severity and complexity. More extensive testing of instrumentation, mine sealants, and bulkheads will be performed.

o Respirable Dust — +$300,000; total $800,000
+ 1 position; total 8 positions

Silicosis is still a serious health problem in metal and nonmetal mines. An accelerated study of the best means to alleviate this problem is planned.

o Ventilation — +$300,000; total $600,000
+ 2 positions; total 7 positions

Improved ventilation systems are needed to cope with increased temperature as mines go deeper and to cope with radiation, respirable dust, and diesel exhaust hazards. Ventilation system analysis and development have cross-over benefit to coal mine ventilation problems.

o Ground Control — +$1,100,000; total $2,200,000
+ 7 positions; total 21 positions

To reduce the danger of fatalities and injuries from falling roof, ribs, and faces, additional funds will be added to accelerate the development of reliable means for detecting unstable ground ahead of mining and for calculating support requirements for safe mine design. Cross-over benefit for coal mines will be realized.

o Industrial Type Hazards — +1,000,000; total $2,200,000
+ 7 positions; total 22 positions

As haulage costs have increased, the size of trucks, bulldozers, front-end loaders, etc., has been scaled up to mammoth proportions. Immediate needs exist for R&D efforts in driver/operations, visibility and control of these heavy vehicles on steep grades.

Present techniques for high voltage transmission and grounding are inadequate. New procedures will be developed, and the effect of the application of selected provisions of Schedule 2G to metal and nonmetal mines will be determined.

Present training practices may be outmoded as evidenced by injury frequency rates. New programs will be devised and fully tested.

Cross-over benefits for coal mines will be realized.

o Fire & Explosion Prevention — +$400,000; total $1,200,000
+ 2 positions; total 11 positions

Additional funds will be added to present projects to accelerate the development of automatic fire sensing and isolation in complex metal and nonmetal mines. Cross-over benefit will be realized for coal mines in the area of vehicle fire protection and possibly in shaft protection.

o Post Disaster Survival & Rescue — +$200,000; total $400,000
+ 1 position; total 3 positions

The development of emergency communications and rescue techniques suitable to the diverse conditions encountered in metal and nonmetal mines will be accelerated.

o Systems Engineering — +$100,000; total $344,000
No change; total 4 positions

An expanded effort will be undertaken to define key technologies critical to new or revised standards planned for the next 3 to 5 year period.

Mineral Land Assessments

The annual completion rate for the assessment of specifically related wilderness areas is 1.5 million acres. Additional resources of $1,000,000 and 20 positions, if made available, would accelerate this to a yearly rate of 2.0 million acres. At this rate the completion date for the currently identified 40 plus million acres would be the end of FY 1988. The 20 positions would provide the professional and support staffing required to conduct the site-specific evaluations and subsequent reports shich are a major part of the wilderness work.

TRANSFER OF BUREAU PROGRAMS TO PROPOSED DEPARTMENT OF ENERGY

Mr. MURTHA. And Doctor, will you provide for the record the details of proposed legislation and what they intend to do to the Bureau of Mines in the new Department of Energy?

Dr. MORGAN. Yes, sir. We certainly have that as far as program, personnel, and dollars and all of that is concerned.

[The information follows:]

FUNCTIONS PROPOSED FOR TRANSFER TO DEPARTMENT OF ENERGY

The Bureau of Mines functions which have been proposed for transfer to the Department of Energy are described in section 302(e) of the administration's "Department of Energy Oranization Act (S. 826)".

"Sec. 302. There are hereby transferred to and vested in the Secretary (of Energy):

* * * * * * *

"(e) Those functions of the Secretary of the Interior, the Department of the Interior, and officers and components of that Department under the act of May 16, 1910, and other authorities, exercised by the Bureau of Mines, but limited to:

"(1) Fuel supply and demand analysis and data gathering.

"(2) Research and development relating to increased efficiency of production technology of solid fuel minerals; provided, that research relating to mine health and safety and research relating to the environmental and leasing consequences of solid fuel mining shall remain in the Department of the Interinor, and

"(3) Coal preparation and analysis."

Resources associated with the transferring programs have been identified as follows:

Program	Funds (thousands)		Full-time ceiling personnel	
	Fiscal year 1977	Fiscal year 1978	Fiscal year 1977	Fiwcal year 1978
Fuels data	$2,000	$1,900	116	115
Coal mining production	42,000	39,900	19	19
Coal preparation, analysis, and sampling	3,000	5,900	44	44
Total	47,000	47,700	179	178

NO TRANSFER OF FACILITIES

Mr. MURTHA. And provide the facilities that are proposed to be transferred.

Dr. MORGAN. So far no facilities as such have been proposed. There will have to be an agreement between the Depratment of Energy and the Department of Interior establishing a determination order. But, since none of our facilities are specifically earmarked exclusively for the items scheduled to be transferred, it's going to take a little sorting out. And I really wouldn't anticipate any significant movement of facilities.

TRANSFER OF PERSONNEL AND AFFECT ON BUREAU PROGRAM

Mr. MURTHA. Do you see any problem in coordinatior of your Bureau with the transfer in personnel?

Dr. MORGAN. At the present time we have about 2,800 people and we have earmarked 179 people who would be affected. This is a small percentage, and will not affect the viability of the Bureau.

I think the important thing is that, if the programs are to be kept running effectively, while the transfer could take place legally at any date, in my opinion, it would require 1 or 2 years to really carry it out without fouling up the programs?

COORDINATION OF MINING RESEARCH

Mr. MURTHA. How about mining R. & D. for instance? Would it affect the emphasis or the coordination of that policy or is there a duplication or overlap?

Dr. MORGAN. I don't think it would, if we took, as I indicate, about 2 years to really carefully work out the transfer.

Let me say why: For example Doctor Yancik pointed to the big modified continuous mining machine.

All right. Now that machine may be funded under coal mining productivity, coal mining health and safety, and possibly even some other appropriation because we conduct an integrated mining program in which productivity, health and safety, and environmental enhancement, or at least limitation of harm to the environment, all have to be fitted together in the mining system.

When you come to the people who are working on that project, in almost no case can we say engineer A is working 100 percent on health and safety, engineer B is working 100 percent on productivity, and engineer C is working 100 percent on environment.

Therefore, we are going to have to phase out some contracts and have the new contracts picked up by the new department over a period of time. And suppose we have a man who is working 70 percent on health and safety and 30 percent on productivity? If we keep the man who is doing 70 percent, the new department will have to find somebody to pick up the 30 percent.

On the other hand, if we transfer him over there, then we have got to find a man. So, there will be a period of readjustment but if it's done intelligently, I think it will work.

COORDINATION OF DATA COLLECTION ACTIVITIES

The same with the data. Right now we are collecting, and your committee was kind enough, sir, if I may refer to the report here of your investigation of the Department and the Bureau of Mines just last year, Part 8—DOI and Realted Agencies Appropriations for 1977, in which you said here on page 95 of your staff report that the Bureau of Mines has been widely praised as having one of the best systems of gathering, analyzing, and publishing meaningful data that exists in the Federal Government.

Now we are collecting a lot of the information right now for the FEA, and transmitting it to them on computer tapes.

If they suddenly take those people that are involved in the system and say, "You people stop doing that and go somewhere else," the whole system will come to a halt. But if in an orderly way we con-

tinue to collect that information, continue to transmit it, only put DOE on the masthead of the form instead of Bureau of Mines and then over a period of time some of the people are moved and the wire which now transmits information from the Bureau to the DOE then transmits it from the DOE back to the Bureau, I think this can be worked out very effectively.

TRANSFER AND RETENTION OF EFFECTIVE PROGRAMS

Mr. MURTHA. Is it your impression that is the way it's going to be done, orderly, in that manner?

Dr. MORGAN. Well, if we have anything to do about it that is the way it is going to be, yes, sir. But we may not have the final control. But I want to assure you that if the President wants this transferred we are going to transfer an effective, viable program and at the same time we are going to maintain the efficiency and ability of the Bureau of Mines to deliver the goods. We cannot lose sight of all of these strategic materials problems that have been referred to today, and furthermore, the Secretary of the Interior is going to have very large responsibilities for coal. He is going to be leasing it, and he is going to be concerned with the strip mining. He is concerned with mine health and safety, and he will be concerned with the Mining and Minerals Policy Act, and so forth, and I believe he will need a viable Bureau of Mines to help him with those responsibilities. So we are going to do them both.

METALLURGY RESEARCH ON CRITICAL MINERALS

Mr. MURTHA. Under metallurgy, you ask for an increase of $3,113,000 in advancing minerals technology for work on critical minerals. Which minerals are those?

Dr. MORGAN. These are largely the highly imported ones, the nickel, the cobalt, chromium, and to a lesser degree manganese and tungsten and others, and we will also pick up platinum.

Mr. DUNCAN. Did you get cut down by the Bureau in that area?

Dr. MORGAN. Let me check. I think that was a pretty good area.

Mr. DUNCAN. Insert in the record—the difference between what you requested and what they gave you, will you?

Dr. MORGAN. All right, sir.

[The information follows:]

DETAILS AND IMPACT OF OMB CUTS ON ADVANCING MINERALS TECHNOLOGY

The Bureau of Mines requested the following increases for work on three critical minerals under metallurgy's advancing minerals technology. The critical minerals and the requested increases are:

Chromium: Requested $500,000 for operation of a miniplant to demonstrate extraction of chromium from domestic laterite residues from which nickel and cobalt had been recovered.

Platinum. Requested $600,000 to develop benefication methods and improved extraction techniques for recovering platinum from western deposits.

Nickel and Cobalt. Requested $2,013,000 for a new pilot plant and demonstration of innovative technology for recovering nickel and associated cobalt from western laterites.

OMB concurred with each of these requests for increases. Therefore, there were no cuts in advancing minerals technology to adversely impact on metallurgy's work on these critical minerals.

IMPACT OF PROPOSED CRITICAL MINERALS PROGRAMS

Mr. MURTHA. Would you also, Dr. Morgan, explain the timing and total costs for each of these projects and the impact they would have, if successful, for the record?

Dr. MORGAN. Yes, sir.

[The information follows:]

TIMING AND BENEFITS OF ADVANCING MINERALS TECHNOLOGY PROJECTS FOR WHICH INCREASES WERE REQUESTED

Chromium

The increase of $500,000 provides for the miniplant demonstration of extraction technology for recovering chromium as a byproduct from the residues of nickel laterite processing. Concerning timing of this work, although the research is not as far advanced as the nickel processing, we anticipate that the technology for chromium will be developed concurrently with nickel-processing pilot plant work and could be available by the end of fiscal year 1979. Byproduct chromium recovery from laterite residues would reduce the need for imported chromite. Since the material would be already mined and available as a residue, recovering it would add to the attractiveness of the process in terms of total resource recovery.

Platinum

The increase of $600,000 for platinum will be directed principally toward benefication of western deposits and development of improved extraction technology for a major prospect of 150 million troy ounces of platinum-group metals in the Stillwater Complex, Montana. We cannot be sure when this research will make a major impact on the western platinum deposits, but if it is successful, the 150 millon troy ounces of platinum-group metals in Montana have the potential for supplying United States needs for about 50 years.

Nickel/Cobalt

The increase of $2,013,000 will provide for development of pilot plant data through a cooperative cost-sharing effort with industry. Sufficient data for assessing the engineering and economic feasibility at a scale of approximately 5 tons of laterite ore per day should be available by the end of fiscal year 1979. If the Bureau's effort is successful and the technology is transferred to commercial practice, about 10 percent of United States nickel requirements could be obtained from one nickel laterite plant treating 5,000 tons of laterite daily. The impact of this effort would be to double the present domestic mine production of nickel. Coproduct cobalt would be sufficient to account for about half of present requirements for the metal.

ALUMINUM PILOT PLANT

Mr. MURTHA. Also in "Advancing Minerals Technology," a $500,000 decrease is proposed for the aluminum pilot plant, reducing it to zero.

What was the fiscal year 1977 money for?

Dr. MORGAN. This is the program that I just alluded to, sir, where the nine companies are each providing $50,000, and we are providing $700,000. That program will continue in the base program. But the reduction relates to the fact that it will not be until fiscal year 1979 before we are in a position to determine whether to go to a larger plant.

NEED FOR NEW POSITIONS

Mr. MURTHA. For the record, describe the need for 18 new positions under "Advancing Minerals Technology." What would happen if you did not get the increase in people?

[The information follows:]

NEED FOR ADDITIONAL POSITIONS UNDER "ADVANCED MINERALS TECHNOLOGY"

The 18 new positions under "Advancing Minerals Technology" are directly related to the expanded effort on critical minerals and are primarily for metallurgists and engineers, with some technical support. Allocation of the positions is as follows:

Chromium.—Six positions, consisting of metallurgists, chemical engineers, and technicians, are required to operate a miniplant to demonstrate extraction technology for recovering chromium from domestic laterite residues. The miniplant will treat up to 200 pounds of lateritic residue per hour to demonstrate and improve technology of component steps proposed for extracting the 2 to 3 percent chromium content.

Platinum.—Three positions, consisting of a metallurgist and two chemists, are required to increase research on beneficiation of western platinum deposits and to develop an improved solvent- extraction technology for platinum. These activities will be conducted on a bench scale to devise and improve processing technology.

Nickel and Cobalt.—Nine positions, consisting of metallurgists, engineers, and technicians, are needed to work with the pilot plant for recovering nickel and associated cobalt from western laterites. The proposed pilot plant will develop economic and engineering data for further scale-up of the process. The pilot plant will treat about 5 tons of laterite per day and recover about 100 pounds of nickel and 20 pounds of cobalt per day.

In the event that Congress approves the increased funding of $3,113,000 to expand and accelerate critical mineral research activities, but does not approve the increased 18 positions, the Bureau of Mines would be placed in an extremely difficult position. Maintaining the increased effort in critical minerals without the additional 18 positions will result in a major dislocation of personnel and overall research function. Examples of such dislocations are:

Chromium.—The chromium miniplant is dependent upon the laterite residues from the nickel/cobalt pilot plant for feed materials. Effective use of these residues would require that the chromium miniplant be operated concurrently with the nickel/cobalt pilot plant. Since the nickel/cobalt pilot plant is expected to complete operations in fiscal year 1979, failure to secure additional positions for the chromium miniplant would delay and lessen the chances of a successful conclusion to the effort on chromium.

Platinum.—Failure to secure the requested additional positions would delay development of domestic resources of platinum, such as contained in the Stillwater, Mont., complex. Delays would prolong the almost total U.S. dependency on imports to supply the 2,400,000 troy ounces of platinum consumed in 1976. Successful development of technology would increase the U.S. resource base by up to 150 million ounces of platinum-group metals.

Nickel and Cobalt.—Operation of the nickel/cobalt pilot plant is expected to be completed in fiscal year 1979 so that the technology for this innovative process can be transferred to the private sector. If the requested additional positions are not obtained, opportunities to participate effectively in cost sharing with industry in the pilot plant effort may be lost. Further, failure to obtain the additional positions will not only prolong completion of the pilot plant demonstration beyond fiscal year 1979, but will also hamper concurrent demonstration of the chromium miniplant technology which is dependent on laterite residues from the nickel/cobalt pilot plant for feed materials.

RECOVERY OF MINERALS FROM OIL SHALE

Mr. MURTHA. On page 24 of your justifications you indicate a fiscal year 1978 objective of constructing a miniplant for continuous processing of dawsonite contained in oil shale.

How much does this process potentially help the economics of the regular mining of shale?

Dr. MORGAN. This could make a significant contribution. Whether we can put an actual dollar-and-cents on it I don't know. The oil shale contains dawsonite which is an aluminum-oxide source, and it also con-

tains another mineral known as nahcolite, which is a sodium bicarbonate. Hopefully, the full use of the oil shale resource would result in the oil from the shale, plus the alumina for aluminum from the dawsonite, plus the nahcolite which is of real interest for flue gas desulphurization—because it combines with sulphur dioxide to make sodium carbonates which are now in powerplant use as an SO_2 getter. A combination flowsheet would do this and this is one of the reasons why we have in our budget several million dollars in fiscal 1979 to sink a shaft in the deeper part of the area, an 8-foot shaft to study the rock mechanics, study the environmental impacts, the stresses and strains and hydrology, and also to get adequate samples of the oil shale, including the dawsonite and the nahcolite to run the tests to determine technologically can it be taken out, and get an idea of the economic parameters that would be involved.

Mr. MURTHA. Could it be done in situ somehow?

Dr. MORGAN. I am afraid if it were done in situ you would only get the oil shale and not the dawsonite and nahcolite.

Mr. MURTHA. Is industry interested in this project at all?

Dr. MORGAN. Yes, sir. Some firms have already said that they have processes which would recover this on their own, but they have not been demonstrated.

Mr. MURTHA. How about ERDA?

Dr. MORGAN. ERDA is more concerned with what happens to the oil shale once it has been mined. How do you treat it in a retort, what kind of oil do you get out, how do you then refine the oil and so forth.

So, the division between the Bureau of Mines and ERDA is that we are concerned with the mining and the metallurgy aspect of the minerals in the ground, and ERDA is more concerned with the oil shale as it goes into retorts.

Now, the in situ, since it takes place in the ground, is a sort of a meeting ground between ERDA and the Bureau of Mines. We are in touch with them, and they are in touch with us on the programs.

TRACE ELEMENTS IN MINERAL PROCESSING

Mr. MURTHA. In Effecting Pollution Abatement, a reduction of $820,000 and 29 positions is requested. How much of this money appears in other areas and is not actually reduced? How much and where?

Mr. MORGAN. The work will continue because when we were talking earlier, sir, I mentioned that I think it very important that we identify these trace elements that are present in part per million and parts per billion. This $879,000 project was one where we first clearly identified these trace elements, what they are and where they are, and now we are going to continue that work in our other metallurgical processing. The people will be transferred to that. The work is important and will continue. Indeed, I think it is an area where more emphasis is needed.

Mr. DUNCAN. How much more in terms of dollars and people?

Dr. MORGAN. We will supply that, sir, along with the request that you gave us covering all of those items. I would like to take a careful look and break that down.

Mr. MURTHA. I won't have to repeat this question. You are going to do that automatically?

Dr. MORGAN. Yes, sir, since you asked us to.

CITRATE PROCESS FOR THE GAS DESULFURIZATION

Mr. MURTHA. Doctor, describe the funding by all the participants and the timing of the demonstration of the citrate process for sulfur dioxide removal at St. Joe Minerals Corp's. powerplant in Monaca, Pa.

Dr. MORGAN. Yes, sir. That is the one where we are proceeding with a joint project with the St. Joe Minerals Corp. where the Bureau funding is of the order of $6 million and theirs is of the order of $6 million. We are going to install the complete citrate process on an ongoing full size powerplant.

Let me ask Dr. Henrie, our Chief Scientist, or Mr. Kirby, our Assistant Director of Metallurgy, for further details.

Dr. HENRIE. You have it right, Dr. Morgan. This is about a 60-megawatt plant. We will process the flue gases from that powerplant through the citrate process. The contract is progressing right along.

Dr. MORGAN. The beauty of the citrate process is that it will recover elemental sulfur. This sulfur can then be used to make sulfuric acid which can be used and will be used for any other purpose sulfuric acid would be used for so there will not be a waste product as there is in other flue gas desulfurization processes.

Mr. MURTHA. What are the chances for success for this project?

Dr. MORGAN. I think they are very good. We already tried this on a demonstration size on a smelter out in Idaho. The difference is here that the smelter flue gases contain a higher concentration of sulfur dioxide. They ran 5 to 10 percent SO_2, something like that.

Mr. KIRBY. Five.

Dr. MORGAN. The SO_2 in the powerplant will probably be closer to 1 percent or something like that. So therefore a greater volume of hot gas has to be handled, and the question is, will the scaleup work, but I am sure it will work and the scaleup is not so great.

Mr. MURTHA. Can you go directly to the commercial project from this?

Dr. MORGAN. This is a commercial powerplant.

Mr. MURTHA. This is commercial scale?

Dr. MORGAN. That is right. If it works on this one, it should work on anything of comparable size.

USES OF BYPRODUCT SULFUR

Mr. DUNCAN. Aren't you going to have sulfuric acid running out of your kazoo pretty soon?

Dr. MORGAN. The citrate process is going to produce sulfur in a brick. It will be solid sulfur, just as they get out of the sulfur mine.

Mr. DUNCAN. But you say you have a market for it. Isn't the potential so great you will flood the market?

Dr. MORGAN. If all of the sulfur were recovered from our natural gas which has hydrogen sulfide in it, from sour crude oils which have sulfur content, from coal burning—we burn 400 million tons of coal, and if that contains 2 or 3 percent of sulfur—2 or 3 percent of that alone is as much sulfur as we use now naturally.

On the other hand, the good old Bureau of Mines has an answer for this, too, because we are going to go more and more into hydrometallurgical mining and processing whereby instead of going down and digging out a low-grade copper ore, bringing it up to the surface and then floating it, probably what we will be doing is fracturing it in place in the ground, pumping down material like sulfuric acid, pumping up copper sulfate, ready for electrolytic precipitation, thus avoiding the smelter fumes and giving us a way of mining it in situ, providing we can do this without fouling up the water table by some escape of the acid or the copper sulfate into the water table.

So we are doing research now in Arizona on in situ mining—Arizona and New Mexico.

We are working on in situ in uranium, so I think we will keep ahead.

Mr. DUNCAN. Is that one of the projects you have to expand the source of uranium?

USE OF SULFUR IN PAVING AND CONSTRUCTION

Dr. MORGAN. Yes, sir. Another use of sulfur which is a very interesting one, we have found that sulfur can be used in place of asphalt in binding aggregate in paving. We have already developed certain test strips of highway where instead of using asphalt they use half the asphalt and half the sulfur and it has given even a more resistant surface because the asphalt is etched away by dripping of oil and gasoline from cars, and so forth, and the sulfur is not.

Mr. DUNCAN. So every time it rains it smells like sulfur dioxide?

Dr. MORGAN. This is pure sulfur now. It is very resistant to solution. In fact, if you were to visit the sulfur mines in Texas or Louisiana, they have millions of tons of this in the open and it is raining on it and nothing is dissolving.

We found one other thing. One can lay up a concrete block wall, spray it with liquid sulfur, and it acts like a cement. The trouble is if the house caught on fire it would smell like sulfur dioxide.

Mr. DUNCAN. I read about that. They lay up the walls and just smear concrete over it. Now you say you can just spray?

Dr. MORGAN. You can spray sulfur on the blocks, and we have demonstrated this, and make a watertight, very good seal by spraying the liquid molten sulfur on, but I wouldn't want to be in that house when it caught fire.

Mr. DUNCAN. If it is a block house it isn't going to burn.

DUST, FUME, AND SMALL PARTICULATE CONTROL

Mr. MURTHA. What is the relationship of the dust, fume, and fine particulate control program on page 35 to that in the health and safety area, and what does it cost?

Dr. MORGAN. Over here, this on the dust, fume, and fine particulate control is in metallurgy and that program involves some $752,000. Over in coal mine and metal mine health and safety, they also are working on mine gases and largely coal dust in the mine, whereas this is smelter and mineral dust and fumes in metal and mineral processing plants.

There again are tradeoffs and work between the two. For example, what we are doing in asbestos in identifying the particles, if they are down there in a mine that has an asbestos-like seam in it, the question is, is the miner in the mine exposed to asbestos? If they are in an asbestos-handling plant where they are making asbestos cement or tile products that use something alleged to be asbestos, then it is a metallurgical problem. The two areas work very closely back and forth.

STATUS OF URBAN REFUSE PROCESSING RESEARCH

Mr. MURTHA. Please provide an update of the status of your urban refuse work and other Government interests you provided last year.

Dr. MORGAN. Yes, sir, this is an area where we are working very closely with the Environmental Protection Agency, and our people have assisted in coming on the line in some of these plants, and our College Park is continuing to work on that.

Mr. DUNCAN. Are you making any real progress as far as installation of these systems?

Dr. MORGAN. There are a couple in actual operation and we will provide that.

Mr. DUNCAN. Milwaukee has one but that was put in by private capital, wasn't it?

Dr. MORGAN. They may have had some EPA funding in a couple of cases, but of course the ideal situation is if we develop the technology and it is good enough for private capital to go ahead.

Mr. DUNCAN. Put in the record wherever these systems are in place and an anlysis of what they are doing.

[The information follows:]

URBAN REFUSE

The Bureau of Mines urban refuse processing technology continues to be of high interest to Federal, State, and organizations as well as a large number of private firms and individuals. Through continued operation of the Bureau's 5-ton-per-hour pilot plant at the College Park Metallurgy Research Center, we have provided much needed information to the organizations that have constructed their own refuse processing facilities and are experiencing problems in the start up of operations. We have found, also, that operation of the pilot plant has aided immeasurably in the transfer of technology to those organizations that are contemplating adaption of the technique and/or that have provided tonnage samples of refuse to the Bureau for processing and evaluation studies. In all of our experimental work we are continuously improving the process and the quality of the products. The Bureau collects quantities of separated products from the processed refuse and submits the products to extensive testing to prove their utilization acceptability.

Three recycling centers which utilize essentially all of the Bureau of Mines developed technology, are now in various stages of development. A 400-ton-per-day plant has been constructed and is in the early start-up phase of operations in Cockeysville (Baltimore County) Md. Expansion to 1,500-ton-per-day capacity is already underway. Ground breaking ceremonies were held in December 1976 for a 2,000-ton-per-day facility near Rochester (Monroe County) N.Y. In the third situation, preliminary design for a 1,200-ton-per-day plant in Montgomery County,

Md., has been completed and initiation of construction awaits decision of the county council.

The list of government organizations with which the Bureau of Mines has furnished technical and economic data on the technology is extensive, and include the following:

CITIES

Alexandria, Va.
Arlington, Va.
Atlanta, Ga.
Baltimore, Md.
Chicago, Ill.
Dayton, Ohio
Franklin, Ohio
Hempstead, N.Y.
Jennings, La.
Lowell, Mass.
Nashville, Tenn.
New Orleans, La.
Newton, Mass.
Rochester, N.Y.
Rockville, Md.
Saugus, Mass.
Shippensburg, Pa.
St. Petersburg, Fla.
Stamford, Conn.
Tampa, Fla.
Tulsa, Okla.
Washington, D.C.

STATES

Connecticut
Michigan
Tennessee
Wisconsin

COUNTIES

Anne Arundel County, Md.
Baltimore County, Md.
Chemung County, N.Y.
Howard County, Md.
Mifflin County, Pa.
Monroe County ,N.Y.
Montgomery County, Md.
New Castle, Del.

FEDERAL ORGANIZATIONS

Department of Agriculture
Energy Research and Development Administration
Environmental Protection Agency
Oak Ridge National Laboratory
Tennessee Valley Authority

Mr. MURTHA. Please answer the following question for the record.

Question. In "Minimizing Mineral and Metal Needs," you project no change from 1977. ($3,968,000)

Doesn't ERDA spend considerably more in material and corrosion studies? How much?

Doesn't industry spend considerably more also?

What impact does your approximately $4 million have in comparison?

MINIMIZING MINERAL AND METAL NEEDS

Answer. Funding requested for this metallurgy program is the same in fiscal year 1978 as it was in fiscal year 1977, $3,968,000. According to the Federal Council for Science and Technology Committee on Materials (COMAT) report, Inventory and Analysis of Materials Life Cycle Research and Development in the Federal Government—Fiscal Year 1976, the Federal Government spent approximately $658 million on materials research and development in fiscal year 1976. ERDA alone spent $243 million for materials research and development, most of which was directed towards materials needed in nuclear, fossil fuel, solar, and other potential energy systems. Nuclear energy materials research traditionally has been expensive and some of the other materials research and development for energy conversion systems involve costly large-scale demonstration projects.

The Bureau of Mines is currently providing research support in certain specialized areas as ceramic liners, valve materials, and methanation catalysts to ERDA because of the excellent materials research capabilities and facilities which exist in the Bureau.

The amount of industrial materials R. & D. is not known since existing surveys have categorized R. & D. by industries and not by the disciplinary areas in which the research is being done. However, if the same ratio of total R. & D. to materials R. & D. in the Government—$20 billion to $0.7 billion—is applied to

the total R. & D. in industry—$16 billion—the result is $0.6 billion being spent by industry for materials R. & D. This would include all types of materials R. & D. from manufacturing to utilizing, developing, and testing, as well as basic research. The effort to categorize the materials life cycle R. & D. being funded by industry, in a form suitable for analysis and planning, is being planned by the Committee on Metal and Nonmetal Mining, Resources, and Recovery—successor to COMAT—of the Federal Coordinating Council for Science, Engineering, and Technology.

The Bureau of Mines responsibilities include conservation of our mineral resources. As implied by the name of this research program, minimizing mineral and metal needs, the research objective is to conserve materials by developing new materials that will last longer in service and to develop useful materials from domestically abundant mineral resources that can be substituted for scarce or critical materials. The Bureau, in the course of its efforts to advance minerals technology, also has need of construction materials to meet severe corrosion and/or high temperature conditions, often associated with innovative technology, to meet its own program needs, and conducts research to develop these materials. It should be pointed out that the Bureau only undertakes these tasks when industry is not able to provide the needed materials.

The impact of the Bureau's materials research efforts are significant even though funding levels are relatively modest. Bureau research is selective rather than all-inclusive so that funds can be used most judiciously. The impact of the Bureau's research is not completely known as the results are often of a long-range nature, and credit is not always given when others adopt new materials or processes. As an example of long-range impacts, original materials research conducted in the 1940's on synthesizing of garnets was the forerunner of today's commercial synthetic garnet industry which is important to modern electronics. This impact could not have been predicted when the research was started.

The Bureau of Mines has had a considerable number of cooperative programs with industry in which the unique nature of the Bureau's expertise, capabilities, and facilities were employed to solve problems of a national nature. In addition, the Bureau's unique facilities have been employed by other Federal agencies in addition to the ERDA work mentioned previously to provide specialized materials R. & D. support. The zirconium alloys used for the first nuclear submarine were developed by the Bureau for the Navy, titanium fabrication methods were developed for the Army and Air Force, and synthetic mica was developed for the Navy and Army. Currently, the Bureau of Mines is working to develop ceramic aggregate for road construction under an interagency agreement with the Department of Transportation.

There is a critical need for the Nation to have mineral research laboratories, to broaden and develop its technology base, keeping it competitive on an international basis, and maintaining a core of scientific and engineering talent to use on high priority national needs as they develop in the area of minerals. We think the proposed funding is adequate for this purpose.

ENERGY BALANCE IN STEEL PROCESSING

Mr. DUNCAN. In your opening statement, Dr. Morgan, you mentioned that the heat or energy balance has become critical. I agree. There is a little steel plant in Portland I visited where they make molten ingots and then they put them out to cool. Fifty yards away they have a rolling mill. They heat the ingots up again and put them on the rolling mills instead of letting them cool and then reheating?

Nobody can answer it from the manager of that plant down to the foreman. I can understand why they have an inventory of these things, and I can understand why their flow charts would change with some different requirements, but I don't understand why some of them can't be used in a preheated situation unless there is some metallurgical reason why those things have to cool and then be reheated before they can be rolled.

Do you know what I am talking about?

Dr. MORGAN. Certainly your observation is absolutely correct. In many plants they have what they call a soaking pit where the hot ingots are put in to maintain the temperature and in other places they actually move hot metal from plant to plant rather than heat it again.

Dr. HENRIE. It is necessary that before they roll steel, that the ingots go through a soaking pit. You really should have the inside solid before you start to roll because you are going to squeeze it pretty hard. You have to have uniform temperature. As Dr. Morgan says, you have to go through the soaking pit.

Whether this is owned by one company is a matter——

Mr. DUNCAN. I didn't see any soaking pits. They were air cooling.

Dr. HENRIE. Yes; but you said they reheated them. That is the soaking pit. This treatment is to get a good uniform temperature through the ingot.

A lot of steel mills at the present time have no inventory essentially. After they receive the order—then they determine which ingot is going to go where.

Mr. DUNCAN. There are energy-saving techniques that can be used?

Dr. HENRIE. I am a little surprised they don't put those ingots directly from the casting into the soaking pits because they would conserve that energy. While the one is cooling, it is heating the other somewhat.

Dr. MORGAN. The ultimate is a continuous casting process in which hot metal goes continuously in the melts and is cast in the ultimate form and comes out the other end.

Mr. DUNCAN. But that would be for castings. That is different than in a rolling mill.

Dr. MORGAN. Yes, sir.

Mr. DUNCAN. If you have a little short paper——

Dr. HENRIE. We can supply it for you and report on the situation.

[The information follows:]

ENERGY LOSS IN COOLING STEEL INGOTS

Some steel companies allow ingots to cool, store them outside, and then reheat them before rolling. Although this practice appears to be wasteful of energy, there may be several reasons for the procedure.

Steel is an alloy made from iron and several other metals such as manganese, silicon, chromium, molybdenum, to name a few. Each of the different steels has a specific chemical or alloy composition that affects its properties. This is a planned composition and is acquired during the melting and finishing of the heat by metal and slag control. The melted steel is tapped from furnace, separated from the slag, and cast into molds. The castings are allowed to freeze and become solid enough to remove the molds. There are generally at least 6 or even 12 ingots per heat of steel from the furnace. The ingots are inspected for defects and most of them go directly to the soaking pit. In the soaking pit (a large gas-fired furnace) the ingot is brought to uniform temperature and then removed to the rolling mill for production of steel blooms, slabs, or billets. If the rolling mill does not have orders for all the ingots from one specific heat, the ingots may be set aside for use in the future. Plant layout, materials handling, and safety considerations also may require the cooling of ingots before their preparation for the rolling process. These are a few of the may reasons for some ingots to be set aside and not continuously processed through to the finished product.

In conventional practice, treatment of the ingots involves six steps: (1) ingots are cooled in the molds to 1,200° to 1,600° F.; (2) charged hot into vertical soaking pits which reheat slowly (6 to 12 hours) and are heated for considerable interval (2 to 3 hours) at rolling temperature (2,300° to 2,350° F.); (3) ingots are withdrawn individually and rolled on primary slabbing, blooming, or billet mills to semifinished products; (4) cooled in air for inspection and/or transfer

to final rolling mills, or hot scarfed and recharged directly at 1,200° to 1,800° F. to reheat furnace; (5) reheated for final rolling in a horizontal furnace to 2,250° to 2,300° F. in 3 to 6 hours; (6) final hot rolling to plate, sheet, bars, or tube rounds.

In contrast, direct or continuous casting, involves four steps: (1) continuous casting of slabs or billets; (2) cooling in air for inspection and/or transfer, or recharged hot (1,100° to 1,800° F.) into reheat furnace; (3) reheating to 2,250° to 2,300° F. in 3 to 6 hours; (4) final hot rolling to plate, sheet, bar, and tube rounds.

A study by Battelle Columbus Laboratories under Bureau of Mines contract ("Energy Use Patterns in Metallurgical and Nonmetallic Mineral Processing," Phase 4 Report) shows total energy consumption by the ingot route as 27.24 million Btu per ton of slabs compared to 22.20 million Btu per ton by the continuous casting method.

ANTHRACITE MINED LAND DEMONSTRATIONS

Mr. MURTHA. Let's go to mining. Please answer the following questions for the record.

[The questions and answers follow:]

Question. Your program in "Coal Mine Health and Safety Research" is at the maximum authorized level of $30 million. Is that an effective level? Could you use more money effectively? How?

Answer. We believe that the $30 million maximum authorized level set by Congress in 1969 is an effective level of funding. However, the inflationary impact has reduced the effective level of this program to about $18 million in terms of 1970 dollars. This reduction in buying power dictates that research must be extended over longer time.

Increased funding would permit expanded research efforts in critical areas of compliance research and new technologic developments. For example, increased energy impetus in coal mining will require the mining of deeper coal beds in the Appalachia area and thick seams in the West; increased methane release and ground control problems will necessitate accelerated research to resolve safety problems. Newly enacted regulations specifying illumination systems and canopies for operator protection necessitate compliance research to insure industry acceptance and compliance with new technologic requirements.

The demand for new workers and natural attrition of personnel through retirements, has sparked an influx of young miners, including some women, dropping the average age of coal miners from 40 years, 10 years ago, to 35 years today. The trend is expected to continue. Concurrent with this manpower change is emerging technology fostered by the need to comply with strengthened regulation of mining operations and a critical need to arrest a declining productivity trend. Superimpose on this the need to mine deeper and gassier coal in the East and thick seams in the West and we see the reasons for a continued strong effort in mine health and safety.

Question. Through 1977 you will have spent approximately $200 million in mining health and safety research since 1970. What have been the major things you have accomplished? What do you hope to accomplish in the near future?

Answer. The details on all expenditures and accomplishments in mining health and safety programs since 1970 are contained in the annual reports of the Secretary of the Interior under the Federal Coal Mine Health and Safety Act—Public Law 91–173—and in the annual reports of the Secretary of the Interior on Administration of the Federal Metal and Nonmetallic Safety Act—Public Law 89–577. Major accomplishments to date are listed here under the appropriate mine health and safety problem area.

HEALTH

Nonclogging water spray filtration system developed and in use in at least 40 coal mines.

Canopy air curtain system developed for personal protection of mining machine operators against respirable dust. About 15 units have been sold to mining companies to date.

System for putting water through the shaft of low-coal auger miners developed and tested.

Deep cutting continuous miner developed and tested underground showed large reductions in dust generation by increasing depth of cut.

Dust collectors installed on Eickhoff and Sagem longwall shearers at two mines in West Virginia achieved dust reductions of about 50 percent.

Wet-head mining machines were shown to be generally superior to conventional sprays in reducing dust on all types of machines. Problems with seal leakage make questionable their practical use on drum-type miners.

A secondary exhaust ventilation system developed for a Jeffrey 100L auger miner was tested at the Lens Creek Mine in West Virginia. The 200 cfm system reduced dust levels from 3.2 to 1.5 mg/m^3.

Good agreement was found between dust concentrations measured by samplers worn by mining machine operators and by samplers located nearby on mining machines, justifying development of larger and more reliable dust measurement instruments for area sampling.

A 7-decibel noise reduction was achieved on a Joy 14BU 10 loader, primarily through use of energy-absorbing material.

Prototype hardware was developed for a portable calibration facility for audio dosimeters.

The Georgetown preparation plant of the Consolidated Coal Co. was brought into compliance with noise standards using available noise abatement techniques.

Development by the Bureau of Mines of a pocket-size audiodosimeter that records both total exposure and any exposure to noise louder than 115 decibels stimulated commercial interest that resulted in marketing of several different models.

In integral muffler-jacket system was developed that reduces the noise level of a 75-pound class of pneumatic stopper drill from 115 to about 100 decibels and is available as a retrofit kit.

A small handheld instrument has been developed that immediately and quantitatively measures carbon monoxide concentrations in underground coal mine atmospheres. A similar instrument configuration is being developed to measure oxides of nitrogen.

A simple personal dosimeter has been developed to measure the cumulative exposure of a miner to nitrogen dioxide. This sampler has been extensively tested by industry and is available for commercial application.

The Bureau has identified the toxic potential from the thermal decomposition products of many materials used in coal mining. This information is available and will aid the coal industry in selecting materials for mining equipment that emit no toxic products from thermal decomposition.

SAFETY

A horizontal borehole for methane drainage has been drilled more than 2,100 feet into a coalbed using a simple rotary drill in combination with drag bits and centralizers without reaching the capacity of the drill.

More than 800 million cubic feet of gas has been drained from the Federal No. 2 Mine in the Pittsburgh coalbed over 3 years through a ventilation shaft drilled in advance of mining and having five horizontal holes radiating into the coalbed from its bottom.

Unstable foams were found to be more effective than water in blocking the flow of methane.

Demonstrated degasification of permeable coalbeds through vertical boreholes with hydraulic stimulation in advance of mining.

Demonstrated control of methane at the face with water infusion.

Developed a new type of brattice which offers reduced weight, leakage, and installation time for sealing mine passages—useful in reestablishing ventilation during coal mine rescue and recovery operations.

A remote coal mine sealing system has been developed which can isolate from the surface areas of coal mines that are burning. The system consists of probing instruments that define passageway geometry, obstructions, and hole location, mobile sealing equipment that isolates coal passageways, and seal-checking instrumentation.

Fire detection instrumentation and fire suppression systems for mine shafts and underground locations were mine-tested. The systems sense fires and provide location information, and have the capability to shut airdoors, turn off air fans and/or direct air flow, as well as actuate fire suppression equipment. This technology is now available to industry.

Prototype automatic fire sensors and suppression devices for underground and large surface mining equipment were fire-tested in mines.

Surface seismic system is available which can locate geologic hazards ahead of mining that could affect mine stability. Existing equipment can "see" such hazards at depths ranging from 100 to 1000 feet.

Production models of flexible roof drills are now undergoing field trials. When fully developed, these devices will remotely drill bolt holes that are longer than seam height without the need to change drill steel.

A single-entry development system for longwall mining has been demonstrated in field trials. The entry is supported by fibrous-reinforced concrete cribs.

Microseismic equipment and procedures have been developed to predict coal bumps and outbursts. Prototype equipment is being developed.

A prototype, portable, roof-fall warning indicator is being field tested to establish its degree of reliability. The indicator has the potential to reduce roof fall accidents by 50 to 90 percent.

Shortwall mining system demonstrated and evaluated.

Prototypes of a belt-mounted self-rescuer able to supply 10 minutes of oxygen were tested, as was a plug-in canister having an additional 1-hour supply.

A prototype rescue-team helmet was developed that synthesizes protection and communications into one unit.

Mine wide monitoring system developed and undergoing long term demonstration.

Portable belt box pager telephone successfully developed.

A series of canopies have been developed and tested for retrofit to existing coal mining equipment that protect operators from roof falls. Drawings for such installations are available.

A system of radio telephone communications has been developed that can provide areawide and minewide communications, extenable even to roving personnel.

A training system is available that teaches operational procedures and proper reaction to hazards common to shuttle-car operation. The system exposes students to the equivalent of 1 year experience in a mine within 28 hours of course work.

Illumination standards for underground coal mines were promulgated by MESA on October 1, 1976, based on Bureau research.

Determined the visual requirement for underground mine lighting to establish the basis for the mandatory standards required by the act.

Developed and demonstrated systems for lighting.

An accident/cost computer-based model was completed that estimates the tangible costs of injuries and deaths from work-related accidents in underground bituminous coal mines. The final report will be issued in 1977.

Completed under the Inherently Safe Mining Systems contract two long term full mine-scale demonstrations—one a continuous mining section at the Pawnee No. 10 Mine in Illinois and the other a conventional section at the Jenny Mine near Prestonsburg, Ky. New hardware for illumination, communications, and protective canopies were demonstrated to industry. The concept of remotely installing roof bolts as part of the continuous miner operation was demonstrated. Although reliability of this pioneering equipment was not optimal, this work set the stage for a whole family of ongoing automated roof bolting projects that have high promise for accident prevention.

Some examples of near term expectations for the coal mine health and safety program as shown below.

Further reduction in diesel engine emissions.

Commercialization of minewide communication and monitoring systems.

Novel cabs and canopies for low-coal mining equipment.

Guidelines for revision of schedule 2G permissibility regulations and standards.

Additional training systems for mining machine operators.

Improved splice techniques for shielded electrical cables.

90-minute O_2 self rescuer accepted by industry.

A dust collector mounted on a surge car for control of dust around borer type miners is ready for field testing.

Tamperproof filter cassettes should be available this year.

A light scattering dust monitor for routine mine use should be ready within 2 years.

A thermoluminescent dosimeter will be used for enforcement of the radon daughter standard in 2 to 4 years. A study of the cost impact of implementation on Government and industry is planned.

A personal alpha alarm to warn against high radiation levels may be ready in about a year.

Design of a quiet pneumatic drill which will operate at about 90dbA.

Successful demonstration of bringing a large coal cleaning plant in to compliance with the mandatory noise standards by retrofitting noise control measures throughout the plant.

Development of retrofit noise control techniques to reduce the noise of a continuous mining machine to about 90 dbA.

Demonstration of removal of methane from the coalbed ahead of the face underground and transport of the gas through a pipeline to the surface.

Development of techniques to increase methane removal rate from the less permeable coalbeds.

Development of lighting systems designed for and built into various types of mining machinery.

A means for industry to obtain the training needed to specify and maintain mine lighting systems that will provide illumination of each mine to levels required by the standards.

Major emphasis will continue to address the high risk areas of mining including roof falls and haulage and equipment accidents. In addition, respirable dust, noise, and other health related engineering problems will be pursued.

Question. We know that productivity trends are down. What about coal mining death and injury rates? What effect has your research had on these rates?

Answer. Coal mining death and injury rates are shown on the two charts titled "Coal Mine Fatal Accidents and Frequency Rate" (fig. 1) and "Coal Mine Nonfatal Injuries and Frequency Rate" (fig. 2). The fatal accident frequency rate shows a decrease since 1970. The number of fatalities also has decreased since 1970 although the Scotia disaster temporarily reversed the trend in 1975.

FIGURE 1

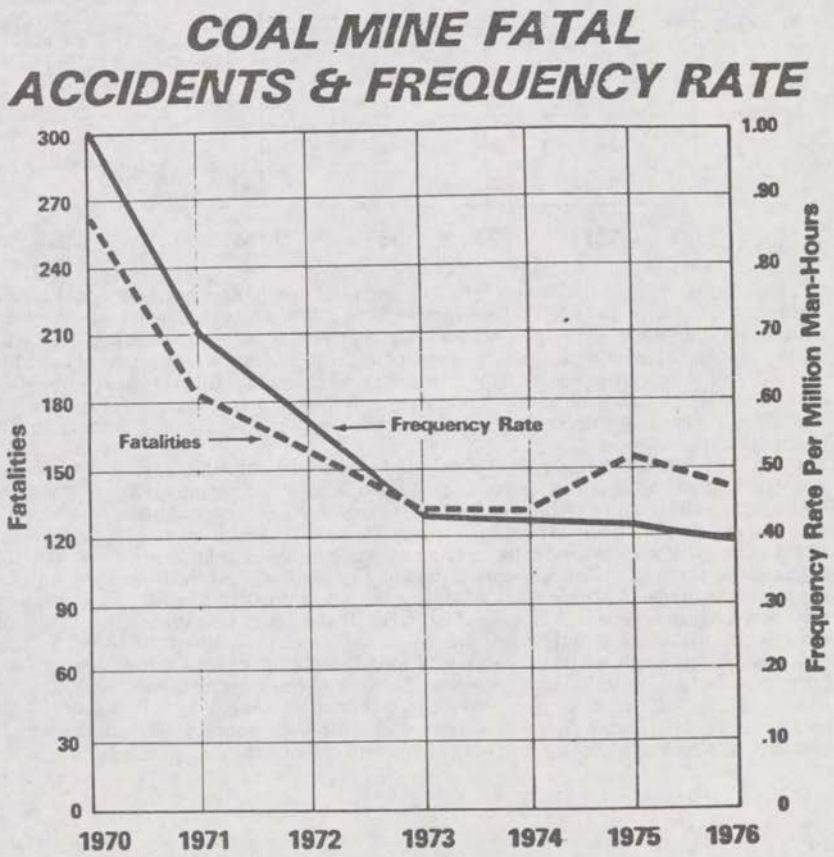
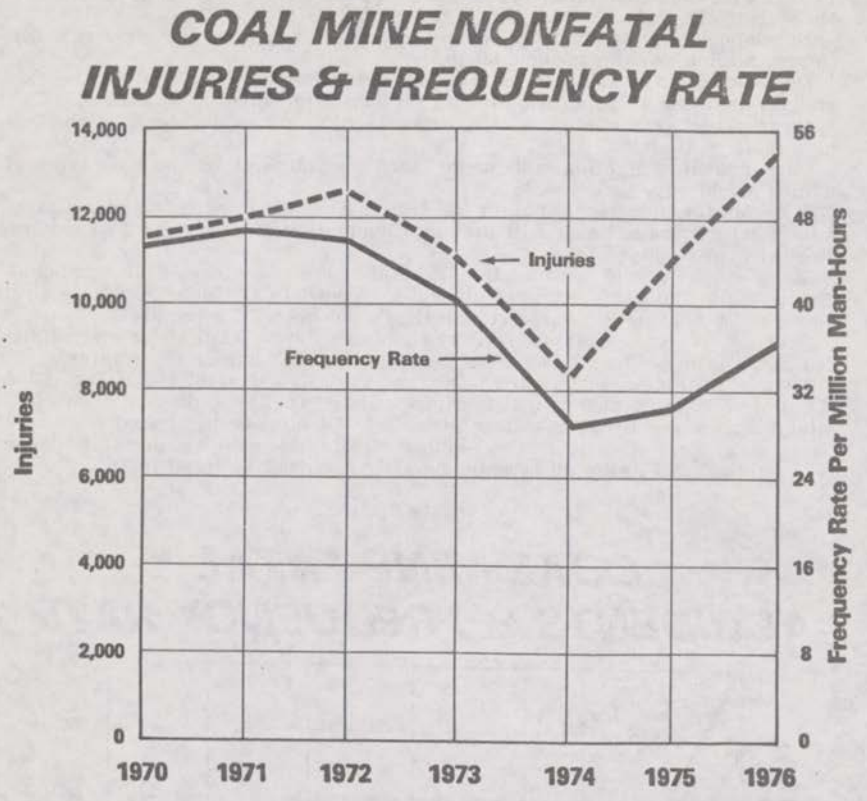


FIGURE 2



The overall coal mine nonfatal injuries and frequency rate decreased from 1970 to 1974. Since 1974 both these indicators show an increase which, if attributable to increased employment and inexperienced miners entering the work force, is a most serious matter. We are conducting research as though this indeed were the case and are accelerating a number of projects on better training. However, the MESA Administrator has called attention to the fact that nonfatal accidents are being better reported today and the increase may be largely attributable to this factor.

Prior to 1973, the Mining Enforcement and Safety Administration was part of the Bureau of Mines and personnel who assisted in preparation of the 1969 standards and initiated the original research are now distributed between the two organizations. Research results prior to 1969 contributed to the technologic basis upon which the standards in the act were based. From 1969 to present this technologic base has been expanded and has contributed directly to new and improved standards. Although all research does not lead to standards we believe that research in industrial engineering early in the program pointed out that task experience was a very important factor in accidents and identified specific high risk operations such as roof bolter and shuttle car operator. Subsequently technology emerged for cabs and canopies, for example, both new and retrofit, that have had tangible impact on decreasing accidents. Research has also contributed to advances in human factors engineering and new equipment reflects design changes incorporating many features to protect operators.

TABLE VIII.—FATALITIES OCCURRING WITHIN 8 WEEKS OF UNDERGROUND ACCIDENTS IN COAL MINING IN COUNTRIES OF THE EUROPEAN COMMUNITIES

[Per million man-hours (frequency)]

	1967	1968	1969	1970	1971	1972	1973	1974
1. Fall of ground	0.192	0.160	0.176	0.135	0.133	0.092	0.13	0.11
2. Haulage and transport	.128	.115	.145	.132	.104	.141	.12	.08
3. Movement of personnel	.044	.054	.038	.039	.043	.043	.04	.05
4. Machinery, handling of tools and supports	.024	.017	.023	.027	.029	.019	.02	.02
5. Falling objects	.036	.040	.031	.025	.041	.038	.02	.04
6. Explosives	.002	.006	-------	.002	.005	-------	-------	-------
7. Explosions of firedamp or coal dust	-------	.044	-------	.037	.005	-------	-------	.13
8. Sudden outburst of firedamp, suffocation by natural gases	.012	.006	.004	-------	.027	.022	.012	-------
9. Underground combustion and fires	-------	-------	-------	-------	-------	.003	-------	-------
10. Inrushes of water	.002	-------	-------	.011	-------	.003	.003	-------
11. Electricity	.004	.006	.006	.004	-------	.003	.003	-------
12. Other causes	.015	.012	.015	.016	.053	.035	.06	.02
Total	.457	.460	.438	.429	.440	.399	.413	.456

Source: Commission of the European Communities: "12th Report of the Mines Safety and Health Commission" (Luxembourg, 1975).

Question. How do our death and injury rates relate to those of other countries?

Answer. Injury rates of other countries are not directly comparable to the United States. For example European countries rely primarily on the longwall mining method whereas the United States uses primarily the room and pillar method. The comparison between countries is also difficult for lack of standardized definitions and reporting procedures. Almost all accidents are reported in the United States and Canada whereas only accidents causing absence from work for 3 days or more are reported in the United Kingdom.

Fatality rates can be more easily related. The following table showing fatalities is taken from Report III, International Labor Organization, Safety and Health in Coal mines, Geneva International Labour Office, 1976, p. 17. The frequency rates in fatalities per million man-hours since 1970 appear comparable to the U.S. experience.

Question. Does your information get put into MESA standards? How long does it take? What is industry's response to new techniques you recommend?

Answer. Bureau of Mines input into MESA standards is accomplished through several mechanisms. Bureau standards input committees provide close liaison with MESA on technologic bases for new or revised standards. MESA input to Bureau programs directs research into necessary areas impacting standards.

No exact time can be cited for the standards setting process because of its complexity. In the case of mine illuination the process was started shortly after the 1969 act was passed. Standards were promulgated in October 1976. Bureau hardware developments were followed by lengthy demonstrations in coal mines between 1973 and 1976. Another example is the proposed regulations on 10-minute and 1-hour oxygen self rescuers. These regulations are based essentially on Bureau research. There is no difficulty in getting research results to MESA and for insurance that this is done promptly the Bureau has formal committees to advise MESA of pertinent research results on both new and revised standards.

Industry is generally receptive to Bureau recommendations regarding techniques that will help compliance with a standard. New equipment however, is critically reviewed by industry in terms of purchase cost, installation cost, maintenance and operating labor costs, and impact on mine productivity. In-mine demonstrations in representative mine operating conditions may be required before industry will admit that acceptable technology is available. An example of this is the present industry position (based on recent hearings held by MESA) that new 10-minute and 1-hour self-rescuers should be widely demonstrated in mines before new standards are promulgated by MESA.

Question. What are the most serious mining health and safety problems? How have you reduced those problems?

Answer. The most serious coal mining health and safety problems are respirable dust, falls of roof, haulage and equipment accidents, and methane-coal dust explosions. We have completed and ongoing projects addressing each of these problems. Following is a brief overview of the most important of these projects.

RESPIRABLE DUST PROBLEMS

Development of improved face ventilation techniques and better use of water for dust control. Examples of improved use of water are (1) the nonclogging water spray filtration system recently developed an (2) the use of water through the shaft on low coal auger type machines.

Demonstration of significant dust reductions using secondary ventilation systems on auger machines and also on longwall shearers. Both these types of machines have severe problems with respirable dust.

An air curtain system mounted on the canopy of a mining machine has been developed for the protection of machine operators against respirable dust. At least 15 of these units have been purchased in the mining industry.

ROOF FALL ACCIDENTS

Demonstration of the shortwall mining system for total extraction. Three-year program with Beth Elkhorn with no lost time accidents for 700,000 tons coal produced over one-half million man-hours. Room and pillar mining with retreat would normally expect about seven accidents including one fatal.

Single entry longwall demonstration experienced no fatals for development of entries. The decreased amount of openings and improved stability of one entry reduced the normally expected ground fall accident rate.

Mechanics of mechanical anchors and resin column bolts investigated by the Bureau resulted in increased attention to ground control plans. MESA implementation of standards for plans from all operations focused industry planning on Bureau roof support recommendations.

Surface geophysical system demonstration resulted in identification of geologic hazards ahead of mining. Mine operators now lay out mine plans to avoid hazards or to plan for extra and remedial artificial support in their ground control plans to stabilize these roof-fall prone areas.

Geological identification of known roof fall associated hazards, procedures for mapping, development of core photo books and identification of major hazards for the major U.S. coal seams provided mine planners with information to avoid or plan for extra and remedial supports.

Guidelines for mining near bodies of water were established and are now in process for standards imp'ementation. Systematic techniques to identify the weakened zones of rock near water bodies avoid the associated roof falls by avoiding mining near this zone.

Blasting criteria established (in one seam at this time) by Bureau research to place safety limits on surface blasting for minimizing the weakening of underground mine roof.

Sealants developed by the Bureau to minimize roof slacking which sometimes progresses to roof falls. Dry process (among others) sealants developed to provide economical solution to roof slacking stabilization.

Bo!ting machine modifications to insure more uniform and consistent installation of bolts to stabilize mine roof included; output torque indicators to insure bolt tension compliance, simplification of bolter controls to minimize accidental deviation from established bolt installation processes.

Development of equipment for instal!ation of longer-than-seam height bo!ts. A bolt bender and associated flexible drilling systems place the operator away from unsupported ground while providing the necessary anchor horizon for roof fall prevention.

Roof fall warning indicators developed including horizontal roof strain indicators, multi-position roof sag indicators, and an operational microseismic roof fall warning system which is now in final field trials. Use of these warning devices has been optional for operators but Bureau research has been establishing case

history information to demonstrate their success and warning. Microseismic system has the potential to reduce roof fall accidents by 50 to 90 percent.

Microseismic equipment and procedures have been developed to predict coal bumps and outbursts. Prototype equipment is being developed.

HAULAGE AND EQUIPMENT ACCIDENTS

Developments aimed at short term remedial corrections on existing equipment include: improved cabs and canopies; automated temporary roof support; improved circuit protection devices; and automatic car couplers for rail haulage.

Development of new inherently safer equipment and/or procedures include automatic steering systems for low coal shuttle cars; automatic braking systems for rail haulage; loading machine redesign to put the operator cab transversely on the boom, farther from the face; standardized controls on face machinery to reduce accidents caused by confusion in an emergency; and improved illumination and communications systems to preclude exposure of a worker to an unrecognized hazard and to keep him aware of the changing mining situation.

METHANE-COAL DUST EXPLOSIONS

Removal of methane by degassification techniques, both in advance of mining and during mining, reduces the probability of methane ignitions and subsequent coal dust exp osions. Such degassification is being done using horizontal boreholes into both unmined and gob areas. These techniques reduce methane emission during mining which also simplfies face ventilation problems.

Protective devices and ssytems are being developed to reduce the explosion probability. Improved methanometers and machine mounted monitors provide warning of increasing methane concentrations well in advance of dangerous levels.

New fire detector devices and systems warn of incipient fire growth from electrical faults of spontaneous combustion; in more gassy mines such fires can ignite methane-coal dust explosions even when the fire is quite small.

Improved systems of fire suppressants and novel dispersal devices will soon provide ways to detect and suppress methane-coal dust explosions, in a sufficiently early stage to provide protection for the workers on the section.

Question. Please describe your program in methane control. Can you recover the methane? Is ERDA involved in this? How does your program tie into theirs?

Answer. The general objective of the methane control research program is to develop the technology necessary for safe and economic mining of methane-laden coalbeds so as to eliminate the mine disasters caused by accidential ignition of methane-air mixtures during shaft sinking and subsurface excavation. Recently the objective of demonstrating the feasibility of recovering commercial quantities of methane from virgin coalbeds and from underground job areas to increase the production potential and productivity from United States coal deposits has been added.

Flammable mixtures of methane and air are readily ignited and currently are eliminated by diluting the methane with air. This is an acceptable approach as long as the required volume of air can be properly disturbed at the fact to dilute the methane. The hazards resulting from accidental ignition of uncontrolled methane emissions continue to threaten the safe operation of coal mines. Moreover, since the methane emission rate depends upon both the coal production rate and mining depth, the need for methods other than dilution alone to control methane will increase because the need for increased production of high quality coals requires mining deeper and generally more gassy coalbeds.

Research and development to achieve the objective of mining coal without danger from ignition of explosive mixtures of methane and air is directed to three problem areas, namely, (1) determination and assessment of factors related to the occurrence and movement of methane in coal and adjacent strata, (2) development and testing of methane control techniques applied in advance of mining, and (3) development and testing of techniques to control methane in active workings and abandoned areas during mining.

Methane may be emitted in different ways depending on the nature of the coalbed and surrounding strata, the geological conditions, and the method of mining. Therefore no single method of methane control will be universally applicable.

Methane that is removed from the coalbed before mining begins or that is drained from the coal ahead of the working face through horizontal holes in the rib can be recovered and is usually of near pipeline-quality gas. Many factors affect the cost of draining gas from coal, and the economics of removing methane ahead of mining must be determined on an individual basis. The costs are offset by the greater safety and increased productivity in mining a less gassy coalbed and can be recouped still further by utilization of the high-quality gas.

ERDA is not directly involved in the Bureau of Mines program whose major concern is with the safety and productivity of the mining operation. In the coal mine health and safety program the work involves mines now operating whereas under advancing mining technology the techniques are developed and applied where mining is planned for the future. Through a number of discussions ERDA is aware of our work on recovering methane from coalbeds. Our understanding is that their program is pointed toward utilization methods for more dilute methane mixtures such as gob gases and recovery of methane from coalbeds and other gas-containing rocks considered unminable.

Mr. MURTHA. I think we have pretty well exhausted our oral questions. Please answer the following questions for the record.

[The questions and answers follow:]

Question. Your metal and non-metal mine health and safety research remains constant in 1978 at $5,816,000. How does this work differ from the work done in the coal mining area? Aren't the hazards similar? Aren't solutions to problems similar?

Answer. The metal and nonmetal mine health and safety research is fully coordinated with the coal research but recognizes the differences that exist and some of the special problems. Metal and nonmetal mines occur in bedded deposits as do most coal mines but they also occur in other configurations including sporadic lenses, narrow and tenuous veins, and massive disseminated deposits. Conditions of geometry, attitude, rock pressure, and temperature are much more varied in metal and nonmetal mining and a large number of special mining techniques are used to exploit the diverse ore bodies. Solutions to problems unique to noncoal mining must be sought.

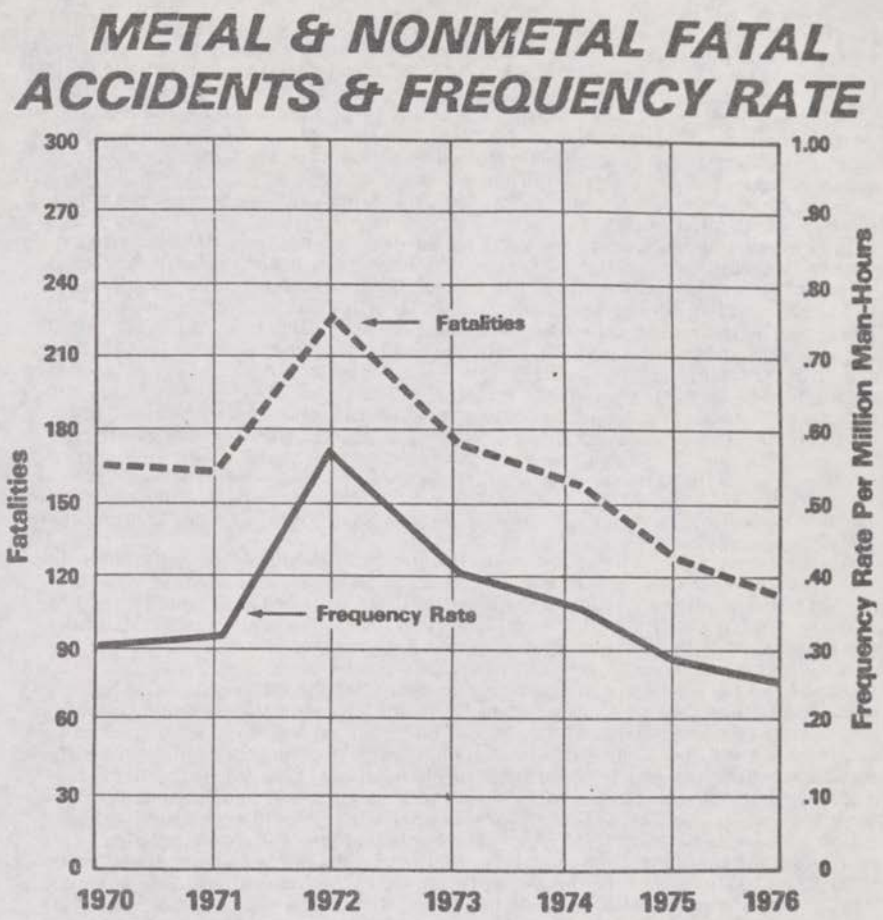
Some of the hazards in metal and nonmetal mining are similar to coal and some are not. Radiation is a major hazard in uranium mines that is uncommon in coal mines. Methane gas is a major hazard in many coal mines and uncommon in most noncoal mines. However, many equipment and haulage related hazards are similar. Solutions to metal and nonmetal health and safety problems are not necessarily similar to those in coal. For instance coal mines require permissible equipment and most noncoal mines do not.

There is significant cross-over benefit between these health and safety programs because they are conducted in an integrated manner within the Bureau of Mines. These programs are further coordinated with production and environmental research. Specific cross-over benefit exists, for example, in fire control technology developed for metal mines. This technology has definite applicability to coal mining. Illumination hardware developed for coal mining has applicability to metal mines. Rock burst technology developed for deep metal mines has applicability to coal mine bump problems. The important thing is that coal and noncoal health and safety research are closely coordinated and every effort is made to avoid duplication.

Question. On page 64, under "Benefits" you indicate a downward trend in fatalities. Is this different from coal? Why? What has caused the decrease in your opinion? Is there anything here that can be applied to coal?

Answer. The chart of Metal and Nonmetal Fatal Accidents and Frequency Rate (Figure 1) and the discussion on p. 64 of the budget justification shows that, except for the Sunshine Mine Fire event, there has been an overall improvement in both performance indicators from 1970 to 1976. The downward trend is similar to that experienced in coal but the rate of decrease is less. One reason for this smaller rate of decrease might be that both fatalities and frequency rate were lower in metal mines in 1970 than in coal mines. It is more difficult to drive these indicators lower even as some metal mines reach great depth and the mine environment becomes more difficult to work in.

We believe the improvement in safety performance indicators is the result of complex forces including better enforcement, training, research, and a heightened safety awareness on the part of mine management and labor.



Question. Did you not publish a program report in 1975 calling for a funding level of about $70 million in 1978 and one in 1976 calling for a level of about $74 million? Why is this budget now so different?

Answer. A report entitled "Energy Research Program of the Department of Interior" was prepared by the Office of Research and Development and published in January 1975. This report indicated a projected fiscal year 1978 coal mining research budget of $70 million to meet a specified series of objectives. Subsequent policy decisions have necessitated modification of those projections in light of overall fiscal considerations. The January 1976 Bureau of Mines strategic and tactical plan was a draft and was never published and hence has no official status. The fiscal year 1978 budget levels requested for advancing coal mining technology represent a balanced, effective program.

Question. How long have you been working in this area? How much money have you spent in the last 10 years?

Answer. The advancing coal mining technology program began with a supplemental appropriation of $7 million by Congress in December 1974. We are now in the fourth fiscal year. Through the end of the fiscal year 1977, the funding total for the advancing coal mining technology program (excluding coal preparation) will be $173.2 million.

Question. What have been your results? What are your most promising areas of research?

Answer. Many of the more significant results to date are listed in the attached compilation. In structuring the program we sought to achieve a balance between short- and long-range activities. The shorter range activities relate principally

in efforts to stimulate the use of improved techniques such as the use of shield type longwall supports. Longer range activities include development of new equipment and the conduct of fundamental investigations. It is impossible at this time to single out a line of investigation as the most promising because no one solution is going to meet our Nation's needs. A large number of technologic improvements must be made. We do feel that the first successful use of longwall mining in Illinois and the projects related to the development of miner-bolters are indicative of what this program can do.

There is every reason to believe that longwall mining will be used more extensively in the United States. Just what level of use will be achieved by any given data is impossible to predict; however, recent data [1] shows over 70 longwalls currently in operation in the United States, which is a significant increase in a short period of time. These operations still represent a relatively small percentage of U.S. coal production. There are many reasons why longwalling is not used as much here as in Europe. One reason is that room and pillar mining is well suited to the generally favorable mining conditions we have experienced in the past and are still experiencing. Our mining people are experienced in room and pillar workings. We have an equipment industry which is oriented toward room and pillar equipment. Our mining regulations are generally based on room and pillar practices. Nevertheless, as conditions worsen, as familiarity with longwall mining increases and as longwall equipment suited to the needs of our industry is developed, we think the use of longwall mining will increase even further.

ADVANCING COAL MINING TECHNOLOGY—RESULTS TO DATE

Since its inception in fiscal year 1974 significant strides have been made in achieving the overall program goals and the accomplishment of key objectives related to the program of work. More recently those include the completion of key problem analysis and definition studies, the initiation and/or completion of significant system and equipment design and development efforts; the completion of major demonstrations and the initiation of others.

One of the key elements in the Bureau's mine development research program is shaft sinking. This is a pacing item in opening new deep mines and, because it is costly, has a pervasive and enduring effect on overall mine economics. The design of a blind shaft borer has been completed. The project was undertaken to accelerate shaft construction through mechanization. The object is to provide a system that will construct a 24 foot diameter shaft at a rate of 25 feet per day. The conventional method utilized today is only capable of 60 feet per month.

Raise boring is an efficient shaft excavation technique. The lining process, however, is quite hazardous, time consuming and costly. A remote controlled shotcrete shaft lining system has been developed to reduce these constraints. A demonstration of the system at the Peabody Star Mine, Evansville, Ky. was successful in lining a ventilation shaft at rates approaching 60 feet per day, well in excess of the present capability of 25 feet per day. It also eliminated the requirement of having men in the shaft during the lining operation.

The British developed DOSCO in-seam miner is designed to allow for placement of the roof support immediately behind the face which in turn lends itself to continuous forward advancement. To better evaluate the potential of this machine for U.S. mining conditions and to verify the apparent advantages in terms of noise, dust emissions, reliability, and maintainability a demonstration has been initiated at Allied Chemical's Harewood Mine, Longacre, W. Va.

Question. Is industry funding a larger R. & D.. program than before? How do they feel about your program? Do they implement the innovations you develop readily?

Answer. Precise values for industry R. & D. expenditures in coal mining technology are impossible to obtain. However, judging by their participation in cost sharing contracts with the Bureau and our discussions with industry representatives, the level of industry investment has certainly increased in recent years. The industry reaction to our program has been uniformly favorable. The National Coal Association, American Mining Congress, and the National Coal Board (United Kingdom) are typical of the industry organizations worldwide that have expressed strong support for the advancing coal mining technology programs. Further industry support for the Bureau of Mines program is evidenced by increasing participation in the programs by coal mining companies and frequent requests for Bureau personnel to participate in a variety of technical meetings and symposia.

---

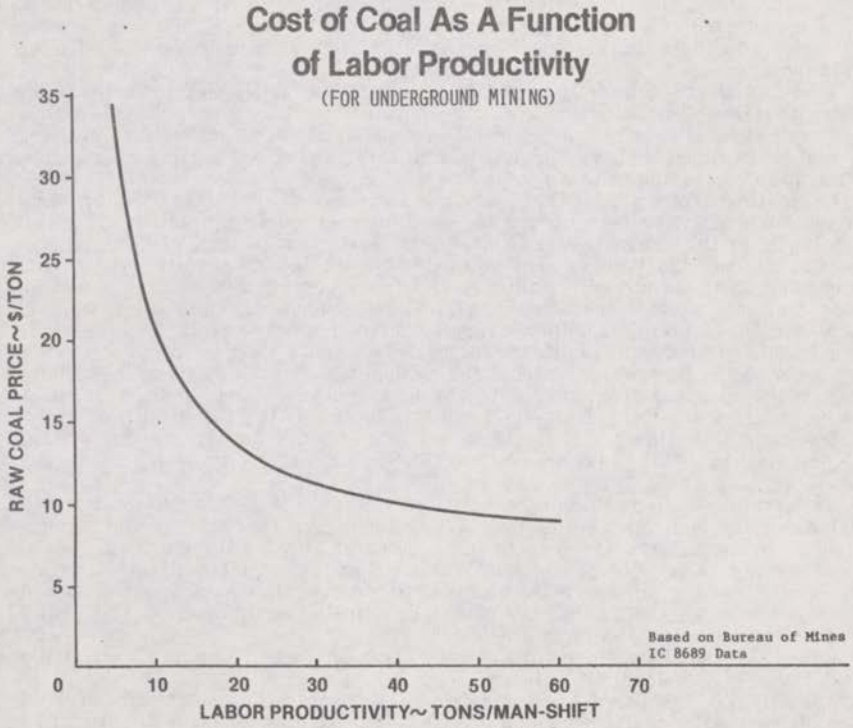
[1] Coal Age, January 1977, McGraw-Hill, New York, N.Y., p. 96.

The Bureau's technology transfer activities focus on industry acceptance of mining technology developments. Acceptance of these developments by industry is encouraging. In those cases where we have attempted to stimulate the use of improved commercial or near-commercial technologies the results suggest that industry will move rapidly forward to implement improved techniques. Our truly innovative technology is still a few years away from the stage where it can be implemented, because of the leadtime required for research, development, and demonstration.

Question. On page 68 you show a chart reflecting the cost of coal as a function of productivity. Why isn't this relationship a straight line?

Answer. The advancing coal mining technology program is directed toward reducing the cost of coal. Increasing productivity is an important aspect of reducing the cost of coal. This is illustrated by the curve on page 68 of the budget justifications which shows the relationship between underground coal mining labor productivity—tons per man shift—and raw coal price—$ per ton. This chart was developed by taking the Bureau's analysis of underground coal mining cost as reported in IC 8689 and reducing the individual components to a continuous function which describes the average cost of coal over the life of a hypothetical mine. Some components are basically a function of tonnage produced. Others are a function of time. The combination of all elements produces an equation which, as shown, is hyperbolic in form not straight line.

A major segment of the advancing coal mining technology program is also devoted to the development of more cost-effective surface mining techniques and equipment. In developing this technology we are looking for methods which will assure the lowest cost surface mined coal consistent with the protection of the environment. The projects under this area of work include development of more efficient equipment for regrading the disturbed land to accelerate the reclamation process and the study of the economics and environmental effects of mountain top mining. These efforts address many areas of concern as expressed in the proposed surface mining legislation and will aid mining companies in their compliance efforts.



87-591 O - 77 - 12

Question. Will longwall mining methods ever be used extensively in the United States? Why isn't this technique used as extensively here as in Europe?

Answer. The biggest obstacle to producing a design for an automated longwall face lies in an inability to accurately steer the mining machine as it passes along the coal face. The most critical part of the problem is the development of a reliable means for detecting the interface between the coal and the roof and floor rock. Work in Europe has concentrated on the development of nucleonic means for sensing the interface with only limited success and very limited application. Work in the United States has indicated four other means whereby the interface might be detected. Development of the four alternative systems has been initiated and continued work on the nucleonic system is being undertaken, together with the development of equipment capable of accepting the output and translating this into machine control.

There has been considerable uncertainty about the applicability of long wall mining to U.S. geological conditions. For example, in Illinois, nine industry attempts to apply this technology have failed. A 10th longwall has been started under a cost-shared contract between a coal mining company and the Bureau using a new design of longwall shield support. The longwall is now in operation and had produced an average of 3,600 tons per day in the first 3 months. No unexpected problems have been encountered and the outlook is promising.

Because of success in Europe in working in previously unworkable roof conditions with shield-type supports, a demonstration was initiated to determine the feasibility of applying such supports in the United States. The York Canyon mine in New Mexico was chosen as the demonstration site partly because the 10-foot seam would be the thickest seam worked by longwall methods in the United States. The first panel was successfully worked with no serious roof control problems and the equipment was transferred to a second panel which is now working satisfactorily.

In the eastern United States, 49 billion tons or 29 percent of the coal reserve base minable by underground methods lies in seams less than 42 inches. A wealth of experience exists within the U.S.A. for mining thin seams by room and pillar methods but very little for longwall which offers advantages in improved resource recovery, safety, and productivity. A longwall shearer and powered support will be demonstrated in a Kentucky coal mine in a seam varying in thickness between 36 inches and 40 inches. The coal mine operator has been chosen and site selection is underway.

Coal has been successfully mined at various times using high pressure water jets. An attempt is being made to incorporate the jet cutting principle into a longwall shearer in a typical longwall system. Trials at a surface site utilizing prototype equipment have indicated that this method of cutting is feasible. Testing is continuing with an improved model.

Current technology limits the resource recovery of thick seam western coal to approximately 30 percent. An engineering evaluation of multilift longwall mining in the thick seam western coal beds is nearing completion. The preliminary results indicate that this type of mining is feasible and competitive with room and pillar methods and will result in a resource recovery of 60 percent. Based on this information plans for a cost-shared in-mine demonstration are being prepared.

A detailed cost and feasibility analysis effort was undertaken to determine the applicability of longwall-caving mining to 20 feet and thicker western coal seams. As practiced in European countries, the method was labor intensive. Preliminary results indicate that extensive equipment development and modification will have to be undertaken before the method can be adopted by the U.S. coal industry.

Question. Will this research aid in reaching targets for the amount of coal to be mined by 1985? What are the specific targets that are projected? Can they be met?

Answer. The current Bureau forecast for 1985 coal production to meet anticipated demand is about 1 billion tons. We feel confident that this level of production can be met. The early products of our research effort will undoubtedly assist in reaching this level of production. We feel that the chief benefits of our technology will be minimizing the cost of coal production thus assuring that cost of energy will be kept to the minimum and in reducing environmental and health and safety consequences of mining.

Question. What have the results of your program on shaft sinking been? What will these results lead to? When?

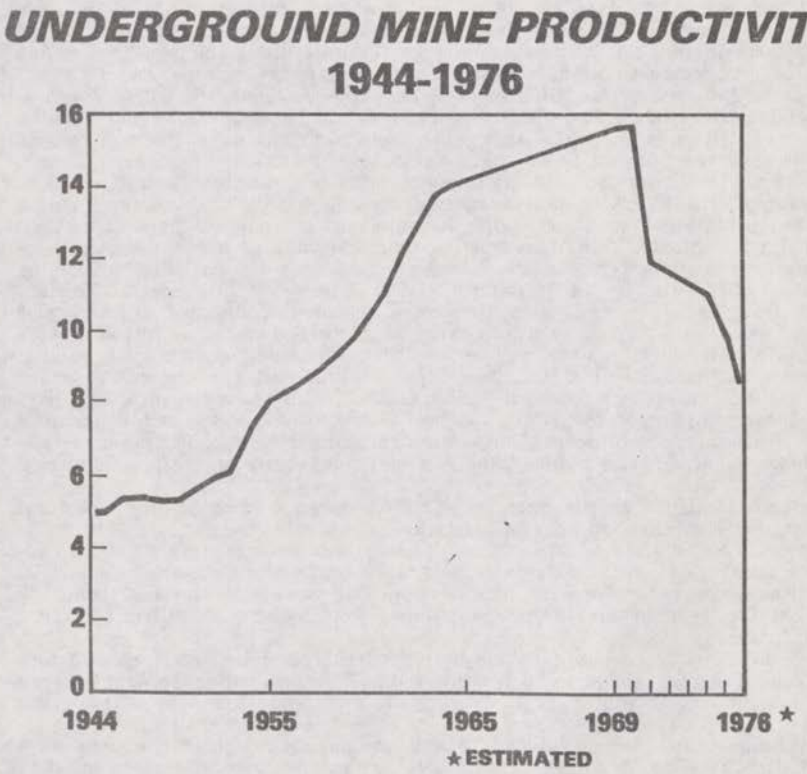
Answer. The Bureau's shaft sinking R. & D. is part of the general area of work dealing with those activities which precede the production phase of the life of an

underground mine. The expected increase in opening new mines and expanding existing ones to increase coal production will further underscore the importance of this research. A recent study[1] indicates that decreasing the development time from 5 years to 4 years by the use of improved shaft sinking techniques while simultaneously reducing the cost of the shafts by 50 percent (from $3,000 per foot to $1,500 per foot) can result in a reduction of the price of coal of $2 per ton—or a 10-percent savings to the consumers. As with the other elements of the advance coal mining technology program our shaft-related R. & D. is structured to include a mix of long- and short-term products. In the former category we have under development a mechanized shaft boring system similar to a tunnel boring machine on-end, the prototype version of which should be boring a shaft this time next year. On the other end of the spectrum we have already demonstrated a system for remotely lining a raised-bored shaft which reduces the time required for shaft development by weeks.

Question. Isn't it the case that productivity per man has declined substantially in underground coal mining?

Answer. Underground coal mining productivity has declined about 40 percent since 1969—from about 15½ tons per man-day to 8½ tons in 1976. In terms of productivity, we are about where we were 15 years ago as shown on the attached figure 1.

FIGURE 1



Question. Could better technology play a role in arresting or reversing this decline in productivity?

Answer. Yes; it could.

Question. Is your program directed toward increasing productivity?

Answer. Major efforts have been undertaken to improve the operational capabilities of continuous mining machines, to develop an automated remote con-

[1] Dahl, H. D., 1976, "The Impact of Mine Development Lead Times on New Coal Mining Ventures," proceedings, Rapid Excavation and Tunneling Conference, March 1976, AIME, New York, N.Y.

trolled continuous miner, and to better predict and control the environmental effects of the mining operation. Fabrication and assembly of an improved continuous miner is nearing completion. This machine with integral roof support, onboard roof bolter, and self-advancing ventilation represents a significant step toward realizing the fullest capability of the continuous miner concept. A demonstration to verify the design capabilities is scheduled for early 1977.

Permanent roof support—drilling and bolting—in underground coal mines is widely recognized as a hazardous and time-consuming element in the production cycle. In an attempt to solve both the hazard and delay problems, three contracts were awarded for miner/bolter systems. Automated drill/bolt modules will install less-than-seam-height bolts. These modules will be mounted on the continuous miner or on a transfer unit immediately behind the miner. These units will allow up to 100 feet of continuous advance in contrast to the 20 feet now permitted. Prototype modules are being assembled and laboratory tested. Machine fabrication and the first underground tests are scheduled for fiscal year 1978.

A prototype model of a ground elevation cart has been fabricated and field tested. It will be used to establish the rate and geometric pattern of gradual subsidence in an area well in advance of damaging displacement. A subsidence detection system for underground areas has been developed. A multielement geophysical probe which can be inserted into small diameter drill holes and used above or below the water table for subsurface investigations is being fabricated. This probe will expedite the collection and interpretation of detailed subsurface data needed for mine design in subsidence prone areas.

Question. Surface mining productivity has been declining the past 2 years and much of this decrease has been attributed to greater reclamation efforts. What R. & D. programs does the Bureau of Mines have that could arrest this declining productivity? If a Federal strip mine bill is passed, would the ongoing Bureau of Mines R. & D. be applicable to helping mining companies comply with stricter reclamation plans and procedures?

Answer. The thrust of the surface coal mining program has been directed at the development of surface mining and reclamation systems and the development and demonstration of new or modified equipment. In general, the problems associated with surface coal mining stem from the lack of a cost effective systematic approach for removing the overburden, mining the coal and reclaiming the land within the limits of environmental statutory requirements. To date the program has developed several concepts designed around the utilization of low-wall conveyors for overburden haulage, parting removal and stowage for multiple seam operation, and conveyor overburden haulage for mountaintop removal and head-of-hollow fill. The present plans call for demonstration of these system concepts to determine their economic and environmental effectiveness. The remainder of the effort has been directed at demonstrating new and improved prototype equipment. The more significant items demonstrated include the dozer mounted vee blades and a mobile, low-cost, high-rate production machine.

Question. Coal preparation increases $2,900,000 over fiscal year 1977 to a total of $5,020,000. Explain what progress you have made in this area.

Answer. The Bureau of Mines coal preparation research efforts have produced a number of significant results, several of which are summarized below.

A two-stage flotation process was developed to remove pyrite and ash from coal that has been ground to the very fine sizes necessary to "liberate" these contaminants.

A special filtration technique was developed that permits dewatering of fine coal from 20 percent down to 10 percent water. This technology is vital because of the trend toward finer grinding of coal for separation of sulfur-bearing pyrite.

A technique has been developed to dry and pelletize lignite from the vast deposits of the Western States. This laboratory process will be demonstrated to show that lignite can be upgraded in terms of Btu content and prepared in a form that can be transported to Eastern U.S. markets.

The University of Indiana, working on a Bureau grant, has shown that pyrite, although very weakly magnetic, can be separated from coal by a high gradient magnetic separator.

The Bureau has performed laboratory tests with excellent results for removing fine coal particles from water using small quantities of oil to coat and "agglomerate" the coal. High gradient magnetic separation used in conjunction with agglomeration holds great promise.

Question. How do you interact with ERDA and EPA in this area?

Answer. The Bureau of Mines has memorandums of understanding with both ERDA and EPA. Both agencies coordinate their work with the Bureau of Mines. EPA, over the last several years, has transferred roughly $1 million annually to the Bureau for coal preparation research. Although ERDA has not previously transferred funds, ERDA has indicated a desire to transfer funds this fiscal year and next year to help defray the cost of assembling and operating a pilot plant designed to remove contaminants from coal prior to conversion or combustion.

Question. The largest increase in this area is for a test facility. What is its total cost? Where will it be? What is EPA's and ERDA's interest? Are they cost sharing?

Answer. $2,200,000 have been allocated during fiscal year 1978 for the coal preparation test facility. This amount will be sufficient to buy the special equipment and pay the installation costs. The test facility is an integral part of the continuing coal preparation program and hence development of the facility will extend into future years at a cost which is at present undeterminable. Current plans are to locate the test facility at Bruceton, Pa., near the ERDA facilities and the Mining and Safety Research Center. Other reasons for selecting that location include a site in a major coal producing area and accessibility by coal producers, design engineers, and coal consulting firms. ERDA requires 50 to 200 tons lots of clean coal with sulfur, ash, and fugitive elements removed for feed stock to synthane, synthoil, and other conversion processes. EPA is interested in the facility as a means of proving bench scale processes and transferring technology. EPA is sharing the cost and ERDA has indicated a willingness to share in the cost.

Question. Please explain how these methods of removing sulfur compare on an economic basis with scrubbers. What part of the market can these methods penetrate? When will you have marketable methods?

Answer. An estimated cost for removing sulfur dioxide by scrubbing is $16 per ton of coal burned. Removal of sulfur from raw coal may be performed by a variety of physical and chemical preparation techniques. Some coal can be cleaned by fairly simple physical preparation processes for about $2 per ton. More complex processes will cost about $5–$6 per ton. We believe that 40 to 50 percent of coal mined in the eastern part of this country can be cleaned to meet EPA new source standards. It is conceivable and probably quite practical to combine physical cleaning with chemical cleaning in treating some of the high-sulfur coals. Finally, physical cleaning can be combined with flue gas scrubbing at a lower total cost than $16 per ton for sulfur removal by scrubbing alone.

Some methods for sulfur removal by coal preparation are available now. The Bureau of Mines is trying to develop improved processes for removing more sulfur. A major problem is the reluctance of industry to adopt the technology. The coal preparation test facility is expected to accelerate technology transfer. To date we have not had a facility to show producers the technical and economical benefits of new technology.

Question. "Advancing Oil Shale Mining Technology" decreases by $2,442,000 in 1978 to $3,221,000. Why isn't a demonstration mine for deep shales necessary at this time? When will it be necessary?

Answer. The proper timing for development of a deep oil shale demonstration mine is a complicated question. One basic consideration around which this and a number of related questions revolve is when and under what conditions a commercial oil shale industry will come into being. If the Nation does require shale oil in large quantities in the near future and if the oil shale is to be mined underground economically and in a manner which is socially acceptable, then development of improved mining technology will be required. Time will be needed to develop and prove that technology. Another requirement is a site in which to do this work. There are no such existing sites. Assuming that conditions in the future are such that a demonstration mine would benefit the Nation, the mine development could be begun at any time. At present, the Bureau is completing those preliminary activities which will allow the mine to be started.

Question. Please explain the "low rock strength" findings on existing oil shale leases and their importance

Answer. The low rock strengths encountered on existing oil shale leases has been a major concern to those contemplating development. Perhaps the most illustrative of the prototype leases with regard to this situation is the Colorado B tract (Cb). The proposed mining plan involved room and pillar mining of the

mahogany zone using basically the same technique the Bureau demonstrated 30 years ago at Anvil Points near the edge of the Piceance Creek Basin. In the case of Cb, the tract is located in the deeper section of the Basin about 30 miles from the Anvil Point workings. Rock conditions and strata pressures differ. The leaseholder's drilling indicated that rock mechanics considerations ("low rock strengths") would require the use of smaller openings and/or larger pillars. This means a lower recovery of the resource and shorter life for a given size of property. This in turn leads to a higher cost for the shale oil because the investment must be written off in a shorter time. Bureau mining research is directed toward high recovery mining methods especially suited to deep Basin deposits.

Question. What is the purpose and use of your 8-foot diameter exploratory shaft in deep oil shales?

Answer. One of the preliminary activities is the development of an 8-foot diameter shaft. The shaft will provide our first access to the full section of oil shale in the deepest part of the Piceance Creek Basin. Eventually, it may serve as a second shaft for a demonstration mine. When the 8-foot shaft is completed and equipped, the experimental program will begin. Holes will be cut through the lining and room will be mined in a number of horizons. Some of these workings will be used to collect samples of Dawsonite for the Bureau's alumina research. Others will be used for rock mechanics studies and studies of water quantities and qualities and gas and other industrial hazards. This comprehensive program will provide many of the answers needed by industry and government engineers for decisions about the mining of oil shale and associated minerals.

Question. Describe the work that will be done on waste disposal of shales. What progress has been made to date?

Answer. Our efforts to date on disposal of waste from shales have focused on the determination of physical properties of retorted shales and the ways in which these materials might be disposed of in an environmentally acceptable manner. This includes stabilization of the shales for surface disposal and various techniques for emplacement of spent shales in underground workings. Future plans include additional characterization work in mine waste disposal experiments and stabilization of spent shale in in-situ retorts.

Question. We have been told that the air around some oil shale deposits already exceeds hydrocarbon emission standards for pristine areas. How serious a problem is this? What are suggested solutions?

Answer. It appears that due to the effects of plants and other organisms around some oil shale deposits the natural level of hydrocarbons in the air exceeds what were assumed to be background levels. The principal effect of this finding is that development of the oil shale deposits will be impossible until this matter is resolved. The Interior Department and the Environmental Protection Agency are examining this problem.

Mr. MURTHA. Do you have any additional questions on mining?

I think we have pretty well exhausted our questions.

Mr. MCDADE. Yes; I think it is well covered. I think you have responded with a lot of good information to the committee, Dr. Morgan.

Mr. MURTHA. Please answer the following questions for the record.

[The questions and answers follow:]

Question. In "Advancing Metal and Nonmetal Mining Technology" your request remains at $6,267,000, the same level as 1977.

How does this technology differ from coal mining technology?

Answer. The major differences between technology for mining metal/nonmetal ores and technology for mining coal are a result of the differences in the nature of the ore body. Coal is relatively soft, easily cut, typically occurs in flat-lying beds and when mined underground, is normally mined on one level with room and pillar methods or longwall methods. Some noncoal minerals (such as potash, trona and salt) are also relatively soft and flat-lying and technology and methods similar to coal mining are used. But many minerals including most metallic ores occur only in irregular-shaped deposits and entirely different mining methods and technology are used for their extraction.

Examples of technology being developed that is different from coal mining technology includes improved underground crushing capabilities; improved

understanding of caving phenomena; improved secondary breakage techniques; improved raise hoist systems; distressing to relieve pressures in deep mines; mechanizations of the mining process in deep, narrow, vein mines; improved backfilling techniques; development of more continuous mining systems for metal/nonmetal deposits that cannot be mined with continuous coal mining equipment; development of borehole probes for in-situ assaying of metal deposits and improved techniques for in-situ mining of copper and uranium.

Question. Explain the advantages of in-situ mining. How much does it increase the amount of recoverable resources?

Answer. In-situ mining offers potential advantages over conventional mining in that it requires relatively low capital costs, shorter lead time to production, lower operating costs, no workers underground, low labor intensity per unit of output, and causes less environmental disturbance. Uranium deposits are typically small and low grade. For example, the rollfront type deposits, which presently account for 97 percent of our uranium reserves, often occur in small isolated pods and stringers. Most of these are too small to be mined by conventional open pit or underground methods, but could be mined with in-situ methods. Without a deposit-by-deposit evaluation, the total uranium potentially recoverable cannot be estimated but it is felt to be significant. In copper mining, a large amount of ore that is too low grade to mine conventionally is often left in the fringe areas around the open pits. These areas could be leached thereby allowing recovery of copper that would otherwise be left in place. The total increase in recoverable copper using in-situ techniques is also unknown at the present time, but the potential is quite large.

Mr. MURTHA. Mined Land Demonstrations is $4,138,000. This program decreases $5,971,000 from 1977. Why don't you ask these questions on anthracite.

Mr. MCDADE. Dr. Morgan, I see we do have another decrease in this account, and my memory tells me this is about the fifth straight year OMB has cut requests the Department has made for demonstrations on mined land.

Dr. MORGAN. This gets to the situation where sometimes we have a good idea and we go ahead and do it.

Mr. MCDADE. What did you request of OMB?

Dr. MORGAN. Let me ask our budget officer.

Mr. DUNCAN. The Department submitted $7.70 million. They gave you $4,148,000.

Dr. MORGAN. For anthracite alone, sir, the submission to OMB was $5,861,000, and they granted $3,890,000, which is in here.

Mr. MCDADE. Would you repeat the figure?

Dr. MORGAN. Our submission to OMB was $5,861,000. They granted $3,890,000, which is the amount in the budget.

Mr. MCDADE. They have done that repeatedly since I have been a member of this committee. That has been the history of it, I guess, for at least 5 or 6 fiscal years. Your high figure for mined land demonstrations was $14.5 million.

Dr. MORGAN. That is right. That, of course, included work in other areas, $5 million in bituminous, and that included another million in metal and nonmetal and there was an added amount for fire control.

Mr. MCDADE. Has the bituminous fund been cut completely?

Dr. MORGAN. Yes.

Mr. MCDADE. There is still a lot of work to be done in this area, isn't there?

Dr. MORGAN. Oh, yes, sir.

Mr. MCDADE. Depending on how far you wanted to go, you could spend up to 20—what was the high figure? I will let you repeat it.

Dr. MORGAN. $20 billion I said in restoring mined lands and subsidence.

RECLAMATION OF ABANDONED LANDS

Mr. McDade. We may get general authority under the strip mining bill. If it contains the reclamation we might have a national goal to get at these abandoned lands and start reclaiming them. Have you testified before the Interior Commitee on that?

Dr. Morgan. We have not testified on that part of the bill, sir, although, of course, Secretary Andrus has testified in favor of the strip mining bill and we would hope he would assign such responsibilities to the Bureau.

Mr. McDade. I would too. It is where the natural expertise lies. My understanding is that would be a $200 million level. Is that your figure?

Dr. Morgan. I am going to have to check.

Mr. Murtha. Put it into the record.

Dr. Morgan. They have talked of very large numbers. These, of course, would be cost-sharing projects probably with the States. There would be a fund, so many cents a ton for coal, yet they would need technological advice and assistance on how to do it.

[The information follows:]

Abandoned Mine Reclamation Program Under Proposed Surface Mining Legislation

Both title III and title IV of S. 7 and H.R. 2 respectively (Surface Mining Control and Reclamation Act of 1977) provide for a tax on coal for the purpose of abandoned mine reclamation. The House version taxes all coal while the Senate version taxes only federally owned coal. Had this tax been in effect during 1976, the income, based on 1976 coal production, would have been $171.1 million (H.R. 2) and $19.7 million (S. 7).

Using estimated production levels for the first year, as proposed in the current respective bills, H.R. 2 will provide approximately $178.0 million (1977). S. 7 will provide $33.6 million (1978).

ENVIRONMENTAL CONSEQUENCES OF MINING

Mr. McDade. The reductions OMB made of course slowed down the program the Bureau of Mines intended to carry out?

Dr. Morgan. There is no question. On the other hand, when you have demonstrated something up to a certain point and it is clear that it works, then there becomes a little less priority to demonstrate it further in the same area. But where there are very severe problems, we view the anthracite as a model study area for the reason Dr. Yancik was discussing earlier on subsidence. People think that underground mining doesn't cause any subsidence problem compared to surface mining. The difference is that what happens is the underground mining causes subsidence problems which may be years before they come to somebody's attention. By the time they come to their attention the mining company that caused the damage may be gone and you can't even find who is responsible or where the maps are or anything else like that.

In surface mining it is very clear what is happening right before your very eyes and it is very clear where the hole is. You can take a picture of it. But the anthracite area exemplifies the long-term effects of subsidence and of acid mine waters and fires and waste banks and all that sort of thing which are the very things that we wish to guard

against, both in underground mining and surface mining, as we go to utilize the coal resources in other parts of the country.

Mr. McDade. I couldn't agree with you more. It is regrettable some people do really have the feeling that deep mining is an environmental free lunch. The people who feel that way have never seen deep mining, seen how difficult it is and how difficult the environmental consequences can be unless they are properly attended to. It is too bad we didn't learn about it a long time ago.

ANTHRACITE CONVERSION DEMONSTRATION PLANT

There is a $3 million reduction in the anthracite conversion demonstration plant. That was a one-time startup cost in last year's budget?

Dr. Morgan. That is right, sir. We have implemented that, we have put out the requests for proposal and early in April the proposal should come into the Bureau of Mines and they will be screened.

Mr. McDade. The status was my next question.

Dr. Morgan. The RFP's were issued and the responses are due in early April. I think a few firms were sufficiently interested that they asked for a delay and we gave them a 1-week delay.

Mr. McDade. What about operational funds; what is the Bureau's intention with respect to that right now?

Dr. Morgan. We would hope, sir, that the $3 million and what someone else would put up would be enough. We will have to wait until we see what the proposals are when we open them.

Mr. McDade. There is also $2 million that was in the supplemental appropriation bill?

Dr. Morgan. Yes, sir.

Mr. McDade. As an effort to try to make sure we have sufficient funding to complete this project. I believe your estimates show there may be as much as 100 million tons of anthracite coal recoverable if we can demonstrate the new technology and get it back into the stream of commerce and into usable form.

Dr. Morgan. This is quite possible because as you know, sir, years ago they mined as much as 100 million tons of anthracite a year. They were not as selective in their coal preparation plants. A lot of good material particularly in those years, recalling our discussions this morning, they wanted lump coal and a lot of the fine material was run off into waste. There is a lot there.

Mr. McDade. I should point out to you, too, that we had a meeting yesterday with Dr. Schlesinger's people. When I say "we" I mean a lot of people that have an interest in the anthracite coal industry and its potential. The reason was to try to make certain that as they prepare the energy message for submission on April 20, they don't forget about the fact there is an enormous potential energy resource in a very heavily populated and energy-short area of the country. We have asked for the formation of a task force to coordinate any efforts made with Mr. Schlesinger's group as he prepares the energy message.

Thank you very much.

ENERGY DATA COLLECTION AND ANALYSIS

Mr. Murtha. Data Collection and Analysis increases $1,053,000 from fiscal year 1977 to $17,174,000.

Please explain what energy-related data collection and analysis you do.

Dr. MORGAN. In energy, sir, we collect information on petroleum, on natural gas, on coal. We really don't collect too much information on uranium. That had been a responsibility of the Atomic Energy Commission. That has continued up through ERDA.

We also collect information on energy use throughout the country. I might show you our annual Energy Balance which we put out. Here is the latest one that came out on March 14, which describes the entire use of energy in the country by sectors of the economy.

The Bureau of Mines was the only agency collecting this broad gamut of information. The Federal Power Commission collects certain information particularly on natural gas and electric power, but we and they have worked together very closely over the years.

When the energy crisis came along and the FEO, the predecessor of FEA, was set up, the Bureau of Mines turned over to them all of its petroleum collection forms and our rosters of where the wells are, the refineries, the major users, the bulk plants, all that we collect.

So for a period of time what happened was that the FEA was collecting from the industry using a short form which was a bobtailed Bureau of Mines form, and the Bureau of Mines came along a month or two later with its much more detailed form and collected the same information and more.

Rightly, the industry complained that there was a duplication of effort. Therefore, we worked out an arrangement whereby the FEA in effect extended to the Bureau of Mines the FEA's mandatory collection authority with respect to petroleum.

We collect the information from the petroleum industry that they need on production and stocks, and so forth, and get all of the information and transmit to them what they need on computer tapes for their system. We have a memorandum of understanding between the two agencies and it is working very happily and they have attested to that. We are the main collector of information on coal.

I signed a tentative memorandum of understanding with the FEA whereby we would collect the information on coal. We are doing that. We put out publications. You may have seen our most recent ones: Projects To Expand Fuel Sources in the Eastern United States, and Projects To Expand Fuel Sources in the Western United States, with respect to mines that are coming on the line in coal or uranium or tar sands, and geothermal projects, powerplants, and ancillary installations. We have a complete roster of all of those.

All told, in energy we must have somewhat over 100 people collecting this information and putting it out.

Mr. MURTHA. Please answer the following questions for the record.

[The questions and answers follow:]

Question. You request increases of $1 million and seven positions for an "Automated Minerals Information System" and a "Minerals Availability System." Do these systems cover the same 18 critical minerals? What is the difference between the systems? Why are two separate systems needed?

Answer. The Automated Minerals Information System is designed as a readily retrievable automated data base covering all historical aspects of individual mineral activities other than reserve-resource deposit data. Included will be production, consumption and stock data, industry structure, environmental factors, et cetera.

The Minerals Availability System is a reserve classification activity based on

the systematic evaluation of individual mineral deposits to determine the availability of mineral supplies from each deposit and to aggregate these individual deposits into national and international reserve assessments.

Both systems are covering the same 18 critical commodities, one from the viewpoint of an historical supply/demand record, the other from a potential mineral reserve position. Future plans call for them to interact and eventually to be united into one basic system.

Question. On page 117, you say you will improve timeliness of publication of data. How long does it take to publish this data now? How much will you shorten it?

Answer. The lapsed time between the close of the year being reviewed and the date of publication in calendar year 1976 and planned for 1978 is as follows:

	Calendar year (months)	
	1976	1978
Minerals in the U.S. Economy	20	9
Trends and Forecasts	22	12
Minerals Yearbook (Vol. I)	26	12

Lapsed time for each publication would be significantly reduced by approximately 11 to 14 months.

Question. What is the "Fuels Availability System" you are expanding? (Page 117). How does this relate to FEA's job in the energy data area?

Answer. The Fuels Availability System (FAS) is an energy data system developed to collect and process pertinent data for coal, petroleum, natural gas and related energy information. The FAS is comprised of nearly 40 subsystems, each dealing with specific aspects of energy supply, production and demand within the United States. Automation of this system began in 1964 and currently 80 percent of all data processing within the FAS is computerized. The FAS collects data from many sources, including 40 canvass forms, State agencies, other Federal agencies, and the private sector. Periodically 25 reports covering the coal, petroleum and natural gas industries are published as Mineral Industry Surveys. Statistical data are also provided for such publications as Information Circulars, Reports of Investigations, Bulletins, and Minerals Yearbook. In addition the information maintained in the FAS has been utilized to meet numerous energy needs of the Bureau relating to fuel supply/demand and analyses of energy problems. Other uses include responses to Congressional Subcommittees as well as providing information to Federal agencies, States, and industry.

The Bureau of Mines (BOM) has been and continues to be a major source of petroleum and natural gas data and the principal source of coal data relative to statistical data requirements of FEA. Since July 1975 the BOM has had an Interagency Agreement with the Federal Energy Administration (FEA) by which BOM is designated the data collection agent for FEA for the collection, validation, processing and reporting of specific petroleum data reported by refiners, bulk terminal operators, product pipeline companies, and holders of crude oil stocks. Other historical statistical data collected by the BOM have been provided to FEA concerning petroleum, natural gas, and coal. Further cooperative efforts for data collection and utilization currently are being developed between BOM and FEA.

Due to different data requirements, regulatory and allocation data are gathered by the FEA. The Bureau does not collect this type data for the Fuels Availability System.

Question. Have you done any work on consolidating the information you provide, reducting its amount or reducing the number of times you publish it? With what results?

Answer. In an effort to reduce the reporting burden imposed on industry (in the 2d quarter of fiscal year 1977) recipients of mineral industry surveys were asked to return a second copy of the survey with data redlined if they found it not needed. Approximately 2,000 responses have been received as of March 1977 from over 20,000 mailouts. Although recipients of the survey were instructed not to reply if the current data meet their needs, over 400 responded expressing satisfaction. Approximately 10 percent expressed a need for additional data. One mineral industry survey has subsequently been eliminated

(zinc oxide) with essential data combined with the zinc industry survey and other consolidations are being considered.

Question. Why do you publish weekly, monthly, quarterly, and annual "mineral industry surveys"? Can't you cut one or two of those out?

Answer. Mineral industry surveys are published more frequently than annually for those commodities where government or industry has indicated a need for more timely data. The data are used to closely follow trends and make intelligent planning decisions. The material published more frequently than annually is for a limited number of data elements and not as comprehensive or detailed as that published annually. For instance, industry and government need monthly production, consumption, import, export, stock data at different points in the mineral cycle for guidance of their operations.

Question. In "Policy and economic assessments" you request $300,000 for ocean mining studies. Please explain what these studies will do and how they relate to work in the Ocean Mining Administration. Why do you also need six positions? What is your assessment of the speed with which such resources need to be developed?

Answer. As part of the Bureau of Mines mission pertaining to assessment of minerals availability, the studies would involve the gathering and analyzing of data to help evaluate the potential and probability of minerals recovered from the ocean floor becoming an economic supply. Emphasis would be on those critical metals, principally nickel, cobalt, copper, and manganese, which are found in nodules lying on the ocean floor. The studies would include: An assessment of the nodule resources and operational costs including environmental considerations as applicable; analysis of current suppliers and consumers of the important minerals found in the nodules; and estimates of the impacts that the introduction of ocean minerals into world supply would have on land-based mineral industries of traditional producing countries. The studies would aid in the integration of ocean minerals into the economy and also would be useful in working out details of international agreements in the Law of the Sea Conference.

This work would complement that of the Ocean Mining Administration (OMA). The Bureau of Mines provides technical and economic analysis support to OMA. Planning of the studies is being coordinated with OMA in order to improve effectiveness and prevent duplication.

The requested six positions will expand the Bureau's expertise in this area where sources of information are very limited. Primary duties will include conducting special studies, monitoring contracts, and providing liaison functions with other public and private groups having ocean mining responsibilities.

The United States has a vested interest in recovering its fair share of these resources. The need for these minerals is exemplified by the fact that we are dependent on foreign sources for virtually 100 percent of our cobalt and manganese needs and 71 percent of our nickel requirements. Recovery technology is being developed by several multinational companies, some of which plan prototype operations in the near future. Development of ocean minerals on a commercial scale could be realized in the 1980's. Therefore, it is important to expand and update the data base as rapidly as feasible.

Question. Your "State liaison" function remains at $2,409,000 for 1978. Please explain what functions these State liaison offices perform. On page 128 you refer to an evaluation plan for these offices. What will you be looking to do with this plan? When?

Answer. Through 38 State liaison officers serving the 50 States and Puerto Rico, the Bureau of Mines collects and disseminates mineral information at the State level. They maintain continuing contact with State natural resources departments, geological surveys, bureaus of mines, industrial companies, and similar agencies. Information, gathered by research and through personal contact, is used to prepare the State chapters of the Minerals Yearbook, develop issue papers, and respond to inquiries from both the public and private sectors. They also provide a mineral information and service function to State and local planning groups, legislative and executive bodies, industry, and educational institutions. These dual functions improve the flow of information, increase dialog, and minimize duplication of effort.

Present plans call for this program to be evaluated in fiscal year 1978. The primary objectives of this evaluation will be to assess the program's impact in influencing State and local decisions from a minerals perspective and in contributing to the Bureau's program structure and content.

Mr. MURTHA. This program increases $1,097,000 over fiscal year 1977. The increase in this area is in "Wilderness and public land assessments." Please explain the $1,097,000 increase and the increase of 13 positions. Also your functions and your relationships in this area with Forest Service, Geological Survey, and BLM.

Dr. MORGAN. That is the one Mr. Dare was describing earlier. We will be glad to submit that.

[The information follows:]

BUDGET INCREASE FOR MINERAL LAND ASSESSMENTS

An increase of $1,097,000 and 13 positions is requested for mineral land assessments in fiscal year 1978. This increase will be used to assist the major Federal land managing agencies with mineral information on public lands so that a mineral perspective can be factored into the preparation of their land-use management plans.

Three projects are proposed as follows:

(1) Forest Service plans: plus $420,000 plus 3 positions. As part of his responsibility under the Mining and Minerals Policy Act, the Secretary of the Interior recently established a task force on mineral lands availability. The restrictions imposed by land use planning by Federal land managers is unique in the case of the Forest Service where authority for surface and subsurface management is split between Agriculture and Interior. In its recent report to Congress, "Need to Develop a National Non-Fuel Mineral Policy," GAO pointed out that Interior must make greater efforts to evaluate the effects of legislation and the policies of other agencies on the availability of non-fuel minerals. One of the most basic needs of the minerals industry is access to public lands. At least, it must have the knowledge of where access is not permitted. This portion of the proposed study will evaluate the restrictions on mineral availability prescribed by the 175 completed Forest Service planning units.

(2) Management framework plans: plus $400,000 plus 5 positions. Under an agreement with BLM, the Bureau will provide direct minerals input to BLM's management framework planning (MFP) system and the Department's land withdrawal process. The Assistant Secretary—Land and Water Resources—has recently asked for joint Bureau of Mines-Geological Survey guidelines to set up a formal means by which these two bureaus can make onsite examinations of reserve/resource potential in terms of economic recoverability.

(3) Overthrust belt: plus $277,000 plus 5 positions. Approximately 150,000 square miles in the overthrust belt area will be evaluated to assess the availability of such land for oil and gas leasing and for mineral development under mining laws. The overthrust belt covers a 650-by-100-mile overthrust disturbed belt that stretches across Utah, Wyoming, Idaho, and Montana. Based on recent oil and gas discoveries this area potentially has the most important new oil and gas province in the continental U.S. within the last 10–20 years. A status review of public lands within the belt indicates that up to 44 percent of these acres are closed or restricted for oil and gas leasing. The increase will support an evaluation of 150,000 square miles of land (mostly public) to determine the availability of such land to oil and gas leasing and to entry under the mining laws. These evaluations will include historical mining records search, past and current drilling and exploration activities, and similarity of geologic conditions.

MINERAL LAND ASSESSMENTS—BUREAU RELATIONSHIPS WITH OTHER AGENCIES

The Bureau of Mines appraises the engineering and economic aspects of mineral land assessments primarily in the area of mineral reserves and subeconomic resources, the latter with respect to changes in technology and market conditions that could convert them to reserves. Under the memorandum of understanding between the Geological Survey and Bureau of Mines, awaiting momentary approval by both bureaus, the Bureau of Mines responsibility is to identify, sample, and evaluate mines, prospects, and associated mineralization, to document past and ongoing production, and from these data to appraise reserves and estimate identified subeconomic resources. The Geological Survey on the other hand has the primary responsibility for geology, regional geophysical,

and geochemical surveys and the evaluation and interpretation of these data to assess total mineral potential. The Bureau compiles and documents past mining claims and related mining activities; locates, maps, and samples underground and surface workings and associated mineralization; investigates extensions of mineralized structures exposed in workings and outcrops through the use of all appropriate means; coordinates resource estimates with the Geological Survey; collections and evaluates exploration and metallurgical data from past and ongoing exploration by private industry; performs engineering sampling on potential new occurrences including those identified by the Geological Survey; conducts minability and metallurgical studies on significant, identified subeconomic resources; and evaluates reserves and subeconomic resources based on the compilation and interpretation of all pertinent data.

The Bureau of Mines provides mineral reserve assessments for BLM when requested concerning withdrawals of public lands. The Bureau assists Forest Service by evaluating mining plans, past mining activities, land transfers and mine costing problems on national forest lands.

By and large there are many land-use decisions being made without benefit of adequate information on mineral potential. We would hope that a more consistent procedure could be developed whereby all land-use decisions that would exclude future mineral development could be preceded by an orderly evaluation of mineral potential.

Mr. MURTHA. Please answer the following questions for the record. [The questions and answers follow:]

Question. Program administration is $10,703,000. This area increases $2,090,000 in 1978 to $10,703,000. Please describe the scope of the employee workplace health and safety program, requested at $1 million in 1978. What is its expected cost annually? Total cost?

Answer. The Bureau maintains 12 federally owned laboratories throughout the country for the purpose of conducting research involving mining and mineral materials. Most of the laboratories were constructed 20 or more years ago which means that dust collection systems, fume hoods, ventilation systems, fire prevention systems, and similar features are less than optimum and, in some cases, border on being inadequate. The requested increase of $1 million will be used in replacing dust collection systems in coal and other ore sample rooms; replacing fume hoods to improve exhausting chemical fumes in work areas; and installing ventilation ducts and fans in work areas where gases and fumes are generated.

We do not know the annual cost of this program because as research programs change, so the health and safety systems change for providing a healthy and safe work environment. Furthermore, standards for working place environments are regularly revised and upgraded so the employee workplace health and safety program is not a static program subject to definitive and total forward planning. We feel that the requested increase of $1 million will take care of the more severe problems which have been identified. We feel that there will be continuing requirements for workplace health and safety projects and these needs will be addressed each year in the budget cycle.

Question. The $778,000 increase in administrative services is considerably over inflationary adjustments. Please explain why.

Answer. A breakdown of increases programed for administration is as follows:

Federal telecommunications system costs	+$150,000
Postal service (increase levied by the Postal Service over fiscal year 1977)	+ 107,000
Nonrecurring reimbursable space costs. (Alterations of new leased space to be occupied by the Bureau and modifications of existing leased space in Columbia Plaza and elsewhere.)	+ 145,000
Equipment (Purchase of microfische, microfilm, and ADP terminal equipment to modernize the financial management and payroll systems	+ 35,000
Other increases in all offices for all other costs (plus 4.5 percent)	+ 341,000
Total	778,999

Question. Employee compensation payments rise from $69,000 to $354,000. How much of this is because of an increased number of injuries? Why are the number of injuries increasing? What are you doing to rectify this problem?

Answer. The breakdown of employee compensation costs by the Department of Labor is as follows:

Medical and other payments	$26,310
Nonfatal injuries	248,924
Fatal injuries	66,662
Charges not classified	12,000
Total	353,896

Injuries in calendar year 1976 totaling 183 represented a decrease from 199 in the preceding year. Disabling injuries increased from 22 to 23. The frequency rate remained constant at 37. The Bureau does not anticipate an increase in the number of injuries in fiscal year 1977 and 1978.

In short, the Bureau does not have definite knowledge as to the cause of the large projected increase in employee compensation costs. It is believed that the increase projected by the Department of Labor is at least partially due to escalating medical costs. The Department of Labor could also be anticipating an increased number of employee job-related occupational diseases and illnesses.

UNOBLIGATED BALANCES AND CARRYOVER—YEAR FUNDING

Mr. MURTHA. You requested that $95,938,000 of your appropriation remain available until expended. Please describe what funds in what areas carried over into fiscal year 1977 and also anticipated carryover into fiscal year 1978. In the past, your unobligated balances were nowhere near the amount requested to remain available until expended. Why do you need such a large amount?

Dr. MORGAN. We anticipate this year no carryover, although it is very difficult to say for sure because we don't know what may happen down the road. But in our biggest single program involving these funds which are largely so called energy funds, Dr. Yancik told me just the other day that mining was running indeed ahead of where they would have been percentagewise during the fiscal year, so that I don't think there will be any substantial carryover this year.

On the other hand, we do want the authority to carry over so that if some unfortunate thing came along we would not be in a position of closing on some deal in the last week or two of the fiscal year and take a poorer deal for the Government that we might get if we had somewhat longer. We will supply what the carryover was in prior years as you requested.

[The information follows:]

UNOBLIGATED BALANCES OF NO-YEAR FUNDS

Unobligated balances carried forward from fiscal year 1976 to the transition quarter totaled $15.5 million. Unobligated balances carried forward from the transition quarter to fiscal year 1977 totaled $4.2 million.

HELIUM FUND

Mr. MURTHA. Are you going to request rescission of contract authority in 1978 for the helium fund?

Dr. MORGAN. Yes, sir. That is the $47.5 million which is not being used because of the cancellation of the helium purchase contracts, so that will be a routine matter.

Mr. MURTHA. Dr. Morgan and gentlemen, thank you very much. We enjoyed your presentation. It was delightful.

TUESDAY, MARCH 29, 1977.

FEDERAL ENERGY ADMINISTRATION

WITNESSES

JOHN F. O'LEARY, ADMINISTRATOR
GORMAN C. SMITH, ACTING DEPUTY ADMINISTRATOR, ASSISTANT ADMINISTRATOR, REGULATORY PROGRAMS
ERIC J. FYGI, ACTING GENERAL COUNSEL
JOHN D. CHRISTIE, ASSISTANT ADMINISTRATOR, ENERGY INFORMATION AND ANALYSIS
THOMAS E. NOEL, ASSISTANT ADMINISTRATOR, STRATEGIC PETROLEUM RESERVE
MARTIN SENECA, JR., ACTING ASSISTANT ADMINISTRATOR, ENERGY CONSERVATION AND ENVIRONMENT
ROBERT I. HANFLING, ACTING ASSISTANT ADMINISTRATOR, ENERGY RESOURCE DEVELOPMENT
MARTIN D. HOWELL, ASSOCIATE ADMINISTRATOR, MANAGEMENT

Mr. YATES. The hearing will come to order.

We are pleased today to welcome the new Administrator of the Federal Energy Administration, the Hon. John F. O'Leary, in his first appearance before our Appropriations Committee. He appears in support of the appropriation for fiscal year 1978. Mr. O'Leary is accompanied by Mr. Gorman C. Smith, Acting Deputy Administrator and Assistant Administrator, Regulatory Programs; Mr. Eric J. Fygi, Acting General Counsel; John D. Christie, Assistant Administrator, Energy Information and Analysis; Mr. Thomas E. Noel, Assistant Administrator, Strategic Petroleum Reserve; Mr. Martin Seneca, Jr., Acting Assistant Administrator, Energy Conservation and Environment; Mr. Robert I. Hanfling Acting Assistant Administrator, Energy Resource Development; and Martin D. Howell, Associate Administrator, Management.

Mr. O'Leary, your statement may be made a part of the record, together with your biography and the revised justifications.

INTRODUCTORY STATEMENT OF THE HONORABLE JOHN F. O'LEARY,
ADMINISTRATOR, FEDERAL ENERGY ADMINISTRATION,
BEFORE THE HOUSE APPROPRIATIONS COMMITTEE, SUBCOMMITTEE
ON INTERIOR AND RELATED AGENCIES
TUESDAY, MARCH 29, 1977

Mr. Chairman and Members of the Committee, I appreciate the opportunity to appear before you today in support of the Federal Energy Administration's Fiscal Year 1978 Budget Request.

I would like to spend a few minutes highlighting the major programs within the FEA budget before entertaining your questions.

The primary authorizations for FEA's FY 1978 budget request are the Energy Policy and Conservation Act (EPCA) of 1975 and the Energy Conservation and Production Act (ECPA) of 1976. These laws specifically assign to FEA responsibilities for establishing and operating near-term programs which promote energy conservation, provide for emergency petroleum requirements, maintain a national energy data base, encourage optimal development and use of energy resources, and regulate certain petroleum products.

To carry out our responsibilities in the area of energy conservation, the Federal Energy Administration is requesting funds in the FY 1978 budget for five major activities. First, the Weatherization Program as mandated by the ECPA is designed to provide assistance to low income persons, especially the elderly and handicapped, in weatherproofing their homes. The emphasis of this program is on actions that would conserve energy, and at the same time it would reduce the fuel costs of those most in need. Without this program it is likely that the same people will be faced with the same problem the next winter and each winter thereafter. The FEA program is designed to solve the weatherization problem in a relatively permanent fashion by providing primarily materials for the weatherproofing of homes. This is a very cost effective approach since the value of the energy conserved offsets the cost of the materials in less than two years. By limiting funding to these improvements we can assure that a great number of poor people are given weatherization assistance. As you know, the FEA Weatherization Program was authorized last summer by the Energy Conservation and Production Act. Funds have been requested by FEA rather than the Community Services Administration in order to maintain a coordinated energy policy and to simplify administration of the program. FEA is ready to proceed with the program; and we feel we should start to resolve the problems addressed by the Weatherization Program, especially when the benefits are so great and are permanent.

87-511 O - 77 - 13

Our budget request of $65 million together with another $55 million requested in our FY 1977 Supplemental Budget will provide for the permanent weatherization of approximately 880,000 homes.

Second, our budget includes two State Grant programs, each focusing on a different aspect of energy conservation. The initial program, which is currently in operation under the EPCA, provides that participating States must implement five energy conservation actions; and if funds are still available, they may develop other innovative approaches aimed at achieving a five percent reduction of projected energy consumption in the State by 1980. Grant funding of $47 million would be provided in FY 1978 to assist the States in this endeavor. The other State conservation program is for Supplemental State Grants designed to provide the States with increased financial and technical assistance in developing and promoting additional energy conservation plans. These plans are expected to include provisions for energy audits of owner-occupied homes, public education efforts, and development of procedures within each States for effective coordination of conservation programs administered by all levels of government. The supplemental grant funding will provide $23.5 million to the States in FY 1978. While the bulk of the funding requested for these programs is for grants, FEA support is needed for preparation of model plans and for administration of the grant programs.

A third activity, the Obligation Guarantee Program, is authorized by Congress to foster energy conservation in existing buildings owned by State or local governments, institutions, or businesses by guaranteeing, for up to 25 years, loans for the installation of approved materials or devices which either conserve energy or generate energy from a renewable source. Supplemental funding for determining the most cost-effective design and initial implementation was requested in FY 1977. The FY 1978 portion of this program provides $15 million in no year funds for possible default payments and $5 million for implementation, application processing, development and implementation of a management information system, monitoring, and program evaluation.

Fourth, conservation is being promoted through a Utility Demonstration program. This program provides co-funding of projects with State Public Utility Commissions and electric or natural gas utilities to test the impact of various techniques such as load management, time-of-day metering and rate reform on energy consumption, the need for new generating capacity, and consumer costs. The $5.2 million requested in FY 1978 will provide for the completion of all projects presently in progress as well as four new ones in this budget. A total of thirty demonstration projects will have been fully funded if funds previously requested in the FY 1977 Supplemental and this budget are approved.

The fifth major conservation request is $25 million for the development of innovative conservation programs. This funding is designed to accelerate energy conservation. Specific proposals will be based upon identification of those sectors of the economy which would benefit most from Federal programs and to allow for rapid advancement into areas where energy conservation can have the greatest pay-off. The rapid changes that have occurred in the energy field and the need to respond to a crisis situation make it important to maintain some flexibility. Specific conservation initiatives involving the use of these funds will be included in the President's comprehensive energy policy annoucement scheduled for April 20, 1977. We are requesting these funds now to provide for the lead time necessary to act on these new initiatives.

Other conservation efforts reflected in this FY 1978 budget include the Appliance Efficiency Program which is designed to inform consumers of the relative energy efficiency of similar appliances; the Industrial Reporting Program which promotes energy conservation in major industries; grants for State Offices of Consumer Services which will permit utility customers to have a greater input to State utility regulatory proceedings, and the Federal Energy Management Program which promotes conservation of Federal Government energy utilization.

The EPCA provides for the creation of a Strategic Petroleum Reserve (SPR) in order to diminish the vulnerability of the United States from the effects of an energy supply interruption. Plans to accomplish an Early Storage Reserve (ESR) of 150 MMB by December 1978 and the total Strategic Petroleum Reserve of 500 MMB by December 1982 have been submitted to Congress. This amended budget provides for acceleration of these plans to attempt to have 250 MMB in storage by December 1978 and 500 MMB by December 1980. This accelerated program is recommended because it is desirable to move quickly to reduce our vulnerability to threatened or actual embargoes. The national security and potential economic benefits of this accelerated program are significant. The SPR Plan which is now before Congress for approval will shortly be amended to reflect these changes. The total request is for $3 billion in FY 1978, of which $2.5 billion is for oil acquisition with the remainder for storage facilities and program management.

This budget also requests funds for the Office of Energy Resource Development to more adequately develop and utilize our national reserves of coal and other energy sources which will in turn reduce our dependence on foreign energy supplies. The major funding increase in this area is for expansion of the Coal Conversion Program to accelerate the conversion from oil and gas to coal by utilities and industrial firms. Activities will consist of

performing environmental and other analyses required to make the orders issued in FY 1977 and prior years effective. Under current legislation, order-issuing authorities expire June 30, 1977, with enforcement authorities extending through 1984. We are planning to issue approximately 250 orders by the end of June. This is a complex and controversial activity, but one which can contribute significantly to our national energy security. It should be noted that Congress is presently considering several modifications and extentions to the present FEA order issuing authority under this program.

The statutory requirement to establish an Office of Energy Information and Analysis resulted in an internal reorganization to separate policy and data analysis functions previously performed by the Office of Policy and Analysis. Also, as required by the ECPA, a National Energy Information System (NEIS) was created to insure that comparable, accurate, and credible energy information is available to the Federal Energy Administration, to other Government agencies responsible for energy-related policy decisions, to the Congress and to the public. The NEIS will permit the analysis of U.S. energy supply and demand with emphasis on consumption and the sensitivity of the supply system.

The Office of Energy Information and Analysis also performs analytical functions in support of FEA policy-making and programming, to include competition analysis, socio-economic analysis, macroeconomic analysis, and regional analysis; all statistical and forecasting analysis functions in support of energy policy and program development; and design, development and operation of all data collection and data processing systems of the Agency. The above responsibility includes the operation of the Project Independence Evaluation System (PIES) and of the National Energy Information Center (NEIC), the single Federal clearinghouse for energy data. The 39.6 million in FY 1978 for EI&A is requested to support development of the NEIS, conduct of an oil and gas reserve study, improvement of the consumption data base, and other designated EI&A functions.

The FY 1978 request for the Regulatory Programs reflects a continuation of auditing activities to identify those petroleum industry firms which have not complied with FEA's pricing, allocation, and import rules and regulations. The compliance program is designed to concentrate Federal resources on auditing those sectors of the petroleum industry having the greatest economic impact on consumers and those firms within each sector with the largest number of probable violations.

The request also provides for continuation of crude oil pricing and allocation controls through April, 1979, as required by law. The Administration has not yet made a decision on the decontrol of petroleum products. However, additional funds may be necessary if controls are continued on these products through the end of FY 1978. No change is proposed at this time pending submission of the national energy policy to be transmitted to Congress in late April, 1977.

Mr. Chairman, this concludes my opening remarks. I will be happy to respond to any of your questions. Thank you.

JOHN F. O'LEARY

ADDRESS:

Route 3, Box 1249
Santa Fe, New Mexico 87501

DATE & PLACE OF BIRTH:

June 23, 1926
Reno, Nevada

MARTIAL STATUS:

Married to the former Patricia Eagleston

Three children: David - 15
Karena - 11
Mark - 10

EDUCATION:

George Washington University, 1947-1950
A.B. Economics, 1950

EMPLOYMENT RECORD:

November 1975 to Present - Energy Administrator, State of New Mexico

Administered state energy agency while also serving as Governor's energy and science advisor. Responsible for formulation of energy plan for State of New Mexico. Provided energy policy options and advice to the Governor in areas of uranium, coal, petroleum, and natural gas. Directed state's Solar Energy Research Institute proposal efforts. Developed on-going programs in energy conservation and energy impact assistance. Directed state's energy R&D program. Responsible for management of state fuel allocation program.

October 1974 to November 1975 - Technical Director, Energy Resources, and the Environment Division, The MITRE Corporation

Responsible for the direction and management of work conducted by MITRE in the energy, resources and environment field.

June 1974 to October 1974 - Energy Consultant

Private consultant working with government agencies and other organizations, including The MITRE Corporation, advising on energy matters in general, and the role of nuclear energy in the future, in particular.

June 1972 to June 1974 - Director of Licensing, U.S. Atomic Energy Commission

Directed the staff of approximately 500 professionals within the Atomic Energy Commission responsible for licensing of commercial nuclear generating plants, fuel cycle facilities and nuclear materials. Had responsibility for the timely completion of comprehensive safety, environmental and antitrust reviews. Served as a principal advisor to the Commission in its activities related to creation of nuclear generating industry.

March 1970 to June 1972 - Energy Consultant

Self-employed as a consultant in energy matters working with a number of firms in the petroleum, natural gas and coal industries. Provided extensive advice with regard to the overall energy position of the United States and conducted specific studies related to new commercial opportunities including the development of new coal mining capacity, construction of facilities for production of synthetic natural gas, construction of facilities for production of synthetic coke and development of LNG facilities. Served as a Director to several companies in the energy field. During this period, prepared for publication several papers relating to various aspects of the impending energy shortage.

October 1968 to February 1970 - Director, Bureau of Mines

Provided Executive direction to program involving annual expenditures of more that $100 million, and approximately 4,500 employees. The Bureau then conducted physical and economic research to the value of approximately $50 million a year. As Director was active in developing and securing passage of the Coal Mining Safety Act of 1969 and obtained authorization for the Bureau to initiate a major coal/gas conversion program. Initiated numerous economic studies relating to the mineral industry including comprehensive analyses of the oil import program and of the physical and social problems associated with mining activities. These included the lankmark analyses of post-mining influences in Appalachia and a major study of the environmental impacts of the extractive industries. The initiation of these environmental and social studies marked a departure from past practices of the Bureau. During tenure secured funding support for a major R&D effort aimed at improving coal mining technology to minimize the social and environmental costs traditionally associated with this activity.

March 1967 to October 1968 - Chief, Bureau of Natural Gas, Federal Power Commission

Duties included development of capability within the Bureau of Natural Gas for analysis of complex regulatory issues relating to public utility rates and services of the producing and transmission industries. Position involved direction of activities of highly specialized experts in various fields of natural gas regulation. In addition to program development and supervisory activities, incumbent served as principal advisor and consultant to the Federal Power Commission with respect to natural gas matters, including their relationship to the alternative energy resources and to the national economy. Duties also included extensive consultation and negotiation with representatives of regulated utilities affected by the Natural Gas Act, including companies in interstate commerce and local distributor companies. In the course of this assignment obtained through familiarity with the attitudes and methods of doing business utilized by utility companies.

May 1962 to March 1967 - Deputy Assistant Secretary - Mineral Resources, Department of the Interior

Assisted the Secretary and the Assistant Secretary in exercising direction and supervision over the Bureau of Mines, Geological Survey, Office of Minerals and Solid Fuels, Office of Oil and Gas, Oil Import Administration, and Office of Coal Research. In this position, took substantive responsibility for formulation and implementation of programs related to international petroleum relationships of the United States, serving as U.S. representative to OECD Oil and Energy Committees, NATO Oil Committee and the Oil Committee of the I.L.O., played an active role in development of Federal oil shale policy, oil import control policy, Outer Continental Shelf leasing policy, coal export policy, formulation of energy R&D programs within the Department, and related matters.

June 1952 to May 1962 - Served as Economist and later as Senior Staff Economist in the Office of the Assistant Secretary of the Interior for Mineral Resources

Conducted and supervised economic studies relating to individual mineral and energy industries, particularly, the non-ferrous minerals industry. Served as one of five international experts on lead and zinc providing guidance to the International Lead/Zinc Study Group. Participated as a U.S. representative at the initial meeting of the International Copper Study Group. Provided economic advice to the Secretary of the Interior with respect to the development of mineral resource programs, including programs related to acquisition and disposition of strategic stockpiles. Served as a departmental representative to the Presidential Advisory Committee on Mineral Policy and prepared final drafts of the recommendations of that group, served as departmental representative on the International Advisory Committee on Export Policy.

July 1951 to May 1952 - Management Intern

Served as management intern in the Department of the Interior's third management training program.

July 1950 to July 1951 - Commodity Industry Analyst, Bureau of Mines

In this capacity prepared the volume "Minerals Handbook - Zinc" and was responsible for preparation of chapters on lead and zinc for inclusion in Bureau of Mines Annual Minerals Handbook.

GOVERNMENT EXPERIENCE:

Energy Administrator
State of New Mexico
(See above)

Director of Licensing
Atomic Energy Commission
(See above)

Director, Bureau of Mines
Department of the Interior
(See above)

Chief, Bureau of Natural Gas
Federal Power Commission
(See above)

Deputy Assistant Secretary - Mineral Resources
Department of the Interior
(See above)

MEMBERSHIPS:

Member, Chesapeake Bay Foundation
Member, Cosmos Club
Member, National Academy of Sciences' Coal Forum
Member, Resources for the Future's National Energy Strategies Forum Project
Chairman, Curtailment Strategies Technical Advisory Committee, National Gas Survey, Federal Power Commission
Member, Research Advisory Committee, National Science Foundation
Adjutant Professor, Public Administration, University of New Mexico

HONORS & AWARDS:

Distinguished Service Award, Department of the Interior, 1967
Distinguished Service Award, Federal Power Commission, 1968

PUBLISHED WRITINGS:

A State Energy Plan for New Mexico, University of New Mexico Printing Plant, 1977

"Coal - Energy of the Past for Future," The Changing Economics of World Energy, edited by Bernhard J. Abrahamsson, Westview Press, 1976

"Nuclear Energy and Public Policy Issues," Energy Supply and Government Policy, edited by Robert J. Kalter and William A. Vogely, Cornell University Press, 1976

Amended

FEDERAL ENERGY ADMINISTRATION

FY 1978 Amended Congressional Budget Submission

General Statement

Since the creation of the Federal Energy Administration in May 1974, the role of the Agency has evolved to keep pace with changing national priorities for energy needs. The Agency has moved from concern with short-term reactions to an emergency situation to concern with development of a long-term (through the mid-1980's) national energy policy aimed at balancing energy needs while maintaining a strong and healthy economy.

This evolving role can be traced through the enactment of major authorizing energy legislation since 1973. The Emergency Petroleum Allocation Act of 1973 (EPAA) authorized price and allocation controls to be administered by the Department of the Interior. The Federal Energy Administration Act of 1974 created the Agency as a separate administration within the Executive Branch and transferred to the Agency energy-related functions authorized by law and previously vested in other government agencies. The Congressional concern as expressed in the Act was to "meet the energy needs of the Nation." The immediacy of this concern can be seen in the emphasis on conserving scarce supplies, insuring fair and efficient distribution of supplies, maintaining fair and reasonable consumer prices for such supplies, and promoting the expansion of readily usable energy sources. The groundwork for long-term planning was laid to develop policies and plans to meet the future energy needs of the Nation. The Energy Supply and Environmental Coordination Act of 1974 (ESECA) authorized Federal intervention in utility activities, to require, where practical, conversion of existing facilities to coal usage and construction of new facilities with the capability for coal usage.

The Energy Policy and Conservation Act of 1975 (EPCA), while providing additional authority to manage the continuing energy crisis (providing standby authority for conservation and rationing contingency plans and to exempt regulated products not in short supply) concentrated on longer-term plans for avoiding the impacts of such crisis through establishment of a strategic petroleum reserve and through conservation and resource development efforts. This Act addresses the use of price incentives, energy efficiency improvement targets, coal conversion, and conservation regulations as a means of achieving energy independence. The need for reliable energy data was recognized as a key element to any national energy effort. The Energy Conservation and Production Act of 1976 (ECPA) reiterated this emphasis on data requirements and authorized the creation of a National Energy Information System to act as a clearinghouse for energy information for the entire Federal Government. Implementation of energy conservation policies developed by the Agency and by the Congress included the expansion of the State Energy Conservation Program, the Weatherization Program, and various programs to provide financial assistance to States, businesses, institutions, and individual citizens in developing and implementing conservation measures.

The FY 1978 budget submission reflects the continuation of efforts to develop long-term policy and the initiation of efforts to implement policies thus developed. The latter involves a shift to greater State and industry involvement in implementation efforts, especially in the area of conservation. The major increases from FY 1977 to FY 1978 reflect this shift, primarily through expanded State grant programs - the Weatherization Program (+$65 million), the State Energy Conservation Program (+$25 million) and the Supplemental State Grant Program (+$24 million)- and through implementation of the Conservation Obligation Guarantee Program (+$20 million). The Weatherization Program provides for weatherization of the homes of elderly, handicapped, and low-income persons with funding channeled through States, community action agencies or minority organizations. The State Energy Conservation Program provides for grants to States for implementation of comprehensive energy conservation plans designed to reduce energy consumption by 5% by the year 1980. The Supplemental State Grant Program provides for energy audits of owner-occupied homes, expanded public education activities, and promotion of State, local and Federal coordination of conservation efforts. The Conservation Obligation Guarantees Program provides for federal guarantees of loans for installation of energy conservation devices in industrial and commercial buildings.

Pursuant to the ECPA, an internal reorganization to separate policy and data analysis functions previously performed by the Office of Policy and Analysis was initiated by the statutory requirement to establish an office of Energy Information and Analysis (EI&A). As required by the Act,a National Energy Information System (NEIS) was created to assure the availability of adequate, comparable, accurate, and credible energy information to the Federal Energy Administration, to other Government agencies responsible for energy-related policy decisions, to the Congress,

Amended

and to the public. An increase of approximately $8.5 million in FY 1978 for EI&A is to support development of the NEIS, an oil and gas reserve study, consumption data base improvement, and other designated EI&A functions. The NEIS will permit the analysis of U. S. energy supply and demand with emphasis on consumption and the sensitivity of the supply system. The NEIS will provide access to energy information and analysis by the Congress and the public.

Plans to implement the Early Storage Reserve (ESR) program and the Strategic Petroleum Reserve (SPR) program were submitted to Congress during calendar 1976. These plans proposed an ESR of 150 million barrels of centrally stored crude oil to be in place by December 1978, and an SPR of 500 million barrels of centrally stored crude (including the 150 million barrel ESR) to be in place by December 1982. Subsequent analysis has showed that this schedule could, and should, be accelerated to have 250 million barrels in place by December 1978 and about 500 million barrels in place by 1980. This budget reflects funds required to develop the reserve at the accelerated rate. It includes those amounts necessary for the purchase of 211 million barrels of crude, the amount necessary to bring the total FY 1977 and FY 1978 purchases to 250 million barrels, at the national average composite price, taking into account the January 1977 OPEC price increase. Also included are funds required for the construction of storage facilities for both the expansion and acceleration of the ESR, and for the development, under the accelerated schedule, of the full SPR capacity.

Program by Activities

The Federal Energy Administration budget submission is presented in seven major budget activities. A brief description of each of these activities follows:

1. Executive Direction and Administration. This activity provides for the immediate Offices of the Administrator and the Regional Administrators and for those support services necessary for proper execution of Agency responsibilities. These support services include Advisory Committee management; administrative support; personnel management; budget, payroll and accounting support; internal review and management sciences; communications and public affairs; legal services; Congressional and intergovernmental relations; private grievances and redress activities; and policy and program evaluation. This activity also provides for centralized funding for General Services Administration building leases, Federal Telecommunications System billings, and U.S. Postal Service Billings.

   The FY 1978 request of 1,015 positions and $37,288,000 reflects an increase of 33 positions and $2,385,000 above the FY 1977 appropriated levels. This increase relates to a requirement to cover increased billings for the Temporary Court of Appeals, General Services Administration leases, and Federal Telecommunications System support; for audit coverage of the Strategic Petroleum Reserve Program; and for legal, management and appeals activities in support of the regulatory and conservation programs. These increases have been partially offset by regional intergovernmental activities relating to a shift of responsibility for liaison with State and local governments to the program offices.

2. Energy Information and Analysis. This activity provides for analytical functions in support of FEA policy-making and programming, to include competition analysis, socio-economic analysis, macroeconomic analysis, and regional analysis; for all statistical and forecasting analysis functions in support of energy policy and program development; and for design, development and operation of all data collection and data processing systems of the Agency. The above responsibility includes the operation of the Project Independence Evaluation System (PIES) and of the National Energy Information Center (NEIC), the single Federal clearinghouse for energy data.

   The FY 1978 request of 459 positions and $39,585,000 reflects an increase of 92 positions and $10,652,000 above the FY 1977 appropriated levels. This increase relates to requirements for expansion of the PIES system, as well as increased access to the system for the Congress and the public; development of a comprehensive energy consumption data base; validation of energy data in Government data systems; and increased data systems support for new and expanded programs in the program offices supported.

3. Regulatory Programs. This activity provides for enforcement of Agency pricing, allocation, and import rules and regulations applicable to the petroleum industry; for planning, direction, and execution of the Mandatory Petroleum Allocation Program to insure the equitable and

Amended

efficient distribution of available crude oil and petroleum products remaining under control; for planning and direction of the Oil Imports Program; for contingency planning activities; and for data coordination in support of the regulatory programs.

The FY 1978 request of 1,623 positions and $47,098,000 reflects an increase of 140 positions and $1,866,000 above the FY 1977 appropriated levels. The current compliance program is based on revised audit times and an expanded universe. The operation program increase allows for the continuation of the crude oil allocation and pricing programs beyond the end of FY 1978 (mandatory controls are required through April 1979) and provides for administration of allocation and pricing controls for propane. Offsetting decreases relate to reduced contractual support in the area of contingency planning and to reduced data development in the data coordination function.

4. Energy Conservation and Environment. This activity provides for policy and program development and evaluation relating to conservation and environment issues and activities; for financial assistance to the States for energy conservation programs and for weatherization assistance for low income persons; for workshops and seminars for industry and the private sector; for conservation initiatives undertaken at the national level: the Federal Energy Management Program, voluntary programs, programs directed toward regulatory institutions; the obligation guarantee program; and for the Appliance Labeling and the Industrial Reporting Programs mandated by the Energy Policy and Conservation Act.

The FY 1978 request of 389 positions and $204,509,000 reflects an increase of 139 positions and $169,457,000 above the FY 1977 appropriated levels (including $114 million in grant funds). This increase relates to expansion of the State Energy Conservation Program, implementation of the Weatherization Program, the Supplemental State Grant Program and the Obligation Guarantee Program; expansion of the utility rate demonstration programs; and increased formal agency intervention in regulatory rate proceedings.

5. Energy Resource Development. This activity provides for development and implementation of programs to increase the supply of domestic oil, gas, petroleum products, coal, synthetic fuels and the use of geothermal and solar energy; for implementation of the coal conversion provisions of the Energy Supply and Environmental Coordination Act of 1974; for management of the Electric Power Program aimed at insuring an adequate supply of electrical power by minimizing regulatory and procedural impediments to powerplant construction and maximizing the use of fuels in electricity generation; for development and analysis of Federal financing programs designed to encourage increases in the rate of growth of domestic energy production; for assessing specific sites for potential use as major energy supply facility locations; and for analysis of related environmental data in support of energy facility planning, siting programs and environmental legislation.

The FY 1978 request of 282 positions and $14,152,000 reflects an increase of four positions and $3,847,000 above the FY 1977 appropriated levels. This increase relates to expanded enforcement activities for prohibition and construction orders issued pursuant to the coal conversion provisions of the Energy Supply and Environmental Coordination Act of 1974. Order issuing authorities expire June 30, 1977, with enforcement authorities extending to December 31, 1984. Enforcement activities will consist of preparation of Environmental Impact Statements, issuance of Notices of Effectiveness, and monitoring of compliance schedules.

6. International Energy Affairs. This activity provides for development, evaluation and implementation of policies, plans and programs dealing with the future price level, stability and adequacy of world energy resources as well as the sources, supply security and emergency supply alternatives related to U.S. energy imports and exports; and for proposing, negotiating, and implementing U.S. international energy agreements. This latter responsibility involves liaison with multinational organizations, such as the Organization for Economic Cooperation and Development, the International Energy Agency, the Conference on International Economic Cooperation, and the North Atlantic Treaty Organization Petroleum Planning Committee.

The FY 1978 request of 45 positions and $1,678,000 reflects an increase of $163,000 above the FY 1977 appropriated levels. This increase relates to the transfer of responsibility for an interagency agreement with the Department of State for foreign transcription services previously funded by the Office of the General Counsel. The increase also includes support for expanding bilateral and multilateral energy activities of the international organizations identified above.

7. Strategic Petroleum Reserve. This activity provides for the establishment of a national strategic petroleum reserve to diminish the vulnerability of the United States to a severe energy supply interruption and to provide limited protection from the short-term consequences

Amended

of interruptions in the supply of petroleum products. Activities include acquisition and construction of storage facilities, acquisition and transportation of petroleum, operation of the storage facilities, and the overall program management.

The FY 1978 request of 218 positions and $3,018,933,000 reflects an increase of 68 positions and $2,262,944,000 above the FY 1977 appropriated levels. This increase relates to acceleration of the Early Storage Reserve to 250 MMB in storage by December 1978, and the acquisition and development of storage facilities with a total capacity of 500 MMB by 1980.

Budget Justification by Activity

The detailed budget justification for each activity includes a comparison of positions, manyears, and obligations; identification of Headquarters and Regional resource levels; identification of FY 1977 Supplemental Request resource levels and the extension of these requirements into FY 1978 analysis of requested contract authority for each program area; and obligations by object classification for each fiscal period. October 1976 pay raise amounts are included in all FY 1977 and FY 1978 estimates. Major functions within each program area are addressed separately, with resource displays, program description, and justification.

Resource Summary

A resource summary by budget activity follows.

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
A. Summary By Activity
(dollars in thousands)

Program:	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	M/Y	Amount	Amount	Pos.	M/Y	Amount	Pos.	M/Y	Amount	Pos.	M/Y	Amount
Salaries and Expenses:													
Executive Direction & Administration	1,039	1,070	$ 35,783	$12,575	982	972	$ 34,903	1,015	1,032	$ 37,288	+ 33	+ 60	$+ 2,385
Energy Information Analysis	387	349	22,463	6,540	367	369	28,933	459	459	39,585	+ 92	+ 90	+ 10,652
Regulatory Programs	1,766	1,396	35,979	11,398	1,483	1,615	45,232	1,623	1,709	47,098	+140	+ 94	+ 1,866
Conservation & Environment	316	256	23,849	18,473	250	276	35,052	389	405	204,509	+139	+129	+ 169,457
Energy Resource Development	285	261	10,793	4,196	278	275	10,305	282	280	14,152	+ 4	+ 5	+ 3,847
International Energy Affairs	42	39	1,162	619	45	41	1,515	45	43	1,678	...	+ 2	+ 163
Total - S & E	3,835	3,371	$130,028	$53,801	3,405	3,548	$155,940	3,813	3,928	$ 344,310	+408	+380	$+ 188,370
Strategic Petroleum Reserve	100	15	321	5,497	150	137	755,989	218	175	3,018,933	+ 68	+ 38	+2,262,944
Total - FEA	3,935	3,386	$130,349	$59,298	3,555	3,685	$911,929	4,031	4,103	$3,363,243	+476	+418	$+2,451,314

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
Crosswalk of the FY 1977 Estimate
(dollars in thousands)

Program	FY 1977 Appropriation	Policy and Analysis Adjustment	SLUC Adjustments	Pay Raise Estimates	Unobligated Balance Available	FY 1977 Estimate
Salaries and Expenses:						
Executive direction and administration	27,326	+ 1,659[2/]	+ 3,522	+ 1,129	+ 1,267	34,903
Energy Information and analysis	30,311	- 1,659	- 206	+ 487	...	28,933
Regulatory programs	45,774[1/]	...	- 2,437	+ 1,895	...	45,232
Conservation and environment	34,700	...	...	+ 352	...	35,052
Energy resource development	10,674	...	- 729	+ 360	...	10,305
International energy affairs	1,600	...	- 150	+ 65	...	1,515
Total, salaries and expenses	150,385	-0-	-0-	+ 4,288	+ 1,267	155,940
Strategic Petroleum Reserve	447,684	...	...	+ 148	+308,157	755,989
Total FEA	598,069	-0-	-0-	+ 4,436	+309,424	911,929

1/ Includes decrease of $460,000 for travel as described in Conference Report 94-1330 of July 1, 1976.
2/ Policy and Analysis split into two offices, Energy Information and Analysis and Policy and Program Evaluation. Policy and Program Evaluation is now part of Executive Direction.

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: Administrator

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual Pos.	FY 1976 Actual MY	FY 1976 Actual Amount	TQ Amount	FY 1977 Estimate Pos.	FY 1977 Estimate MY	FY 1977 Estimate Amount	FY 1978 Estimate Pos.	FY 1978 Estimate MY	FY 1978 Estimate Amount	Change FY 1977 to FY 1978 Pos.	Change FY 1977 to FY 1978 MY	Change FY 1977 to FY 1978 Amount
Administrator	72	79	2,417	720	71	69	1,618	71	71	1,970	...	+ 2	+352
Total	72	79	2,417	720	71	69	1,618	71	71	1,970	...	+ 2	+352
(Headquarters)	(32)	(39)	(1,579)	(494)	(29)	(29)	(708)	(29)	(29)	(920)	(...)	(...)	+(212)
(Regions)	(40)	(40)	(838)	(226)	(42)	(40)	(910)	(42)	(42)	(1,050)	(...)	(+ 2)	+(140)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Administrator	PROGRAM: Executive Direction and Administration												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	72	79	2,417	720	71	69	1,618	71	71	1,970	...	+ 2	+352
Headquarters	32	39	1,579	494	29	29	708	29	29	920	...	...	+212
Regions	40	40	838	226	42	40	910	42	42	1,050	...	+ 2	+140
(Contracts/Grants)	XX	XX	(158)	...	XX	XX	...	XX	XX	...	XX	XX	...
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION

Provides for the immediate office of the Administrator, the Deputy Administrator(s), their assistants and clerical staffs, the Office of Executive Communications, and staff support for the 16 FEA Advisory Committees authorized under Section 17 of the FEA act. Also provides for the Regional Administrators, their deputies, assistants, and clerical staffs.

JUSTIFICATION

The increase of $352 thousand above FY 1977 levels provides for travel and support of the FEA Advisory Committees and for the management of the sub-Regional office in Alaska.

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: General Counsel

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Regulatory (Compliance)	62	54	1360	361	49	42	1055	52	52	1292	+3	+10	+237
Regulatory (Except Compliance)	38	29	826	256	46	37	989	34	39	1023	-12	+2	+34
Energy Resource Development	11	10	261	72	22	19	483	22	22	585	...	+3	+102
International Energy Affairs	3	2	71	22	3	3	135	3	3	90	...	...	-45
Strategic Petroleum Reserve	...	...	...	...	3	3	80	...	...	...	-3	-3	-80
Conservation and Environment	16	14	363	106	20	19	487	35	36	921	+15	+17	+434
General Law, Litigation and Legislation	30	24	643	182	30	26	672	30	32	820	...	+6	+148
Executive Direction and Support	17	14	398	118	17	15	400	17	17	444	...	+2	+44
Total	177	147	3922	1117	190	164	4301	193	201	5175	+3	+37	+874
(Headquarters)	(109)	(84)	(2407)	(736)	(131)	(108)	(2938)	(131)	(139)	(3661)	(0)	(+31)	(+723)
(Regions)	(68)	(63)	(1515)	(381)	(59)	(56)	(1363)	(62)	(62)	(1514)	(+3)	(+6)	(+151)
FY 1977 Supplemental Pending; FY 1978 ECFA Amounts Included Above					21	9	230	15	18	461			

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: General Counsel

PROGRAM: Regulatory (Compliance)

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	62	54	1,360	361	49	42	1,055	52	52	1,292	+ 3	+ 10	+ 237
Headquarters	17	13	374	113	20	15	400	20	20	522	...	+ 5	+ 122
Regions	45	41	986	248	29	27	655	32	32	770	+ 3	+ 5	+ 115
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					3	2	44	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					3	2	44	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

This program provides legal concurrence on all formal enforcement actions brought by FEA for violations of regulations promulgated by FEA pursuant to authority under the Emergency Petroleum Allocation Act of 1973 (EPAA) (P.L. 93-159), as amended; Energy Policy and Conservation Act (ECPA) (P.L. 94-163); Energy Conservation and Production Act (ECPA) (P.L.94-385); and Federal Energy Administration Act of 1974 (P.L. 93-275). Legal review is provided for all Notices of Probable Violation, Remedial Orders, Consent Orders, and agreements to compromise civil penalties. This program also handles all referrals to the Department of Justice for institution of proceedings for civil or criminal penalty proceedings, and for injunctions to compel compliance with FEA orders.

JUSTIFICATION

A large number of major audits conducted during FY 1977 will reach the case resolution stage during FY 1978. In addition, FEA's enforcement program will remain at a high level in FY 1978. These cases will require very substantial legal participation in the formulation of agency positions on regulatory interpretation matters and in the preparation of formal enforcement documents (Notices of Probable Violation, Remedial Orders, Consent Orders and compulsory process documents). The legal staff will also participate in negotiations with firms to compromise civil penalties, and in preparation of referrals to the Department of Justice for institution of civil and criminal proceedings pursuant to Section 5 of the EPAA, as amended by Section 452 of the EPCA. An increase of 268% in the number of major audits requiring substantial legal review is anticipated during the remainder of FY 1977 and during FY 1978 over the FY 1976 level. It is essential that the increase in regional counsel compliance staff requested for FY 1977 be available in FY 1978 for without adequate legal staff compliance activities cannot progress beyond fact finding (audits) into remedial (refund, rollback, penalties) activities.

COST FACTORS ($000)

Personnel Compensation and Benefits	1,169
Other	123
Total	1,292

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: General Counsel | PROGRAM: Regulatory (Except Compliance)

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	38	29	826	256	46	37	989	34	39	1023	-12	+2	+34
Headquarters	38	29	826	256	46	37	989	34	39	1023	-12	+2	+34
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

This program pertains to all legal aspects of the regulatory programs mandated by the EPAA, as amended by the EPCA and the ECPA, including drafting of proposed and final regulations regarding pricing and allocation of crude oil, refined petroleum products, and natural gas liquids. This unit participates in public hearings required in the rulemaking process. It also issues formal rulings and interpretations regarding general or particular applicability of the regulations. This staff's activities cover all legal aspects of transfer pricing between affiliated firms, as well as the entitlements program. It provides legal counsel to the Operations section of Regulatory Programs in the assignment of crude oil and propane. The staff also handles the regulatory work involving the Oil Import Program, pursuant to the authority contained in the Trade Expansion Act of 1962 (P.L. 87-794), Executive Order 11790 (39 F.R. 23185), Proclamation No. 3279, as amended, 38 F.R. 9645, 38 F.R. 16195, 39 F.R. 35103, and the FEA Act of 1974 (P.L. 93-275).

This staff also covers federal court litigation involving challenges to regulations promulgated pursuant to the EPAA and administrative action taken by FEA to enforce such regulations. This staff also handles legal aspects of contingency plans and rationing plans authorized in Title II of the EPCA.

JUSTIFICATION

A reduction of 11 positions is proposed reflecting the reduced requirements for regulation drafting with respect to crude oil and petroleum products. Allocation and pricing controls will be maintained during FY 1978 and a considerable number of regulatory changes will be necessary to keep these programs on a current basis. Legal staff is required to handle the complex rulings and interpretations that will be needed for crude oil and propane regulations and as a result of pending enforcement actions initiated when controls on other petroleum products were in effect.

The EPCA requires a continued high level of activity in the following programs: price controls on refined petroleum products, including natural gas liquids (Sec. 461); and price controls on crude oil (Sec. 401) through April 1979. The crude oil price regulations are complex to administer. They have been designed to achieve compliance with the EPCA limitations on the weighted average first sale price of crude oil produced in the United States ($7.66 per barrel in February 1976) and to increase that price gradually over 40

months, as permitted by the EPCA. The EPCA requires that actual crude oil prices be monitored and appropriate periodic adjustments made to insure compliance with the statutory maximum weighted average first sale price (Sec. 401). Substantial effort will also be placed on modifying the regulations to maximize domestic crude oil production, by enhanced recovery and other means.

The EPCA provides increased flexibility in gradually decontrolling refined products at the refiner, wholesale and retail levels, subject to disapproval by either House of Congress. Certain refined products have already been exempted, but FEA is committed to monitor prices carefully and to consider reimposing controls on some products if necessary. A substantial amount of legal support will be required in conjunction with the development of procedures for the monitoring of prices of deregulated products.

A slight reduction is expected in the workload supporting contingency plans and therefore one position has been dropped.

An increase is expected in the amount of EPAA litigation because of the projected increase in FEA audits during FY 1977 and FY 1978. The positions allocated to transfer pricing and the oil import program will likewise be needed to maintain the effectiveness of these programs.

COST FACTORS ($000)

Personnel Compensation and Benefits	931
Other	92
Total	1023

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: General Counsel

PROGRAM: Energy Resource Development

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	11	10	261	72	22	19	483	22	22	585	...	+3	+102
Headquarters	6	5	141	42	12	10	266	12	12	332	...	+2	+ 66
Regions	5	5	120	30	10	9	217	10	10	253	...	+1	+ 36
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

This program provides legal assistance to the Office of Energy Resource Development, which is responsible for solar, geothermal and synthetic fuels projects, as well as a major program for regulation of fuels utilized by utilities, pursuant to the Energy Supply and Environmental Coordination Act (ESECA), P.L. 93-319. Section 101 of EPCA extended and expanded coal conversion authority contained in ESECA, including extension of time to issue and enforce conversion orders, and expansion of authority to cover non-utility major fuel burning installations. Coordination with legal units of EPA is necessary to harmonize FEA conversion actions with the implementation of the Clean Air Act. Legal activities include drafting proposed orders, participation in hearings, drafting final conversion orders and notices of effectiveness, reviewing modification or recision requests, and proceedings to enforce ESECA orders.

JUSTIFICATION

The amount of legal work to support this program will increase during FY 1978, particularly for support of ESECA activities as additional orders are issued and as previously issued orders progress to more complex stages. There will also likely be a heavy load of enforcement work as companies fail to meet conversion schedules dictated in FEA orders; however, no actual increase is being sought in the legal staff supporting ESECA. The increase in legal activity will be handled by attorneys previously assigned to drafting and interpreting the regulations promulgated to implement the conversion program. It is also anticipated that by FY 1978, sufficient experience will have been developed to increase the manageable caseload of each attorney. Because of the heavy regional aspect of this work, ten of the nineteen positions will be assigned to FEA's regional counsel offices.

The three positions presently assigned to provide legal assistance to other ERD projects will be maintained during FY 1978. This is a minimum requirement since the level of projects and studies to be undertaken by ERD in the fields of solar, geothermal, synthetic and nuclear energy will be expanded during FY 1978. Substantial legal work will be needed to analyze proposals for statutory authority and to assist in proposing and commenting on new legislative initiatives.

COST FACTORS ($000)

Personnel Compensation and Benefits	533
Other	52
Total	585

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: General Counsel

PROGRAM: International Energy Affairs

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	3	2	71	22	3	3	135	3	3	90	...	...	-45
Headquarters	3	2	71	22	3	3	135	3	3	90	...	...	-45
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(14)	...	XX	XX	(55)	XX	XX	...	XX	XX	(-55)
FY 1977 Supplemental Pending; FY 1970 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

Legal support for U.S. participation in the International Energy Agency, particularly for the administration of the standards and procedures by which persons engaged in the petroleum industry may develop and carry out voluntary agreements and plans of action required to implement the information and allocation provisions of the International Energy Program (IEP), pursuant to Sections 251-255 of the Energy Policy and Conservation Act (P.L. 94-163, December 22, 1975, as amended by P.L. 94-385, August 14, 1976).

JUSTIFICATION

This program area involves legal support with respect to implementation of the allocation and information provisions of the International Energy Program, analyzing proposed legislation in the international area, and developing long term cooperative programs with other countries. Legal support is required in connection with statutory requirements for public notice of international conferences, participation in IEP and committee meetings, and participation in inter-agency collaborative efforts in conjunction with the agency's international projects and programs. This program is expected to expand its universe of international concerns and projects during FY 1978. No increase in staff from FY 1977 levels is requested.

The reduction of $55,000 in contract funds reflects the transfer of responsibility for the statutory requirement to transcribe IEP proceedings abroad to the Office of International Energy Affairs.

COST FACTORS ($000)

Personnel Compensation and Benefits	.83
Other	.7
Total	.90

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: General Counsel

PROGRAM: Strategic Petroleum Reserve

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	...	...	...	...	3	3	80	...	...	...	-3	-3	-80
Headquarters	...	...	...	...	3	3	80	...	...	...	-3	-3	-80
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...
FY 1977 Supplemental Pending; FY 1976 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

This program provides legal support for the Strategic Petroleum Reserve Program, including, as necessary, contract and other document drafting, negotiation, real estate acquisition, legal review of environmental analysis, drafting of statutes and regulations, and other legal activities as required to support the effective administration of the strategic storage program and to ensure compliance with the multitude of legal requirements applicable to the program.

FY 1978 program resource requirements are included in the Strategic Petroleum Reserve appropriation request.

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: General Counsel

PROGRAM: Conservation and Environment

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	16	14	363	106	20	19	487	35	36	921	+15	+17	+434
Headquarters	8	6	170	57	10	9	241	25	26	675	+15	+17	+434
Regions	8	8	193	49	10	10	246	10	10	246	...	...	...
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...
ECPA: FY 77 Supplemental Pending; FY 78 Amounts Included Above					13	4	112	15	16	408			
Headquarters					13	4	112	15	16	408			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

This staff provides legal support for FEA's conservation programs, including the State Grant program authorized by Section 361-366 of the EPCA; the supplemental State Grant program authorized by Title IV, Part B, of the ECPA; the Appliance program authorized by Sections 321-339 of the EPCA; the Electric Utility Rate Design program authorized by Title II of the ECPA; the Weatherization program authorized by Part A, Title IV of the ECPA; the Obligation Guarantee program authorized by Title IV, Part D, of the ECPA; and general miscellaneous conservation projects authorized by the FEA Act, the EPCA and the ECPA (such as exchanges of information with state agencies pursuant to ECPA, Title IV, Part E).

This unit also is responsible for legal work in connection with FEA's compliance with environmental requirements pursuant to National Environmental Policy Act including review of environmental impact statements with respect to all major FEA programs.

JUSTIFICATION

There will be a substantial increase in workload during FY 1978 in several areas for which this program is responsible. The number of types of appliances for which conservation standards may be required will increase during FY 1978. The program to improve electric utility rate design will involve increased legal responsibility as specific intervention activities proceed to more sophisticated and complex stages. The Weatherization program will also involve substantial legal work in connection with approval of grants and coordination with various other agencies as provided in Title IV of the ECPA. The State Programs authorized by Section 361-366 of the EPCA and Title IV, Part B, of the ECPA will also require substantial legal service during FY 1978 to process state grants and conduct the monitoring requirements of the statutes. Strong regional counsel support will be needed to maintain the effectiveness of this state grant program to insure that state conservation plans conform to statutory requirements and that funds are actually expended in accordance with the terms of individual grants. The Obligation Guarantee program will require a high degree of legal involvement since the full faith and credit of the United States government is pledged to the payment of all loans guaranteed under the program. The Obligation Guarantee program will require increased legal support in FY 1978 to assure that the extensive requirements of law applicable to the program are complied with in the processing of individual Federal obligation guarantees and that information gathering and recordkeeping procedures insure the Government has sufficient data adequately to protect its interest with respect to every commitment made; and to provide the range of detailed legal services needed in every case of default, which potentially may involve the Government's possession, management and sale of property.

Amended

The amended request includes $275,000, 11 positions and 11 manyears more than the initial FY 1978 request for this program.

COST FACTORS ($000)

Personnel Compensation and Benefits	835
Other	86
Total	921

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: General Counsel	PROGRAM: General Law, Litigation and Legislation										Change FY 1977 to FY 1978		
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate					
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	30	24	643	182	30	26	672	30	32	820	...	+6	+148
Headquarters	20	15	427	128	20	16	427	20	22	575	...	+6	+148
Regions	10	9	216	54	10	10	245	10	10	245	...	...	...
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					5	3	74	...	2	53			
Headquarters					5	3	74		2	53			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

The General Law staff supports all FEA activities with respect to legal concerns of a general nature. Activities include procurement (including formal participation as a member of FEA's Project Review Board); review of decisions under the Freedom of Information Act; the Privacy Act and Federal Advisory Committee Act; legal advice concerning data collection and dissemination; legal support regarding personnel operations, conflicts-of-interest, standards of conduct and internal management matters. This staff also serves in liaison capacity with the Department of Justice and the General Accounting Office with respect to these activities.

The General Litigation staff handles administrative and court litigation other than proceedings arising under the Emergency Petroleum Allocation Act. This unit also handles interventions in electric utility rate proceedings before local utility commissions in support of federal conservation policies.

The Legislation staff coordinates agency policy and formal comments on pending energy legislation and on legislative proposals by FEA and other agencies in the energy field; prepares formal legislative reports to Congressional committees and to OMB; drafts and coordinates staffing for legislative proposals; and coordinates and supervises the clearance process for all FEA Congressional testimony.

JUSTIFICATION

Activities in these programs will be expanded during FY 1978. The number of Freedom of Information Act requests requiring legal review will increase to an estimated 1,200 in FY 1978 from 1,080 during FY 1977. Appeals from denials to access will climb to about 84 from the FY 1977 level of 72.

The number of Congressional reports handled by the Legislation staff will increase to an estimated level of 300 during FY 1978, as compared to 240 during FY 1977. Recent enactment of the Energy Policy and Conservation Act (EPCA) and of the Energy Conservation and Production Act (ECPA) have substantially expanded the overall jurisdictional interests and mission of FEA. As a result, the scope of overall legislative involvement has expanded into such areas as energy conservation, coal loan guarantees, and numerous other generic areas which require the preparation of a substantially increased number of formal legislative comments and reports. As the mission of the agency expands, the requirements upon the legislative program will expand correspondingly.

The Litigation staff will be required to handle approximately 25 utility interventions currently in progress for FY 1977. Litigation contesting FEA conversion orders under the ESECA program will substantially increase in volume during FY 1978. The increase in Freedom of Information Act litigation already evident during FY 1977 will further be increased during FY 1978 due to the substantial increase in the volume of such information requests.

COST FACTORS ($000)

Personnel Compensation and Benefits	745
Other	75
Total	820

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: General Counsel	PROGRAM: Executive Direction and Support												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	17	14	398	118	17	15	400	17	17	444	...	+2	+44
Headquarters	17	14	398	118	17	15	400	17	17	444	...	+2	+44
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

This program is responsible for executive management and supervision of all FEA activities assigned to the General Counsel. Staff support provides administrative assistance to the General Counsel, including formal transmittal of Federal Register notices, personnel functions, budget preparation, accounting records maintenance, inter-office delivery, equipment maintenance, and maintenance of a law library.

JUSTIFICATION

Expansion of FEA's missions and the projected increase in legal responsibilities of the General Counsel requires maintenance of three deputy general counsel positions that supervise the major operational components of the Office of General Counsel and direct clerical support. The responsibilities of the administrative staff will require staffing at FY 1977 levels. The increase of funds will provide adequate staffing for this program.

COST FACTORS ($000)

Personnel Compensation and Benefits	404
Other	40
Total	444

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: Management

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual Pos.	MY	Amount	TQ Amount	FY 1977 Estimate Pos.	MY	Amount	FY 1978 Estimate Pos.	MY	Amount	Change FY 1977 to FY 1978 Pos.	MY	Amount
Resource Management	119	117	2,871	970	118	111	2,704	121	121	2,952	+ 3	+ 10	+ 248
Personnel Management	109	108	2,796	951	99	102	2,564	99	99	2,598	...	- 3	+ 34
Administrative Management	152	171	4,372	1,689	162	164	4,515	181	177	5,296	+ 19	+ 13	+ 781
FTS, GSA, Postal Services	...	...	4,689	1,256	...	...	7,427	...	...	8,539	...	...	+ 1,112
Special Support Functions	27	26	645	217	46	45	1,102	50	50	1,230	+ 4	+ 5	+ 128
Executive Direction	29	33	1,310	210	27	27	650	27	27	655	...	...	+ 5
Total	436	455	16,683	5,293	452	449	18,962	478	474	21,270	+ 26	+ 25	+ 2,308
(Headquarters)	(300)	(323)	(13,917)	(4,502)	(322)	(319)	(13,112)	(343)	(339)	(14,784)	+ 21)	(+ 20)	(+ 1,672)
(Regions)	(136)	(132)	(2,766)	(791)	(130)	(130)	(5,850)	(135)	(135)	6,486)	+ 5)	(+ 5)	(+ 636)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					11	6	886	11	11	267			

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Management	PROGRAM: Resource Management											
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	119	117	2,871	970	118	111	2,704	121	121	2,952	+ 3	+ 10	+ 248
Headquarters	84	84	2,181	776	87	80	2,000	88	88	2,189	+ 1	+ 8	+ 189
Regions	35	33	690	194	31	31	704	33	33	763	+ 2	+ 2	+ 59
(Contracts/Grants)	XX	XX	(...)	(...)	XX	XX	(150)	XX	XX	(100)	XX	XX	(- 50)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					2	1	24	2	2	47			
Headquarters					...	...	...	...	...	...			
Regions					2	1	24	2	2	47			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION

Provides budget formulation and execution, payroll and other accounting operations and systems, program review and management, data systems development review for all Agency data systems, economic analysis activities, management sciences support and manpower management overview.

JUSTIFICATION

The increase of three positions provides for expansion of the staff capability for economic analysis of energy management activities of the Agency (+1) and increased support for financial management activities in the Regions (+2). These increases provide the minimal additional management support needed to insure successful implementation of new and expanded Agency programs. The increases are partially offset by a decrease in contract requirements, reflecting completion of one-time studies planned for FY 1977 and covering design of a cost tracking system for cost benefit evaluation and determination.

Cost Factors

Personnel Compensation and Benefits	2,565
Other Costs	287
Contracts	100
Total	2,952

Contracts ($000)
Planning Programming Budgeting and Evaluation System (PPBES) tracking system. Development of a data system for tracking energy programs through all stages of planning, programming, budgeting and evaluation, to include development of a remote capability for regions $25

Program Analyses. To be broken out into individual contracts for study of specific energy issues as they are generated in the program development process. Studies will cover program feasibility, organizational evaluation, efficiency evaluation, and program accomplishment methodology $75

87-591 O - 77 - 15

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Management

PROGRAM: Personnel Management

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	109	108	2,796	951	99	102	2,564	99	99	2,598	...	- 3	+ 34
Headquarters	77	77	2,147	767	73	76	1,972	73	73	1,998	...	- 3	+ 26
Regions	32	31	649	184	26	26	592	26	26	600	...	...	+ 8
(Contracts/Grants)	XX	XX	(118)	(32)	XX	XX	(230)	XX	XX	(272)	XX	XX	(+ 42)
FY 1977 Supplemental Pending: FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

Provides for administrative support, policies, and procedures for personnel management; employee/labor relations; management of executive development programs; recruitment and placement activities; classification; and training and development of Agency employees.

JUSTIFICATION

The increases in FY 1978 reflect increased support requirements for training, support and Agency health unit activities.

Cost Factors

Personnel Compensation and Benefits	2,097
Other Costs	229
Contracts	272
Total	2,598

Contracts ($000)

Health Units. Maintain health facilities for Headquarters and Regional personnel $200

Training. To fund executive training seminars as required by the Civil Service Commission and to provide training for Agency employees.. $72

Total..... $272

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Management	PROGRAM: Administrative Management											
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	152	171	4,372	1,689	162	164	4,515	181	177	5,296	+ 19	+ 13	+ 781
Headquarters	103	123	3,369	1,404	110	112	3,354	126	122	4,048	+ 16	+ 10	+ 694
Regions	49	48	1,003	285	52	52	1,161	55	55	1,248	+ 3	+ 3	+ 87
(Contracts/Grants)	XX	XX	(175)	(270)	XX	XX	(820)	XX	XX	(1,125)	XX	XX	(+ 305)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					5	3	282	19	15	368			
Headquarters					5	3	282	19	15	368			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(210)	XX	XX	...			

PROGRAM DESCRIPTION

Provides for security and safety, procurement activities, logistics support, directives and publications management, and administrative programs.

JUSTIFICATION

The increase of 19 positions will provide additional support in the area of contracting for both the Headquarters (+2) and the Regions (+3), especially in the area of conservation and environment (Weatherization, state grants, etc.). The largest portion of the increase, 14 positions, will provide support for the obligation guarantee program to be initiated in FY 1978. The increase in contracts includes increased billings in support of the Temporary Emergy Court of Appeals (TECA).

Cost Factors

Personnel Compensation and Benefits	3,767
Other Costs	404
Contracts	1,125
Total	5,296

Contracts ($000)

Temporary Emergency Court of Appeals (TECA). TECA provides expedious appellant and/or final decisions in what otherwise may be a lengthy process before a case is heard. The funds requested are transferred to TECA for reimbursement of salaries and other expenses related to specific cases heard before the Court	$ 500
Guard services for FEA buildings	400
Auditing of potential contractors. Federal Procurement Regulations require that all cost plus contracts involving more than one hundred thousand dollars be audited prior to, or after, the award of the contract	100
Field investigation of employees. Provides for transfer of funds to the Civil Service Commission for reimbursement of costs associated with updating clearances of present employees as well as investigations necessary for the issuance of clearances to new employees	125
Total	$1,125

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Management	PROGRAM: Federal Telecommunications System, General Services Administration, Postal Services										Change FY 1977 to FY 1978		
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate					
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	...	...	4,689	1,256	...	...	7,427	...	...	8,539	...	...	+ 1,112
Headquarters	...	...	4,689	1,256	...	...	4,544	...	...	5,175	...	...	+ 631
Regions	...	...	...	...	...	...	2,883	...	...	3,364	...	...	+ 481
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	529	...	...	...			
Headquarters					...	...	273	...	...	...			
Regions					...	...	256	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

Provides for centralized payment for all FTS billings in support of both Headquarters and Regional communications, for leasing of office space through the General Services Administration, and for U.S. Postal Service fees for indicia mail as determined by semi-annual samplings of outgoing mail.

JUSTIFICATION

Of the total increase of $1,112,000 in FY 1978, $816 thousand provides for increased space charges as identified in GSA Bulletin FPMR D-142, Public Buildings and Space, dated July 16, 1976; $25 thousand provides for expansion of the public education effort, expanded mailings of FEA publications, and general correspondence increases in support of new and expanded programs; and $271 thousand provides for projected increases in communications billings from the Federal Telecommunications System.

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Management	PROGRAM: Special Support Functions												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	27	26	645	217	46	45	1,102	50	50	1,230	+ 4	+ 5	+ 128
Headquarters	27	26	645	217	46	45	1,102	50	50	1,230	+ 4	+ 5	+ 128
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	...	...	XX	XX	(20)	XX	XX	...	XX	XX	...
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					4	2	51	4	4	102			
Headquarters					4	2	51	4	4	102			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION

Provides for (1) Internal Review activities, providing management capability for auditing internal Agency procedures and regulations, (2) Freedom of Information activities, assuring Agency compliance with the Freedom of Information Act, and (3) equal employment opportunity activities of the Agency.

JUSTIFICATION

The increase of four positions above FY 1977 levels reflects annualization of the ECPA supplemental request, which provided additional auditing capability for the Strategic Petroleum Reserve Program.

Cost Factors

Personnel Compensation and Benefits	1,084
Other Costs	146
Contracts	...
Total	1,230

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Management	PROGRAM: Executive Direction												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	29	33	1,310	210	27	27	650	27	27	655	...	...	+ 5
Headquarters	9	13	886	82	6	6	140	6	5	144	...	...	+ 4
Regions	20	20	424	128	21	21	510	21	21	511	...	...	+ 1
(Contracts/Grants)	XX	XX	(29)	(30)	XX	XX	(...)	XX	XX	(...)	XX	XX	(...)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION

Provides for the Associate Administrator for Management, the Regional management directors and their support staffs.

Cost Factors

Personnel Compensation and Benefits	584
Other Costs	71
Contracts	...
Total	655

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: Communications & Public Affairs

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Communications & Public Affairs	124	133	3,628	607	60	72	2,112*	60	60	1,804	...	-12	-308
Total	124	133	3,628	607	60	72	2,112*	60	60	1,804	...	-12	-308
(Headquarters)	(112)	(112)	(3,185)	(557)	(50)	(59)	(1,768)	(50)	(50)	(1,504)	...	(-9)	-(264)
(Regions)	(12)	(21)	(443)	(50)	(10)	(13)	(344)	(10)	(10)	(300)	...	(-3)	-(44)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			

*Exceeds the Congressional restriction of $2,036,000 specified in P.L. 94-385 dated August 14, 1976, due to an additional $76,000 added for the October, 1976 pay raise.

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: COMMUNICATIONS & PUBLIC AFFAIRS	PROGRAM: COMMUNICATION AND PUBLIC AFFAIRS												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	124	133	3,628	607	60	72	2,112	60	60	1,804	...	-12	308
Headquarters	112	112	3,185	557	50	59	1,768	50	50	1,504	...	-9	-264
Regions	12	21	443	50	10	13	344	10	10	300	...	-3	- 44
(Contracts/Grants)	XX	XX	(440)	...	XX	XX	(270)	XX	XX	(170)	XX	XX	(-100)
Fy 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

The Office of Communications and Public Affairs (C&PA) supports all programs of the agency and establishes policy and operational guidelines to insure the free flow of energy information to the public, news media, special interest groups, governmental agencies as well as internal, community and educational programs. C&PA provides public information support and coordination to the Energy Resources Council (ERC) since the Administrator of FEA serves as the Council's Executive Director. Direct relations with the media and public are accomplished through the following program elements.

Information Materials Production includes the development, production and implementation of public information and awareness programs through an effective mix of publications, fact sheets, brochures, pamphlets, reports and other written material, still and motion picture photography, radio and television production, public service announcements, exhibits and graphic arts to explain critical program issues and policies to the American public. This program also provides for development and coordination of agency-wide publications activity.

Information Materials Distribution provides for development and implementation of distribution plans for materials produced within FEA for use by the news media and the general public. Also provides for distribution operations of the Press Room.

Media, Public Inquiries, and Special Projects provides responses to media and public inquiries; coordination of interviews between FEA officials and the media and public; liaison with Regional Public Information Officers; and support of senior FEA officials in the area of media and public relations. This latter function involves the preparation of speech texts, articles, briefing books, fact sheets, Q's and A's, and other written materials.

Executive Direction provides for overall program formulation, direction, evaluation and coordination and maintains and reinforces special public affairs programs and liaison with national media, White House, Congress, OMB and other Federal agencies, private industry, public interest groups, and the general public. The Director serves as principal advisor on public affairs aspects of FEA to the Agency senior staff.

The Energy Ant Program provides for production and distribution of publications, filmstrips, posters, and other audio-visual materials aimed at furthering energy awareness in school children and the general public. To date, program materials have reached an estimated audience of more than two million.

JUSTIFICATION

C&PA functions are established to support FEA programs in accordance with Public Law 93-275 dated May 7, 1974. They include: public, internal and community information, public correspondence, publications, graphics, public appearances, and regional liaison for public affairs.

C&PA provides the Administrator and Senior Staff with support, direction and principal guidance for media-related information programs. It also stimulates public awareness of all energy policies and FEA activities, especially the need to conserve energy and to increase energy supplies. To accomplish this goal, appropriate informational materials have been made available and both written and telephonic responses provided to inquiries from the public, the press and Congress. Examples are spot public announcements, motion pictures on energy resources, personal letters and post card responses to public inquiries, press releases, "OpEd" pieces and speeches for the Administrator and Deputy Administrator.

During FY 1977 C&PA will provide graphics support for 6,000 pages of publications, distribute 20,000 photographs to the media and schools, write and distribute approximately 300 news releases, respond to approximately 9,600 requests for press material and regulations, and provide approximately 3,000,000 Energy Ant publications to school systems throughout the Nation. In addition, 300 radio service announcements will be provided to radio stations across the country; energy conservation and awareness feature films should reach an audience of over 25 million viewers; the monthly Energy Reporter newsletter will be distributed to 30,000 subscribers and over 12,000 letters will be written in response to energy related inquiries from the public.

CONTRACTS

		Cost ($000)
1.	Graphic Art and Photo Laboratory Services: To provide agency-wide support including briefing and news materials, visual aids, reports and publications.	50
2.	Exhibits and Displays--Design, Fabrication and Management: To provide national and regional support of agency programs and policies, such as Strategic Petroleum Reserve, coal leasing and conversion, and energy resource development.	25
3.	Mini-Documentary Film Series: To continue to provide mini-documentary films to TV news media, theatre, and educational audiences in support of agency and national energy programs and goals. Original series funded in FY 76.	75
4.	Production and Distribution of radio feature programs: There is a constant need by the broadcast industry for factual, up-to-date information and program materials to keep the American people informed on the national energy situation. These programs would be provided nationwide to over 5,000 radio stations reaching 90% of the public.	20
	TOTAL	170

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: Congressional Affairs

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Congressional Affairs	57	56	1,202	314	24	28	631	24	24	629	...	-4	-2
Total	57	56	1,202	314	24	28	631	24	24	629	...	-4	-2
(Headquarters)	(43)	(43)	(901)	(234)	(24)	(28)	(631)	(24)	(24)	(629)	...	(-4)	(-2)
(Regions)	(14)	(13)	(301)	(80)	...	...	...	...	...	...	...	...	...
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Congressional Affairs	PROGRAM: Executive Direction and Administration												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	57	56	1,202	314	24	28	631	24	24	629	...	-4	-2
Headquarters	43	43	901	234	24	28	631	24	24	629	...	-4	-2
Regions	14	13	301	80	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(...)	(...)	XX	XX	(...)	XX	XX	(...)	XX	XX	(...)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION

This Office provides policy guidance on Congressional activities of the Agency; develops and maintains information files on Congressional interests; coordinates all correspondence relating to Agency matters of interest to the 535 Members of Congress; provides coverage and reporting of legislative functions of the 96 Committees and Subcommittees of the Congress interested in energy; and acts as a central point of contact on Congressional relations.

FY 1978 levels of activity are difficult to project but are not expected to reflect any reduction from those experienced in FY 1976. Examples of support provided:

Coverage and reporting of Congressional hearings on energy or energy-related matters - 591 (an average of 12 hearings per week).
Coordination of FEA witnesses before Congressional Committees - 97 occasions.
Coordination of all written Congressional communications - 6,860 pieces.
Provision of oral and written justification for energy or energy-related legislation - 1,100 bills.
Response to telephonic Congressional inquiries - over 600 calls per week.

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: Private Grievances and Redress

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Executive Direction and Support	10	10	286	80	11	16	403	11	11	308	...	- 5	- 95
Analytical and Decisional Activity	44	68	1389	366	59	64	1588	69	76	1872	+10	+12	+284
Total	54	78	1675	446	70	80	1991	80	87	2180	+10	+ 7	+189
(Headquarters)	(41)	47)	(1055)	(279)	(60)	(60)	(1546)	(70)	(67)	(1704)	(+10)	(+ 7)	(+158)
(Regions)	(13)	31)	(620)	(167)	(10)	(20)	(445)	(10)	(20)	(476)	(...)	(...)	(+ 31)
ECPA: FY 77 Supplemental Pending; FY 78 Amounts Included Above					15	4	100	...	...	...			

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Private Grievances and Redress

PROGRAM: Executive Direction and Support

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	10	10	286	80	11	16	403	11	11	308	...	-5	-95
Headquarters	10	10	286	80	11	11	333	11	11	308	...	...	-25
Regions	...	...	...	...	...	5	70	...	...	...	...	-5	-70
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

Office of Exceptions and Appeals

The Office of Exceptions and Appeals is responsible for receiving, evaluating and deciding all applications for exceptions, exemption, stay and appeals filed with the FEA from any regulatory or other mandatory requirement or program administered by the FEA. The Director of the Office is authorized by the Administrator to sign all Decisions and Orders approving or denying applications received by the Office following the submission of the matter to an inter-office review committee.

Appeals

The Office of Exceptions and Appeals is authorized to analyze and decide all regulatory appeals from any order issued to a business or other entity by any FEA official. The Office is also responsible for deciding appeals from all interpretations issued by the FEA General Counsel or a Regional Counsel, all appeals from Remedial Orders issued by an FEA official and appeals filed under the Freedom of Information Act and the Privacy Act of 1974 (Pub. L. 93-579, 5 U.S.C. 552(a)). The Decision and Order issued on an appeal by the Office of Exceptions and Appeals is the FEA's final administrative determination in the matter. Any further review can only be sought from a Federal Court.

As is the case with a judicial decision, each Decision and Order issued by the Director of Exceptions and Appeals discusses in detail the application of the FEA regulations to given factual situations and provides essential guidance to FEA officials throughout the country as well as to any firm affected by FEA requirements. A Decision issued by the Director of the Office of Exceptions and Appeals also constitutes a binding precedent which governs the determination of other similar situations.

Exceptions

The exceptions process has been established to afford appropriate relief to firms that may be experiencing a serious hardship as a result of the application of the general FEA requirements. In administering this process, the Office of Exceptions and Appeals analyzes claims that the continued existence of a particular firm has been placed in serious jeopardy by the general programs authorized by the Congress and administered by the FEA and that exception relief is essential to mitigate the burden.

Exception relief may also be granted on a showing of gross inequity. Exception applications submitted on the basis of this criterion allege that unless exception relief is granted, a firm's productive capacity or operations will be subject to severe distortions; that various classes of consumers will experience severe adverse economic consequences or that significant segments of the country's productive capacity will be obstructed in a manner wholly unintended by the applicable statutes and regulations.

The type of entity that seeks exception relief ranges from small minority owned business enterprises to independent marketers and refiners to major integrated oil companies with assets of several billion dollars. Other entities that seek exception relief include public utilities, transportation systems, and county, state and local governments.

Oil Import Matters

The Office of Exceptions and Appeals is responsible for receiving, analyzing and deciding exceptions and appeals with respect to the Mandatory Oil Import Program which was established under Presidential Proclamation 3279, as amended by Presidential Proclamation 4210.

Office of Special Redress Relief

The Office of Special Redress Relief is responsible for receiving and resolving petitions in connection with matters within the jurisdiction of the FEA for which a specific regulatory process does not exist. The Office therefore, performs a general ombudsman function within FEA, handling those matters for which an appropriate regulatory process does not exist and those matters in which the regulatory process has failed to operate as envisioned by the Federal Energy Administration.

Regional Offices of Exceptions and Appeals

The Office of Exceptions and Appeals has delegated to each Regional Office the authority to decide certain types of exceptions and appeals. However, any exception application or appeal which presents issues of national importance or involves issues of major economic consequences is forwarded to the National Office of Exceptions and Appeals for analysis and decision. In addition to receiving certain significant appeals from initial decisions made by Regional Office officials, the Director of the Office of Exceptions and Appeals also exercises general supervisory authority over the exceptions and appeals functions performed by the FEA Regional Office, establishes the criteria applied by the Regional Offices in deciding exceptions and appeals and generally guides and assists the regions in the exercise of their exceptions and appeals responsibilities. Those exceptions currently delegated to the Regional Offices include pricing cases at the wholesale or retail levels involving motor gasoline, propane and aviation fuel, as well as appeals from regional decisions (other than Remedial Orders).

JUSTIFICATION

The Executive Direction Component consists of the Director of the office and one secretary. The Director provides policy guidance and management review. The headquarters support staff is responsible for operating the Public Docket Room of the Office of Private Grievances and Redress, for receiving all official filings and ensuring the appropriate processing of submissions and correspondence to the office, for operating a computerized case tracking system and for administrative support.

The component for Executive Direction and Support constitutes less than 14% of the positions requested for the Office of Exceptions and Appeals. The regional component of five man years of effort during FY 1977 is to provide typing support to the regional activities of Exceptions and Appeals. These are being dropped in FY 1978.

COST FACTORS ($000)

Personnel Compensation and Benefits	270
Other Costs	38
Total	308

87-591 O - 77 - 16

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Private Grievances and Redress	PROGRAM: Analytical and Decisional Activities												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	44	68	1389	366	59	64	1588	69	76	1872	+10	+12	+284
Headquarters	31	37	769	199	49	49	1213	59	56	1396	+10	+ 7	+183
Regions	13	31	620	167	10	15	375	10	20	476	...	+ 5	+101
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...
ECPA: FY 77 Supplemental Pending; FY 78 Amounts Included Above					15	4	100	...	10	251			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX		XX	XX				

PROGRAM DESCRIPTION

This program includes all of the substantive activities conducted by the Office of Exceptions and Appeals. For purposes of workload analysis they are considered as falling into the following categories: Pricing authorities, allocation authorities, Compliance related activity, Coal Conversion Cases, and other appeals including Special Redress Relief cases and Freedom of Information Act Appeals.

Allocation Cases (Emergency Petroleum Allocation Act, PL 93-159 as amended, Section 4)-(#10 CFR, Part 212)

During FY 1978, we anticipate that a major portion of the Applications for Exceptions, Appeals, and Applications for Stay which are submitted with respect to the FEA allocation program will pertain to the Old Oil Entitlements Program. These submissions will be considerably more complex than the typical filing which we are now receiving. The experience of the Cost of Living Council clearly indicates that as a control program continues beyond a very brief period of time the economic problems which firms encounter become increasingly complex. In addition, the firms regulated by an allocation and price controls program become increasingly sophisticated as to the remedies which they might seek. While a firm might choose to continue to incur the burdens which it encounters under a brief temporary allocation program rather than assemble the complex data necessary to obtain exception relief, it will not do so if the regulatory program persists for several years. As a result we have found that the present filings involve increasingly complex economic problems and require a detailed analysis of a firm's financial and operating posture. These tendencies will continue in FY 1978.

Pricing Cases (Emergency Petroleum Allocation Act, PL 93-159 as amended, Section 4 and Section 8) - (#10 CFR, Part 212)

The submissions involving the FEA price control program will become significantly more complex than previous filings. Because of the relatively long duration of the price controls program these submissions now require an analysis of such matters as the techniques which producers claim can be employed to produce additional quantities of domestic oil if exception relief is granted, the rate of return which would be generated if varying proportions of the firm's crude oil production were sold at new oil prices and the return which is appropriate to induce the enhanced production. In order to ensure that the statutory objectives are being advanced and that windfall profits are not being obtained, a review of the exception relief granted must be conducted subsequent to the approval of an initial application.

Compliance Related Activity (Emergency Petroleum Allocation Act, PL 93-159 as amended - Section 5)

This program decides appeals from remedial orders issued by the Federal Energy Administration after a determination that a violation of its regulations has occurred. The Regional Offices of Exceptions and Appeals are responsible for resolving certain cases involving retroactive exception applications related to compliance activity (Notices of Probable Violation) and provide field staffs where necessary to support the National Office's evaluation of appeals and exception applications.

Program projections for FEA compliance audits call for an increase from 1,921 to 5,164 for FY 1977 and a sustained level for FY 1978. The significantly expanded compliance activity will unquestionably result in a very dramatic increase in the number of appeals which are taken from adverse actions resulting from the audits. On the basis of past experience, a corresponding number of exception applications will also be filed seeking relief which would remove the potential violation under investigation.

Under the most reasonable estimates at least 17 percent of the ORP completed audits budgeted will result in Appeals. Since an appealable Remedial Order would not be issued until an audit were completed there will be a lag of approximately six months between the date on which the audit is begun and any appeal taken from a Remedial Order issued on the basis of the audit findings. On this basis the level of appeals is expected to reach 595 during FY 1977 and 1,190 by FY 1978. A minimum of 33 positions will be needed at the National Office to handle appeals from Remedial Orders alone with a back-up of 10 positions in the Regions. These estimates only include Appeal filings that may result from ORP compliance activity and do not include any positions to account for other submissions such as Applications for Stay and for Exceptions from the regulation under which the compliance action is taken or Appeals from the denial of such exception requests.

Coal Conversion (Energy Supply and Environmental Coordination Act, PL 93-319 as amended - Section 2)

This program is responsible for deciding exception applications and appeals from Construction and Coal Conversion Orders issued under the Energy Supply and Environmental Coordination Act.

The Office of Energy Resource Development is issuing Orders to utilities and Major Fuel Burning Installations which require the use of coal rather than petroleum products. These Orders are an important part of the FEA's effort to reduce dependency on oil as an energy source. Preliminary Orders were issued to 111 Major Fuel Burning Installations prior to FY 1977. An additional 153 orders will be issued by June 30, 1977. During FY 1978 FEA will make these orders effective (a Notice of Effectiveness). These notices are also subject to appeal.

Amended

Other Appeals

This program decides Petitions for Special Redress Relief filed under Section 21 of the FEAA; appeals from interpretations issued by the Regions or the General Counsel's Office, Freedom of Information Appeals and all other types of submissions which are not specifically described in other parts of this budget narrative.

JUSTIFICATION

The number of appeals from interpretations and Freedom of Information appeals may increase slightly in FY 1978. The number of petitions for Special Relief and other appeals is expected to remain the same as projected for FY 1977.

Anticipated decreases in caseload arising from decontrol of products will be more than offset by the significant increase in compliance related activity. For example, fifteen positions related to allocation and pricing cases in the regions are being eliminated along with 12 positions relating to pricing cases in the Headquarters' office. At the same time 22 positions are being added to the Headquarters' office to handle the expected surge in appeals from Remedial Orders. No significant change is anticipated in Coal Conversion Cases or in Other Appeals. Overall there is an increase of 8 man years and $184,000 as compared to the FY 1977 supplemental level.

The amended request includes $251,000 and 10 man years more than the initial FY 1978 request for this program.

COST FACTORS ($000)

Personnel Compensation and Benefits	1,677
Other	195
Total	1,872

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: Intergovernmental Relations and Special Programs

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Intergovernmental Relations	42	50	3,743	2,178	28	28	2,578	21	25	1,123	-7	-3	-1,455
Consumer Affairs/Special Impact	22	22	548	122	22	22	628	18	20	658	-4	-2	+ 30
Small Business	1	1	451	179	4	4	136	4	4	229	...	...	+ 93
Executive Direction and Administration	6	6	195	39	6	6	216	5	5	188	-1	-1	- 28
Total	71	79	4,937	2,518	60	60	3,558	48	54	2,198	-12	-6	-1,360
(Headquarters)	(33)	(34)	(3,715)	(2,181)	(33)	(33)	(2,898)	(20)	(30)	(1,646)	(- 5)	(-3)	(-1,211)
(Regions)	(38)	(45)	(1,222)	(337)	(27)	(27)	(660)	(20)	(24)	(552)	(- 7)	(-3)	(- 149)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Intergovernmental Relations and Special Programs	PROGRAM: Intergovernmental Relations												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	42	50	3,743	2,178	28	28	2,578	21	25	1,123	-7	-3	-1,455
Headquarters	14	15	2,766	1,903	11	11	2,138	11	11	801	...	...	-1,337
Regions	28	35	977	275	17	17	440	10	14	322	-7	-3	- 118
(Contracts/Grants)	XX	XX	(2,468)	(1,834)	XX	XX	(1,767)*	XX	XX	(500)	XX	XX	...
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION This program provides for the participation of State and local government in the development and implementation of national energy policy, in accordance with Section 20 of the FEA Act. At the national level, the office maintains a continuing close working relationship with the National Governors Conference and other associations of State and local officials to provide FEA with expert representation on task forces formed to resolve specific energy problems. This office also develops, coordinates and monitors contract energy projects with some of the major associations. Coordination of Agency energy activities with those of other Federal agencies at both the national and regional levels is accomplished primarily through the Intergovernmental Coordinating Committee and the Federal Regional Council System.

JUSTIFICATION

The Intergovernmental Relations Program establishes effective arrangements to assure State and local input into national energy policy development and implementation through a variety of mechanisms and ongoing procedures; provides leadership, coordination and support for the activities of the Intergovernmental Coordinating Committee, the ERC interagency staff working group which focuses on the intergovernmental implications of energy policies and programs and is chaired by the Director of IRSP; maintains close liaison with the National Associations of elected State and local officials; administers contracts with these associations through which technical and financial assistance programs are developed and delivered to State and local governments; convenes meetings of State and local officials with FEA's and other appropriate agencies' program staffs on specific issues and policies through a process designed to raise, discuss and resolve problems of State and local governments; provides leadership in the energy area within the FRC System in the role of lead agency on all energy matters; provides support to the Deputy Administrator as member of the Under Secretaries Group and oversees and evaluates FEA's Regional Office participation on the Federal Regional Councils; and provides the Administrator with timely information on emerging problems and significant energy developments in the States.

*Includes $1,267,000 of unobligated no-year money as appropriated by Public Law 94-165 for reimbursement to the States.

Information on the energy problems and concerns of State and local governments is compiled, analyzed and disseminated to appropriate offices within FEA or in other Federal agencies. Any conflicts or potential conflicts are identified, discussed and resolved through various issue resolution processes developed and implemented by this Agency.

During FY 1978 the field strength of Intergovernmental Relations will be reduced to 10 manyears, primarily devoted to Federal Regional Council activity, since FEA is the lead agency for energy in the FRC system and has made a commitment to support the FRC systems at both the national and regional levels.

Some of the energy policy input activities previously performed by IGR personnel in the regional offices will be centralized to national headquarters. The national IGR staff and the remaining regional IGR staff will provide us with the necessary resources to maintain direct contact with State energy offices which have expanded over the past two years from relatively small offices handling emergency cases under the State set-aside program to major government departments responsible for energy management and planning for the entire state.

In addition the IGR headquarters staff will continue to work with the national associations of local officials such as the National Association of Counties and the National League of Cities/Conference of Mayors to assure continued input from local elected officials to national energy policy development.

Other activities will include coordination of major FEA program officer activities with State and local government energy activities analysis of FEA policy and program initiatives for potential impact on state and local governments.

Cost Factors:

Personnel Compensation and benefits	$519,000
Other expenses (travel, printing, etc.)	104,000
Contracts	500,000
Total	1,123,000

List of Contracts

IGR Contracts with the Public Interest Groups to collect information on energy programs, conduct analytical studies of energy activities, disseminate information on proposed Federal energy programs to the Governors, State legislators, etc., and to solicit their views on these matters.

National Governors Conference	$135,000
National League of Cities	105,000
National Conference of State Legislators	130,000
National Association of Counties	130,000
	$500,000

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Intergovernmental Relations & Special Programs	PROGRAM: Consumer Affairs/Snecial Imnact												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	22	22	548	122	22	22	628	18	20	658	- 4	- 2	+ 30
Headquarters	12	12	303	60	12	12	408	8	10	428	- 4	- 2	+ 20
Regions	10	10	245	62	10	10	220	10	10	230	...	...	+ 10
(Contracts/Grants)	XX	XX	(...)	(...)	XX	XX	(...)	XX	XX	(150)	XX	XX	(+ 150)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION CA/SI advises the Administrator on the opinions of consumers, the poor, the handicapped, the elderly and Native American Indians about energy issues, options and programs and the effects they will have on these persons. This is accomplished through the review and preparation of issue papers, monthly meetings of the CA/SI Advisory Committee, for which CA/SI provides support, and through meetings of regional citizen task forces, in addition to the transmission of information received through consumer complaints and correspondence. Conversely, CA/SI transmits to the target population information about Federal energy policy and programs through consumer energy workshops, newsletters, responses to correspondence, speeches by Regional and Headquarters personnel and non-technical summaries of agency proposals, regulations and decisions.

JUSTIFICATION

The Consumer Affairs/Special Impact program will continue to fulfill its primary function, to advise the Administrator on the effects of Federal energy policy and programs on the target population. As a framework for this overall effort, the Comprehensive Human Resources Data System (CHRDS), augmented by the Transfer Income Model (TRIM), will be expanded to provide the capability for measuring the social and economic impact of the direct and indirect effects of both existing and suggested alternative energy strategies across selected population strata. In addition, studies and surveys will be undertaken to update and improve the quality of the data base. CA/SI will be the agency's focal point for citizen participation in agency decision-making through its role as coordinator of FEA's Consumer Representation Plan. Many of the Plan-related activities to increase citizen participation will be regionally oriented, including the conduct of State consumer energy workshops and the formation of regional citizen energy task forces. At this time, it is anticipated that eighty such meetings will be held during Fiscal Year 1978. Headquarters support for these meetings will be required.

At the National level, citizen participation will be facilitated by dissemination of summaries of FEA reports, proposals and recommendations in non-technical language. CA/SI will continue to provide some administrative support for the Consumer Affairs/Special Impact Advisory Committee, including the development of a Request for Proposals for analysis of proposed energy initiatives that are made by that Committee.

CA/SI's FY 1978 budget reflects a decrease of four headquarters positions. The office will retain primary responsibility for special impact policy, program and regulatory development. This encompasses special impact data systems design and development of agency policy for such groups as consumers, the poor, elderly and handicapped. Some efforts relating to the implementation of the Consumer Representation Plan will be continued by the remaining staff, composed of statisticians, attorneys and program analysts. Headquarters staff must continue to monitor implementation of the Plan by other headquarters program offices. A minimum amount of assistance will be given to those offices with their efforts to obtain informed citizen and consumer opinion relating to proposed programs and policies. FY 1978 budget totals reflect increases in travel and contracts, chiefly related to the Consumer Representation Plan and CA/SI's efforts in the data collection and analysis areas.

Cost Factors:

Personnel Compensation and Benefits	$404,000
Other expenses (travel, printing, etc.)	104,000
Contracts	150,000
Total	$658,000

List of Contracts

FY 1978 Contracts are as follows:

CA/SI Advisory Committee Support (small, purchase order contracts)	$ 90,000
Update of CA/SI study, "The Effects of Rising Energy Prices on the Low and Moderate Income Elderly"	25,000
Study of the impact of heating and cooling prices on handicapped persons	35,000
Total	$150,000

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Intergovernmental Relations and Special Programs	PROGRAM: Small Business												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	1	1	451	179	4	4	136	4	4	229	...	...	+93
Headquarters	1	1	451	179	4	4	136	4	4	229	...	...	+93
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	(88)	XX	XX	(+88)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION This program provides for small and minority business input into national energy policies, regulations and programs; for determination of the impacts of FEA actions on the Nation's 9.4 million small and minority businesses; and for assistance to small and minority businesses in coping with energy costs estimated at $100 billion annually.

This includes: advising the FEA Administrator on the energy concerns of small businesses, review of proposed policies, regulations, and programs for small business impact; maintenance of an interchange program and liaison with trade associations; development of information and data on small business energy use patterns; support for the Small Business Advisory Committee and the Interagency Small Business Energy Committee; joint programming with SBA and ERDA; participation in small business meetings; and response to small business inquiries.

JUSTIFICATION

This program includes The Small Business Energy Cost Reduction Program which is an analysis of specific industrial sectors of small business. These analyses provide the basis for an "energy cost reduction guidebook" for each sector which will be disseminated through a series of workshops and visits to individual firms. Although FEA has funded the cost of the studies and training of personnel to conduct the workshops, trade associations will print and distribute the guidebooks and sponsor the workshops at no cost to the government (estimated value $1.5 million) and the Small Business Administration will provide out-of-pocket and travel expenses estimated at $300,000 for SCORE volunteers who will conduct some workshops and handle visits to individual firms.

	76	77	78
Businesses contacted	6	250,000	2,000,000
Workshops held	..	200	1,000
Publications	..	1,000,000	2,000,000
Small Businesses counseled	..	10,000	50,000
Estimated decrease in consumption as a result of these programs (barrels of oil per day)	..	10,000	100,000

FEA proposes to extend the Small Business Energy Cost Reduction Program through a contract ($60,000) to convert the existing conservation studies in such industries as chemicals, cement, rubber, bakeries, etc. for small business use. This conversion would consist of a review of the original FEA audit data, comparison of that data against a single small business case, and preparation of a non-technical guide for small businesses in the industry. This approach will avoid a duplication of effort and produce useful energy cost reduction information at approximately 25% of the cost of original studies in these industries.

In FY 1978, $28,000 will provide for the cost of instructional materials and training of workshop leaders and Senior Corps of Retired Executives (SCORE) volunteers, in support of individual visits to small businesses by SCORE volunteers to assist in implementing the Small Business Energy Cost Reduction Program.

Cost Factors:

Personnel Compensation and benefits	$112,000
Other expenses (travel, printing, etc.)	29,000
Contracts	88,000
TOTAL	$229,000

List of Contracts

Contracts for FY 1978 include: conversion of four FEA conservation studies for small business use; and preparation of instructional materials and conduct training of workshop leaders and SCORE members who will staff energy cost reduction workshops (sponsored by trade associations) in the four (4) additional sectors of small business.

Conversion of FEA Studies	$60,000
Instructional Material and Training	28,000
Total Contracts	$88,000

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Intergovernmental Relations and Special Programs	PROGRAM: Executive Direction												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	6	6	195	39	6	6	216	5	5	188	-1	-1	-28
Headquarters	6	6	195	39	6	6	216	5	5	188	-1	-1	-28
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(...)	(...)	XX	XX	(...)	XX	XX	...	XX	XX	...
FY 1977 Supplemental Pending; FY 1978 Amounts ECPA Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION This program provides direction and coordination for the activities of the Office of Intergovernmental Relations, Consumer Affairs and Special Impact and Small Business. It provides executive planning, policy development, evaluation, management and administrative support such as budget formulation, personnel mangement, training and general administrative functions for these activities.

JUSTIFICATION

The Office of the Director is the principal advisor to the Administrator in matters involving other levels of government, consumers, the aged, small business, handicapped, Indians and other minorities. The Director represents the Administrator and the agency in meetings with individuals and groups impacted by energy problems.

COST FACTORS:

Personnel compensation and benefits	$153,000
Other expenses (travel, printing, etc.)	35,000
TOTAL	$188,000

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: Policy and Program Evaluation

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Program Development and Evaluation	...	...	...	...	10	5	190	11	11	380	+1	+6	+190
Energy Policy Development	44	40	1,234	272	40	40	1,412	45	45	1,550	+5	+5	+138
Executive Direction	4	3	85	22	5	5	128	5	5	132	...	...	+ 4
Total	48	43	1,319	294	55	50	1,730	61	61	2,062	6	11	332
(Headquarters)	(48)	(43)	(1,319)	(294)	(55)	(50)	(1,730)	(61)	(61)	(2,062)	(6)	(11)	(332)
(Regions)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					2	2	76	3	3	80			

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Policy and Program Evaluation	PROGRAM: Program Development and Evaluation												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	...	...	...	...	10	5	190	11	11	380	+1	+6	+190
Headquarters	...	...	...	...	10	5	190	11	11	380	+1	+6	+190
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(...)	(...)	XX	XX	(50)	XX	XX	(100)	XX	XX	+(50)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters													
Regions													
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION: This program coordinates the program development process for FEA issues on new or substantially changed program authorities and responsibilities and conducts major, indepth evaluations of existing FEA programs, to make recommendations to the Administrator and Deputy Administrator with respect to appropriate changes needed for implementation. In addition, this office develops and evaluates planning objectives for the budget preparation process to assure consistency with national energy policy, to assist the Office of Management in analyses of all FEA program plans to meet planning objectives, and reviews the overall FEA annual budget.

JUSTIFICATION: As a result of the FEA reorganization approved by the Administrator in June of 1976, the Office of Policy within the former Office of Policy and Analysis is now a separate office reporting directly to the Deputy Administrator with the new title of the Office of Policy and Program Evaluation. The intent of this restructuring, which affords new responsibilities in the area of program management, is not to duplicate existing responsibilities in the Office of Management but to more fully and effectively coordinate program development and evaluation with policy development and analysis.

These new responsibilities may be separated as follows:

- Program Development

  To effectively coordinate the program development process for Agency issues on new or substantially changed program authorities and responsibility. This process is applicable to approval of all major FEA programs which:

  - would be newly included in FEA Operating Plans;
  - would involve significant change from existing program direction or priorities;
  - would require either the appropriation of additional resources or the redistribution of current resources;
  - involve an area of significant disagreement between staff elements over location and execution of a program.

  The staff processed seven program development issues. In excess of 35 issues are expected to be fully processed per year. Processing is not limited to coordination but encompasses assuring adequacy of all program development issues generated in the Agency with respect to format, depth of discussion, objective of arguments, preciseness of resource allocation, and

timeliness of proposal; coordinating final preparation, review (by all Headquarters and Regional Offices), and evaluation of all such issues; and, preparing indepth evaluation and full analysis for review and decision by the Deputy Administrator.

- Program Evaluation

  To conduct (in conjunction with Management and affected program offices) major, indepth evaluations of existing FEA programs to make recommendations to the Administrator and Deputy Administrator with respect to appropriate changes needed. Seven existing programs were approved to be evaluated for the TQ and first quarter 1977 in accordance with the Office of Management and Budget's guidelines with respect to Presidential Management initiatives. Based on these approvals, it is projected that 14 evauations will be performed this year.

- Program Budget Evaluation

  To develop and evaluate planning objectives for the budget preparation process to assure consistency with national energy policy; to assist Management in analyses of all FEA program plans to meet long range planning objectives; and to perform an overall FEA annual budget review and provide recommendations to Management.

COST FACTORS:

11 positions, salaries and benefits	$262,000
Contracts	100,000
Other	18,000
Total	$380,000

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Policy and Program Evaluation	PROGRAM: Energy Policy Development													
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	44	40	1,234	272	40	40	1,412	45	45	1,550	+5	+5	+ 138
Headquarters	44	40	1,234	272	40	40	1,412	45	45	1,550	+5	+5	+ 138
Regions	...	...	...	...	...	..	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(193)	(...)	XX	XX	(350)	XX	XX	(400)	XX	XX	+(50)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					2	2	76	3	3	80			
Headquarters					2	2	76	3	3	80			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(25)	XX	XX	(...)			

PROGRAM DESCRIPTION

This activity has primary responsibility in three areas:

1. Policy Development

   This activity has the primary responsibility for the coordination, development and continual refinement of policy in response to the changing energy situation, new policy directions on the part of the Administration and the Congress, and new legislation. The scope of this activity ranges from preparing policy papers for FEA, ERC and Presidential review to developing the energy portion of the President's State of the Union Message; from providing continual input into the President's energy issues book to developing policy options and program strategies on all elements of the energy situation handled within FEA.

2. Policy Analysis

   This activity has the responsibility of conducting a wide range of policy analyses in evaluation function. This activity encompasses the review, evaluation and integration of all energy related programs, policies, and legislation in the FEA and in support of the ERC.

3. Support to ERC

   This activity includes costs of all staff support activities to the Energy Resources Council including planning and coordinating agendas, preparation of briefs, talking points, background papers, information papers and minutes of meetings. In addition, this office assures that all issues identified for ERC review are completed on a timely basis and conform to all criteria necessary for ERC presentation.

JUSTIFICATION: As the central policy development center for FEA, continued demands are anticipated in FY 78 to provide expeditious and expert policy development in response to changes in energy policies or passage of new legislation. Based on FY 76 experience and FY 77 expectations, numerous proposals will be initiated both within the Executive Branch and Congress which will necessitate comprehensive

and effective efforts in the area of energy policy development and coordination. Included in this category are new regulatory and legislative initiatives.

Some of the major FY 78 policy projects now planned include Alaskan gas transportation, liquified natural gas imports, new international initiatives, domestic crude oil price decontrol strategies, utility finance strategies, strategic reserve strategies, nuclear power, new technologies, natural gas curtailments and Outer Continental Shelf development strategies.

The following energy initiatives have been enacted into law: Naval Petroleum Reserves; Strategic Reserves; ESECA Extension; Energy Labeling; Emergency Standby Authority; Conservation Standards for Buildings; Weatherization Assistance; and Alaskan Gas Transportation. For each of these initiatives, this office performs an ongoing substantive role prior to enactment:

- early Congressional drafts of bills, comparable to the Administration's are analyzed for purpose and function, probable amendments, Administration position, and a selected course of action based upon current Administration policies on the particular issue.
- liaison with the pertinent Congressional committees involved in the drafting of bills, resolutions, and amendments.
- composing testimony on numerous occasions for each of the energy issues along with questions and answers for the Administration's use during the interrogatory period. Background materials are also prepared to support the Administrator's statements.
- respond to various Congressional requests regarding energy legislation.
- once legislation passes the Congress and is sent to the President, this office inputs into the enrolled bill memorandum to the President soliciting the viewpoints of the other interested FEA offices. A signing/veto statement and a fact sheet for each piece of enacted legislation is additionally prepared when required.

It should be noted here that with the reduction in FEA's Congressional Affairs staff, our workload has increased as this office is called upon to a greater degree to review legislation, prepare testimony, monitor and analyze hearings and conferences, etc. To characterize this increased workload, during FY 76, with full Congressional Affairs staffing, P&PE (POLICY) was involved in the preparation and/or substantive review of approximately 180 separate testimonies which FEA was requested to deliver on the Hill. This office furnished major input into the writing of approximately 25% of those statements, while being responsible for the actual preparation of testimony and back-up materials for approximately 20% of those hearings.

The Congress has been extremely active in the energy area. For example, during the 2nd session of the 94th Congress, 1,985 separate pieces of energy-related legislation were introduced. It is considered pro forma for many of these bills to be sent to the Federal Energy Administration for comment. The Office of P&PE reviews this legislation in depth in order to provide sound reasoning for either encouraging or discouraging the concepts contained therein. During the 2nd session of the past Congress, more than 100 bills were examined and commented upon.

Regulatory policy development involves recommendations for changes in the Federal Energy Administration price and allocation regulations, and analyzing Administration and Congressional proposals affecting allocation and price policy, with regard to National and regional economic impacts. During calendar year 1976, comments were prepared on 5 rulings, 51 proposed regulation changes, and 56 final regulation changes, many of which were subject to three or four drafts. The review of exceptions and appeals cases has increased P&PE's regulatory policy development efforts. FY 76 saw 1,030 cases resolved; and it is anticipated that there will be 1,200 cases for FY 77 and 1,970 cases for FY 78. It is estimated that P&PE is regularly involved in the substantive review of 10% - 15% of these cases.

87-591 O - 77 - 17

Most importantly, this Office coordinates the Policy Issues Process for FEA. This process is applicable whenever the Administrator's approval or disapproval of a new FEA policy is involved; whenever the matter involves significant changes from existing policies; or whenever major disagreement develops between two or more offices as to the policy to be followed. In 1976, approximately 40 policy issues were processed through the FEA issues process. This system will continue to be utilized on a comparable basis for FY 1978.

The most resource consuming efforts in the Office of Policy and Program Evaluation for FY 78 will be in the area of policy development and policy analysis. There will be a continuing need for a constant monitoring of our energy situation and a constant reevaluation of our energy policies in light of the changing energy situation and in light of new directions the Congress and the Administration may choose to take. There are too many uncertainties regarding future energy supply and demand to expect that energy policies established over the short-term will remain fixed. Because of this, our responsibilities in the area of policy analysis will necessitate greater efforts in 1978. Some of the important issues include:

- analysis to justify further production incentive increases;
- design and analysis of domestic crude oil pricing projections;
- analysis of changes to entitlements program and Mandatory Oil Import Program;
- major exceptions and appeals cases;
- strategic reserves oil acquisition and impacts on foreign and domestic energy policy;
- continuing economic and regional impact analysis of Presidential and Congressional price (de) control proposals;
- natural gas liquids are related products (supply, demand and allocation assessments);
- ongoing analyses of changes to current price and allocation regulations;
- ongoing analyses of supply and allocation problems in the Northern Tier;
- competitive aspects of marketing and distribution logistics;
- analysis of natural gas curtailments for each winter and development of policy options to minimize the effects;
- reviewing and assessing policy options and regulatory proposals to ensure timely development of the Outer Continental Shelf;
- reassessing the potential of nuclear technology to meet our 1985 needs and beyond;
- evaluating issues in the international area such as:

  - OPEC pricing
  - Canadian pricing and supply
  - Producer-consumer country negotiations
  - U. S. export policies on coal and uranium
  - Foreign investment in the U. S. energy sector

- analysis of our utilities policies for continuing applicability;
- analysis of issues with regard to new technologies;
- analysis of issues associated with this nation's ability to finance needed new energy sources and conservation programs;
- assessing coal production and use, and analyzing related policy issues, including environmental implications;
- reassessing current environmental regulations and proposals to determine energy impacts.

The updating of the National Energy Outlook will be a major task associated with this functional area. This report represents an annual series of energy forecasts designed to evaluate alternative energy policies. This will involve comprehensive national and regional energy planning, on both a short-term and long-term basis, making use of complex computer models and engineering analyses.

The Office of Policy and Program Evaluation expects increased workload for FY 1978 in support of the Energy Resources Countil. This Office assesses all background papers, status reports, briefing papers, issue papers and the agenda calendar itself on behalf of the FEA Administrator and Deputy Administrator to assure consistency with national energy policy, timeliness of issue, adequacy of presentation and depth of discussion. In conjunction with the Administrator's office, this Office establishes the long range ERC agenda and assures that all issues identified for ERC review are completed on a timely basis and conform to all criteria necessary for ERC presentation. This Office actually prepared or had substantive input into 60 issues which came before the ERC in the last year. Scope of participation extends from assistance in drafting and review of issue papers to actual writing of issue papers; from conducting interagency meetings prior to submission of papers to preparing Presidential memos following ERC meetings.

COST FACTORS:

45 positions, salaries and benefits	$1,074,000
Contracts	400,000
Other	76,000
Total	$1,550,000

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Policy and Program Evaluation	PROGRAM: Executive Direction												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	4	3	85	22	5	5	128	5	5	132	...	....	+ 4
Headquarters	4	3	85	22	5	5	128	5	5	132	...	...	+ 4
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(...)	(...)	XX	XX	(...)	XX	XX	(...)	XX	XX	(...)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters													
Regions													
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION: This activity provides support to the Associate Administrator, his assistants, his Administrative Officer, and their clerical staff in the execution of their duties and responsibilities.

JUSTIFICATION: As a result of the FEA reorganization, the Office of Policy and Program Evaluation was required to establish an administrative staff. This office's responsibilities consist of coordinating milestones and schedules relating to proposed policy issues and statements, performing a variety of special projects and studies, and being responsible for the total office management program effort. The administrative staff provides the following internal liaison and support services;

- o Contracts management: plans and reviews all funding actions, tracks contract projects and reports, serves as liaison with FEA's Project Review Board and Procurement office;
- o General services: handles all administrative action with regard to staffing plans, personnel, travel, space, equipment and correspondence control;
- o Publications: plans, budgets, manages and tracks all printing requirements and provides graphics support and staff assistance for editing and design;
- o Budget support: prepares budget request for OMB and Congressional submissions; appropriately allocates and monitors flow of funds.

While existing functions were re-allocated to provide for an administrative staff in the Transition Quarter, additional staff is necessary for both FY 77 and FY 78, although the level for both these years will remain the same.

COST FACTORS:

5 positions, salaries and benefits	$119,000
Other	13,000
Total	$132,000

Program Development and Evaluation

	($000) Cost
FY 78 CONTRACT REQUIREMENTS:	
Contract support for evaluations of preoperative and current programs to provide quick response analysis of data regarding program scope, targeting, costs and payoffs, including program assumptions of individual, sectoral and industrial behavior as affected by program assistance, incentives and disincentives	100
Subtotal	$100

Energy Policy and Development

FY 78 CONTRACT REQUIREMENTS:	
Group of contracts to conduct a wide range of policy analyses in support of our policy development and coordination function to further goals of energy independence in such areas as conservation, nuclear and coal programs, OCS, LNG, international policy, and emergency measures	250
A group of task order contracts to support development of regulatory and pricing policies regarding Alaskan oil and gas, production incentive factors, natural gas liquids costs, and enhanced recovery techniques	150
Subtotal	$400
TOTAL FY 1978 CONTRACTS	$500

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: Energy Information and Analysis

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Executive Direction	13	11	582	126	13	13	344	13	13	352	...	...	8
Economic Impact Analysis	62	60	2,186	442	55	58	2,768	61	61	3,490	6	3	722
Data and Analysis	150	135	4,459	2,180	144	144	6,902	205	205	14,562	61	61	7,660
Data Services	162	143	15,236	3,792	155	154	18,919	180	180	21,181	25	26	2,262
Total	387	349	22,463	6,540	367	369	28,933	459	459	39,585	92	90	10,652
(Headquarters)	(367)	(329)	(21,978)	(6,433)	(357)	(359)	(28,623)	(449)	(449)	(39,275)	(92)	(90)	(10,652)
(Regions)	(20)	(20)	(485)	(107)	(10)	(10)	(310)	(10)	(10)	(310)	(...)	(...)	(...)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					73	70	5,497	90	90	7,914			

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Energy Information & Analysis

PROGRAM: EXECUTIVE DIRECTION

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	13	11	582	126	13	13	344	13	13	352	...	...	8
Headquarters	13	11	582	126	13	13	344	13	13	352	...	...	8
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(...)	(...)	XX	XX	(...)	XX	XX	(...)	XX	XX	(...)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION

The Energy Conservation and Production Act of August 14, 1976, Section 142, establishes the Office of Energy Information and Analysis. The Office of Assistant Administrator for Energy Information and Analysis (OEI&A) is responsible for the analysis of energy related programs. To achieve this objective, the Office's primary activity is the review, and coordination of energy programs. Through the quantitative analysis of various policy alternatives and the assessment of the economic and social impacts of those alternatives, the office provides statistical and analytical studies on which to base the FEA's overall formulation and evaluation of energy policy. This office is responsible for developing a family of econometric models to perform impact analysis, analyzing long-term energy supply and demand and producing short-term and long-range energy forecasts. To support these efforts, this Office also includes data collection, processing and ADP systems design for all of FEA. This program also serves as the national energy data clearing house for State and Federal government agencies, for Congress and the general public.

In addition, the Assistant Administrator is responsible for providing the supporting services necessary for the proper execution of the Administrator's responsibilities through the Office of Management Operations. The supporting services provided by Management Operations include:

- Contract Management, including the planning and review of all funding actions, guidance for project officers, tracking and reporting on contracts progress, and liaison with FEA's Project Review Board and Procurement Office.
- General Services, including travel, personnel, space, equipment, and correspondence control.
- Publications, including the planning, management, and tracking of all printing requirements.

- Budget preparation and execution, including the development of justifications, estimation of program costs, support activities relating to OMB and Congressional consideration of budget requests, and direction, review and monitoring of funds following appropriations.

The following legislation empowers the Assistant Administrator for Energy Information and Analysis to perform his mission: The Federal Energy Administration Act enacted May 7, 1974, The Energy Policy and Conservation Act, enacted December 22, 1975, Emergency Petroleum Allocation Act of November, 1973; Executive Order 11821, the Energy Supply and Environmental Coordination Act (ESECA) of 1974; and the Energy Conservation and Production Act of August 14, 1976.

JUSTIFICATION:

In order to support the anticipated increases in personnel, contract support and program management analyses in FY 78, it will be necessary to maintain the FY 77 staff level of 13 positions.

COST FACTORS:

Personnel Comp & Benefits	325
Others	27
TOTAL	352

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY INFORMATION AND ANALYSIS	PROGRAM: ECONOMIC IMPACT ANALYSIS												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	62	60	2,186	442	55	58	2,768	61	61	3,490	6	3	722
Headquarters	62	60	2,186	442	55	58	2,768	61	61	3,490	6	3	722
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(894)	(56)	XX	XX	(1,316)	XX	XX	(1,976)	XX	XX	(660)
FY 1977 Supplemental Pending; ECPA FY 1978 Amounts Included Above					5	5	250	6	6	397			
Headquarters					5	5	250	6	6	397			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(120)	XX	XX	(235)			

PROGRAM DESCRIPTION

The Office of Economic Impact Analysis is responsible for economic analytical functions in support of FEA policy making and programming. The primary activity of the office is directing the development, application and maintenance of advanced economic models as they relate to energy supply, energy demand, and substitutability of alternate energy sources, performing macroeconomic and microeconomic analyses of the impacts on the economy and society of energy shortages, and of FEA policies and programs, assessing the state of the economy as it relates to energy; analyzing the impact of changes in energy supply, demand and policies in support of the Federal Energy Administration's programs and policy analysis on the economy; analyzing economic, institutional and resource constraints on energy policies and programs; and assessing supply and demand impacts. In addition, the office has responsibility for the assessment of capital, labor, materials, transportation and other resource requirements for meeting national energy programs and for the analysis of energy strategic options and the evaluation of program and policy alternatives. The Economic Impact Analysis program also is responsible for the development of methodologies for analyzing the economic and environmental impact of energy-related actions on the national, regional and international economies.

In order to accomplish its mission, the Office of Economic Impact Analysis is functionally organized into four program elements: Macroeconomic Impact Analysis; Socioeconomic Impact Analysis; Competition Analysis, and Regional Analysis.

The following legislation empowers the Office of Economic Impact Analysis to perform its mission: The Federal Energy Administration Act (FEAA) enacted May 7, 1974, The Energy Policy and Conservatin Act (EPCA), enacted December 22, 1975, Executive Order 11821, Emergency Petroleum Allocation Act of 1973 (EPAA), and the Energy Conservation and Production Act of August 14, 1976.

JUSTIFICATION:

Competition Analysis: This program is established to provide analysis and evaluation of the impact of energy related events, activities or programs on the market structure of energy producing industries; to analyze the impact of regulatory actions and programs relating to the energy industries on the economy, and to analyze the impact of price and quantity regulations on energy products. This program will assess competition in the U.S. energy industries and its impacts on price, supply and the development of energy resources, and will provide analyses of Congressional activity with respect to divestiture of the petroleum industry, and competitive implications of Congressional energy proposals.

The above Competition Analysis responsibilities are authorized or mandated by the following: EPCA, Sections 455 & 521(b); EPAA, Sections 4(c)(2) and 12(d)(1) and 2; FEAA, Section 5(b)(5); Executive Order 11821, Sections 1, 2(a) and 3.

The analyses started in FY 1977 will be continued into FY 1978 to assess the effect on competition in all phases of the petroleum industry with the planned decontrol of crude oil and petroleum products by May 1979. To comply with the requirements authorized under ECPA, an increase is anticipated in the volume and complexity of economic impact analyses of crude oil, petroleum product, and other FEA regulations, as well as government actions affecting utilities and coal. Demand for market structure analyses is anticipated as price and allocation controls on the oil industry are phased out under EPCA. As petroleum products are decontrolled and as crude oil prices are gradually decontrolled, it becomes increasingly more difficult to ascertain the effects of additional changes in petroleum product price regulations, alternative primary energy sources and secondary energy sources. In addition the implementation of new regulations, the elimination of regulations, and modification of existing regulations (the volume of which will increase as regulations are eliminated through FY78) will require continuing resources specific to this activity.

Socioeconomic Impact Analysis: This program is established to develop the data and methodology to analyze the impact of energy policy on the poor and various minority groups in society. The program will analyze the impact of energy events on the income distribution, occupational status, migration patterns, and employment status of socioeconomic groups. This will analyze the impact of alternative energy policies on low and middle income families.

The above Socioeconomic Analysis responsibilities are authorized or mandated by the following: ECPA, Section 31(3) and FEAA, Sections 15(c)(2) and 18.

An outgrowth of Project Independence, the annual National Energy Outlook (NEO) containing analyses of various energy policy scenarios' impacts is a continuing requirement. The need for updating and integrating of indirect consumer price effect models will continue as more reliable data or systems present themselves. Inclusion of indirect price effects in household impacts will present a more complete picture of the true impact of energy shortage. In addition, NEO scenarios of Project Independence Evaluation System are required to be made available to the Public and Congress.

Macroeconomic Impact Analysis: This program has primary responsibility for developing the methodology and analyses to quantify the relationship between energy alternatives and the economy in aggregate and disaggregated terms. The program develops, implements, and analyzes the output of macroeconomic models of the U.S. economy that relate energy to the broad sectors of the U.S. economy: consumers, businesses, industry, investment, foreign trade, and the economy as a whole. The interrelationship of energy and economics is used to determine the impact of broad energy alternatives on the economy, and disaggregated sectors of the economy.

The above Macroeconomic Analysis responsibilities are authorized or mandated by the following: FEAA, Sections 5, 14 and 18; Executive Order 11821, Sections 1 and 2(a); EPCA, Sections 521(b), 401 and 251; and ECPA, Sections 54(b), 109, 121, 122, 113, and 31(3).

ECPA establishes domestic crude oil ceiling prices, forecast and monitor actual price behavior, determine amount of excess oil revenues, and develop corrective action as necessary. Continuation of efforts to model the relationship between the energy sector and the general economy and to relate the effects of PIES analyses to business, industry and the economy. Continuation of support functions for International Energy Affairs (IEA) and participation in the preparation of the NEO. The impact of alternative world energy scenarios on less developed countries in support of CEIC and the feedback effects on the U.S. economy will be adequately analyzed and included in the National Energy Outlook in FY 1978.

Increase in number of proposals, regulations, and rules to be evaluated as products are decontrolled. The complexity of the analyses may increase, as an increasing number of products are decontrolled because of the uncertainties involved in the interactions between energy prices and the economy. Supply data on stripper oil and enhanced recovery techniques are used to compute crude oil paths as determined by FEA regulations.

Regional Analysis: This program has primary responsibility for developing the methodology and analytical expertise to quantify the relationships between energy policy or energy events and the spatial distribution and environmental effects of economic activity. This would include responsibility for estimating the effects of energy on regional growth and industrial location, estimating the degree of disparity in the regional costs and supplies of energy, analyzing the desirability of certain region policies (e.g., the development of oil shale) identifying important regional problems and recommending solutions and tracing out the effects of energy policy on state and local finance.

The above Regional Analysis responsibilities are authorized or mandated by the following: FEAA, Section 18, EPCA, Titles I, II, and IV Section 364; EO 11821; and ECPA, Section 31(3).

It is anticipated that in FY 78 regional and environmental impact analyses will be required with respect to coal conversion, facility siting, potential nuclear moratoria, crude and product decontrol, Alaskan natural gas transportation, and energy/environmental/water use tradeoffs. Regional labor, environmental, and boomtown impacts for NEO will be provided. Supports. Regional Energy Activity & Demographic (READ) Model which will become operational in FY 78. Regional impact models are being increasingly integrated with the Project Independence Evaluation System (PIES). It is anticipated that public requests for use of those models will be forthcoming under ECPA and that regional impact analyses of NEO solutions will also be requested by Congress and the public.

COST FACTORS:

Personnel Comp & Benefits	1,403
Contracts	1,976
Others	111
TOTAL	3,490

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Energy Information and Analysis

PROGRAM: DATA AND ANALYSIS

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	150	135	4,459	2,180	144	144	6,902	205	205	14,562	61	61	7,660
Headquarters	150	135	4,459	2,180	144	144	6,902	205	205	14,562	61	61	7,660
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(1,161)	(1,331)	XX	XX	(2,950)	XX	XX	(8,963)	XX	XX	(6,013)
FY 1977 Supplemental Pending; ECPA FY 1978 Amounts Included Above					42	42	3,442	58	58	5,347			
Headquarters					42	42	3,442	58	58	5,347			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(2,350)	XX	XX	(4,013)			

PROGRAM DESCRIPTION

The Office of Data and Analysis is responsible for all statistical and forecasting analysis functions in support of energy policy and program development. The Office formulates and directs statistical programs designed to assemble and validate energy data collected by other Federal and private organizations; identifies necessary data not provided by these sources, participates in the development and implementation of new data collection systems, develops requirements or specifications for data bases and analyzes energy data, evaluates policy and program requirements for energy data, and prepares and disseminates statistical reports. It develops, applies and maintains advanced econometric and process models of the energy system required for analysis of policy issues; prepares short and long range forecasts of energy supply/demand distribution and the relationships between energy and economic factors; coordinates long range energy forecasts of the Federal government; and assesses international and regional factors affecting energy supply and demand.

The following legislation empowers Data and Analysis to perform its mission: The Federal Energy Administration Act (FEAA) of May 7, 1974; The Energy Policy and Conservation Act (EPCA) of December 22, 1975; The Energy Petroleum Allocation Act of 1973 (EPAA); Energy Supply and Environmental Coordination Act (ESECA) of 1974; Executive Order 11821; and the Energy Conservation and Production Act of August 14, 1976.

In order to accomplish its mission, the Office of Data and Analysis is functionally organized into four program elements: Energy Systems Data; Oil and Gas Analysis: Coal, Nuclear and Electric Power Analysis; and Energy Systems Modeling and Forecasting.

Energy Systems Data: This office is responsible for the specifications of standards for the substantive conduct of energy data collections; for the development of both occassional and continuing data acquisition programs; for the review, validation, and control of energy systems data bases; for the processing of energy data to derive the information necessary for the syntheses and analysis of energy policy; and for the distribution and dissemination of energy systems information to the user community in coordination with the National Energy Information Center. The major interface is with the Energy Systems Modeling and Forecasting Office in the design and development of models and supporting data bases for forecasting all aspects of energy supply, demand and conversion and distribution systems.

Oil and Gas Analysis: The Oil and Gas Analysis program area involves the modeling and forecasting of oil and natural gas including developing, maintaining, documenting, operating, calibrating and extending capabilities to assess the impact on supply and demand of short-term disruptions in energy markets, new technologies, environmental standards, alternative energy policies and regulatory practices; assimilates, reviews for quality and consistency, analyzes, and reports data concerning the cost and price of oil and gas at all levels in the distribution chain. Provides development and application of structural models of prices, and complete quantitative analyses of price changes under alternative policies, economic conditions, and competitive situation; concerns financial aspects of the oil and gas industry and assimilates financial information, maintains financial data bases, maintains access to external data sources, uses econometric modeling, monitors oil industry financial performance, and provides analytic studies of economic, financial and accounting questions. Study areas cover the industry's profits and investment performance, financial and accounting method, capital requirements, sources and uses of funds, and institutional structure; relates to statistical aspects of pertroleum and natural gas supply and demand information, and is to identify, assemble, analyze, maintain and report current and historical data relating to oil and gas for the purpose of supporting analytical efforts, informing the government and public, and to support the formulation and implementation of decisions that affect national oil and gas supplies and demand. Analytical efforts include studies of various economic, technological, and behavioral factors impacting oil and gas supply and demand.

Coal, Nuclear and Electric Power: The Office assimilates and reports statistics describing the current and historical supply, demand, costs, and prices for the specified energy sources; identifies and develops substantive data collection requirements in support of energy policy and program analysis; assimilates, develops and maintains automated mathematical and statistical systems to forecast energy supply, demand, cost, and prices; incorporates in the energy forecasting methodologies the capability to assess the impact upon assigned energy supply, demand, costs, and prices of short-term disruptions in energy markets, new technologies, environmental standards, alternative energy policies, regulatory practices and analyses of financial requirements. The office participates in energy forecasting, statistical, and analytical programs where coal, nuclear, and electric power studies cannot be separated from integrated analyses of the energy system; publishes current statistics and forecasts of specified energy supply, demand, costs, and prices; and documentations of specific forecasting, statistical and analytical methodologies; prepares analysis of important factors and uncertainties in estimating future supply and demand, and serves as the focal point for inquiries concerning coal, nuclear, and electric power statistical and analytical issues.

Energy Systems Modeling and Forecasting: The Office is established to develop, maintain, validate, enhance, and apply integrated economic and process models of domestic and international energy production, utilization, and prices, in response to Federal Energy Administration energy policy analysis and program development requirements. The focus of the office is on the coordinated development of economic research and modeling activities providing an analytical capability for forecasting and policy analysis of energy production, utilization, and prices. The office is responsible for examining fuel substitution possibilities, demand reduction and modification possibilities, alternatives for conversion of fuels to energy, and alternative new technologies for supplying energy. The general responsibilities is to perform and coordinate analyses of current and proposed policies and programs which may simultaneously influence the supply of, demand for, or prices of, multiple energy products and require a comprehensive analysis of the integrated energy systems.

Included in the above are the following:

- Analytic capability which integrates regional, fuel, and sector specific supply and demand models so as to provide baseline forecasts and scenario analysis in support of administrative and legislative requirement;

- use and maintenance of the Project Independence Evaluation System (PIES), and integrating framework which combines fuel-specific supply models and sector- and fuel-specific demand models with transportation and conversion representations in an analysis framework which includes a price equilibrating mechanism for balancing supply and demand to present an integrated model of energy markets both domestic and international (note that primary supply models and data are furnished to this function by other programs)

- multi-fuel, sector-specific regional demand and fuel substitution analysis for national and international energy markets;

- analysis of the impact of conservation programs and options for energy forecasting and program support; and

- international analysis, using the International Energy Evaluation System (IEES) extension of PIES to international markets.

In addition to the ongoing requirements imposed by the various acts and executive orders governing Data and Analysis activities, specific new requirements for FY 78 are as follows:

Oil and Gas Reserves Assessment

An oil and gas reserves assessment is necessary in FY 1978 to fulfill a number of Congressional mandates and is basic information required in analyzing energy alternatives. The assessment includes a survey of oil and gas reserves and an extensive field validation program. Resources are necessary to develop data requirements, develop samples, design validation procedures, conduct audits and field studies, complete statistical and analytical studies, and prepare reports. This assessment is necessary for meeting the requirements of the FEA Act of 1974 (Section 5) and ESECA of 1974 as amended which requires FEA to collect energy information on reserves and publish data on a quarterly basis.

National Energy Information System Development

Resources are necessary for implementing high priority data activities, updating data bases, extending the NEIS to fill major data gaps, and documenting the NEIS. Major data base efforts referred to above will include PIES, the international data, coal data base, and energy price data. Section 57 (a) of ECPA requires the publication of an annual report and additional reports to provide a comprehensive picture of the entire system of energy production, distribution, prices and consumption. Section 57(b)(1) requires adequate documentation of all statistical reports at the time of publication.

General Modeling and Forecasting

Modeling and Forecasting capabilities are necessary for consumption demand analysis; forecasting supply, prices, and energy distribution; and analyzing energy alternatives. Additional resources are necessary to maintain existing models, revise models to be responsive to changes and legislation, update mathematical coefficients, and calibrate and validate models against actual data and other models. FEA is required under FEAA (Sections 5(b)(2), 5(b)(9), 13(a), 14(a) and 15(b)) to monitor energy markets, prepare projections of supply - demand balances, prepare comprehensive reports on consumption and supply trends, and develop projections of energy demand and supply to assess energy sufficiency.

Annual Report

ECPA (Section 57(a)) requires that the Director of the Office of Energy Information and Analysis produce an annual report containing a wide variety of statistical information including short-, medium- and long-term forecast informaxion. Additional resources are required to produce this new report which includes expanded information over other reports required by Congress.

Project Independence Evaluation Study (PIES) Access

ECPA (Section 31) directed that the PIES analysis system must be accessible to Congress and the Public. To accomplish this on a timely basis, resources are necessary to develop an automated access, capability and provide analytical support to users.

Consumption Data Base Development

ECPA (Section 52) requires development of a comprehensive energy consumption data base meeting the needs of Federal agencies, the Congress, State and other users are essential for analysis of energy alternatives. In a detailed examination of consumption data including over 2.7 million data elements convering the major consuming sectors, fuels, and geographic areas will be conducted.

Data Validation

A major effort is needed to validate energy data covering the issues of data accuracy, comprehensiveness, duplicates, user requirements, legislated requirements, verification, consistency, respondent burden and precision of meaning. Data validation criteria will be applied to 20 data systems out of an estimated 240 energy data systems in the Government in FY 77 and an additional 50 systems in FY 78. Sections 141(b) and 142 of ECPA require, explicity, data validation of FEA and all other Federal energy data systems.

General Analysis

The application of data bases, models, and other statistical and analytical techniques to specific energy issues and energy alternatives is required for development of comprehensive energy policy. High priority areas include analysis of natural gas deregulation, natural gas curtailments studies of electric utility rate schedules, conservation and BTU taxes, Alaskan Oil, Alaskan natural gas distribution and pricing and crude oil pricing.

Cost Factors:

Personnel Comp & Benefits	5,015
Contracts	8,963
Others	584
TOTAL	14,562

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Energy Information & Analysis

PROGRAM: Data Services

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	162	143	15,236	3,792	155	154	18,919	180	180	21,181	25	26	2,262
Headquarters	142	128	14,751	3,685	145	144	18,609	170	170	20,871	25	26	2,262
Regions	20	15	485	107	10	10	310	10	10	310	...	...	...
(Contracts/Grants)	XX	XX	(11,269)	(2,733)	XX	XX	(15,000)	XX	XX	(16,468)	XX	XX	(1,468)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					26	26	1,805	26	26	2,170			
Headquarters					26	26	1,805	26	26	2,170			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(1,129)	XX	XX	(1,468)			

PROGRAM DESCRIPTION

The Office of Data Services has sole responsibility within FEA for the design, development and operation of all data collection and data processing systems supporting the Federal Energy Administration as well as the administration of the National Energy Information Center (NEIC), the single Federal clearinghouse for energy data. The functions of this Office encompass all headquarters activities and all regional data requirements. Some of the legislation which created requirements for the functions performed by the Office of Data Services are:

EPAA, PL93-159, enacted November 27, 1973, Section 4
FEAA, PL93-275, enacted May 7, 1974, Sections 5, 13, 14, 20 and 25
ESECA, PL93-319, enacted June 22, 1974, Sections 2, 5, 8-11
EPCA, PL94-163, enacted December 22, 1975, Sections 101, 154-158
ECPA, PL94-385, enacted August 14, 1976, Sections 109, 111, 113, 121, 122, 142, 203-205, 416, 461

JUSTIFICATION

1. Support to other FEA Offices: This program provides ADP and data collection services to the Office of Management, Exceptions & Appeals, Congressional Affairs, Intergovernmental Relations & Special Programs, General Counsel, Communications and Public Affairs and Policy & Program Evaluation. Specifically, resources for FY 78 are requested for the following: continued maintenance of all FEA administrative systems, including payroll and personnel, horizontal accounting, contracts, property management and others; operation of the Comprehensive Human Resources Data System (CHRDS) including system maintenance, collection of additional data, and contribution to the interagency consortium of Transfer Income Model (TRIM) model users in support of the Consumer Affairs/Special Impact Programs; enhancements to the consumer complaint and correspondence system to anayze complaints on matters relative to changes in energy policy; enhancements to and operation of the exceptions and appeals monitoring systems, and impact analysis systems supporting the Office of Policy & Program Evaluation.

2. Support to Energy Information and Analysis: This program provides ADP and data collection services to the Office of Energy Information and Analysis (EIAA) which is responsible for performing economic impact analyses related to potential and actual changes to energy programs; completion of the National Energy Outlook (NEO) report; development and operation of supply/demand, availability and production models related to energy resources, on both national and international levels; completing all other analyses required by FEA authorizing legislation, and publishing periodic statistical reports.

In order to support programs of the Office of Energy Information and Analysis, massive data bases and extensive data support are required. The data must be updated frequently and forecasting tools must be constantly monitored to reflect changing national and international energy supply and economic factors. In FY 78, legislatively mandated recurring and special reports will continue to require extensive ADP support for the following:

Continued collection and maintenance of data and computer models in support of the preparation of the National Energy Outlook. The extensive modeling and forecasting capabilities require continued data acquisition, software enhancement and overall system maintenance.

Integration of consumption data for entry into consumption data base.

Data acquisition and system maintenance for the International Modeling System, Short Term Supply and Demand Forecasting Systems, and Coal, Nuclear and Electric Power Data Base.

Enhancement, maintenance and operation of petroleum pricing systems, including improved procedures and additional linkages. These systems are also required for decontrol analysis.

Data collection and processing of price data for decontrolled petroleum products.

Operation of the Joint Petroleum Reporting System and production of special reports.

System development, data reduction and report generation for the new oil and gas reserves survey.

Data validation for all FEA systems, including procedures, and documentation audit of all data systems.

Maintenance of the Market Shares System, including programming, data acquisition and data processing.

Studies to determine the economic impact of energy policies on the populace, aggregated at the regional level.

Data acquisition and updating of the third National Household Energy Use Survey.

Transfer to FEA information pertaining to energy data systems maintained by other Federal agencies for use in the NEIS.

Implementation and operation of new energy data subsystems required for the NEIS.

Continued development and validation of NEIS subsystems and the data contained in those subsystems for overall accuracy and completeness.

Collecting and processing of data for those elements of the FEA Annual Report which are not supported by existing collection efforts.

Conversion of PIES models to permit public access and operational support for public access.

The NEIC continues to expand the scope and depth of its information bank. In FY 78, the expanded information gathering requirements of

the FEA Act will further stimulate utilization of the NEIC by the Congress, the public and both Federal and State agencies. This expanded use of NEIC will necessitate a continuation of support for the following:

Continuation of National Technical Information Services (NTIS), which include periodical printing and distribution, document processing and announcements.

Access to energy information data bases for use in conducting research and answering inquiries and subscriptions to energy related periodicals at both the national and regional levels.

Expansion and maintenance of a large integrated data base which provided data from all major data systems to the public and support for NEIS.

Operation of the FEA library data systems.

3. Support to Regulatory Programs: This program provides ADP and data collection services to the Office of Regulatory Programs which is responsible for the audit and enforcement activities required to insure compliance with FEA legislation. In addition, Regulatory Programs must provide a standby force to perform regulation development and operational readiness responsibilities in accordance with the FEA Act and provide contingency planning for distribution of supplies in the event of a curtailment of supplies or new development.

In order to support programs of the Office of Regulatory Programs, resources are required in FY 78 for the following:

Enhancement of Propane Information System required by revised regulations, legislation and program requests.

Modification of the Refinery Yield Model to include identification of crude quantity and quality on a regional basis.

Modification of Compliance Case Tracking System to correspond to regulatory and functional changes.

Maintenance and operation of ongoing regulatory systems, including motor gasoline, contingency plans, refinery cost audit, and monitoring of selected decontrolled products.

Enhancement and maintenance of the mandatory oil import system to include direct interface with the U.S. Customs Service system and process directly from that system.

Conceptualization and systems development in support of the contingency planning for petroleum product curtailment including a gas rationing monitoring system.

Maintenance and operation of the crude oil entitlements system, designed to equalize costs among domestic refiners while maintaining a competitive market.

Update the crude oil pricing system to meet changing requirements.

Maintain and operate the crude oil exchange (buy/sell) system which determines whether a refiner is a "buyer" or a "seller", then allocates available crude oil among refiners.

Continued development and modification of the compliance audit target ranking system to incorporate program changes.

Development of special auditing target runs from historical files for the Transfer Pricing System. Implement systems to process revised data forms resulting from decontrol.

System development and maintenance in support of the Alaskan Crude Oil Allocation System, which analyzes the impact of excess Alaskan crude oil on the northwestern states.

Update the 76 study of the impact of Canadian crude oil curtailments on the Northern tier states.

Operate and maintain as well as modify crude oil pricing systems to comply with legislation pertaining to the first sale price of stripper well crude oil.

4. Support to Conservation & Environment: This program provides ADP and data collection services to the Office of Conservation and Environment which is charged with reducing U.S. energy demand, developing programs to encourage efficient energy use, and ensuring environmental concerns are balanced with national energy goals. Conservation activities encompass federal and state agencies and include project concerned with utility operation and utility rate design, environmental assessments, transportation efficiency, consumer product labeling, industrial monitoring, marketing and education, and administration of the renewable-resource loan guarantee program, and Federal/State coordination which includes administration of the low income weatherization program and provision for exchange of energy information.

In order to support programs of the Office of Conservation and Environment, resources are required in FY 78 for the following:

Data base design and maintenance for systems related to conservation policy and program development and evaluation.

System operation and maintenance to support State conservation systems; industrial, van pool, and buildings workshops; and technical assistance to States developing State level conservation programs.

Enhancement and maintenance of the systems developed to promote and monitor Federal conservation programs.

Support for the Utility Load Management and Rate Policy Program.

System development and implementation to support the Commercial Transportation Efficiency programs.

Data base development and modeling for the applicance program.

Enhancements, expansion and maintenance of industrial energy conservation programs.

Operation and maintenance of systems to support: the design of electric utility rates; the monitoring of grants and loans; the low-income weatherization program.

Enhancement of systems to maintain exchange of energy information among states.

5. Support to Energy Resource Development: This program provides ADP and data collection services to the Office of Energy Resource Development which is responsible for developing and implementing national programs and policies to increase production and utilization of energy from present sources and encourage development of new sources. To support this area, extensive inventory monitoring is involved, as well as are information systems to monitor development, production and reserve conditions both nationally and by region.

In order to support programs of the Office of Energy Resource Development, resources are required for the following:

Enhancement, maintenance and operation of the Natural Gas Curtailments survey system to include programming, systems, data collection and processing.

Enhance the Major Fuel Burning Installation Coal Conversion System to meet expanded power plant conversion from petroleum to coal.

Development and implementation of the Coal Information System to provide data on the coal industry and supply/demand data.

Development of system that would support coal loan guarantees programs for opening old coal mines or improving existing ones.

Development of centralized data bases to support the Energy Facility Siting and Project Inventory Systems.

6. Support to International Energy Affairs: This program provides ADP and data collection services to the Office of International Energy Affairs which is charged with establishing and maintaining bilateral and multilateral relationships with foreign countries and with the completion of analyses and studies necessary to evaluate international energy resource supply and demand for the formulation of U.S. energy policies. The Energy Policy and Conservation Act established an international energy data exchange program. This program requires a constant monitoring of the U.S. supply situation.

In order to support the programs of the Office of International Energy Affairs, resources are required in FY 78 for the following:

Maintenance, improvement and documentation of systems which provide information on international crude oil stocks, costs, and pricing for the IEA Standing Group on Oil Markets.

Develop and implement a system to assess thecurrent level of foreign investment in U.S. energy corporations.

COST FACTORS:

Personnel Comp & Benefits	4,140
Contract	16,468
Others	573
TOTAL	21,181

CONTRACT LIST - ECONOMIC IMPACT ANALYSIS

Competition Analysis	325
Analysis of horizontal divesture	(85)
Assessment of competition in the petroleum industry	(90)
Competition analysis to support NEO	(150)
Socioeconomic Analysis	500
Third national household survey	(130)
Indirect consumer price effects analysis	(350)
Public access to PIES	(20)
Macroeconomic Analysis	575
Analysis of the macroeconomic effects of alternative market structure	(50)
Macroeconomic interindustry analysis	(105)
International energy analysis	(75)
Petroleum product pricing model	(75)
Natural gas impact analysis	(75)
Crude oil pricing	(175)
Public access to PIES	(20)
Regional Analysis	576
Regional and State income and employment analysis	(231)
State and local government fiscal impacts	(100)
Regional environmental studies	(130)
Regional model development	(95)
Public access to PIES	(20)
TOTAL FOR ECONOMIC IMPACT	1,976

DATA AND ANALYSIS CONTRACTS

Oil and Gas Reserves Survey

Field audits (30 Fields)	(775)
Data validation and reconciliation	(600)
Data processing - keypunch, edit, machine time	(400)
Data processing software	(200)
Miscellaneous - administrative, printing project management	(25)
SUB TOTAL	2,000

National Energy Information System Development

PIES integrating model documentation update	(50)
PIES demand model documentation update	(50)
International energy demand and supply models update	(50)
PIES energy transportation/transmission update and documentation	(50)
International energy data base update	(50)
Major additions to the data base	(150)
Electric power data bases to be maintained and further expended	(50)
Nuclear and new technology data assimilation, monitoring, implementation and reporting	(50)
Expand nuclear and new technology data assimilation, monitoring, implementation and reporting	(30)
Coal data assimilation, maintenance and reporting	(50)
Compilation of coal data on production and consumption for additional time periods; regionalization of mine cost data; analysis of sensitivity of modeling and forecasting activity to crucial data elements	(30)
Continuation of data collection for post exemption monitoring of gasoline, propane and selected other petroleum products	(250)
Documentation of routine reporting procedures and major data bases for petroleum and natural gas supply	(50)
Analysis of natural gas curtailments through direct survey of industries and large commercial gas users	(100)
Operate the data assimilation, analysis and reporting phase of the petroleum industry financial reporting system	(100)
Comparative Analysis of Company Responses to alternate Oil and Gas reporting systems	(100)
SUB TOTAL	1,210

General Modeling and Forecasting

Commercial sector process and conservation modeling	(100)
Industrial environmental/conservation process models	(100)
Environmental air/water quality capability in the PIES/READ system	(100)
Residential/commercial appliance penetration/energy consumption analysis	(100)
OECD structural energy demand/supply analysis	(150)
Energy demand forecasting for non-OECD countries	(50)

International energy supply/transportation analysis.....(100)
NEO quick turnaround support.....(150)
PIES software stabilization and documentation.....(175)
Regional modeling support.....(99)
Integration and coordination of short-, mid-, and long-term forecasting procedures. Revision of short-term modeling capabilities to include actual 1976 and 1977 data and capabilities for annual revision and backcasting analysis. Inclusion of state and Federal incentives and disincentives for coal.....(100)
Coal forecasting and analysis systems and model development, for short-term, mid-range and long-term forecasting of coal demand, supply, transportation and economics. Systems and model testing and validation.....(75)
Developing, maintaining, and implementing and enlarged and expanded nuclear and new technologies mid-term forecasting and analysis system.....(150)
Developing, maintaining and implementing nuclear and new technologies mid-term forecasting and analysis systems.....(50)
The forecasting and analysis models will provide projections of electric power supply sufficiency, prices and the sensitivity of these variables to economic and other factors.....(50)
The development acquisition of a power generation reliability analysis model, and a simulation model of the national electric power transmission network.....(100)
Assemble data base for regionalized national Energy Accounts.....(100)
Assemble and maintain improved international data base for use by IEES.....(100)
Develop management procedures and user interface for end-use consumption data base.....(50)
Update and improve documentation of PIES data base.....(50)
Finish assembling READ data base and structure the data to meet additional requirements.....(25)
Development of short-term natural gas price forecasting system.....(100)
Continuation of development, reconciliation and documentation of short-term petroleum demand models.....(150)
Update natural gas distribution model to include 1976 pipeline flows and intra-state pipeline description.....(50)
Analytical support to long-term oil and gas supply forecasting model in support of FEO-78.....(100)
Update, perform necessary restructuring and apply refinery models to issues related to oil supply, price forecasting, and refinery operations.....(50)
NEO development, review and production.....(50)

SUBTOTAL.....2,474

PIES Access

PIES access administrative support.....(100)
PIES access user documentation update.....(25)

SUBTOTAL..... 125

Consumption Data Base

Update the Energy Consumption Date Base (State Energy Information System and Functional Use Consumption Data Base).....(60)
Residential Energy Consumption Survey - Phase II (implementation).....(250)
Industrial Energy Consumption Studies - Phase II (implementation).....(170)

SUB TOTAL..... 480

Data Validation

Expand documentation and validation of data inputs and modeling operations. Include state data validation programs.....(50)
Validation and documentation of coal data systems, data processing procedures, coal forecasting and analysis systems.....(20)
Expanding data validation procedures for the assembling and reporting of nuclear and new technologies energy information.....(50)
Development and implementation of data validation procedures - nuclear and new technologies.....(25)
Electric power data collected by the FPC and NRC will be independently validated for consistency with FEA data bases.....(25)
Develop primary validation criteria for FEA systems.....(20)
Study precision measurements in petroleum industry.....(30)
Validate 5 FEA data systems (Contract 1).....(75)
Validate 5 FEA data systems (Contract 2).....(75)
Standardize data base data elements for all Federal data systems.....(200)
Validate 20 Federal energy data systems (Contract 1).....(300)
Formalize and document data validation procedures for general use.....(24)
Validate 4 Federal energy data systems (Contract 2).....(60)
Evaluation, review, documentation and recommend modification to post-exemption price monitoring system, study would include detail evaluation of major Federal petroleum price data systems including imports, petroleum refinery and retail prices, and transportation costs.....(200)
Data review and validation study of natural gas supply, demand, distribution, curtailments and price data.....(25)
Data review and validation study of refinery capacity information reported to the government.....(25)
Data review and validation of Government estimates of oil and gas resources.....(150)

SUB TOTAL.....1,354

General Analysis

Extend PIES review.....(50)
Strategic storage analysis.....(50)
Internal energy supply analysis.....(160)
General analysis includes monitoring and interpretation of electric power data and the preparation of periodic and special reports describing the Nation's status to electric power.....(50)

Examines the economic trade-off between generation reserve margins and increased transmission line interconnections	(50)
Documentation of nuclear and new technology data and analysis systems, procedures and activities	(50)
Special studies applying the existing models and systems to forecast coal supply and price patterns under varying government initiatives and policies and various levels of U.S. energy use	(30)
Updating and developing solar energy and new technology portions of the PIES model	(100)
Detailed studies and analysis applying the Coal Data Base and modeling capabilities including the changing patterns of near and long term coal analysis	(120)
World-wide survey of probable and possible additions to energy sources	(100)
Update regionalized National Energy Accounts data base to include 1975 and 1976 data	(120)
Extend management procedures and user interface for consumption data data base to handle more extensive data required by ECPA	(80)
Analysis of secondary storage facilities owned by industrial and commercial users of petroleum. Determine changes in capacity since 1973, and seasonal fluctuations to estimate impact on demand calculations	(100)
Analysis of end-use consumption of residual oil, distillate oil and gasoline	(75)
Update analysis of Outer Continental Shelf production potential	(75)
Analysis of sensitivity of oil and gas supply to alternative prices and to new sources of supply	(100)
SUB TOTAL	1,320
TOTAL D&A FY-78 CONTRACTS	8,963

CONTRACT LIST - OFFICE OF DATA SERVICES

Support to Other FEA Offices

ADP Facility Operation and Management 900
Data Preparation Support 360
Other Contracts 700
- Personnel and Payroll, Accounting, Property Management and Procurement Systems .....(220)
- Comprehensive Human Resources Data System (CHRDS), Consumer Complaint and Correspondence System and Usage of the TRIM Model .....(425)
- Regional Operations.....(55)

SUBTOTAL 1,960

Support to EI&A

ADP Facility Operations and Management 4,100
Data Preparation Support 280
Other Contracts 3,472
- NEIC - Technical Reference, Referral, Publication and Distribution.....(588)
- NEO Systems Data Bases - PIES, READ .....(800)
- Consumption Data Base - Consolidate Several Consumption Subsystems into an Integrated Data Base .....(200)
- Maintenance and Operation of Data Bases and Data Validation to Support: Coal, Nuclear and Electric Power Studies; International Supply; Demand and Pricing Modeling; Short Run Supply and Demand Forecasts; Regional Income and Employment Impact Models; Third National Household Energy Use Survey .....(250)
- Maintenance and Processing of Price and Energy Data for: Pricing Systems; Decontrolled Petroleum Product Analyses; Joint Petroleum Reporting System .....(235)
- Oil and Gas Reserves - Update 1976 Oil and Gas Reserves Study .....(260)
- Market Shares Data Processing .....(330)
- Interagency Data Collection .....(119)
- NEIS Operation and Maintenance .....(100)
- NEIS Data Validation .....(250)
- PIES Access and Processing of Data for the FEA Annual Report.....(340)

SUBTOTAL.....7,852

Support to Regulatory Programs

ADP Facility Operations and Management 900
Data Preparation Support 580
Other Contracts: 605
Maintenance and Processing of Data in Support of:
Compliance Systems ..... (70)
Regulatory Operations to Include Systems for:
Mandatory Oil Imports; Refinery Yields and Audits; Entitlement Programs; Transfer Pricing; Price Regulations; Crude Oil and Product Allocation ..... (350)
Contingency Planning and Regional Operations ..... (185)

SUBTOTAL 2,085

Support to Conservation and Environment

ADP Facility Operations and Management 700
Data Preparation Support 565
Other Contracts 1,046
C&E Policy and Program Development and Evaluation Data Base Development, and Regional Operations ..... (105)
State Programs: State Projects - Enhance, Maintain and Operate Data Systems in Support of State Energy Conservation Projects; Systems Maintenance to Monitor and Evaluate the Effectiveness of C&E Workshop Programs; Technical Assistance to States Implementing Conservation Data Management Programs ..... (535)
National Programs: Federal Energy Management Program (FEMP) Data Support to Implement the Ten Year Plan for Federal Energy Management; Utility Programs - Data Support to Utility Management and Utility Rate Policy Programs; Voluntary Programs - Data Support to Commercial Transportation Efficiency Programs ..... (200)
Mandatory Programs - Appliances Data Base Development and Modeling Support for the Technical Efficiency Monitoring Programs; Data Collection and processing for Establishment of Industrial Conservation Goals and for Monitoring of Progress for the 10 most Energy Consumptive Industries ..... (60)
Energy Conservation and Renewable Resource System; Electric Utility Rate Design Proposal Development and Electric Utility Grants System; and Weatherization Programs ..... (146)

SUBTOTAL 2,311

Support to Energy Resource Development

ADP Facility Operation and Management 810
Data Preparation Support 140
Other Contracts 1,020
Natural Gas Information Systems - Data Collection, Processing and Reporting for the Natural Gas Information System ..... (565)
Coal Systems: Coal Conversion for Major Fuel Burning Installation (MFBI); Coal Financial Information System - Development and Implementation of a System to Monitor the Coal Industry Financial Status, used for the Loan Guarantee and other Coal Programs; Coal Loan Guarantees for Underground Coal - System Development that would support proposed program, Financial Accounting and Program Evaluation and Monitoring ..... (270)

ERD Integrated Data Systems, Centralized Systems and Data Bases to Support Energy Facility Siting and Project Inventory Systems	(100)
Regional Operations	(85)
SUBTOTAL	1,970
Support to International Energy Affairs	
ADP Facility Operation and Management	40
Data Preparation Support	35
Other Contracts	215
International Oil and Product Data System - Information Systems which Store & Compile Data on International Crude Oil	(145)
Foreign Direct Investment (FDI) in U.S. Energy - System to Explore the Level of Foreign Investment in U.S. Energy Corporations	(70)
SUBTOTAL	290
TOTAL DATA SERVICES CONTRACTS	16,468
GRAND TOTAL EI&A CONTRACTS	27,407

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: REGULATORY PROGRAMS

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual Pos.	FY 1976 Actual MY	FY 1976 Actual Amount	TQ Amount	FY 1977 Estimate Pos.	FY 1977 Estimate MY	FY 1977 Estimate Amount	FY 1978 Estimate Pos.	FY 1978 Estimate MY	FY 1978 Estimate Amount	Change FY 1977 to FY 1978 Pos.	Change FY 1977 to FY 1978 MY	Change FY 1977 to FY 1978 Amount
Compliance	1326	1004	24,782	7,111	1326	1324	35,443	1384	1384	37,148	+ 58	+ 60	+1,705
Headquarters	(162)	(80)	(2,442)	(926)	(162)	(160)	(4,946)	(155)	(160)	(5,060)	(- 7)	(0)	(+ 114)
Regions	(1164)	(924)	(22,340)	(6,185)	(1164)	(1164)	(30,497)	(1229)	(1224)	(32,088)	(+ 65)	(+ 60)	(+1,591)
Operations	349	322	8,701	3,126	75	208	6,099	164	234	7,356	+ 89	+ 26	+1,257
Headquarters	(186)	(148)	(4,626)	(1,726)	(75)	(136)	(4,341)	(124)	(131)	(4,863)	(+ 49)	(- 5)	(+ 522)
Regions	(163)	(174)	(4,075)	(1,400)	(...)	(72)	(1,758)	(40)	(103)	(2,493)	(+ 40)	(+ 31)	(+ 735)
Contingency Planning	24	17	837	836	24	24	1,922	22	22	969	- 2	- 2	- 953
Data Coordination	30	16	788	140	27	26	887	18	20	691	- 9	- 6	- 196
Executive Direction and Administration	37	37	871	185	31	33	881	35	35	934	+ 4	+ 2	+ 53
Total	1766	1396	35,979	11,398	1483	1615	45,232	1623	1695	47,098	+ 140	+ 80	+1,866
(Headquarters)	(439)	(298)	(9,564)	(3,813)	(319)	(379)	(12,977)	(354)	(368)	(12,517)	(+ 35)	(- 11)	(- 460)
(Regions)	(1327)	(1098)	(26,415)	(7,585)	(1164)	(1236)	(32,255)	(1269)	(1327)	(34,581)	(+ 105)	(+ 91)	(+2,326)
FY 1977 Supplemental Pending: FY 1978 ECPA Amounts Included Above					290	61	2,795	...	...	...			

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: REGULATORY PROGRAMS	PROGRAM: COMPLIANCE											
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	1326	1004	24,782	7,111	1326	1324	35,443	1384	1384	37,148	+ 58	+ 60	+ 1,705
Headquarters	162	80	2,442	926	162	160	4,946	155	160	5,060	- 7	0	+ 114
Regions	1164	924	22,340	6,185	1164	1164	30,497	1229	1224	32,088	+ 65	+ 60	+ 1,591
(Contracts/Grants)	XX	XX	(410)	(...)	XX	XX	(530)	XX	XX	(625)	XX	XX	(+95)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					70	19	504	...	...	...			
Headquarters					5	1	28	...	...	...			
Regions					65	18	476	...	...	...			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION The Compliance Program enforces the Federal Energy Administration's pricing, allocation, and import rules and regulations that are applicable to the petroleum industry. The authority to enforce such regulations as promulgated under Section 4(a) of the EPAA is contained in Section 5. The EPAA has been extended and amended by Title IV of the Energy Policy and Conservation Act (EPCA). The National Office develops, executes, monitors and evaluates national policies, strategies and programs for obtaining uniform application of the regulations and for insuring compliance. It is also responsible for verifying energy data pursuant to Section 13 of the FEA Act. The ten regional offices are responsible for the actual implementation of the Compliance Program, including conducting investigations and audits to determine whether companies have complied with FEA's regulations. The regional offices also undertake the institution of formal enforcement actions such as the issuance of Notices of Probable Violation, Remedial Orders, Consent Orders, and compromises of civil penalties.

The regional Compliance Program is subdivided into nine program areas aligned with the marketing levels of the petroleum industry. The Headquarters staff provides both program support to these nine programs and provides staff support not directly related to the nine programs. Staff support involves the performance of "fixed" Headquarters requirements that are needed to adequately support regional Compliance efforts. This "fixed" requirement does not fluctuate based on regional size. Fixed requirements include performing field reviews, working National Office cases, processing freedom of information requests, operating and maintaining the Compliance Management Information System, developing and updating policy and procedural guidance, scheduling regional workload, performing staffing functions, managing Compliance training, and developing requirements for managing the targeting system.

The compliance program is designed so that Federal resources are concentrated on auditing those sectors of the petroleum industry with the greatest economic impact on consumers and those firms within each sector with the largest amount of probable violations.

Importers

A staffing level of 18 will permit importers to be audited on a five year cycle, 20% per year.

An importer is defined as any firm that owns at the first place of storage a regulated petroleum product brought into the United States. These firms perform as resellers and importers. In the latter capacity, the import regulations must be applied as well as entitlement transfers. In addition, the importers become involved in domestic/international exchanges. Audits are required for each of these areas. Price increases must be reviewed to assure proper license and supplemental fees. Compliance with pricing regulations must be determined.

PROGRAM: COMPLIANCE

PROGRAM DESCRIPTION: (Continued)

Crude Oil Resellers
A staffing level of 42 will permit crude oil resellers to be audited on a five year cycle, 20% per year.

A crude oil reseller is defined as any firm which is usually the first purchaser of crude oil subject to price rules. Crude Oil Resellers include those collectinn crude oil by tank, truck unit, train, barge, tanker or pipelines. Companies taking title to purchased crude must obtain a price certification from the seller. In addition to equitable pricing, the pass through of old oil certification must be equally applied. Each of these areas must be examined by FEA. FEA activities include audits of documents, receipt accounts and inventory accounts, including run statements, purchaser summary, exchange status, processing agreements, production requisition, etc. There are 470 Crude Oil Resellers.

Independant Crude Producers
A staffinn level of 258 will permit independent crude producers to be audited at the rate of 18% per year.

An independent crude producer is defined as a firm or that part of a firm primarily involved with obtaining (drilling) crude petroleum from the ground or which owns crude petroleum when it is produced. Under the present three-tier pricing system, determination must be made of whether producers have properly measured and priced old and new crude oil for the purposes of price and entitlements programs. There are about 15,261 independent crude producers; production by refiners is audited under the refinery program. Producers/operators are targeted from complaints, FEA reporting forms, or link-audit clues. Audits include a statistical sampling of the targeted firm's properties. After completion of this sampling, the firm's selected properties are examined for their crude oil pricing for the period of September 1973 to the month of audit.

Major Refiners
A staffing level of 393 will permit continuous coverage of major refiners.

The 35 largest refiners in the United States have been designated "major" for compliance purposes. All have refining capacity in excess of 75,000 barrels per day. Most also have extensive overseas exploratory development, crude production and refinery operations. Because major refiners are, for the most part, completely and thoroughly integrated, the compliance effort includes work in all areas from crude production through refinery operation and the marketing chain. The focus of audit coverage is toward specific areas of operations on a nationwide basis as opposed to an individual refiner basis.

PROGRAM: COMPLIANCE

PROGRAM DESCRIPTION: (Continued)

Small Refiners
A staffing level of 69 will permit audit level of 31% annually.

All other refiners not included in the 35 majors are considered to be small refiners. The capacity of a small refiner is less than 75,000 barrels per day. Compliance is achieved through enforcement of the regulations covering the pass through of allowable costs, the uniformity of price increases between products, the proper allocation of increased product costs among product categories, price discrimination between classes of purchasers, inventories, consistent business practices, etc. To insure that the refiners pass through only those direct product costs, and such other costs as are authorized by the FEA regulations and to determine that the refiners are in compliance with other applicable regulations, the auditors test and review information from periodic reports, records, documents, and other data which will be made available by the refiners. The thrust of coverage of small refiners is toward known or potential problems identified by link-audit clues, information from the National Office or complaints. There are 107 small refiners.

Natural Gas Liquids
A staffing level of 156 will permit 29% of such plans to be audited yearly.

This program covers firms that are primarily involved with the operation of a gas plant in which natural gas liquids are separated from natural gas, or in which natural gas liquids are fractionated or otherwise separated into natural gas liquid products. There are 825 such gas plants. Audits include a sampling of appropriate records at gas plants in which the firm holds an interest in order to validate the pricing of natural gas liquids and/or natural gas liquid products during the period from August 1973 to the month of audit.

Propane Resellers
A staffing level of 37 will permit resellers to be audited on a five year cycle, 20% per year.

Propane resellers are targeted by both the National Office and the regions. Audits determine compliance with allocation and pricing rules. Both areas are especially significant for this product as propane is the best alternate fuel for natural gas and is projected to be in short supply. Resultant price and supply pressure offer substantial inducement for violations of FEA regulations. There are about 2,500 resellers.

Propane Retailers
A staffing level of 84 will permit annual audit of 14% of retailers.

There are approximately 10,000 firms which act as retail outlets of propane. Propane retailers will be selected by a computerized targeting system and the use of reporting forms. Audits include an examination of propane pricing for the period November 1973 to month of audit. The primary concerns are the calculation of maximum authorized selling prices and the proper determination of class of purchaser for industrial users, state and local government and residential customers. This program is of major concern to agricultural users who have no substitute fuel available to dry and process crops, and heat animal and poultry shelters and rural residences.

PROGRAM: COMPLIANCE

PROGRAM DESCRIPTION: (Continued)

Resellers - Other

A staffing level of 172 will permit continuation of this program in which audits are initiated to uncover significant embargo period violations.

This program covers firms (other than a refiner or retailer) primarily involved with the trade or business of purchasing, receiving through transfer, or otherwise obtaining covered products (excluding crude oil and propane) and reselling or otherwise transferring them without substantially changing their form. Reseller customers generally exclude those purchasers which are ultimate consumers. The exceptions are those products in large quantities. Audits measure compliance with pricing regulations. Of primary concern are maximum selling prices and proper determination of class of purchaser between industrial, state and local government, and residential customers.

COST FACTORS ($000)

Personnel and benefits....	31,133
Travel.....	3,903
Other.....	1,487
Contracts.....	625
Total request.....	37,148

The amended request includes $1,200, 163 positions and 32 manyears more than the initial FY 1978 request for this program

87-591 O - 77 - 19

Amended

PROGRAM: COMPLIANCE

JUSTIFICATION

The staffing required for any market level is based upon a simple formula which is the number of audits to be performed multiplied by the number of hours per audit with the result divided by the number of productive hours per staff year. The number of audits performed is based upon a percentage of the universe to be audited each year. These percentages, program by program, were established in March 1976 by the President as the necessary coverage level to assure adequate compliance.

In the Headquarters, a ratio of approximately .065 Headquarters personnel to regional personnel is used to calculate support for the 9 programs. These activities include technical guidance, on-site visits for fact gathering, monitoring activities, resolution of formal actions, special analyses, data collection, coordination of multiregional projects, etc.

Following are workload analyses for both the regional programs and the Headquarters.

Workload Analysis

PROGRAM	%Coverage	X	UNIVERSE	=	NO. OF AUDITS	X	AVERAGE CASE TIME	÷	PRODUCTIVE MANHOURS	=	ANNUAL POSITIONS
Importers	20		579		116		279		1760		18
Crude Oil Resellers	20		470		94		792		1760		42
Independent Crude Producers	18		15,261		2,747		165		1760		258
Major Refiners	100		35		35		19,771		1760		393
Small Refiners	31		107		33		3,705		1760		69
NGL	29		825		239		1,151		1760		156
Resellers Prop	20		2,500		500		131		1760		37
Retailers Prop	14		10,000		1,400		106		1760		84
Reseller Other	Level of effort to continue initiation of audits to uncover significant embargo period violations.										172
Executive Dir	Responsible for supervising four large Headquarters program offices and 5 policy direction for ten regional offices										
Program Support	.065 ratio to regions										80
Staff Support											70
							Total				1384

ANALYSIS OF CONTRACTS FY 1978 - COMPLIANCE

	($000) Cost
° Develop modification requirements and update criteria for the Case Tracking Information System, Time Activity System and Personnel Locator System. This is needed due to Regulatory Program changes. Previous history indicates changes in regulatory areas with subsequent changes to program which affects information and data requirements.	$ 50
° Analyze and develop requirements for improvements to the Compliance Targeting System. The Compliance Targeting System (CTS) will have been in operation for approximately one year prior to the beginning of the '78 fiscal year and will be in need of a comprehensive analysis of its operation and relative effectiveness. Following the analysis and documentation of the system's first year of operation, recommendations defining specific improvements that will enhance the CTS would be presented for comment and eventual implementation.	50
° Develop, revise, update and change Programs of Instruction for Compliance. New and revised programs require current training programs for maximum utilization of manpower.	75
° Provide periodic revisions to the Compliance Manual	50
° Conduct special studies with recommendations for implementation in a wide range of technical area requiring special skills for limited periods of time; e.g., statistical sampling, developing standardized computerized audit programs, etc.	150
° Develop methods for testing refiners' computer programs to determine compliance with FEA Regulations.	200
° Provide two revisions to the Computer Audit Procedures Manual.	50
Total Compliance	$ 625

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: REGULATORY PROGRAMS	PROGRAM: OPERATIONS													
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	349	322	8,701	3,126	75	208	6,099	164	234	7,356	+ 89	+ 26	+1,257
Headquarters	186	148	4,626	1,726	75	136	4,341	124	131	4,863	+ 49	- 5	+ 522
Regions	163	174	4,075	1,400	...	72	1,758	40	103	2,493	+ 40	+ 31	+ 735
(Contracts/Grants)	XX	XX	(1,170)	(688)	XX	XX	(520)	XX	XX	(1,500)	XX	XX	(+ 980)
FY 1977 Supplemental Pending; ECPA FY 1978 Amounts Included Above					216	39	2,213	...	...	...			
Headquarters					80	4	1,366	...	...	...			
Regions					136	35	847	...	...	...			
(Contracts/Grants)					XX	XX	(1,260)	XX	XX	(...)			

PROGRAM DESCRIPTION This program is authorized by Section 4 of the EPAA as amended by EPCA Sections 8(a), 8(c)(1), 8(d), (f), (g), 11 and 18 of the EPAA and Sections 102, 104, 203(a)(1), 402(a), 410, 454, 455 of EPCA and Part B of Title I, of the ECPA.

The Operations Program is responsible for: the planning, direction, execution, and operations of the Mandatory Petroleum Allocation Program to ensure the equitable and efficient distribution of available crude oil and petroleum products remaining under controls; the maintenance of the viability of the independent sector of the petroleum industry; the planning and direction of the Oil Imports Program as mandated by Presidential Proclamation; insuring that allocation and price programs conform to legislative allocation and policy guidelines; the development of regulations to implement mandatory or standby petroleum allocation and price programs; the conduct of public hearings as part of the administrative rulemaking process; the management of the FEA rulemaking process and liaison with the petroleum industry and the public. Operations is composed of five major offices: the Office of Crude Oil Operations, the Office of Price Regulation, the Office of Program Management and Analysis, the Office of Product Allocations and the Office of Allocation Regulations.

The Office of Crude Oil Operations is responsible for the various crude oil allocation missions mandated by the Emergency Petroleum Allocation Act as amended and for administration of the Mandatory Oil Import Program (MOIP). The Office has four elements which include: Mandatory Oil Imports: Directs and manages the overall MOIP and interfaces with industry and government agencies on all matters relating to the MOIP. Crude Oil Allocation: Directs and manages the Crude Buy/Sell Program and the Canadian Allocation Program. Refinery Operations: Performs refinery inspections and certifications necessary for participation in various FEA programs. Also manages FEA's refinery yield model and the refinery fuel control programs. Entitlements and Transfer Pricing: Implements and administers all programs relating to crude cost equalization (entitlements), transfer pricing of crude oil imported into the U.S., and the first purchaser crude oil price program to regulate well head crude oil prices.

The Office of Price Regulations is responsible for administering the regulatory pricing program. It involves developing criteria for determining pricing levels for regulated products; assessing the need for regulatory changes in the pricing of crude oil and petroleum products; evaluating pricing trends of decontrolled products, and developing regulations in the event that reimposition of controls for specific products becomes necessary. In addition, the EPCA permits adjustment every six months of the aggregate crude oil price. This includes determining appropriate incentives to encourage production, particularly with respect to high-risk, high-cost properties, and recommending regulatory changes to assure viability of each component of the petroleum industry.

Amended

PROGRAM: OPERATIONS
PROGRAM DESCRIPTION: (Continued)

The Office of Program Management and Analysis serves as a conduit between FEA and the various segments of the petroleum industry, trade associations, and consumer groups. The Office evaluates the effect of proposed regulations on the petroleum industry, performs special marketing studies, and provides early warning to FEA senior staff on adverse market trends. This Office also conducts all public hearings for FEA; conducts operations program reviews of FEA regional offices; and provides operational assistance to budget, personnel, contract, advisory committee and correspondence functions for the Office of Operations.

The Office of Product Allocations is responsible for the implementation of the Mandatory Allocation Program for propane, propane allocations and all other petroleum products not exempted from controls. Functions include (1) administering the propane allocation program; (2) issuing SNG feedstock allocations for propane; (3) processing and issuing allocation decisions and orders for propane and Defense Production Act orders, where required, for other petroleum products to meet requirement of the Department of Defense; and (4) maintaining standby capability for residual fuel oil, SNG feedstocks, butane, natural gasoline, naphtha, gas, aviation fuels, motor gasoline, middle distillates, and "other products" should reimposition of controls become necessary.

The Office of Allocation Regulations monitors the effectiveness and integrity of petroleum allocation and import regulations and evaluates their impact specifically with respect to crude oil, crude oil entitlements, oil imports and refined products allocation. The Office identifies improved regulatory concepts; assesses alternative regulatory approaches; designs programs and regulations to implement national energy policy; responds to outside regulatory initiatives of a complex nature; develops and amends regulations for the Standby Allocation Program; acts on requests for rulemaking from sources outside and within FEA; prepares, coordinates and finalizes allocation, oil imports, entitlements and buy/sell regulations.

JUSTIFICATION: Changes to the FY 1977 budget have been proposed separately to maintain Presidential flexibility regarding product decontrol. No change for FY 1978 is proposed at this time pending development of the Administration's energy policy to be issued in late April, 1977.

Within the Office of Crude Oil Operations, program activity is expected to continue at the same or slightly higher level as in FY 1977. The resources required for the Mandatory Oil Import Program will continue to be required until the phase out of fee free license system in 1980. However, in FY 1978, there will be a slight increase in fee paid licenses with an offsetting decrease in the workload to handle fee free allocation. Refinery Operations will continue to be responsible for periodic refinery inspections as required for the Buy/Sell Program and oil import regulations. Eighty inspections are planned for FY 1978. Also continuous maintenance and redevelopment of the Refinery Yield models will be required in order to keep the system current for potential usage during a severe supply interruption or shortage. The Crude Oil Allocation program, which includes the Canadian Allocation Program and the Buy/Sell program, will require the same staffing levels as in FY 77. However, as the incremental reduction in Canadian crude oil exports occurs, additional requests for adjustments and exchanges and other non-routine requests will be received for processing. In FY 1978, the Entitlement and Transfer Pricing Division within Crude Oil Operations, will continue to implement the program relating to crude cost equalization (entitlements); transfer pricing of foreign crude oil imported into the U.S.; and, the first purchaser crude oil price program. These programs are designed to control prices of domestic crude oil and to foster competition in the production, refining and marketing sectors of the industry. The entitlements program promotes cost equalization and fosters competition by requiring refiners and eligible importers to purchase or sell entitlements valued at approximately $170 million each month. The EPCA extended price controls on crude oil for 40 months. As a result, crude oil supplier/purchaser relationships continue to be frozen. The first purchaser price program insures that actual well head crude oil prices meet the composite price requirement of the Energy Policy and Conservation Act. This program will require the same level of resources in FY 78 as in FY 77.

Within the Office of Price Regulation, the FY 78 activity will decrease slightly, resulting in a reduction of two positions from the FY 77 request. The Price Regulations Office will continue in FY 78 to formulate necessary amendments including rulings, rulemakings, and guidelines for price regulations for crude oil, propane and other petroleum products remaining under controls. A major responsibility will be to evaluate the impact of price deregulation on different products and marketing sectors.

Amended

Program: OPERATIONS
JUSTIFICATION: (Continued)

The EPCA requires that certain production incentives be provided for the discovery of development of high cost and high risk properties. To make the findings necessary to determine what prices will accomplish the above purposes over time will require substantial utilization of available resources in FY 1978. In addition, environmental impact studies are required for all major regulatory changes.

In the area of crude oil pricing and compliance liaison, the EPCA requires FEA to establish the aggregate price of crude oil at $7.66 per barrel and to adjust this price every six months for the duration of the crude oil price program (April 1979). This office must monitor crude oil prices to assure that the formula utilized produces aggregate prices for domestic crude oil which are consonant with the intent of the law. The office will be responsible for determining what price increases are necessary and justify to the Congress any price adjustments to the weighted average price.

Within the Office of Program Management and Analysis, there is a slight decrease from the FY 1977 supplemental level. The office will continue in FY 1978 to provide liaison between FEA and the various segments of the petroleum industry, including trade associations, advisory committees and consumer groups. Also, it will continue to do special studies to assess the impact of regulatory changes on the petroleum industry and the economy. It will assimilate marketing information, perform analyses and coordinate with other offices, within FEA as appropriate. The office will also continue in FY 1978 to conduct all public hearings on proposed regulations and regulatory changes as required by the EPAA.

Within the Office of Product Allocations, regional assistance, program analysis processing of inquiries and correspondence workloads will remian constant. Assignments and adjustments will decline but there will be an increased need for special studies because of the propane allocation program. This office will supervise and direct the allocation program for propane and any other products still under control. The office will act on petitions filed by suppliers and users of controlled products. It will also develop and recommend program changes.

Within the Office of Allocation Regulation, there is expected to be a slight decrease from the FY 1977 supplemental in FY 1978. Activities in FY 1978 will include the continuing development of amendments to existing allocation regulations (i.e., propane, buy/sell, entitlements, crude oil) and the preparation of rulings and guidelines necessary to clarify any allocation regulations in force. Also, it will be responsible for monitoring the decontrolled market to evaluate and make recommendations on the basis of complaints and/or for the reimposition of controls. Finally, it is the responsibility of this office to insure that standby regulations are developed and readily available for implementation.

COST FACTORS ($000)

Personnel and benefits	$ 5,424
Other	432
Contracts	1,500
Total	$ 7,356

The amended request includes $1,749 and 70 manyears more than the initial FY 1978 request for this program.

ANALYSIS OF CONTRACTS FY 1978 - OPERATIONS (Continued)

	($000) Cost
° Analyze the effects of removing crude oil allocation controls (post-EPCA), considering the impacts on small and independent refiners and on products made and markets served by those refiners.	$ 100
° Develop crude oil and refined product allocation concepts and regulatory outlines to serve as a standby program to be re-instated in the event of a new shortage. Current regulations for exempt products are in a standby mode by law but are obsolete because of developments in supply, demand and marketing, and must be revised to meet the objectives of the EPAA adequately in case a new shortage occurs.	125
° The existing series of eleven (11) linear programming mathematical models which simulate refinery operations on an aggregated basis will be broken down further. Refineries will be grouped based on common processing characteristics in an attempt to more accurately represent U. S. refining flexibility. Then, specific studies for identification of crude quantity and quality will be conducted on a regional basis.	175
° Develop requirements, for a program which will interface the MOIP computer program with the computerized data system being developed by the Customs Service. This will allow direct data entry into the MOIP programs.	225
° Provide court reporting service for the public hearings held at the national and regional level on rulemakings, approximately 60 hearings will be held at a cost of approximately $1,700 each.	100

ANALYSIS OF CONTRACTS FY 1978 - OPERATIONS (Continued)

	($000) Cost
* The Office of General Counsel and the Office of Environmental Impact have determined that all SNG plants require evaluation for a site specific EIS prior to the issuance of Final Decision and Order for the designation of a supplier and the allocation of feedstocks. Contracts in process indicate an average cost of $50,000 per contract.	$ 195
* The Office of Environmental Impact has determined that an EIS may be required prior to issuance of a Decision and Order with respect to the use of propane by gas utilities for supplementing natural gas supplies where new plants are involved. FEA anticipates requests from nine such plants during FY 1978.	450
* Update the Northern Tier Study completed in FY 1976. Analyze the impact of reductions in Canadian crude oil availability on Northern Tier States. Determine what government actions are needed to assure uninterrupted supply of the product.	130
Total Operations	$1,500

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: REGULATORY PROGRAMS	PROGRAM: CONTINGENCY PLANNING												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	24	17	837	836	24	24	1,922	22	22	969	-2	-2	-953
Headquarters	24	17	837	836	24	24	1,922	22	22	969	-2	-2	-953
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(400)	(129)	XX	XX	(1,300)	XX	XX	(400)	XX	XX	-(900)
FY 1977 Supplemental Pending; EPCA FY 1978 Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION This program is authorized by Sections 201-203 of the Energy Policy and Conservation Act of 1975 which provides for the development of conservation, rationing and other contingency plans. The plans will be part of the Nation's first line of defense against the threat of an energy supply interruption. If initial plans are not approved by Congresss, FEA has an obligation to redraft and resubmit alternative proposals so that a set of approved plans is ultimately developed. Included in this program is the evaluation of the capabilities and performance of Headquarters elements and other Federal agencies assigned to accomplish responsibilities contained in contingency plans, performance of periodic tests of contingency plans to insure that the plans are workable and up-to-date, and that the underlying rationale and data bases used in preparing the plans are valid. In addition, reviews and evaluations will be made to determine if State Contingency Plans satisfy the EPCA requirements; insure that FEA's contingency plans are compatible with the plans of the states; and insure that FEA carries out its obligations in the Federal Emergency Preparedness Program.

JUSTIFICATION The FY 1978 workload will be somewhat reduced from FY 1977 levels. Consequently, staffing will be reduced by two positions and the contracting requirement by $900,000. However, there is a greater need for coordination of energy planning and development activities within and among Federal, State and local governments. This requirement will place an added burden on the Plans Review Program which will be handled by shifting manpower within contingency planning.

In FY 1978, contingency plans will be reviewed, revised and new plans developed as necessary. Also, greater emphasis will be placed on blending various energy contingency plans (allocation, storage, rationing, demand curtailments) into the context of an overall emergency preparedness energy plan.

COST FACTORS ($000)

Personnel and benefits	507
Other	62
Contracts	400
Total	969

Amended

ANALYSIS OF CONTRACTS FY 1978 - CONTINGENCY PLANNING

	($000) Costs
- Review and revise contingency plans and as necessary develop new plans. (Includes Environmental Impact Assessments and Economic Impact Analyses, as required by EPCA.)	$ 250
- Support the review of up to 50 state contingency plans to determine acceptability of each plan on a case by case basis for fulfilling the requirements for exemption from Federal contingency plans.	150
Total Contingency Planning	$ 400

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: REGULATORY PROGRAMS	PROGRAM: DATA COORDINATION													
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	30	16	788	140	27	26	887	18	20	691	-9	-6	-196
Headquarters	30	16	788	140	27	26	887	18	20	691	-9	-6	-196
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(350)	(25)	XX	XX	(150)	XX	XX	(200)	XX	XX	(+50)
FY 1977 Supplemental Pending; EPCA FY 1978 Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION This program is authorized by Sections 8a, 9, 14 of the EPAA, and Sections 201, 202, 203, 401, 402, 403, 457 of the EPCA. The Data Coordination Division uses knowledge of ORP programs and data processing/data collection techniques to develop detailed requirements for data support systems which allow ORP to implement Congressional mandates in the price and allocation regulation of the petroleum industry. The centralization of ORP data processing support avoids the development of duplicative or unnecessary systems and ensures that those systems which are developed by the FEA Office of Data Coordination will accurately reflect the regulatory data needs of ORP, and will be implemented and placed in operation in a manner which causes minimum disruption to regulatory functions. In order to do this, Data Coordination performs the following functions: (1) Analysis of legislative/program requirements to determine data collection required to support Congressional mandates; (2) Integration of all ORP needs for similar data; (3) Monitoring of system acquisition to ensure adherence to requirements; (4) Systems test and user training; (5) Evaluation of operating ORP data systems.

JUSTIFICATION A decrease in staffing is possible because of a shift from data program development to data program maintenance as systems become operational. There will be a slight increase in overall workload but the nature of the workload, the distribution of the workload and projected increases in efficiency will mitigate the effect of the personnel reduction. In systems development, there will be an additional requirement to support contingency plans which will be offset by a reduction in effort to support other programs and reductions in system testing and user training for newly acquired systems and a decrease in forms design and revision.

There will be an increase in effort to review the requirement for and effectiveness of operational systems, with concomitant effort to enhance data system efficiency with the consequent need for testing and training for modified systems.

COST FACTORS ($000)

Personnel and benefits	432
Other	59
Contracts	200
Total	691

Amended

ANALYSIS OF CONTRACTS FY 1978 - DATA

	($000) Cost
o Preparation of development plans and requirements for data systems to support FEA contingency plans. Nationwide implementation of contingency plans, when approved, will require computer data systems to determine effectiveness of the mandatory conservation measures and to identify potential violations for compliance follow-up.	$ 120
o Develop detailed forms designs, respondent instructions and GAO justification packages to reduce burden on industry. Analyze the effectiveness of the Programmed Job Performance Guide approach to simplify the instructions, reduce respondent costs and improve effectiveness of the submissions.	80
Total Data	$ 200

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: REGULATORY PROGRAMS	PROGRAM: EXECUTIVE DIRECTION AND ADMINISTRATION												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	37	37	871	185	31	33	881	35	35	934	+4	+2	+53
Headquarters	37	37	871	185	31	33	881	35	35	934	+4	+2	+53
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(...)	(...)	XX	XX	(...)	XX	XX	(...)	XX	XX	(...)
FY 1977 Supplemental Pending; EPCA FY 1978 Amounts Included Above					4	3	78	...	...	...			
Headquarters					4	3	78	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION The Office of Regulatory Programs operates under the authorities of the EPAA as amended, the FEAA of 1974 and the ECPA. This program provides executive direction and administrative management support for the Office of Regulatory Programs. It also provides various administrative support activities for the 2000 M Street location to FEA offices located therein and nearby office facilities. This program has four elements which include the Office of the Assistant Administrator, ORP Staff Support, FEA Logistic Support and a Correspondence Control element. ORP Staff Support provides budget formulation for headquarters and regional programs, financial analysis and funds control, procedural interpretation and coordination of personnel and employee related services. FEA Logistic Support includes buildings management liaison, security, safety and property inventory. It includes a telecommunications facility, inter-office mail services, photo-duplication services and an office supply distribution facility. Correspondence Control provides for the expeditious receipt, routing and control of Congressional and public correspondence for the Office of Regulatory Programs.

JUSTIFICATION Personnel supported remains approximately the same in FY 1978 as in FY 1977. Consequently, the number of positions required for Executive Direction and Administration remains constant with the FY 1977 level. Slight increases in ORP staff support functions involved with personnel counseling and contract administration will be offset by decreases in the amount of effort required in budget formulation. Correspondence Control will require a slight increase in effort. Overall, slightly increased productivity and small changes in increased workload make it possible to support ORP and over 300 other FEA employees located at the 2000 M Street location with the same number of positions in FY 1978 as in FY 1977.

COST FACTORS ($000)

Personnel and benefits	878
Other	56
Total	934

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: ENERGY CONSERVATION AND ENVIRONMENT

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
ASSISTANT ADMINISTRATOR	8	8	259	60	8	8	243	7	7	215	-1	-1	-28
ADMINISTRATIVE OFFICE	18	13	416	108	13	16	464	12	13	578	-1	-3	114
MARKETING	7	7	1,108	389	7	6	174	4	5	146	-3	-1	-28
POLICY AND PROGRAM DEVELOPMENT AND ENVIRONMENT	73	43	5,305	1,366	43	61	1,844	75	82	26,851	32	21	25,007
STATE PROGRAMS	113	100	7,301	11,132	94	100	26,030	139	142	140,621	45	42	114,591
NATIONAL PROGRAMS	66	60	6,091	4,096	60	57	3,785	128	131	32,571	68	74	28,786
MANDATORY PROGRAMS	31	25	3,367	1,322	25	28	2,512	24	25	3,527	-1	-3	1,015
Total	316	256	23,847	18,473	250	276	35,052	389	405	204,509	139	129	169,457
(Headquarters)	(243)	(190)	(21,849)	(13,017)	(190)	(212)	(10,696)	(249)	(269)	(65,989)	(59)	(57)	(55,293)
(Regions)	(73)	(66)	(1,998)	(5,456)	(60)	(64)	(24,356)	(140)	(136)	(138,520)	(80)	(72)	(114,164)
ECPA: FY 77 Supplemental Pending; FY 78 Amounts Included Above					67	36	75,728	127	121	116,110			

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY CONSERVATION AND ENVIRONMENT	PROGRAM: ASSISTANT ADMINISTRATOR												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	8	8	259	60	8	8	243	7	7	215	-1	-1	-28
Headquarters	8	8	259	60	8	8	243	7	7	215	-1	-1	-28
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...
ECPA: FY 77 Supplemental Pending; FY 78 Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

The Office of the Assistant Administrator for Energy Conservation and Environment is responsible for developing FEA and Administration policy in the areas of energy conservation and environment and for executing national energy policy through development and implementation of appropriate conservation programs and energy-related environmental policies.

The Assistant Administrator for Energy Conservation and Environment has the primary responsibility for reducing the rate of growth of energy demand in the United States. In carrying out this charge, the Assistant Administrator is responsible for developing FEA and Administration policy in the areas of energy conservation and environment and for executing national energy policy through development and implementation of appropriate conservation programs and energy-related environmental policies.

Cost Factors:

Personnel compensation and benefits (7 positions, including one Executive Level IV)	$175,000
Other	40,000
Total	$215,000

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY CONSERVATION AND ENVIRONMENT	PROGRAM: ADMINISTRATIVE OFFICE												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	18	13	416	108	13	16	464	12	13	578	-1	-3	114
Headquarters	18	13	416	108	13	16	464	12	13	578	-1	-3	114
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	(200)	XX	XX	(200)
ECPA: FY 77 Supplemental Pending; FY 78 Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

The Administrative Office provides the following internal liaison and support services: (1) contracts/grants management - planning and review of all funding actions, guidance for project monitors, tracking and reporting, and liaison with FEA's Project Review Board and Procurement Office; (2) General services - personnel, travel, space, equipment and correspondence control; (3) Publications - planning, budgeting, management and tracking of all printing requirements, as well as providing graphics support and staff assistance for editing and design; and (4) Support of the Office of Policy and Program Development and Environment - budget preparation and execution, including assistance related to OMB and Congressional consideration of budget requests, and direction, review, and monitoring of funds following appropriations.

Amended

JUSTIFICATION

The Administrative Office develops and implements management support policies, programs, and activities for Conservation and Environment. Specifically:

a. Advises the Assistant Administrator on and carries out Conservation and Environment management activities in the areas of mission and functions, management analysis and organizational matters, and staffing and personnel requirements. Effects coordination with appropriate FEA support staffs.

b. Effects certain financial management activities such as designing, controlling, and coordinating an integrated budgeting, accounting, and fiscal reporting system; developing budget support data documents and working with the Office of Policy and Program Development and Environment to formulate budget requests, controlling C&E requests, printing requisitions, contracts and contract proposals, and purchase orders; and serving as C&E payroll timekeeper liaison.

c. Provides other management and logistics support in such areas as receiving, monitoring, and reviewing all controlled and uncontrolled correspondence to include preparing responses to public and private inquiries into general C&E activities; coordinating C&E's space (facilities) needs with appropriate FEA support staffs; coordinating publications activities, involving the planning, budgeting, management and tracking of all printing requirements; and providing graphic and staff assistance support for editing and design of C&E publications.

$200,000 in contract funds is required in FY 1978 to provide support in the area of publications. These funds would be used to accomplish those design and layout requirements which could not be provided within FEA.

Cost Factors:

Personnel compensation and benefits (12 positions, 13 staff years)	$307,000
Other	71,000
Contracts	200,000
Total	$578,000

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY CONSERVATION AND ENVIRONMENT	PROGRAM: MARKETING										Change FY 1977 to FY 1978		
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate					
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	7	7	1,108	389	7	6	174	4	5	146	-3	-1	-28
Headquarters	7	7	1,108	389	7	6	174	4	5	146	-3	-1	-28
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(884)	(331)	XX	XX	...	XX	XX	...	XX	XX	...
ECPA: FY 77 Supplemental Pending; FY 78 Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

The Marketing Office provides staff support and technical assistance for C&E programs in both the development and implementation stages of programs established under the authority of the FEA Act and the Energy Conservation and Production Act, and specifically mandated by Sec. 381(b)(1) of the Energy Policy and Conservation Act. This function maximizes the impact of such programs by identifying appropriate target audiences and the most effective methods of reaching them.

The Marketing Office is responsible for performing the following functions:

a. To develop C&E-wide conservation marketing plans and programs.
b. To recommend marketing strategies for the various conservation programs developed within C&E.
c. To provide technical expertise on marketing strategies for conservation products, including timing, scope of marketing effort required, extent of resources needed (contracts and personnel), etc.
d. To develop and monitor energy conservation marketing and advertising campaigns.

The purpose of C&E-wide marketing plans is to aid in developing a framework of specific energy conservation programs and a rationale for such a framework. The feasibility and marketing strategies for the specific programs must be examined to ensure that cost effective measures are used to promote the programs.

Energy conservation programs which depend on the voluntary activities of their respective target audiences can succeed only if supported by an effective marketing effort. Since such voluntary programs do not mandate audience participation, compelling marketing campaigns must be undertaken to elicit the desired conserving awareness attitudes and behavior. Marketing expertise is used to aid program personnel in the implementation of their programs.

Cost Factors:

Personnel compensation and benefits (4 positions, 5 staff years)	$118,000
Other	28,000
Total	$146,000

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY CONSERVATION AND ENVIRONMENT	PROGRAM: POLICY AND PROGRAM DEVELOPMENT AND ENVIRONMENT												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	73	43	5,305	1,366	43	61	1,844	75	82	26,851	32	21	25,007
Headquarters	73	43	5,305	1,366	43	61	1,844	75	82	26,851	32	21	25,007
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(3,929)	(1,009)	XX	XX	(75)	XX	XX	(24,470)	XX	XX	(24,395)
ECPA: FY 77 Supplemental Pending; FY 78 Amounts Included Above					...	...	500	...	...	500			
Headquarters					...	...	500	...	...	500			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(500)	XX	XX	(500)			

PROGRAM DESCRIPTION

Four centralized Office of Energy Conservation and Environment activities are grouped in this organization: Policy Development, Program Development, Program Evaluation and Environment.

Principal Policy Development responsibilities are: (1) assistance in the formulation of FEA positions on proposed legislation related to energy conservation; (2) identification and analysis of unresolved policy issues, particularly those arising from the authorities and direction provided by the Energy Policy and Conservation Act (P.L. 94-163) and the Energy Conservation and Production Act (P.L. 94-385); and, (3) formulation of energy conservation policy concepts. These support activities encompass the annual budgeting process, long-term or strategic planning, formulation of policy issue papers, drafting Congressional testimony and reports (specifically those mandated by Section 109, 162, 203, and 206 of the Energy Conservation and Production Act and the Congress), interaction with other FEA offices on non-programmatic issues and conservation policy coordination with other Federal agencies.

Principal Program Development functions are: (1) the effective formulation and development of new conservation programs consistent with policy promulgated by the Administration, FEA and legislative mandates; and (2) data and analysis activities undertaken with specific regard to energy use and conservation. This activity also includes the continued analysis of energy consumption patterns and behavior necessary for program formulation.

The principal responsibilities of the Office of Program Evaluation are to ensure that the energy conservation programs implemented by FEA under EPCA, ECPA and the general authorities provided by the FEA Act are fulfilling their established objectives and that the allocation of resources accurately reflects the benefits actually being derived.

The Office of Environment performs three major activities: (1) assessing the energy impacts of environmental requirements and developing alternative environmental policy proposals to minimize adverse energy impacts; (2) assessing the environmental implications of alternative energy policies and projects (for example, as mandated by Section 109 of ECPA) and recommending approaches for minimizing environmental impacts; and (3) managing FEA's efforts to assure compliance with the National Environmental Policy Act with respect to programs initiated administratively or established by EPCA and ECPA. In addition, the office provides environmental technical assistance and staff support to all other FEA offices on major agency initiatives.

Amended

JUSTIFICATION

Executive Direction

This function provides executive guidance and leadership to the Office of Policy and Program Development and Environment.

Cost Factors:

Personnel compensation and benefits (2 positions, 2 staff years)	$47,000
Other	11,000
Total	$58,000

Policy Development

It is this Office's responsibility to develop, collect, and assess policy and program ideas and to refine the decisions of the Assistant Administrator's Office so that they constitute the basis for program development. It is also responsible for the maintenance of a cohesively articulated energy conservation policy. Specifically:

a. Assist in the formulation of FEA positions on proposed legislation relating to energy conservation.
b. Identify and analyze unresolved conservation policy issues.
c. Formulate energy conservation policy concepts.
d. Provide support activities including preparation of policy issue papers, drafting of Congressional testimony and reports.
e. Consult with HUD to develop new performance standards for commercial and residential buildings in accordance with Title III of ECPA.
f. Provide assistance on activities relating to international aspects of energy conservation policy, in particular those relating to the International Energy Agency.

Cost Factors:

Personnel compensation and benefits (4 positions, 6 staff years)	$142,000
Other	33,000
Contracts	100,000
Total	$275,000

Program Development

The primary responsibility of the Program Development Office is the scoping, design and detailed definition of programs intended to implement the policies of the Office of Conservation and Environment. Programs designed by the office are to have a defined life, purpose and product. Specific functions within the purview of the office, and which will therefore be undertaken by its staff, include:

- Formulation, evaluation and development of new energy conservation programs, including those mandated or authorized by statute. This includes generation of draft regulations.

- Preparation of program justification documents for use in formulation of budget requests and submissions, and to provide support for recommended legislative initiatives.

Amended

- Utilization of economic, energy savings projections, and other pertinent information to support C&E initiatives.
- Liaison with other offices, both within and outside C&E, to assure that data and information needed for the development and refinement of programs are generated on a systematic basis.
- Analysis of program alternatives, with emphasis on economic analyses and determination of the energy conservation potential of selected alternatives.
- Maintenance and continuing development of the energy conservation and renewable-resources measures list mandated by Title IV of ECPA.

The initial measures list will be developed and published during Fiscal Year 1977. Much work must be done in FY'78 to assimilate information provided by the public regarding energy measures which should be evaluated.

With contractual assistance, the responses to FEA's request for information on conservation measures, as well as existing lists of measures, will be screened in a systematic way. Screening will be accomplished using criteria which test potential measures for their relevance to the provisions of ECPA, for the analytical effort required to develop a full evaluation, and for their applicability to various types of buildings and industrial plants. The results will be the basis for a detailed work plan to evaluate selected energy measures and their potential applications. The anticipated output includes a listing of measures and their applications, ranked on the basis of priority for further development, as well as a brief summary and preliminary evaluation of high priority measures. With some available lists containing 200 measures, many of which may be applicable to five or more types of buildings, the potential number of combinations to be ranked could easily exceed 1,000.

The initial energy measures list will include only the most obvious energy measures, as applied to relatively simple building types. This first list will begin with single family dwellings and will encompass as many simple building types as possible using available staff resources. Additional contract assistance in this area would have the objective of considering additional applications of measures included on the initial measures list. Examples of the building types which would be addressed (to the extent they are not covered in the initial list) are multi-family dwellings, retail stores, office buildings, schools, and industrial plants. Included in this contract effort is the development of methodologies to determine eligibility for energy measures applied to the additional building types.

The majority of resources in this area ($25 million dollars and 39 positions) are requested for developing and implementing innovative programs to accelerate energy conservation. Specific conservation program initiatives involving the use of the fund will be announced in the comprehensive energy policy scheduled for April 20, 1977. The funding of $25 million is needed to provide flexibility to develop innovative programs and have them funded in FY 1978. Specific proposals will be made following an evaluation of current post-embargo energy consumption trends, and identification of the individual subsectors of the economy where Federal programs should be most appropriately directed, and development and analysis of the workability of program details.

The amended request includes $25,000,000, 39 positions and 39 manyears more than the initial FY 1978 request for this program.

Cost Factors:

Personnel compensation and benefits (48 positions, 53 staff years)	$ 1,251,000
Other	286,000
Contracts	24,020,000
Total	$25,557,000

Amended

Program Evaluation

This Office is responsible for the "learning" process within the staff element. The elements of ongoing programs evaluated will be the quality and adequacy of:

a. Resources committed.
b. Program definition.
c. Program scheduling.
d. Program product delivery.
e. Program management.

The purpose of such evaluations will be to determine whether or not individual program elements achieved their stated objectives, to assess the effectiveness of such program activities in accomplishing the purposes for which funding was intended, and to evaluate the adequacy of program administration.

Receiving special attention in FY'78 will be the evaluations of the Weatherization Program (ECPA, Section 416), the Supplemental State Grant Program (ECPA, Title IV, Part B), and utility demonstrations and initiatives.

The amended request includes $100,000 more than the initial FY 1978 request for this program.

Cost Factors:

Personnel compensation and benefits (4 positions, 4 staff years)	$ 95,000
Other	21,000
Contracts	200,000
Total	$316,000

Environment

The Environment Office's major responsibilities are:

- Coordinating and assuring, through technical assistance and document review and comment, the adequacy of Agency documents prepared pursuant to the National Environmental Policy Act (NEPA). This includes environmental assessments (EA's) and environmental impact statements (EIS's) under preparation for FEA programs arising from the Energy Policy and Conservation Act and the Energy Conservation and Production Act, as well as other legislatively authorized programs. In addition, resources are required to perform and coordinate the review of other agency EIS's.

- Evaluating the energy effects of environmental initiatives within the Federal Government and keeping the Agency current with regard to environmental aspects of energy policy and actions. Specifically, the office will address the following: the Clean Air Act which may be revised (particularly the automobile emission standards); the Federal Water Pollution Control Act which may be amended and new strip mining legislation which is anticipated.

- Performing environmental/energy tasks as assigned by the Assistant Administrator.

Amended

Finally, the reports mandated by Sections 109 and 162(a) of ECPA will require assessment of the environmental impacts of existing conservation initiatives and various alternative methods for achieving national energy needs.

Contractual assistance is most needed in the following areas:

- Assessments of energy/economic impacts of the non-attainment Clean Air Act issues.
- Technical contractual support in review of Agency-prepared NEPA documents.
- Assessments of the environmental implications of energy taxing or pricing alternatives, including a Btu tax.

Cost Factors:

Personnel compensation and benefits (17 positions, 17 staff years)	$401,000
Other	94,000
Contracts	150,000
Total	$645,000

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY CONSERVATION AND ENVIRONMENT — PROGRAM: STATE PROGRAMS

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	113	100	7,301	11,132	94	100	26,030	139	142	140,621	45	42	114,591
Headquarters	52	44	5,606	5,752	44	46	1,964	49	55	3,523	5	9	1,559
Regions	61	56	1,695	5,380	50	54	24,066	90	87	137,098	40	33	113,032
(Contracts/Grants)	XX	XX	(4,198)	(10,387)	XX	XX	(23,000)	XX	XX	(136,200)	XX	XX	(113,200)
ECPA: FY 77 Supplemental Pending; FY 78 Amounts Included Above					32	16	67,174	42	42	88,748			
Headquarters					12	6	475	12	12	349			
Regions					20	10	66,699	30	30	88,399			
(Contracts/Grants)					XX	XX	(66,722)	XX	XX	(87,566)			

PROGRAM DESCRIPTION

The activities of this office include the State Energy Conservation Program (EPCA and ECPA), the State & Local Voluntary Program, the Conservation Workshops Program, and Weatherization Assistance for Low-Income Persons (ECPA).

The State Financial Assistance Office administers the State Energy Conservation Program (SECP) authorized by Section 363 of the EPCA, and the Supplemental State Energy Conservation Program authorized by Title IV, Part B of ECPA. The SECP is a grant-in-aid program, for qualified States, whose goal is a 5% savings in the total consumption of energy from the consumption projected for 1980. To qualify States must submit an acceptable energy conservation plan which saves at least 5% in energy consumption and includes the five program measures required by EPCA. Under the Supplemental program, FEA is to provide technical assistance and financial support for State initiatives particularly as they apply to continuing public education efforts, coordination among local, State and Federal conservation programs, and encouraging energy audits for households, buildings and industrial plants.

The State and Local Voluntary Assistance function brings together a variety of activities developed or implemented on a limited basis which can most efficiently and effectively be applied and implemented by localities and institutions. These activities are distinct from the mandated portions of the State grant programs in that they offer a range of mechanisms which may be chosen and adapted to meet unique needs, or institutional constraints. Examples of areas in which technical assistance is provided are; health care facilities; elementary and secondary schools; colleges and universities; commercial buildings; industrial processes; transportation; draft standards or model legislation; and residential buildings.

The Conservation Workshops Program offers a series of seminars and workshops for executive and management representatives in the areas of commercial buildings conservation, industrial energy conservation and vanpooling.

Title IV, Part A of the Energy Conservation and Production Act (ECPA) provides that the FEA shall make available grant funds over the next three years not to exceed $200 million. The purpose of the grant money is to fund State Weatherization Programs to insulate the homes of low-income persons, with particular emphasis on the low-income elderly and handicapped. FEA is also charged with the responsibility for developing program regulations, insuring the fair and equitable treatment of Native Americans, providing technical assistance to the States and local organizations, and carrying out program monitoring and evaluation.

Amended

JUSTIFICATION

Executive Direction

This function provides headquarters and regional executive guidance and leadership for the Office of State Programs.

Cost Factors:

Personnel compensation and benefits (22 positions, 22 staff years)	$519,000
Other	121,000
Total	$640,000

State Financial Assistance

The State Financial Assistance Office administers both the State Energy Conservation Program authorized by Section 363 of the Energy Policy and Conservation Act (EPCA) and the Supplemental State Energy Conservation Program authorized by Title IV, Part B of the Energy Conservation and Production Act (ECPA).

Under the basic program, FEA, as required by EPCA: (a) provides grants to qualified States for implementation of energy conservation plans designed to reduce energy consumption by 5% in 1980; (b) provides assistance to States in the development of plans and in grants-in-aid administration; (c) assesses the impact of State plans; and (d) reports to the President, Congress and the States. The resources requested in FY 1978 will ensure that States participating in the EPCA authorized program will be able to fully implement their approved plans, thus providing every opportunity for achievement of their goal. Headquarters staffing will remain relatively stable. The increase in Regional positions is to support the management of the State Energy Conservation Program. During FY'78, the five required program measures must be on-line in each State. The program emphasis will be on closer State program assistance and coordination, program achievement, monitoring (against quarterly milestones), and assessment of program effectiveness. These activities necessitate increased Regional staff capability. An estimated 2.5 personnel per Region are essential for effective goal achievement under the basic program.

Due to the nature of the program, extraordinary requests for printed material germane to the State Energy Conservation Program are expected. Requests for information are anticipated from all 55 entities participating in the program as well as their political subdivisions. Requests are also expected from contractors and universities working with States on the development and implementation of their plans, as well as from interest groups affected by the plan.

Under the Supplemental State Energy Conservation Program authorized by ECPA, FEA will: (a) prepare and publish guidelines for the preparation and funding of supplemental plans; (b) prepare model supplemental energy conservation plans; (c) provide financial assistance to qualified States for the development and implementation of supplemental plans; (d) provide assistance to States in the administration of their supplemental plans; (e) assess the impact of the implemented plans; and (f) report to the President, the Congress and the States.

In order for a State to be eligible to receive financial assistance for its supplemental plan, FEA would require that a State's Governor submit a plan, within three months of the effective date of the guidelines, to the appropriate FEA Regional Administrator. The plan submitted by the State would include detailed information regarding the nature, implementation schedule, estimated energy savings and costs of implementation of all measures which the States wishes to be considered for Federal implementation funding.

To be eligible for funds, a State must include three measures in its plan: energy audits, public education and intergovernmental coordination. Additional measures may also be included provided all minimum criteria for the required measures are met. FEA would mandate that all required measures would be in place and ready for implementation within six months after grant award.

Amended

Minimum criteria for the required measures would emphasize the importance of energy audits in relation to the overall supplemental plan. Energy audits for homeowners, in whose interest it is to retrofit their dwelling units in order to cut both energy cost and consumption, would be specifically emphasized. The purpose of the energy audit is to inform homeowners of the possible ways of retrofitting their homes, the costs involved, and the ultimate savings and pay-back period.

The 1970 census (Bureau of the Census, "Census of Housing") indicates that there were approximately 63.5 million dwelling units in the United States (current estimates are over 70 million). Of these dwelling units approximately 46.3 million are single-family detached units and of the total number of dwelling units 62.9% are owner-occupied. The target audience for this measure would thus be those 29.2 million single-family, detached dwelling unit owners and those other homeowners who reside in duplexes, townhouses, etc., that also have the interest to retrofit their dwelling units. FEA is interested in funding audits for these households using audit procedures similar to those developed by FEA--the "Project Conserve" questionnaire and the "Home Energy Savers' Workbook." Project Conserve is a computer processed questionnaire designed to elicit input from the dweller on the characteristics of his dwelling unit and provide as output suggestions for retrofit and information on costs and cost savings. The "Home Energy Savers' Workbook" will produce approximately the same product as Project Conserve but computations are left to the homeowner.

FEA assumes that, with funding of the total FY 1978 request for the supplemental program, from 12.5 million to 15.7 million dwelling units could be audited using the noted methods. This assumes that $15.7 million of the grant funds would be used for home energy audits and that those audits would cost the State from $1.00 - $1.25 per unit. The figures are based on calculations from the Project Conserve Program and those programs using the "Home Energy Savers' Workbook." It also assumes that $7.8 million of the grant funds would be used for State administrative costs as well as other phases of the supplemental program. Assuming that 25% of these homeowners acted on the results of the audit by taking the necessary retrofit actions and by adjusting their thermostats to suggested levels, estimated savings as a result of the program would be between 2.7 and 3.45 million barrels per year oil equivalent, or an estimated 31 to 39 million dollars per year. States will also be required to develop audit programs for non-residential buildings and industrial plants and insure their availability at minimal cost.

To satisfy the mandatory public education measure, a State will be required primarily to provide information to the public relating to energy audits and will also be allowed to expand its efforts into other areas.

Finally, in satisfaction of its third required measure, States will include in their plans procedures for ensuring that effective coordination exists among the various local, State and Federal energy conservation programs within and affecting the State, including any energy extension service program administered by the Energy Research and Development Administration.

Funds for the supplemental program will be made available on the following basis: twenty-five percent divided equally among participating States and seventy-five percent divided among the participating States on the basis of their resident population.

The staff requested for the supplemental program (2 Headquarters and 10 Regional positions) represents no increase over the FY 1977 level.

This program will be evaluated by Conservation and Environment's Program Evaluation Office in FY 1978 ($100,000 in contract support).

Amended

The amended request includes $23,848,000, 12 positions and 12 manyears more than the initial FY 1978 request for this program.

Cost Factors:

Personnel compensation and benefits (52 positions, 49 staff years)	$ 1,157,000
Extraordinary printing assistance for States	289,000
Other	268,000
State Conservation Grant Awards (EPCA)	47,000,000
State Supplemental Grant Awards (ECPA)	23,500,000
Contracts	1,634,000
Total	$73,848,000

State and Local Voluntary Program

This Office provides non-financial support, primarily on request, to any State entity, institution or local subdivision. Assistance is provided on any aspect of energy conservation. More specifically, it encompasses a variety of activities developed or implemented on a limited basis which can most efficiently and effectively be applied and implemented by localities. Assistance will be provided for innovation where there has been no previous FEA activity. Examples of areas in which technical materials and programs will be developed are:

- local home-builders' handbook for energy efficiency;
- model school and fleet transportation systems;
- pamphlets on energy conservation for distribution by welfare workers to recipients;
- local government contingency planning; and
- encourage energy efficiency as a consideration in long-range planning by local governments and institutions.

Support currently available includes:

a. Residential retofit program designed primarily for single-family homeowners.

b. Tools to support energy conservation in institutional buildings, such as in elementary schools, secondary schools, colleges and universities and in health care facilities (e.g. hospitals, nursing homes).

c. Model legislation and implementation procedures in the area of used oil recycling.

d. Assistance to government entities below the State level to establish and implement local energy management programs.

e. Information on energy conservation curricula and teaching aids for kindergarten, elementary, and secondary schools. Additional information will be added as it becomes available.

Amended

The provision of assistance deals largely with establishing pilot programs for institutions and local governments. This Office will serve as a catalyst in the technology transfer process at the Federal and State level as well as the community to community level.

During FY'76 and FY'77 the State and Local Voluntary Assistance Office further developed Project Conserve, a residential energy conservation program, and monitored its implementation in a total of 14 States. As part of this program, the Office developed and printed the Home Energy Savers' Workbook, a 30-page guide to home retofitting. In the institutional buildings area, the Public School Energy Conservation Service (PSECS), a computerized energy analysis program, was expanded during FY'77 to include secondary as well as elementary schools. The Office sponsored a series of energy management workshops for school administrators and business officers from schools (K-12), colleges and universities across the country. Similar workshops were also held for health care facilities engineers and administrators. In the area of used oil recycling, a Model Used Oil Recycling Act was developed for use by State and local governments interested in developing a similar piece of legislation for their areas. To assist local governments in the establishment and implementation of energy management programs, the staff prepared workshop materials to be used and evaluated by State and local government officials.

During FY'76, this Office surveyed existing curricula and materials that could be incorporated into energy conservation curricula and conducted regional seminars for educators to determine energy education needs; an energy conservation awareness training program was developed for teachers and student leaders. The Office sponsored a guide to currently available energy/environment teaching aids and produced a booklet on energy suitable for the junior high school level. In addition, the Office sponsored a program of energy awareness through the Nation's parks. During FY'76 and FY'77 the Office investigated institutional barriers to adopting vanpooling and carpooling programs. The staff also tested and developed various vanpool and carpool marketing strategies. In the area of building standards, the Office sponsored a variety of activities during FY'76 and FY'77. During FY'76 building code workshops were held in each of the 10 FEA Regional Offices and followed up on a State-specific basis in 30 States. Studies were held to evaluate the economic impact of building energy conservation standards such as ASHRAE 90-75 and the HUD Minimum Property Standards. Under the Building Standards Program, cooperative agreements were funded with 10 States to determine the most effective means of implementing energy efficient building codes. Follow up analysis work is being conducted in FY'77 with the League of Cities, Conference of Mayors and National Association of Counties to determine specific options in implementing energy efficient building standards.

During FY 1977, a great number of new programs are being developed by individual States. Many, if not all, of these programs have some applicability in a large number of States. Staff will be needed to review these programs, identify "universal" elements in them, properly organize and package this information, make the information available, and provide any assistance requested to further develop and implement such programs.

No increase in Headquarters staff is requested in FY 1978. An increase of five regional positions is requested. Specifically, the provisions of assistance across the board to institutions and communities is expected to increase. The increase in Regional positions from FY'77 to FY'78 is caused by the fact that Regional personnel must provide the link between the target group and Headquarters staff to assure efficient implementation of individual conservation programs. As this assistance service becomes established and recognized, local entities are expected to take increasing advantage of the conservation expertise offered through the Regional staff.

Cost Factors:

Personnel compensation and benefits (35 positions, 35 staff years)	$ 826,000
Other	193,000
Total	$1,019,000

Amended

Conservation Workshops

Conservation Workshops is a program of energy conservation seminars and workshops designed to stimulate and facilitate conservation in large and medium-sized commercial and industrial businesses and facilities. Included are conferences for top management and technical workshops for physical plant personnel. These workshops promote energy-saving opportunities and provide techniques for capturing these opportunities with regard to industrial processes, improved conservation practices for buildings and vanpooling programs.

The man-year staffing level requested for FY 1978 is required to phase out the FEA role in this program. As a result of conducting a successful effort during FY 1977, it is anticipated that a significant demand will develop for additional materials and follow-up information from States, trade associations and others.

Cost Factors:

Personnel compensation and benefits (no positions, 8 staff years)	$176,000
Other	38,000
Total	$214,000

Weatherization Program

The Weatherization Program was proposed in January 1975. This proposal was based on a successful Office of Economic Opportunity program of insulating the homes of low-income persons in Maine. Currently, the eligible universe is estimated at six million low-income homes. FEA anticipates that approximately 880,000 of those homes will be weatherized if the requested funds are appropriated. In addition to the funds requested in this budget, $55 million in supplemental funding is also requested in FY'77.

The program is mandated by P.L. 94-385, Section 413, for three fiscal years beginning October 1, 1976 and ending September 30, 1979. Some program development work has been done in FY'76. Currently, regulations, program manual, technical assistance packages, a monitoring contract and requirements for a management information system are being prepared.

Pending supplemental appropriations for FY'77 and final publication of the regulations, the program will be ready for full implementation in the spring of 1977. Contact with the States and local delivery agencies is still minimal, but will require greater expenditure of man-hours as we move closer to actual program implementation. Headquarters coordination will be of paramount importance during FY'77 to ensure that grant administration is consistent and equitable. During FY'78 administration of the program will be regionalized to provide for effective management of the numerous and diverse applications which are expected. Already there are indications that not every State plans to apply for grant funds. Community Action Agencies (900), Indian tribal councils (500) and units of local government (3,000) will be eligible to apply for funding in the event their State elects not to do so. The implementation burden is likely to be multiplied many times in this way, thereby increasing the workload not only in Headquarters but in the Regional Offices as well. We estimate that 45 State, 100-150 local government/CAA, and 100 Indian applications will have to be processed in FY'78.

As the program becomes fully operational in FY'78, management emphasis will shift to the regions, the principal source for technical assistance, program monitoring and application processing. The budget estimates reflect the regional shift and provide the resources necessary for a more decentralized operation of this program. Current plans call for 10 new regional positions to be filled at the beginning of FY'78.

Amended

This program will be evaluated by C&E's Program Evaluation Office in FY'78 ($100,000 in contract support).

The amended request includes $10,000,000 more than the initial FY 1978 request for this program.

Cost Factors:

Personnel compensation and benefits (30 positions, 28 staff years)	$ 675,000
Other	159,000
Grants	64,066,000
Total	$64,900,000

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY CONSERVATION AND ENVIRONMENT

PROGRAM: NATIONAL PROGRAMS

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	66	60	6,091	4,096	60	57	3,785	128	131	32,571	68	74	28,786
Headquarters	54	50	5,788	4,020	50	47	3,495	78	82	31,149	28	35	27,654
Regions	12	10	303	76	10	10	290	50	49	1,422	40	39	1,132
(Contracts/Grants)	XX	XX	(4,188)	(3,199)	XX	XX	(1,880)	XX	XX	(27,890)	XX	XX	(26,010)
ECPA: FY 77 Supplemental Pending; FY 78 Amounts Included Above					35	20	8,054	85	79	26,862			
Headquarters					35	20	8,054	35	35	25,587			
Regions					...	...	...	50	44	1,275			
(Contracts/Grants)					XX	XX	(7,472)	XX	XX	(24,572)			

PROGRAM DESCRIPTION

The Office of National Programs is responsible for four energy conservation initiatives undertaken at the national level: the Federal Energy Management Program (FEMP), the Obligation Guarantee Program, programs directed towards regulatory institutions, and voluntary programs.

The Federal Energy Management Program was established in 1973 to set policy for and monitor the progress of energy conservation efforts in the Federal Government. Under the Energy Policy and Conservation Act (Section 381), the President has been directed to develop and implement a 10-year plan for energy conservation in all Federal Government buildings. The responsibility for this plan has been delegated to FEA by Executive Order 11912.

The Obligation Guarantee Program Office is responsible for administering the implementation of the Obligation Guarantee Program, authorized in Part D of ECPA as a means of installing energy conservation or renewable-resource energy measures in buildings and industrial plants.

The Regulatory Institutions Program Office is responsible for: (1) the continuation of the utility demonstration program authorized in part by Section 204(1)(A) of the Energy Conservation and Production Act; (2) the implementation of programs authorized by Title II of ECPA to encourage the institution of energy conservation, rate reform and load management activities by gas and electric utility regulators; (3) intervention in utility rate hearings to advocate the adoption of policies and programs in accordance with policy as authorized in part by Section 204 of ECPA; and (4) to provide for the operation of offices of consumer services to assist consumers in their presentations before utility regulatory commissions as authorized by Section 205 of ECPA.

The Voluntary Conservation Programs Office is responsible for encouraging and obtaining the participation of Federal agencies, business associations and professional societies in programs to conserve energy. Specifically, such programs include: (1) encouraging manufacturers and operators of transportation equipment to improve the energy efficiency of trucks, buses, and automobiles; (2) implementing a voluntary goal-setting and reporting program in conjunction with the Department of Commerce and national trade associations to improve energy efficiency in the industrial sector, including administration of the exemption provision in EPCA; and (3) working with engineering and architectural professional societies to urge adoption of energy conserving design techniques.

Amended

JUSTIFICATION

Executive Direction

This function provides executive guidance and leadership to the Office of National Programs.

Cost Factors:

Personnel compensation and benefits (2 positions, 7 staff years)	$165,000
Other	39,000
Total	$204,000

Federal Energy Management Program

The Federal Energy Management Program Office is responsible for:

a. Developing and managing the Federal Energy Management Program and reporting to the President and Congress on Federal agency performance;

b. Working with Federal agencies to develop and implement consistent energy conservation programs; and,

c. Developing and implementing a 10-year plan for energy conservation with respect to buildings owned or leased by an agency of the United States, as well as with respect to other areas of Federal agency operations affecting energy use.

The 10-year plan for Federal Energy Management will be developed during FY 1977 and some limited implementation activities will begin. Increased funding levels will be required to fulfill the President's EPCA mandate (delegated to FEA) in the following areas:

a. Continued refinement of the original plan based on initial implementaiton experience, as well as new developments (technological or otherwise) which would improve the plan;

b. Increased demand for interagency liaison, monitoring and reporting as the plan begins to be implemented; and,

c. Provision of technical assistance to other Federal agencies.

Contract assistance is needed to develop end-use efficiency measures, programs to convert Federal boilers from petroleum or natural gas, new construction energy standards and for improvements to data collection and reporting systems.

Cost Factors:

Personnel compensation and benefits (12 positions, 12 staff years)	$283,000
Other	66,000
Contracts	630,000
Total	$979,000

Amended

Obligation Guarantee Program

Part D of the Energy Conservation and Production Act (ECPA) authorized the Administrator to issue or commit to issue obligation guarantees. Total guarantees are not to exceed a total of $2 billion dollars by September 30, 1979. This section authorizes FEA to guarantee qualified loans made to States and local governments, institutions, businesses, and owners of residences which comprise 3 or more dwelling units. Specific qualifications for eligibility are: (1) that the loan must be for installing an approved material or device which either saves energy or generates energy from a renewable source; (2) the applicant must not be able to obtain financing for his plan on "reasonable terms and conditions"; and (3) there must be a reasonable prospect for repayment of the loan.

Applications for loan guarantees are limited by legislated criteria such as:

a. 5 million dollar maximum for any single borrower;

b. only 90% of any conservation plan's cost may be guaranteed;

c. a loan must be repaid within 25 years;

d. the purpose of the loan must be in accordance with the list of eligible measures published by the FEA Administrator or approved by an energy audit (ECPA, Section 432 and 451(b)).

The staff and contract resources are requested to implement the program and to monitor the progress and impact of the program authority contained in ECPA. As there is a significant lack of information about economically attractive opportunities for investment in energy conservation, resources will be needed to create public awareness. Background studies already accomplished have shown this effort to be vital to this program's success.

Implementation of a management program to be designed in FY 1977 is required to perform the tasks and resolve the issues identified which must be accomplished in order to issue obligation guarantees early in FY 1978. Implementation, installation and operation of a management information system is required to insure the proper handling of the data and timely processing of the applications. Regulations and administrative procedures must be developed and technical support requirements undertaken. The technical support activities include manuals for conducting and reviewing audits, continuing analysis of measures and their applications for potential inclusion on the energy measures list and assistance in the review of applications to systematize, standardize and streamline guarantee procedures.

The staffing requested will be needed to maintain the energy measures list, to review energy audits, to process applications, to issue commitments and guarantees, to disseminate information concerning the program and to develop and implement analytical criteria for program evaluation. The Regional offices will need 50 positions and will be primarily responsible for disseminating information, processing applications, reviewing energy audits and issuing commitments and guarantees. Headquarters will require the remaining 25 positions. These personnel will be responsible for maintaining the energy measures list, insuring consistency in processing applications, reviewing problem cases referred from the regional offices, reviewing applicants' appeals, operating and maintaining the management information system and developing and implementating program evaluations.

The amended request includes $19,500,000, 75 positions and 69 manyears. There was no initial FY 1978 request for this program.

Cost Factors:

Personnel compensation and benefits (75 positions, 69 staff years)	$ 1,628,000
Other	372,000
Contracts	2,500,000
Default fund (no-year money)	15,000,000
Total	$19,500,000

Amended

Regulatory Institutions Program

Under Titles I and II of the Energy Conservation and Production Act, the Office of Conservation and Environment undertook in Fiscal Year 1977 four distinctly different efforts to advocate utility rate reform and related conservation measures. During Fiscal Year 1978, these efforts will be continued and in some instances completed.

This request provides for the continuation and completion of the electric utility demonstration program authorized by ECPA, Section 204(1). The program provides financial assistance to utility regulatory bodies. The initial phase was designed to produce a comprehensive experimental data base on the impacts of specific rate reform and load management practices so that local regulatory authorities, utilities, and consumer representatives can assess their potential. The second phase of this program (to be initiated in Fiscal Year 1977 and continued in Fiscal Year 1978) will demonstrate actual system-wide implementation of these reforms (as contrasted with experimentation). The requested resources provide $1,325,000 for the initiation of 2 new fully funded demonstrations and $2,480,000 for completion of 9 projects initiated in earlier years. With this funding, there will be a total of 23 fully funded demonstrations since the inception of the program in FY 1975. In addition, this request will allow initiation of 2 new fully funded natural gas utility demonstrations, at a cost of $780,000, and completion funding of $620,000 for 5 projects initiated in FY 1977. These gas demonstrations will focus on pricing and conservation techniques uniquely applicable to gas distribution utilities, including utility financing of heating system modifications.

Gas and electric regulatory rate reform initiatives are nationally-directed technical assistance activities designed to modify regulatory policies and processes. These rate reform tools include case studies, jurisdiction-specific needs assessment, improved supply/demand forecasting techniques, utility simulation models, customer response analyses, information collection/dissemination systems and technical assistance teams to help regulatory institutions. These must cover not only rate structures, but also the ancillary conservation measures that allow customers to adapt to new rates. Examples of such measures are conservation financing, elimination of master metering and averaged billing, energy efficiency advertising, energy audits, and mandatory efficiency criteria for continuation of service. Rate reform initiatives covering these areas will be used to provide technical assistance to regulatory institutions and, through them, to gas and electric utilities and their customers. They will provide detailed "how to" assistance that will not only communicate generic rate reform/conservation principles, but will also allow regulators to translate these general approaches into specific actions appropriate for the local regulatory context. These initiatives will be complementary to FEA's formal intervention in regulatory proceedings. With expanded funding and concentration of effort on regulatory institutions in FY 1977-1978, coverage could be expanded to all 50 State regulatory commissions and the 15 largest municipal commissions. Through the leverage of these institutions, about 93 percent of gas and electricity sales will be covered. This request will use the jurisdiction-specific profiles of regulatory problems and the results of the field testing of improved gas and electric load forecasting techniques funded in FY 1977 for increased direct technical assistance to regulatory institutions. This will be done principally through technical assistance teams.

FEA utility conservation programs will also feature intervention in gas and electric regulatory rate proceedings, complementing the informal (less legalistic) advocacy efforts undertaken as Regulatory Rate Reform Initiatives. Intervention may be at the request of any State, utility regulatory commission, or participant in a utility regulatory proceeding, and is intended to encourage energy conservation by providing expert testimony and technical assistance at rate hearings. The program's objectives will continue to be: (1) recommend rate structure revisions to reflect utility costs, including those that vary with time-of-use; (2) advocate the adoption of cost-effective conservation measures, including electric utility load management; and (3) provide technical information, obtained through the FEA demonstration projects or other methods, on the effectiveness of various conservation techniques. The program activities include development of testimony, preparation briefs and reply briefs, preparation and appearances of FEA witnesses, analysis of utility system characteristics, examination of other parties' submissions, and resolution of technical rate-making policy issues. In Fiscal Year 1976, FEA participated with full intervenor status in seven rate cases, at an average cost of $32,000. The agency also participated in five additional cases, but not as full intervenor. The requested funds for Fiscal Year 1977 will cover 25 full intervenor cases at an average cost of about $30,000. Prior to Fiscal Year 1977, FEA honored only invitations directly from the regulatory commissions. In Fiscal Year 1978, the requested funds would cover 30 full intervenor cases, again at an average cost of about $30,000. The substantial increase in case load over pre-FY 1977 levels is expected because of the new policy (consistent with ECPA, Section 205) to honor invitations from

Amended

any participant in any rate case, of which there are about 250 annually for investor-owned retailers alone, and several times this number for municipals, co-ops and wholesalers.

Section 205 of ECPA authorizes FEA to provide grants to States for the establishment and operation of offices of consumer services to assist consumers in their presentations before utility regulatory commissions.

The consumer services office program will enable consumers to become more informed about and active in influencing public decisions concerning the price, and thus the amount, of utility-supplied power which they use. Such an FEA grant program is important for several reasons: (1) to help consumers respond knowledgeably in an environment in which energy prices are rising steadily and proposals for utility rate reforms are proliferating; (2) to encourage State utility regulatory commissions to give full consideration to the concerns of the various utility consumer classes; (3) to alleviate the present situation wherein the consumers' ability to retain legal assistance is limited by their lack of resources; and, (4) to advance FEA goals, since consumer interest in furthering utility load management and rate reform can improve utilities' load factors and thus result in a shift from gas and oil to coal and reduce overall energy consumption.

The full Congressional authorization of $2 million is necessary to establish, where necessary, and operate State utility consumer services offices. Two FEA staff persons are needed to implement and monitor this grant program.

The amended request includes $2,925,000, 5 positions and 4 manyears more than the initial FY 1978 request for this program.

Cost Factors:

Personnel compensation and benefits (31 positions, 32 staff years)	$ 753,000
Other	175,000
Contracts	7,680,000
Grants	1,942,000
Total	$10,550,000

Voluntary Programs

The Voluntary Conservation Programs Office is responsible for encouraging and obtaining the participation of Federal agencies, business associations, professional societies, and others in the private sector.

Existing programs in this area include:

a. A program to encourage manufacturers and operators of transportation equipment to improve the energy efficiency of trucks, buses, and automobiles.

b. A program to implement a voluntary goal setting and reporting program in conjunction with the Department of Commerce and national trade associations to improve energy efficiency in the industrial sector, including administration of the exemption provision contained in EPCA.

c. A program to educate and work with engineering and architectural professional societies to urge the adoption and implementation of energy conserving design techniques.

d. In conjunction with EPA, produce and distribute New Car Mileage Guides as required by EPCA.

Amended

These programs are expected to continue through 1978. Since they are voluntary programs attempting to institutionalize conservation procedures, at least 2-3 years will be required before impacts can be expected. Program implementation is also expected to occur in FY 1978 in the following areas: (1) a program for home builders in new residential construction; (2) a program to encourage the development of a residential retrofit business, expected to be implemented with the assistance of national remodeling associations; and (3) a program to encourage the use of dual purpose power plants by industry.

Cost Factors:

Personnel compensation and benefits (8 positions, 11 staff years)	$260,000
Printing of New Car Mileage Guides (20,000,000 copies at 4.4 cents each)	880,000
Other	60,000
Contracts	138,000
Total	$1,338,000

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY CONSERVATION AND ENVIRONMENT	PROGRAM: MANDATORY PROGRAMS												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	31	25	3,367	1,322	25	28	2,512	24	25	3,527	-1	-3	1,015
Headquarters	31	25	3,367	1,322	25	28	2,512	24	25	3,527	-1	-3	1,015
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(2,567)	(1,114)	XX	XX	(1,400)	XX	XX	(2,800)	XX	XX	(1,400)
ECPA: FY 77 Supplemental Pending; FY 78 Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	...	XX	XX	...			

PROGRAM DESCRIPTION

The Office of Mandatory Programs provides support for two activities mandated by the Energy Policy and Conservation Act (ECPA).

The Appliance Program, Part B, Title V of the Energy Policy and Conservation Act includes: (1) developing procedures to test energy efficiency of appliances; (2) measuring and monitoring of the energy efficiency improvement activities conducted by appliance manufacturers; and (3) disseminating to consumers information that will enable them to ascertain the life cycle cost of owning and operating different products.

The Industrial Reporting Program provides for the continuing implementation of the mandatory industrial energy conservation provisions of the Energy Policy and Conservation Act (Section 375).

Amended

Executive Direction

This function provides executive guidance and leadership for the Office of Mandatory Programs.

Cost Factors:

Personnel compensation and benefits (2 positions, 2 staff years)	$47,000
Other	11,000
Total	$58,000

Appliance Program Office

The Appliance Program as mandated under Part B, Title III of the Energy Policy and Conservation Act (EPCA) must:

a. Develop and publish test procedures to measure the annual operating costs and energy efficiency of major home appliances;

b. Advise FTC on publishing labeling rules for covered products;

c. Identify other types of consumer products and make recommendations to include these as "covered" products under EPCA;

d. Develop and publish energy efficiency improvement targets for each type of covered product and monitor progress against these targets;

e. Conduct a program to educate consumers and others with respect to the appliance efficiency and labeling programs; and,

f. Prepare an annual report to the Congress on the progress of the program and its energy impact.

The FY'78 funds and personnel requested will provide for continued technical support that the National Bureau of Standards (NBS) performs for the program, continued study of consumer usage of appliances, a substantially increased consumer education program, and the initiation of a program to evaluate the potential benefits and problems from retrofitting furnaces, hot-water heaters and other major energy consuming appliances with energy savings devices such as the automatic flue gas damper. Specifically, such additional resources will be applied to the following activities:

NBS must continue to provide general technical support for the Appliance Program. Targets and test procedures for covered products (11-13) must be finalized and modification of existing test procedures will be necessitated by future innovative design changes. Modification of test procedures is very important because it is the mechanism that will allow manufacturers to receive credit for design changes, and thereby, reduce the estimated annual operating cost figure which will appear on the labels. If test procedures are not able to measure and give credit for innovative design changes, there will be no incentive for increasing the efficiency of appliances. NBS must also continue laboratory testing to insure that energy efficiency is maintained over the life of the product.

Consumer usage patterns must be monitored on a continuing basis so that accurate data is available to calculate the "estimated annual operating cost" of covered products.

Amended

The most critical aspect of the appliance program is consumer education. Without it, there will not be an adequate awareness of the existence of energy efficient appliances nor an understanding of the information contained on the appliance labels, which will enable the consumer to make the crucial decision to buy the most energy efficient appliance. In addition to the individual consumer, groups such as homebuilders, contractors, and retail salespersons must be made aware of the program and must be convinced that the effort to increase appliance efficiency is important. FY 1978 will be the first year that labels will be on all 13 product types, and thus, it is the appropriate time for the maximum effort in the consumer education area.

Significant, immediate energy savings can be realized by the retrofit of certain appliances, particularly furnaces and hot water heaters, with energy saving devices such as the automatic flue gas damper and electronic ignition. There currently is no formal Federal program to investigate the energy-saving advantages of retrofit devices and to determine the extent (and appropriateness) of the impediments to the installation of certain devices that now exist. FEA will initiate such a program and establish a coordinated Federal effort to address the retrofit concept by including agencies such as the Energy Research and Development Administration and the Consumer Product Safety Commission.

The amended request includes $1,649,000, 3 positions and 1 manyear more than the initial FY 1978 request for this program.

Cost Factors:

Personnel compensation and benefits (15 positions, 15 staff years)	$ 354,000
Other	82,000
Contracts	2,800,000
Total	$3,236,000

Industrial Reporting

The Industrial Reporting Program Office is responsible for:

a. Identification and ranking of the major energy-consuming industries as required by EPCA;

b. Identifying the 50 most energy-consumptive corporations in at least the 10 most energy-consumptive industries;

c. Establishing energy efficiency improvement targets for at least the 10 most energy-consumptive industries;

d. Preparing standard mandatory reporting form for use by the identified corporations to report energy use and conservation data to FEA; coordinating with the Voluntary Programs Office regarding implementation of the provision for the corporations exempt from this requirement for full participation in adequate voluntary programs;

e. Receiving reports and making an annual report to the Congress and the President on the progress of energy conservation in industry, the need for further legislation, etc.

Amended

In FY 1978 this office will:

. Review the industrial energy efficiency targets in light of available energy management reports to determine whether such targets should be modified. Any modifications will be published in the Federal Register.

. Receive energy progress reports from the 50 identified companies in each of the 10 most energy intensive industries.

. Prepare the annual report for the Congress and the President, including a summary of the progress made by industry toward achieving the improvement targets set by FEA.

Cost Factors:

Personnel compensation and benefits (7 positions, 8 staff years)	$189,000
Other	44,000
Total	$233,000

Amended

FEDERAL ENERGY ADMINISTRATION

Congressional Budget Submission
Fiscal Year 1978

OFFICE OF ENERGY CONSERVATION AND ENVIRONMENT

Analysis of FY 1978 Contracts/Grants

	($000) Cost
Administrative Office:	
o Technical support for writing and editorial services, graphic services, film and videotape duplicating and photographic services	200
Subtotal	200
Policy and Program Development and Environment:	
--Policy Development--	
o Contractual support for Congressional Reports mandated by ECPA	100
--Program Development--	
o Contractual assistance for innovative conservation programs	23,870
o Screen potential energy conservation and renewable-resources measures list (Title IV, ECPA) and extend initial list	150
--Program Evaluation--	
o Evaluation of the Weatherization Assistance Program required by ECPA, Section 416	100
o Evaluation of the Supplemental State Grant Program (ECPA, Title IV, Part B)	100

Amended

--Environment--

o An analysis of the non-attainment Clean Air Act issue to identify Air Quality Control Region industries and pollutants involved, and to develop economic and energy impact estimates	75
o Technical contractual support in review of Agency-prepared NEPA documents	25
o Assessment of environmental implications of energy taxing or pricing alternatives including a Btu tax. (ECPA, s109 and 162(a))	50
Subtotal	24,470

State Programs:

--State Financial Assistance--

o Grants to States for implementation of energy conservation programs (EPCA)	47,000
o Grants to States for supplemental energy conservation programs (ECPA)	23,500
o Update the State Energy Conservation Program Sourcebook	50
o Study to identify the relative effectiveness of different implementation options for particular program measures	100
o Contract to revise and improve the energy savings estimation methodologies and data tables	20
o Contract to evaluate the "results" data collection portion of the established management information system	50
o Conduct conferences, develop publications, disseminate materials and technical support to States	350
o In the area of building standards analyze savings potential from retrofit; conduct regional workshops to disseminate results of retrofit savings analysis; develop and disseminate utility-specific fuel cost projections; develop requirements for computer graphics capability to accommodate building performance standards	275
o Conduct State demonstrations of building performance standards for new and renovated buildings	200

Amended

o Demonstrate transportation control alternatives	200
o Develop and disseminate information pertaining to the relative energy efficiency of items most commonly purchased through State procurement procedures	134
o Survey and evaluate existing energy conservation education programs, including in-school programs, and develop supplemental information for State assistance	255
--Weatherization--	
o Weatherization Grant Awards	64,066
Subtotal	136,200
National Programs:	
--Federal Energy Management Program--	
o Development of additional end-use energy efficiency measures (Federal Energy Management Program)	200
o Development of programs to convert Federal boilers to fuels other than petroleum or natural gas	200
o Technical assistance to Federal agencies, e.g., retrofit handbook revision, additional energy standards for new construction, technical information materials, and improved data collection and reporting techniques	230
--Obligation Guarantee Program--	
o "No year" money to cover loss on guarantees issued during FY 1978 (estimated to be $500,000,000) at the anticipated loss rate of 3 percent	15,000
o Implement management information system in FEA headquarters and regions including training appropriate personnel in system operation and maintenance	300
o Develop analytical techniques/tools to monitor the progress and evaluate the impact of the program	350

Amended

o Develop program support activities for the 10 regional offices including technical assistance in reviewing the feasibility of energy measures identified by an energy audit.	500
o Technical assessment of measures for possible inclusion on the energy measures list.	150
o Develop and publish audit manuals, workbooks, brochures etc., for sectors offering greatest promise in terms of energy savings	100
o Develop energy consumption and financial profiles of various classes of borrowers	150
o Provide technical assistance to borrowers and lenders concerning energy audits and applications for obligation guarantees	500
o Develop conservation investment awareness programs describing energy audits and energy measures suitable for the various classes of borrowers.	325
o Develop and disseminate data on the performance and effectiveness of various energy conservation measures to various public/private sectors	125
--Regulatory Institutions--	
o Gas Utility Demonstrations	1,400
o Electric Utility Demonstrations.	3,805
o 10 Gas Utility Interventions at $30,000 each	300
o 20 Electric Utility Interventions at $30,000 each.	600
o Support of technical assistance teams of nationally recognized experts to aid gas and electric utility regulators in planning and implementing rate design and conservation activities that meet their specific needs	800
o 7 case studies which analyze how gas and electric utility reforms could be approached, from initial problem identification to actual implementation.	175
o Application of computer simulation models to predict the impacts on gas and electric utilities of rate reform and conservation options. This is a preliminary step to initiating regional and State specific rate reform and conservation programs.	500

Amended

o Operation of information transfer systems to keep regulators advised of developments pertinent to gas and electric utility rate design and conservation.	100
o Consumer Office Grant Awards	1,942
--Voluntary Programs--	
o Transportation Energy Conservation: Technology Transfer	38
o Auto Fuel Economy: Consumer Education	50
o Industrial Voluntary Conservation Program Support.	25
o Energy Conservation Design Techniques for Buildings.	25
Subtotal	27,890
Mandatory Programs:	
--Appliance Programs--	
o Transfer of funds to National Bureau of Standards (NBS) for: completion of test procedures and targets for covered products in categories 11-13; modify existing test procedures to account for innovative design changes; technical analysis of energy consumption and trends; research to determine revised minimum energy efficiency levels; review and analysis of industry energy efficiency improvement data; and, analysis and evaluation of technical support information	1,800
o Contract to study potential changes in appliance usage patterns in households. Changes in usage must be reflected on appliance labels	100
o General consumer education program to promote awareness of the Appliance program and to educate consumers on the use of labels on appliances; specific program to educate consumers and other groups on the proper sizing of heating and cooling systems; consumer research analysis survey to determine, for example, if the program has influenced consumer willingness to buy more energy efficient appliances even though these may have a higher first cost	600

Amended

o	Collect background data and materials on appliance retrofit devices (both domestic and foreign); determine magnitude of energy savings and economic feasibility; assess safety of current retrofit devices; identify institutional and technical barriers that must be resolved to make retrofit devices acceptable for consumer use; develop implementation strategy.	100
o	Accomplish monitoring and evaluation of the appliance industry's energy improvement activities.	200
	Subtotal	2,800
	TOTAL CONTRACTS AND GRANTS	$191,560

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: ENERGY RESOURCE DEVELOPMENT

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual Pos.	MY	Amount	TQ Amount	FY 1977 Estimate Pos.	MY	Amount	FY 1978 Estimate Pos.	MY	Amount	Change FY 1977 to FY 1978 Pos.	MY	Amount
ENERGY SOURCES	89	101	4,504	693	84	83	3,132	82	82	3,199	- 2	- 1	+ 67
ESECA-COAL UTILIZATION	60	30	1,519	1,765	58	57	2,071	70	68	5,807	+12	+11	+3,736
ELECTRIC POWER	55	53	2,374	754	54	54	1,894	51	51	1,981	- 3	- 3	+ 87
FINANCIAL PLAN & INCENT	22	21	754	204	22	22	1,028	22	22	1,011	-	-	- 17
SITING	21	19	569	285	23	22	814	20	20	894	- 3	- 2	+ 80
ENVIRONMENT	12	11	354	221	12	12	610	12	12	571	-	-	- 39
EXEC. DIRECTION & ADMIN.	26	26	719	274	25	25	756	25	25	689	-	-	- 67
Total	285	261	10,793	4,196	278	275	10,305	282	280	14,152	+ 4	+ 5	3,847
(Headquarters)	(230)	(212)	(9,680)	(3,897)	(225)	(222)	(9,039)	(227)	(225)	(12,770)	(+ 2)	(+ 3)	(+3,731)
(Regions)	(55)	(49)	(1,113)	(299)	(53)	(53)	(1,266)	(55)	(55)	(1,382)	(+ 2)	(+ 2)	(+ 116)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above				...	...	...	3,150	...	...	...			

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY RESOURCE DEVELOPMENT	PROGRAM: ENERGY SOURCES										Change FY 1977 to FY 1978		
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate					
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	89	101	4,504	693	84	83	3,132	82	82	3,199	-2	-1	+67
Headquarters	64	76	3,936	574	64	63	2,654	57	57	2,571	-7	-6	-83
Regions	25	25	568	119	20	20	478	25	25	628	+5	+5	+150
(Contracts/Grants)	XX	XX	(1,933)	(154)	XX	XX	(1,000)	XX	XX	(1,000)	XX	XX	(---)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					---	---	1,900	---	---	---			
Headquarters					---	---	1,900						
Regions					---	---	---						
(Contracts/Grants)					XX	XX	(1,900)	XX	XX				

PROGRAM DESCRIPTION

The goal of the Energy Sources function is to develop and implement project and programs that aim to increase the supply of domestic oil, gas, petroleum products, coal, synthetic fuels and the use of geothermal and solar energy. Four divisions in conjunction with strong support or lead by regional personnel have responsibility for achieving the goals and objectives of the Energy Sources Program. Increased supply and use of domestic energy sources is achieved through many approaches. Staff in the program offices for Coal and Oil& Gas identify potential constraints, problems, or issues that may impede achievement of national energy production goals. The Program offices develop programs and efforts to resolve the impediments or facilitate resolution of the issues. Program offices identify site specific projects that are transferred to Project Operations staff for tracking and implementation. Project Operations personnel facilitate and expedite preparation of major project-related studies such as an EIS, obtain required approvals, licenses, or permits from Federal, State or local agencies or governments. Project Operations personnel conduct near term energy development studies to identify key actions to be taken for a region of the country, identify obstacles impeding a project's progress, and identify and implement corrective measures. The objectives for each of the offices comprising Energy Sources follows:

The Office of Coal is responsible for promoting the expansion of coal and developing plans and programs to meet coal demands. Six major programs have been identified as necessary to achieve the goal of additional coal production.

The Office of Oil and Gas is responsible for promoting increased domestic exploration for crude oil, production of refined products and petrolchemicals, transportation and distribution of oil, and the production and distribution of natural gas. The Office administers 4 programs to achieve these objectives.

Solar, Synthetic Fuels, and Geothermal Energy is responsible for encouraging the commercialization and widespread use of altermative energy sources. The office is implementing 4 programs to achieve its objectives.

Project Operations is responsible for monitoring and expediting implementation of site specific projects important for achieving national energy supply objectives. The site specific projects involve development of coal, oil and natural gas and the distribution or transportation of these resources. Projects are choosen on the basis of their energy supply impact, according to criteria derived from Agency authorizations and often represent concrete examples, or prototypes of the issues represented.

87-591 O - 77 - 22

PROGRAM JUSTIFICATION

The 82 man years and $900,000 of contract funds are aimed at supporting the following domestic energy supply increases in FY 1978 over FY 1976 levels: 75 million tons per year increase in coal production; 700,000 barrels per day (B/D) in oil production; 500,000 B/D increase in refinery production; 3 billion cubic feet per day increase in natural gas production; and significant contributions to commercialization programs for alternative energy sources.

The above output will be achieved through implementation of 15 Programs by Program Offices, 4 near term energy development studies for specific regions of the country, and about 18 large energy projects involving increased oil or natural gas production, increased pipeline capacity for oil or natural gas, additional refinery production, development of western coal mines, improved distribution and transportation of coal, and development of an accelerated solar energy commercialization program. The specific programs near term development studies and projects necessary to achieve Energy Sources objectives listed by divisional offices are:

I COAL

The Coal Mine Expansion Program is designed to identify constraints of increasing mining capacity at an early stage in order to develop solutions to these constraints as quickly as feasible.

The Coke Capacity Program is designed to provide a detailed assessment of future demand for coke and coke oven capacity to ascertain future coking shortfalls and consequent constraint on steel production.

The Indian Lands Coal Development Program is designed to assist Indian tribes develop their coal resources by becoming involved with unique problems associated with Indian land development.

The Transportation/Distribution Program is designed to identify and provide programs that enable rapid resolution of site specific problems relating to transportation/distribution constraints of additional coal production.

The Metallurgical Coal Program is designed to provide information on current reserves, and supply/distribution patterns which will be the basis for planning future production of this valuable coking resource.

The Pennsylvania Anthracite Program is designed to increase the production of anthracite by assisting the Commonwealth of Pennsylvania to expedite their anthracite programs.

II OIL AND NATURAL GAS

Crude Oil: Routine petroleum monitoring activities and reserve and resource estimates will continue. Major efforts will involve an analysis of petroleum finding and production costs in new frontier areas, an assessment of equipment manufacturing capability, and the eventual implementation of programs, projects, and/or legislation to ensure adequate profitability and equipment availability to realize a high rate of oil exploration, development and production of new fertile areas. Also, a determination will be made of the quantity of oil and gas that will be left behind due to abandonment of oil and gas leases when such abandonment is directly related to inadequate producer profits which are a result of Federal-State-local taxes and royalties.

Refining and Petrochemicals: Trends in refinery capacity utilization will continue to be monitored and assistance to State and local communities entertaining new refinery construction will be provided. An evaluation of the incentive for domestic capacity utilization will be made taking into account product import fees as well as entitlement credits that are in existence in 1978. Modification of import fees and/or entitlement credits will be made in accordance with the findings.

PROGRAM JUSTIFICATION (Cont'd.)

Transportation and Distribution: Monitoring of various pipeline systems and port facilities will continue. Analytical studies will be conducted to show several ways to minimize petroleum transportation costs. Also, a study will be conducted to indicate major oil and gas pipeline systems and to pinpoint spare capacity. Pipeline abandonments will also be identified. This will enable the industry and the public to have an improved data base from which to plan expansion or better utilization of existing facilities.

Natural Gas: Collection and analysis of natural gas curtailment data and certain consumption data will be undertaken. The program involves development of means to minimize economic and social impacts resulting from an anticipated shortage of natural gas. It also includes development and coordination of FEA's participation in other Federal (principally the FPC) agency actions and some state actions affecting the supply of natural gas.

III SOLAR, SYNTHETIC FUELS AND GEOTHERMAL ENERGY

Solar Energy Commercialization Program is designed to develop a national plan for accelerated commercialization of solar energy including options to achieve by 1985 energy savings on the order of 1 million barrels per day of oil equivalent from solar technology. In order to achieve this it is necessary to develop recommendations on (1) mitigation of constraints to solar commercialization; and (2) development of (a) plans to commercialize each major solar technology; (b) State solar commercialization programs; and (c) major solar commercialization projects such as Southwest Project Solar Electric and Solar Energy Government Buildings Project. Further program development and definition may be continued in FY 1978 dependent upon the results of an interagency study being done in FY 1977.

Synthetic Fuels Program is designed to facilitate Federal regulatory and other actions to stimulate the development and growth of a synthetic fuel industries in order to achieve production of not less than 350,000 barrels of oil equivalent per day by 1985. The program focuses on identification and resolution of major policy questions that must be addressed prior to eventual large scale development of synfuels.

The Solid Waste Program focuses on identification and resolution of institutional and socio-economic constraints and promotion of use of municipal solid waste as an energy resource. It complements EPA's programs that emphasize environmental aspects of solid waste energy conversion and ERDA's efforts to develop new technologies.

The Geothermal Energy Program is designed to identify and develop corrective action for institutional barriers to the prompt development of geothermal energy. It requires assessment of legal, environmental, regulatory and other aspects of Federal, State, and local government policy as it relates to geothermal energy and development of recommendations for changes and improvements.

IV PROJECT OPERATIONS

Oil and Gas Supply and Distribution Projects: Projects are chosen on the basis of their energy supply impact and are often selected because they are concrete examples of issues or problems applicable to other similar energy supply projects. The function necessitates following progress and problems associated with specific Energy projects in order to surface and resolve operational policy questions. The function involves identifying specific projects that are experiencing particular regulatory or practical constraints and developing methods to expedite removal of potential or actual regulatory delays or prohibitions often involving FEA intervention on behalf of a specific project before a regulatory body.

Coal Supply and Transportation Projects: This activity focuses on monitoring and expediting development of western coal. It involves identifying and resolving environmental, institutional, socio-economic, and regulatory obstacles impeding progress of specific projects.

PROGRAM JUSTIFICATION (Cont'd)

Near Term Regional Energy Development Studies in Support of Specific Projects: Understanding and developing the issue or problem associated with an individual energy project often requires that each issue be put in the context of the near term energy development situation within the region of the country where the project is located. The product of these analyses is a better understanding of the issue to be resolved for the project, identification of other key site specific which also have important energy implications for the subject original region, identification of the operational policy issues associated with each key project, and an analytical framework for resoltuion of those issues.

COST FACTORS[1] FOR ALL ERD PROGRAMS LESS COAL CONVERSION PROGRAMS:	$(000)
- Personnel Compensation and Benefits for 212 man-years	$5,215
- Travel and Transportation	160
- Miscellaneous Support Costs	370
- Contracts	2,600
TOTAL	$8,345

[1]The cost factors for all ERD programs except Coal Conversion are the same. Therefore, they are summarized here and are not repeated for each program.

Amended

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY RESOURCE DEVELOPMENT	PROGRAM: ESECA/COAL UTILIZATION												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	60	30	1,519	1,765	58	57	2,071	70	68	5,807	+12	+11	3,736
Headquarters	45	21	1,315	1,676	43	42	1,713	55	53	5,430	+12	+11	3,717
Regions	15	9	204	89	15	15	358	15	15	377	...	...	+ 19
(Contracts/Grants)	XX	XX	(777)	(1,500)	XX	XX	(610)	XX	XX	(2,431)	XX	XX	(+1,821)
ECPA: FY 77 Supplemental Pending; FY 78 Amounts Included Above					...	...	900		...	...			
Headquarters					...	...	900						
Regions					...	...	...						
(Contracts/Grants)					XX	XX	(900)	XX	XX				

PROGRAM DESCRIPTION

The Office of Coal Utilization implements the coal conversion provisions of the Energy Supply and Environmental Coordination Act of 1974 (ESECA), as amended by the Energy Policy and Conservation Act of 1975 (EPCA). FEA, pursuant to the authorities granted it under the law, issues Prohibition Orders to existing utility powerplants and Major Fuel Burning Installations (MFBI's) requiring that they switch from burning oil and natural gas to coal. FEA issues Construction Orders to utilities and MFBI's in the early design stage requiring them to be constructed with the capacity for 100% coal burning.

In both instances, certain findings must be made before FEA can make its final binding order: a Notice of Effectiveness. These include (1) an available supply of coal, (2) compliance with environmental standards, (3) practicability (which involves financial capability and reasonableness), and (4) the order's effect on reliability (for utilities only).

Order issuing authorities expire June 30, 1977 with enforcement authorities extending to December 31, 1984. Absent any extension or modification of the program, work in FY 78 will consist of actions leading to issuance of Notices of Effectiveness and compliance monitoring.

Amended

JUSTIFICATION

The Energy Supply and Environmental Coordination Act of 1974 (ESECA) created the coal conversion program. Order-issuing authorities under this Act expired June 30, 1975. These authorities were extended in December, 1975, by the Energy Policy and Conservation Act (EPCA) with order-issuing authorities extended to June 30, 1977. Authority to enforce these orders does not expire until December 31, 1984.

The coal utilization program authorizes FEA to issue two types of orders to utilities and major fuel burning installations (MFBI's):

1. Prohibition Orders: issued to existing facilities that have coal-burning capability and also the capability to burn oil or gas. These orders would prohibit the burning of oil or natural gas.
2. Construction Orders: issued to new facilities in the "early planning process" requiring that these facilities be constructed with 100% coal-burning capability. They would also be eligible for a Prohibition Order. However, once a plant is designed to burn coal, it is unlikely that oil, at a higher cost, would be used.

both ordering authorities are done on a case-by-case basis in compliance with applicable environmental requirements.

In order to issue Prohibition Orders for existing plants FEA must make a series of positive findings:

- -- that the capability to burn coal exists.
- -- that coal of the proper quality is available.
- -- that coal transportation is available.
- -- that the order is "practicable" (meaning financial capability and cost impact be considered).
- -- that reliability of service will not be impaired (only for utilities).

Construction Orders can only be issued if FEA cannot find that coal is unavailable and FEA considers financial and reliability (for utilities) aspects.

The coal utilization regulatory process carefully considers environmental requirements, public comment, and due process. The sequence of events requires the following actions:

1. The gathering of data and a preliminary determination by FEA that an order fulfills the necessary requirements.
2. The issuance of a Notice of Intent (NOI) (published in the Federal Register) to issue a Construction Order or Prohibition Order.
3. Public hearings are held for all Prohibition Orders and Construction Orders if current plans are not for coal.
4. If still appropriate, Construction or Prohibition Orders (P.O.) are issued.
5. An Environmental Impact Statement (EIS) or a negative determination is prepared for each order, and a public hearing is held, as required by the National Environmental Policy Act (NEPA).
6. In the case of P.O.'s, EPA provides certification of the earliest complying coal burning date and a possible compliance date extension.
7. A Notice of Effectiveness (NOE) setting forth the required compliance schedule is issued.
8. Compliance schedules are monitored and the NOE enforced.

The total process time from boiler analysis to NOE is 1½ to 2 years.

To date, FEA has issued utility Prohibition Orders to 74 powerplants at 32 generating sites and Construction Orders or NOI's for Construction Orders to 143 powerplants at 97 generating sites.

Amended

JUSTIFICATION (cont'd)

By June 30, 1977, we anticipate issuing the following additional orders:

	Utilities	MFBI's
Construction Orders	0	35
Prohibition Orders	40	60

By FY 1978, the required steps will have been completed for many, but not all order recipients. The table below indicates the anticipated number of orders by type issued between June 30, 1975, and June 30, 1977, for which implementation (NEPA process, NOE's) and/or subsequent compliance monitoring work must be performed:

	Orders Issued
Utility Prohibition	72
Utility Construction	97
MFBI Prohibition	60
MFBI Construction	35
	264

For FY 78, FEA assumes that EPA will certify coal burning dates for all Prohibition Orders issued through FY 77. EPA certification is not required for Construction Orders since order recipients must be capable of burning coal in compliance with applicable new performance standards. Thus, FY 78 work will concentrate on producing NEPA-related documents (Environmental Assessment, EIS's) and NOE's performance and non-degradation air quality standards.

Amended

JUSTIFICATION (cont'd)

Cost Factors

Staffing: 70 positions	$(000)	$(000)
68 man-years @ 24K personnel compensation and benefits		= $1632
Notices of Effectiveness (NOE): technical analysis		
100 Utility/MFBI Prohibition Orders (P.O.) @ 3K	= $ 300	
1 Utility Construction Order (C.O.) @ 5K	= 5	
35 MFBI C.O.'s @ 5K	= 175	
Total NOE technical analysis		= 480
Environmental Assessments (EA's) and Impact Statements (EIS's) technical analysis		
72[1] MFBI/Utility P.O. EIS's @ 20K	= 1440	
28[1] MFBI/Utility P.O. EA's @ 7.5K	= 210	
1 Utility C.O. EIS's @ 20K	= 20	
5 MFBI C.O. EIS's[2] @ 30K	= 150	
Total EA/EIS technical analysis		= 1820
EA/EIS Printing and Hearings Costs		
108 EIS hearings @ 7K	= 756	
108 EIS printings @ 6K	= 648	
28 EA printings @ 2.5K	= 70	
Total printing & hearing		= 1474
Pre-NOE Conference, Compliance Inspection Admin Costs		
Administrative costs	= 270	
Contractual Assistance	= 131	
Total other costs		= 401
TOTAL ESECA PROGRAM COST		= $5807

(1) Total P.O.'s will be 100 of which an estimated 28 will not require a full EIS

(2) MFBI C.O. EIS'sare more costly than utilities for the following reasons:
- MFBI's in industrialized, urban centers where more detailed analysis is needed to determine impact.
- data collection for MFBI's more difficult than for utilities; additional, and costly, air modeling required.
- Total requirement is estimated as 35 EIS's of which approximately 30 are requested for funding in FY 77

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY RESOURCE DEVELOPMENT	PROGRAM: ELECTRIC POWER											
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	55	53	2,374	754	54	54	1,894	51	51	1,981	-3	-3	+87
Headquarters	45	43	2,146	693	44	44	1,655	41	41	1,730	-3	-3	+75
Regions	10	10	228	61	10	10	239	10	10	251	--	--	+12
(Contracts/Grants)	XX	XX	(1,014)	(430)	XX	XX	(500)	XX	XX	(600)	XX	XX	(+100)
FY 77 Supplemental Pending; FY 1978 ECPA Amounts Included Above					--	--	350	--	--	---			
Headquarters					--	--	350						
Regions					--	--	--						
(Contracts/Grants)					XX	XX	(350)	XX	XX				

PROGRAM DESCRIPTION

The Electric Power Program consists of a number of discrete activities and functions intended to: ensure an adequate supply of electrical power; maximize the use of domestic fuels to generate electricity; remove bottlenecks which impede required powerplant construction; promote increased powerplant and system reliability and productivity; and assist States and localities to develop electricity programs and policies consistent with the National interest. Specifically, these efforts include:

- o Electricity Economics. A program to analyze, evaluate, and monitor the comparative economics of existing and planned electric facilities to determine the economic implications of Federal/State policy and regulatory decision making.
- o Coal/Nuclear Fuel Cycles. Analyses aimed at resolving uncertainties related to the supply and use of coal and nuclear fuel to generate electricity from industrial steam.
- o Electric Rate Initiatives. Activities to examine and analyze effects of alternative approaches and rate initiatives upon: projected energy resource savings; electrical generating capacity; capital financing requirements; and the cost of electricity for the consumer.
- o Powerplant Reliability/Productivity. A program in which FEA acts as a catalyst to promote improvements in powerplant reliability/productivity to assure adequate electric energy at reasonable cost.
- o Co-generation. An effort to identify problems and propose remedies to institutional factors impeding installation of dual purpose industrial boilers to produce industrial steam and electric power.
- o Project Expediting. A program to monitor powerplant construction, identify problems impeding timely construction, and act as a catalyst to bring interested parties together to resolve problems on a project-by-project basis.
- o State/Regional Planning. A program of assistance to State PUC's energy offices, environmental offices and others to analyze State energy balances and future needs, and to develop plans and make decisions which take into account regional impacts and the national interest.
- o Energy Labor Requirements. An interagency program to identify the projected energy-related skilled labor requirements; and to identify bottlenecks to powerplant and energy facility construction before they become harmful.
- o Hydroelectric Power. Activities which analyze generating efficiency and reliability from conventional and pumped storage, with particular emphasis on determining cost/benefits of small hydroelectric generating plants.

PROGRAM JUSTIFICATION

The Federal presence in the field of electric power is fragmented. Each Federal agency approaches electric power from its own perspective: regulation, safety, research and development, loan assistance. Only FEA has the authority to take an overall view of electric power and relate this form of energy to other systems. FEA's Electric Power Program does not usurp nor overlap programs of other agencies. Rather, FEA acts as a catalyst to encourage Federal and State cooperative efforts and assists in developing needed information when necessary. The emphasis on cooperative efforts with the States is a prime consideration in all FEA's undertakings. State Public Utility Commissions comprise the front-line agencies to assure the Nation an adequate supply of electric energy.

Electricity Economics. This program is a continuing effort designed to analyze, evaluate and monitor the comparative methods of existing and future electric facilities. The analysis focuses on existing technologies, primary energy sources utilized in the generation of electricity--nuclear, coal, oil, etc.,--considering for each, the relative capital, fuel, operating and maintenance costs. The output of these analyses are used to determine the economic implications of Federal and State policy decisions, or regulatory processes as they relate to electricity system development. The program includes FEA leadership of interagency efforts to develop and maintain consistent Federal cost estimating procedures and data. Cost estimates, procedures, assumptions, and computerized evaluation tools will be packaged for use by all Federal agencies and will be made available to State regulators and energy commissions upon request.

Coal & Nuclear Fuel Cycles. This program is directed at evaluating uncertainties related to the supply and use of coal and nuclear fuel for electricity generation on industrial steam. For coal, these uncertainties focus on the effects of rapid mine development, transportation capability, and environmental control at powerplants. Nuclear fuel cycle uncertainties relate to mine and mill development, enrichment capacity, spent fuel storage, reprocessing, and radioactive waste storage. This program provides the principal FEA analytic capability with respect to: (a) problems related to nuclear fuel cycle capacity and facilities planning; and (b) comparative analysis of coal, oil, natural gas, and nuclear fuel utilization for electricity generation. The program provides input to the electricity economics effort for policy evaluations related to coal or nuclear fuel development and use. It also provides information to Congress and State energy regulators and commissions on coal and nuclear fuel supply and economic factors. The program objective is to enable FEA to assist Federal Government and industry actions directed at assuring adequate domestic coal and nuclear fuel supplies.

Electricity Rate Initiatives. Analysis of effects of FEA proposed electric utility rate initiatives upon (a) projected energy resource savings, (b) reduced electrical generation capacity, (c) capital financing requirements, and (d) potential changes in the cost of electricity to the consumer. In FY 78, analysis of new rate initiatives will continue by examining alternative approaches to traditional utility methods for system expansion. Studies will be made in the context of existing power pool operating agreements, joint ownership of facilities, maintenance requirements and reliability criteria. Potential benefits in terms of reduced energy consumption for generation and lower consumer costs will be assessed. This effort will endeavor to provide a basis for utilities and State regulatory agencies to use new approaches to achieve greater efficiency of interconnected utility systems.

Powerplant Reliability/Productivity. FEA's role is to stimulate and coordinate aggressive analysis and implementation of productivity programs in the electricity industry. Trends over the past several years indicate that, while some plants achieve high productivity levels, productivity for the most part has been declining. Potential benefits of improved productivity are large. By 1980, an industry-wide reduction in the average forced outage rate of just one percent could reduce the Nation's installed capacity requirements by 6800 MW and capital requirements by $1-8 billion (1974 dollars). Over the same period, a capacity factor increase of 8 percentage points for nuclear units, and several percentage points for 400 MW and larger coal-fired units, would permit an increase in output equivalent to that produced by burning 500,000 barrels of oil per day. Powerplant productivity closely complements load-management activities. Without powerplant reliability, load-management is impossible. Load leveling techniques, on the other hand, make improvements in powerplant productivity all the more dramatic. FEA, for the past several years, has been the lead Federal agency in efforts to stimulate the electric power industry and State regulatory commissions to undertake aggressive productivity improvements programs.

PROGRAM JUSTIFICATION (cont.)

Cogeneration. The program will seek to insure the efficient use of fuel by promoting dual generation of industrial process steam and electricity. At present, substantial amounts of energy are lost through waste heat from the separate processes. This program will not require new technology, but will identify and implement remedies to the institutional factors impeding more extensive installations of dual purpose industrial boilers.

Project Expediting. This program maintains an inventory of present and prospective energy projects which involve conventional technologies or commercialization of existing technologies; selecting from it those projects which because of their importance merit FEA tracking; determining the impediments to successful and expeditious completion and operation of selected energy facilities; and intervening to provide assistance, whenever appropriate and feasible, to remove such impediments.

The types of responses which are appropriate include: formal intervention in regulatory proceedings; discussions with appropriate private parties and Government bodies to assist in removing bottlenecks.

Inventories of existing and projected powerplants will continue to be published and disseminated semiannually to Federal and State agencies.

State/Regional Planning. This program assists State public utility commissions, energy offices, environmental offices, and consumer groups to develop the capability to independently analyze their respective State energy balances and future energy needs. It serves as a key vehicle for communicating the implications of evolving national energy policy into key decisions which are made at the State level. It will supplement State resources and capabilities so that State-level decisions and actions do not preclude sufficient development of energy and electricity supply to meet State, regional and national needs. It highlights the need for regional planning/ coöperation to cope with mutual problems. Assistance to State groups is rendered by FEA through (1) testimony, (2) national data input, and (3) production and analysis of State energy balances and implementation of a load forecasting system providing the States with assistance in the decision-making process.

Energy Labor Requirements. This program provides for short- and long-range projections of skilled manpower requirements for energy facility construction. The end result is to reduce construction costs due to delays caused by manpower shortages on new energy construction and improve employment opportunities for craftsmen. The vehicle for developing the computerized system and the resulting projections and analyses is an interagency agreement between FEA, DOL, ERDA, and TVA signed in FY 77.

Hydroelectric Power. A number of Federal agencies--TVA, Corps of Engineers, etc.,--are involved in hydroelectric power development. FEA's program does not overlap, but compliments the work of these agencies. Its emphasis is on analysis of potential system improvements in generating efficiency and reliability resulting from development of conventional and pumped storage capacity. The results of these analyses are intended to optimize system utilization of baseload units; minimize oil/natural gas supplies; and promote use of clean, renewable energy resources.

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY RESOURCE DEVELOPMENT	PROGRAM: FINANCIAL PLANNING AND INCENTIVES										Change FY 1977 to FY 1978		
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate					
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	22	21	754	204	22	22	1,028	22	22	1,011	..	..	-17
Headquarters	22	21	754	204	22	22	1,028	22	22	1,011	..	..	-17
Regions	..	..	...	...	..	..	...	..	..	...	..	..	...
(Contracts/Grants)	XX	XX	(188)	(70)	XX	XX	(450)	XX	XX	(405)	XX	XX	(-45)
FY 77 Supplemental Pending; FY 78 ECPA Amounts Included Above					..	..	...	..	..	...			
Headquarters													
Regions													
(Contracts/Grants)					XX	XX		XX	XX				

PROGRAM DESCRIPTION

The Financial Planning and Incentives responsibility in Energy Resource Development involves the development and analyses of Federal financing programs designed to ensure the availability of adequate capital to attain the necessary national growth levels for domestic energy production. This includes: monitoring energy industry cash flows and capital requirements; analysis of the ability of capital and money markets to accommodate these capital requirements; reviewing existing economic and regulatory restraints and disincentives in the Federal and private sectors which discourage the financing of domestic energy production; developing and implementing programs to both remove financial and economic barriers and to provide financial incentives to promote the expansion of domestic energy production; reviewing and recommending FEA policy options on economic regulatory issues such as rate of return, tax matters, financial incentives, etc. In addition, the Materials Allocation program is responsible for determining priority assistance for scarce energy supplies and equipment.

PROGRAM JUSTIFICATION

Under the major programmatic heading of Financial Planning and Incentives, the following six subprograms will be undertaken in fiscal 1978.

1. Materials Allocation: The purpose of this program is to provide priority authority to essential and critical materials. The implementation of the project include the processing of applications, analysis of contractor data, liaison with GSA and DOC, monitoring of approved programs until completion, familiarizing energy contractors about the Defense Materials and Priorities systems, investigating and remedying conflicts arising between project contractors and their suppliers, and sponsoring one-time priority assistance for energy contractors or suppliers.

2. Advisory Committees: This project provides a lisison between ERD/FEA and the Construction and Energy Finance Advisory Committees which results in the provision of independent advice on the subjects. In order to implement this, four full meetings are held annually for each committee, monthly telephone contact is made with each member, 12-15 subcommittee meetings are held annually, pertinent correspondence is answered, information and data is collected as is needed by subcommittees, and coordination and incentive is provided through several smaller meetings with FEA personnel.

3. Financial Planning and Finance Incentives for Coal: This includes: specifying the requirements for and use of a financial data base on approximately 100 largest coal companies which represents more than 90% of total U.S. production; reviewing and analyzing new financing techniques used by coal companies; establishing an information system to determine coal industry forecasts and capital requirements; reviewing methods of encouraging coal development, by offsetting some risks of coal development through Federal programs; and studying potential impacts created through forced divestiture of coal company ownership.

4. Financial Planning and Incentives for Electric Power: This includes: specifying the requirements for and use of a financial data base on approximately 100 electric utility companies which represents more than 95% of total U.S. electric generating capacity; financial analysis of the electric power industry to forecast long-term capital requirements and to determine their ability to finance planned projects; evaluating the ways in which the existing regulations either impede or aid the development of electric power and recommending appropriate changes to enhance domestic production; and developing financial incentive programs, where necessary, to stimulate domestic electric power.

5. Financial Planning and Incentives for Oil and Gas: This includes: specifying the requirements for and use of a financial data base for the oil and gas industry; developing and implementing programs necessary to support the financial requirements of the oil and gas industry to expedite additional domestic supplies and maintain a balance of imports; and studying methods for financial incentives to stimulate oil and gas domestic production.

6. Underground Coal Loan Guarantee: Section 102 of EPCA as amended in August 1976 authorizes FEA to guarantee loans to eligible persons for the opening of new, expansion of any existing, or reopening of any underground coal mines. The feasibility of the program is being studied in FY 1977. No funds are included for FY 1978.

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY RESOURCE DEVELOPMENT	PROGRAM: SITING												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	21	19	569	285	23	22	814	20	20	894	-3	-2	+80
Headquarters	16	14	456	255	15	14	623	15	15	768	..	+1	+145
Regions	5	5	113	30	8	8	191	5	5	126	-3	-3	-65
(Contracts/Grants)	XX	XX	(113)	(178)	XX	XX	(255)	XX	XX	(355)	XX	XX	(+100)
FY 77 Supplemental Pending; FY 78 ECPA Amounts Included Above					..	..	...	..	..	...			
Headquarters													
Regions													
(Contracts/Grants)					XX	XX		XX	XX				

PROGRAM DESCRIPTION

The Siting program at the Federal Energy Administration is responsible for assessing specific sites for potential use as major energy supply facility locations and analyzing programs which promote utilizations of Federal lands for purposes of increasing domestic energy supply. In order to meet these objectives, the siting program has and will continue to address the following issues related to the siting of energy facilities: National and State siting legislation to improve the siting permit and licensing process; water availability to assure the adequate supply of water for energy facilities; coastal zone management to assist States in planning for the needed energy facilities in the coastal zones; socio-economic impact to assist States and communities in preparing for the problems associated with growth caused by energy development; license and permit tracking in order to identify all necessary energy facility permits and licenses and to track the status of these permits and licenses for each energy facility to identify delays and determine necessary expediting measures; and to improve Federal and State coordination in the siting process.

PROGRAM JUSTIFICATION:

Under the major programmatic heading of Siting, the following eight subprogram elements will be performed during FY 1978:

1. Water Resources: FEA, as an associate member of the Water Resources Council (WRC) will work on the revision and augmentation of the water for energy element of the National Water Assessment. In this capacity, FEA is working to develop a program for water assessment studies for converging energy technologies, energy demonstration projects, and commercial application of new technologies. FEA will assist in supervising an estimated five contracts funded through WRC.

2. Siting Legislation: FEA will review State siting legislation to assess conformance to Federal legislation, supervise five State Cooperative Agreements to develop models for State siting legislation, review site-specific problems to establish cost of delay from siting difficulties, prepare legislative information to support Congressional action, and participate in conferences, etc., to obtain various viewpoints.

3. Coastal Zone Management (CZM): The CZM Act requires State CZM programs to establish a planning process for energy facilities located in or affecting the Coastal Zone. The FEA will assist the States in program development and administration. By FY 1978, many of these State programs will have achieved approved program status. This will precipitate work to evaluate and document the consistency of energy facility proposals with approved CZM programs.

4. Project Licenses and Permits: This project represents the first attempt at specifying requirements for a composite Federal energy project data bank to identify and resolve data, collection, and tracking problems. In doing this, the States and regions will be given assistance in developing a comprehensive energy plan. The project will be fully operational by FY 1978.

5. Regulatory Management: The purpose of this project is to identify conflicts in siting between Federal, State and local interests to eliminate the regulatory redundancies; to collect and catalog each agency's permit and application procedures; to create a regulatory management system; and document problems on a site-specific basis. In implementing this project, FEA must decide which licenses and permits cause delays and why, to what extent the delays are justifiable, which changes should be recommended, and which recommendations are most feasible.

6. Surplus Property and Economic Adjustment Committee: FEA works with DOD and GSA to determine feasibility of siting energy facilities on surplus Federal lands. In doing this, the program must screen approximately 500 surplus property notices a year, 24 of which will be selected for more detailed review, and 6 for intensive review.

7. Energy Parks: This program is designed to assist States to develop effective energy resource development program by supporting development of State facility planning capabilities, serving as a clearing house for information of energy park activities and plans, develop optional plans for energy park identification and set asides, and followup on the five completed studies. Main focus is to help States effectively plan for setup of energy facilities in predesignated areas.

8. Socioeconomic Impacts Finance: This program will analyze site-specific socioeconomic impacts and their solutions. Emphasis will be placed on the financing and planning aspects of the impacts. The program will manage contracts, conduct workshops, publish socioeconomic impact papers, conduct site-specific analyses, and assist State Energy offices with planning, program development and evaluation.

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY RESOURCE DEVELOPMENT	PROGRAM: ENVIRONMENT												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	12	11	354	221	12	12	610	12	12	571	..	..	-39
Headquarters	12	11	354	221	12	12	610	12	12	571	..	..	-39
Regions	..	..	...	...	..	..	...	..	..	...	..	..	...
(Contracts/Grants)	XX	XX	(63)	(157)	XX	XX	(295)	XX	XX	(240)	XX	XX	(-55)
FY 77 Supplemental Pending; FY 78 ECPA Amounts Included Above					..	..	...	..	..	...			
Headquarters													
Regions													
(Contracts/Grants)					XX	XX		XX	XX				

PROGRAM DESCRIPTION

The environmental analysis responsibility in Energy Resource Development involves analysis of related environmental data in support of energy facility planning, siting programs and environmental legislation. The programmatic activity includes air and water quality studies related to energy projects; significant deterioration and non-attainment issues related to the Clean Air Act and potential amendments; Clean Fuels Policy, specifically State Implementation Plans and their restrictions on energy growth; sulfates as a potential pollutant and the energy development impact if limitations are mandated; environmental control technologies including a feasibility study of industrial and utility scrubbers; review and analysis of environmental legislation including amendments to the Clean Air Act and Federal Water Pollution Control Act. In addition, the environmental staff provides technical assistance and support to energy resource development projects on a site-specific basis. Environmental policy options pertaining to energy development are defined and recommended alternatives studied for implementation.

PROGRAM JUSTIFICATION:

Under the major program heading of Environment the following six subprogram elements will be undertaken during FY 1978.

1. Non-Attainment: The purpose of this project is to reduce or eliminate the delays in siting or construction of new energy facilities. In order to accomplish this, several tasks must be performed. These include compilation of inventories of applicable regulations and air quality data, a list of involved agencies, performing impact and cost/benefit analysis, analyzing energy impacts, determining alternatives, and providing input to National Energy policy.

2. Sulfates: The purpose of this is to coordinate with EPA regarding the finalization of sulfates standard which will not have adverse impacts on Energy Resource Development. Workload would include reviewing all existing studies; working with EPA to determine if sulfates are a significant risk to public health, if scientific evidence exists, and to set reasonable thresholds; working with utilities and industries to determine reasonableness of a sulfate standard, economic/energy impacts, and alternative compliance strategies.

3. Environmental Legislative and Regulatory Initiatives: This project involves further work on Congressional legislative matters and EPA regulations especially concerning regulations to implement The Clean Air Act Amendments and Water Pollution Control Act Amendments. Action on this include development of significant deterioration regulations with the thought of giving the States control of the Air Quality regulations. Efforts consist of technical analyses leading to policy formulation and evaluation of energy and economic implications.

4. Coal Initiatives and Projects: The primary objective is to identify and resolve problems which threaten to delay or cancel Energy Resource Development projects. Approximately 100 projects will be identified and 10 will be assessed as to usefulness of FEA involvement and impact on Energy Resource Development. The procedures implemented will include coordination with other Federal and regulatory agencies research, a technical support contract, further agency coordination, a final report, implementation of recommendations and further evaluation of future concerns.

5. State Implementation Plans (SIP): In this subprogram, FEA will recommend SIP revisions in the cases where it would be possible to switch oil- or gas-fired powerplants to coal without scrubbers. Prior to recommending SIP revisions, FEA will visit industrial sites, collect air quality data, and perform air modeling. In performing these tasks, FEA will coordinate with State agencies and the EPA regions.

6. Scrubbers: This program will serve to analyze plants in South and Midwest to determine the feasibility of retrofitting scrubbers. In performing this function, FEA will analyze plant layouts of the 20 plants, to determine if there is sufficient available space for retrofitting scrubbers. Site-specific studies regarding environmental, economic, supply, and reliability studies will also be performed.

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: ENERGY RESOURCE DEVELOPMENT	PROGRAM: EXECUTIVE DIRECTION AND ADMINISTRATION												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	26	26	719	274	25	25	756	25	25	689	..	..	- 67
Headquarters	26	26	719	274	25	25	756	25	25	689	..	..	- 67
Regions	..	..	...	...	..	..	...	..	..	...	..	..	...
(Contracts/Grants)	XX	XX	(38)	(119)	XX	XX	(100)	XX	XX	(...)	XX	XX	(-100)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					..	..	...	..	..	...			
Headquarters													
Regions													
(Contracts/Grants)					XX	XX		XX	XX				

PROGRAM DESCRIPTION

Provides for executive direction, management and administrative support for ERD. The Assistant Administrator is responsible for: plans and programs to expand domestic production of energy resources; incentive programs to encourage development of energy facility projects; and financial/environmental programs to mitigate adverse effects of resource development. The Office of Program Planning, Information and Evaluation develops short- and long-range plans for ERD programmatic initiatives, management and information systems to improve operating performance; evaluation systems to assess program and organizational effectiveness; and provides coordination and liaison in the areas of data systems and public information. The Office of Administrative Operations provides administrative services in the areas of personnel, contracts, budget and finance, office services and correspondence control.

87-591 O - 77 - 23

FEDERAL ENERGY ADMINISTRATION

Budget Request
Fiscal Year 1978

Energy Resource Development

Analysis of FY 1978 Contracts	($000) Cost
ENERGY SOURCES	
. Industrial coal distribution system. Study of ways to distribute coal in an economical and efficient manner to industrial users	100
. An analysis of supply/demand picture through 1985 for metallurgical coal to assist in developing policies regarding coal experts	50
. An analysis of the coal distribution system to determine causes for price differential for electric utility, industrial, commercial and residential consumers	50
. Supportive analysis associated with near-term development studies in the following six areas for Project Operations	
1. Atlantic OCS exploration and development 2. Impact of western coal movement on waterborne transportation system in upper Mississippi and Great Lakes region 3. Energy resource potential of internal sedimentary basins in Alaska 4. Development and delivery to the Lower 48 States of Alaska natural gas - both North Slope and Cook Inlet 5. West coast energy supply/demand balance and need for additional west-to-east transportation systems 6. Impact of reclamation requirements on western coal production	200
. Update and expand on elements of Oil and Gas Replacement Cost Study	
- Finding Rate	150
- Consolidation Report	150
. Data Service on Wildcat wells to monitor exploration activities	25
. Study to ascertain amount of oil and gas that will remain unproduced from wells that drop below marginal economics and to recommend possible incentives that will keep these wells active	125
. Several small contracts to further define options and associated costs - benefits for solutions to identified institutional barriers for Geothermal energy	25
. Synthetic Fuels Commercialization Contract. A major contract to assist in the development of policy. Determine a reasonable production goal for a mature synfuels industry, with emphasis on regional considerations. A policy-oriented study of key considerations determining the future development of a synthetic fuels industry in the U.S.	100

Amended

Analysis of FY 1978 Contracts (Cont'd)	($000) Cost
. Municipal Solid Waste and Synfuels Commercialization -- Assist in the development of incentive programs for the accelerated development of these energy programs and for the identification and elimination of institutional barriers blocking program development	25
Subtotal, Energy Sources	$1000
ESECA-COAL UTILIZATION	
. Site specific analysis of environmental impact of implementing FY 1977 Orders	1820
. Site-specific technical analysis for the following: . practicability of conversion . coal availability . capability of conversion . reasonableness of cost	480
. Pre-NOE Conference and Compliance	131
Subtotal, ESECA-Coal Utilization	$2431
ELECTRIC POWER	
. State/Regional Planning. Develop initial component of Phase II of the comprehensive electricity forecasting system which will complement the demand for forecast with a supply forecast. Overall requirements will continue into FY 1979	110
. Energy Manpower Requirements. Development of system for forecast energy related construction activity and skilled labor needs	40
. Hydropower Development. To analyze the desirability of the construction of new mini-hydroelectric powerplants (less than 5MW). This study will determine where the potential is the most promising	50
. Powerplant Productivity. To undertake studies, analyses and demonstrations to encourage improvement programs, promote cooperative efforts, publicize specific examples of improvements, highlight cost effectiveness and benefit and encourage increased applied technology and testing	150
. Comparative Electric Generating Costs. In conjunction with ERDA, NRC, and others, develop improved cost estimating methods and up-date data requirements. Focus on improving operating cost and maintenance price estimates for the coal fuel cycle. Disseminate methodology, cost data and analysis to State energy agencies	150
. Co-generation Projects. Two or more cooperative projects undertaken jointly with ERDA and other Federal and State agencies to demonstrate how institutional inhibitions on specific problems can be resolved, and how equitable financial and cost sharing arrangements can be estimated. Projects undertaken are expected to involve cooperative participation of utilities energy-consuming industries, and state agencies	100
Subtotal, Electric Power	$600

Analysis of FY 1978 Contracts (Cont'd)

	($000) Cost
FINANCIAL PLANNING AND INCENTIVES	
. Contractor will be prepared, on a quick response basis to provide analytic and data gathering support to the Finance Advisory Committee. Committee members will provide subject areas for investigation and data sources. Contractor will interview, collect data and prepare preliminary reports to be reviewed and finalized by the Committee	25
. Assess capital requirements estimating procedures and forecast financial operations of coal industry with respect to availability and price of coal	70
. Financial Impact/Implications of Initiatives, Financial Techniques and Regulations on Business and Public Policy (for Coal and coal fired Electric Power Plants)	160
. Analysis of potential materials and equipment shortages for the Materials Allocation program	150
Subtotal, Financial Planning and Incentives	$405
Siting	
. Cooperative Agreements with States for the support and evaluation of energy facility siting program development including model state legislation	75
. Appraisal of the impact on energy facility siting resulting from the implementation of the State CZM programs	40
. Specific regional studies of two high priority energy related water supply problems identified in the results of the current National Water Assessment, Water for Energy Analysis. (May be done under cooperative agreements with States.)	100
. Cooperative Agreements for Socio-Economic Impacts in States	

- Governmental Incentives for PrivateImpacts Finance
  An analysis of specific Federal structural instruments which would induce private capital sources and developers to participate in remote community development, using two types of impacted communities as case studies.

- Interagency Coordination on Impact Assessment and Financing Assistance
  Working with the Federal Regional Council (FRC), FEA will train locally selected individuals from impacted communities in Alaska, both interior and in the coastal zones to act as ombudsmen.

- Analyses of Relative Merits of a Community Development Authority (CDA) and a Nonprofit Corporation as Applicable in Appalachia, New Mexico, and Montana
  The CDA and the Nonprofit Corporation (NPC) are two mechanisms by which capital can be raised to meet front end financing problems experienced by impacted communities.

Amended

Analysis of FY 1978 Contracts (Cont'd)	($000) Cost
Colorado - Legislative Analysis Using the findings of the Western Governors in Regional Energy Policy Office and the Western Socio-economic Impacts Finance Workshop, FEA will conduct a study of the various constraints and implications of alternative state legislative reforms designed to induce public and private financial investment in impacted areas.	
Subtotal, Cooperative Agreements	140
Subtotal, Siting	355
ENVIRONMENT	
. Analysis of non-attainment of the National Ambient Air Quality Standards (NAAQS) on a site specific basis for the purpose of identifying relevant issues and proposing solutions at a local level	50
. Analysis of industrial plants in Regions 4 and 5 to determine the feasibility of retrofitting scrubbers	50
. Analysis of State Implementation Plans (SIP's) in Regions 4 and 5 to determine areas where emission requirements are more stringent than necessary to meet National Ambient Air Quality Standards	50
. Technical analysis of proposed environmental legislation and related Federal regulatory actions in order to determine the energy and economic impacts involved	50
. Analysis and appraisal of the "State-of-the-art" concerning sulfates to include reviews of sulfates criteria, preparation of related energy/economic impact analyses, and determination of enforcement alternatives	40
Subtotal, Environment	$240
TOTAL, ENERGY RESOURCE DEVELOPMENT	$5,031

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
B. Summary By Program
(dollars in thousands)

ACTIVITY: International Energy Affairs

APPROPRIATION: Salaries and Expenses

Program	FY 1976 Actual Pos.	FY 1976 Actual MY	FY 1976 Actual Amount	TQ Amount	FY 1977 Estimate Pos.	FY 1977 Estimate MY	FY 1977 Estimate Amount	FY 1978 Estimate Pos.	FY 1978 Estimate MY	FY 1978 Estimate Amount	Change FY 1977 to FY 1978 Pos.	Change FY 1977 to FY 1978 MY	Change FY 1977 to FY 1978 Amount
International Policy	21	20	506	463	24	23	898	24	23	831	...	...	- 67
International Agreements	12	11	314	84	13	11	358	13	13	572	...	+2	+214
International Data Systems Support	...	...	...	...	...	...	...	..	...	5	...	...	+ 5
Executive Direction and Support	9	8	262	72	8	7	259	8	7	270	...	...	+ 11
Total	42	39	1,162	619	45	41	1,515	45	43	1,678	...	+2	+163
(Headquarters)	(42)	(39)	1,162	(619)	(45)	(41)	(1,515)	(45)	(43)	(1,678)	(...)	(+2)	(+163)
(Regions)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: International Energy Affairs	PROGRAM: International Policy												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	21	20	586	463	24	23	898	24	23	831	...	...	-67
Headquarters	21	20	586	463	24	23	898	24	23	831	...	...	-67
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(74)	(332)	XX	XX	(283)	XX	XX	(218)	XX	XX	(-65)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION

As required by Sections 5(b) and 26 of the Federal Energy Administration Act (FEA Act), by Sections 103, 151-166 and 456 of the Energy Policy and Conservation Act (EPCA) and by Sections 109 and 113 of the Energy Conservation and Production Act (ECPA), this program has responsibility for the development, evaluation, and implementation of policies, plans and programs which deal with the future price level and stability, the adequacy of world energy resources as well as the sources, supply security, and emergency supply alternatives related to U.S. energy imports and exports. These activities require analytical capability to carry out 2 primary functions: The first involves detailed analyses of international resource potential, conservation strategies, production capacities, logistics requirements, programs and objectives of the International Energy Agency, including the prospects for joint cooperative strategies, and political/commercial considerations that underlie international energy policies, plans and programs. The second international policy function involves assessments of the international implications of proposed domestic energy policy options, as they relate to domestic laws, regulations or tax structures and the implications for the United States of energy-related events, initiatives and policies of key energy producing and/or consuming countries. This responsibility also includes providing assessments of the international and domestic implications of energy policies to assure, in general, that they are considered in their interrelationships with each other, and with other non-energy foreign or international economic policy objectives.

JUSTIFICATION

In the area of international policy development responsibilities, some specific examples of issues which are now being and will continue to be addressed are: U.S. policy toward OPEC pricing/production decisions; national contingency plans for dealing with embargoes and other supply interruptions, including creation and use of the Strategic Petroleum Reserve; future exchanges of crude oil with foreign countries/companies; security/price of LNG imports; U.S. coal export policies; U.S. policies toward international trade in natural uranium; U.S. supply of uranium enrichment services to foreign companies/governments; U.S. exports of nuclear and other advanced energy technologies; availability/impact of Export-Import Bank financing for U.S. energy-related equipment exports; policy toward investment by foreign companies and governments in U.S. energy resources and U.S. energy companies, and toward U.S. investment in foreign energy resources and companies; United States Government policies affecting international supply logistics, e.g., international tanker ownership/availability; United States Government policies toward and monitoring of U.S. energy company contracts/negotiations for future terms of access to and prices of foreign energy resources; and an understanding of the energy problems of the Lesser Developed Countries and the development of a United States Government policy with regard to efforts of the LDCs to attain energy and energy-related objectives.

An integral part of the Project Independence Evaluation System (PIES) model is the International Energy Evaluation System (IEES) computer model which is used by the Agency to materially assist in developing, projecting, and evaluating future international trade in energy resources and the implications of such trade for prices and supply security. Specification, modification and maintenance of the currency of the documentation will be required in FY 1978 as anticipated improvements in methodology and analytic techniques are introduced into the IEES model.

In addition to the policy development and assessment activities cited above, accomplishment of these tasks also involves monitoring of international energy developments and contacts with representatives of foreign governments, international organizations and international energy companies, as well as coordination with the Departments of State, Treasury, Defense, Interior and Commerce and the National Security Council, the Council on International Economic Policy and the Committee on Foreign Investment in the United States.

In the area of international assessments, specific examples of "domestic" policy issues that have had and will continue to require significant resource commitments: energy industry policy, e.g., divestiture proposals, foreign direct investment in U.S. energy company assets, nuclear industry "privatization," and effect of specific U.S. tax changes on U.S. energy companies' international activities, profits and competitiveness; import supply (including quotas) and pricing policies, e.g., international/national supply routes (including alternative pipelines), and supply disposition/trade; "Northern Tier" refiners, allocations and Canadian oil and U.S. export policies, particularly with respect to nuclear materials and technology transfer.

Of the reduction from FY 1977 to FY 1978, $65,000 relates to a reduction in contract support for the United States negotiating team in the Energy Commission of the Conference on International Economic Cooperation in Paris. It is currently anticipated that the Conference will conclude in late Spring 1977.

COST FACTORS

23 Manyears, salaries and benefits	$578,000
Contracts	$218,000
Other Costs	$ 35,000
Total	$831,000

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: International Energy Affairs	PROGRAM: International Agreements										Change FY 1977 to FY 1978		
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate					
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	12	11	314	84	13	11	358	13	13	572	...	+2	+214
Headquarters	12	11	314	84	13	11	358	13	13	572	...	+2	+214
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(...)	(...)	XX	XX	(30)	XX	XX	(185)	XX	XX	(+155)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION

Under the Federal Energy Administration Act of 1974 (FEA Act), Section 5, this program has responsibility for proposing, negotiating, and implementing U.S. international energy agreements. This includes providing policy recommendations and technical input for closer bilateral and multilateral ties with key energy producing and consuming nations, especially: the Organization for Economic Cooperation and Development (OECD); the 19-nation International Energy Agency (OECD/IEA), and its Subgroups and Industry Advisory Board (IAB); the 27-nation Conference on International Economic Cooperation (CIEC); the North Atlantic Treaty Organization (NATO) Petroleum Planning Committee; the United Nation's Law of the Sea Conference and meetings of the Antarctic Consultative (Treaty) Powers. In the International Energy Agency, monitoring, transcription, storage and distribution of IAB meeting records are mandated by Section 252 of the Energy Policy and Conservation Act of 1975.

JUSTIFICATION

The program provides the technical and international expertise necessary for meetings with other countries of special energy significance. A primary responsibility is the coordination of U.S. energy policies with the major industrialized allies, particularly with respect to world oil pricing, supply security and emergency measures as authorized under the Energy Policy and Conservation Act of 1975 (EPCA), Section 255. In support of these activities, and to provide policy guidance, the development of more comprehensive expertise in the evaluation of key issues involving energy producing and consuming countries will require increased staff commitment. For example, Canada plays a critical role in determining the availability of future oil and natural gas supplies to the United States, and logistics questions involved with our Alaska resources. With sharply declining volumes, increased FEA man-hour requirements are necessary for analyses of the equitable allocation by Canada to U.S. customers. Following an exploratory period and a temporary suspension, the U.S.-USSR Joint Energy Agreement, which was signed by Heads of Government in 1974 and involves information exchange, technology assessment, scientific cooperation and mutual trade discussions, is expected to require increased activity under the FEA Administrator, who is U.S. Chairman. At the same time, increased Soviet civil defense and military developments will require stepped-up contingency training in NATO's civil emergency programs, where this office represents U.S. Government energy interests.

Results attained to date within OECD/IEA include: creation of a coordinated emergency sharing system, strengthening of an emergency storage program, and development of a long-term cooperation program. In addition, consumer country positions will be coordinated on energy pricing,

import dependence and future trade patterns. U.S. domestic energy conservation policies and programs are being prepared, presented and defended by this office at international meetings.

Specific representation activities include:

° International Energy Agency (IEA): Membership on U.S. Delegations to Governing Board and Standing Group on Long-Term Cooperation (SLT); Chairmanship of 19-nation SLT Subgroup on Accelerated Development; Membership on SLT Subgroup on Conservation; Delegation Leadership to Standing Groups on the Oil Market and Emergency Questions; oversight and monitoring of IAB meetings under the EPCA of 1975, Section 252; and technical and policy staff support functions for all U.S. participation in these functions, including developing specific mechanisms for long-term cooperation in energy resource development and emergency sharing procedures under the EPCA of 1975, Section 255.

° Conference on International Economic Cooperation (CIEC), or its successor, for consultations among industrialized, developing and OPEC countries: Membership on U.S. Delegation to full Conference; Deputy Chairmanship of U.S. Delegation to Energy Commission; staff support for U.S. participation in these, as well as Commissions on Finance, Development and Raw Materials.

° Membership on: NATO's Petroleum Planning Committee (U.S. Delegation leadership); U.S. Delegations to Law of the Sea Conference and Antarctic Treaty Conference (and leader of the Technical Subcommittee on Natural Resources); U.S.-USSR Joint Energy Committee -- information group's chairmanship, staff support for Administrator of FEA in capacity as U.S. Committee Chairman; U.S. Delegation to Committee on Energy Policy of OECD; and support for all international negotiations and visits of FEA Administrator and Deputy Administrators.

In addition to these formal memberships, this program requires active contact with foreign officials responsible for energy-related affairs based in the United States and similar assistance to foreign energy officials and U.S. embassies abroad, as well as international organizations. This program insures consistency of U.S. energy policy initiatives/actions with other foreign policy actions/decisions. In these functions and on continuing basis, this Office works directly with Departments of State, Treasury, Defense, Commerce and Interior as well as Energy Research and Development Administration, Office of Management and Budget and the National Security Council.

The program increase results from additional staff commitment to expanding bilateral and multilateral energy relations and the assumption of monitoring, transcription and reporting requirements pursuant to Section 5(C)(1) of the U.S. Voluntary Agreement and Plan of Action to Implement the International Energy Program and Section 252 (C)(3) of the EPCA. The contract increase includes $110,000 for an inter-agency agreement with State Department for foreign transcription services, as well as other contractual arrangements for domestic reporting requirements.

COST FACTORS

13 Manyears, salaries and benefits	$327,000
Contracts	$185,000
Other Costs	$ 60,000
Total	$572,000

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: International Energy Affairs	PROGRAM: International Data Systems Support												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	...	...	...	...	...	...	...	...	...	5	...	...	5
Headquarters	...	...	...	...	...	...	...	...	...	5	...	...	5
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(...)	(...)	XX	XX	(...)	XX	XX	(5)	XX	XX	(5)
FY 1977 Supplemental Pending; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION

This program provides for special formating of data generated in other programs in support of the international policy and agreement functions, especially the data systems of the International Energy Agency.

JUSTIFICATION

Special data services are needed in support of international policy and agreements programs to meet obligations to the International Energy Agency's Standing Group on the Oil Market (SOM) and Standing Group on Emergency Questions (SEQ). In particular, the SOM monitoring of international crude oil costs and pricing periodically requires special analyses and formating. Tests of the SEQ's emergency sharing system also require special data support.

COST FACTORS

Contracts	$5,000
Total	$5,000

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: International Energy Affairs	PROGRAM: Executive Direction and Support												
	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	9	8	262	72	8	7	259	8	7	270	...	...	+11
Headquarters	9	8	262	72	8	7	259	8	7	270	...	...	+11
Regions	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(...)	(...)	XX	XX	(...)	XX	XX	(...)	XX	XX	(...)
FY 1977 Supplemental; FY 1978 ECPA Amounts Included Above					...	...	...	...	...	...			
Headquarters					...	...	...	...	...	...			
Regions					...	...	...	...	...	...			
(Contracts/Grants)					XX	XX	(...)	XX	XX	(...)			

PROGRAM DESCRIPTION

Executive Direction provides management, policy guidance, evaluation and oversight to all international activities. The Assistant Administrator and his staff direct the Office so as to ensure compatibility of international activities with overall FEA objectives, the timeliness and relevance of policy development and the appropriate level of representation in performance of international agreement responsibilities. The Senior Staff represents the International Office when required in intra-agency, inter-agency and international meetings. In particular, the Assistant Administrator and his Deputy represent FEA on the Governing Board of the International Energy Agency, serve as Deputy Head of Delegation to the Energy Commission at the Conference on International Economic Cooperation, and in other bodies as appropriate. The Executive Direction support function involves participation in and development and implementation of administrative policies and procedures, including compilation and execution of the budget; preparation, coordination and monitoring of personnel actions; supervision and control over administrative support functions, including financial, property, procurement, security, space, records and information activities; and direction regarding all administrative management functions for the international staff.

JUSTIFICATION

This program provides direction and oversight for FEA's international activities, as required by Sections 5(a), (b)(1), (2), (5), (7-10), 13 (a-c), and 26 of the Federal Energy Administration Act, by Sections 103, 151-166, 252 and 456 of the EPCA, and by Sections 109 and 113 of the Energy Conservation and Production Act.

COST FACTORS

7 Manyears, salaries and benefits....$196,000
Other Costs.....$ 74,000

Total.....$270,000

FEDERAL ENERGY ADMINISTRATION

Congressional Budget Submission
Fiscal Year 1978

INTERNATIONAL ENERGY AFFAIRS

PROGRAM: International Policy

	($000) Cost
Analysis of FY 1978 Contracts	
Monitoring of FDI in U.S. Energy Sources and Supplies	
Analysis of adequacy of present USG authority to monitor as well as actual monitoring for foreign direct investment (FDI) in U.S. energy sources and supplies, as required by Section 26 of the Federal Energy Administration Act, with specific regard to its timeliness, scope, the level of detail required for purposes of conducting analyses and developing options regarding USG policy toward FDI in the US energy sector. Identification and specification of information system requirements to better centralize and systematize the existing reporting requirements of various Federal and State regulatory agencies to meet legislative mandates and better serve national energy objectives.....	$ 70
National Tax Policies	
Analysis of and comparisons among U.S. and other nations' tax policies affecting worldwide consumption and production. Considered would be the bearings that various nations' tax policies have on both consumer and industry decisions including: - Impact of BTU tax on conservation in the OECD (as required by Section 109 of the EPCA). - Impact of tariffs or import fees on conservation in the OECD. - Impact of alternative production tax methods, including producing - sharing contracts, development and production contracts with limited rates of return and "North Sea" contracts (which present a mixture of the two). The analysis will evaluate the potential impact of alternative tax policies on U.S., OECD and LDC energy balances in 1985 and 1990.....	70
Energy and World Development	
The project will examine the energy problems and options of the developing countries as they affect the energy security of the U.S. and its principal allies. The study will examine how the rise in world petroleum prices with attendant effects on economic growth in many LDCs threatens the political viability of many LDCs, and how these countries are increasingly looking toward the nuclear solution as the only means to protect their national security. The study will assess the means by which the U.S. and its principal allies can help the LDCs solve their energy problems through the implementation of technologies adapted to their particular energy needs, thus avoiding the dangerous geopolitical consequences of an ever-expanding nuclear proliferation. Finally, the study will propose various bilateral and multilateral initiatives that will lead to increased worldwide cooperation in energy resource development.....	40

	($000) Cost
International Energy Evaluation System Documentation	
Detailed and updated documentation of worldwide supply estimates as required by Section 113 of the ECPA. This assessment will concentrate on the potential for increased supplies from non-OPEC areas in the 1985-90 timeframe. Annual updates will be required to reflect new geological discoveries as well as changes in productive capacity, new tax structures, changes in the international oil company positions and changes in conservation policies in major consuming countries. Additional documentation will also be required as the system is elaborated to analyze logistical and processing activities in more detail	$ 38
Subtotal	218
PROGRAM: International Agreements	
Trade and Resources Analysis	
Identify and evaluate alternate arrangements by which less developed countries could increasingly make energy resources available to foreign firms for commercial development. Provide information to promote flow of capital and technology from the developed countries for this. Analyze cost structure of resource development and production, appraise institutional and contractual relationships, and assess related financial base developed countries	75
Monitoring, Transcription and Report Preparation - Industry Advisory Board and Industry Working Group meetings	
Under EPCA Section 252, Administrator or designee shall keep a "full complete record, and where practicable a verbatim transcript" of any meeting where discussion or consultations involve U.S. oil companies advising IEA on technical matters. There are approximately eight days of meetings per month, including one day per month of Industry Advisory Board of Subcommittee A, one of Subcommittee C and two of Industry Working Group. Participants review bulky, closely-controlled transcripts for substantive accuracy, requiring at least nine copies of each transcript--six are distributed to FEA Regional office directors and three to Department of State for limited distribution overseas	110
Subtotal	185
PROGRAM: International Data Systems Support	
Special data services are needed in support of the international policy and agreements programs to meet obligations to the International Energy Agency's Standing Group on the Oil Market (SOM) and Standing Group on Emergency Questions (SEQ). In particular, the SOM monitoring of international crude oil costs and pricing periodically requires special analyses and formating. Tests of the SEQ's emergency sharing system also require special data support	5
Subtotal	5
Total	$408

FEDERAL ENERGY ADMINISTRATION

Budget appendix page	Heading	1978 request pending	1978 proposed amendment	1978 revised request
723	Salaries and Expenses	$258,463,000	$85,847,000	$344,310,000

(On line 8 delete the figure $258,463,000 and insert the following in lieu thereof:)

$344,310,000

(In the paragraph following the heading above, delete the third colon through the end of the paragraph and insert the following in lieu thereof:).

: Provided further, That $15,000,000 of this appropriation shall be available for the obligation guarantee program authorized by Public Law 94-385 for payments upon default by the obligator under an obligation guarantee, and shall remain available until expended: Provided further, That loan guarantees and obligation guarantees authorized by Public Law 94-163 shall not be made unless so authorized by limitations of outstanding obligational authority provided in future appropriation acts: Provided further, That $238,137,000 of this appropriation shall be available only upon enactment into law of authorizing legislation.

STANDARD FORM 300-T
June 1975, Office of Management and Budget Circular No. A-11, Revised.

FEDERAL ENERGY ADMINISTRATION
SALARIES AND EXPENSES
program and Financing (in thousands of dollars)

Identification code 92-1500-0-1-305	19 76 actual	19 TQ actual	19 77 estimate	19 78 estimate
Program by activities:				
1. Executive direction and administration	31,227	11,312	34,903	37,288
2. Energy information and analysis	22,463	6,540	28,933	39,585
3. Regulatory programs	39,894	12,461	45,232	47,098
4. Energy conservation and environment	24,210	18,579	35,052	204,509
5. Energy resource development	11,054	4,268	10,305	14,152
6. International energy affairs	1,233	641	1,515	1,678
Total program costs, funded	130,082	53,801	155,940	344,310
Change in selected resources (undelivered orders)	-54	...	...	...
10.00 Total obligations	130,028	53,801	155,940	344,310
Financing:				
21.00 Unobligated balance available, start of period	-2,775	-25,824	-1,267	...
24.00 Unobligated balance available, end of period	25,824	1,267	...	...
25.00 Unobligated balance lapsing	...	3,039	...	...
Budget Authority	153,077	32,283	154,673	344,310
Budget authority:				
40.00 Appropriation	153,077	32,283	150,385	344,310
44.10 Supplemental now requested for wageboard pay raises	...	...	16	...
44.20 Supplemental now requested for civilian pay raises	...	...	4,272	...

FEDERAL ENERGY ADMINISTRATION

SALARIES AND EXPENSES

STANDARD FORM 300-T
June 1975, Office of Management and Budget
Circular No. A-11, Revised.

Program and Financing (in thousands of dollars)

Identification code 92-1500-0-1-305	19 76 actual	19 TQ actual	19 77 estimate	19 78 estimate
Relation of obligations to outlays:				
71.00 Obligations incurred, net	130,028	53,801	155,940	344,310
72.00 Obligated balance, start of period	46,321	40,557	58,835	22,058
74.00 Obligated balance, end of period	-40,557	-58,835	-22,058	-70,503
90.00 Outlays, excluding pay raise supplemental	135,792	35,522	188,681	295,613
91.10 Outlays from wageboard pay raise supplemental	...	...	15	1
91.20 Outlays from civilian pay raise supplemental	...	...	4,021	251

STANDARD FORM 304-T
June 1975, Office of Management and Budget Circular No. A-11, Revised, 304-103T

FEDERAL ENERGY ADMINISTRATION

SALARIES AND EXPENSES

OBJECT CLASSIFICATION (in thousands of dollars)

Identification code 92-1500-0-1-305	19 76 actual	19 TQ	19 77 estimate	19 78 estimate
Personnel compensation:				
11.1 Permanent positions	64,457	18,544	72,003	80,203
11.3 Positions other than permanent	1,252	288	630	581
11.5 Other personnel compensation	1,705	403	1,300	1,377
~~11.8 Special personal service payments~~				
Total personnel compensation	67,414	19,235	73,933	82,161
Personnel benefits:				
12.1 Civilian	5,856	1,717	6,726	7,406
~~12.2 Benefits for former personnel~~				
21.0 Travel and transportation of persons	4,030	1,321	5,971	6,959
22.0 Transportation of things	265	111	339	261
23.0 Rent, communications, and utilities	6,364	1,949	4,248	4,878
23.1 Standard level user charges	...	...	5,073	5,889
24.0 Printing and reproduction	1,777	972	1,420	2,941
25.0 Other services	2,625	1,219	1,436	2,178
Contracts	39,465	21,562	32,791	78,543
26.0 Supplies and materials	1,145	357	808	960
31.0 Equipment	1,086	358	695	626
~~32.0 Lands and structures~~				
33.0 Investments and loans	...	...	...	15,000
41.0 Grants, subsidies, and contributions	...	5,000	22,500	136,508
~~42.0 Insurance claims and indemnities~~				
~~43.0 Interest and dividends~~				
~~44.0 Refunds~~				
99.0 Total obligations	130,028	53,801	155,940	344,310

STANDARD FORM 5UD
July 1968, Bureau of the Budget
Circular No. A-11, Revised.
206-109

FEDERAL ENERGY ADMINISTRATION

SALARIES AND EXPENSES

DETAIL OF PERMANENT POSITIONS

	19 76 actual	19 77 estimate	19 78 estimate
Executive Level I	...	...	...
Executive Level II	1	1	1
Executive Level III	2	1	1
Executive Level IV	7	6	6
Executive Level V	8	9	9
Subtotal	18	17	17
GS-18	...	1	3
GS-17	18	19	22
GS-16	59	65	69
GS-15	260	208	242
GS-14	347	328	317
GS-13	571	486	505
GS-12	543	476	548
GS-11	491	428	522
GS-10	14	14	12
GS- 9	383	332	386
GS- 8	101	101	101
GS- 7	343	326	373
GS- 6	176	152	169
GS- 5	282	256	302
GS- 4	151	132	159
GS- 3	49	43	46
GS- 2	3	2	2
GS- 1	...	...	...
Subtotal	3,791	3,369	3,778
Ungraded	26	19	18
Total permanent positions	3,835	3,405	3,813
Unfilled positions, end of year	357	...	...
Total permanent employment, end of year	3,478	3,405	3,813

STANDARD FORM 300–T
June 1975, Office of Management and Budget
Circular No. A-11, Revised.

FEDERAL ENERGY ADMINISTRATION
SALARIES AND EXPENSES
PERSONNEL SUMMARY

Identification code 92-1500-0-1-305	19 76 actual	19 TQ	19 77 estimate	19 78 estimate
Total number of permanent positions	3,835		3,405	3,813
Average paid employment	3,371		3,548	3,928
Average GS grade	10.38		10.36	10.27
Average GS salary	$20,704		$20,294	$20,418
Average salary of ungraded position	$11,315		$11,959	$11,959

AMENDMENT

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
8. Summary By Program
(dollars in thousands)

ACTIVITY: Strategic Petroleum Reserve

APPROPRIATION: Strategic Petroleum Reserve

Program	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Storage Facilities	41	3	122	4,011	75	64	306,617	110	110	470,758	+35	+46	+ 164,141
Petroleum Acquisition & Transportation	4	...	...	...	6	6	440,216	12	12	2,538,595	+ 6	+ 6	+2,098,379
Planning & Analysis	30	10	184	1,224	39	37	4,495	39	39	4,586	...	+ 2	+ 91
Program Management & Review	17	1	7	236	21	21	1,166	21	21	1,567	...	...	+ 401
Executive Direction	7	1	8	26	7	7	252	7	7	232	...	...	- 20
Data & Procurement Support	1	...	...	...	2	2	3,243	17	17	2,799	+15	+15	- 444
General Counsel Support	...	...	...	...	...	...	...	12	12	396	+12	+12	+ 396
TOTAL	100	15	321	5,497	150	137	755,989	218	218	3,018,933	+68	+81	+2,262,944
(Headquarters)	94	15	321	5,497	136	125	755,557	186	186	3,017,878	+50	+61	+2,262,321
(Field)	6	...	...	...	14	12	432	32	32	1,055	+18	+20	+ 623

AMENDMENT

GENERAL STATEMENT

Background

The interruption of petroleum supplies during the winter of 1973-74 demonstrated the need for an emergency storage program. The resulting petroleum shortage caused severe economic impacts on the U.S. economy and emphasized our vulnerability to interruptions in imports from the major oil exporting nations. The repercussions of supply denial and simultaneous price increases of the 1973-1974 oil embargo is estimated to have caused a loss of $35-45 billion in gross national product (GNP) and 500,000 jobs. A GNP loss of $10-20 billion is directly ascribed to the embargo. A future petroleum cutoff could be more severe because many energy users have already restricted their use of energy while the level of imports has continued to increase. Many relatively easy steps to conserve energy have been taken, and further improvements in energy efficiency may be more difficult.

Public concern, in addition to the formal commitment of the United States to the International Energy Program (IEP) agreement entered into with other energy-importing countries, provided a strong impetus for an emergency storage program. A number of bills providing for a Strategic Petroleum Reserve were introduced into the 93rd Congress. Thereafter, the Senate and the House of Representatives passed separate bills (S. 622 and H.R. 7014) requiring or authorizing creation of a Strategic Storage Reserve, which ultimately was enacted as Title I, Part B, sections 151 through 166, of the Energy Policy and Conservation Act (P.L. 94-163).

Energy Policy and Conservation Act (EPCA)

The Energy Policy and Conservation Act (EPCA) provides for the creation of a Strategic Petroleum Reserve (SPR). The objective of the Strategic Petroleum Reserve program is to provide for the storage of substantial quantities of petroleum in order to diminish the vulnerability of the United States from the effects of a severe energy supply interruption and to provide limited protection from the short-term consequences of interruptions in the supply of petroleum products.

A Strategic Petroleum Reserve will help stablize the national and international petroleum situation by:

- Providing credible evidence that the United States has the will to insulate its energy economy from major supply disruptions.
- Avoiding undue pressures on either our domestic or foreign policy, as well as contributing to international stability through the International Energy Agency (IEA).
- Reducing the economic impact of an interruption if one occurs.

The Federal Energy Administration, as required by the EPCA, has developed national plans for crude oil storage that provide, to the maximum extent practicable, and except to the extent that any change is justified pursuant to the EPCA, for the storage by December 22, 1982, of crude oil equal to the volume of crude oil imports into the United States during the three consecutive highest import months in the 24 months preceding December 22, 1975 (subsequently determined to be approximately 500 million barrels, which were imported during August-October 1975). An Early Storage Reserve Plan was submitted to the Congress on April 22, 1976, which outlined plans for accomplishing storage of 150 MMB by December 1978; the Strategic Petroleum Reserve Plan submitted to Congress on December 15, 1976, proposed a fill schedule to meet the EPCA goals of 65% (325 MMB) by December 1980 and 100% (500 MMB) by December 1982.

AMENDMENT

Accelerated Program

This amended budget for Fiscal Year 1978 is directed to exceeding the goals of the Early Storage Reserve and Strategic Petroleum Reserve Plans. It requests funding for 211 million barrels (MMB) of crude oil which, together with the 39 MMB funded in FY 1977, will provide for a total of 250 MMB of petroleum in storage by the end of 1978 instead of the earlier planned 150 MMB.

This budget also provides funding for the acquisition, development, and expansion of storage facilities to provide the storage capacity necessary to store about 500 MMB by the end of 1980 rather than 1982.

This accelerated program is recommended because it is desirable and appears to be feasible. The result will provide the United States the benefits of a 500 MMB reserve two years earlier than originally proposed. Accelerated development of the Reserve would reduce our foreign policy vulunerability to threatened or actual embargoes. The potential economic benefits would be substantial and the national security benefits would be significant.

In summary, this budget request provides for a two year acceleration of the current ESR and SPR Plans as follows:

	Current Plan	Accelerated Program	Increase
1978	150	250	+100
1980	325	500	+175
1982	500	500	---

The SPR Plan will be amended to reflect these changes.

Site Acquisition

The proposed costs for land acquisition are based on the best information available at the time of submission. Site appraisals currently underway by the Corps of Engineers and negotiations with the owners of the sites are essential before precise costs can be determined for each site. Should the appraisals and negotiations with owners indicate a lower cost, the savings would be applied to the purchase of oil required for the total storage program.

Facility Design and Construction

Facility design and construction cost estimates are based on detailed analyses and feasibility studies for each candidate storage site. Following the guidance of OMB Circular A-11, Sec. 13.5(a), the estimates shown in this submission include an escalation factor.

AMENDMENT

Oil Acquisition

The estimated cost of purchasing the oil is based on a projected national average composite price of crude in FY 77 and FY 78 which includes the price of new and old domestic oil and imported crude prices with the January 1977 OPEC price increase. Both domestic and imported crude costs are delivered prices to the storage site. FEA intends to use the authorities granted in the Energy Petroleum Allocation Act (EPAA) to allow the Government to obtain the benefit of domestic price controls for the SPR to the same extent that those benefits accrue to domestic refiners that process imported crude oil under FEA's domestic crude oil allocation (entitlements) program. The Government will engage in competitive procurement but expects to receive the benefits of cost equalization through amendments to be proposed to the entitlements program.

Management

Every effort has been made to keep the number of full-time Federal employees to the minimum necessary for the timely and efficient operation of the program. The nature of this program itself is ideal for a high level of contract-funded activities as the program moves through the phases of site acquisition, construction, fill and maintenance of the reserve. Half of the requested position increase is for additional legal and data support and half is for the increased scope of the construction activity and oil purchase taking place in FY 78. The increase of positions requested in this submission reflects the minimum number of Federal employees required to effectively administer the high level of contract activities.

Funding

It is imperative that "no year" funds be appropriated since justified delays, beyond the control of the Administrator, may occur during program implementation.

Regional Petroleum Reserves

FEA has determined that at this time sufficient transportation and refining capacity will be available to distribute and refine centrally stored crude oil with no inequitable effect on either import dependent regions or non-contiguous areas. Therefore, reserves for these regions of the country will be maintained in the large, central crude storage facilities.

The amended request includes $1,329,400,000, 43 positions, and 43 manyears more than the initial FY 1978 request for this program.

AMENDMENT

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Strategic Petroleum Reserve	PROGRAM: Storage Facilities

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	41	3	122	4,011	75	64	306,617	110	110	470,758	+35	+46	+164,141
Headquarters	35	3	122	4,011	61	52	306,185	78	78	469,703	+17	+26	+163,518
Field	6	...	...	...	14	12	432	32	32	1,055	+18	+20	+ 623
(Contracts/Grants)	XX	XX	(100)	(3,899)	XX	XX	(304,314)	XX	XX	(467,133)	XX	XX	(+162,819)

PROGRAM DESCRIPTION

In determining where storage sites should be located so that the reserve oil can function as an efficient replacement for lost imports, careful consideration was given to the existing petroleum refining and transportation network. The philosophy underlying the design of the reserve system is that the Government should not expend funds nor commit labor resources to the construction of distribution facilities that the private sector is willing and able to undertake. In effect, the Government should not duplicate components of an oil distribution system that already exists.

In essence, the storage sites will be located where they are most accessible to existing tanker or major crude oil pipeline terminals, or both, to provide for rapid withdrawal during an interruption, and to permit the reserve to be used for a wide range of interruptions. The locations that provide the greatest flexibility are in the Gulf Coast because that area already receives the majority of imports and provides ready access to the primary imported crude oil distribution system of the country. Storage in this area can feed the major crude oil requirements of the interior, the Gulf Coast refineries, and East Coast, West Coast, and noncontiguous area refineries by pipelines or tankers, or by combinations of the two.

In order to determine the most efficient and cost-effective mode of storage for the reserve, a number of alternative types of storage facilities were examined. Among those considered were solution-mined caverns, conventionally-mined caverns, surface tanks, mothballed tankers, depleted oil wells, shut-in oil production, and others. Analysis has shown that salt dome caverns, mines, or rock caverns are the lowest cost form of storage. Underground storage also minimizes environmental problems and at the same time provides maximum security.

Trade-offs between conversion or expansion of existing capacity and development of new capacity at undeveloped sites are being considered. The most feasible and cost beneficial methods will be selected.

Seven candidate sites--three salt domes, with existing leached caverns, and four existing mine sites--are being considered for development for the early reserve. The sites are grouped by proximity to major crude oil distribution centers, as follows: at Freeport, Bryan Mound would serve the Texas/Seaway pipeline; West Hackberry would serve the Texas/Texoma pipeline at Nederland; and Bayou Choctaw, Weeks Island, and Cote Blanche would serve Louisiana/Capline at Saint James. Each of these sites could also serve local refineries and other areas of the country by tanker as well. The Central Rock and Ironton Mines would serve the Ashland or Mid-Valley pipelines. In this manner, crude oil stored in selected sites would be used to replenish petroleum supplies lost during an import interruption.

Because the environmental assessment process is not complete, the sites proposed for acquisition and development in the submission are offered as typical sties for budget purposes only and represent no De Facto decision to acquire, develop and store oil at any specifically determined site.

AMENDMENT

This program includes the actions required to perform environmental assessments, acquire the sites, secure necessary permits, design, manage, construct and operate the storage sites. It provides for the acquisition of the real estate on which storage facilities will be built, the personnel staffing and support functions necessary to effectively administer the extensive design and construction programs, and the action required to administer, operate, maintain and fill the storage sites during a filling operation, and to monitor all activities to assure conformance with environmental requirements.

This accelerated budget request proposes expansion of two of the salt domes to be acquired in FY 1977 and proposes the development of additional sites in FY 1978 for a total of seven sites. As noted above, this request implies no De Facto selection of sites or the number of storage complexes to be developed. Final decisions of these issues will be made on the basis of environmental considerations, feasibility and cost effectiveness.

The Environmental Projects and Permits function is responsible for assuring that design, construction, and operation of storage facilities are accomplished in an environmentally acceptable manner. This function is also responsible for complying with the requirements of all Federal permits and for full compliance with the National Environmental Policy Act. In addition, this function coordinates all SPR activities with State, county, and local authorities for licenses, permits, and regulations. Specific actions required are:

- o Prepare environmental impact statements; prepare and implement environmental mitigation plans and specifications, including permits.
- o Prepare and submit all permit applications.
- o Develop, maintain and update environmental protection plans for each storage site.
- o Conduct environmental assessments of all proposed design configuration or construction modifications; prepare and publish modifications, if required, to the environmental impact statements.

The initial acquisition of real estate in FY 77 represents the largest manageable tracts that can efficiently be programmed to implement the Early Storage Reserve Plan consistent with realistic construction schedules. The FY 78 expansion provides the additional capacity as required to accomplish the total storage objective of about 500 MMB by 1980.

Real estate will consist of dock sites, pipeline rights-of-way, pump station sites, ancillary sites as required as well as the storage sites themselves. Property will be bought, leased, rented or possibly condemned for purchase. Easements across properties will have to be secured from waterfront to the sites in order to construct the connecting pipelines and pump stations.

The Design and Construction effort covers development, modification, or expansion of facilities at selected sites. The funds provide for materials and contracted services to construct oil injection systems, pipelines, docks, terminals, tank farms, brine disposal systems, raw water supplies, electrical power systems, instrumentation, control, and other associated systems required for each project. The final total system will be capable of providing about 3 million barrels of crude oil a day to the nation's oil distribution systems in the event of an energy supply interruption.

AMENDMENT

The Operations function includes fill, maintenance, test, inspection, and drawdown in the event use of the stored oil is required. All of these activities will be under contracts which cover personnel staffing and supportive functions necessary to receive, ship, store, account for and maintain the crude oil in storage.

During filling operations the facilities will operate seven days a week, three shifts each day. Dozens of valves and manifolds must be set, product must be sampled and gauged, environmental checks must be accomplished, pump stations must be manned, and meters must be operated; at the caverns and mine sites brine pumps must be operated and approximately 50 miles of pipeline must be in operation as up to 10,000 barrels of crude (420,000 gallons) an hour will be pumped into the storage cavity. A similar quantity of brine must be pumped out and disposed of in a manner consistent with the environmental impact statements filed for each site.

Shift work will not be required until the fill operation is begun, but all facilities and procedures must be fully operational at that time. To accomplish this, the staff must be in place 30 days before the start of fill so that they may be trained in equipment operation, operational techniques, acceptance procedures and inventory control, fire prevention and firefighting methods, and preventive maintenance and repair. The staff must also be thoroughly familiar with environmental requirements and procedures applicable during both fill and standby operations.

During the construction period these operations costs are funded as part of the design and construction activity. Once construction is completed and the site is filled to capacity, additional standby operations funds will be required.

JUSTIFICATION

Workload analyses are presented below which highlight significant elements within the Storage Facilities Program:

o Environmental Projects and Permits Contracted Support

DESCRIPTION	COST ($000)
- Preparation of amendments in EIS's as program proceeds into implementation stages and design alternatives are firmed up	200
- Preparation of environmental operating plan for each site	400
- Preparation of additional EIS's for alternative storage sites	400
- Performance of baseline study work in support of plans/EIS updates	500
TOTAL	1,500

AMENDMENT

o Storage Facilities (site acquisition, design, construction and fill)

--SITE--	PRIOR YEARS		FY 1978		TOTAL	
	CAPACITY MMB	FUNDING ($000)	CAPACITY MMB	FUNDING ($000)	CAPACITY MMB	FUNDING ($000)
Site 1 & Expansion	63	69,700	66	86,600	129	156,300
Site 2 & Expansion	61	102,300	76	188,500	137	290,800
Site 3	94	89,165	---	14,100	94	103,265
Site 4	---	---	27	34,400	27	34,400
Site 5	---	35,900	89	88,333	89	124,233
Site 6	---	3,300	14	26,900	14	30,200
Site 7	---	1,000	21	26,800	21	27,800
TOTAL	218	$301,365	293	$465,633	511	$766,998

NOTE: Development of storage facilities at various sites range from $1.10 per bbl to $2.16 per bbl with the total 500 MMB system averaging $1.50 per bbl for site acquisition, construction and fill.

The amended request includes $68,624,000, 24 positions, and 24 manyears more than the initial FY 1978 request for this program. Differences between these figures and the original request results from a realignment of programs.

AMENDMENT

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Strategic Petroleum Reserve	PROGRAM: Petroleum Acquisition and Transportation

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	4	...	...	...	6	6	440,216	12	12	2,538,595	+6	+6	+2,098,379
Headquarters	4	...	...	...	6	6	440,216	12	12	2,538,595	+6	+6	+2,098,379
Field	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	...	...	XX	XX	(440,000)	XX	XX	(2,538,200)	XX	XX	(+2,098,200)

PROGRAM DESCRIPTION

After examining several options for acquiring oil to fill the reserve, it has been determined that the crude oil to be stored should be obtained through the normal Federal procurement procedures. FEA will request offers from interested sellers. A revision of the crude oil Entitlements Program to permit a class of suppliers of oil to FEA to earn "entitlements" to price-controlled domestic oil as a result of delivering oil for storage will result in prices for the reserve oil near the national average composite price (imports included). It provies an equitable way for the petroleum industry and petroleum consumers to pay a proportionate share of the costs of the reserve, which would directly benefit both the industry and petroleum consumers during an interruption.

This activity provides for acquisition of a total of 250 million barrels (MMB) of crude oil for storage by December 1978; this represents an acceleration of the goal of 150 MMB presented in the Early Storage Reserve Plan, as noted above. The Early Storage Reserve and the additional 100 MMB will become part of the total reserve after the Strategic Petroleum Reserve Plan and its amendments are approved by Congress.

Appropriation authority currently exists for the first 150 MMB of oil. Further legislative action is required for authorization to appropriate funds for the additional 100 MMB.

JUSTIFICATION

The $11.40 a barrel price for FY 77 and $11.98 a barrel price for FY 78 are estimates of the national average price for the respective years. These estimated prices include the cost of delivery to the storage sites in the United States and take into account both new and old domestic crude prices and the cost of imported crude with no further OPEC price increases. The January 1977 OPEC increase has been considered in these prices.

AMENDMENT

Should the price of oil be higher at the time of purchase, FEA will request supplemental appropriations to assure delivery of the necessary quantities. Should the price of oil be lower than the estimates, any excess appropriation will be carried over the next fiscal year in order to fund subsequent oil purchases.

	FY 77	FY 78
National Composite Average Price	$ 11.40/BBL	$ 11.98/BBL
Purchase of Crude	38.60 MMB	211.87
Cost ($000)	$440,000	$2,538,200

A lead time of five months is required for SPR petroleum purchases. This allows for 45 day procurement notice, 30 day negotiation, 45 day transportation and delivery arrangement, and 30 day sailing time. Since filling will commence in the last quarter of FY 77, procurement action for the initial 38 MMB must be started in March of 1977. Procurement of 212 MMB must be initiated in the first quarter of FY 78 to provide continuous filling of the sites throughout the year so that the 250 MMB goal will be met.

Oil will be delivered to the storage sites by ocean tanker, barge, or pipeline depending upon its source. Tanker, barge and pipeline movements must be forecasted monthly, scheduled weekly and dispatched daily. FEA will be using ICC determined rates for barge/pipeline movements into storage pending final construction of SPR pipelines. Considering port congestion, tanker delays, barge and pipeline movements, the administrative workload, including reporting, monitoring and operational control, will be considerable and will require close coordination with other aspects of the storage program.

It should be noted that the Cargo Preference Act requires that 50 percent of all cargo purchased overseas by the Federal Government be shipped on American flag vessels if such vessels are available. This may result in an increase in the cost of transportation. It has been impossible to estimate with accuracy what additional costs may result from compliance with the Cargo Preference Act, particularly because of uncertainty as to how much oil for the Reserve may be supplied from domestic sources obviating the necessity for oceanic transportation of oil. Cargo Preference costs, to the extent necessary, will have to be accommodated in future budget submissions on the basis of actual cost experience.

The amended request includes $1,259,331,000, 4 positions, and 4 manyears more than the initial FY 1978 request for the program.

AMENDMENT

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Strategic Petroleum Reserve

PROGRAM: Planning and Analysis

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	30	10	184	1,224	39	37	4,495	39	39	4,586	...	+2	+ 91
Headquarters	30	10	184	1,224	39	37	4,495	39	39	4,586	...	+2	+ 91
Field	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	(108)	(950)	XX	XX	(3,164)	XX	XX	(3,300)	XX	XX	(+136)

PROGRAM DESCRIPTION

The basic functional responsibilities of this program are to specify and analyze the major issues pertinent to creation and use of the Strategic Petroleum Reserve; specifically, to determine: how the facilities will be designed and updated to optimize their value; what method will be used to monitor, control and use the reserve; what foreseeable impacts the creation, maintenance and use of the SPR will have on the economy; the size and availability of reserved industrial inventories and how to develop and (if authority is exercised) implement measures to manage a minimum level industrial inventory program or some other industrial reserve program. Other functions include the presentation of storage alternatives and plans for the use of the SPR in conjunction with all other contingency actions during emergency supply interruptions.

JUSTIFICATION

Planned activities for FY 78 include:

- o Analyze and plan use of all emergency energy shortfall management options, including the reserve, under alternative scenarios including integration with regulatory and conservation activities.
- o Analyze petroleum distribution system including transportation, refinery, storage and demand factors, to provide improved basis for future distribution decisions and determination of product storage in regions and non-contiguous areas.
- o Analyze and plan continuing petroleum acquisition efforts, including consideration of alternative sources, prices, crude types, timing, and transportation.
- o Analyze alternative development schedules, including costs, resource needs, benefits, and national security consideration.
- o Evaluate initial experiences in petroleum acquisition, site acquisition, and design and construction to identify opportunities for improvements.

AMENDMENT

- o Update the comprehensive plan for the SPR; develop reports to Congress, the President and others regarding revisions in policies and plans, and on progress in developing the reserve.
- o Respond to requests for information regarding the policies and plans for the SPR and their analytical basis.
- o Manage and integrate emergency energy supply.
- o Perform and continually update the analyses for IPR, including the minimum inventory levels program and implementation strategy.
- o Provide implementation procedures/guidance on program activities, such as Defense Production Act (DPA), reserve oil allocation and pricing authorities, real property acquisition.
- o Prepare and coordinate reserve program regulations on use, allocation, and oil acquisition.
- o Study and propose, as appropriate, alternate methods of paying for the reserve.

Staffing will have been completed by the end of FY 77, resulting in full funding for personnel support in FY 78. The total workload will not change between FY 77 and FY 78, but the emphasis will shift somewhat from a focus on initial planning decisions to a greater effort on use plans, more detailed operating plans, final plans for the full reserve, and evaluation of initial experience of operating a reserve program. The continuing contract effort is indicative that initial workload has leveled out as the program proceeds from planning stages into full implementation.

The amended request includes $1,928,000, 13 positions, and 13 manyears less than the original FY 1978 request for this program. This reduction results from organizational transfer of the Environmental Projects and Permits function from Planning and Analysis to Storage Facilities. This change was made to reflect the increasing involvement of Environmental Projects and Permits with the on-going Storage Facilities design and construction effort.

AMENDMENT

STRATEGIC PETROLEUM RESERVE OFFICE
Congressional Budget Submission
Fiscal Year 1978

Analysis of
Policy, Planning and Analysis Contracts

DESCRIPTION	COST ($000)
Petroleum Analysis:	
o Crude: analytical and experimental	250
o Refined Products: analytical and experimental	200
o Embargo level refinery yield slate	200
Subtotal	650
Distribution Analysis:	
o Regional pilot study	350
o Product distribution data file generating maintenance and retrival system, including monitoring	300
o Drawdown rates versus economic impacts	150
o Distribution planning support	350
o Model allocation schemes	150
o Refinery survey and analysis	300
Subtotal	1,600

DESCRIPTION	COST ($000)
Economic Analysis:	
o Embargo effects	155
o Impacts of establishing a reserve	165
o Regional impacts	230
o Simultaneous embargoes: oil and LNG	200
o Cost factor analysis	200
o Analysis of alternative SPR pricing policies	100
Subtotal	1,050
TOTAL, Policy, Planning and Analysis	3,300

AMENDMENT

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Strategic Petroleum Reserve

PROGRAM: Program Management and Review

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	17	1	7	236	21	21	1,166	21	21	1,567	...	...	+ 401
Headquarters	17	1	7	236	21	21	1,166	21	21	1,567	...	...	+ 401
Field	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX		(151)	XX	XX	(410)	XX	XX	(875)	XX	XX	(+465)

PROGRAM DESCRIPTION

This activity includes program coordination and review, resource management, and administrative services.

The program coordination and review function is responsible for integrating program planning, coordinating project execution of all SPR programs and maintaining the program's operating plan. It serves as "third party" evaluator of projects conducted within the program, identifies issues to be examined, oversees those plans which affect SPR program schedules, objectives, and resources, and maintains a decision documentation process for issue resolution and documentation.

The resource management function is responsible for budget planning, formulation, and execution, for financial management and contract administration, and for audit activities.

The administrative service function is responsible for manpower planning and personnel management, space and property management, travel and transportation planning and control, and correspondence and classified material control.

JUSTIFICATION

o Workload Analysis

FY 77	FY 78
SPR Plan	Annual Congressional Report
Oil Procurement	Oil Procurement (3 times greater than FY 77)
9 EIS's	10 EIS's
4 site acquisitions	3 site acquisitions
4 site designs	7 site designs (4 in progress)
4 site construction projects	7 site construction projects (4 in process)
Material Procurement	Material Procurement
150 Total Positions	218 Total Positions
$751 Million Contracts	$3,012 Million Contracts

AMENDMENT

- This effort continues at its current level of 21 positions; workload will shift in FY 78 for the following reasons: 1) increased project evaluation workload and an increase in inquiries from the public, State officials and the Congress regarding the SPR as it proceeds into full implementation; 2) increase in SPRO staffing level causes a slight increase of the support services workload; and 3) increased number of storage projects in progress from four to seven results in a proportional increase in financial management, audit, and information requirements.

- Contract funding for audit services is increased to cover added effort required as fill operations begin. Current planning calls for these services to be procured from DCAA or a private contractor.

The amendment request includes $350,000, 0 positions, and 0 manyears more than the initial FY 1978 request for this program. This increase covers increased audit effort required as a result of program acceleration.

AMENDMENT

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Strategic Petroleum Reserve

PROGRAM: Executive Direction

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	7	1	8	26	7	7	252	7	7	232	...	...	-20
Headquarters	7	1	8	26	7	7	252	7	7	232	...	...	-20
Field	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...
(Contracts/Grants)			...	...			...			...			...

PROGRAM DESCRIPTION

This activity represents the Office of the Assistant Administrator, who is responsible for the overall direction and management of the Strategic Petroleum Reserve (SPR) program. The AA is responsible to the Administrator of FEA for ensuring that the missions of the SPR program are accomplished within the time frames and funding limits established by the President or by the Congress.

JUSTIFICATION

Full staffing was accomplished during the Transition Quarter, and it is planned to maintain this level through FY 78. Although the SPR program will increase significantly in size and scope of work, no additional positions are requested.

The amended request calls for $32,000, one position, and one manyear less than the initial FY 1978 request.

AMDNEMENT

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Strategic Petroleum Reserve

PROGRAM: Data and Procurement Support

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	1	...	...	...	2	2	3,243	17	17	2,799	+15	+15	-444
Headquarters	1	...	..	...	2	2	3,243	17	17	2,799	+15	+15	-444
Field	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	...	...	XX	XX	(3,171)	XX	XX	(2,240)	XX	XX	(-931)

PROGRAM DESCRIPTION

This program provides Management Information System (MIS) for the identification, scheduling, coordination and control of all essential program activities required for the implementation of the Strategic Petroleum Reserve and for the highly specialized procurement of storage design, construction and related construction sub-contracts, as well as petroleum acquisition and transportation procurements.

JUSTIFICATION

o Data Support

Manyears shown in FY 77 are only those directly charged to the Strategic Petroleum Reserve appropriation although support is provided under the FEA Salaries and Expenses appropriation. Total charges are shown against the SPR appropriation in FY 78.

Data support includes the design and development of 13 major ADP systems. These systems will provide information required for management of site acquisition, design and construction, financial management and accounting, transportation, operation and policy analysis.

Major ADP system design will be completed in FY 77; however, significant funding is required in FY 78 to assure continued development, implementation, and operation. Full operation of the ADP systems in FY 78 is anticipated with a subsequent increase in data input and an emphasis on data validation and quality control.

o Procurement Support

During most of FY 77 procurement support is provided under the FEA Salaries and Expenses appropriation because the kinds of procurement are general planning and analysis contracts which the FEA staff is capable of absorbing. However, two contract specialists, experienced in architect and engineer and construction procurement are required and because these skills have applicability only to the SPR program a direct charge is shown in the FY 78 submission.

Specialized procurement will begin in late FY 77 and continue throughout FY 78.

The amended request includes $896,000, 9 positions, and 9 manyears more than the initial FY 1978 request for this program.

AMENDMENT

STRATEGIC PETROLEUM RESERVE OFFICE
Congressional Budget Submission
Fiscal Year 1978

Analysis of Contracts
Data Support

DESCRIPTION	COST ($000)
o ADP Facility Operation and Management Contracts.....	1,000
- This element represents a prorated portion of total usage costs. SPRO requires massive volumetric, demographic transportation, cost accounting, and other similar tracking systems. Maintenance of these systems requires significant computer utilization.	
o Data Reduction Support Contracts.....	400
- This element represents data entry and data reduction efforts required to provide continual update to maintain timeliness of the operational systems and data bases developed during FY 77.	
o ADP System Support.....	840
- This element provides contracted ADP support for specific SPRO activities, studies and analyses. Full operation of the ADP system in FY 78 will result in increased data input and the need for quality control and data validation. Specialized procurement, begun in late FY 77, will continue through FY 78. Included are:	
- Financial planning, purchasing, disbursement and control (120).	
- Program-Wide Tracking MIS with charting capability (80).	
- Implementation of the Comprehensive MIS for SPRO operational support (640).	
TOTAL DATA SUPPORT.....	2,240

AMENDMENT

FEDERAL ENERGY ADMINISTRATION
FY 1978 CONGRESSIONAL BUDGET ESTIMATES
C. Resource Summary
(dollars in thousands)

ACTIVITY: Strategic Petroleum Reserve

PROGRAM: General Counsel Support

	FY 1976 Actual			TQ	FY 1977 Estimate			FY 1978 Estimate			Change FY 1977 to FY 1978		
	Pos.	MY	Amount	Amount	Pos.	MY	Amount	Pos.	MY	Amount	Pos.	MY	Amount
Estimate	...	...	...	...	...	...	...	12	12	396	+12	+12	+396
Headquarters	...	...	...	...	...	...	...	12	12	396	+12	+12	+396
Field	...	...	...	...	...	...	...	...	...	...	...	...	...
(Contracts/Grants)	XX	XX	...	...	XX	XX	...	XX	XX	...	XX	XX	...

PROGRAM DESCRIPTION

This program element provides legal support for the entire Strategic Petroleum Reserve program, including, as necessary, (1) legal review of contracts and other documents, negotiation, real estate acquisition, environmental analysis, statutes, regulations and permits and (2) other legal activities as required to support the effective administration of the SPR program and to ensure compliance with the multitude of legal requirements applicable to the program.

JUSTIFICATION

Legal support for the SPR involves legal review of the following: (a) Real estate acquisition, including evaluation of the various legal interests in land, and the comparative advantages of acquisition of alternative interests, such as leases, fees, easements, rights-of-way, etc.; the real estate work will involve working with the Corps of Engineers in all aspects of property acquisition, including negotiations with property owners; (b) the legal sufficiency of environmental analysis with respect to acquisition, construction, and filling of sites; and (c) contracts and other procurement documents, negotiations with parties with respect to such documents and legal actions required to ensure fulfillment of their terms.

Legal support will also ensure that acquisition and construction efforts meet the legal requirements of applicable statutes including Federal requirements relating to environmental protection, pipeline safety and all other applicable legal requirements. General legal support to the SPR program includes review of reports and other documents for legal sufficiency, drafting of legislative proposals, and drafting of proposed and final regulations to implement the program.

Support provided in FY 1977 is funded under the FEA Salaries and Expenses appropriation, and in FY 1978 is now shown as a direct charge to the Strategic Petroleum Reserve appropriation.

The amended request includes $198,000, 6 positions, and 6 manyears more than the initial FY 1978 request for this program.

GPO 813-429

FEDERAL ENERGY ADMINISTRATION

Budget appendix page	Heading	1978 request pending	1978 proposed amendment	1978 revised request
724	Strategic Petroleum Reserve (On the third line delete the figure $1,689,533,000 and insert the following in lieu thereof:) $3,018,933,000 (In the appropriation language under this heading delete the period after "1976" and add the following:) : Provided further, that $1,168,300,000 of this appropriation shall be available only upon enactment into law of authorizing legislation.	$1,689,533,000	$1,329,400,000	$3,018,933,000

STANDARD FORM 300-T
June 1975, Office of Management and Budget
Circular No. A-11, Revised.

FEDERAL ENERGY ADMINISTRATION
STRATEGIC PETROLEUM RESERVE
Program and Financing (in thousands of dollars)

Identification code 92-1501-0-1-305	19 76 actual	19 TQ actual	19 77 estimate	19 78 estimate
Program by activities:				
Total program costs, funded ..	321	5,497	755,989	3,018,933
Change in selected resources (undelivered orders)	...	...	...	...
10.00 Total obligations	321	5,497	755,989	3,018,933
Financing:				
21.00 Unobligated balance available, start of period	...	-313,054	-308,157	...
24.00 Unobligated balance available, end of period	313,054	308,157	...	...
25.00 Unobligated balance lapsing	...	...	...	...
Budget authority	313,375	600	447,832	3,018,933
Budget authority:				
40.00 Appropriation	313,375	600	447,684	3,018,933
44.20 Supplemental now requested for civilian pay raises	...	...	148	...
Relation of obligations to outlays:				
71.00 Obligations incurred, net	321	5,497	755,989	3,018,933
72.00 Obligated balance, start of period	...	321	2,818	441,565
74.00 Obligated balance, end of period	-321	- 2,818	-441,565	-1,174,192
77.00 Adjustments in expired accounts	...	...	...	...
90.00 Outlays, excluding pay raise supplemental	...	3,000	317,100	2,286,300
91.20 Outlays from civilian pay raise supplemental .	...	...	142	6

STANDARD FORM 304-T
June 1975, Office of Management and Budget Circular No. A-11, Revised. 304-103T

FEDERAL ENERGY ADMINISTRATION
STRATEGIC PETROLEUM RESERVE

OBJECT CLASSIFICATION (in thousands of dollars)

Identification code 92-1501-0-1-305	19 76 actual	19 TQ actual	19 77 estimate	19 78 estimate
Personnel compensation:				
11.1 Permanent positions	86	260	2,980	4,805
11.3 Positions other than permanent	7	22	279	258
11.5 Other personnel compensation	1	3	156	203
~~11.8 Special personal service payments~~				
Total personnel compensation	94	285	3,415	5,266
Personnel benefits:				
12.1 Civilian	10	24	286	462
~~13.0 Benefits for former personnel~~				
21.0 Travel and transportation of persons	1	4	280	280
22.0 Transportation of things	...	...	78	90
23.0 Rent, communications, and utilities	1	4	435	580
24.0 Printing and reproduction	...	55	110	100
25.0 Other services	4	12	35	50
Contracts	208	2,000	14,059	7,915
26.0 Supplies and materials	...	2	440,048	2,538,298
31.0 Equipment	3	111	243	259
32.0 Lands and structures	...	3,000	297,000	465,633
~~33.0 Investments and loans~~				
~~41.0 Grants, subsidies, and contributions~~				
~~42.0 Insurance claims and indemnities~~				
~~43.0 Interest and dividends~~				
~~44.0 Refunds~~				
99.0 Total obligations	321	5,497	755,989	3,018,933

STANDARD FORM 5UD
July 1968, Bureau of the Budget
Circular No. A-11, Revised.
306-103

FEDERAL ENERGY ADMINISTRATION

STRATEGIC PETROLEUM RESERVE

DETAIL OF PERMANENT POSITIONS

	19 76 actual	19 77 estimate	19 78 estimate
Executive Level I	...	...	...
Executive Level II	...	...	...
Executive Level III	...	...	...
Executive Level IV	...	1	1
Executive Level V	...	...	...
Subtotal	...	1	1
GS-18	...	1	1
GS-17	1	3	3
GS-16	3	3	3
GS-15	11	12	17
GS-14	15	20	27
GS-13	11	20	35
GS-12	9	21	37
GS-11	12	20	37
GS-10	...	...	...
GS- 9	11	17	20
GS- 8	4	4	4
GS- 7	9	11	15
GS- 6	7	8	10
GS- 5	4	5	5
GS- 4	3	3	2
GS- 3	...	1	1
GS- 2	...	...	...
GS- 1	...	...	...
Subtotal	100	149	217
Ungraded	...	...	...
Total permanent positions	100	150	218
Unfilled positions, end of year	64	...	...
Total permanent employment, end of year.	36	150	218

STANDARD FORM 300-T
June 1975, Office of Management and Budget
Circular No. A-11, Revised.

FEDERAL ENERGY ADMINISTRATION
STRATEGIC PETROLEUM RESERVE
PERSONNEL SUMMARY

Identification code 92-1501-0-1-305	19 76 actual	19	19 77 estimate	19 78 estimate
Total number of permanent positions	100		150	218
Full-time equivalent of other positions	0		0	0
Average paid employment	15		137	218
Average GS grade	10.91		11.13	11.38
Average GS salary	$16,933		$21,618	$22,041

ENERGY REORGANIZATION

Mr. YATES. You have not been in your job very long and I assume there are one or two things about it that you still don't know, but we will be pleased to have you tell us what you wish to tell us about the operations or the energy picture.

The question is, where are you going? We had a briefing by Mr. Schlesinger at the White House about 2 weeks ago on reorganization into the Department of Energy. Will you be moved into that? Tell us what you envision.

Mr. O'LEARY. Mr. Chairman, the FEA will be moved, although not intact, into the new Department of Energy. Its functions will then be reassembled and combined with those of the other organizations that will be brought together into that Department. You won't be able to have a discernible, recognizable FEA any longer, but all of the functions will be carried over into the new agency.

Mr. YATES. Where will you be?

Mr. O'LEARY. I have a very short-term contract with President Carter that expires on the day you reorganize. My plans beyond that are quite indefinite.

Mr. YATES. You don't know yet whether you will be with that new agency or somewhere else?

Mr. O'LEARY. I do not, Mr. Chairman.

Mr. YATES. I take it you support the concept?

Mr. O'LEARY. Very much. I think this is a long overdue step. I have had service with a number of the agencies that are going into the new department, and have recognized for years there was too much fragmentation. This is a very useful step indeed.

FEDERAL ENERGY ADMINISTRATION PROGRESS

Mr. YATES. What is your impression of how the FEA is working?

Mr. O'LEARY. The FEA is having some very severe difficulties, Mr. Chairman, largely as a result of the attitudes of past administrators. I think that the FEA always regarded itself as about to go out of the regulatory business. The regulatory area itself is in some disarray. We are now taking steps that over time will tend to correct that, but it is a long rebuilding job.

With regard to other activities, we find on review that the conservation programs are really not at the point that I would like to see them. The energy resource development programs are not mature. The principal one, the coal conversion program, has a very long way to go and may require a complete legislative overhaul before it can be made effective. The data-gathering services and the information services are much better generally than they were governmentwide say 2 or 3 years ago. Still, there is an immense chore to be done in the area of pulling together data that are satisfactory for the use of the Congress and the executive branch in decisionmaking.

I think the proof of the data pudding is in the degree to which the data are credible for decisionmaking. I have to say, despite the very substantial improvements over the last 3 years in data services, they are still not good enough.

FEDERAL ENERGY ADMINISTRATION BUDGET

Mr. YATES. Tell us about the budget. Will this budget be adequate for your purposes? Have you been injured at all through your trek through OMB?

Mr. O'LEARY. I don't think so, Mr. Chairman. I think we have sufficient money with the flexibility that is inherent and, of course, with the understanding we can come back to you after the April 20 message as these new missions devolve upon the organization that was formerly the FEA.

Mr. YATES. I assume if the funding isn't sufficient the new department will come in for a supplemental?

Mr. O'LEARY. Yes. It may well have to do that.

Mr. YATES. Tell us about the strategic petroleum reserve. Have you seen the report by the Comptroller General?

Mr. O'LEARY. Yes, I have, Mr. Chairman.

Mr. MURTHA. May I ask a couple questions about administration?

Mr. YATES. Of course you may.

EMPLOYEE TURNOVER

Mr. MURTHA. We found previously, Mr. O'Leary, a 40-percent turnover in the agency. Will that be corrected under the new reorganization, do you believe?

Mr. O'LEARY. It is down substantially over the last year. The very, very high rate of turnover that was noticeable in the first 2 years of the agency's life, is pretty much par for the course for a new agency that is constantly running into deadlines. I think when the personnel realize they are working in an agency that may have only another 6 months of life, they begin to look for alternatives.

In addition to that, early in the agency's life there were brought into it a number of people on a relatively emergency basis, and they understandably had reversion rights and did go back to their home agencies over a period of time. I think that these are startup problems, not surprisingly, and my understanding is now there has been in the last year particularly, a great deal more stability in the work force. I think we will not really shake down entirely until the Department of Energy has been created and we have some operating experience.

Mr. MURTHA. What was the turnover rate last year?

Mr. O'LEARY. Fourteen percent for January through August of 1976.

Mr. HOWELL. The overall rate for the whole year was considerably above that, approximately 25 percent. We had 13 people who left the agency the week before last, and last week some 6 people who left the agency.

Mr. MURTHA. One of the concerns I had was the possibility of people coming from energy producers into the agency and going back to energy producers.

Mr. O'Leary. There is very little of that.

Mr. MURTHA. Was it transfer between Government agencies?

Mr. O'LEARY. Yes, Internal Revenue Service, Cost of Living Council, and Department of Interior.

Mr. SMITH. The majority of that turnover, Mr. Murtha, was in my own program in the regulatory areas, and this was a direct result of

the uncertainties that Mr. O'Leary alluded to first, and second, it was a result of the policy of the decontrol of products.

There is still a little bit of that uncertainty left. Since the passage of the Energy Policy and Conservation Act in 1975 and the implementation of an ongoing crude oil regulatory program, we have considerably more stability in those programs than we have had to date. That has gone a long way toward reducing the turnover in the regulatory side of the house, which is the biggest single part of the personnel of the agency.

RETIRED MILITARY PERSONNEL

Mr. MURTHA. There seemed to be a large number of retired military personnel. I know the President addressed himself to this. He said he is going to try to eliminate this type of thing. I agree with him. I think this is just not right that a person gets a large pension, then goes to work for another Government agency. You seem to have an exceptional number of retired military personnel in the home office and in the Atlanta office.

Mr. O'LEARY. That is true in the Dallas office as well. There is a certain amount of that, and we will be looking at that very carefully.

Mr. SMITH. Mr. Murtha, Mr. Zarb on at least three occasions that I know of asked for a specific rundown of this. It turns out the overwhelming majority of those people were already on board in the agencies and offices that were transferred to FEA. In particular, based on my own military background although I have an Active Reserve commission, he was nervous about my hiring practices and had my hiring practices examined. Over the period of the first 18 months I was in my office I had hired one military person—a retired Navy enlisted aircraft mechanic—who was hired as a messenger and driver in my office.

Mr. MURTHA. I am not trying to create the impression I am antimilitary. I am trying to eliminate what I think is a duplication of payments and an unfair practice in many of the agencies. This came, you say, even before Zarb became the Administrator?

Mr. SMITH. The overwhelming majority of these people were employed by the offices that were pulled into FEO before FEA existed. Of course, you do understand those people forego a very substantial part of their military retirement anuity to do so. They do not get their full military retirement and their full Government paycheck.

EMPLOYEE TRANSFERS FROM CONGRESSIONAL OFFICES

Mr. MURTHA. Another thing I have a great concern about. It seemed to me—and we have full personnel records from FEA and information was furnished to us after haggling with the agency—that there were people coming from congressional offices from Congressmen who had been defeated, going into the agency for a short period of time, then back again. I don't know what time frame this was. This may have been before the last 2 or 3 years. I can't pin down the time because of the privacy problem.

It seemed to me that there were an inordinate number of people coming in there, spending 6 months there and then going back to another congressional office or agency of the Government.

I had the feeling that we had a political bull pen, so to speak, for the agency, rather than hiring experts. I assume this will be eliminated.

Mr. O'LEARY. Mr. Chairman, I can't speak to history on that but I can tell you this agency is run strictly on a professional basis now, and there is none of that.

CONSULTANTS

Mr. MURTHA. How about the consultants? I notice a fellow named Roddis on there who was making in excess of $100,000 and you were getting him for something like $145 a day, which was a very reasonable figure. Do those people make reports? Are those reports available to Congress?

Mr. O'LEARY. The gentleman you have named is a man with very long experience in the electric power industry—he was, as you know, president of Consolidated Edison at one time and has had many other senior industry posts. Any time we have use of a consultant we have what we in the trade call a deliverable. Any time you would like to review those with us, I would be more than pleased to completely open our books to you.

FISCAL YEAR 1978 BUDGET REQUEST

Mr. YATES. Your budget is $3,363,243,000, which is an increase of $2,729,006,000 over the previous fiscal year. You have a total increase of 80 positions. In response to my earlier question you have indicated insofar as your responsibilities for carrying out the duties of the Federal Energy Administration you think this is an adequate budget.

INCREASED ENERGY USE

The Wall Street Journal on March 14, indicated that energy use in this country was up 4.8 percent in 1976. Does that agree with your figures?

Mr. O'LEARY. That is approximately right.

Mr. YATES. Can you tell us the reasons for the rise?

Mr. O'LEARY. There are 3 essential reasons. First, we did have extremely cold weather and space heating led to the rise. The overall increase from period to period for those things that are associated with a temperature-sensitive load was up 7½ to 8 percent. There was a further increase in industrial activity that accounted for probably another 3-percent rise in that sector, and there was an increase in driving that I think we can associate with the second point, that is, the increase in industrial activity. The country is a little better off than last year.

I have seen estimates that if we were to go tomorrow morning to 4½ percent unemployment, we would immediately incur an additional requirement in the economy for about 3½ million barrels of oil.

Mr. YATES. Where are you going to get it?

Mr. O'LEARY. The way things are now, we are going to get it from OPEC.

INCREASED OIL IMPORTS

Mr. YATES. Have our imports increased?

Mr. O'LEARY. Our imports are up substantially, Mr. Chairman. At the moment, we are producing about 9 to 9.2 million barrels of liquids and importing at least 10 million barrels a day.

OIL PRICES

Mr. MCDADE. Would you reflect on the costs of the three-tiered system we have now. What are we paying for imported?

Mr. O'LEARY. About $13.50, depending on the quality of the crude.

Mr. MCDADE. What about new oil?

Mr. O'LEARY. We are split about 50–50 now between old oil, which is in the 5¼ range, and the so-called new oil, which is about $11.30.

Mr. MCDADE. Making an average price of what?

Mr. O'LEARY. About $11.50.

WEATHERIZATION PROGRAM

Mr. YATES. You indicated earlier in response to my previous question that you are unhappy about our conservation efforts. The committee is faced with one conservation problem in connection with our 1977 supplemental. This committee struck $55 million for the part of the conservation program relating to insulation of homes from the supplemental. We did that because we were told a significant increase in the program had occurred in the HEW subcommittee which has the same kind of service provided by the Community Services Administration.

What advice can you give us on this? Is this adequate? Can you get along without the $55 million in view of this increase to the CSA?

Mr. O'LEARY. This is essentially a decision to be made by the Congress. If this were the extent of it, if we were not going to go beyond the present weatherization program directed at low-income people in this country, and run a program in the range of $50 million to $75 million a year, I would have no doubt that this could properly be classified as a socially oriented activity and would be appropriate for the Department of Health, Education and Welfare. This appropriation, however, in my judgment is a precursor for a very, very substantial national weatherization program aimed at every house not presently up to useful standards that is going to be, in the normal course of events, administered not by HEW, but by FEA or the new Department of Energy.

My brief to you is simply this. We ought to begin to get the hands on experience with this $55 million during fiscal 1978 that will permit us to discharge our responsibilities to the much larger program that probably will cost the national economy, not the Government but the economy, somewhere in the range of ten to fifteen billion over the next 8 to 10 years.

I think that if we fly blind without getting the sort of hands-on experience that I want the agency to get with this coming $55 million program, we will not do as well on that very much larger and more important program as if we do proceed.

87-591 O - 77 - 26

COMMITMENT OF WEATHERIZATION FUNDS IN FISCAL YEAR 1977

Mr. YATES. Can you commit the $55 million during the balance of fiscal '77?

Mr. O'LEARY. No.

Mr. YATES. What portion of it do you think you will be able to commit?

Mr. O'LEARY. I think a very substantial portion of it during the remainder of this year. We have the regulations out now. The draft regulations came out the day before yesterday. I think we are ready to proceed. My instructions to the staff were to be ready to proceed at the time the appropriation was forthcoming; I think we will approximately meet that. We have the arrangements ready, so I think we can make a very rapid start on this with the cooperation of the affected States.

CONSERVATION EFFORTS

Mr. YATES. Can you give us a summary of what you are trying to do in the field of conservation?

Mr. O'LEARY. What we are trying to do is to bring about a substantial uncoupling. The whole object from the standpoint of the strategic relationship is this. There has been historically for the last 25 years, since 1950, an almost constant relationship between the number of Btu's injected into the product and per dollar of gross national product coming out. If you put these in 1958 dollars, we have used, within a very narrow range, about 90,000 Btu's per dollar of GNP for 25 years. Prior to the war, this was closer to 140 to 150 thousand Btu's. During the war something happened that did, in effect, significantly change the relationship between energy and dollars of GNP out. We really don't have a full understanding of that.

Since the 1973–74 embargo there has been an enormous discussion in this country of conservation efforts. To date, at least running through the figures we have seen for the first half of 1976, there is very little evidence that there is any conservation. In a micro sense, that old relationship of 90,000 Btu's per dollar of GNP continues to obtain. The massive chore before this economy now is to take a look at ways in which we can significantly reduce that.

In my judgment, current technology would permit a reduction of that to about 60,000, or about a third, if we were able to apply it all at once. Clearly, we are not going to be able to do that, so we have to go for short-term targets. In the program of FEA, particularly under the Energy Policy and Conservation Act, there are five mandatory conservation steps that each State must put into effect before it can share with us in the funds relative to the conservation program.

They are the right turn on red, which has now been adopted by most of the States in this country.

Mr. YATES. But not the District of Columbia.

Mr. O'LEARY. The District has not.

The mandatory standards include lighting in public buildings, mandatory thermal standards for public buildings, life cycle costing for public procurement by the States, and matters of similar nature.

LIFE CYCLE COSTING

Mr. YATES. What does life cycle costing mean?

Mr. O'LEARY. If you were to take a look at the energy requirements for a new air conditioner over its life, it might indicate to you that you could pay a little more in dollars at the front end of the procurement and come out on the total operating cost of the full life of that appliance with a dollar saving to you and a conservation saving at the same time. This is something States are beginning to move to. Some agencies of the Federal Government had begun to look at this as early as 3 years ago.

Mr. EVANS. Would the gentleman yield?

You mean your requirements state in terms of purchasing of heating or air-conditioning equipment——

Mr. O'LEARY. Automobiles.

Mr. EVANS. Automobiles. This kind of approach is in an agreement on the part of the States?

Mr. O'LEARY. Yes. In order for the States to participate with us, they have to put in that particular requirement.

Mr. EVANS. But it just relates to State properties?

Mr. O'LEARY. All of the things I am describing relate to things directly under the control of the State.

FEDERAL PURCHASES

Mr. YATES. What are we doing about Federal purchases?

Mr. O'LEARY. There is simultaneously, a cooperative program between FEA and GSA looking toward the imposition of the same sorts of rules at the Federal level.

Mr. YATES. We have been requested to appropriate funds for the purchase of substantial numbers of automobiles for some of the agencies before us. Will they have to be purchased pursuant to some directive having life-cycle requirements?

Mr. O'LEARY. Mr. Chairman, GSA is the responsible agency for that, and they are working now on rules which will bring this life-cycle concept into play. They are presently using a modified life-cycle cost concept for automobile purchases, which involves a life cycle of either 6 years or 60,000 miles.

Mr. YATES. Do you control GSA?

Mr. O'LEARY. No. GSA controls procurement. We simply work with them and do our best to influence them on their management of procurement and of public buildings.

Mr. MURTHA. Would the gentleman yield?

IMPORTANCE OF CONSERVATION PROGRAM

One of the problems we run into on the Military Construction Subcommittee is exactly what you are talking about. The Ford and now the Carter administration has endorsed the elimination of $130 million in energy conservation programs. Here you are talking about an overall energy program for the country. This is a priority, as I see it, and yet the military has been forced to cut $130 million in energy conservation programs with a 6-year payback out of their budget.

We, of course, got it back into appropriations but it hasn't been authorized yet. It seems to me that nobody has gotten the message yet. After 3 years of haggling, we are still in the process of getting the message to the agencies. OMB made these cuts in the very area where we have such a national priority. How are we going to change this? How much is this new energy agency going to change this?

Mr. O'LEARY. You understand that this continues to be a matter that is controlled by the agency in question and by OMB, and I think we are seeing significant changes. For example, the efficiency of Government buildings has increased significantly. This can be measured. I don't know the fact setting in which this point you raise occurs, whether this is a portion of the program or the totality.

Mr. MURTHA. The total program was cut out by OMB and they use the excuse they are reevaluating all the bases, but Annapolis and some others were obviously long-term bases, so it was just an across-the-board cut by OMB. That is why I say we are not getting the message across to the agencies that there is a priority in this area.

Mr. O'LEARY. I think that the very fact that the Department of Defense was willing to advance almost $150 million worth of conservation saving shows that the agency has the message. There are, of course, in OMB the weighing of a whole series of priorities, as you well know. I would take it quite literally that they are reevaluating. Probably you will hear more of this. Let me tell you categorically that the instructions that we are operating under in this conservation program plays this as the President's primary energy initiative. I think not only will that be reflected in the April 20 message with regard to things that are going to go on in the private sector, but I am sure it will be reflected in time by activities in the various agencies within the executive branch.

CONSERVATION AWARENESS

To go on with the conservation problem, Mr. Chairman, when you take a look at the universe of what you can do in this area, one of the reasons that it hasn't worked very well to date, I think is because, in fact, conservation savings, the ones that are easily attainable, are pretty pedestrian. If you take a look at where you use oil and gas, they take the form of corrections to space heating, improvements in insulation, et cetera. These are things that have been recognized for a long time, they are not particularly sexy; very little in the way of organized programs has been put together with it. They take the form of the automobile transportation uses.

AUTOMOBILE MILEAGE

As you know, there is a standard in EPCA that calls for a very significant improvement in the overall performance of the mix between; for example, 1972 was 14 miles per gallon; by 1980, 20 miles per gallon, and by 1985, 27.5 miles per gallon.

Mr. YATES What do you mean by the mix?

Mr. O'LEARY. The whole performance of everything that comes out of Detroit. There will be some bad performers, such as very heavy recreation vehicles, and some sterling performers like the unguzzlers that

will do 30 miles to the gallon, but the mix according to EPCA will come up to these standards I have related to you.

Mr. YATES. How are you betting?

Mr. O'LEARY. Mr. Brock Adams and I had a hearing, Mr. Chairman, on Monday of last week and we listened to the four major automobile producers in the United States. Each of them told us this was a very, very difficult thing to do and asked that they be granted a certain amount of relief.

Let me explain their position. This is not a technology problem. If you wanted to tomorrow you could say: All right, no more 25 miles to the gallon. That is it; 30 miles.

Certainly there are enough models around, unfortunately most of them imported, in order to make that stick. If you look at it, the performance of the automobile in terms of miles per gallon right now is directly related to weight. You cut a pound, you save some gas. This, of course, unless you are willing to lighten the materials that go into the car, makes the relationship directly related to size. So the reductions we are going to see between now and 1985 are going to be primarily size and weight related to the same degree over time.

The question is one of the wilingness of the American public to purchase cars that meet that mix standard. The fear on the part of the automobile manufacturers is based upon their knowledge that there is an enormous amount of voluntary capability on the part of the automobile-buying public. Most people, for example, can get another year out of their car. And in 1974, during that period of uncertainty after the Arab embargo, a lot of people who could have bought cars just chose not to buy cars.

The automobile industry is interested in conservation, I am sure, but they are also interested in their balance sheet. They see an antagonism between going from the current 18 miles per gallon, and the 1978 model year is in that category, to 27½ miles per gallon, knowing you will accomplish that saving through weight and size reductions. They think, particularly in light of today's trend where people are buying bigger rather than smaller, people will just stay out of the market, and their balance sheet will be severely affected. These are the sorts of considerations we have to weigh.

Mr. YATES. What did the manufacturers tell you at your meeting with Brock Adams?

Mr. O'LEARY. They told us there should be additional flexibility in the program and that the likelihood of the bottom line was that the 27½ miles per gallon was going too far and too fast.

PUBLIC RESPONSE TO CONSERVATION

Mr. MURTHA. If the gentleman would yield?

I think in relation to that the Harris poll indicated when the temperature was supposed to be cut down to 65 people just don't do it; they cut it to 70. They say they are cutting it down but they aren't. If they cut it down they save fuel and obviously costs, but they don't do it because they want to be more comfortable. A lot of people in my district still don't believe there is an energy crisis and then they are not willing to cooperate. This cuts right across all segments and age groups. I have had small children and older people in the house who

couldn't stand the cold temperature, and of course in hospitals you get into all kinds of arguments about that. I don't think the public will accept it if you do it too drastically.

Mr. O'LEARY. Mr. Chairman, I think there is another side to that coin. We did some admittedly preliminary calculations on the hardest hit parts of the United States during the very severe winter weather of last January and February.

Mr. YATES. Ohio?

Mr. O'LEARY. Ohio, the Buffalo area, New York, and so on; Philadelphia was almost a model case. Voluntary conservation was achieved in Philadelphia by the mayor going on television every night saying, "You better do it." As a result, there was a substantial saving in the residential sector. This is where you get excellent correlations of temperature and burn. There was quite evidently some significant conservation achieved there.

I have to agree with Mr. Murtha that exhortatory calls to reason are not the way to do it. The fact is that there is now a discernible change in automobile buyer habits. For example, I was at Airlie House 2 weeks ago. There had been a group of industrialists present. When I came out I saw a dozen black Fleetwoods out there. It just jarred me.

Mr. YATES. They really ought to at least paint them brown.

Mr. O'LEARY. The campus at the Pentagon was simply afloat with black Fleetwoods 10 years ago, and they are not there anymore. They now have a medium-sized Cadillac which is selling very well.

There is a change in buying habits, and I think there is an analogy that makes sense here. Up until 15 years ago the Kleenex was the national flower, so to speak. People thought nothing of rolling down the window and throwing the Kleenex out the window. Since then we have had an ethical change in our litterbugging. Our children say, "Don't do that." I think we are finding the same thing occurring in energy, that the very large conspicuously energy-inefficient automobiles are no longer status symbols.

55-MILE SPEED LIMIT

Mr. YATES. I think you are optimistic. If you drive the roads the majority of cars and trucks on that road are going over 55 miles an hour.

Mr. O'LEARY. In New Mexico, Mr. Chairman, that is true.

Mr. YATES. Only in New Mexico?

Mr. O'LEARY. No. It is now 10 miles an hour less than it was 3 years ago.

Mr. YATES. What do you mean by that?

Mr. O'LEARY. Now, the average speed on the highways in New Mexico is 58 miles an hour. It was just a shade under 70 prior to the reduction. Although people are not observing the 55-mile-an-hour speed limit, there are a lot of 50's and 65's in that, the 80's and 90's that characterized the mix that got you up to almost 70 has dropped off.

Mr. YATES. Mr. Duncan.

SMALL CARS VERSUS LARGE CARS

Mr. DUNCAN. I wanted to comment on two things that have been said. You anticipated one of them. One of them was Mr. Murtha's

comment that people aren't really convinced there is an energy crisis. You disputed it with respect to home heating. You did not in respect to the use of the automobile. You suggested that the weight is the prime factor. I dont' disagree with that. But I think that consumption is a factor of weight, speed, and distance. People are reluctant to go to the small automobiles as long as you have big, heavy ones on the highways because it is hard to argue with them on even terms.

Your mix is still going to pose problems with safety-minded people.

You have covered the weight problem, I think, which I think we ought to point out includes the use of lighter metals, perhaps aluminum blocks instead of cast iron, which means that the aluminum industry in spite of its high energy consumption in primary production is very important all the way along the line in saving energy. It does more than just make beer cans.

The final thing is this question of distance. I am convinced there are a lot of miles being traveled now that weren't being traveled at the time of the crunch. Nobody wants to go to rationing, but it is difficult to convince the citizen there is a crisis where in some areas there are gas wars going on. I am sure I suggested this last year, that one of the good things that came out of that energy crunch started in Oregon. That was a purely voluntary plan that gasoline would be made available on alternate days. If it was an odd day and your license plate ended in an odd number, that is when you could buy gas. I don't think it would be a hardship on anybody. Short of rationing, it would be a psychological reminder to the American people that even though the fuel is in the tanks we can not afford indefinitely to ship out $30 billion to $60 billion a year for imported oil. I say that to commend it, or something similar to that, as a purely psychological device to encourage conservation.

GASOLINE SHORTAGE

Mr. YATES. Isn't it more than a psychological device the way you explain it? What you are going to have to do is cut off imports and tell the people we only have this much oil to serve the country?

Mr. DUNCAN. It is short of a rationing program by a long way. You simply set up some rules. The gas stations enforced it.

Mr. YATES. But you had a shortage?

Mr. O'LEARY. We had a shortage then.

Mr. YATES. Therefore you had to do it. But what you are arguing for now is an artificially created shortage. By that I mean, you are going to stop importing as much oil as you have been.

Mr. DUNCAN. That to me is a desirable result. I think that is what we are trying to direct all of our efforts to.

Mr. YATES. I think we ought to let Mr. O'Leary respond to that.

Mr. O'LEARY. When you take a look at this transportation business, there are really two things you have to consider. One is the vehicle and the other is the driving habit. If you go to most people, you will find that they will say, "He does all sorts of excessive driving; I don't." There is a general feeling that essentially all of the driving that I do is in a good cause and a lot of the driving those other guys do is just wasting gas. So it really makes a very difficult problem to deal with.

We have had some experience with putting an arbitrary limit on imports under the oil import control program during the period prior

to 1972. The west coast imports were the difference between the available supply and the amount of oil that was required.

It turned out every time there was a miscalculation and you needed 100,000 barrels a day and things began to tighten up a little, the Government perforce provided the 100,000 barrels per day. The people took the view it is out there; there is no emergency now. From the standpoint of public acceptance, I think this discussion really goes to the heart of the matter. Up until this winter, most of the people in this country thought if there were an energy problem, it was really a conspiracy laid on them by the oil and gas companies. Since the winter, we have seen an awareness of the fundamental problem here. I think I can sum my view up in this way: If I was asked if there was one thing in the field of energy policy I could do, my answer would be to get a complete understanding on the part of the American people of where they stand on energy now.

Mr. DUNCAN. That is the basis of my suggestion. I would not impose import quotas at all. I am simply saying a device like this would raise the perception of the American people that there is a crisis in spite of the availability of the fuel at a price.

Mr. O'LEARY. Let me take you one more step into that. If the man who is affected by this, for example, the motel operator whose business falls off—you begin to get some secondary effects throughout the economy—comes before this committee and says, "Why are you singling out our industry? Why not those fellows with all the lights? Why not that industrialist down there who hasn't reformed his industrial plants?" You have some very difficult questions to answer.

Mr. DUNCAN. I am not suggesting that this be the exclusive energy savings program. We shut off our lights on a voluntary basis.

Mr. YATES. You haven't talked to him about recycling, about how Oregon led the field.

Mr. DUNCAN. We did. As a matter of fact, it is so difficult to come back here and throw a beer can or a milk bottle away.

Mr. O'LEARY. You are not throwing them out the window.

Mr. DUNCAN. The ethic develops just as you say with respect to the Kleenex. Everybody that leaves Oregon and goes elsewhere is appalled at the waste and the litter.

Mr. YATES. Mr. Murtha.

ECONOMIC IMPACT OF CONSERVATION

Mr. MURTHA. Isn't the real problem with conservation what you have just said, the counterproductive economic impact? For instance, if we make smaller cars, obviously it takes less material, it takes less labor, and you get into this whole involved economic problem of higher unemployment because you have smaller cars.

What about the idea—and I am sure we have tried this over and over and over again with all different kinds of methods—of more people in the cars. Three or four people riding in the cars would be as sensible as cutting down the size of the cars. Of course, if we are going to put a tax of $500 on a large car, and that person carries four people in the car, we are penalizing that individual.

Mr. O'LEARY. On the carpooling issue, there has been an enormous amount of publicity. My understanding is that the pre-emergency ratio

of people to automobile was 1.7 to 1 and the post-emergency ratio is 1.7 to 1. This is the point that I am making.

It seems to me that unless there is an enlightened public perception of the problem—and maybe Mr. Duncan's proposal is one way to get it—we are not going to see the voluntary measures that are necessary to deal with it.

May I give you a little excursion into the reasons why we really ought to get on with this conservation business?

Mr. YATES. Sure.

U.S. CONSERVATION POLICY

Mr. O'LEARY. It is really not an abstract proposition. If you were to back off and take a look at the United States from the perspective of the Moon and say what is the policy of the United States, you would come up with two conclusions. The first is that the old least-cost principle or at least the price principle that has guided us from the memory of man knows not whence, still prevails. We are still getting our energy at the lowest possible price. Our activities with regard to gas, with regard to the composite on oil, our efforts to get productivity increases in coal, our efforts to keep the whole machinery running, run to the lowest acquisition price that we can obtain.

The second principle of U.S. energy policy is to throw all of our incremental demand on OPEC. In natural gas, for example, many industrialists had to go off the line as the supply of natural gas in interstate commerce declined. According to our estimates, 86 percent went to oil. There was no constraint on it. They didn't have to get permission; they put in oil-burning equipment and away they went. That immediately required an increase in the barrels that had to be imported.

So that is the policy. That is all right as long as you have a big strategic stockpile and as long as you can continue to get that oil. But let me tell you what we have concluded, or at least what I have concluded, with regard to availability of that oil. Right now, this world of ours is running at close to 60 million barrels per day of production. That is going up according to the best numbers we can get, at about 5 percent per year. That was running at about 7 percent per year in annual increments up to the 1973–74 break point. The best estimate is it is running at about 5 percent. All of Europe's demands, all of West Europe's, all of Japans's all of the LDC's are really not going to coal—they are going to oil. That is how you get to that number. If you put that back it means you have to go up by 2–2½, and 3 million barrels a day annually in addition to what you are losing, and you lose about 6 percent.

OIL REQUIREMENTS AND PRODUCTION

Putting it in these terms, every year you have to find another Texas somewhere in the world. Texas is running at 3 million barrels a day. Every 3 years you have to find another United States. We are the second producer now to the Soviet Union, 9 million barrels a day. We have had this enormous amount of interest in the North Slope. You have to find another one of those every 9 months.

The North Sea will produce 4 million barrels at maturity. You have to find one of those every 15 months. We can continue to do that for another few years. The man who is most respected in this business,

Walter Levy, says we have about 5 years in which we can continue to do that. He is regarded as a pessimist. There are optimistic people who say you can do it for a long time, 15 years. Probably if you had to bet, you couldn't do it for more than 10.

It takes 10 years to do anything significant in the energy business. For example, we went all out for nuclear energy in 1947 and got to the point by 1970 where it was 1 percent of the energy mix. It took in that case, almost a quarter of century to get up to that point and that was under extraordinary circumstances. No environmental impact statements, no opposition by the public sector, very large amounts of Federal funds going in in the past 23 years, to get to be 1 percent.

When we begin to look at the amount of time it takes to change in any significant way the energy economy versus the amount of time we have, which is as a world, 10 years of probable petroleum growth, it really begins to pose a massive problem. That is why, not because we like austerity, but because we simply have a cognizance of where the world is going, we say we had better get onto this conservation program and get onto it real hard.

Mr. YATES. A barrel saved is equivalent to a barrel bought.

Mr. O'LEARY. Or maybe two.

ARMS SALES TO FINANCE OIL IMPORTS

Mr. DICKS. Going back to the economic question. There has been a big debate on the question of arms sales. Isn't this really the way we have been financing the additional imports of oil in this country? Now the Carter administration is going back——

Mr. YATES. And agriculture.

Mr. DICKS. In agriculture, absolutely right—and revising its strategy on that. Has anyone sat down between FEA and Treasury and tried to look at the economic impact of a much restricted arms sales program?

Mr. O'LEARY. There are, of course, people who specialize in this.

Mr. DICKS. Can you tell us anything about their results? It seems to me it has to be fairly devastating.

Mr. O'LEARY. My recollection of the numbers is that for Saudi Arabia arms sales were $2.5 billion for fiscal year 1976. The majority of this money was spent on such things as construction projects and training programs rather than actual hardware. They are a substantial but not a critical element in this. Let me describe how these flows work. The Saudis are not spending anywhere near the amount of cash they are generating. Further, the odds are if you look upon Saudi Arabia as a supplier of last resort, it has a capacity for expansion. It looks like over the next 3 to 4 years their revenues will double. They have an enormous problem laying off that cash. What they are doing now is making short-term bank entries in Great Britain and the United States to put it out. I don't know if you went into the nefarious game I did as a child, playing Monopoly. We would get into a situation where somebody had Boardwalk and Atlantic City and would knock everybody out of the game unless he kept passing money back under the table. I think you have to understand that what is happening now through the extension of credits is that we are playing a vast game of Monopoly with enormous amounts of money. In order to survive this,

they are coming back under the table. The Saudis realize this. The shipping space at the docks is completely loaded. Their Cadillacs and Mercedes are there, as well as their refrigerators and industrial equipment. You can't get a ship into their ports.

Mr. YATES. It takes 3 weeks to unload.

INFLATIONARY ASPECTS OF OIL

Mr. O'LEARY. Quite right. So we have come to the point—that has been broached once or twice before in history. Once there was a gold-inspired inflation in the early 1500's in Spain; and the Swedish had so much money during World War I they had a gold-inspired inflation. We are coming to another currency inflation of epidemic proportions, probably with no historical parallel, as a result of this absolute tilt in the historical relationship of oil to other goods.

I don't think that denial of arms sales is going to change this, largely because you do have the outlet of simply cycling the cash around. Right now, there is no disruption on the part of the receiving companies, those that can absorb it. There are a group called the haves and a group called the have-nots. Iran is the leading have-not. They are able to spend with more efficiency everything they receive. The Saudis and the United Arab Emirates are the classic examples of the haves. They are not by any means able to effectively use those vast sums that are coming in, $17 billion last year. Consequently, they are finding all sorts of devices for laying off the money in short-term arrangements here. They are not buying property. They can't buy goods at an adequate rate. They can't buy arms. It just confronts them with an enormous, although a very comforting type of problem.

Mr. YATES. You say the revenues are going to double?

OIL SUPPLIES

Mr. O'LEARY. If the Saudis continue to be the provider of last resort, revenues will double. Mr. Chairman, one of the grim elements of this equation that I have just sketched for you is, it isn't evenly divided. We won't get 10 percent from Iran next year or 5 percent. As a matter of fact, we might get a decrease. Venezuela just indicated they were cutting back their production.

Mr. YATES. None of them are cutting back price?

Mr. O'LEARY. No. You recall the Saudis did not follow the general OPEC price the last time around, but they are not cutting; they just didn't advance it as rapidly. But if you look upon Saudi Arabia and the United Arab Emirates as the suppliers who have the capacity and the rest of the world as not having that capacity—and that is a fair way to look at it now—the next two turns of the wheel are going to be supplied by the Saudis and the supply is probably going to be higher; consequently this cash flow problem moves from very large to monstrous.

Mr. YATES. What happens if the price goes up? What do we do, buy it?

Mr. O'LEARY. Mr. Chairman, it is probably fair to say under the conditions that I have sketched for you, what we will see is a bidding

between the people who have to have oil. The Western Europeans will get a little relief from the North Sea, the Japanese will be very much in the market, and the LDC's on borrowed money will have to meet the price. I suspect the price will go up from the current world price of $12.50 to $13 to somewhere in the range of $20 to $25 over the next 7 or 8 years.

People look at me when I say that sort of thing, and say "You are out of your mind." I remind them, however, that in the summer of 1973, I was speaking around the world in France and in Japan and suggesting that the discipline that was then on the world market, which is to say the very substantial shut-in capacity in the United States, had disappeared and within the next year or two Europe and Japan could be looking forward to an increase from about $2 a barrel to something in the range of $7 per barrel.

They said: "You just don't understand the problem." I was wrong. It didn't go to $7. It went to $10.

MOVEMENT TO COAL

Dr. DICKS. In light of that, what troubles me after hearings here and in the Public Works Committee, is why we aren't doing something in coal utilization where we have not been able to clear away the problems, and getting with it?

Mr. YATES. Cutting back the imports?

Mr. DICKS. Exactly.

There doesn't seem to be a policy to move in that direction.

Mr. O'LEARY. You will see on April 20th that the first pivot will be switching to coal.

Mr. DICKS. How are you going to do it? Are you going to waive environmental considerations?

Mr. O'LEARY. You really don't have to.

Mr. DICKS. If we didn't have to, why haven't we done it before?

ENVIRONMENTAL STANDARDS FOR COAL

Mr. O'LEARY. Not because of the environmental standard of today, but because of your concern over the environmental standard of tomorrow. The utility industry has been caught in an extremely complicated situation, that I would be delighted to go into in some detail if you would like to hear where they stand.

Mr. YATES. Sure, we want the whole picture.

Mr. O'LEARY. Let's ask ourselves what is happening today to the utility industry, and why they are not burning more coal. You have to start with this sort of thesis. About two-thirds of the burn of the utility industry in this country is coal. It is a very large user. It is not now ordering new coal plants. The utility burn of coal has been going up moderately, but it has been offset by reductions in other sectors and, of course, the household sector went to pieces in the late 1940's.

The transportation sector, which was a very big market for coal, was completely replaced by dieselization of the railroads between 1945 and 1952 roughly. We have a situation then where coal has been compacted tighter and tighter into the utility industry, and we have a further

situation where the utility industry is not ordering plants to burn coal today. The reasons for that are fairly complicated, but I think it is very important you understand them.

The first reason is their load projections have turned out to be thoroughly wrong. You are dealing in a 6- to 10-year leadtime world in the utility industry and in 1974 Pepco, for example, found itself, on the basis of decisions made back in the mid-sixties, with 48 percent reserves. They like to carry 20. It was an embarrassment of riches.

When they found themselves in that reserve position they said, what what does the future hold? Is there a steep change now in the demand function for electrical energy?

Mr. EVANS. What do you mean by reserves; of coal?

Mr. O'LEARY. No; of capacity to generate energy.

Mr. DUNCAN. What year was that?

Mr. O'LEARY. 1974 and 1975. They like to carry about 20 percent because that reduces from their standpoint the opportunity for this light to go out as a result of a generating failure to a reasonable minimum.

Mr. DUNCAN. That was the year of the oil crunch?

Mr. O'LEARY. Yes. Two things happened. The decision that had been made in 1964, vesting the new generating capacity, and load growth, went to pieces. In the case of Pepco, for example, instead of having their normal 7 to 8 percent rate of load growth, they had a 3 percent increment, and a lot of utilities around the country didn't gain a bit. The first thing that happened was the old standby.

Let me tell you that the projection department of the average utility in the year 1965 was a fellow back in the back office who 15 minutes a year took a slide rule and said another 7 percent, and they went back.

UTILITY PICTURE IN THE NORTHWEST

Mr. DICKS. But that isn't true nationally. Mr. Duncan and I are from the Pacific Northwest and our utilities don't have any reserves. We are looking at serious shortages over the next 10 years.

Mr. O'LEARY. Your utilities in 1974 had very serious overages, and you are looking at shortages in today's market as a result of aberrations of the weather last winter.

Mr. DICKS. The projections 10 years down the road by the Bonneville Power Administration is that we are going to have shortages every single year for 10 years in firm power.

Mr. O'LEARY. I think that is fair, because your part of the country has historically been able to rely upon low-cost hydro. It is going through a shaky change trying to find a successor to hydro.

Mr. DUNCAN. It is called a drought.

NATIONAL UTILITY PICTURE

Mr. O'LEARY. Nationally, however, the picture that I have painted for you is directionally about right.

Mr. DUNCAN. Weren't those straight line projections remarkably accurate in those years?

Mr. O'LEARY. They were good enough, and the interesting point that you want to speculate on is who was pushing who, the load growth pushing the generating capacity or the generating capacity pushing

the load growth? This is one of those things you can't really sort out easily.

Mr. YATES. I think we ought to let him finish.

Mr. O'LEARY. The first thing that entered into this equation in 1974 was vast uncertainty with regard to the old rules. The second, coincident with the first situation, was an enormous runup in costs. The old regulatory lag worked well for the utility industry at the end of the war when real costs were dropping, as we went up from about 15-percent efficiency for a new plant in 1945 to 38-percent efficiency for a new plant in 1970, and got the real cost savings along with it. However, those old regulatory lags began to bite the utilities and they got into a cash-flow bind.

Right now, most utilities in the country don't want to spend a dime. They just don't want to.

Mr. YATES. For what?

Mr. O'LEARY. For anything. For example, under our coal conversion program we are trying to get a whole series of utilities that have the capacity to burn coal and are now burning primarily oil, to switch back to coal. This can be accomplished at a saving to them in their fuel costs, although they will have to make some front-end investment to capture the saving. Now, they flow through their regulatory mechanismsm the higher costs for oil. They don't have a big rate fight on their hands. If they go in and get a rate change in order to make the capital investment for the scrubbers, or for whatever changes are required, it means confronting their public service commission on a rate change. There are people now running for public service commissioner on the platform that they will not approve rate increases. That is an additional element in the problem.

An associated element is the fact that many of these utilities have a stock market value that is below their book value. Any time they make a substantial new capital addition it means some equity match with the borrowed money. In order to get the equity, they put out a stock offering that will generally go below book, so they are in the position of watering their stock and they don't want to do it.

So we have then, the situation where instead of the usual drive for the utility sector, which is to invest as much as you can because you make your money in your investment, not on your sales, they now don't want to invest anything they can avoid. There are some exceptions, but generally this is an accurate reflection.

Mr. YATES. I didn't understand one point. I was under the impression that you told the committee that the book value of utilities assets exceeded their equities.

Mr. O'LEARY. No. I am sorry. Their common is selling below book equivalent in many instances now. The result is that if they make an additional common or preferred issue, they are watering their stock.

Mr. YATES. And have trouble with the SEC?

Mr. O'LEARY. Of course.

Mr. DICKS. And their stockholders.

Mr. O'LEARY. That is the principal element.

In addition to that, Mr. Chairman, there are some vast uncertainties concerning next year's rules with regard to air and water quality and with regard to the terms of access to strip mining.

UTILITY INVESTMENT

Mr. YATES. Before I yield to Mr. Dicks on this, is this true of all utilities?

Mr. O'LEARY. No. There are some utilities that are——

Mr. YATES. You mean a small percentage?

Mr. O'LEARY. A small percentage. Right now, Mr. Chairman, we hear a lot of publicity about the cancellations in the nuclear sector. Last year there were 40. Also last year, 100 coal-burning plants were deferred. You dont' hear much about that. This is across the country. There are some rapidly growing utilities that are investing; Colorado Public Service is one.

Mr. YATES. May I be the traditional Congressman? I shake my head and say, "What are you doing about it?"

Mr. O'LEARY. Understanding it, for starters.

Mr. YATES. Where are you going then?

ENERGY INITIATIVES

Mr. O'LEARY. I think that takes you into what is going to be, as I pointed out earlier, a key element of the April 20 message. We are going to have to go to coal. In consequence, we have to begin to stabilize the environmental regime in ways that will permit people to plan ahead and to stabilize in terms of access to strip mining, among other things. I think there are some very useful initiatives that can be made in mining technology that will be helpful. We are going to have to get that coal. We better get it in ways that do the least damage socially and environmentally over time.

This may require a whole series of initiatives. You are familiar, I am sure, with the ESECA program now administered by FEA, under, first, the ESECA legislation and then EPCA. In that program, the ordering authority terminates on June 30 of this year. However, the remnants of the program will continue for another 4 years. This is the one that permits us to order a utility with a conversion capacity for coal burning to go back to coal. Thus far, after 3 years of experience with that program—and this is one of the reasons I observed earlier we are having a little difficulty with our program—we have not been able to effect a single switch.

Mr. YATES. Mr. Dicks.

Mr. DICKS. This same kind of economic dilemma faces you with conservation.

Mr. O'LEARY. Precisely.

Mr. DICKS. Again, the utilities where fuel may be 3 percent of their costs, if you ask them to insulate, which is going to cut their revenues by 10 percent, you are left with a 7 percent shortfall. So there is no incentive for them to do anything about conservation. Isn't that exactly the same dilemma you are in?

Mr. O'LEARY. I think that is right. It takes money to make money in this area, and people are very reluctant to put up the front-end investment.

Let me tell you of a pet peeve. I don't like the word "conservation." I would much prefer to talk about this in terms of energy efficiency and always with economics behind you, some understanding of what the costs-to-savings relationships are.

THE RELATIONSHIP OF ENERGY TO THE ECONOMY

If I may make a large excursion, this economy has optimized low-cost energy. After the war, we made a very conscious decision, beginning in the 1930's, and including REA, TVA, the whole antitrust regime that was pursued by the Department of Justice against the utilities during that period of time, the depletion allowance, the Natural Gas Act, and the Federal Power Act, to keep our power costs low.

As a result of that, when a businessman walked up to the bottom line he would say, "I want to put in very little in the way of energy-saving capital investment because it doesn't pay me to do it with two-buck oil or three-buck oil."

Europe, on the other hand, had a high-cost coal industry, and after the war they set out to protect that by a very large tax and heavy oil, which was, of course, the base point for industry in that economy. Their price for energy was roughly triple the U.S. price all during the forties, fifties, and sixties. The consequence was that Europe optimized to much more capital intensivity in its industrial process than we have, and, of course, much less energy.

The metallurgical industry in Europe, for example, is about 75 percent as intensive as the metallurgical industry here. Why is that? Because they are smarter than we are? No. Much of that technology was developed. Much of the plant was developed here. It was because they had high-cost energy and we had low-cost energy.

Mr. YATES. The thought occurs to me that FEA has been in business for several years. Why haven't they done something about this?

HISTORICAL VIEW OF FEDERAL ENERGY ADMINISTRATION ACTION

Mr. O'LEARY. I think, first of all, the organization took the view that it wasn't going to be in business very long. It probably thought that the principal business that it should be engaged in was trying to do something to obtain additional supplies of oil and gas and cure it that way.

The first 3 years of its activities were predicated upon incentives, supply incentives, price incentives, and what-have-you, in order to get more supplies to the country.

I think that there is now a good body of evidence that would indicate that that policy was founded in error. I don't think we will find massive additional supplies of oil and gas, and I would like to supply you with background about that, if I may, as long as we are trying to get a complete picture of the energy situation.

Mr. YATES. This is the kind of background we need.

CONSERVATION AS AN ANSWER TO THE ENERGY PROBLEM

Mr. MCDADE. In that connection, your conversations about the impact of where the world is going with respect to energy usage and that very fact leading you toward a very heavy emphasis on conservation leads me to ask, doesn't that just buy time? In other words, doesn't that just get us over a few humps and not begin to solve the problem, as essential as I think it is?

Mr. O'LEARY. Mr. Chairman, in response to that question, let me give you a horrible number. If each of us living in this country today were to have our share of the nonrenewable energy sources at the renewable rate, and you know we are building coalfields such as the Galveston Bay field, we will get 4 pounds per person, per lifetime, of coal equivalent for the oil and gas and what-have-you that is around. Any time you exceed that rate, and, of course, in a reasonable world, consumption will exceed that rate, you are really saying that we are going to grab it off now and leave posterity to suffer, the classical statement being what did posterity ever do for us?

THE THEORY OF HUBBARD'S PIMPLE

This has been assimilated into a theory by King Hubbard that has come to be known as Hubbard's pimple. He takes mankind along on a straight line increase, and this is the area of fossil fuel use, and this is per capita income.

Probably in today's terms, it is about the equivalent of $150 a year if we did not have an energy incentive society versus the $6,000 per year per capita, we enjoy in the society as a result of our insensitive use of energy.

It is true that what you are doing is borrowing time. The conservation measures do more than that. They extend, and moderately in terms of Hubbard's view of the world, 100 years, 50 years, 25 years, a little time for us to get to solar energy or to fusion if that is our destiny.

SOLAR ENERGY TIME FRAME

My view is we will go to solar energy in all likelihood. We need 50 years to do that.

Mr. YATES. Fifty years for solar?

Mr. O'LEARY. Twenty-five years to get 1 percent of nuclear.

MONEY SPENT ON NUCLEAR DEVELOPMENT

Mr. MCDADE. How much did we spend during that time? That was a very instructive lesson for me about the amount of time and the lack of public confrontation and general acceptance that we were going to go nuclear.

What did we spend, by the way, in terms of appropriated dollars?

Mr. O'LEARY. The appropriated dollars behind the light water reactor were about $2 billion, essentially in 1950–55 dollars. What would that be now, $10 billion equivalent, or something like that?

Mr. MCDADE. What about the private side? Do we have any idea?

Mr. O'LEARY. The private side has spent an enormous amount of money.

FUTURE OF NUCLEAR DEVELOPMENT

Mr. MCDADE. Is it correct to say that in your view we are moving away from the atomic side now, that we have looked at it and said that is just not a way we can go?

Mr. O'LEARY. No; I don't think so. I think it is fair to say that during the onrush, the period that followed Eisenhower's announce-

ment to the world in 1953 that we were going to beat that particular sword into a plowshare, a lot of problems were swept under the rug. There was an almost evangelical fervor on the part of the Atomic Energy Commission and the Joint Committee during that period of time.

Mr. YATES. And still is.

Mr. O'LEARY. The Joint Committee, of course—it is noteworthy that both these organizations have disappeared.

Mr. YATES. May their souls rest in peace.

Mr. O'LEARY. I can recall the unwillingness of the Commission that I served with to listen to bad news. I would say, "We have a proliferation problem." "Don't worry about it. It will be all right." Now it drives the problem. So I think there are some things that have to be straightened out.

But fundamentally, Mr. Chairman, nuclear energy is going to be a mainstay of getting from now to that period where we get into the renewables.

FUTURE NUCLEAR INVESTMENT

Mr. YATES. If that is true, how much do you want to invest in it?

Mr. O'LEARY. So far as safety and proliferation aspects are concerned, it is worth a continued investment along the general lines we are doing now. With regard to the breeder, that is a deferrable proposition.

Mr. YATES. It has been deferred.

Mr. O'LEARY. That is a deferable proposition. With regard to the safety aspect of the light water reactor, we should continue to pursue that research aggressively.

NUCLEAR WASTE DISPOSAL

Mr. YATES. Where are you going to put the waste?

Mr. O'LEARY. The waste, Mr. Chairman, is a management failure, the sorry situation that we find ourselves in in waste today. As I referred to earlier, I have just returned from a year and a half as the Energy Resouce Board Administrator for the State of New Mexico, and one of the prime candidates for waste disposal is in the Carlsbad area. We assembled a group of people with no axe to grind, known as the welcoming committee, headed by Dr. Marvin Wilkoning—the spelling isn't quite as it sounds—in order to track activity with regard to that potential depository. We had a series of geologists and ecologists, who on behalf of the Governor took a careful look at it and found that so long as the geology stands up to our original expectations, it will be a perfectly acceptable place to get rid of high-level waste.

I think the unwillingness of the system to confront this problem—and here again, a little history is appropriate, Mr. Chairman. The Atomic Energy Commission did march up the hill of waste disposal in Lyons, Kans., in the late sixties and early seventies, and about the time they decided to go ahead and dispose, it turned out that the salt in which they going to dispose had been the site of a lot of drilling in the early 1900's. The holes were lost, they weren't mapped, and

there was a thought that there was the possibility of getting water into that structure and starting a leaching reaction and aborting the vault.

The response of the Atomic Energy Commission was to withdraw in some disarray from the whole idea of permanent disposal. At that point, the people who were convinced that nuclear wouldn't work anyway, said, "See, I told you so; you can't do it."

I think that is wrong. This is a solvable problem and the Carlsbad repository, if, as I say, the geology works out, will be acceptable. If not, there are a number of other acceptable solutions to the problem.

Mr. YATES. GS hasn't found Carlsbad caverns acceptable yet, or any other——

Mr. O'LEARY. These aren't caverns.

Mr. YATES. The salt dome.

Mr. O'LEARY. It is a bedded salt structure, not a dome.

Mr. YATES. As soon as you get GS approval of that, I will agree to it. We haven't been able to get it yet.

Mr. DICKS. Let me ask one further question on the nuclear issue. There was a story in the Washington Post the other morning about a different strategy on the proliferation issue; instead of getting plutonium into a single state, you would merge it with some uranium which would take it out of the weapons grade prospect, and you have to do this with uranium 235, I guess.

What do you think of that strategy?

URANIUM ENRICHMENT

Mr. O'LEARY. I read that article and I couldn't understand it. It didn't really relate to anything——

Mr. DICKS. I have heard from some people who are in the nuclear field that when plutonium is in a pure state, it is weapons grade material, and I guess when you go through the reprocessing, you separate the plutonium from the uranium and other materials, and instead of coming through that process with pure plutonium or uranium, you allow them to mix which takes the plutonium out of the weapons grade quality.

Mr. O'LEARY. The weakness in that, Mr. Chairman, is that plutonium and uranium are sufficiently far apart on the periodic table so that they can be chemically separated without elaborate apparatus. The charm of U–235 versus U–238 is that they are very, very closely related on the periodic table. You can only separate them as far as we know with gaseous diffusion plants such as are used in this country, or centrifugence such as is used abroad. Both would require investments. So the bad part about the plutonium, the mixed oxide fuel economy is that you can effect a chemical separation. You don't have to go to the isotope separation that you do in order to get to the fissionable isotope of uranium up to the point where it can go into bombs.

NUCLEAR POLICY WITH REGARD TO OTHER COUNTRIES

Mr. DICKS. Let's go to another point on that same question. Aren't the French and the Russians and others developing the breeder? Isn't there still going to be a possibility in the world community for the pro-

liferation issue to be a problem? We are not going to be able to dictate to the rest of the world what the policy should be. It seems to me it is more difficult for us to play in the game unless we are part of it. How do you handle that?

Mr. O'LEARY. Indeed, you don't require the breeder; all you require are the military programs that are being conducted not only abroad, but right here in the United States. We have a plutonium separation capability, and there is a great deal of plutonium fitting in the economy and a great deal of highly enriched uranium, which, from the strategic standpoint, has the same capability around this economy.

NUCLEAR SAFEGUARDS

It is a question of how far and how fast the targets expand. And I think that probably the world would be well served if they would get their safeguards house in order, and it is not in order now, before moving into this very complicated, risky, mixed oxide fuel economy.

Mr. YATES. What do you mean by that?

Mr. O'LEARY. Four years ago, when last I was closely associated with this, there were about 500 movements of trigger quantities of special nuclear material; that is a euphemism for bomb grade plutonium or highly enriched uranium around this economy. Had, at that point in time, a third party wished to obtain access to one of those movements, he would have simply gone to a motel where the representative of Tristate Trucking was spending the night prior to a pickup, tie the fellow up, get his card, present the card at the loading dock at the facility in question the next morning, no guns, no checks beyond that, and drive off with enough stuff to make a bomb.

Since then, as a result of publicity given to precisely this point, there has been a massive tightening up of that system. We are now beginning to treat special nuclear material in much the same way we treat a weapon.

But what I am describing to you is a phenomenon where 3 years ago, not only in the United States but abroad, the safeguards system, and that is a term of art, as you know, Mr. Chairman, surrounding special nuclear material before it was incorporated into a bomb, was very, very lax, indeed. And it continues to be something less than perfect today.

Some of that is due purely to the technology. A lot of our safeguard efforts, for example, are in statistical checks at processing plants. The limits of error on those statistical checks are such that over the life of a plant, you might lose thousands of pounds of material from the accounting system. That is regarded as normal. You have no assurance that there hasn't been some slight amount of pilferage that accounts for only a tiny percentage of the forecast lost with today's accounting systems at a processing center.

There are real time-processing innovations that are coming down that will not eliminate but severely reduce that kind of risk of diversion. At the moment, we have, largely because the whole institution was unwilling to seriously address these problems behind the light-water reactor, the problems of disposal, the problems of reprocessing, and the problems associated with the breeder.

INABILITY TO HANDLE NUCLEAR PROBLEMS

Going into the plutonium economy, we really don't have the structure to handle these either here or abroad acceptably. I think many countries are just beginning to understand these problems. The Japanese are finding that their once very favorable public view toward nuclear energy deserves some questioning. Europe has run the same course. There have been efforts at outright bans in Scandinavia, and the British have looked at this—and realized the serious problems associated with this technology. I think we have a great deal of work that was not done in the sixties and early seventies that should be done before we proceed further with mixed oxide in this economy.

Mr. DUNCAN. What does that mean?

Mr. O'LEARY. Plutonium and uranium.

Mr. DUNCAN. The two together?

FISSIONABLE MATERIAL

Mr. O'LEARY. Yes; precisely the point Mr. Dicks was making earlier. The fissionable material in a light-water reactor, before you go into reprocessing, or the breeder is the very, very minor constituent in natural uranium called U^{235}. In nature, you find that about 99.3 percent of the uranium in a deposit is U^{238}, and 0.7 percent is U^{235}, the fiissionable material.

In order to get a reaction going, you have to take that 0.7 percent and get it up to about 3 percent. In order to get a bomb, you have to go way above that. But for a reactor, you have to enrich from 0.7 to 3 percent, and that is done through a very, very complex costly process of isotope separation. When you go into the reprocessing, you would be producing plutonium. Incidentally, plutonium comes out this way. You have U^{238}—that is the gross material that has been regarded not as fissionable but as fertile. You hit it with a neutron and it instantaneously becomes U^{239}, which decays into Pu^{239}. That is a stable isotope. The mixed oxides come when you combine Pu^{239} fissionable elements with U^{235} or U^{233}, another fissionable element, into a fuel rod.

UNITED STATES ENERGY POSITION IN THE WORLD

Mr. YATES. Let's consider now where we stand in the world. Are we alone in our relationship with OPEC? What is the European community doing? What are the less developed countries doing? What is Japan doing? What is the picture?

Mr. O'LEARY. Mr. Chairman, we are not alone because we do have a lot of indigenous oil and gas, and a very substantial coal and uranium potential in this country. We are in better shape than most other parts of the world, except the Soviet bloc and China, if you look at where the world's populations are located. The Soviet bloc is in good shape because the Soviet Union, particularly Siberia, has turned out to be a prolific area with respect to hydrocarbons, enormous reserves of natural gas, and very large reserves of oil..

Mr. YATES. As much as Saudi Arabia?

Mr. O'LEARY. The indications are that there is as much or more. However, there is a much larger population against which to play it off. There are very, very large reserves and for some little time to come, assuming they can get the technology. Although their technology is not up to our standard, the other resources that are associated with their technology will allow the Soviets to be more than self-sufficient. They are on an export basis now. They are producing a little more than we are. The Soviets, Saudi, and United States are the three premium producers, around 10 million barrels a day. China is producing at 1 to 1½ million barrels a day. China is meeting its own requirements, and it appears to be capable of meeting its own needs for some time to come.

When you get out of that area and go over to Western Europe, you find it is running at 7 to 8 million barrels a day and increasing rapidly. It will depend heavily on the North Sea oil that will be coming in, which appears to be capable by the mid-1980's of taking perhaps half of today's load off of the imports. Virtually all European oil is imported today.

URANIUM SUPPLIES

Mr. DUNCAN. Did you say we had plentiful supplies of uranium in conjunction with coal?

Mr. O'LEARY. Yes, we have substantial supplies.

Mr. DUNCAN. I thought that was the reason we were going toward plutonium because there are limited supplies of uranium in the world.

Mr. O'LEARY. The U.S. resource of uranium is little understood, and therefore what I will be saying to you is largely speculative. The appearnce is that we will have sufficient uranium, on the basis of what we are sure about the resource now, to carry about 600 reactors through their useful life.

Mr. DICKS. We have 60 now?

Mr. O'LEARY. We have 60 at the moment, another 70 building, and roughly another 100 ordered.

Mr. DICKS. You say that is speculative, and I understand there is the optimist and there is the pessimist and the range here is rather substantial. How can we base an energy policy on guesstimates?

Mr. O'LEARY. We don't have to because the odds are that we are not going to be above 400 reactors. I think there is no question, even among the pessimists, that there is enough uranium to carry those through to the year 2000.

Mr. DUNCAN. What is the useful life?

Mr. O'LEARY. Thirty years.

Mr. YATES. What is the cost going to be, and what is Westinghouse going to do?

Mr. O'LEARY. Let's not address Westinghouse, but we can address price.

Mr. YATES. Isn't that part of Westinghouse's problem?

THE COST OF URANIUM

Mr. O'LEARY. It was, indeed, Mr. Chairman. The price of uranium in 1973 was $6.75 a pound. Today it is $42 a pound. For delivery in the early 1980's, it will be up to $61 or $62 a pound, and there are some forward transactions in the high sixties, I understand.

LOCATION OF U.S. URANIUM

Mr. YATES. Do we have uranium on public lands?

Mr. O'LEARY. There is a great deal of uranium on public lands in the West. Most of it in the States I am aware of is on Indian lands.

You will be interested, Mr. Chairman, to hear that uranium is not a leasable. It is handled as gold would be under the Mining Act of 1872. People go out and stake a claim. If you look at the public land States, Wyoming, Colorado, and New Mexico, where the bulk of our uranium appears to be, you will find that it is staked to a degree you wouldn t believe.

U.S. RELATIONSHIP WITH OTHER COUNTRIES VIS-A-VIS OPEC

Mr. YATES. Again, I don't think you answered my question with respect to our relationship with Japan, with the European countries, with the less-developed countries, vis-a-vis OPEC.

Mr. O'LEARY. They are very sensitive to OPEC, to their relationship to OPEC. That is why the Japanese and Western Europeans are so strongly committed to nuclear reform. They feel that it is fair to rely on OPEC for a major source of their energy, but they should not be totally reliant. The only option that appears viable from the standpoint of Japan and Western Europe is the nuclear option.

Mr. YATES. That isn't quite what I was getting to. There was a while when Mr. Kissinger reported that he had an agreement for cooperation between the countries on what we are going to do in our relationship to the OPEC nations. Is that initiative still alive?

Mr. O'LEARY. Indeed, Mr. Chairman, there has been established, under Mr. Kissinger's plotting, an organization called the International Energy Agency, associated with the OECD in Paris. It has membership from all of the importing countries. They have made certain arrangements with regard to supply sharing during periods of emergency.

INTERNATIONAL ENERGY AGENCY

Mr. YATES. What is it doing, and what can it do?

Mr. O'LEARY. It has numerous meetings; it sponsors research——

Mr. YATES. Research into what?

Mr. O'LEARY. Among other things, into coal conversion. It does a lot of planning. In the event that there should be a massive interdiction of supply, how to handle it, and other plans in that area. Those are the things with which it is primarily occupied now. It is trying to make inputs into the development of a European energy policy, as well.

Mr. YATES. Does FEA have a representative to that?

Mr. O'LEARY. Indeed, we participate with them extensively.

Mr. YATES. All right. Are there other questions on the background material? Is there anything else you want to discuss before we move on? You have been helpful, and I think the picture you have given us——

NEW SUPPLIES OF OIL AND GAS

Mr. O'LEARY. There is one point, Mr. Chairman. We had talked a little about the outlook for finding new massive supplies of oil and gas in the United States. I think the committee should have a clear

perspective on that. We may indeed find very large new supplies of oil and gas here.

However, there are a couple of points of reference we should think about. Roughly three-fourths of the oil that we have in this country now comes from fields that are classified as giants. These are east Texas, for example, and Prudhoe Bay. Despite a lot of drilling in the last 30 years, we have found one giant in this country, and that is Prudhoe Bay. We found a slew of giants back in the twenties and thirties. They led to our current potential capacity for producing large volumes of oil.

I think we should bear in mind that we have looked over this country pretty well. The odds of finding a lot more of these, some maybe, but a lot more onshore, are very low.

Consequently, when you think of the enormous role that they play in our current capacity for producing oil, and think there will be none or very few of them coming on, it suggests to me that, regardless of the level of drilling activity in the now explored areas of the United States, we are not going to turn the corner. At least we had better not bank on it.

OFFSHORE DRILLING

With regard to the Outer Continental Shelves, we should have access to those, but here is another data point worth noting. The USGS took some very optimistic views of the potential off-shore of the Atlantic That number, 3 years ago, was thought be 30 to 60 billion barrels. In perspective, the total reserve in the continental United States is 33 billion barrels. The new number from USGS is zero to six.

Mr. YATES. Zero to six billion?

Mr. O'LEARY. Yes; down from 30 to 60. Nobody has drilled out there. When you begin to reasonably analyze, taking a look at known areas that are comparable geologically to the areas off shore of the Atlantic, they have radically reduced their prospects.

Mr. MCDADE. Isn't that a reaction? Aren't we doing this consistently? We used to find ourselves in a time of plenty and people used to speculate and say there is plenty of fossil fuel everywhere. Now we are on the short side and every scientist is scared to say that 30 billion is out there. I am not going to put my professional reputation on it, because you don't know until you have the well drilled and the parameter of the field discovered, and since you don't know that, why should you speculate.

Haven't we retrenched from the standpoint of what the scientific community is doing in that regard?

OIL FORECASTS

Mr. O'LEARY. Mr. Chairman, a little history here is appropriate. Back in 1910, the Geological Survey forecast—these dates are not precise, but they are representative of history—that we would be out of oil by 1915. In 1915, they projected we would be out of oil by about 1920. In 1920, they said we would be out of oil by 1925. Somewhere around that time, they said, "Boy, we aren't going to make that mistake again." They then began to make high estimates in a time when it didn't make any difference.

ZAPP HYPOTHESIS

I would like to explain to you the basis for those estimates. It is known as the Zapp hypothesis after a gentleman who for many years was with the Geological Survey by the name of Zapp. He took this view, which was the official view of the Geological Survey up to 2 years ago this month, that if you explored a cubic mile of rock, found x in the way of oil, and went on a random basis to the next cubic mile of rock, you would find x or no less than 0.5 x.

Now that was the contention of the Survey. The hypothesis was based on an unstated predicate that the first x of drilling was random. The first x, in reality, was based on a slick or a show, or visible structure and was not random.

To take you down to the ridiculous point of this, if the first x had been in the Middle East, think of the projections that would have come out of that. The first x was like the Middle East. It was during the age of giants. Hubbard, the same pimple guy, in the same Geological Survey, took a different, still simplistic, hypothesis, and said,

> Now, if in your first 100 million linear feet of drilling, or 10 million, you find this, and in your next you find this, and in your next 100 million feet you find this, you are getting into a decline curve.

Hubbard, then in the mid-1950's projected almost with precision what has happened through the mid-1970, the declining function.

That clearly ignored technology and the new technique that has come into vogue now is a technique that has really not the degree of conservatism that Congressman McDade contributes to it. It is simply saying let's not look at x as being random, but being this kind of rock, with this kind of history, and go over and take a look at an analogous rock with the same sort of history and figure what we can get out of it. That is how they are making these more refined estimates that I just referred to.

PROSPECTS OF FUTURE OIL DISCOVERIES

The point of all this, Mr. Chairman, is to say that our prospects are not all that bright. We should by all means go to the Outer Continental Shelves and drill. We should do whatever is necessary to reform the Outer Continental Shelves Land Act and drill, and Alaska and drill, but to bank, as there has been a tendency to do, that simple price increases are going to turn the corner is bad policy.

Mr. YATES. What are you going to do about imports? Are we going to continue to increase imports?

FUTURE ENERGY ACTION

Mr. O'LEARY. We are going to have to conserve. We are going to have to go to coal and find whatever there is to be found in conventional oil and gas.

Mr. YATES. You said that after the last embargo.

Mr. O'LEARY. We didn't do any followthrough.

Mr. YATES. Are you following through now?

Mr. O'LEARY. Hopefully the April 20 message will convince you of a will to follow through.

Mr. MURTHA. Could I ask a question?

Mr. YATES. You may indeed in just a second.

What is there so miraculous about the April 20 message that we have to wait for it to come off the mount?

APRIL 20 MESSAGE

Mr. O'LEARY. Mr. Chairman, I think that it is in the form of an affirmative statement of policy in an area where at the moment the administration has not affirmatively stated its policy. From that will grow a series of legislative proposals that will come before you, in the areas of conservation and fuel switching.

Mr. YATES. In the meantime, we hold everything in abeyance.

Mr. O'LEARY. No; in the meantime, we proceed with the tools at hand. We don't weatherize, we don't convert, we don't get to the Outer Continental Shelves. We kind of stumble along; wallow may be the better word.

Mr. MURTHA. You seem to say deregulation is the answer, and you just said that price certainly doesn't solve our problems. Isn't that what you were saying?

PRICING

Mr. O'LEARY. Price helps, of course. You get more at two bucks than at a buck. As far as turning the corner on the basis of price, which I think is fair to say was the predicate of some of my predecessors, I don't believe it. We have had one massive experiment with decontrol in this country. In Texas, gas has been a decontrolled market for all intents and purposes for the last 7 years. As you look over the contrast between 1971 and 1976, you find these things, Mr. Chairman.

Drilling has doubled, the rig rate has doubled, the number of rigs that are in the State has doubled, completions have doubled, but production is off 20 percent. I think there is a message for all of us in those data.

Mr. EVANS. Spell that message out a little more clearly.

OIL PRODUCTION IN TEXAS

Mr. O'LEARY. You have all the indicia of finding production up except finding production. That is down.

Mr. YATES. Why?

Mr. O'LEARY. Because there isn't that much left to find.

Mr. DUNCAN. In Texas.

Mr. O'LEARY. At least in Texas.

Mr. YATES. Can you not equally draw the conclusion that the companies don't want to put out production? As a matter of the price they can get, they just don't want to flood the market?

Mr. O'LEARY. I really don't think so, Mr. Chairman. I think that a producer who was inveigled by a price objective into spending a large amount of money to double the number of rigs running and double the number of holes drilled would certainly have liked to have found something for his money and cash in on it. He did a little, but he didn't do anything more than take a decline curve that otherwise would have gone down very steeply and make it go down more gradually.

CAPPED WELLS

Mr. YATES. You don't believe in capped wells. Is that a logical conclusion?

Mr. O'LEARY. Mr. Chairman, there are capped wells. As a matter of fact, from my experience in the Federal Power Commission, the State of New Mexico, and the Department of the Interior, there are a lot of capped wells. In the Department, from my experience, I was well aware that early in the lease term on the Outer Continental Shelf a company would go out and slim hole down, find hydrocarbon and back off the well. If you had 5 more years to fool around with it, why not? That was the attitude of the company.

Mr. YATES. Of course, it took 5 years to bring it in.

Mr. O'LEARY. Sometimes it does and sometimes it doesn't.

Mr. YATES. You say there are capped wells and the reason the wells are capped is because they hope for higher prices later on.

Mr. O'LEARY. Indeed.

Mr. YATES. If that be true, why isn't that applicable to the producer in Texas?

Mr. O'LEARY. It is. There is a man by the name of Chavez in Texas who blatantly advertised he wasn't going to sell his gas until the price got right. He provides, in the lack of any other evidence, clear evidence that this does go in Texas as well as New Mexico.

Mr. YATES. Why isn't that true of the producer, then?

Mr. O'LEARY. While it occurs, it does not occur with sufficient frequency to really change the picture that I put before you. If all that had been brought on in January, I don't think it would have materially affected the shortage.

NUMBER OF CAPPED WELLS

Mr. EVANS. Do we have an accurate inventory of how many wells have been brought in and capped and sitting there waiting?

Mr. O'LEARY. We don't, at the national level, have an accurate inventory to my knowledge, although the Secretary of Interior is trying to develop one with regard to public lands. While in New Mexico, I did develop an accurate inventory of the capped wells in the State of New Mexico. My recollection is the last number was about 350.

Mr. YATES. Waiting for a higher price?

Mr. O'LEARY. Yes, or a connection; the usual business reasons.

VOLUME OF CAPPED WELLS

Mr. EVANS. Do you have any idea of what volume of gas was capped?

Mr. O'LEARY. Yes; I would suspect that if that had been turned loose, it might have been able to increase production in the State of New Mexico, that day, by approximately 5 percent.

IMPACT OF CAPPED WELLS

Mr. YATES. Could it have made an impact in Ohio, or was there no connection?

Mr. O'LEARY. Yes; it could have. There is always that little bit of lag in the system, Mr. Chairman. I think you have to understand that. In addition to people who are deliberately waiting for the price to get better, there are people who simply have completed their well, are negotiating a sale, and haven't made the sale yet. There are those who haven't made the connection, and are too far away from the pipeline to make the connection. There is always a floating inventory, to the one I think is politically sensitive of people, who are staying off the market. In addition to this, there is the phenomena of the known discovery, early in the lease term, where you then back out of the well and say, "Good, I will go off and look in other areas." The reason you do that is good and bad from your standpoint. If you have a block, you might very well want to prove up some additional hydrocarbon so you can optimize on the development scheme. Of course, in the gas business you have a fair feeling that if you hold off the market for a year, it will more than repay you.

HOLDING SUPPLIES OFF THE MARKET

In my period in the FPC, we used to figure that the holding cost was worth about a penny per MCF as a rough rule-of-thumb. It might be 2 or 3 now. The expectation that a producer has had over the last 3 years is that the price recovery permitted by the FPC was probably going to go up faster than that. On the other hand, the producer is under a very, very strong incentive to recover his cost and get on to the next well.

So you have these two more or less countervailing considerations. Will I sell now and recover my cost and get on to the next well? Will I take advantage of the higher price on the next well? Will I withhold now, and take advantage of a speculative increase in the market price?

EFFECT OF PRICING ON SUPPLIES

Mr. EVANS. Your point is on letting loose with controls, decontrolling, that the amount of actual discovery that you get, additional production that you get, is not going to make us turn the corner. It is not really going to do anything more than just flatten out the declining curve a little?

Mr. O'LEARY. Yes. The original estimates under the Project Independence blueprint of the FEA, or its predecessor, was that under attractive pricing conditions we could take the then current 8 or 9 million barrels a day and push it to 17 million barrels a day by 1985. We could take the then current 22 trillion cubic feet of gas and push it to 29 trillion by 1985. I think there never was any possibility of making those.

The most recent estimates which were made by FEA incidentally, before I came back into the Government, were, in my own kind of betting ballpark. We can about stay even on oil, and our decline curve in gas will take us from the current 21 trillion to 17 or 18 trillion in 1985.

Mr. MURTHA. You are saying deregulation is still a good thing because it would increase production, but it is just not going to eliminate the problem.

Mr. O'LEARY. I don't say it is a good thing. As a straightforward proposition, if you were a producer, you would regard it as a good thing. If you were an energy specialist and looked at all the changes that should occur among consumer habits for the most part, you would say deregulation is a good thing. But if you think of the very, very large amounts of money, the economic impact on this economy of outright deregulation, pulling all controls off, I don't think, on balance, it would be a good thing.

Mr. YATES. Mr. Duncan.

Mr. DUNCAN. Well, the experience we had, we decontrolled in two areas within the last year, didn't we?

Mr. O'LEARY. Stripper and tertiary.

Mr. DUNCAN. And we didn't really have any runaway prices then, did we?

Mr. O'LEARY. Not in the product end of the business. We had enough of a runaway so that the trigger has triggered in the upper midcontinent. We have to go to hearings and see what we can do to get it back.

Mr. DUNCAN. How much has it gone up?

Mr. O'LEARY. About 0.3 cent over the trigger.

THE TWO CATEGORIES OF DEREGULATION

Mr. DUNCAN. What were the two categories deregulated?

Mr. SMITH. The two big ones were residual fuel oil and heating oil.

Mr. DUNCAN. Both of those have gone up?

Mr. SMITH. No, sir. At the risk of making this my last appearance, I would make a comment that the so-called trigger or index price was always viewed as a cap that was more restrictive than the regulations would have been had the regulations stayed in effect. This includes the 2-cent flexibilty factor, and this was a piece of insurance that was extracted from us.

Our argument was we have plenty of refining capacity, crude oil, and competition; therefore, prices shouldn't go up other than on a cost-increase basis. The response from Congress was, if you believe that, why aren't you willing to put a cap on it so we can take that home to our constituents and say prices won't rise exceedingly without some action being taken by the Government.

Mr. DUNCAN. That trigger figure was less than you would have been able, under regulation, to raise the price to on a cost basis?

Mr. SMITH. The specific answer is that in the case of many individual refiners and resellers, yes, sir. You cannot say that it would have been less in every case because of the different cost impact on different companies. That index price was exceeded by actual prices by three-tenths of a cent in the north-central region. At the same time, I think it is appropriate to observe that we have had the coldest winter in recorded history and the highest volume of heating oil in recorded history. We had rivers frozen and getting material into the Northwest involved some very unusual expenses in terms of longer hauls, truck hauls, and railroad hauls instead of barge hauls.

PRICE MEASUREMENT

Mr. EVANS. Isn't that measurement of cost at the refinery, not the delivery?

Mr. SMITH. No; the measurement of the prices is the price to the final consumer. These are the prices that went up by three-tenths of a cent more than, under even the most restrictive regulations, they could have been expected to under continued regulations, and that was only in the north central region. They did not exceed the index price in any other region of the country, including the Northeast and Southeast.

Mr. YATES. That is because of your toughness?

Mr. SMITH. No, sir; that is because of the presence of adequate supplies of crude oil refinements. There was a little jawboning involved during the winter, I will acknowledge. The purpose of the upcoming hearings is to find out whether this price increase was an increase in dealers' margins, and the profits of refiners, distributors, and retail dealers. We know there were certain cost-base increases because of the disruption to the delivery system particularly in the Northwest. What we don't know is the specifics of whether those increased costs account for the amount of the increase to the consumer or not.

SLOWDOWN OF THE DECREASING RATE OF OIL SUPPLIES

Mr. DUNCAN. I would like to pursue this discussion you gave us with respect to the gas in the deregulated State of Texas. As I recall, you indicated that there was a great deal of drilling——

Mr. O'LEARY. There was.

Mr. DUNCAN. And presumably you infer a cause and effect between deregulation——

Mr. O'LEARY. Clearly.

Mr. DUNCAN. And you also have suggested, have you not, that we may find another Prudhoe Bay in the United States; I think that was the word you used. We may, and, in any event, I assume you would not argue that there could well be a number of discoveries in the United States of a lesser dimension?

Mr. O'LEARY. Right. We should do whatever is necessary to provide the proper climate to get to those.

Mr. DUNCAN. At least it is certain we are not going to discover them unless we drill, isn't that true?

Mr. O'LEARY. That is true.

Mr. DUNCAN. So even though your anticipated discoveries may be less than enough to increase our reserves, at least those additional discoveries slow down the rate of decrease, do they not?

Mr. O'LEARY. Absolutely. That was the effect in Texas.

EFFECT OF DEREGULATION

Mr. DUNCAN. So we could draw a conclusion from what you have said that the deregulation would stimulate drilling without which there will be no more discoveries?

Mr. O'LEARY. I think that is a fair conclusion. Partial deregulation will probably achieve the same end.

Mr. DUNCAN. Well, I would think that might be true.

With respect to the capped wells or deferred developments that you and the chairman were discussing, you mentioned, I think, a number of reasons, other than selfish reasons to get an increase in price.

Mr. O'LEARY. I think the drilling in the first place is motivated by a selfish reason—to make money.

Mr. DUNCAN. Of course, that is right, and that is what makes the country go. But beyond that, we are at least implying that if they hold the product for a higher price, that is somehow or other something undesirable, but there are other reasons, are there not? You mentioned accessibility to the pipeline for one thing, optimizing the recovery from your field by not developing a single well but exploring the whole tract, and you also mentioned that there are difficulties in arranging the sales. There is always a lag——

Mr. O'LEARY. I have a feeling that this conversation has been bugged. You have been taking notes.

OIL RESERVES FOR PRODUCERS

Mr. DUNCAN. The other thing that occurred to me, and I wonder if there is any validity in it, and that is that some producers have long-term contracts, and don't they have to maintain some reserves from a business standpoint in order to fulfill long-term contracts?

Mr. O'LEARY. Generally not, Mr. Duncan. In the sixties, there were a few warranty-type arrangements in which the producer accepted a substantial portion of the risk. Some of those are still going forward, and there has been a good deal of controversy over them. But 99 percent of the contracts are on a "whatever I get, you can have, but there are no guarantees as to what I am going to get" basis.

Mr. DUNCAN. So long-term contracts even in the absence of a legally enforceable contract commitment to a particular customer, have no validity from the standpoint of capping?

Mr. O'LEARY. I think they deal very much on an arm's-length basis. What they say is:

We will go out and we will drill and find a well and dedicate production, whatever it is, to you. Beyond that we are not making any agreements.

Mr. DUNCAN. And not with respect to a field or a block?

FIELD OR BLOCK DEVELOPMENT

Mr. O'LEARY. Let me put it clearly. It is a block. Generally speaking, you will take a lease and you will dedicate the production from that lease, or a portion of the production from that lease which generally is your interest. You might have a divided working interest in that lease, and you may dedicate your interest in the production of that lease to the pipeline purchaser.

Mr. DUNCAN. But in that block, there could be wells not producing at that time.

Mr. O'LEARY. Sure, and there would be other working interests dedicated to different buyers on different terms.

CAPPED WELLS IN NEW MEXICO

Mr. DUNCAN. 300 wells you said you had cataloged in New Mexico?

Mr. O'LEARY. Some 350.

Mr. DUNCAN. Can you break down the figures as to those that were not producing simply because of the price?

Mr. O'LEARY. Probably, of that total, there were about 50, plus or minus 10, that were not producing purely because the owner anticipated higher price in the future.

Mr. DUNCAN. The balance of them would be for these other causes you have enumerated?

Mr. O'LEARY. Yes, sir.

Mr. YATES. Thank you, Mr. O'Leary, for an interesting and valuable contribution.

We will return at 2 o'clock.

AFTERNOON SESSION

HARRIS POLL RESULTS

Mr. YATES. Let's go back on the record.

Before we get to the budget, I am in receipt of a letter from Mr. William Sheehan, president of ABC News, dated March 21, 1977, in which Mr. Sheehan points out that ABC News and the Louis Harris organization have just completed a nationwide poll on the energy crisis. This is what Harris told him.

On the magnitude of the shortage, a sizable 81 percent of the American people are convinced that there is a serious shortage of energy in this country. That is different from previous results.

By a nearly unanimous 88 to 89 percent, most people think it important that the country learn how to cut back on its use of energy. By 57 to 27 percent, a majority favor having President Carter impose a tough program of conservation on both consumers and industry.

On voluntarism versus compulsion on conservation, by a narrow 52 to 46 percent, people believe that voluntary conservation of energy by the public would be effective. By 51 to 45 percent, a slender majority think that such voluntary approaches would work with industry. By contrast, a much larger 61 to 34 percent think that a compulsory conservation program would work with the people and an even higher 67 to 28 percent think the compulsory approach would be effective with industry.

However, when asked which approach they preferred to see taken, by an overwhelming 75 to 20 percent, a majority favored a voluntary way to solve the problem.

This is available for the members of the committee and it should be very interesting reading.

SHORT TERM WITH REGARD TO ENERGY

Mr. MCDADE. Whenever I engaged in conversation about the problems of energy shortfall it was always useful to me to try to compartmentalize by dividing the problem into the short term and the long term. It seemed to me today a lot of our discussion was looking at that

long-term 20- to 25-year problem, what we do about getting through this fossil fuel age and the shortages that confront us.

I don't think we addressed ourselves to short-term problems, with the possible exception of the conservation program, which is an obvious need in the short term. What other kinds of short-term solutions are there?

First, what would you define as the short term?

Mr. O'LEARY. In the energy business the short term is generally 5 to 10 years. There is really very little you can do to change things around——

Mr. MCDADE. If we are going to define it as 5 to 10 years, what kind of priorities do you see us addressing within that short term? I know conservation is the keystone.

SHORT TERM PRIORITIES

Mr. O'LEARY. Energy efficiency is the most important thing you can do during that period of time. It is far and away the most predictable Let me give you the time frame for switching a large gas-fired plant over to coal. It is probably on the range of 5 to 10 years. It is getting into that midterm period.

Mr. MCDADE. That much?

Mr. O'LEARY. Yes.

If you decided to build a coal-fired plant today, a big one, in most parts of the country it would take a minimum of 5 and more like 6 or 7 years.

Mr. MCDADE. What about the public's resources and the management of them?

Mr. O'LEARY. They tend really to be incidents to the system. They are technical considerations.

Mr. MCDADE. Is that right?

Mr. O'LEARY. Yes; Elk Hills——

Mr. MCDADE. I know Elk Hills is a small amount but if you put it in the context of an immediate embargo—if they get Elk Hills up to 300,000 barrels a day, it becomes pretty significant.

Mr. O'LEARY. If the price of getting it up to 300,000 barrels a day is having room for that 300,000 barrels a day, then there it is.

PET 4

Mr. MCDADE. What about Pet 4? We used to hear the same geologic projections about enormous reserves.

Mr. O'LEARY. Pet 4 is a black box.

Mr. MCDADE. Then you can't fit it into short- or long-term solutions?

Mr. O'LEARY. You know Pet 4 is now in the process of being transferred to the Secretary of Interior.

Mr. MCDADE. We are getting requests for appropriations there. It hits on the supply side but it is a black box.

Mr. O'LEARY. We will know a lot more about it in 5 years.

Mr. MCDADE. It will take 5 years to get the kind of acquired knowledge?

Mr. O'LEARY. At least 3 to 4 to get a significant body of knowledge.

87-5 1 O - 77 - 28

Mr. McDade. We had testimony we have spent about $10 million and we have gotten so far, dry holes.

Mr. O'Leary. No. you have gotten some gas wells.

Mr. McDade. New discoveries?

Mr. O'Leary. No; They continue to bring in gas wells in Pet 4.

Mr. McDade. For the Navy supply?

Mr. O'Leary. No; for the town of Barrow.

Mr. McDade. But it is a small pool, I am told.

Mr. O'Leary. It is a very shallow pool and very easily tapped. They have to drill a new hole each year.

Mr. McDade. It will be a part of the administration's program, I assume, that we should aggressively attempt to learn everything we can about Pet 4?

Mr. O'Leary. Oh, yes; even with all the discussion we had this morning we ought to find out about the Gulf of Alaska, the Beaufort Sea, and also the Baltimore Caynon.

Mr. McDade. I classify them as short-term efforts increasing the supply side of the picture.

Mr. O'Leary. The current efforts that will result in flowing oil from Prudhoe Bay in 1977.

Mr. McDade. We had the 10-year delay because of the environmental fight.

Mr. O'Leary. That is the world we live in.

Mr. McDade. What other kinds of short-term options do you see? Are there any others that you see?

OTHER SHORT TERM OPTIONS

Mr. O'Leary. The principal thing that you can do in this time frame is to insulate, to begin to take some of the more superficial things with regard to industrial use, to convert the easily convertible parts of the utility industry back to coal and away from oil. You can't begin to touch the gas problem in that sort of time frame.

Mr. McDade. We have a lot of places in the United States in which we are making choices whether to keep the schools or factories open and both are being fed off natural gas. We have natural gas being used for space heating in public buildings. It seems to me to be a dreadful road to be pursuing, and it seems to me something we ought to think about as a short-term solution to free up gas for manufacturing purposes and to get public buildings, et cetera, off the oil and gas system in the near future. Is that problem as difficult as converting electrical plants?

Mr. O'Leary. Yes, in the terms you have discussed it, Congressman McDade. It you want to get them off oil and gas it is a difficult problem.

It is going to require an apartment building or large establishment to completely rerig its boiler.

Mr. McDade Is it that difficult?

Mr. O'Leary. Yes. These buildings have no storage to begin with. They don't have the appropriate rates for burning coal. They have to essentially take out their combustion apparatus and put in coal burning. If there is an air quality problem then that has to be corrected along with it. Probably most of these buildings ought to stay on gas. It is the big industrial user of gas that should change.

Mr. McDade. You mean for generating electricity?

Mr. O'Leary. No; for raising steam as well. The larger, not the one that goes to an apartment house, but the one raising the process steam should change.

Mr. McDade. Shouldn't we get public buildings out of the oil and gas business for space heating and cooling to the maximum extent?

USE OF OIL AND GAS IN PUBLIC BUILDINGS

Mr. O'Leary. I think that you have to look upon this as a function of size. When you begin to think of the amount of ancillary equipment you have to put on the burners in order to cover the air quality problem, you want to have a fairly good-sized target. You don't want to do it with a small intermittent burner. It is a fairly expensive process. You get to the point where it drives the economics of the whole system.

Mr. McDade. We are transferring $40 billion a year out of the country. The amounts that can be spent on this side to retrofit, if that is an appropriate word, can be pretty large sums if your objective is to cut that $40 billion.

Mr. O'Leary. If you are looking for targets of opportunity to do that, you want fairly substantial combustion setups. You wouldn't want to do it with small ones. This building, for example, would be a prime target for converting. A 15-room schoolhouse probably would not be. Mr. Hanfling can tell us about the limits that are currently being discussed, and I think this is a useful input into it. This is one of the criteria that is in the ESECA law now, and in EPCA and will be in the Jackson bill, I assume.

CUTOFF LIMITS

Mr. Hanfling. One of the cutoffs in the Jackson bill is for combusters or boilers smaller than 100 million Btu's an hour. It's about 10 megawatts. Anything below that size is impractical to convert. There is even a question as to what the clean air amendments will go down to, whether they will go down as low as that and require a scrubber. There is some talk about having a cutoff at 25 megawatts.

Mr. McDade. I can't relate to 25 megawatts.

Mr. Hanfling. That was about the size of the buildings Mr. O'Leary mentioned. When you start getting to the apartment house building or even medium-sized office buildings you are talking below the 10-megawatt range.

Mr. O'Leary. This building is in the 10- to 15-megawatt range?

Mr. Hanfling. Yes; the problem of converting those, or switching is that you need a total new infrastructure within the system itself.

COAL USE IN NEW CONSTRUCTION

Mr. McDade. What about new construction?

Mr. Hanfling. There it is a similiar thing. A lot of the new construction is additions to where people have two or three gas or oil facilities in downtown areas. At the present time it is impractical to bring coal in. We are trying to do this in both the current legislation

we are trying to enforce as well as the Jackson bill. The coal program that will be in the April 20 message will also address new construction. That is the area we want to try to hit first.

In the existing facilities we are looking at the larger ones first, the big fellows mostly in the industrial area.

Mr. McDade. This is a surprise to me. I thought there was some elasticity you could get at by trying to get first public buildings that were on oil and gas and then larger commercial units that were heating or cooling that way.

I thought there was an opportunity there to move them into coal. I didn't realize it was that difficult.

Mr. Hanfling. The one area we are trying to look at is centralized steam heat. There are some new developments mostly in this area in the upper Midwest.

Mr. McDade. They have been doing that in my town for years.

Mr. Hanfling. The country has been doing it for a long time. Then, they began to stop it as soon as gas came in. This is something that clearly could be gone back to. There are a lot of infrastructure problems in getting the utility companies and utility commissions to allow adequate rates of return. That is an area where you can use the coal twice, essentially; once to generate electricity, then a second time to heat.

Mr. O'Leary. Just to underscore that, the average efficiency of electric generation in this country is about 30 percent. In Sweden, with about the same equipment, they get about 60 percent because they use the waste heat for hot water.

Mr. McDade. It just makes that conversion to coal so much more difficult when you eliminate those. You are really talking about coal for generation of electricity.

Mr. O'Leary. And for big boilers.

Mr. McDade. What did you say that was?

Mr. Hanfling. Ten megawatts, which is sizable, but that picks up 75 percent of all the boilers and the combusters.

Mr. McDade. It just makes the future look so much more dedicated to oil and gas. If we are going to have to keep using them in public buildings.

Mr. O'Leary. Still, what you are talking about is in the range of 12 to 15 percent of combustion. We are always going to have a lot of gas in this country, relatively speaking, and oil. It is not a matter of getting off those two fuels completely. It is a matter of putting them to their highest priority use. Everybody who chooses to use coal should be encouraged to do so.

Mr. Yates. Are you originally from Pennsylvania?

Mr. O'Leary. I am from Nevada.

Mr. McDade. I did think there were more possibilities.

Mr. O'Leary. They are expensive.

Mr. McDade. But if you can confine it to electrical generation——

INDUSTRIAL ENERGY USE

Mr. O'Leary. Don't forget the very significant 40 percent of the energy used in this country is used in the industrial sector. Twice as much there is in electrical energy, and most of that is reachable through this program. That is an enormous amount of energy.

Mr. McDade. We have had to crunch several times in natural gas and I find that most of my large industrial users of gas are out of the gas business for space heating and cooling.

Mr. O'Leary. And you know where they are?

Mr. McDade. Propane.

Mr. O'Leary. They are on oil.

Mr. McDade. But they are preserving that natural gas specifically for manufacturing processes, for jobs, and if you don't keep that dedicated to that use, you are stuck. I was assuming this declining curve in gas we are talking about, and the natural hope that as the country turns itself around economically, that demand increases. The question that always strikes me: What do you do about commercial heating, space heating in public buildings, industrial heating? If you want to get them, the only way to go is coal.

Mr. O'Leary. Sixty percent of the gas in this country is under boilers that will be reached under the definition Mr. Hanfling gave us.

Mr. Hanfling. If you talk first about total oil and gas usage—and these are 1975 fuel consumption areas—you are talking about 1.5 million barrels a day and about 3.3 trillion cubic feet of gas.

Mr. Yates. Per day?

Mr. Hanfling. No; per year.

Mr. McDade. That 26 percent of our natural gas? I have heard that figure before.

Mr. Hanfling. The total figure is about 20 trillion cubic feet a year, so this is about 15 percent.

ELECTRIC GENERATION IN INDUSTRY

Mr. McDade. Dedicated toward the generation of electricity?

Mr. Hanfling. Yes, in industry, that is the large industry, large commercial, which includes boilers combusters' furnaces, kilns, process heaters, the comparable numbers are about 1.2 million barrels of oil a day, and 7.4 trillion cubic feet a year, which is like one-third of all the natural gas used. The program which will be part of the President's energy message——

Mr. Yates. On April 20?

Mr. Hanfling. The message on April 20 will provide mechanisms for most of these gas and oil burners. Some are needed. So included in that number is some process gas for which there is no technical substitute.

THE SHORT-TERM MANAGEABILITY OF OIL AND GAS

Mr. McDade. It is the administration's conclusion if we can reach those sources and convert them and engage in weatherization, conservation use, the economic predicates you have talked about, that we really are out of the problem of natural gas and oil in the short term? Is that it?

Mr. Hanfling. No.

Mr. O'Leary. It then becomes manageable. If you do, the things that I have outlined in very rough terms this morning, by 1985 you should be importing at about last year's level.

Mr. McDade. For the short term, does that mean if we have a severe winter in the 5- to 10-year frame and you have these outfits coverted out of the electrical generation business and you have substituted coal, that I can say to the people that were laid off in this district because of the natural gas that they won't face it again?

Mr. O'Leary. No, the natural gas situation is going to get worse before it gets better.

Mr. Evans. We have to run to stay where we are?

INTERSTATE MARKET VERSUS INTRASTATE MARKET

Mr. O'Leary. Yes. I think it is useful to think about the dichotomy between the interstate market and the intrastate market. The interstate market is roughly 65 percent of the total gas market. It is 13½ trillion cubic feet now. That leaves 7 trillion cubic feet in the intrastate market. We have found about 10 trillion cubic feet a year for each of the last 7 years. The interstate market has bought one. The intrastate market is about 17. What that suggests is that the interstate market is about staying even. It also suggests that the interstate market is on a replacement basis now. There is no fat in that system, and they are at the rate of 6 to 7 percent a year. Next year it is going to be 6 percent worse than last year, et cetera.

Mr. Evans. Doesn't that make it all the more essential to get to the public buildings fueled with natural gas?

RELATIVE COSTS OF CONVERSION

Mr. O'Leary. The problem you have is the cost of conversion. The underlying foundation is the cost of conversion. You go to the utilities first because their costs are one one-hundredth of the cost of converting a household.

Mr. Evans. I don't want to get into households.

Mr. O'Leary. I give you that as a frame of reference. If you take that as the highest cost element of the business you can get to the utility at about one one-hundredth of that cost. Then you go ino the industrial establishment, and they might be approximately one-half the cost of the household. When you get to the commercial sector, it is very comparable to converting a household.

Mr. Evans. I understand it is tough but I don't know where we end up if we go through the essential steps of not using natural gas to generate electricity. My view was we were going to create some elasticity in the system.

Mr. O'Leary. It will.

OVERVIEW OF THE PRESENT GAS SYSTEM

Mr. McDade. But if we have a tough winter 7 years from now we will have the same plants facing the same problems?

Mr. O'Leary. The underlying premise for this statement is, unless we begin to do something fairly strong to the system now—let me just give you a little bit of this. Last year, the Federal Power Commission asked me to serve as chairman of a group called the National Curtailment Strategy Committee. The committee worked on their national up-

date of their national gas survey. I came in about once a month and sat down with people from Columbia Gas and I said, "It seems to me we have one big problem, pooling,"—the thing we had to do this winter. Those people jumped up and down and said, "Are you a Communist?"

I said, "no." Probably within a year we are going to have to see how we allocate supplies among pipelines. My recommendation is that the Federal Power Commission very, very sharply address that problem. As long as we take the attitude we are not going to get bad winters and everything is going to be all right, and we don't have to conserve, then 7 years from now we are going to have 40 percent less gas in the interstate system.

It isn't going to take a bad winter, with a mild winter we will go through worse than last winter.

DESIGN BASIS FOR THE GAS SYSTEM

Mr. EVANS. Would you allow me to question there?

As I understood your testimony, even if we did what you say we must do, after 7 years we would still be about where we are now relative to the problem of a tough winter.

Mr. O'LEARY. No. Here is what you do. You design your system for the 4 or 5 worse days you have ever had. That is known as the design basis for the peak demand of the system. There are really two problems here. One is the problem of supply, the sheer availability of the stuff. The other is the capacity of the system to meet peaks. You do not buy insurance against a 300-year event. One of the difficulties that we ran into in Philadelphia, for example, which is archetypical of this last winter, is that Philadelphia relies upon supplemental gas when the temperature gets down to 25 degrees. It has no capacity to bring in natural gas, that is, additional gas to relieve that system.

We were at one point in late January or mid-February where 3 more days in the 8-to-12-degree range would have put Philadelphia down. There was plenty of gas around Philadelphia. In anticipation of this, we had gotten gas from the Texas utilities, from the refineries in Texas, but it couldn't be delivered into the city of Philadelphia.

Mr. EVANS. Why?

Mr. O'LEARY. Because they didn't have the capacity to bring it in. They had bought a system that was designed for a 50- or 20-year event, not for a 1-in-300-year event.

Mr. EVANS. I thought we were talking about doing the efficient things we should do in terms of transferring from gas and oil to coal? If you do what you are recommending, then 7 years from now if we are lucky we won't be in a worse position than we are now?

Mr. O'LEARY. If we run into another 100-year event in a few years we will have a very serious problem because we don't design our systems to meet those low-probability events.

NEEDED GAS LEGISLATION

With regard to the supply problem, my own view is that if we go very hard after the Jackson-type legislation, not the current ESECA-type legislation, I think it will not get us from here to there. If we go after

the piece of legislation that provides a realistic test, and puts the burden of proof where it ought to be, on the manufacturer or the utility, and not on the Government, so that we don't have to be in the position of making the case several hundred times; then it seems to me we can get in the position where in aggregate there is enough supply.

THE PROBLEM OF PEAK DEMAND

The problem with this comes this way. Last year, 1976, about 40 percent of the new households nationally were attached to natural gas. One of the things you have to know to look at this is that the residential sector commands most of the capacity of a pipeline during the winter. During the summer, it is industrial. If we continue to add households as we are doing now, there isn't any way in which we can meet, under the prospective supply conditions of 1980, the peak day in a bad winter. This is not because there isn't enough for the year as a whole to go around, but because in the worst day of the winter all the households are on, and with all the pipeline capacity in the world to supply them, you can't meet your household requirements.

So you have to look upon this not simply as the aggregate, but as the shape of the load as well. We are moving to the point now where all of the cushion in the system that was provided by industry which we could lop off, is beginning to disappear. We are down to hard rock. We are down to the point where if you miss a beat, you lay people off. We will get closer to that so long as we continue to attach households.

ATTACHMENT OF NEW HOUSEHOLDS TO GAS

The second question we addressed in that exercise with the Power Commission last year was, should we attach new households to gas?

As I said last year, 40 percent of the new households were attached to gas. It isn't an aggregate supply problem.

Mr. YATES. You didn't say what conclusion you came to.

Mr. O'LEARY. The conclusion I came to is that unless you are willing to recognize the seasonal shape of the load, you had better be very careful how you attach new household load. Otherwise you will find yourself with plenty of gas on the average, but not enough to meet your December and January peaks.

Mr. YATES. What are the new home-builders going to do?

OPTIONS OF NEW HOMEBUILDERS

Mr. O'LEARY. They have essentially in today's world three options. They can go to gas, they can go to electricity, which is much more expensive and probably not the best solution, or they can go to oil. They don't have at the moment a solar option.

Mr. YATES. You didn't include coal.

Mr. O'LEARY. I don't think it is a realistic fuel for individual heating.

Mr. DUNCAN. Is hot water realistic for new homes?

Mr. O'LEARY. Solar hot water heating?

Mr. DUNCAN. The waste hot water from any kind of production plant. They are proposing to build geothermal wells in Oregon and pipe that.

Mr. O'LEARY. They will do that in a few instances.

Mr. DUNCAN. I wondered if they couldn't do that from a nuclear reactor instead of wasting the heat.

Mr. O'LEARY. They can't, because a nuclear reactor is designed to maximize the yield of power and the outlet water temperature is about 110°. If you want to do district heating, you have to have a temperature of at least 160°.

Mr. MCDADE. I am still back on that short-term side of the ledger that happens to be our lifetime. I am trying to figure out what we have in that short term. I thought we were going to make some very difficult choices about how we move from natural gas in order to protect the high-priority load, and I find out we still don't have a lot of elasticity even if we do that. I don't see why it has to be high priority to burn natural gas.

THE HIGH PRIORITY OF BURNING NATURAL GAS

Mr. O'LEARY. The reason would be the economics of it. What does it cost to go to the alternative? Generally speaking, it is cheaper for the great big burner to go to coal, if that is the alternative, than the small burner.

Mr. MCDADE. Aren't there reasons to really look closely at that question? Because I wonder what it costs—I saw my own district with virtually every manufacturing plant closed, admittedly by the 300-year event that you were describing.

Mr. O'LEARY. Yes.

Mr. MCDADE. Hopefully we won't be looking at that again. It seemed to me we were beginning to make choices about whether we were going to have people going to work every day, the manufacturing process protected, to keep our economy going, or, on the other side of the ledger, close the school. If we continue on that road of using natural gas for those purposes, is that a proper priority?

Mr. O'LEARY. Last winter, we had more gas than we are going to have next winter and more gas than we are going to have the following winter. Last winter, in our district, the only thing you could meet was the residential load. That is the point I am trying to make. It isn't the aggregate amount of gas; it is the load profit you have to take into account.

Mr. MCDADE. We have no other choices?

Mr. O'LEARY. It is cheaper to convert your manufacturing facilities, and your industrial facilities, generally speaking, than it is to convert your smaller burners in the commercial and residential sectors.

Mr. MCDADE. You said one of the problems we had was we used the least expensive method and we let OPEC pick up the increment?

Mr. O'LEARY. In a different context.

Mr. MCDADE. Yes. We were talking about oil then.

Mr. O'LEARY. Yes, sir.

Mr. MCDADE. But here there isn't anybody to pick up the increment unless you want to go to LNG, I suppose, from some other part of the world.

Mr. O'LEARY. If we insulate the houses, we will make a significant saving. I would imagine, even in your part of the country, you could make a 15-percent saving on that peak day in the residential sector.

Mr. McDade. Space heating?

Mr. O'Leary. Yes; the boiler uses of natural gas are back in your part of the country. Columbia serves you.

Mr. McDade. We have some Columbia.

Mr. O'Leary. I think you are back on with some of their boilers now.

Mr. McDade. Space heating.

Mr. O'Leary. For raising steam for industrial processes in the plant.

ESSENTIAL USES OF NATURAL GAS

Mr. McDade. I am not talking about that type of utilization. What I am talking about is the kind of uses of natural gas that are essential to manufacturing processes.

Mr. O'Leary. One of the things we found in the course of that long exercise last summer is that nobody can put a number to it. We heard time and time again, from the industrial representatives on that committee, that you must protect the essential process uses of natural gas. We said: "Fine, what is that?"

It is unclear to me whether that is 3 percent or 10 percent of the total. It isn't very much. Naturally, it is not a great amount of gas.

TERTIARY OIL RECOVERY

Mr. McDade. We used to talk about tertiary oil recovery as a possibility in the short term. Do you still believe that is a potential within the short term?

Mr. O'Leary. Yes; it is a matter of a blend of technology and economics—turning out something approaching 200,000 barrels a day. There was none 10 years ago. It seems to me that this is one of the things that might make a difference of up to half a million barrels a day by 1985. This has the potential for keeping the supply curve from declining and making it level.

Mr. McDade. Can it do any more than that?

Mr. O'Leary. We know where there are 300 million barrels of oil in this country with precision. Now, getting to it costs too much money and too much energy. One of the things about tertiary recovery, it is energy intensive. In California, there is a huff-puff system; you breathe steam into the formation for a month and then withdraw oil for a month and, huff-puff, back and forth, rotating the processes. It takes a lot of energy to produce that. It is an energy tradeoff.

Others require a great deal of energy in fracturing the formation and in pushing the flood.

CHEMICAL EFFORTS FOR OIL RECOVERY

Mr. McDade. What about the chemical efforts? Is that energy intensive?

Mr. O'Leary. Yes; it seems to me to be one of the unhappy characteristics about that; they tend to be energy intensive.

Mr. McDade. So nobody is going to pull a rabbit out of the hat.

Mr. O'Leary. No; the rabbit has been pulled. In 1950 we were getting 15 percent from the reservoir. This year we are going to get 31 to 32

percent, so we have doubled recoveries. That is useful. We are doing it another way. We are getting a lot more than we had historically, but it isn't magic.

OIL SHALE

Mr. McDade. There is nothing in oil shale in the short term?

Mr. O'Leary. In oil shale, if you wanted to, in the sense of building 50,000 planes a year, you could turn out 2 million barrels a day by about 1985 of liquids from oil shale.

Mr. McDade. At what price?

Mr. O'Leary. About what the OPEC will be at that point in time.

Mr. Yates. Which is what?

Mr. O'Leary. Oh, $20 to $25.

Mr. Yates. We had testimony before this committee from Occidental to the effect that oil from oil shale is now recoverable at the world price, which is about $13 or $15.

Mr. O'Leary. There is always room for discussion. I have heard from people who say they can do it at $9 or $10. My comment is that it has to be done at the world price at the time this event will occur. At roughly the forecastable price regime, you could be producing 1½ to 2 million barrels a day if you chose to. That is to say, if we were to say to the environmentalists, we are going to reserve the water in the Colorado plateau for this purpose, there is 2 million barrels we can have.

INVESTMENT AS A CONSTRAINT

Mr. McDade. What could you do?

Mr. O'Leary. If you had to probably between now and then, you would have to regard the investment as the constraint over that period of time. The world is the limit. You can produce 10 million barrels a day if you want to make enough investment.

We are now talking about such very large investments in this business. It might be useful to think of the range. If you want to make a new barrel a day capacity, here is the range of choice. You can go to the Middle East and for $300 to $500 you can get a new barrel a day of capacity. You can go to the Colorado plateau and for about $20,000 a barrel a day in a plant get one. You can go to the Outer Continental Shelf and, for about $10,000 a barrel a day get one, if you are lucky and everything works right. You can go to a coal-fired plant up in Pennsylvania and for about $50,000 to $60,000 get a barrel a day of capacity.

So we have a range with oil shale falling well below the midpoint.

Mr. McDade. We have had a lot of money appropriated in this committee for years on pilot plants for coal gasification. What are the prospects in that system?

COAL GASIFICATION

Mr. O'Leary. I haven't looked at this in any hard sense of the word for a couple of years. I would say in your terms, which is to say the near term, the best thing to do is to build some plants. I think we ought to build Lurgi plants.

Mr. McDade. What is the lowest possible competitive price one can look for in today's technology to gasify coal?

Mr. O'LEARY. It is probably—and this is a synthetic number in a synthetic fuel that is arrived from an awful lot of conversations back and forth—approximately in the range of $4.

Mr. MCDADE. Last year we had quite a fight on the floor on the question of whether we should create a commercial size plant for synthetic fuels to try to get through the environmental, technological, social problems. How do you view that? Is that a useful exercise in your view?

Mr. O'LEARY. The foundation for this answer lies in the mix of residential attachments. I mentioned that last year 40 percent of the new households went to natural gas. Fifty percent went to electricity, all of that or essentially all of that on resistance heating. If that is the choice——

RESISTANCE HEATING

Mr. MCDADE. What is resistance heating?

Mr. O'LEARY. That means not a heat pump, but a unit across the hall that works on the basis of resistance. It is a relatively efficient form of heating, but it is very expensive. It comes in at the equivalent of about $7 to $8 an Mcf equivalent into the house. We are saying in half of the new houses you may have electricity, not gas, because in many parts of the country there were moratoriums on new gas hookups. Sorry about that. It's going to tax you over the life of that house probably $3,000.

The reason you can do that is because the financial community and the regulatory community have no difficulties in licensing and permitting the construction of a coal-fired electric-generating plant. Everybody knows the territory and the technology. You cannot, however, say the same thing with a coal-to-gas plant. It is regarded as primary technology. The regulatory community doesn't know how to handle it. I would think it would be worthwhile from the standpoint of national policy to put that option into operation by doing something along the line of the more conservative pieces of legislation before you last year. Not so much to get the production but to open the channel, to plow the furrow so that people will say, "Good, that is an option."

Mr. EVANS. Would the gentleman yield?

Mr. MCDADE. Yes.

Mr. EVANS. Senator Haskell of Colorado has introduced a bill which has as its purpose the Government construction in the oil shale area of four prototypes.

GOVERNMENT CONSTRUCTION OF PROTOTYPES IN OIL SHALE

Mr. O'LEARY. I think it is three.

Mr. EVANS. This bill, as I understand it, uses the technology produced by three or four existing oil shale producing companies and increasing the production from 1,000 barrels to 10,000 barrels. This is all done in one place, consolidating some of the ancillary costs that follow on with this. Is this interpretation correct?

Mr. O'LEARY. Yes.

Mr. EVANS. Developing in one place the three technologies for 10,000 barrels production.

Mr. O'LEARY. One in situ and two surface facilities, one using one of the exothermic and the other endothermic.

Mr. EVANS. You are familiar with the bill and its purposes?

Mr. O'LEARY. Yes.

Mr. EVANS. Do you have any comments to make on that?

Mr. O'LEARY. I really haven't looked at it in sufficient detail.

Mr. EVANS. Just the concept? Is this the thing that should be done?

Mr. O'LEARY. As a concept, I think the fact of the matter is that the thing that you can do most rapidly in the synthetic field is go to an oil shale plant. The reason for that is, to elaborate, to get the kerogen from the rock you don't go through a complicated chemical process; you simply cook it. It is much simpler than the alternative forms. However, it has very serious environmental drawbacks. You mine as much as six times of rock for oil shale as you do for coal. That is the essential question with regard to the development of oil shale.

Mr. EVANS. The bill is to show what these new technologies can do at 10,000 barrels a day, and hopefully show to the commercial world and the financial world this is an area in which there is great promise.

OIL SHALE PROCESSES TO BE STUDIED

Mr. O'LEARY. It is well known the processes they are going to look at are well known. They are Union Oil's process which was worked in 1954, the Tosco process, which has been piloted to a fare-thee-well and has very substantial industrial support and the Occidental in situ process that was developed by one of Occidental's subs sometime back.

I don't think there is any fundamental question about the Union process, very little about the Tosco, and still some outstanding about the Occidental process, so you are really not proving a great deal. The overhanging question is where do you get the water necessary for these processes. This is a demographically intensive industry. If you get it up to the size of 2 million barrels a day, where do you get the water for all those people and the industrial processes?

Above all, every time you mine a cubic yard of this stuff, and retort it, you are confronted with other problems.

Mr. EVANS. I take your answer to mean this approach is not needed?

Mr. O'LEARY. It may be that it will tell us something about the other aspects of the business. It is not going to tell us an awful lot about the technology.

Mr. EVANS. Are you talking about the quantity used?

Mr. O'LEARY. The social and environmental aspects. It may be there are some valuable lessons to be learned. Also, it will begin to pin down the economics. I gave you a range here which is a factor of approximately two or thereabouts.

OIL FROM SHALE AS CONTRIBUTOR TO ENERGY SUPPLY

Mr. EVANS. Taking Joe McDade's near term, 7 years, do you believe we would be in a position where oil from shale is able to make a contribution?

Mr. O'LEARY. If we chose to get a contribution from oil shale, I am sure that we could have 2 million barrels a day by 1985.

Mr. EVANS. If we were willing to take the social and environmental risks.

Mr. O'LEARY. If we were to say exactly, that we will allocate our water in that direction and be willing to take a large environmental debit.

Mr. EVANS. It is just a question of whether these other things would be acceptable?

Mr. O'LEARY. I really have been very close to the technology for 25 years, and I think the Bureau of Mines process and the Tosco process will both obviously work.

OCCIDENTAL PROCESS

Mr. EVANS. When the Occidental representative was before this committee, not too long ago, if I understood him correctly, he said he and his company had developed a policy incentive, I think either to the Secretary of Interior or the President, which, if followed by this Nation, would result in a fantastic amount of oil developed through their process utilizing the in situ or modified in situ process, and they wouldn't need Government loans or guarantees. They would have to have assurance of a competitive chance to get some of the Federal lands that have this oil shale on them. Do you know of this plan, or know what they are talking about?

Mr. O'LEARY. I don't know the specifics of their plan, but I do know something about the technology associated with the modified Occidental plan. It does involve a substantial amount of mining and surface retorting. Therefore, it creates the same sort of environmental detriment. I don't think that the major hangup on the application of oil shale technology lies either in the field either of technology or economics. I really think it is the overall environmental question that you have to address.

Mr. EVANS. Thank you, Mr. McDade.

Mr. MCDADE. I thank you, Mr. Chairman.

I want to echo the chairman's comments to Mr. O'Leary that it has been tremendously illuminating and informative today. We have enjoyed it enormously, and it really helps us understand the dimensions of this tremendously complex problem that all of us face as a Nation. I don't feel any more at peace than when I came in the room this morning because the choices are very difficult, but you certainly have added to our knowledge of the problem and our education, and we are grateful to you and your associates at FEA for doing so.

MAGNETOHYDRODYNAMICS

Mr. YATES. He hasn't commented on the option that the people of Butte, Mont., say is going to be the saving option, and that is magnetohydrodynamics. They say it is the wave of the future. What is your feeling about MHD?

Mr. O'LEARY. It has been the wave of the future now, Mr. Chairman, for a good many years, and it still may be.

Mr. YATES. Do you think it is still a ripple?

Mr. O'LEARY. I think it is a great idea. The last time I was close to that technology, which was about 2 years ago, it still had some relatively serious problems. It has an enormous appeal to people in that part of the country because it is fairly efficient. But most of all, it is sparing in the use of water. If you can do it, it is very nice. But both we and the Russians have been dealing with this technology now for a long time. In our case, since about 1965, on a reasonable scale, both the Bureau of Mines and the Office of Coal Research had very active programs in this. The Russians have been dealing with it since the early 1960's. It remains one of those technologies, like the atmospheric fluidized bed that is just out of reach.

I think there is no question about it in a few years, and maybe sooner, we will do the fluidized bed and maybe MHD I hope so. But it is not the sort of thing you can bank now. When I refer to conservation you can bank, you know you can get the savings. Oil shale you can bank; you know you can do it if you have to do it. The coal switching, you can do it, and bank it. The big Prudhoe Bay, the next one, you don't bank. MHD, you don't bank. The atmospheric fluidized bed, you don't bank.

COAL CONVERSION IN SOUTH AFRICA

Mr. YATES. One of our colleagues from Pennsylvania reminds us of how well they are doing in South Africa with coal conversion.

Mr. O'LEARY. The Sasol plant has been running on Lurgi technology and has produced gasoline for 15 years, but at a very high cost.

Mr. YATES. What is the relative cost?

Mr. O'LEARY. I would imagine their costs are probably in the range of $20 a barrel. The closest you can come, if you were to build that plant do novo, to replicating that on paper here yields costs that are in the range that I gave you a little bit ago, which are about $20–$25 a barrel.

FLUORESCENT AND SPHERICAL LIGHT BULBS

Mr. EVANS. The fluorescent light bulb that was demonstrated to the committee last year showed promise. Would this result in any significant contribution?

Mr. O'LEARY. Without any new innovations, the fluorescent are much more efficient than the incandescent bulbs they replace.

Mr. EVANS. Last year, we had a spherical light bulb that was adopted to fluorescent.

Mr. O'LEARY. This is the one you can relamp?

Mr. EVANS. Yes.

Mr. O'LEARY. I think that holds a real promise.

Mr. EVANS. What is the status?

Mr. O'LEARY. I haven't heard anything for a year on that.

Mr. YATES. ERDA came in with it.

Mr. O'LEARY. They were then supporting a modest program, as I recall, $800,000, in order to prove it up. I suspect it is fairly close now.

Mr. YATES. Are there any general questions before we turn to the budget, itself?

ALASKAN OIL DISPOSITION

Mr. DICKS. I have one. I want to get this on the record about the Alaska oil transportation. Could you tell the committee where we stand on that, what the various options are?

Mr. O'LEARY. Alaskan oil is gong to go into the pipe in July and if everything works right, will begin to come out, at the lower end of the pipe in Valdez in September.

Now there are three broad options on the disposition of that oil. One, is to go into the west coast. Some will go into the west coast, although it is not compatible with most of the refinery capacity on the west coast. The Alaskan oil is a heavy, somewhat sulfurous crude that is not versatile, and the crude they like on the west coast is a light, low-sulfur crude, very versatile, which minimizes investment in refineries. This stuff, in order to handle it appropriately, requires additional refinery investment. A good bit of this will go in the west coast. There is no current link to bring the stuff from the west coast to the mid-continent, and particularly to the northern tier, where it is needed.

Pending the construction of that link, a chunk of it will have to go around, be offloaded from large tankers that will come from Valdez, broken to small tankers and shipped to the gulf coast.

A third option, which may be more theoretical than real, is to move a portion of the crude into the Japanese market in exchange for crude that would otherwise be going to Japan. That would come around from Saudi Arabia and into the gulf. Those are the three broad near-term options for disposition of the crude, Mr. Chairman.

APRIL POLICY PAPER

Mr. DICKS. As you mentioned, you have a general policy paper that is coming out, a study on that which is due on April 15. Will there be policy recommendations on what should happen?

Mr. O'LEARY. The minimum that will be in that paper is an assessment of where we stand at the moment. There are uncertainties and will be some for the next few months. The first of those uncertainties has to deal with the tariff in the Alaskan section of the transportation movement. That tariff will not be finally determined until probably sometime next year. The way it is done is that 30 days before the oil begins to flow, the companies put a tariff to the Interstate Commerce Commission. They then put the tariff into place, begin to study the format for 6 months, and come up with a final tariff. That will probably be next spring, or maybe later than that. That is one of the uncertainties.

ALASKAN OIL PRICING

Then we have to ask ourselves how will we treat the oil from the standpoint of pricing. The options there are, broadly, we can treat it as imported oil. We can treat it as released oil, and let it go into the west coast or any market at a competitive price with imported oil and net back whatever resultant that is to the field. Then we can treat it as high tier oil and put it in the entitlements program. These both would tend

to reduce the net back to the field. Or we can put it in as high tier oil without incorporating it into the entitlements program.

We can also make a mix of the two by having the west coast movement within the entitlements program and the gulf movement—there is more or less a compensating offset there in the transportation movement—exempt from the entitlements program. There are probably other permutations for pricing I have failed to cover.

All of these will be discussed in the mid-April submission to the Congress.

One final point, Mr. Dicks. We have seen the enormous number of players in this, and they are, at the Federal level, in addition to FEA, the Department of Commerce, the Maritime Administration, the Coast Guard and probably others, such as the Department of Interior. At the State level, we have the State of Washington, the State of California, and possibly other transit States. We also have the possibility of dealings with Canada, and dealings with the companies. We have asked one person to head this for the Federal Government. His name is Doug Robinson, a member of my staff. He has a small staff and is trying to work through this enormously complicated problem, so that we will have some idea of how to go in this mid-April submission.

Mr. DICKS. Thank you very much.

ALASKAN GAS

Mr. MURTHA. Mr. Chairman, since he brought up that, just a couple more general questions. How about the gas coming from Alaska? Could you give us a rundown on what is going to happen there and what the possibilities are and some idea of the recommendation on which route they are going to take?

Mr. O'LEARY. Yes; the statutory situation is that the Congress has required the Federal Power Commission to come up with its conclusions with regard to the preferred route by the first of May. The President is to respond to that no later than September 1.

Presently there are three possible gas pipeline routes under consideration. There is a route that would traverse the Beaufort Sea, going through the wildlife refuge, come to the lower end of Mackenzie Delta, up the Mackenzie Valley and split to serve both the Western and the midcontinental part of the United States. That is the first route.

The second route is an Alcan route that roughly parallels the Alcan Highway, comes across Alaska and then through Canada on the Alcan route.

A third route would roughly parallel the Alyeska oil pipeline to a port 50 miles north of Valdez, where the gas would be liquefied and then would come in LNG tankers to California.

The state of play thus far is that Judge Litt, a hearing examiner for the Federal Power Commission, has come out with a decision that has to be regarded as tentatively favoring the first of these routes I have stated. The Commission, itself, will now take a look at Judge Litt's preliminary decision and will render its final recommendations within the next month and a half.

Mr. MURTHA. Let me ask you; it seems to me that the Indian claims are going to be such a major obstacle in the Arctic or the Alcan route that it would be 2 or 3 years longer.

INDIAN CLAIMS ALONG THE ALCAN ROUTE

Mr. O'LEARY. I think it is not really a major problem with regard to the Alcan route. It depends upon the Burger Commission now at work in Canada and their attitude toward these various routes. It also depends, of course, on the outcome of the Burger Commission report as to how that will be treated. We simply have no comment on it until we see the Burger report.

Mr. MURTHA. What concerns me is they have been studying that for 2 years, and there doesn't seem to be any recommendations, and the Indians have said they are not going to build a pipeline through their land, and yet that is the route that the FPC recommended.

Mr. O'LEARY. That was Judge Litt's recommendation to the Federal Power Commission. The Federal Power Commission will, of course, consider the point you are raising when it makes its recommendation.

Mr. MURTHA. That is right; he didn't take into consideration the Indian claims question or the international relations question.

ALASKAN OIL AND NORTHERN TIER REFINERIES

Mr DUNCAN. Do you recall what that hearing examiner did with respect to the provision in the law we passed which maybe didn't quite rise to a requirement? I am talking about the northern tier, and a line into the Pacific Northwest.

Mr O'LEARY. No. In the gas legislation there is a provision with regard to the desirability of solving the Alaskan crude problem with some refernce to the requirements of the northern tier refineries. Judge Litt had nothing to do with that. That is a responsibility of FEA, and will be addressed in part in our April 15 submission.

Mr. DUNCAN. Am I wrong, in the natural gas bill we passed, setting the Federal lines, there was a requirement——

Mr. O'LEARY. On us, not on FPC.

Mr. DUNCAN. It was on you?

Mr. O'LEARY. It was on FEA, and that is the point I referred to earlier.

Mr. DUNCAN. But you are talking oil, and I am still talking gas.

Mr. O'LEARY. The provision that you are referring to, Mr. Duncan is a requirement in the gas bill that the oil problem of the northern tier refineries be addressed. What we have just been discussing is the FPC's activity with regard to the gas portion of the problem, which ultimately the President must decide. I have earlier addressed the problem that we must decide, which is the oil part of the equation in that gas bill.

PRELIMINARY THINKING ON A LINE TO NORTHERN TIER REFINERIES

Mr. DUNCAN. Have you made a tentative decision that such a line serving the northern tier is not necessary?

Mr. O'LEARY. No; by no means. As a matter of fact, if I had to make a tentative decision today, I would say the most pressing part of the problem is to find a window into those northern tier refineries. As I said earlier in a private conversation with Mr. Dicks, there are two

ways to do that. You can either go back and do a major overhaul on the CAP line, the big south-to-north line, or come across on one of the three variants of the west-to-east supply system that would link into interprovincial.

Mr. DUNCAN. I won't pursue it further, but my impression was that the northern tier was mentioned with respect to gas and that judge made a preliminary decision that service was not necessary, and I think our bill put it in terms "if necessary," such a line was to be provided.

Mr. MURTHA. One point, you said the President will decide, but the President will recommend to the Congress, and the Congress will decide.

Mr. O'LEARY. Yes, for the executive branch, the President has the last shot.

FEDERAL POWER COMMSSION PRELIMINARY DECISION

Mr. DICKS. I think what Mr. Duncan was referring to was that in the preliminary decision there was a pipeline down to the Midwest and no spur from that Canadian pipeline from Washington into Oregon, and then they came back, and I guess in his final opinion put that back in. Isn't that accurate?

Mr. O'LEARY. My understanding is that the Arctic pipeline project comes up the Mackenzie Valley to a point, I believe, in Alberta. At that point, it splits, and a portion of the line goes over to serve the Northwest part of the United States——

Mr. DICKS. That is what he has decided ultimately, but the initial preliminary finding was you didn't need to do that, and it caused a furor.

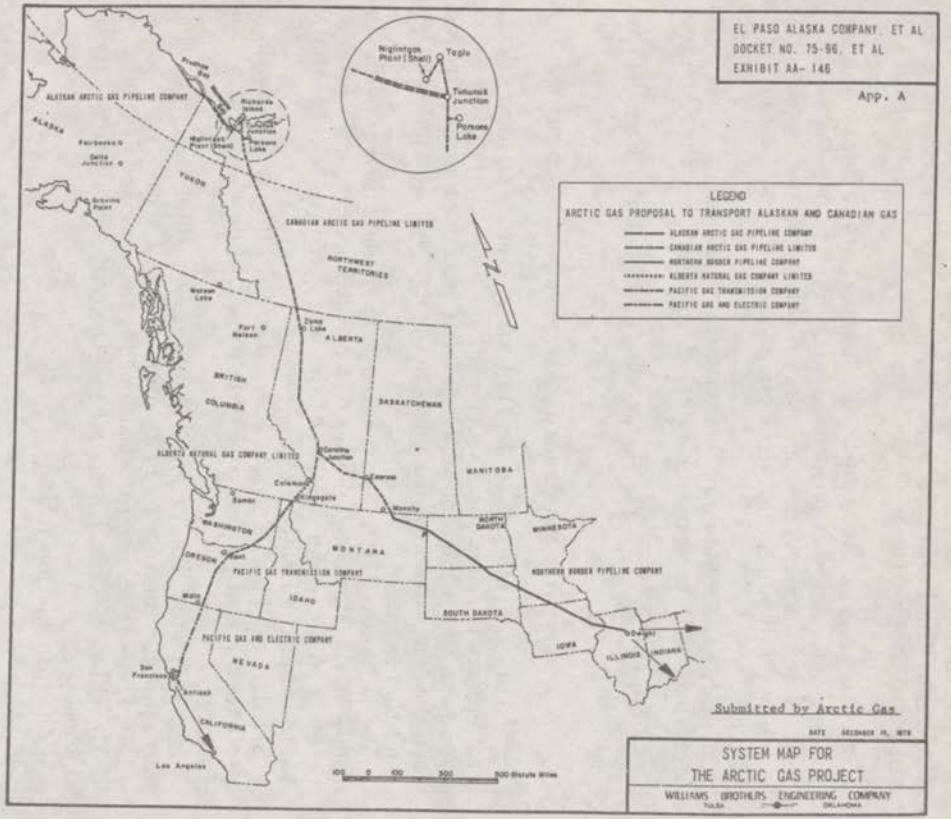
Mr. O'LEARY. The original Arctic gas project did have the two-way split coming to a point in Montana, as I recall it.

Mr. DUNCAN. Straighten that out for the record, will you?

Mr. O'LEARY. Yes, I will give you the routes of all three pipelines in the record.

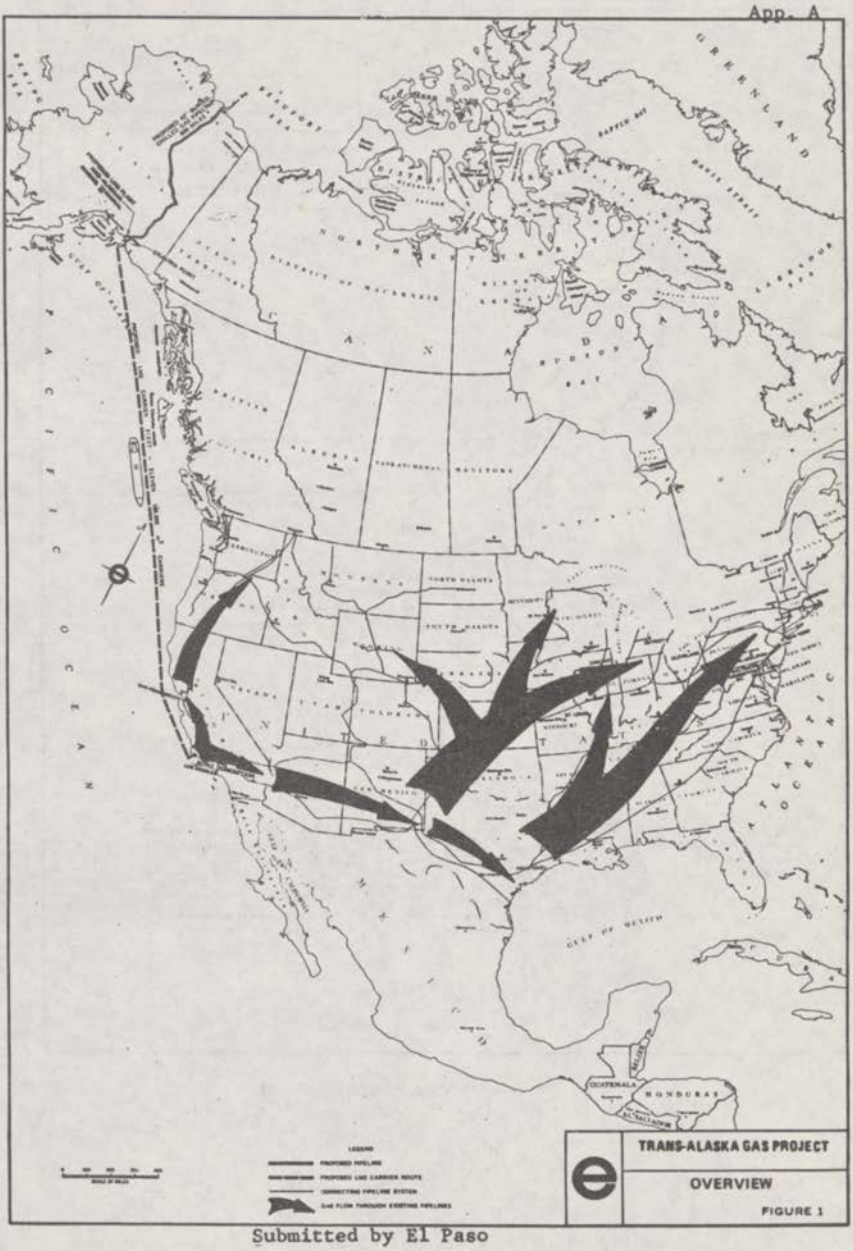
[The information follows:]

ARCTIC GAS PROPOSAL FOR TRANSPORTATION OF ALASKAN GAS



EL PASO PROPOSAL FOR TRANSPORTATION OF ALASKAN GAS

App. A



Submitted by El Paso

ALCAN PROPOSAL FOR TRANSPORTATION OF ALASKAN GAS

App. A

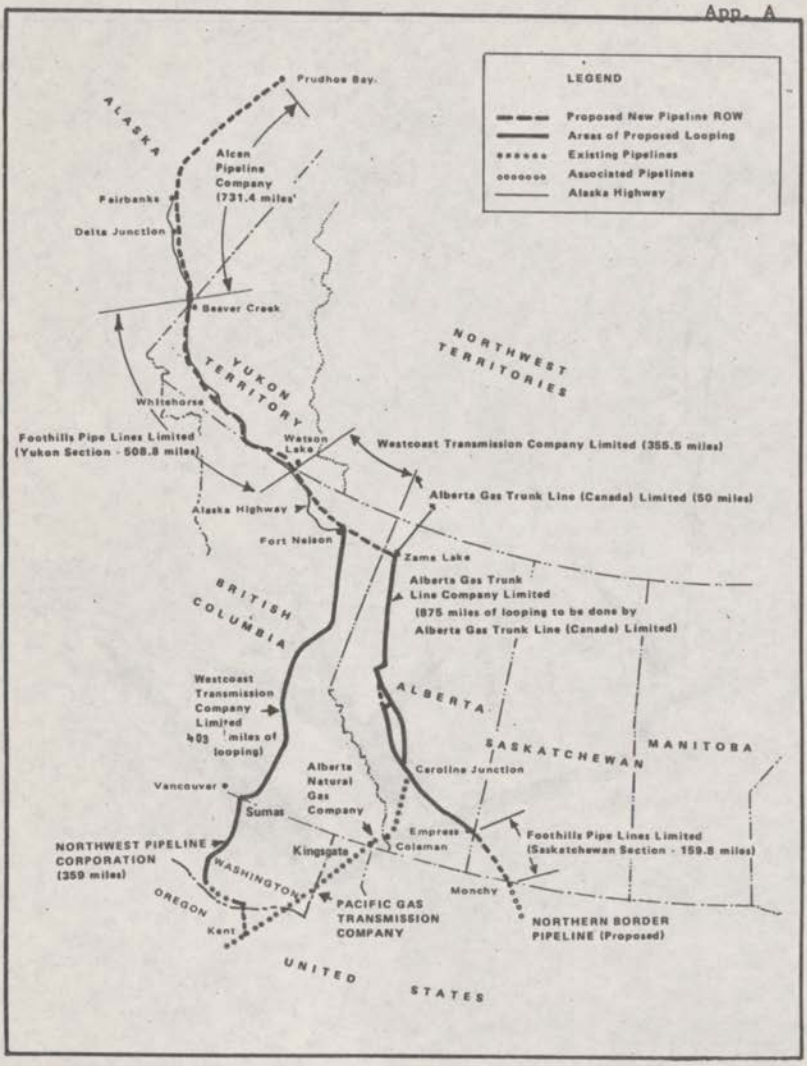


Figure 1. Overall System Map - Alcan Pipeline Project.

ALCAN-MAPLE LEAF PROPOSAL FOR TRANSPORTATION OF ALASKAN GAS

App. A



ALCAN - MAPLE LEAF PROJECTS

(From Staff Brief)

Mr. MURTHA. We are talking about 5 or 6 percent of our natural gas in the lower 48 which is going to be significant in the decision that is made. In other words, the judge didn't consider the Indian claims, but you are going to consider them, and FPC will consider them when they make a recommendation?

Mr. O'LEARY. The Commission has the next set of responsibilities, and I am sure they will put that in. As a matter of fact, my understanding is that the Burger committee report will be out in the near future, and I think then we will know more about the problem.

SHORTAGE OF REFINERIES

Mr. YATES. Some years ago, we were concerned about the shortage of refineries in this country. Are we still?

Mr. O'LEARY. We will probably get into a refinery bind again in about 2 years.

Mr. YATES. What do we do about it? There isn't a place in the country that wants a refinery, is there?

Mr. O'LEARY. There are a lot of places that would like to have refineries. I don't think that is the element. We are at the point now where the oil industry, at least, regards itself as having better options for investment. They distrust the entitlements program as bridging the gap that would force that investment because they regard that as a kind of sometime thing. It may be that we will have to find some new and novel ways in order to obtain the necessary refinery capacity in this country.

EFFECT OF CONSERVATION PROGRAMS ON DEMAND

Mr. YATES. How do FEA programs in conservation moderate demand?

Mr. O'LEARY. Over the next 7 years, we could have a moderating effect to the extent of around 3 million barrels a day, if the programs that we have discussed here were all to be put into effect, and we were to move them with a good deal of vigor.

COST OF CONSERVATION PROGRAMS

Mr. YATES. We haven't discussed questions of cost of your programs, have we? What are they likely to cost the Government?

Mr. O'LEARY. It is not a matter so much of cost to the Government. Indeed, the cost will most likely be on the private sector, and it will be substantial. I would imagine we will see an energy efficiency bill that will be in the range of $100 billion over the next 10 years.

Let me give you one example. If you decide that the Texas utility industry should go to coal, and should no longer burn oil and gas, or if they don't have the capacity to burn coal, every time you replace one of those plants that probably cost about $100 million, it will cost $1 billion. You will have to have a transportation system to get the coal there and mines behind it, and so on. It is not a cheap business.

EFFECT OF PRICE ON DEMAND

Mr. YATES. Nor a particularly easy one.

To what extent would price affect demand?

Mr. O'LEARY. Probably the price effects for gross energy demand are relatively negligible. There is substantial price elasticity across fuels, but there is some evidence to suggest that there is very little price elasticity for energy in toto.

OIL SAVINGS FROM THE COAL CONVERSION PROGRAM

Mr. YATES. Did you tell us this moring how much oil your coal conversion program is saving?

Mr. O'LEARY. I don't think I did this morning.

Mr. YATES. It hasn't saved much; has it?

Mr. O'LEARY. It has saved none yet. It seems to me that it will be saving about a half a million barrels a day.

Mr. HANFLING. Mr. Chairman, if all of the orders that we foresee issued by June 30, which is the expiration of the authority, can be fully implemented, we could save the equivalent of half a million barrels a day.

Mr. YATES. By when?

Mr. HANFLING. By 1985.

Mr. YATES. That is the target date?

Mr. HANFLING. Not so much a target date but a lot of the conversions appear to take that length of time.

Mr. YATES. What would be the coal use in 1985?

Mr. HANFLING. That would be about a billion tons a year.

Mr. O'LEARY. Not as a result of the coal program.

Mr. HANFLING. Only 50 million tons. The equivalent coal impact of that half million barrels a day is 50 million tons of coal a year.

EFFICIENCY OF COAL COMPARED TO OIL AND GAS

Mr. YATES. Would the use of coal probably be as efficient as oil and gas?

Mr. HANFLING. From an energy point of view?

Mr. YATES. Yes.

Mr. HANFLING. Not from the Btu point of view but from a cost point of view it would be less.

Mr. YATES. What is the difference in Btu content?

Mr. HANFLING. I am not sure of that.

Mr. O'LEARY. Let me help you. When you put on heavy scrubbing equipment, you derate a plant about four to six points. You can look on that as reducing the overall efficiency of the plant from, let's say, 38 percent to approximately 33 percent.

Mr. YATES. Mr. Hanfling has talked about reaching the figure in 1985. Shouldn't we also know other relevant statistics like the number of mines, the number of railroad cars, the number of pipelines that would have to be utilized to reach that figure?

Mr. HANFLING. We should; yes, sir.

Mr. YATES. You don't have that now?

Mr. HANFLING. No; we can get it for you.

[The information follows:]

COAL PRODUCTION

Production Forecast

The FEA forecast utilizing the PIES model estimates that over one billion tons of coal will be produced in 1985. In this forecast coal production East of the Mississippi River was estimated at 706 million tons while coal production West of the Mississippi River was estimated to be 340 million tons. Over 55 percent of the total production will be from surface mine operations with the remainder coming from deep or drift type mines. Two areas, the Northern Great Plains and Central Appalachia, will have the largest expansion in total production, as both areas are forecasted to develop well over 100 million tons of new coal mining capacity by 1985.

New Mines

The number of new mines needed to meet these increased levels of production depends largely upon the specific regional conditions of the reserve base, such as seam thickness, depth of seam, coal quality, and mine conditions. In the West expansion will take place through the development of approximately 150 new mines, most of which being large surface mines over one million tons of production capacity. The number of new mines needed in the East is much larger, and more difficult to estimate. Assuming the distribution of mine size in the East remains fairly constant, approximately 600 new mines will have to be in operation in order to meet the PIES forecasts for 1985.

Transport Requirements

Assuming that rail movements for coal account for the same share of shipments in 1985 as today (63 percent) approximately 650 million tons of coal will be moved by rail car. Estimates vary greatly on the number of hopper cars needed to handle this additional tonnage, for two reasons: first, the load capacity of hopper cars varies considerably, and second, the number of unit trains in operation will affect the overall total efficiency of hopper car utilization. Current utilization is 564,000 ton miles per car per year for an average load size of 76.6 tons per car. The best available technology would be to employ larger, 100 ton capacity cars in unit train operations with 7.2 million tons miles per car year potential.

The total number of cars used for coal is now approximately 225,000. Assuming by 1985 that most western coal production will be transported by unit train and that eastern coal production will be moved in relatively the same manner as it is today, in single or multiple car shipments, the total number of cars needed by 1985 is estimated to range from 188,000 to over 300,000. The actual number will depend primarily on the efficiencies realized and the rate of phase-out of current stock.

In addition to expanding rail capacity, other transport modes for coal will be needed by 1985. Currently, five coal slurry pipeline systems are being planned by 1985, the largest of which is a 1030 mile pipeline from Gillette, Wyoming to Arkansas with a 25 million tons per year capacity. If all five of these pipeline systems become operational by 1985 they will be capable of handling 70 million tons of coal a year. However, development of the coal slurry pipelines is being challenged by the railroads and certain environmental groups. The outcome of this debate is still uncertain at this time.

NUCLEAR POWER GROWTH BY 1985

Mr. YATES. What is your guess as to how much nuclear power will grow by 1985?

Mr. O'LEARY. About 122,000 megawatts.

Mr. YATES. How many reactors?

Mr. O'LEARY. About 135, roughly.

Mr. YATES. What is that equivalent in barrels per day in oil?

Mr. O'LEARY. That is equivalent to about 3½ million barrels a day.

EFFECT OF RESULTANT PRICE ON OIL AND GAS SUPPLIES

Mr. YATES. What would be the expected effect of price on the supply of oil and gas?

Mr. O'LEARY. I think we would be lucky if we hold the price on oil. I think we will reduce the rate of decline on gas, using any reasonable price formula.

Mr. YATES. Would price increases actually result in much more exploration?

Mr. O'LEARY. Yes; they will appreciably increase the activity, but not the finding.

Mr. YATES. Is there a time frame we should be concerned with here?

Mr. O'LEARY. I think we are going to be interested in economic recoveries of oil and gas as long as we are going to be in business.

SUPPLY INCREASES OF OIL AND GAS

Mr. YATES. When could supply increases be expected?

Mr. O'LEARY. For gas, I don't think they can be. For oil, they are very problematical. The only supply increase we are going to get that you can bank on is the Alaskan supply.

Mr. YATES. Is there a much higher level of oil and gas exploration today than in 1973?

Mr. O'LEARY. Significantly higher.

Mr. YATES. This morning, you gave us options Californians can take on the oil that is going to pour into the State. Do other supply problems exist in any other parts of the country?

U.S. ENERGY SUPPLY PROBLEMS

Mr. O'LEARY. There is a propane problem that promises to become increasingly severe as more and more of the natural gas load is moved over to propane. Congressman McDade has found in his part of the country people are doing this.

Mr. YATES. Is there a lack or a great supply of it?

Mr. O'LEARY. There is a fixed supply, and everyone who can't get gas is moving as rapidly as he can to get propane.

Mr. SMITH. Seventy percent available is extracted from the natural gas stream, Mr. Chairman, so as natural gas production declines, the availability of propane declines while the demand increases.

RESPONSE TO VOLUNTARY PROGRAMS

Mr. YATES. Has the response to voluntary programs been documented in any way?

Mr. O'LEARY. We are doing some postmortem work now that will have the effect of documenting it. We want to learn some lessons from this winter, particularly.

MANDATORY CONSERVATION PROGRAMS

Will you place in the record a list of mandatory conservation programs that are still in effect?

Mr. O'LEARY. The five that are called for in EPCA are still in effect.

Mr. YATES. Do you know what the results have been?

Mr. O'LEARY. No; the target of those is a 5-percent saving by 1980. It is unfair to say they are still in effect. They are going into effect now, and there is no savings attributable as of today.

Mr. YATES. You previously indicated that you propose to have independent verification of the data respecting oil and gas which now comes from industry associations. What steps do you propose to take in this area?

Mr. O'LEARY. That will be addressed more fully in April, but let me give you——

Mr. YATES. April 20?

INDEPENDENT DATA VERIFICATION

Mr. O'LEARY. Yes, Mr. Chairman, but let me give you an inkling of the problem. Today, industry has meetings of geologists throughout the country on a regional basis. These are closed. Neither the public or Government representatives participate. The methodology, as I understand it, is not all that concrete. The combination of these two factors, plus the third factor that the data are aggregated, makes it impossible for the Government to track them.

My own view is, in order to track through this, we have to ask the industry to do several things: First, to expose the operation to Government observers; second, to make explicit rather than implicit their methodology so it can be replicated by others; third, to provide us with disaggregated data. When this occurs, we can go in on a sample basis without reproducing everything industry does.

Mr. YATES. What is your guess as to how industry will react?

Mr. O'LEARY. I think they will not welcome this with open arms, but the more broad-gaged people in the industry recognize this day is coming.

Mr. YATES. What is your relationship with the National Petroleum Council?

Mr. O'LEARY. I have none.

Mr. YATES. Does anybody?

Mr. O'LEARY. The Secretary of the Interior; it is advisory to the Secretary of the Interior.

Mr. YATES. Can he add people to it if he desires?

Mr. O'LEARY. He appoints the membership.

Mr. YATES. He could add to that membership if he desired?

Mr. O'LEARY. It would be a very unusual move, but I suspect he could.

Mr. YATES. That should be an interesting membership.

UTILITIES AND PLANT CONSTRUCTION

Are utilities continuing to cancel or postpone new plant construction? You indicated they are postponing. In other words, they are presently having grave problems respecting investment at this time.

Mr. O'LEARY. Yes.

Mr. YATES. I don't remember you indicated how they are going to meet that.

Mr. O'LEARY. The great escape hatch here is gas-fired turbines and diesel sets. What they will do when they get into a crunch is probably what they did back in the early 1970's when they came into a comparative short-term situation, that is, go off the shelf and pick up turbines and burn a lot of gas to meet peakloads. And a lot of No. 2 oil. It is a very bad solution to the problem.

TREND AWAY FROM DECENTRALIZED POWER GENERATION

Mr. YATES. Is there any trend to decentralized power generation?

Mr. O'LEARY. All the trends now lead toward bigger and bigger and more and more centralized. The solar would reverse that trend, but it is some years off.

Mr. YATES. What is your reaction to Amory Lovin's quote, "We could be running the country with no central power stations."

Mr. O'LEARY. This country in the past ran with no central power stations, Mr. Chairman. It is altogether possible. This was some years back, you understand.

BENEFITS OF CENTRALIZED POWER GENERATION

Mr. YATES. Of course. We have grown a little since then, haven't we?

Is there any near-term benefit in this approach?

Mr. O'LEARY. I personally think that Amory Lovin, although he might have overstated his case, has a valid point of view. We should push as hard as we can to exploit the potential in solar, always keeping the economic target in sight.

If we find that solar doesn't have the drive of coal and nuclear, you would not get economies of scale. If you find—and I think we are within just a few years, not a lot of years of finding good technology there, you could bring power generation back into a local siting.

Mr. YATES. What about the wind?

Mr. O'LEARY. Tactically, but not stragetically.

Mr. DUNCAN. There is a guy in Oregon who claims to be able to decentralize both solar and wind, and he has a meter that will shut itself off when using his own power, and if he has a surplus he isn't using, it will reverse that meter and give him credit as it feeds back to the main line.

Mr. O'LEARY. I believe that. There is a full-scaled project going on in Clayton, N. Mex., to go back and forth.

Mr. YATES. You want $39,585,000 for energy information and analysis, which is about $8.5 million over the last fiscal year.

What is the program of the Office of Economic Impact Analysis; what is a competition analysis; and how would that be used?

Mr. CHRISTIE. In the Office of Economic Impact Analysis we are required for any law or regulation to make an economic imact assessment to analyze its effect on the mircoeconomy, GNP, inflation, unemployment, and to the extent we can, make an assessment of the effects on different socioeconomic groups and regional groups around the country.

HORIZONTAL AND VERTICAL DIVESTITURE

Competition analysis is a shop set up to look at both horizontal and vertical divestiture questions which I do not believe will be solved in the short term.

Mr. YATES. You are set up to look at the horizontal and vertical divestiture of the oil companies?

Mr. CHRISTIE. Of the petroleum industry. To the extent FEA has examined those questions in the past, that element of my office has looked at it.

Mr. YATES. Isn't that a tremendous challenge?

Mr. CHRISTIE. It is a tremendous challenge. There is a lack, I think as Mr. O'Leary said this morning, of good and adequate data in a number of areas. That is one. The competition task force, which also does the market shares report which is required by law to be provided to the Congress on the shares of various petroleum products——

EMPLOYEES IN ECONOMIC IMPACT OFFICE

Mr. YATES. How many people do you have?

Mr. CHRISTIE. The total office, in economic impact?

Mr. YATES. Yes.

Mr. CHRISTIE. On the order of 55 people.

Mr. YATES. You take care of all your duties, including the possible breaking up of some of the giants in the fuel business?

Mr. CHRISTIE. We have not completed our efforts and our work. There is no question about that, sir.

Mr. YATES. How old are you?

Mr. CHRISTIE. Thirty-nine or forty, something like that.

Mr. YATES. You still have a lot of years ahead of you.

STATE INCOME AND EMPLOYMENT ANALYSIS

There is a $231,000 contract for regional and State income and employment analysis. Why is FEA doing this study, instead of letting the Department of Labor do it?

Mr. CHRISTIE. If we are to make assessments of the impacts on various income groups around the country to find out how various taxes will affect them, as we are requested to do, we need this information to make input——

Mr. YATES. It is not available to you elsewhere?

Mr. CHRISTIE. To the best of our knowledge; no.

Mr. YATES. Have you looked?

Mr. CHRISTIE. Yes; one of my great concerns in the whole energy information business is to avoid duplication and overlap so we try and take——

Mr. YATES. I think yours is the third agency engaged in that activity, which indicates that is duplicated.

NATIONAL HOUSEHOLD SURVEY

Let's go on to page 75, where you talk about a "third national household survey." What are you going to survey?

Mr. CHRISTIE. We don't mean the total universe, but making a sampling survey——

Mr. YATES. This is a socioeconomic analysis, "a third national household survey." What are you surveying?

Mr. CHRISTIE. We are trying to get information on what people consume energy for. One of the great weaknesses—and this comes up someplace else, also, in the consumption data base—a great weakness in our system is knowing what energy is used for in the various sectors, and we are going to start on the consumption side.

Mr. YATES. Can't you take your own house? You have two television sets, a toaster and vacuum cleaner. Is this the kind of survey?

Mr. CHRISTIE. Not like that, but to try and get some estimate of how much energy is consumed by appliances versus air-conditioning. My household would not be typical, given that my wife and I both work and we are never there.

Mr. YATES. That is typical of a lot of houses these days.

Mr. CHRISTIE. I suppose.

DUTIES OF ENERGY INFORMATION AND ANALYSIS EMPLOYEES

Mr. YATES. It appears that a large part of the work is done by contract. What do your employees do? Let contracts?

Mr. CHRISTIE. No; maybe a little bit too much. Our employees do analysis, but we try to make the split between contracts and analysis when we are going to do something on a one-time effort. It does not make practical sense in my personal view to hire people if you are only going to do things one time. If you are going to do things repetitively, 10 or 20 times, short-term petroleum forecasting or preparing economic impact statements, a lot of that is done in FEA. But, to the extent we need a collection of data or survey done on a one shot basis, in my personal opinion those things should be contracted out.

STAFF RESOURCES

Mr. YATES. Do you have enough employees for your work? Is one of the reasons you do so much contracting the fact that you have employee ceilings that stop you from doing it in-house?

Mr. CHRISTIE. In part, yes. There is an emphasis, to the best of my knowledge, in OMB to do as much contracting out as possible and keep the number of Government employees down to the minimum essential levels. Given those restrictions and pushes on us from OMB, that determines, in part, the balance between in-house work and contract work.

Mr. YATES. What overall benefit does the Government get from the $39.5 million spent by your office?

Mr. CHRISTIE. If I were Eric Zausner, I would have a stack of 11 feet of paper he brought in last year maybe, to this committee and others——

Mr. YATES. But that was triplicate.

Mr. CHRISTIE. I don't think so. I think they were all single copies.

We provide information to the administration and to other parts of the executive branch. We provide analytic work to the FPC with regard to Alaskan gas, statistical reports to the Congress as required by law and some not required by law. We provide to the public and to the Congress a monthly energy review, which has statistical information.

Mr. YATES. Does Mr. O'Leary ever read your stuff?

Mr. CHRISTIE. Some he does and some he disagrees with. The first draft of this year's National Energy Outlook, he made some comments that he did not think some of the things were consistent with his intuition and judgment.

Mr. YATES. Why don't you use his intuition and judgment instead of your studies?

Mr. CHRISTIE. Sometimes I would like to believe that if we have good and valid information we may change his intuition, but sometimes we change our own judgments. The major value of anlytic work is to figure out if your intuition is correct. That is one of the major values. Or whether or not there are some things when you do an analysis that come around to say——

ADEQUACY OF ENERGY INFORMATION ANALYSIS STUDIES

Mr. YATES. How do you know your studies are adequate to persuade you to change your intuition?

Mr. CHRISTIE. I don't

Mr. YATES. That is nonsequitur, isn't it?

Mr. O'LEARY. I think what happens here is that I am not the only one that disagrees or agrees.

Mr. YATES. We are not talking about your intuition, but his.

Mr. O'LEARY. Yes; there are a whole group of people who, every time he puts out a number, are shooting at it, and there is a sort of cauldron effect.

May I say one word about what good is his business? We are making decisions, and the "we" here is between the Congress and the administration, that run in any given week, $5 billion or thereabouts in the oil patch. We make them on the basis of insufficient data. A small error, or misjudgment, for example, in how we handle California crude, is $200 million, and you can demonstrate that.

Mr. YATES. So he has to be as accurate as he can?

Mr. O'LEARY. He has to be as good as he can, and he is 15 years behind the power curve.

Mr. YATES. How good is he?

Mr. O'LEARY. He is not good, but a lot better than anything else and much better than he was 2 years ago.

Mr. YATES. Shall we call him back in 2 years?

Mr. CHRISTIE. I am sorry. I misunderstood your last question about how do you know it is good enough to change my own intuition.

Mr. YATES. You may correct the record.

Then we turn to the Office of Data and Analysis, and there is a request for $14,562,000. Now that is an increase of $6 million over fiscal 1977.

NATIONAL ENERGY INFORMATION SYSTEM

What about the national energy information system? Has it been set up in a manner that will help?

Mr. CHRISTIE. We are in the process of setting it up. That is the system which is required by the ECPA law of August 1976. We have some request in our 1977 supplemental and 1978 budget to set that up. We are in the process of setting up the guidelines as to what will and will not be included in the criteria under which we will include things in the national energy information system.

Generally speaking, that should encompass most of the data systems we have, plus some we still need to develop.

AFFECT OF NATIONAL ENERGY INFORMATION SYSTEM ON OTHER AGENCIES

Mr. YATES. How will it affect other agencies' programs after you have it set up? Will this be the base for action?

Mr. CHRISTIE. It will provide information that is currently available to them, but it will be a better, more valid and credible source of information for the other agencies in the Government, the Congress and the public to use.

Mr. YATES. Better than the Bureau of Mines' data? Is this different than Bureau of Mines' data?

Mr. CHRISTIE. In some cases we have joint systems with the Bureau of Mines. The petroleum reporting system is a case in point where both of us have developed a joint petroleum reporting system. That will become part of the national energy information system at some point. But that one we are jointly improving.

EVALUATION OF OTHER AGENCY DATA SYSTEMS

Mr. YATES. Is it your function to evaluate the data systems of other agencies?

Mr. CHRISTIE. It is our function, as required by the ECPA, to coordinate the data collection efforts of other agencies. I would have to check. I am not sure we have the authority to evaluate and change those. We may have the ability to evaluate, but not the authority to direct changes in other agencies' data collection.

DUPLICATIONS OF DATA SYSTEMS

Mr. YATES. Are there other data collection systems in other agencies that do the same work you do?

Mr. CHRISTIE. I would say the short answer is, "No". There are data systems in other agencies that do similar things to what we in FEA and EIA do, but to the best of my knowledge, there is no one system that is an exact duplicate of another. There are different requirements in different agencies under different laws to collect different things, sometimes under different definitions. That is a frustrating thing to us, you, and the public when you have different definitions, for example, of reserve.

87-591 O - 77 - 30

ENERGY INFORMATION ANALYSIS AND THE NEW DEPARTMENT OF ENERGY

Mr. YATES. How will you fit into the new Department of Energy? Will you be taken over by them?

Mr. CHRISTIE. I have no idea whether they would take me aboard.

Mr. YATES. I don't mean you; I mean the office. We are all expendable.

Mr. CHRISTIE. I assume my office would become a major portion of the Energy Information Administration within the new DOE.

Mr. YATES. It would be the fundamental basis for the Department heads' actions, wouldn't it?

Mr. CHRISTIE. Yes.

Mr. YATES. FEA is supposed to be consolidating energy information and eliminating duplication. You have assured us that you are not duplicative of other agencies, and it is interesting because our investigative staff last year identified 108 data systems, 223 forms, 1,462,000 annual responses to Government energy data requests from the private sector, and I remember witnesses coming in here from Standard Oil, or Exxon, and a couple of other energy companies and complaining bitterly about the requests for information that they had to comply with. I don't know whether you are one of the guilty people or not, but I assume that you are as gentle and as minimal as you can be, within reason.

REPORTING REQUIREMENTS TO ENERGY INFORMATION ANALYSIS

Mr. CHRISTIE. Within reason, and when necessary. Sometimes I probably sign letters to companies saying they have not complied with the rules and regulations for providing data and information, for example, for regulatory programs. In those cases I am probably not too gentle.

In a number of data systems, it is over 200. As I indicated the last time we were before your committee, Mr. Chairman, we did start to coordinate the energy data activity of other agencies on October 28 with that interdepartmental meeting and we have started to get responses from those other agences. And there are problems in the area of companies which are asked for similar types of data from FEA or another agency, or even similar type data from FEA on different forms for different purposes.

Mr. YATES. You have to have your information and you try to make it as simple as possible in order to make it as easy as possible on the recipients to provide it, don't you?

Mr. CHRISTIE. We try.

Mr. YATES. But you still have to be thorough.

Does industry get your data, too, or is this just for Government operation?

AVAILABILITY OF DATA

Mr. CHRISTIE. Our data is available, with the exception of confidential and proprietary data, to any member of the Government, executive or legislative, to the public, and to industry.

Mr. YATES. I was thinking you can't make a deal with industry to get the data from them that you wanted in exchange for this kind of data. I suppose under the law you are required to make this available.

Mr. O'LEARY. It is public domain.

Mr. YATES. Mr. Duncan?

Mr. DUNCAN. The Chairman has been willing to assume that your efforts at collecting all this data are gentle and not too onerous, and yet the impression I have is exactly the opposite, and obviously you believe that there is room for improvement, or you wouldn't have had this coordinating committee sitting with the rest of the agency to try to work out some of these problems. Is that correct?

Mr. CHRISTIE. I believe there is room for improvement, and I am required by law to do the coordination.

RESULTS OF DATA COLLECTION REFORMS

Mr. DUNCAN. Can you give us for the record what results have been accomplished? Have you succeeded in cutting down forms, consolidating definitions, reducing the impact of this on the public?

Mr. CHRISTIE. With regard to the coordination with other agencies, it is too soon, and there are no results in. With regard to FEA, in terms of reduction of paperwork, a Government goal for the last 2 years was improvement of 5 percent. In 1976 our reduction in reporting burden was over 30 percent. I think it was a similar number in 1975. With regard to 1977, we have already made a significant improvement over and above the 5 percent.

Depending upon the requirements in the future, and with new systems that should be implemented it may be necessary that the reporting burden on industry will have to go up. That will be a judgment made depending on the requirements which are placed upon my office by Mr. O'Leary and others.

Mr. DUNCAN. Is that 30-percent reduction in FEA alone?

Mr. CHRISTIE. That is a reduction in reporting burden of people to FEA. That is correct.

Mr. DUNCAN. That is significant, I think, and I am glad to have it, and if you can add any additional details in the record, I think that is important, because each of us have to answer to our own constituency, and I am pleased you are doing this, and if there is something that needs to be done with respect to the law, I hope you won't assume that law is immutable, and if you have suggestions as to changes that can be made, I would be personally pleased to have them.

Mr. YATES. As far as he is concerned, the law is immutable; otherwise he is violating the law.

Mr. CHRISTIE. But I believe to the extent Mr. Duncan is saying if we could suggest changes to that law, he would be receptive.

Mr. YATES. Of course, we are always looking for progressive changes, and we are going to meet tomorrow at 10 o'clock.

WEDNESDAY, MARCH 30, 1977.

DATA ON COAL RESERVES

Mr. YATES. Mr. O'Leary, yesterday we were talking about data systems, and we hadn't completed that. We understand the data on coal, particularly on coal reserves, isn't very reliable. Is it your func-

tion to upgrade that data or Geological Survey's, or do you work with them?

Is our information correct about the reserve data not being very reliable?

Mr. O'LEARY. Reserve data on coal are better than any of the other major commodities. They are good enough for policy purposes. Where you have confusion is when you take an action, for example, on alluvial valley floors. How much in the way of reserves does that cut out? Or if you say you can't mine on prime farmland, how much in the way of reserves does that cut out. Actually, if I had to schedule it; it would be uranium first, it is the biggest problem, the oil and gas data are probably good enough but nobody trusts them. And the coal data are good enough for macropurposes, lousy for micropurposes.

ENERGY RELATED FORECASTS

Mr. YATES. Who else makes energy-related forecasts beside you?

Mr. O'LEARY. The Department of Commerce has emerged here in recent months as a prime modeler; EPA also does a good deal of work in the area.

Mr. YATES. Are you number one?

Mr. O'LEARY. We are number one, but, as Mr. Christie pointed out, there are 240 other entrants in the field.

Mr. CHRISTIE. We are first in data systems, not necessarily in the forecasting, but there are others in the forecasting.

Mr. YATES. When do you reach the finals, and who wins?

Mr. CHRISTIE. I guess I would like to think we are better than that.

DUPLICATION IN ENERGY DATA COLLECTION

Mr. MURTHA. Are you then talking about a lot of duplication? Obviously you would have to collect the information from the companies and then you have to report to all those different agencies?

Mr. O'LEARY. There is a certain amount of duplication, as we pointed out yesterday. The Federal Power Commission, for example, does, to a degree, or we to a degree duplicate what they do. But you have to understand that we have a whole series of agencies involved in this energy business, touching various parts of it. Each has statutory mission-related requirements for data, and they go out and collect the data they require. What we will be trying to do in setting up Mr. Christie's shop is see to it that when there is a common requirement across the government, that it be done on one single pass at the companies who are the respondents.

Mr. MURTHA. You are talking of consolidating the data-collecting agency. Bureau of Mines, FPC, or anybody that has energy information requirements will go through you before they put out a brochure or questionnaire?

Mr. O'LEARY. The clearance function in energy is conducted by OMB and GAO. They are the two agencies who do the review. Right now, let's just track a case through. Let's say that the Federal Power Commission has a requirement for reserve data. We have a good bit

of reserve data; the U.S. Geological Survey has a good bit of gas reserve data as does the Bureau of Mines. Before the FPC is permitted to go out for a new set of reserve data, it must see to it that the existing collection mechanism doesn't meet their requirement. Once that is satisfied, then they go out.

This is going to take, as I suggested yesterday, a long time to accomplish. Data management is one of the most complicated businesses to get involved in, because data requirements shift so rapidly. What we would like to see is a situation where FEA's Office of Energy Information and Analysis acts as a Government resource so that when there is a massive new data requirement, let's say for reserves, FEA isn't simply a checkpoint before the FPC goes out and collects its own data; it does its own and is able to spinoff what FPC requires.

ELIMINATION OF ENERGY DATA DUPLICATION

Mr. MURTHA. What about the agencies that are already duplicating effort? Are you going to eliminate that in any way?

Mr. O'LEARY. As Mr. Christie pointed out yesterday, there has been a substantial reduction in the more obvious areas of duplication already. The FEA, of course, grew up in several stages and various offices within FEA were developing their own data requirements. These were not consolidated, and FEA, itself, duplicated to a degree its own calls on respondents; however, there has been a very substantial reduction in the number of requests that have gone out to respondents from FEA, and we are beginning to see—although I have to tell you we are a long way from completion—the point where the overall reporting burden will be rationalized, but not minimized.

There will be a very, very extensive reporting burden. We are about to get into a financial reporting system within the next year. This is an area that hasn't been hit very effectively except a little by FPC, a little by the Federal Trade Commission and a little by SEC. We are moving in the direction, under title V of ECPA, of going through a comprehensive financial reporting scheme that is going to be bitterly resisted by the companies, because it will be an additional reporting burden. However, it should provide a sufficiently sophisticated system of numbers with regard to the financial position of the companies so all agencies can have a uniform base to use.

Mr. MURTHA. That is all, Mr. Chairman.

AVAILABILITY OF INFORMATION TO THE PUBLIC

Mr. YATES. What is going to happen to all the information that you receive? Will it be made available to the public?

Mr. O'LEARY. Yes, it will.

Mr. YATES. For free?

Mr. O'LEARY. It is made available to the public in several forms; Mr. Christie will explain.

Mr. CHRISTIE. Generally speaking, the only things that are not made available to the public are proprietary or confidential information. Generally, things are made available free. Regular publications are sold through the Government Printing Office, like the Monthly Energy

Review. You can subscribe to that; but if a request comes in from a member of the public, we provide information free.

Mr. YATES. That compares with Smithsonian's Science Information Exchange; they require payment for theirs, information that they gather.

Mr. HOWELL. Mr. Chairman, if I may, in our freedom of information office, which is also in my purview down there, we do charge a fee based on the time and based on reproduction costs.

CONFIDENTIAL FINANCIAL INFORMATION

Mr. MURTHA. How about this financial information that will be confidential?

Mr. O'LEARY. Part will be confidential; part will be aggregated and not confidential. There are broad areas of the companies' financial accounting that are already in the public domain in financial reports.

Mr. Chairman, at the moment, the best data available with regard to the financial accounting of the industry is the Chase Manhattan Service that covers the largest 30 or 32 oil companies. I think that is a commentary on how little we know about the impact of the very large dollar decisions we are making on a monthly or regular basis in the Government on the real fiscal position of the oil industry.

Mr. MURTHA. How much oil do those 30 or 32 produce?

Mr. O'LEARY. Something like 50 percent of it.

Mr. YATES. What happens in the event that some of the information you receive, which is classified confidential and proprietary, is information that you consider important enough to be made public?

Mr. O'LEARY. If we receive the information on a proprietary basis, I think we are honorbound to maintain it that way.

Mr. YATES. And you do?

Mr. O'LEARY. And we do. I have had a very, very long experience in this. When I first went to work for the Bureau of Mines, they received then, as they do now, an enormous amount of information on a voluntary basis which is given to them in confidence. It seems to me that one of the things that you have to do in Government is, when you receive something in confidence you have to maintain the confidentiality.

There has to be a test. A lot of times the guy will send in a newspaper ad and stamp it confidential, so you don't want to blindly accept it. You should test it. But when you have tested it and say, "We intend to release this. Does it breach confidentiality?", and he comes back and says, "Yes, that provides data to a competitor of mine that will permit him to have an unfair competitive advantage over me", then it seems to me that we are simply dutybound to honor the confidentiality.

AGGREGATION OF CONFIDENTIAL DATA

Mr. CHRISTIE. As Mr. O'Leary mentioned before, you can aggregate confidential or proprietary data generally to a level where it is no longer in that category and provide it to the public.

Mr. O'LEARY. When we first began to struggle with this in the Bureau of Mines—and the first struggles in this area were in the Bureau—the rule was an aggregation of three. If there were less than

three respondents in a State, we would not show data that was literally confidential for two, because then the competitor could simply subtract his own and get the residual. But if there were three, we felt that was sufficient cover.

Mr. YATES. Would you place in the record information showing how your personnel and contract dollars are split between data-gathering functions and modeling and forecasting?

Mr. O'LEARY. We shall.

[The information follows:]

DATA GATHERING/MODELING AND FORECASTING

	Positions	Contracts
Data gathering	150	$15,880,000
Modeling and forecasting	51	2,136,000
In addition to the above figures, E.I. & A. also has the following areas to be supported:		
Economic impact analysis	61	1,976,000
Oil and gas reserves study	3	2,000,000
National energy information system development	10	300,000
PIES access	6	125,000
Consumption data base improvement	15	480,000
Data Validation	12	1,184,000
Technical data information dissemination	30	588,000
Office of Assistant Administrator	13	0
Development and improvement of oil, gas, coal, electric and nuclear data bases; financial, price and statistical analysis; documenting data and analysis systems; and international analysis	108	2,738,000
Total	459	27,407,000

OIL AND GAS RESERVE ASSESSMENT

Mr. YATES. You want to make an oil and gas reserve assessment. How much will this assessment cost?

Mr. CHRISTIE. Just over $2 million.

Mr. YATES. Does it involve actual field measurements?

Mr. CHRISTIE. It would not involve actual field measurements on the part of FEA, but there would be selected audits of various reports provided by the individual companies, if we proceed as proposed, but we have not yet gotten Mr. O'Leary's input. But we would get reserve estimates from individual companies. That would be one source. Then we would have independent audits made of a selected small number of fields to check against what was reported by the companies because of our concern with the validity and the credibility of the data.

Mr. O'LEARY. Mr. Chairman, I addressed this point yesterday, and I would like to give you one more aspect of it now. The difficulty with the things that have been done in this area in the past is that we did not get back into the primary data. To give you an idea of the magnitude of the problem, there are something in the range of 650,000 wells in this country now producing oil and/or gas. As I explained yesterday, each year the geologic community, working for the companies, gets together on a regional basis, and tell one another what a certain reservoir is capable of and what the reserve is. From this they develop an estimate without rigorous methodology, and in camera. Before we can really begin to get to the point where we have a public understanding of the reserve data, we are going to have to become involved in that process. The current proposal will take us a little way down the

line, but I think we are going to have to make stronger and more systematic initiatives with industry in order to really get reserve data that we can believe in.

ENHANCED OIL RECOVERY ESTIMATES

Mr. YATES. How does this assessment differ from the one that was just completed by ERDA? They made an assessment of enhanced oil recovery in the oil and gas fields.

Mr. CHRISTIE. The reserve estimate would not be the same thing as estimates of enhanced oil recovery. The reserve estimates are total estimates of proven reserves in the United States.

Mr. YATES. How do you do it? Why wouldn't it be the same?

Mr. O'LEARY. ERDA has a responsibility to conduct a research program in enhanced recovery, and they were looking at the potential for that program to develop new production. This works on reserves in place that are already well known. It is quite a different part of the problem that Mr. Christie is addressing.

Mr. YATES. I would have thought it would be part of the same problem.

Mr. O'LEARY. No; we at the moment recover nationally about 31½ percent of the oil in place. There is about 300 million barrels that we know can't be recovered with today's technology. ERDA is trying to take a look at what portion of the 300 billion barrels is recoverable with extensions of existing technology. It is a separate question.

COMPARISON WITH FEDERAL POWER COMMISSION DATA COLLECTION

Mr. YATES. How does your proposal compare with what the FPC does?

Mr. O'LEARY. It is very comparable, but it suffers from the same disability that the FPC and earlier appraisals by FEA in that we do not get back to the primary data with the degree of aggregation that is essential in order to have an understanding of the problem.

Mr. CHRISTIE. Our effort would be coordinated with the FPC and the USGS. The difficulty that the FPC has is that they only have authority to collect data on reserves that go into the interstate market. The USGS is fully responsible for reserves on Government lands, but to the best of my knowledge it is only FEA that has the broader authority to collect reserve information on lands that fall in neither of those categories.

Mr. O'LEARY. One further point on that. The current FPC effort to go into more detailed work on reserve data is tied up in what is known as form 40, a proposal that has been around Washington for 2 years. It is currently in the courts. There is a challenge testing whether or not FPC has the authority to require that degree of finite detail and information. I think there is no question about our authority.

Mr. YATES. Is there question as to whether you can turn that information over to FPC?

Mr. O'LEARY. Not at all.

DATA VALIDATION EFFORT

Mr. YATES. On page 69, you describe a data validation effort for Government data systems. Are you going to assess the need for these systems before you validate the data?

Mr. CHRISTIE. Yes; we started on October 28 with regard to other Government agencies.

CONTRACT FOR OIL AND GAS RESERVES SURVEY

Mr. YATES. The largest portion of your requested increase for data is in the contract area. Is the $2 million for the oil and gas reserves survey a one-time shot?

Mr. CHRISTIE. The last study was done in 1975. This one, if approved, would be done in fiscal year 1978.

Mr. YATES. Who would do it?

Mr. CHRISTIE. We, in conjunction with FPC and USGS. We have had meetings with OMB to try to get the thing integrated, to get common definitions and minimum overlap of information. In that sense, it is a one-time effort, but depending on the future guidance and direction of this administration, it could become a yearly effort or every other year.

INTERNAL ENERGY SUPPLY ANALYSIS

Mr. YATES. What is an internal energy supply analysis? It is listed on page 78. "Internal energy supply analysis, $160,000," it says at the bottom of the page, under general analysis.

Mr. CHRISTIE. In that context "internal" means, to the best of my knowledge, in the United States versus foreign, because in another aspect of our program we look at international energy.

Mr. YATES. How do you propose to keep track of all this data?

Mr. CHRISTIE. With difficulty, but we have currently a data dictionary and a Federal field system energy information system to keep track of what data is collected by various Government agencies. It is printed in a book, what is collected, not collected, and the point of contact in each agency, so it is a source for people when they do want data and information to find out if it is already being collected in the Government.

Mr. MURTHA. You don't evaluate whether it should be collected?

Mr. CHRISTIE. We have not to date evaluated whether or not it should be collected. What we have started in the October 28 interagency meeting is to get people to submit to FEA, as required by the ECPA, what they collect and under what authority or laws, so we can evaluate what is collected. To the best of my knowledge, the law does not provide FEA or E.I. & A. the authority to tell some other agency not to collect. That authority lies with OMB and the President, generally speaking, to cut off the funds for such collection. We are reviewing people's needs and requirements for data in international coordination.

EVALUATION OF COLLECTED DATA

Mr. MURTHA. You coordinate the collection but don't evaluate the collection?

Mr. CHRISTIE. We will be evaluating within FEA as we get the others agencies' submissions on what and why they collect it. We will be evaluating that.

Mr. O'LEARY. We are part of a larger system of data management conducted by OMB. They are the ones who say, for example, to the Fish and Wildlife Service, you should or shouldn't collect energy data.

Mr. MURTHA. But what I am concerned about is all of this talk about eliminating paperwork, and we continue to add to the burden of private business or even the Government, itself, by all these forms that we send out.

Mr. O'LEARY. We are quite consciously trying to reduce the number of repetitive demands that are made on industry, and let me say that carefully. Over time we will probably ask industry for more and more discreet pieces of data, but we are trying to get to the point where there aren't 15 agencies asking for the same piece of data. This is one of the primary bases of ECPA in that process.

Mr. YATES. How do you achieve that goal unless you stop some agencies from requesting the data?

Mr. O'LEARY. We are not supposed to ask the Department of Commerce whether they need data. That is OMB's function. If they need data, we should see, to the extent we can, that our general purpose data supplies their data needs as well as that of other people.

Mr. YATES. Do you happen to know whether OMB is performing that function?

Mr. O'LEARY. OMB and GAO have been performing that function for years, but it is extremely tricky.

Mr. MURTHA. In line with what the Chairman is saying, when you think about it, the people who should evaluate whether energy information should be collected would be FEA rather than OMB, it seems to me.

Mr. O'LEARY. Let's think now of the requirements of a particular export program with the Department of Commerce. They might need a twist on the data that is of no interest to us at all, and have a thoroughly legitimate requirement for it. I don't think we can put FEA in the process of saying to the Department of Commerce, "We don't think you should collect that."

Mr. YATES. Isn't it possible to combine a number of forms?

Mr. O'LEARY. That is what we are trying to do.

Mr. CHRISTIE. Backing up to your question, Mr. Murtha, we try to work with OMB's statistical division and have suggested, with regard to the data collection requirements, that we work with them as a lead agency, but they maintain, as Mr. O'Leary said, that final responsibility.

As it turns out, one of my deputies used to work in the statistical division of OMB, so I think we have a good working dialog with OMB at this point.

DISTINCTION BETWEEN DATA SERVICES AND DATA ANALYSIS

Mr. YATES What is the difference in function between your Office of Data Services and your Office of Data and Analysis?

Mr. CHRISTIE. The Data and Analysis Office is where the modeling and forecasting work is done. It consists of short-term petroleum models and large integrating models which make projections of energy supply and demand in 1980, 1985, and 1990. The Data Services Office collects data for FEA. About 87 of our proposed people in fiscal year 1978 are for support of other elements of FEA. So Data Services collects data for FEA, processes that data on computers and sometimes by hand, and gives support to the rest of E.I. & A.

Mr. O'LEARY. One collects; the other manipulates.

Mr. YATES. On page 71, one function listed is data validation of all FEA systems, and this function is also listed in the Office of Data Analysis on page 69.

Mr. CHRISTIE. That is correct.

Mr. YATES. They have different responsibilities respecting analysis?

Mr. CHRISTIE. Data validation will be performed in a number of places within E.I. & A., but the primary focus is in my Office of Energy Systems Data, where their concern is making sure we have the right definitions of what we want to collect. We have experts, for example, in price data in the price analysis division, and they will have to support and contribute to the data validation effort.

Mr. Yates. Could you place in the record the cost of supporting each of the major programs that you list as being supported by the data services?

Mr. CHRISTIE. Yes, I can provide it now or put in the record, but it is a long list.

Mr. YATES. Put it in the record.

[The information follows:]

PROGRAMS SUPPORTED BY DATA SERVICES

	Positions	Contracts	Total
Support to miscellaneous FEA offices	10	1,960,000	2,230,000
Support to energy information and analysis	93	7,852,000	10,216,000
Support to regulatory programs	42	2,085,000	3,219,000
Support to conservation and environment	18	2,311,000	2,797,000
Support to energy resource development	14	1,970,000	2,348,000
Support to international energy affairs	3	290,000	371,000
Total	180	16,468,000	21,181,000

IMPORTANCE OF DATA SYSTEMS

Mr. O'LEARY. We have what appears to be a very substantial amount of money involved in this, about $40 million. One of the real problems that the United States has stumbled into in this energy situation is the fact that we ignored data collection for a generation. Time and time again, various Government agencies said we should know more about the energy business, and the response generally in OMB or within the Department was no, we know enough about it. Everything is all right.

Well, we are finding out that one of the real stoppers of any action on energy programs is that we don't have data systems that we can trust. I think that is universally recognized by the people in the business now.

We have depended, I believe, much too much on industry for both the data and for the analysis thereof. This program, although large in dollar terms, is really very small in terms of the enormous amount of leverage it has with regard to moving the Government forward in its capacity to handle this problem. I hope it will be looked on sympathetically by the committee.

Mr. YATES. How long will the task of accumulating the data take?

Mr. O'LEARY. We are going to be adding to the data systems.

Mr. YATES. I know you are, but how long do you think——

Mr. O'LEARY. It is going to be another 2 to 3 years before we have a competent data system, Mr. Chairman.

STATE SET-ASIDE PROGRAM

Mr. YATES. Will you explain how the State set-aside program works?

Mr. SMITH. Yes, sir, Mr. Chairman. The State setaside program involves the allocation or set-aside of a specified percentage of a particular fuel, for example, 3 percent for gasoline and middle distillates, by every prime supplier. A prime supplier is the supplier who first introduces a product into that State for sale in that State. Each prime supplier reports to us for products that are still under controls, how much he plans to introduce into that State in a particular month.

A specified percentage, for example, 3 percent of that amount, is then made available to the State energy office for redirection by the State energy office to alleviate hardship and emregencies on the part of consumers.

ILLINOIS PETROLEUM MARKETERS

Mr. YATES. I have a letter here from Mr. William R. Deutsch, vice president of the Illinois Petroleum Marketers, which discusses the State set-aside program in Illinois, which he says expires on March 31, 1977.

The combination of the tremendously cold winter, the 1976 base allocations, the fact that Marathon Oil Co. and Phillips Petroleum, the two large midwestern suppliers, are presently on 75 percent allocation is causing a great amount of anxiety of whether jobbers who handle approximately 75 percent of the agriculture fuel distribution will be able to sufficiently take care of their customers, once they head for the fields for spring plowing and planting.

Can we tell them anything?

Mr. SMITH. Yes, sir; he is referring to what we call special rule 3, adopted in conjunction with the removal of mandatory price and allocation price controls for middle distillates. Special rule 3 set aside 3 percent of the volume of the middle distillates introduced by the suppliers, notwithstanding their exemption from other allocation controls. In this particular case it was intended to be available to the States to redirect to jobbers or intermediate suppliers who were unable to secure supplies from their traditional suppliers or normal sources.

The cold winter meant any jobber could sell anything he could get ahold of, including the normal contractual volumes, plus anything else he could get in that very tight supply situation. Accordingly, there were substantial numbers of requests to the State set-aside by distributors that were motivated by the desire on the part of the distributor to get additional volumes resulting in additional sales and therefore additional profits.

During the tight supply situation this winter, particularly in the upper Midwest as the rivers were frozen, in no case that we are aware of, did any end-use consumer wind up without fuel. A number of times the dealers had to serve them on what is called a runout basis. That is, instead of filling up the tank when they made a delivery, they would give him 100 or 200 gallons. This would serve as enough to last until the next shipment came in, but he would have to go back and give him several smaller fills rather than filling the tank as is the normal case.

This rule was designed to see that no supplier was cut off from supplies during the winter period, and that particular rule is scheduled to expire on the 31st of March.

SET-ASIDE PROGRAM TO EXPIRE

Mr. YATES. There won't be any need for it after that?

Mr. SMITH. That is our present judgment, Mr. Chairman. We do, however, have the authority to reimpose that rule or whatever other allocation rules might be required in the event there is a showing that either individual end-use customers are not being provided the fuel they need.

Mr. YATES. Apparently that is not the case, is it, because you haven't extended the rule?

Mr. SMITH. That is correct. We have no information that any end-use customer has any problem getting his adequate fuel supplies, nor do we have evidence that any substantial number of jobbers or distributors are having problems making contracts for adequate volumes.

PRICE INCENTIVES FOR TERTIARY RECOVERY

Mr. YATES. Have price incentives for tertiary recovery of oil been established?

Mr. O'LEARY. They are in the process of being established. We have issued a proposal that went out on January 6 that, if finally adopted, will in effect release tertiary oil and put it at the market price.

Mr. YATES. Do you have any idea as to how much you expect to recover?

Mr. O'LEARY. Yes, the tertiary oil is increased from the current level of approximately 200,000 barrels a day to perhaps half a million barrels a day by 1985.

AQUIFER FOULED BY TERTIARY OIL RECOVERY

Mr. YATES. In the hearing on the appropriation request for the Geological Survey, we learned that tertiary oil processes had fouled

an aquifer in Oklahoma through the use of chemicals. Would your office have anything to do with this?

Mr. O'LEARY. This is essentially an ERDA and State regulatory problem. ERDA is conducting the tertiary oil program. There is, as you probably know, a very comprehensive mechanism for regulation at the State level. The oil conservation commissions in the States have very strict rules, and there is an EPA oversight over the application of those rules, particularly as it applies to aquifers.

WATER AND ENERGY RELATIONSHIP

Mr. YATES. That raises a question in my mind. What I wanted to find out is what interest FEA has in conservation of water or the development of water. It is certainly a part of the energy picture.

Mr. O'LEARY. It certainly is. Water, of course, is one of the things like air that cuts all the way across agriculture interests, industrial interests and energy interests. We have a secondary line of interest in water. For example, if you go into a rapid runup in the power requirements of the country, you can expect that will impact heavily on the consumptive use of water in electric power generation.

USE OF WATER FOR COAL SLURRIES

Mr. YATES. What about the use of water in transportation of coal by slurries?

Mr. O'LEARY. That will not be a large use, but it will be a particularly sensitive one because of the areas from which the coal would be forthcoming.

Mr. YATES. Is that your responsibility?

Mr. O'LEARY. That is a responsibility that is primarily at the State level, working basically with the Department of Interior. Generally speaking, the whole scheme of water development in the West, where all of this is developed, is a very finely balanced arrangement between the Department of the Interior and the International Streams Commission.

There are, as you know, compacts with regard to distribution of water. The Colorado River Compact, for example, which is administered by the Department of the Interior, has representation from all the affected States in the Colorado Basin. This is an area that already has a substantial institutional base and the energy requirements thus far have been successfully fitted into that base.

HEATING OIL TRIGGER FORMULA

Mr. YATES. Would you explain in the record how your trigger formula works on heating oil and under what circumstances price controls could be reimposed?

Mr. SMITH. Yes, sir, I would be glad to submit a detailed explanation for that.

[The information follows:]

DESCRIPTION OF THE MIDDLE DISTILLATE TRIGGER

As part of the decontrol of middle distillates, the FEA adopted a plan to assure that no unwarranted prices increases would occur once controls were removed.

The origin of the "trigger" was contained in testimony on middle distillate decontrol by FEA Administrator Frank Zarb. (See "Hearings before the Subcommittee on Energy and Power of the Committee on Interstate and Foreign Commerce, House of Representatives on H.R. 1302 and H.R. 1303, Energy Action Nos. 3 and 4, Decontrol of Pricing and Allocation on Middle distillates, June 22 and 29, 1976, Serial No. 94–131," page 124. See also letter of Frank Zarb to Senator Kennedy on page S11206 of the Congressional Record of June 30, 1976.)

FEA Administrator John F. O'Leary stated that he would honor the commitment of his predecessor, Mr. Zarb. (See Congressional Record of April 1, 1977, page S5375).

To implement the "trigger" agreement, the FEA adopted a quick-response price monitoring system to compare actual prices with projections of what prices would have been if controls were still in effect (index price). The term "index price" includes FEA's computation of what prices would have been under controls and a 2-cent flexibility factor. "Prices" (index and actual) are average retail prices by region to all end users (includes industrial as well as residential end users). Finally, only No. 2 heating oil and No. 2 diesel fuel are included in the "trigger." Prices of other middle distillates (No. 1 diesel fuel, kerosene, and others), however, will be periodically monitored and action taken if prices are excessive.

In addition to a national index price, the price monitoring system establishes a regional index price to which actual regional prices will be compared. The index prices are calculated by FEA index price formulae which were published in the Federal Register of September 21, 1976, page 41158. Separate index prices (national and regional) are computed for heating oil (reported weekly) and diesel fuel (reported monthly).

If actual regional prices exceed the regional index price per gallon, the trigger is tripped and the FEA will take the following action: (1) Hold public hearings within 10 days to determine the causes of the excessive price levels, and to solicit comments on actions necessary to return actual prices to levels at or below index prices, and (2) take action within 10 days following the hearing to restore prices to index levels within 1 month.

IMPACT OF RAISING TAXES ON GASOLINE

Mr. YATES. What would be the effect of raising taxes on gasoline?

Mr. O'LEARY. In the short run there probably would be a very, very short-term interruption of supply depending on the magnitude of the tax, but we think that in the short run there is very little sensitivity to price increases. Over the long term, quite evidently you would get some responses, probably not so much in driver habit changes but in selection of vehicles.

Mr. YATES. Was it you who stuck behind the story that appeared in this morning's press about natural gas prices being increased, or was that Dr. Schlesinger?

Mr. O'LEARY. I haven't read the story, Mr. Chairman.

Mr. YATES. As they say in the trial, I hand you exhibit A and ask for your comments.

Mr. O'LEARY. This looks to me like rampant press speculation, Mr. Chairman.

Mr. YATES. OK; I am glad to know that. I was one who fought the Harris bill many, many years ago.

RATE INCREASES BY FEDERAL POWER COMMISSION

Incidentally, what do you think of what the Federal Power Commission has been doing for the independent producers? Do you think they have been necessary decisions?

Mr. O'LEARY. Are you talking about the $1.42?

Mr. YATES. Yes, the increases over the last 2 years.

Mr. O'LEARY. The Federal Power Commission works within relatively narrow rules. They are supposed to have cost-based regulations. That is now being litigated. The whole concept of a just and reasonable price means that you receive your cost plus a reasonable rate of return. The point of contention is whether the costing has been done accurately and the principal point on that is whether the treatment of the absence of the depletion allowance on new gas finding is treated appropriately. That accounts for around 41 cents of the $1.42 price and is the basis of the current litigation.

I don't know enough about the internal workings of the Federal Power Commission's last decision to be able to comment intelligently on it, Mr. Chairman.

IMPACT OF DECONTROL OF OIL AND GAS

Mr. YATES. If prices on oil and gas were decontrolled immediately, what would be the effects on energy usage? Could industry reasonably invest the added profits into exploration and increased production immediately, or would there be considerable lag time?

Mr. O'LEARY. We saw an analog to that when the price of energy went up very, very abruptly after the 1973–74 supply interdictions.

Mr. YATES. You told us about this yesterday?

Mr. O'LEARY. Yes; I think it would cause another 1½ to 2 years of severe perturbation on the market.

Mr. YATES. Plus the impact on the whole economy.

Mr. O'LEARY. Of course. I think we are still paying a bill that may be in the range of $100 billion a year for that steep change in the whole pricing function for energy.

DIRECTION OF ENERGY POLICY

Mr. YATES. I came away from yesterday's meeting thinking what a comprehensive and valuable estimation of the current situation it was and then I tried to inquire to myself as to where we were going and what we could do to better the situation, and I don't remember I was able to tell myself anything.

Mr. O'LEARY. No; I don't think we addressed that yesterday.

Mr. YATES. Should we address it now?

Mr. O'LEARY. It is a very pressing problem. One of the things that I think you can say is that our policy thus far, if you really had to put a tag on it, is reinforcing OPEC pricing. And one other thing that we should understand in this discussion is that we are giving more and more people a stake in the continued success of OPEC when a large amount of American industry turns to the Middle East as a source of business, as has happened. If you look over the lexicon of people involved there, you will find enormous numbers of architects and engineers with enormous stake in the continued well-being of OPEC. It seems to me that raises some very interesting questions for Congress as well as for us.

Mr. YATES. There were interesting questions on the legislation now being analyzed in the Senate on the question of the Arab boycott.

Where does that leave us, then?

Mr. O'LEARY. It leads us into some strategies that I think are not thoroughly thought out and probably not the sort of thing we would want to put on today's record.

SEVEN SISTERS AND THE OIL EMBARGO

Mr. YATES. Yesterday, we talked about the question of vertical and horizontal divestitures. There have been stories that have been promulgated by authors, apparently with some justification, that the Seven Sisters are the ones that underlay the success of the OPEC embargo. Would you like to comment on that or would you rather not?

Mr. O'LEARY. It is quite evident that the embargo could not have been effected if it had not been for the cooperation of the oil companies that were involved. They were actually the machinery by which the embargo was put into effect. There were obviously liftings, and you can at least develop a thesis that if they had chosen to disregard the embargo, they could have lifted and said we are not going to tell you where we are going to take the ships.

I am not sure what the consequences of that would have been, but it is fair to say that without the active cooperation of the majors and indeed of the other elements in the industry, the embargo could not have been effective. I am not sure that the majors could have done anything about it. When my mind decides that it is going to pick up this glass of water, there is little my hand has to say about that unless I cut it off.

Mr. YATES. Either the mind or the hand.

Mr. O'LEARY. One or the other.

CONSEQUENCES OF ANOTHER EMBARGO

Mr. YATES. Now that that embargo is passed, what happens if there is another embargo? Do you face that when you come to it?

Mr. O'LEARY. We can say generally, if there is another embargo, that the situation will be a great deal worse next time. I have asked the staff to give me a little thought with regard to what would happen if there were an embargo this coming winter with weather conditions comparable to last winter. On the basis of a very superficial analysis, if the 1973–74 embargo was a salutary lesson on the economy, the result would be a disaster. Our reliance is up to essentially double what it was before, domestic production is down, and if we were to combine that with a severe winter with the natural gas running down as it has, it would be just catastrophic.

Mr. YATES. What can we do in the interim?

Mr. O'LEARY. We are stocking. We will have to build strategic reserves up as rapidly as we can. That is the reason this administration wants to move as fast as we can, even gambling on the rapidity of the fill to go to that 250-million-barrel level instead of the 150-million-barrel level, as we will discuss later.

Mr. YATES. Why can't you just leave it in the ground rather than pulling it out and putting it above ground?

Mr. O'LEARY. I will address that. We have one very large——

Mr. YATES. Can't you leave it in Pet 4, for example.

Mr. O'LEARY. Pet 4 is not developed, of course, and we don't know what is there. Elk Hills is competent of pulling 300,000 barrels a day, which is a drop in the bucket. We will have to have fast deliveries, and you don't get that out of reservoirs. You get them out of a tank, so that what you need is a tank.

CENTRAL PURCHASING AGENCY FOR PETROLEUM

Mr. YATES. Let me ask you another question. When I asked Mr. Zarb this question, he thought that it was a feasible device.

At the time of the Energy Act discussions an amendment was proposed to the Congress, suggesting the use of a central purchasing agency for petroleum coming into this country. Does that make sense?

Mr. O'LEARY. The proposer of this is a professor at MIT.

Mr. YATES. Dr. Adelman.

Mr. O'LEARY. Yes; who feels there should be a central purchasing agent and blind bidding by OPEC. My view is that the weakness in Adelman's proposal is the blind-bidding side. These people are not bound by antitrust rules. I imagine they would go into a room the day before the bidding and divide the market. It might be worse instead of better.

Mr. YATES. And this would destroy any effectiveness of a central purchasing agent?

Mr. O'LEARY. I think so. Oil is a very heterogenous material. In any day, there are hundred of deals being made with the objective of the person making the deal to minimize his cost and maximize his profit. I think if we had a purchasing agency sitting up there, it would rapidly lose sight of the enormous intricacies of this business and probably lead to a suboptimized result.

DECONTROL AS SPUR TO EXPLORATION

Mr. YATES. Suppose oil and gas were decontrolled immediately, could industry reasonably invest added profits into exploration and increased production?

Mr. O'LEARY. No; now industry is facing serious constraints on the availability of rigs. There is an interesting article in the April 4 Business Week that you might want to refer to. The article underscores the point that there simply isn't availability of rigs now. They bid it up as they did in 1974. There was an enormous runup in the price of pipe. People were standing in line to get drilling contractors. It was a runaway-price situation. There isn't the infrastructure to support it now.

Mr. YATES. Aren't our steel companies turning out the pipe?

Mr. O'LEARY. They will for today's demand, but if you injected another $10 billion annually in the economy, which would be the effect of this, it couldn't assimilate it.

ENTITLEMENTS PROGRAM

Mr. YATES. How effective has your entitlements program been?

Mr. O'LEARY. In broad outline the entitlements program, which is a necessary evil associated with the two- or three-tier price system, has

worked pretty well. As long as we have to go the entitlements route, it will continue to work well in broad outline but be a disaster in detail.

Mr. YATES. How long will that be?

Mr. O'LEARY. As long as there is tiering, that is until we can get a single price system. If you want five and a quarter to capture the economic rent for the old, away from the producer for the old oil and an intermediate price for the new oil, the consequence is an entitlement program. We may call it something else.

Mr. YATES. What kind of pricing system would you prefer?

Mr. O'LEARY. I would prefer, as an energy person, to see a good completitive strongly competing price system in this or any other market. Unfortunately, with the monopolistic pricing practices of the cartel, you don't have that nice strong competitive thrust at least at the crude level, so you are captive to something like the current system.

IDEAL PRICE STRUCTURE

Mr. YATES. With that background, what kind of price structure would you like to see?

Mr. O'LEARY. I don't really think we want to take the very large economic rents that are now captured by the consumers and turn them over to producers. That seems to be public policy. Maybe you capture them in the form of a tax. That way the pricing system would be something like a market result, but the recapture, the compensation, producers would recognize the very severe distortions in the market and the monopolistic elements in the market.

Mr. YATES. Would it embarrass you to place in the record a more precise explanation of the kind of pricing system that you would like to see in effect?

Mr. O'LEARY. Mr. Chairman, we are now beginning to get close to April 20.

Mr. YATES. Is that in the April 20 message?

Mr. O'LEARY. I would presume one of the things the President will address in his April 20 message is the pricing regime for crude.

Mr. YATES. Can I ask you to put your answer in an envelope that says not to be opened until April 21?

Mr. O'LEARY. You will, in fact, have the envelope on April 21.

Mr. YATES. And keep it in your safe?

Mr. O'LEARY. I will be glad to have any discussion you like on that.

THREE-TIER PRICING AND ONE-PRICE SYSTEM

Mr. YATES. It is a very serious question and we encounter it all the time in our debates. Consumer advocates will say we ought to have no changes at all. They don't even like the prospect of a three-tier system, as you know. Then, of course, the representatives from the producing States all say the answer is obviously a one-price system. and that is going to be adjusted by the competitive features of the market. Of course, we know that is not true. However, the oil producers say we do have competition.

Mr. O'LEARY. Can I give you a little comment on that without telling you how we might cure it?

Mr. YATES. Sure. Of course you are not revealing what the President is going to say on April 20; we wouldn't want that.

Mr. O'LEARY. Of course not. Yesterday, after I left this very pleasant session with you, we went and spent another 2½ hours with Mr. Dingell and his associates. In the course of that, I had a good bit of discussion with Mr. Brown, from Ohio. The discussion boiled down to this: It really has to do with the disposition of the economic rents. The consumer would like to have the rents. This is true in both oil and gas. The producers would also like to have the rents.

Mr. Brown said, "Don't you think if the producer had the rents"—he didn't raise the question exactly this way—"he would do more in the way of drilling." My answer was no. That may or may not be correct. My own judgment is that the producer is attracted by his next deal. He can find money in the system if he has an attractive deal to go out and do his drilling.

I think the Business Week article I referred to earlier tells you that is happening. My feeling is that if we gave him another dollar or another $7 went to market clearing on old oil, which is now at $5.25 and ran it up to $13.50, that it would not usefully increase the drilling rate. And that is really the question.

Mr. YATES. Because there wouldn't be old oil, by definition.

Mr. O'LEARY. That is right. There is a downside part to the old oil treatment. There is some fellow always at the margin, and he will quit producing tomorrow because five and a quarter isn't enough compensation for him.

EXCEPTION PROCEDURES

I explained that we have exception procedures to hand that, and we handled, in the course of the last year, 236 exceptions by crude oil producers. We received that many requests, and we turned out decisions on 182 of them. So this is not a trivial part of our workload. We are handling these as they go down.

CAPTURE OF ECONOMIC RENTS

On flowing oil, in a rigged market, in a monopolistic market, that we all recognize is completely rigged, not price-based at all, what should you do? I think you should capture the economic rents. Certainly they should not go to the producers. He doesn't need them. And is that a matter of philosophy? No, it is a matter of economic reality. They don't provide an economic function. The market system should perform an economic function. It should give money where there is return. I think if you give money to the producers, either gas or oil, for, let's say, old oil or gas, you are giving money to them without a return. That is the first principle.

The second thing that we should remember is as is the case now, the average interstate price at the wellhead for gas is 65 cents, roughly. When you tell an industrialist, "Perform as if you were in a $4 market" and the bill to him is a dollar, he says, "Look, my bill is a dollar. Why should I act as if I were in a $4 market?", and he does some things that are not useful from the standpoint of the real situation

where we find ourselves today. He fights to the end to keep that gas in his system because it is $1.50 cheaper than the oil he would switch to and require no front-end investment as coal would require.

SIGNALS TO PRODUCERS

It seems to me we are giving proper signals to the producers at the moment, in very broad detail with regard to his old oil. Let me take that one step further. I think we are giving improper signals to the producer with regard to the next investment that he makes. He probably should say to himself, well, as long as we are going to pay $13.50 for the next barrel of imported crude that comes in, maybe we should think about paying something approaching $13.50 for the next barrel, the really new barrel of domestic crude that comes in. What we are finding is that rather than looking for the step out, the producer is doing in field drilling, and running a conservative investment game. He doesn't look for a new field, because he wants surety for his investment. He is doing in-field drilling, and that is why there is pressure on the system now. He can make a lot of money by going to oil he knows, drilling it up and getting it out faster. That is the process in which we are currently involved in this country.

GAS ACT ECONOMIC PHILOSOPHY

Mr. YATES. Of course, you have a very sympathetic person on this side of the table, because what you are reciting, it seems to me, is the basic economic philosophy underlining the original passage of the Gas Act in 1938.

Mr. O'LEARY. That is right; the bad part about this is that we are giving good signals to the producer and good signals to producers on flowing oil, and, as I have indicated, improper signals from the standpoint of the national economy to the next dollar that the producer invests. As a result, I think we should put some distinction between flowing oil and the new oil. We are giving terrible signals to consumers, and I am thinking here not so much of the residential consumer but the industrial consumer because we are telling him, your gas, regardless of what we say, is 65 cents at the wellhead, and we know that he should be performing as if he lived in a $2.50 market.

I think if you look at it in these terms, you begin to see the fundamental threads that ought to go into the development of policy.

Mr. YATES. Of course, the people on the other side will ask why the oil and gas industry should pay for keeping the economy stable.

REWARD OF ECONOMIC ACTIVITY

Mr. O'LEARY. Well, the answer to that is, why reward any economic activity, and the answer is, because it makes a contribution. We are in a situation where we are not in a free market economy in oil and gas. Let me give you the analogy that the oil people want you to think about. They want you to think about a shoe manufacturer who all of a sudden gets a little doozy-daddy, and he can make shoes for $2 instead of everybody else's $5. He should be rewarded. He did something.

In time, given our system, that $2 process is going to go out through the economy.

That isn't the situation that we find ourselves in with oil. If we reward that $5 producer whose costs are $5 by giving him thirteen bucks, all we are doing is siphoning money away from one group in the country and giving it to another and not achieving an economic result. This is the application of the most rigorous Marshallian theory, and I think it is appropriate.

Mr. YATES. How did Congressman Krueger, of Texas, react to this?

Mr. O'LEARY. Congressman Krueger thoroughly understands the argument.

CASH-FLOW ARGUMENT

Mr. YATES. Did Mr. Brown understand the argument?

Mr. O'LEARY. Mr. Brown and I differ with regard to the consequences of rewarding the producer. He buys the cash-flow argument. There are two arguments, the shoe argument that I have given you and the cash-flow argument. The oil industry will tell you we don't have enough cash flow to make the necessary investment, and I refer again to the Business Week article of April 4. You have enough cash flow there to surge everything in the system. There isn't enough infrastructure to take care of the drilling requirement today.

Mr. YATES. You said Mr. Krueger understood your argument. You didn't say he accepted it.

Mr. MURTHA. The reason that you don't want to reward the producer is because there is no oil available and he couldn't invest the reward in producing more oil. Is that the idea? Is that the reason it is counterproductive?

SHOE MANUFACTURER ARGUMENT

Mr. O'LEARY. No; let me go over the two arguments that the producer erects. One is the innovative argument that he has something that through his own design is low cost relative to the market, and he should be able to capture the marginal value of that economy. This is the shoe manufacturer that in a $5 world has a $2 process.

Now, I believe in the application of the shoe manufacturing argument to the shoe industry. I think if somebody does innovate, he should be richly rewarded because he is performing a valuable economic service. A new process that has come in will in time extend to other people in the industry, and we get a secular change in terms of making shoes in the country. That happens to industry all the time. The reason that our economy works so well is because there are very, very significant rewards for the petrochemical guy who can cut a penny off the process, and he should capture that penny as long as the lead times permit him to.

That argument, however, applied to old crude is invalid. It is just a non sequitur. There are no benefits from it. You have to remember that what we are working in is not a classical market. It is an entire-

ly rigged market, rigged from Day 1. We find people who invested in old crude by definition, crude that the investor went into when his perception of the market was $3. He is now being kept free with purchasing power; he gets $5.25 for that crude. All of his hard costs are all paid for. He does have a problem with regard to refit of the well, workovers, and what-have-you, but essentially, I would like very much to have 40,000 barrels a day of old crude at $5.25 that I found back in 1970.

REINVESTMENT IN INCREASED DRILLING

Mr. MURTHA. Aren't you still assuming that he would not reinvest that in increased drilling?

Mr. O'LEARY. No; here is the separate function. If there is a drilling opportunity, you have to ask yourself where is the constraint in the system? Is it money or opportunity? And I think what I can tell you with assurance is that it is opportunity, not money. For the good prospect there is ample money. As a matter of fact, we are inflating; after 1973–74 drilling activity which had been fluttering down, went up very strongly. It then had a little pause while people assimilated EPCA, roughly December of 1975 until the spring of 1976. Since then, it has gone back up very, very strongly. We are at the point now where everything that could be used sensibly to drill is being used.

Mr. MURTHA. That is what I was asking. That is the reason they had no place to invest it because we have a limited ability either to produce pipe for the drilling rigs or the oil, itself. So that is the reason we don't want to give them economic advantage.

Mr. SMITH. In addition, Mr. Murtha, there are two other considerations that bear on the question. First, as far as the independent producer is concerned, the real wildcatter who does most of the actual drilling, the independent drillers, have discovered some 80 percent of the total new reserve. They work farm-outs from the major oil companies and make the decision as to where to go and drill. In a very substantial number of cases, they drill and prove up property, they then sell that property off to a larger producer. They then take the money from that, plus the money they can get from other investors and go out and look for another prospect. So that this tends to vitiate the argument that we need to give producers from $5 to $13 so they have enough money to go looking for other things.

The second consideration is that something like 65–70 percent of all the old oil that is currently being produced is owned by and being produced by the major oil companies. It is sort of hard to make a cash-flow argument to the benefit of the major oil companies who again don't do most of the actual drilling and new exploration.

Mr. YATES. They buy the leases, don't they?

Mr. SMITH. Yes, sir, and they will farm-out a lease to an independent and take an override position on it. Oftentimes when he finds something on that, they will buy his interest back from him.

DEREGULATION IN TEXAS

Mr. MURTHA. The fallacy in the argument, as I see it, is your reply to Mr. Duncan yesterday, when he asked if in Texas there wasn't an increase in drilling when they had the deregulation or decontrol.

Mr. SMITH. The difference is between the price for oil that is already flowing, and the price for oil you expect to find from that new drilling. One side of the argument is that because the oil is already flowing, to increase the price of that oil is not going to generate any more production from those same sources or very little extra production. Also this is not inconsistent with holding the position at the same time, that it is appropriate to increase the price for anything anybody finds new. What happened in Texas, is that the prospect for getting more money for whatever you found by going out and looking for a new field rose, and therefore, people went out. But as Mr. O'Leary pointed out yesterday, they increased their drilling, their well completion, their finds, but they didn't increase production. They simply let production decline lower.

So the position amounts to being sure that the price for oil that is already flowing, at least, that it keeps up with the increased cost of keeping it flowing and at the same time offers a prospect of a higher price than for any real new oil that somebody brings in now.

Mr. MURTHA. This would provide incentive for drilling?

Mr. SMITH. Yes, sir.

Mr. YATES. You said the major user will turn the land over to an independent?

Mr. O'LEARY. Yes, sir.

OUTER CONTINENTAL SHELF DRILLING

Mr. YATES. Why doesn't the Federal Government do this?

Mr. O'LEARY. The Government does a little variant on that. They turn it over to a driller.

Mr. YATES. Turns the Government land over?

Mr. O'LEARY. Yes, and keeps a royalty interest in it. If you will follow the debate on the Outer Continental Shelf, we will be looking at variations on that.

Mr. YATES. I wonder whether that is true. How do you know this is going to happen? It didn't happen under the last two Secretaries of Interior.

Mr. O'LEARY. I am pretty sure it is going to happen here.

Mr. YATES. Both of those Secretaries indicated that the Federal Government had a much better deal as a result of the Outer Continental Shelf bids than taking a 16⅔ percent royalty.

Mr. O'LEARY. Mr. Chairman, it really depends on what you want out of it. If you want to generate current income and gamble a little bit, then——

Mr. YATES. I will tell you what I want. I want as good a deal for the taxpayers as I can get because they own the land. What is the businesslike thing to do? What would an oil company do under those circumstances?

Mr. O'LEARY. An oil company under those circumstances would say: Now my taxpayer interest is twofold in this—in getting money and in getting oil; and he would take those steps that maximize those two things rather than maximizing one as we do at present, which is the money part. I think what I would do is probably go in and experiment with some royalty bidding.

Under the proposed new Department of Energy, the lowest terms will be in large part determined by the Secretary of Energy. I think that will be a very useful tool for innovation in this area.

Mr. YATES. That is the way it was under the previous Secretaries of Interior.

Mr. O'LEARY. Secretaries of Interior have been driven by the desires of the OMB to show revenues, to be able to project forward current revenues in the way of bonus bids for this. That has driven the system. The Bureau of the Budget earlier and OMB later said: Here we can get another $2 billion of income and permit certain flexibility on the outgo side.

It seems to me this system has not served us well. We ought to look at other measures of the utility of those lands.

SYSTEM TO ENCOURAGE OIL PRODUCTION

Mr. YATES. What kind of arrangement will bring out the oil?

Mr. O'LEARY. Devising a system where there is more competition, more entrants into the field will help to bring out the oil. Right now most of the investment in the Outer Continental Shelf, probably 80 percent of the money, is put up by 20 percent of the companies.

Mr. YATES. The richest companies?

Mr. O'LEARY. Sure. They have their own timetable and own way of looking at that time. Mr. Smith might comment on that number.

Mr. SMITH. At least 80 percent, if not more. Even the largest companies have to form consortia in order to be able to put up the kind of front-end money required on the bonus bid.

The other consideration that Mr. O'Leary alluded to is that these same companies are by definition the largest integrated companies with worldwide interests and take the longest view with respect to that single compelling item, which is the continued availability of a crude oil supply. Therefore they would have the least incentive for early development of the OCS areas because in their total crude supply picture they might not need it for another 7 to 10 years. They don't have the same kind of pressures to get it flowing early that a group of smaller companies would.

Mr. YATES. The Secretaries made the argument that having developed so much front-end money it was entirely natural and, in fact, imperative that in order to get a return on that investment they would try to bring out the oil immediately.

Mr. O'LEARY. We know that is not so.

Mr. YATES. How do you know that?

Mr. SMITH. There is an incentive in that direction.

Mr. YATES. How do you know that it is not so?

Mr. O'LEARY. The Wilson Associates report shows substantial quota withholding—I think yesterday you understood my reluctance to use that in a pejorative sense. There is a leisurely pace in the early years of the lease.

Mr. SMITH. The reason for this is because the incentive of getting a return on that particular investment has to be balanced on the part of these integrated companies against incentives on other investments in their system. And finally the overpowering consideration is one of long-term availability of supplies of crude oil to feed their system.

INTERIOR INVESTIGATION OF WITHHOLDS

Mr. YATES. I am trying to think of the Ph. D. who investigated the question for the Secretary of the Interior.

Mr. O'LEARY. Wilson, the one I just referred to. The fellow who works with him is——

Mr. YATES. He pointed out the *Texaco* case concerning natural gas at the time when the country was starved for natural gas. He said the Texaco Co. could have put significantly more natural gas into the pipelines for use, if it had wanted to. The reply given by the Texaco representative was that it had supply contracts and that it could not put more into supply than its customers wanted. It had the contracts with its customers and even though the pipeline would have taken more there was no obligation on Texaco to put more into the pipelines, and second, it would have been economically unfeasible for them to do that.

The question I should like to address to you: What could you have done about that situation? Apparently there is nothing you could have done. First, you weren't in office, I assume, at that time. Second, does your position as FEA Administrator give you any power?

Mr. O'LEARY. No. The law does not run to forcing the producer to do anything. Once he enters into a contract he can be compelled by the Interstate Commerce Commission and the Federal Power Commission to honor his contract. But until the producer has bound his gas into interstate commerce, what we refer to as a dedication, he is a free agent and no one runs him.

Mr. YATES. This was interstate commerce. This was a customer.

Mr. O'LEARY. But he was meeting his contract.

Mr. YATES. He was meeting his contract, fine. But couldn't he have met his contract and also have gone beyond the contract?

FORCED DELIVERIES

Mr. O'LEARY. Right. Let's set up the problem in these terms. Let's say he was delivering 100 units a day. The whole system has the capacity to produce 150 units. The contract called for 100. Question: Can we compel him to deliver the other 50?

ANSWER. No.

Mr. YATES. Why not?

Mr. O'LEARY. Because with regard to the extra 50 he is not under anybody's jurisdiction.

Mr. YATES. Is it in interstate commerce?

Mr. O'LEARY. It is. The point where the interstate commerce comes into play, according to the Natural Gas Act, is that instant in time when the gas clears the wellhead.

Mr. EVANS. May I pose a question? The 100 would be subject to interstate commerce?

Mr. O'LEARY. Yes.

Mr. EVANS. But the 50 is not?

PHILLIPS DECISION

Mr. O'LEARY. That is right. The Natural Gas Act of 1938, specifically excludes authority in the Federal Power Commission to regulate the activities of the producer prior to the sale. That is the *Phillips* decision. That was the enabling point in the whole system.

Mr. SMITH. In this case the contract is the same, so anything he has available over that isn't in interstate commerce until he elects to sell it.

Mr. YATES. I see.

What about putting that into a lease?

Mr. O'LEARY. What the Secretary of Interior has done, he has said to all of his lessees: Produce at the maximum.

Mr. YATES. I am talking about an emergency situation.

Mr. O'LEARY. Indeed. In an emergency situation he went to them and said: Produce at the maximum.

Mr. YATES. They are closing factories and schools and there is a question as to whether there is an adequate supply to keep people warm in a situation where you have below-zero weather.

Mr. O'LEARY. If you are over on Mr. Smith's land, that is one thing; no one can reach you. But with regard to Secretary Andrus' lessees, Mr. Andrus can and did tell them: Speed it up.

PHILADELPHIA SUPPLY PROBLEM

Mr. YATES. You had a major disaster in the making because you just had a few days' gas left in Philadelphia.

Mr. EVANS. Wasn't that because of a specific provision in a Federal lease?

Mr. O'LEARY. Yes. We were able to get the producers under the lease terms, not under the Natural Gas Act.

Mr. YATES. Let's turn to page 85 in the justifications.

You talked to 35 major refiners. Will you put a list of them in the record, and do this for the small refiners.

[The information follows:]

MAJOR REFINERS

CAPACITY GREATER THAN 175,000 B/D

Amerada Hess Corporation
American Oil Company
American Petrofina, Incorporation
Ashland Oil Company
Atlantic Richfield Company
Cities Service Oil Company
Coastal States Gas Corporation
Continental Oil Company
Exxon Corporation
Getty Refining & Marketing Company
Gulf Oil Corporation
Kerr-McGee Corporation
Marathon Oil Company
Mobil Oil Corporation
Oil Shale Corporation
Phillips Petroleum Company
Shell Oil Company
Standard Oil Company of California
Standard Oil Company of Ohio
Sun Oil Company
Texaco Incorporated
Union Oil Company of California

CAPACITY 46-174,000 B/D

Apco Oil Corporation
Champlin Petroleum Company
Charter International Oil Company
Clark Oil and Refining Corporation
Commonwealth Oil Refining Company, Incorporation
CRA-Farmland Industries, Incorporation
Crown Central Petroleum Corporation
Diamond Shamrock Corporation
Energy Cooperatives, Incorporation
Good Hope Refineries, Incorporation
Hawaiian Independent Refinery, Incorporation
Howell Corporation
Husky Oil Company
Koch Refining Company
Little America Refining Company
Murphy Oil Corporation
National Cooperative Refinery Association
Pennzoil Company
Powerine Oil Company
Tenneco Oil Company
Tesoro Petroleum Corporation
Texas City Refining, Incorporation
United Refining Company
Vickers Petroleum Corporation

SMALL REFINERS

A. Johnson and Company, Incorporation
Allied Materials Corporation
Arizona Fuels Corporation
Asamera Oil (U.S.) Incorporation
Basin Petroleum, Incorporation
Bayou State Oil Corporation
Beacon Oil Company
Bi-Petro, Incorporation
Calumet Industries, Incorporation
Canal Refining Company
Caribou Four Corners Oil Company
C & H Refinery
Claiborne Gasoline Company
Cross Oil and Refining Company of Arkansas
Crystal Oil Company
Delta Refining Company
DeMenno Resources
Dillman Oil Recovery, Incorporation
Mid-America Refining Company, Incorporation
Mid-Texaco Refining
Mohawk Petroleum Corporation, Incorporation
Monsanto Company
Morrison Petroleum Company
Mountaineer Refining Company, Incorporation
M.T. Richards, Incorporation
Narajo Refining Company
Newhall Refining Company, Incorporation
North American Petroleum Corporation
Northland Oil and Refining
OKC Corporation
Oxnard Refinery
Pester Oil Company
Pioneer Refining Company
Placid Refining Company

SMALL REFINERS CONTINUES

Dorchester Gas Producing Company
Dow/Bay Refining
ECO Petroleum Incorporation
Eddy Refining Company
Edgington Oil Company
Evangeline Refining Company, Incorporation
E-Z Serve, Incorporation
Famariss Oil and Refining
Farmers Union Central Exchange, Incorporation
Fletcher Oil and Refining
Flint Ink Corporation
Gary Operating Company
Gaint Industries, Incorporation
Gibson Oil and Refining Company
Glacier Park Company
Gladieux Refinery, Incorporation
Glenrock Refining Company
Golden Eagle Refining Company, Incorporation
Guam Oil and Refining Company, Incorporation
Gulf States Oil and Refining, Company
Hill Petroleum
Hudson Oil Company
Hunt Oil Company
Independent Refining Corporation
Indiana Farm Bureau Cooperative Association, Incorporation
Inger Oil Corporation, Incorporation
J & W Refining, Incorporation
Kenco Refining Company, Incorporation
La Gloria Oil and Gas Company
Lakeside Refining Company
Laketon Asphalt Refining, Incorporation
Louisiana Land and Exploration Company
Mac Millan Ring-Free Oil Company, Incorporation
Marion Corporation-Refining Division
Plateau, Incorporation
Pride Refining, Incorporation
Princeton Refining
Quaker-State Oil Refining Company
Road Oil Sales, Incorporation
Saber Refining Company
Sabre Refining, Incorporation
Sage Creek Refining Company, Incorporation
San Joaquin Refining Company
Seminole Asphalt Refining
Sigmor Corporation
Somerset Refining Company
Sound Refining, Incorporation
South Hampton Company
Southland Oil Company
Southwestern Refining Company
Sunland Refining Corporation
Texas American Petrochemicals, Incorporation
Texas Asphalt and Refining Company
Thagard Oil
Thriftway Oil Company
Thunderbird Resources, Incorporation
Tonkawa Refining Company
Total Petroleum Incorporation
Trans Ocean Petroleum, Incorporation
United Independent Oil Company
USA Petrochem
U.S. Oil and Refining Company
Vulcan Asphalt refining Company
Warrior Ashpalt Company of Alabama, Incorporation
West Coast Oil Company
Western Refining Company
Winston Refining Company
Wireback Oil Company
Witco Chemical Corporation
Yetter Oil Company
Young Refining Corporation

FOCUS OF AUDIT COVERAGE

Mr. YATES. You also say on page 85:

The focus of audit coverage is toward specific areas of operations on a nationwide basis as opposed to an individual refiner basis.

What advantages does this method of audit provide?

Mr. SMITH. The advantage, Mr. Chairman, is that we can settle in the operation of a single refiner issues that apply under the refiner price rules to all refiners. What this tried to say and didn't say very elegantly is that in one refinery we will put an audit team to work on the nonproduct cost recovery issue. In another major refinery we will put one to work on the crude oil cost pass-through part of the regulations. In a third we will put one to work on the natural gas liquid pricing rules. Then, when we work out the complexities in one, we are able to pass those determinations to the teams in the other refineries rather than putting all 35 of them to work on the same nonproduct cost issue at the same time. It is an attempt to get the regulatory issues resolved, a larger number resolved, in parallel so we can then turn around and apply those findings to the other refineries and the other teams and get caught up more quickly.

Mr. YATES. What did you mean by the line on page 86:

The "thrust" is described as being on known or potential problems identified by link-audit clues, information from the National Office or complaints.

Is that the only way you know what is going on?

Mr. SMITH. No, sir. That means that the principal focus of the teams working in the small refineries are on specific problems peculiar to that small refinery identified by either audits that have turned this up or the people buying from him or information that other small refiners have been engaged in a particular practice or something of that sort.

RESELLERS

Mr. YATES. On page 87 you talk about the program on resellers and you are requesting 152 additional positions over the original budget.

Mr. SMITH. Yes, sir.

Mr. YATES. Is this an attempt to get the people back that were cut out by the Congress last year?

Mr. SMITH. Yes. Not by the Congress however; by the Office of Management and Budget, Mr. Chairman.

Mr. YATES. Of course, the committee cut down the number of people too.

Mr. SMITH. The initial base budget—no, sir.

Mr. YATES. This was OMB.

Mr. SMITH. The committee gave us in the 1976 budget exactly what we asked for, the 1326. OMB directed earlier this reseller program be terminated at the end of fiscal year 1977. The Carter administration restored this program in its amendment to the 1978 budget.

Mr. YATES. New attitudes.

Mr. SMITH. With respect to this program, yes, sir.

TESTING REFINERS COMPUTER PROGRAMS

Mr. YATES. From page 89, explain what the $200,000 contract on testing refiners computer programs to determine compliance with FEA regulations will do.

Mr. SMITH. This is an item to get one stage ahead of where we are now with the compliance effort. We are at least one stage behind. Right now what we do is audit the results of what the refiners do. The refiners run their own systems, they do their own computer programs in terms of allocating cost among products. We take those results and audit them to see whether they are right. What this contract is attempting to do is to see whether we can in fact audit refiners' computer programs to see if the way he does his business is in conformance with our regulations.

If we could do that, then all we would have to audit is the input to that program and we would know that the results that come out were in accordance with the regulations.

MANDATORY OIL IMPORT PROGRAM

Mr. YATES. What do you mean by the mandatory oil import program? Is that a legislative phrase?

Mr. SMITH. I am not sure whether it is embodied in the legislation. It is a program required by Presidential proclamation.

Mr. O'LEARY. The mandatory oil program is a remnant of the one that went into effect under Presidential decree in March 1959. It is not the same detailed thing but it is that under which the fees are currently imposed.

Mr. SMITH. Essentially it issues licenses for imports and collects fees as set out in the proclamation when imports actually occur.

Mr. YATES. What is your relationship with the Hess Oil Co. in the Virgin Islands? Has that been settled?

Mr. O'LEARY. No, it has not.

Mr. SMITH. No, sir.

Not in terms of the regulatory treatment of Hess. Mr. Hess is fond of telling us, and he is quite right, that he is neither a foreign nor a domestic refiner with respect to the treatment of the program. He is part of both. In the respect that he pays fees on his products, he is like a foreign refiner. At the same time he is subject to our price and allocation rules.

Mr. O'LEARY. And he is required to sell 100 percent of his product in the United States.

Mr. YATES. Would you place in the record a statement with regard to the resources that you use in developing regulations and maintaining standby capability in the event controls are reimposed on decontrolled products and what you propose to do in that situation.

[The information follows:]

REGULATION DEVELOPMENT AND STANDBY RESOURCES

Under Section 455 of the Energy Policy and Conservation Act, as amended by P. L. 94-385, allocation and pricing regulations for any exempted product are placed in standby status and may be reactivated by the President should a national situation occur where controls are required. To date the following products have been exempted: residual fuel, as of June 1, 1976; middle distillates, July 1; naphthas, gas oils, lubricants, greases and other specialty products, September 1; and naphtha base jet fuel, October 1. However, existing standby allocation regulations would not be adequate for the administration of a shortage if exempted products should come under controls again because the existing regulations are premised on a situation where adequate product is available. It is, therefore, necessary to prepare revisions to the regulations for emergency situations to make them adequate to cope with future shortages.

Late in 1975, a substantial study was undertaken to determine how allocation priorities should be revised to minimize the impact of a petroleum shortage on the economy. Consuming segments were analyzed by SIC code in terms of various economic indicators, including employment, contribution to GNP, interindustry multiplier effect, etc., and tentative new priorities were developed with a view toward minimizing the overall economic disruption. This work was interrupted by the press of activities resulting from enactment of the EPCA, but it is about to be resumed.

At this time an RFP is being prepared to contract for an update of the 1975 study. The purpose of this update is to review the findings and recommendations of the 1975 study in the light of more recent and precise fuel consumption and economic data. This effort will require three months of contractor effort, at an approximate cost of $100,000. Afterward, 10 FEA professionals will need another six months to write proposed regulations, hold public hearings and finalize the regulations.

Presently, thirteen (13) positions, including clerical support, are employed in developing pricing regulations and sixteen (16) positions, including clerical support, are employed in developing allocation regulations. Although the regulation development process is the prime function of this staff, the staff also develops issue papers and analytical studies of regulatory matters, responds to general and Congressional requests for information, and has responsibility for the development and maintenance of standby regulatory programs. Excluding consultant and contractual assistance, a minimum of ten (10) man/years would be necessary on an ongoing basis to prepare pricing and allocation programs for a standby basis. In the event that controls are reimposed on any product already exempted from regulations, it is the intention of the FEA to have revised and improved regulatory programs available for immediate implementation.

In addition to the 29 positions devoted to the actual development of allocation and pricing regulations, an additional 23 positions are presently devoted to supporting the regulation development function. This includes (1) conducting public hearings (more than 100 rulemaking hearings per year); (2) evaluating comments received during the hearings as well as those received by mail; and (3) preparing the necessary analysis to support the rulemaking process.

The foregoing addresses current resources required to develop standby pricing and allocation regulations. It does not include resources necessary to maintain an operational standby capability in the event of reimposition of controls. Finally, if a decision is made to continue or reimpose controls on various products, a supplemental request will have to be proposed.

REFINERY INSPECTIONS

Mr. YATES. In the Office of Crude Oil Operations, which is on page 91, you say that 80 refining inspections will be conducted in 1978. Is this different from 1977?

Mr. SMITH. Yes, sir, it is more refinery inspections.

Mr. YATES. How much additional cost will that be? Should you be doing more than 80?

Mr. SMITH. No, sir, we believe that will be the number we need. That involves the physical inspection of the refinery to certify its capacity, Mr. Chairman. Its capacity is a function of the treatment under the entitlements program for any refiner with less than 175,000 barrels a day, also a function of its treatment under the mandatory oil import program.

Mr. YATES. How much will the additional cost be?

Mr. SMITH. The total cost of fiscal year 1978 will be four people devoted to this program at approximately $25,000 per person, including travel and other expenses, for $100,000.

Mr. YATES. On page 92, you indicate that to determine prices for a high cost and high risk oil development, which we assume means tertiary recovery of oil, will "require substantial utilization of available resources."

Mr. SMITH. That refers to the people now engaged in the regulation development process, Mr. Chairman. This is a question of first defining regulations, those kinds of high cost tertiary recovery methods prescribed in the Conservation Act. Once the rules are in place, working with the State regulatory agencies on the certification of individual projects so we will be able to identify the incremental production from those new projects.

PROPANE ALLOCATION STUDY

Mr. YATES. Why do you need a special study for the propane allocation program?

Mr. SMITH. Because as we described yesterday, Mr. Chairman, the shortage of propane is going to continue to get worse. Because of the declining production of natural gas, and because of normal growth in the traditional users the demand for propane is going to continue to increase. Our current propane allocation regulations which were a derivative of the shortage, were construed as temporary in nature, and they need substantial revision. Our current perception is that we are going to be regulating propane for a number of years.

Mr. EVANS. Would the gentleman yield?

NO AUTHORITY TO REQUIRE PROPANE PRODUCTION

Do you have the power to require the production of a certain amount of propane?

Mr. SMITH. No, sir, we have no authority to require the production of any goods. We have certain authorities under our refinery yield regulations to require a refiner to shift the particular composition of what he does run through his refinery. But for technical reasons there is very little we can do in terms of propane. Only about 3 percent of the petroleum barrel is propane.

Mr. O'LEARY. Mr. Evans, most of the propane comes right out of a gas drain and is stripped out of the natural gas.

Mr. EVANS. If we are running as short as we are and you anticipate we will be shorter, the farmers and ranchers and those in rural America face serious problems.

Mr. O'LEARY. There is an offset. There are projections around that show an enormous increase in the production of propane and other liquids in the Middle East as they put their stripping plants onstream.

Mr. SMITH. One of the revisions we want to make to these regulations is to allow industrial users to be able to import propane at the higher imported cost of something like 40 cents a gallon. The industrial users can then increase their own storage during the summer months so it won't interfere with the winter distribution system, which is also very limited. This approach will also preserve the lower cost domestic propane for the traditional users, such as farmers and ranchers, and see that the industrial users can continue to meet their clean fuel process requirements with propane without getting in the way of the distribution system during the cold months.

STORAGE OF PROPANE

For example, this winter because of the last 3 winters preceding being warmer than normal, we went into the winter with something like 300 million barrels of propane in storage in Houston and Kansas and west Texas in the caverns that are the primary storage source. We had plenty of propane this winter. We did not have the physical capacity to move it by pipeline, barges, and tank cars in the quantities needed. As a result we had severe propane shortages in the upper Midwest and throughout the Southeast. The system was built to handle the traditional user's requirements. However, when that system is tasked to meet the massive requirements for peak use for utilities and for industrial plant use as a substitute for curtailed natural gas, there wasn't the physical transportation capability to move it, even though there was plenty of propane in Texas and Kansas.

We were able to get the Interstate Commerce Commission to give us a special waiver so that a number of trucks that were capable of carrying propane could be used in interstate commerce to supplement the supplies. The Railroad Administration allowed us to use some cars that didn't meet certain technical specifications. For example, railroad cars are supposed to be painted white on the outside so that they will reflect the heat. We asked them to let us use some gray cars usually used for ammonia because we didn't have a problem of absorbing too much heat during that period of time. They agreed.

ADDITIONAL PROPANE TRANSPORTATION

Mr. EVANS. If we have another winter like we had this winter, are you prepared to provide the transportation?

Mr. O'LEARY. There is no way to stock it.

Mr. YATES. In view of this need, why aren't the truck manufacturers building these trucks?

Mr. O'LEARY. This is a sporadic requirement. There will be less and less propane to go around. The requirements of the transportation system will diminish over a period of time.

Mr. EVANS. There is no way to increase the supply?

Mr. O'LEARY. Propane is stocked in salt caverns in the bedded salt that we find in the Southwest, and there they have very, very large caverns that had, as Mr. Smith told us, 300 million barrels at the beginning of last winter, most of that in salt.

Mr. SMITH. We did try to encourage the people early last year, having been burned the year before, to fill their storage in the summer and fall. Most of the commercial customers did this. The problem is those customers haven't installed sufficient storage to take care of their needs. That got worked down very early this winter so we wound up with this significant overload on the distribution system throughout most of the winter.

Mr. EVANS. Thank you, Mr. Chairman.

STRATEGIC TRANSPORTATION SUPPLY

Mr. YATES. Doesn't it make sense to have a strategic transportation supply in addition to strategic reserves?

Mr. O'LEARY. It may be. As you know, we have gone to a strategic reserve in crude. One of the points Mr. Noel is addressing is whether there should be, in addition to that, stocks of product.

Mr. YATES. Stocks of transportation means trucks and things of that sort?

Mr. O'LEARY. That is one possibility, or regional placement of stocks.

Mr. SMITH. In this case the dilemma is facing the prospect of declining propane supplies. The distributors are reluctant to invest in additional pipeline capacity because they are not going to be sure there will be enough propane to make it pay.

Mr. YATES. That is understandable because it is a substantial investment, isn't it?

Mr. O'LEARY. Yes, it is.

Mr. SMITH. That is why our current approach to this is rather than build the pipeline to try to require the large users that account for most of the surged demand, to put in their own storage and fill that during the summer when there is very little demand from the traditional user.

CHANGES IN OBSOLETE REGULATIONS

Mr. YATES. On page 93 you talk about developing new concepts and regulatory outlines for those that have become obsolete. How often do such regulations and concepts become obsolete?

Mr. SMITH. Depending on the individual regulations, some of them become obsolete based on changed conditions in the market in the space of as little as 6 months or so. Basically the current regulatory scheme started out to deal with an embargo. It was keyed to handling a shortage. Regulatory controls persisted beyond anybody's expectations after the major shortage disappeared. We have decontrolled some of the products. And because the regulations were doing some silly things, operating in an inadequate supply situation, we modified a lot of their provisions one at a time on, frankly, the sort of squeaky wheel theory. The problem that was hurting the most was the area that got the attention. Now we are in the unenviable position that the regulations aren't really good if we are going to keep them in an adequate supply situation and not really suited to deal with a shortage.

We want to deal with the shortage as the first priority and then if the decision is made to continue product regulation, at least approach it from a new standpoint. The new situation is that there is going to be product regulation in an adequate supply situation to achieve other objectives, competitive or whatever.

UPDATE OF NORTHERN TIER STUDY

Mr. YATES. You say it is necessary to update the northern tier study. Would you place in the record the findings of that study.

Mr. SMITH. Yes.

[The information follows:]

Findings Of The Short-Term Northern Tier Study

Recent developments affecting the availability of crude oil for the Northern Tier has dictated that FEA reexamine the data and findings of the draft FEA study "Petroleum Supply Alternatives for Northern Tier States Through 1980." Proposals by the Government of Canada to license "light" and "heavy" crude oils separately and an accelerated curtailment schedule for Canadian exports of "light" crude oils will impact the petroleum supply situation in the Northern Tier through 1980. Consequently, FEA is presently analyzing the available data in view of these new developments.

The following preliminary findings do not reflect these recent developments and may change due to the analysis being presently performed.

- The areas most affected in terms of meeting projected petroleum demand through 1980 are Montana and eastern Washington.

  - Montana, by utilizing existing transportation and refining systems, can meet the projected demand for itself through 1979. In 1980, having exhausted all alternatives and assuming no changes are made to existing FEA crude oil allocation regulations, Montana will experience a shortfall of about 17 MB/D of petroleum products.

- Eastern Washington is supplied both from Montana and from the Salt Lake City refinery center, and by barge from Western Washington. Due to reduced crude supplies to Montana combined with normal growth demands (2.2 percent annually), eastern Washington could experience supply problems starting in 1979, with possible shortfalls of 10.5 MB/D.

- The situation of the remaining Northern Tier areas through 1980 is as follows:

  - Lower Michigan Peninsula - This area has sufficient supply of crude and petroleum products to meet demand through 1980. In 1980, product pipeline capacity into southern Michigan from non-Northern Tier refinery centers will have a 5.5 percent spare capacity.

  - Wisconsin can meet its demand for product through 1980. Product inshipments are expected to increase from 255.6 MB/D in 1976 to 281.6 MB/D in 1980. In addition, by 1980, Wisconsin will have 14.5 percent spare product pipeline capacity. Even though product inshipments will increase, primarily due to demand growth, refinery capacity utilization between 1976 and 1979 will remain relatively constant, i.e., between 60 and 69 percent. Only in 1979 does the utilization decrease to below 60 percent.

  - Minnesota is not expected to experience any product shortfall in the 1976-1980 time period. Product inshipments will rise from 1976 levels of 121 MB/D to 145.8 MB/D in 1978 and then decline to 136.3 MB/D in 1980. This is due to a projected Williams Pipeline increase of up to 130 MB/D. Even in 1978, Minnesota will have 10 percent spare product pipeline capacity entering it from non-Northern Tier States. Refinery utilization in Minnesota will not decrease below 75 percent (the lowest will be 78.2 percnet in 1978). The critical assumption for Minnesota is the expansion of the Williams's Pipeline (crude) to a 130 MB/D capacity (Phase II). If this pipeline is not built then serious shortfalls could occur.

  - North Dakota can be provided with sufficient product from both non-Northern Tier States and Minnesota and Montana to meet its petroleum demands. Sufficient product pipeline capacity exists to meet these demands. Refinery utilization will decrease to below 60 percent by early 1977 and will reach 55 percent by 1980 due to reduced crude supplies. However, sufficient indigenous North Dakota crude exists to bring this utilization up to acceptable levels, assuming FEA regulations do not require it to be shipped out of the area.

- Western Washington area does not appear to have a serious problem in the 1976-1980 period provided that no impediments are placed in increased shipment of crude by ship into Puget Sound. With availability of both foreign and North Slope Alaskan crude, this area should be able to meet its own and western Oregon's needs in the period considered in this study.

* If the Northern Tier States' petroleum demands do not grow faster than projected, the only states that would be affected to a significant degree are North Dakota and Montana. Eastern Washington could have its growth seriously impaired if projected shortfalls are not eliminated. It is not possible in this report to quantify this impact on a sub-state basis.

* The most significant means of alleviating the potential problems in the 1976-1980 appear to be the following:

  1. Making additional local indigenous crudes available to Northern Tier refineries before these crudes are shipped to other non-Northern States.

  2. Facilitating Canadian/U.S. Crude exchanges and if possible utilizing foreign crude through the Portland pipeline to reduce the severely constrained mid-continent crude pipeline system to Chicago. Unless this is done exchanges or swaps via Chicago would be to 80 MB/D or less.

  3. Modification to the Mandatory Canadian Crude Oil Allocation Program to make the program more responsive to spot or seasonal problems.

* Only when all other alternatives have been exhausted, will crude unit trains have a rational basis for implementation.

* This study assumed a level of exchanges of up to 80 thousand barrels a day in 1980. If these exchanges are not fully utilized then potential shortfalls could occur. The magnitude of these shortfalls would depend upon the magnitude of exchanges not utilized, the states impacted by these lower exchange levels and the spare product pipeline capacity existing at that time.

PLACEMENT OF NORTHERN TIER STUDY

Mr. YATES. Why has the study been done in the regulatory area?

Mr. SMITH. Because of our responsibilities to provide crude oil supplies to the northern tier refiners.

Mr. YATES. Why in the regulatory area?

Mr. SMITH. It is not being done exclusively in the regulatory area. We are cooperating with the Energy Resource Office and the other offices of FEA. We took the lead on it because the study has two dimensions: In the short run, meaning the next few years as Canadian crude oil supplies decline, it addresses our responsibility to allocate those Canadian crude oil supplies. The first thing we needed to know was, how should we handle that transitional period? The longer term aspect in terms of pipeline alternative is in fact being done in the Energy Resource Devlopment Office.

ADDITIONAL SUPPLY FROM CANADA

Mr. YATES. Is there any hope of getting any kind of additional supply from Canada?

Mr. O'LEARY. Yes, there is.

Mr. YATES. There is?

Mr. O'LEARY. We are exploring that possibility with the Canadians now.

CONTINGENCY PLANNING

Mr. YATES. Would you place in the record an explanation of what is meant by contingency planning and what other agencies are involved.

[The information follows:]

Definition of Contingency Planning

Generally, the term "Contingency Planning" means to prepare for future emergencies. More specific definitions relating to energy, the role of the Federal government, and the specific responsibilities of the Federal Energy Administration are contained in The Federal Energy Act of 1974, The Energy and Conservation Act of 1975, The Energy Conservation Production Act of 1976, The International Energy Program, and Executive Order 11790. These mandates define the major contingency planning responsibilities of FEA as follows: to

- develop and update comprehensive energy shortage contingency plans for the United States;
- develop and submit to Congress a gasoline rationing contingency plan to include rationing of diesel fuel;
- develop and submit to Congress one or more energy conservation plans which will reduce the demand for petroleum in a severe energy supply interruption;
- develop state guidelines to assist the states in preparing Energy Conservation Contingency Plans geared to the National Conservation Contingency Plans;
- maintain and operate the allocation programs both current and standby;
- develop and operate a refinery yield program;
- develop and plan for the operation of a Strategic Petroleum Reserve;
- carry out the Materials Allocation program in conjunction with the Department of Commerce and the Federal Preparedness Agency by determining what programs or projects are essential to maintain or further exploration, production, refining, transportation, or conservation of energy supplies, or for the construction and maintenance of energy facilities.

Energy Contingency Plans: Other Agency Involvement

The Federal Preparedness Administration

The Federal Preparedness Administration has general responsibility for the coordination of all contingency planning of an emergency nature. The draft circular (Federal Preparedness Circular #6) dated June 16, 1976, assigned emergency energy responsibilities according to Executive Order 11490, and it also delineates a new, "non-mobilization category of emergency energy preparedness responsibilities" which are delegated to the Federal Energy Administration (FEA). Non-mobilization refers to embargoes or short term domestic energy supply crises such as occurred this winter.

Department of Interior

The Department of Interior, in a period of mobilization, would accomplish the contingency planning responsibilities assigned to FEA during periods of non-mobilization. This responsibility includes the distribution and storage of solid fuels, petroleum, gas, and electric power.

Federal Power Commission

Generally, the Federal Power Commission would provide a strong supportive role to those agencies responsible for developing contingency plans relative to the distribution and use of electric power and gas.

Other Agencies

Additionally, there are over thirty Federal departments and agencies which have some interest in energy contingency planning either for mobilization or for non-mobilization purposes. The larger agencies, Department of Defense, Department of Transportation, the Energy Resource Development Administration, and the General Services Administration maintain contingency planning staffs for energy preparedness as it relates to their programs and responsibilities.

FEA did not establish an Emergency Preparedness program (mobilization) under the provisions of E.O. 11790 because it was a temporary agency and as such the Attorney General of the U.S. made a determination that "long term" energy contingency planning was vested in the Secretary of the Interior. The establishment of the proposed Department of Energy would change these considerations, and the planning responsibilities under mobilization and non-mobilization would have to be reassessed.

STATE CONTINGENCY PLANS

Mr. YATES. Do all States have contingency plans too?

Mr. SMITH. All States do not now, Mr. Chairman.

Mr. YATES. Are there many that don't.

Mr. SMITH. Yes, sir. Most do not have formal contingency plans. One of the objectives of the program——

Mr. YATES. Is to persuade them to have them?

Mr. SMITH. Yes, to provide assistance to the States in terms of criteria that the plans should meet and encourage States to develop such plans.

REGULATORY DATA COORDINATION ACTIVITIES

Mr. YATES. You talk about data coordination activities. Why isn't that in your Data Analysis Office instead of your regulatory program?

Mr. SMITH. That is an internal shop in my Regulatory Office that has the specific job of keeping in touch with Dr. Christie's people and my own program managers to see that we meet the requirements of the systems development and forms development imposed by Dr. Christie's office; and that I have control over the priorities in which we request program support. Before I established that office, my individual program managers were working directly with Dr. Christie's people and in effect were setting priorities for my office.

CONSERVATION AND ENVIRONMENT MARKETING OFFICE

Mr. YATES. Let's turn to "Energy Conservation and Environment." You are reducing your Marketing Office. Why do you need a Marketing Office at all?

Mr. SENECA. The Marketing Office is primarily responsible for strategies and getting out conservation information to the public. As you are probably aware, in a voluntary conservation mode we do have to have market analysis to determine how to reach the people involved. So the primary function of that office is to get the information out in a way in which it can be used.

Mr. HOWELL. In this area, Mr. Chairman, we would be losing three positions.

Mr. YATES. All right. You have an Office of Environment.

PROGRAM EVALUATION DUPLICATION

You have a program evaluation effort in your Office of Policy and Program Evaluation. You talk of it in this area as well. Wouldn't you be doing the same kind of evaluation here as you do in the Office of Policy and Program Evaluation?

Mr. SENECA. I am not understanding your question. Are we looking at program evaluation?

Mr. YATES. Yes. You have that listed under your office. You also have that same kind of evaluation effort in the Office of Policy and Program Evaluation. Why don't they do the evaluation instead of you?

Mr. SENECA. You are comparing the different parts of the agency.

Mr. YATES. What I am saying really is—and perhaps I have the wrong concept—I think that perhaps the Office of Policy and Program Evaluation is in the nature of an inspector general's office.

Mr. SMITH. Mr. Chairman, there are two different kinds of review that go on. The Office of Policy and Program Evaluation conducts general broad reviews of the results of the individual programs.

Mr. YATES. For the whole agency?

Mr. SMITH. Yes, to see whether the programs are achieving their intended policy objectives. They look at the outcome, what the program does, and compare it to what should have been done. We intend to try to centralize under my direction a more detailed inspector general kind of program evaluation. We ought to change the name so they are not confusing.

This is the group that sees whether it is doing things in accordance with the established directives and procedures and see if it is still on the track. It is a much more detailed operational kind of review than the other.

INNOVATIVE CONSERVATION PROGRAMS

Mr. YATES. Let's turn to page 107. There you want $25.5 million for three programs that are really unspecified. That is a pretty substantial amount of money for an unspecified programing. Could you let us know what you intend to do with the $25 million.

Mr. SENECA. That justification essentially is in anticipation of innovative conservation programs that would be coming out.

Mr. YATES. Then you want it kept secret until April 20? You don't want to tell us why you want $25 million?

Mr. SENECA. The point is we will probably be able to respond much more appropriately on April 21.

Mr. EVANS. How did you pick the figure of $25 million?

Mr. YATES. If you wait until April 20 you will find out.

Mr. O'LEARY. If I may help you a little. There are three sets of conservation initiatives that are called for in EPCA. The first has to do with the mandatory five, right turn on red, the heating in Government buildings, and what have you. The second one runs to supplemental grants. Those run to audits of buildings, education, and what have you. The third aspect in the act set aside this money for innovative programs.

In fact, the initiatives for these innovative programs are supposed to come from the States in large measure. We are simply going to the authorization level. We are going to $25 million out of $40 million that was authorized for this purpose.

Mr. YATES. But you are saying you don't have any innovative programs.

Mr. O'LEARY. These are programs that will essentially come out of the States in large measure.

Mr. YATES. In other words, you want a reserve to take care of what the States come up with?

Mr. O'LEARY. One thing that one of the States has been looking at is the development of a speedometer device for the kitchen so that a wife who is in an electric home can take a look at the meter that gets closer to the point where she exceeds her peak demand—this runs strictly to load management—and say, "I will now unplug the toaster." She has a speedometer that is in effect a meter.

Mr. YATES. To determine what?

Mr. O'LEARY. To tell her the peak demand of her house.

Mr. YATES. Of the use of electricity?

Mr. O'LEARY. Yes.

One of the problems that you have is not only the absolute amount of electric demand, which is a fuel problem, but the peak demand in households, residential and industrial sectors, which is a capital problem. One of the ways we might be able to conserve on capital is to have much better load management.

Mr. YATES. You know the peak is going to be approximately at 6 o'clock when the husband comes home for dinner, or before 6 o'clock?

Mr. O'LEARY. That is right.

Mr. YATES. Then after that you are going to have television.

Mr. O'LEARY. Wives and husbands both are notoriously insensitive to the fact the meter is speeding up at that time. One of the things that has been discussed in New York is having a model program where they put out a simple low-cost meter that would tell the wife: You are now getting to the point where you are touching a red line; disconnect the toaster. This sounds trivial but in fact if that were done on a very broad basis it might reduce the requirement for investment by hundreds of millions of dollars.

Mr. YATES. Why don't you have a fuse that blows out? That is what happens to my house when I turn on too many gadgets.

Mr. EVANS. Do you want to propose that as the Yates conservation effort?

Mr. YATES. Why do you need a speedometer to tell you that?

Mr. O'LEARY. You obviously have an innovative gadget.

Mr. YATES. Up to now you really haven't told us anything about the $25 million.

Mr. O'LEARY. Because we don't know anything about it. This isn't an April 20 black box; this is a State black box.

Mr. YATES. You are going to wait expectantly for innovative programs the States are going to make?

Mr. O'LEARY. In the event States come forth with sensible ideas, we will spend all or a portion of this.

Mr. YATES. What if an individual comes forward? He doesn't qualify?

Mr. O'LEARY. No; I imagine he would if he can get a State sponsor.

Mr. YATES. But he needs a State sponsor?

Mr. O'LEARY. I am not sure about that. We will supply that.

[The information follows:]

INNOVATIVE CONSERVATION SUGGESTIONS FROM INDIVIDUALS

The Federal Energy Administration welcomes innovative conservation suggestions from all sources including other Government organizations, business, and labor, as well as individuals. Comments and ideas have been actively solicited during our town meeting which were recently held by each of our 10 regional offices. Suggestions have also been sought by Dr. Schlesinger in a recent mailing to assist him in developing the President's April 20, 1977, energy message. These suggestions may then be included in FEA program guidelines and public information pamphlets.

Mr. SENECA. There is one point here that we need to get clarified. The thing is we can't confuse the present State program——

Mr. YATES. I think you are talking about two separate things. You want a $25 million slush fund.

Mr. O'LEARY. Mr. Chairman, we want to respond as best we can.

Mr. YATES. You want us to have faith in you. You said yesterday you were going to be here only a short time.

Mr. O'LEARY. But Mr. Seneca is going to be here for a long time.

Mr. YATES. I am not sure of that.

Mr. O'LEARY. This is nebulous and I think you may want to hear more about it.

Mr. YATES. You may want to expand upon it in the record.

[The information follows:]

NEED FOR RESOURCES FOR INNOVATIVE CONSERVATION PROGRAMS

Energy conservation programs, as evidenced by FEA's FY 1977 Supplemental and FY 1978 Budget requests and numerous statements by the President, will be the keystone of the Administration's energy policy. It is anticipated that the President's specific energy proposals, scheduled to be made shortly, will build upon existing conservation programs and offer a number of new initiatives directed at furthering energy conservation. Because of the urgency of establishing a stronger national conservation program, it is essential that FEA have sufficient resources to enable the Agency to respond rapidly to new developments.

Specifically, it is anticipated that the President's legislative proposals will ultimately require a large increase in the resource requirements of FEA (or the Department of Energy). The changes experienced by FEA as a result of the passage of the Energy Policy and Conservation Act (EPCA) and the Energy Conservation and Production Act (ECPA) offer a small indication of those that are likely to occur as a result of the President's forthcoming proposals. Both EPCA and ECPA were enacted in the latter half of the calendar year and both directed FEA to perform a wide range of specific tasks within a very short period of time. Because supplemental funding was impossible to obtain until the following year, FEA was forced to stretch its existing resources by reallocating funds within the Agency. The limited resources available for these efforts was a major factor in the Agency's failure to meet many of the legislative deadlines. The appropriation of sufficient funds now would enable FEA to begin to develop on October 1, 1977, programs that are likely to be specifically authorized by that date.

In addition to new legislative initiatives, the President may also direct the development of other conservation programs that are already within the scope of FEA's general authorities. Such a direction would also require the quick allocation of additional resources.

It should be emphasized that none of these funds will be used to circumvent the authorization and appropriation process. They will be used strictly for required policy analysis and program development efforts, rather than program implementation, unless specific legislative authority and approval by the Appropriations Committees is obtained.

The Committee will be continually informed of the specific tasks, when they arise, for which these funds are to be utilized.

POSTON LETTER

Mr. YATES. I have a letter from Mr. Poston, who is the head of the Department of Environmental Control of the City of Chicago.

Unfortunately I never met with him, and now they have sent me a casebook of savings.

I wrote them saying that I would keep their suggestions in mind until such time as we have the Federal Energy Administration before us.

May I submit this to you and ask you to get in touch with Mr. Poston. I should have done it a long time ago because he is very anxious to have that kind of program, and I am sure the city of Chicago will be very much interested in it. I must say I, as a good citizen of the city of Chicago, will be very interested in your response.

Having said that, why don't we adjourn now and come back at 1:30.

AFTERNOON SESSION

STATE ENERGY CONSERVATION PLANS

Mr. YATES. How many States have submitted energy conservation plans?

Mr. SENECA. Mr. Chairman, nine plans have been submitted as of March 25. The time frame for plans to be submitted is March 28 and we expect a total of 21 States to have come in with their plans and the rest of them should be in by June 1. Some States have requested extensions. For example, the State of Illinois did request an extension to April 28, when we expect their plan.

Mr. YATES. How many do you expect in 1978?

Mr. SENECA. Mr. Chairman, one of the things to keep in mind is that we are talking about a State grant program. Once the basic plan is in this year, then we will expect a continuation of funding for all those plans in fiscal year 1978.

FORMULA FOR DISTRIBUTION OF STATE GRANTS

Mr. YATES. How do you determine the funding for each State?

Mr. SENECA. There is a formula basis in terms of the funding, Mr. Chairman. Twenty-five percent is equally divided among the States and 75 percent is divided on a population basis.

Mr. YATES. What is the difference between a State energy plan and supplemental State energy plan?

Mr. SENECA. Mr. Chairman, let me just bring to your attention the fact that the State supplemental program, which was in the ECPA, was an amendment to the basic State program in the EPCA, so in effect we are talking about a supplemental plan to the basic State grant program.

As you may recall, in the basic program, there are five mandatory measures that we are involved in, but in the supplemental program there are three different measures.

Congress, in its wisdom, felt that there were additional items that ought to be included in the State energy conservation plan, and they included them in the supplemental.

GUIDELINES FOR STATE ENERGY CONSERVATION PLANS

Mr. YATES. When will your guidelines be published for these?

Mr. SENECA. For the supplemental?

Mr. YATES. Yes.

Mr. SENECA. The guidelines are published and proposed at the present time.

Mr. YATES. How many States have shown an interest?

Mr. SENECA. All the States have shown an interest in the supplemental program.

ENERGY EXTENSION SERVICE

Mr. YATES. How would this program differ from the energy extension service that ERDA is going to develop?

Mr. SENECA. The energy extension service, as I understand it, Mr. Chairman, is essentially a program that is analogous to the Agricultural Extension Service, the purpose being to have several agents around the country assisting people in energy matters. This could be a supplemental effort to the State energy program. In other words, it could very effectively merge in the total Federal support of the State's energy efforts.

CONDUCT OF ENERGY AUDITS

Mr. YATES. How would your energy audits be conducted?

Mr. SENECA. There are a number of ways in which the energy audits could be done. Some of the pilot efforts that FEA has gotten involved in, for example "Project Conserve," involve a manual or workbook, if you will, where nonprofessionals can use this workbook and perform energy audits of their own residences.

TECHNOLOGY TRANSFER

Mr. YATES. On page 114, you say the office will serve as a catalyst in the technology transfer process. ERDA has a technology transfer process, too. How do you avoid overlap?

Mr. SENECA. One of the things that we would do to avoid overlap in this instance is through our coordinating mechanisms with ERDA. In terms of transfer of technology, Mr. Chairman, our point in this aspect of the program is to bring things from the development stage to the application stage.

Now, in terms of avoiding that overlap with ERDA, I guess the direct response to that would be the coordinating factor.

Mr. O'LEARY. One point on that, Mr. Chairman. In the last 2 months we have been using both the ERDA organization and the FEA organization essentially as one body of resources. In the area

of technology transfer, we have asked Bob Fri to designate someone to work with Martin Seneca and Mr. Fri designated David Israel. Mr. Israel has gone through the entire conservation program in FEA, the entire technology transfer program of ERDA, and he has reported back on areas of potential overlap, and thus we have a very workable coordinating mechanism to eliminate potential overlap.

ENERGY CONSERVATION EDUCATION EFFORTS

Mr. YATES. What impact will an energy conservation curriculum in kindergarten and secondary schools have on energy use? Any?

Mr. SENECA. Yes, Mr. Chairman, one of the problems we have had in the whole conservation activity, and it was alluded to yesterday, is in terms of the awareness of the energy problem. The thought is that if we can get people involved in this kind of educational process early on, we will begin to develop the kind of conservation attitudes and energy awareness that will be necessary for this country to deal with its energy problem.

Mr. O'LEARY. Wasn't it Aquinas who said "Give me a child until he is 5." We try to get them at 7 or 8.

WEATHERIZATION

Mr. YATES. When do your weatherization regulations take effect?

Mr. SENECA. In terms of taking effect, Mr. Chairman, we have a schedule that we have worked out on the weatherization regulations, and they will be published in final on June 1. In other words, all of the review processes will have taken place, the comment periods and so on, and we will be ready to work the program on June 1.

Mr. YATES. How do they differ from the regulations put out by CSA?

Mr. SENECA. The CSA mandate is a much broader mandate, and it is a social mandate. The idea for CSA is to get not only into the weatherization of homes, but to do such things as pay fuel bills, buy blankets, that is essentially help out in a social context.

The thrust of the weatherization program that we envision, although the social aspect is a byproduct, is energy conservation, and our thought is to use the weatherization materials in such a way as to conserve energy.

Mr. O'LEARY. I will repeat the point I made vesterday, Mr. Chairman, that this is important to us not because of the program pending before you, but because the experience that we will gain from it will be valuable in the much larger program that we will be administering hopefully beginning next year.

REGIONAL WEATHERIZATION PERSONNEL

Mr. YATES. Why do you need 10 new regional jobs?

Mr. O'LEARY. Thev are the supervisory force necessary to be sure that money is spent effectively.

87-591 O - 77 - 33

Mr. YATES. Your 1977 supplemental referred to weatherization of about 1.4 million houses in 3 years out of an estimated 6 million low-income homes. Is that still about the level?

Mr. O'LEARY. Yes; it is still 1.4 million.

Mr. YATES. Would you place in the record a description of the demonstrations of your State building performance standards and your transportation control demonstrations?

Mr. SENECA. Yes.

[The information follows:]

STATE BUILDING PERFORMANCE STANDARDS AND TRANSPORTATION CONTROLS

Under FEA guidelines for the State energy conservation program authorized by EPCA, States are required to have thermal efficiency standards for new and renovated buildings in place and ready for implementation by January 1, 1978. In support of this requirement FEA is curently conducting demonstrations in 10 States (Florida, California, Oregon, Virginia, Michigan, Minnesota, New Jersey, Missouri, Massachusetts and New Mexico) to resolve major technical issues inhibiting proper standards implementation, e.g., availability of accurate energy consumption data, proper integration of model building codes, complete administrative and compliance systems, and adequate training material. In fiscal year 1978, FEA wishes to continue these demonstration efforts to assist States in their adoption and implementation of standards for new and renovated buildings. FEA plans to demonstrate, through additional cooperative agreements, the cost-effectiveness of standards promulgation, the effect of standards implementation on institutional buildings, and the feasibility and need for a technical and administrative clearinghouse for State and localities charged with adopting, implementing, and enforcing building standards. FEA would, of course, disseminate the results of such demonstration efforts.

As with building standards, the transportation controls requirements of the EPCA State energy conservation program confronts the States with a variety of avaliable options. In order to assist States in implementing programs that have the highest possible potential for energy savings, transportation concepts with high transferability will be demonstrated by FEA, e.g., carpool/vanpool matching, preferential traffic control for carpools and public transit patrons, variable working schedules, exemption of carpools and vanpools from regulated carrier status, full-cost parking fees, urban area traffic restrictions, geographic or time restrictions on automobiles. Techniques and results will be made available to States to facilitate their planning and program processes.

CONTRACTING STUDIES

Mr. YATES. Why do you contract them out?

Mr. SENECA. We contract out some of those activities, Mr. Chairman, because this is information that we need on a one-shot basis, and the idea of contracting for that information is, in our estimation, a better way to go than bringing on new staff to deal with those issues.

Mr. YATES. On page 118, you have two staff positions and 7 man-years of effort.

Mr. HOWELL. Conservation is coming down there, Mr. Chairman.

Mr. YATES. What does that mean?

Mr. HOWELL. I will be glad to check that and put it in the record.

[The information follows:]

NATIONAL PROGRAMS—EXECUTIVE DIRECTION POSITIONS

Until now it was the Office of Conservation and Environment's policy to provide some technical assistance to the public concerning FEA's national conservation programs—such as the utility program—through its regional offices. In the interest of consolidating the regional effort to only the State-directed programs, the Office of Conservation and Environment has decided to phase out its regional national program efforts beginning October 1, 1977. In effect, each region will lose one position in this area but will need support funds for one-half of a staff year to phase down and direct the technical assistance activities into the appropriate headquarters offices. The remaining 2 positions and 2 staff years are headquarters resources needed to manage the national conservation efforts.

FEDERAL ENERGY MANAGEMENT PROGRAM

Mr. YATES. When will your 10-year plan for the Federal energy management program be completed?

Mr. SENECA. The 10-year plan, Mr. Chairman, has been in process. In terms of our expectations of when that 10-year plan will be concluded, our sense is that it will probably be concluded in fiscal year 1978.

Mr. YATES. Why, with ERDA's expertise and that of other agencies, do you contract at $630,000 to develop a credible energy management program?

Mr. SENECA. The contracts that we are involved in, in this instance, Mr. Chairman, are for some information that is not readily available. Part of the discussion that went on yesterday dealt with switching to coal, and the thought was that there are some buildings of such size that it does make some sense for them to be fired by coal. One of the things that we will be looking at is a program to convert some of these Federal boilers to fuel other than petroleum or natural gas or to convert them to coal.

At the present time, although the technology is in existence, the application of that technology to the Federal establishment has not been documented.

OBLIGATION GUARANTEES

Mr. YATES. The obligation guarantee program makes reference to the use of renewable resources as well as conservation measures. Would these guarantees apply to the use of solar devices?

Mr. SENECA. Yes.

Mr. YATES Does ERDA not have a program for that?

Mr. O'LEARY. Yes. They are complementary. Theirs is a demonstration program. This is an actual one and this would apply to industry. It is a $2 billion loan guarantee program.

Mr. YATES. You want 75 employees. Would you place in the record a description of what the 75 would do?

Mr. SENECA We would be pleased to.

[The information follows:]

FUNCTIONAL DESCRIPTION OF OBLIGATION GUARANTEE PROGRAM POSITIONS

FEA plans that this program will be implemented jointly by FEA headquarters and regional personnel. All applications dealing with energy measures which are either on the energy measures list or cost less than $250,000 will be received and finally processed by the appropriate regional office. All other applications will be received initially by the regions, checked for completeness and forwarded to the headquarters office for final processing. In addition, all complex cases involving special handling and interpretation will be processed by the headquarters office.

Headquarters Office

This office will have 25 positions detailed below:

Position	Number	Functions
Program Director	1	Overall management of the program.
Secretary	1	Perform the secretarial functions of the director's office.
Deputy Director (Operations)	1	Responsible for directing, coordinating and processing of guarantee applications at the headquarters and for maintaining liaison with regions. He will be assisted by the following staff:
Case Specialist	9	Review, and process applications, and issue guarantees in all cases involving guarantees over $250,000 that include measures not on FEA's energy measures list. Maintain records and counsel individual applicants.
Secretaries	2	Perform typing and other secretarial functions of the Office of Deputy Director (Operations).
Deputy Director (Analysis and Evaluation)	1	Responsible for directing and managing the Office of Analysis and Evaluation. This office will render technical and financial assistance in analyzing complex and unusual cases. Also responsible for evaluating program progress and effectiveness and preparing periodic reports about program progress. He will be assisted by the following staff:
Technical Analysts	4	Responsible for technical assistance in analyzing complex cases, and updating and expanding FEA's energy measures list. Help prepare audit manuals appropriate for various typical applications.
Financial Analysts	4	Responsible for providing financial assistance in the analysis of individual complex cases, developing procedures and issuing guidelines for evaluating individual applicant's ability to repay the loan, and providing other guidance of financial nature, as needed.

Position	Number	Functions
Secretaries	2	Perform secretarial functions of the Office of Analysis.

Regional Offices

These offices will have a total of 50 positions with each of the 10 regional offices averaging a staff of 5. The breakup of staff functions for a typical regional office is provided below. Main responsibility of regional offices will be to entertain and process guarantee applications, disseminate program publicity material and to counsel individual applicants.

Position	Number	Functions
Regional Director	1	Responsible for managing and supervising the operations of the regional office under the local direction of the Regional Administrator and overall coordination with the Headquarters Program Director.
Case Processors	3	Responsible for receiving, reviewing, and either final processing or forwarding of individual applications to headquarters as appropriate in each case. Counsel individual applicants. Maintain records and disseminate program publicity materials.
Secretary	1	Responsible for the secretarial functions of the regional office.

PUBLIC AWARENESS OF OBLIGATION GUARANTEE PROGRAM

Mr. YATES. How will your program of public awareness be coordinated with State programs?

Mr. SENECA. The program of public awareness within the obligation guarantee program?

Mr. YATES. Yes.

Mr. SENECA. One of the things that we would be utilizing in this instance, Mr. Chairman, would be the State programs, themselves, in terms of information dissemination, so that public awareness would be created for the obligation guarantee program in a manner closely coordinated with the State energy program.

Mr. YATES. What is an energy measures list?

Mr. SENECA. In the legislation, in the amendment to EPCA, one of the issues that was presented there was an energy measures list, and the concept, Mr. Chairman, is that there would be a list of conservation measures that have been proven to be cost-effective, and any measure on that list would be automatically eligible under the obligation guarantee program.

TARGETS FOR OBLIGATION GUARANTEES

Mr. YATES What is the degree of interest in this program?

Mr. SENECA. Let me indicate the target areas for the obligation guarantee program. The legislation indicates that buildings, residential buildings of more than two dwelling units, would be eligible. Great interest has been shown by owners of commercial buildings and apartment buildings that want to get involved in conservation kinds of activity.

There is tremendous interest shown by managers of institutional buildings, hospitals, convalescent homes, and so on. Small business shows a tremendous interest there. Where the program is not receiving much interest is in the large industrial area, and the primary reason for that, Mr. Chairman, is that in order to quality for a guarantee, there has to be a demonstration that the borrower could not otherwise secure credit on reasonable terms through the commercial banking sector. Most of the large industrial complexes usually have triple A credit ratings and have no need of a guarantee.

Mr. YATES. How do you arrive at a $500-million number in guarantees and a default rate of 3 percent?

Mr. SENECA. In terms of the default rate of 3 percent, this has been gleaned from the experience of the current loan guarantee programs in the Federal Government, the Small Business Administration being the primary source in terms of arriving at the 3 percent figure. I am sorry, I missed the first part.

OBLIGATION GUARANTEES $500 MILLION

Mr. YATES. You have an estimate of $500 million in guarantees that you will be giving. How do you arrive at that?

Mr. SENECA. The $500 million is what we arrived at through expressions of interest at this point. Now, keep in mind that the total program is authorized up to $2 billion. At this point, we feel that there is no problem at all in having $500 million worth of business during fiscal year 1978.

Mr. YATES. And what is your estimate of the range of energy savings for that amount? Do you have them?

Mr. SENECA. I think I best supply that for the record.

Mr. YATES. All right.

[The information follows:]

OBLIGATION GUARNTEE PROGRAM'S ESTIMATED ENERGY SAVINGS

FEA estimates show that, at the $500-million loan level, the Obligation Guarantee Program will save approximately 55,000 barrels per day. At the $2-billon loan level, FEA expects the program to save approximately 220,000 barrels per day.

TECHNICAL ASSISTANCE CONTRACTS

Mr. YATES. Then you talk about $1,150,000 in technical assistance contracts for this program. What kind of contractors would be involved?

Mr. SENECA. One of the primary problems of this program is that a lot of potential borrowers do not understand what kind of conservation measures they should be getting involved in. And so part of our budget request is an awareness program to provide those people who are potential borrowers in this program with the information about the kinds of conservation activity they should be engaged in. There may be some fairly large loans—up to $5 million is the limit in terms of guaranteeing any one single loan and so for $5 million a large building, a large apartment complex, or a hospital, may get into a whole new energy plant. Information on the broad spectrum of conservation measures available must be disseminated to potential borrowers.

Mr. YATES. ECPA also authorized a $200-million program for energy conservation demonstrations in existing dwelling units. Do you have any plans to implement such a program?

Mr. SENECA. I think you are referring to the program that HUD has the lead resonsibility for.

Mr. YATES. And you are going to wait for that? You don't have any plans for that?

Mr. SENECA. In terms of plans of spending that $200 million, we are not requesting that in our budget.

REGULATORY INSTITUTIONS PROGRAM

Mr. YATES. Let's turn to regulatory institutions program, and yesterday we had a very good explanation of the problems of the utilities in this connection. You have had 21 demonstrations already concerning the electric utilities. How many more demonstrations do you want before you have had enough?

Mr. SENECA. It is our expectation that by the conclusion of fiscal year 1977 we will have placed a demonstration project in each one of the utility areas or the mixes that we are seeking. In 1978, the demonstration effort is going to be refocused a bit and concentrate on pilot projects designed to accelerate the actual implementation of rate reform and related conservation activities that we have learned in previous demonstrations.

In the 1977 supplemental, as you may well recall, the request included partial funding for five new electric and five new gas demonstrations, and for funds for the completion of three previous electric demonstrations.

In fiscal year 1978, our request would fund four additional demonstrations. There would be 2 electric and 2 gas, which would bring the total utility demonstrations fully funded to 23 electric and 7 gas. It is our thought that we would not be coming back in the fiscal year 1979 budget for any further demonstration activity. This will conclude the program.

VARIETY OF DEMONSTRATIONS

Mr. O'LEARY. The reason there is a variety of requirements for various demonstrations is because you do encounter systems with broadly differing load factors, load distribution and rate structures. This program is an attempt to get something that is applicable nationwide.

ENERGY IMPACT OF DEMONSTRATION PROGRAM

Mr. YATES. What is the projected energy impact of the demonstration program?

Mr. O'LEARY. It will be substantial in time, not only from the standpoint of energy saving, but capital saving.

IMPACT OF PEAK LOAD DEMONSTRATIONS

Mr. YATES. What is happening to your demonstrations with electric utilities on peak loads?

Mr. O'LEARY. Several of the demonstrations run to time-of-day metering——

Mr. YATES. To the housewife?

Mr. O'LEARY. No; this, however, does impact directly on the housewife, but more particularly to industrial load, and you can expect that this will achieve substantial savings, not so much in fuel, but in the capital required in order to maintain the peak accountability of the system.

BEGINNINGS OF RATE REFORM

Mr. YATES. Are rate reforms taking place yet?

Mr. O'LEARY. There are the beginnings of rate reforms. There was a classic case 2½ years ago in Wisconsin, the *Madison* case, which put into effect the first of the great innovative changes in the reverse tilt in rate reform. That has been followed by cases in Pennsylvania and New York. There is always a good deal of innovation going forward in the State of California.

STANTON LETTER

Mr. YATES. I have a letter here from an old friend who used to be in Congress, Mr. James Stanton, written on March 10, containing a memorandum from Mr. Hanfling, respecting an initiative under electric utility rate design initiatives, section 201(A) of ECPA, in which the Congress finds that you ought to improve electric utility rate designs for cutting the cost of electric utility services to consumers, et cetera.

Mr. Stanton represents the National Regulatory Research Institute, which wants to do some work under this section and get a contract, and I assume it has been brought to your attention, because we have a copy of a memorandum to you from Mr. Hanfling, a memorandum I don't quite understand, in which he says.

I pointed out to the gentleman that while the goal is one we support, I do not feel it is proper for FEA to take part in this effort even if funds were available.

He concludes,

There is no further action required from FEA at this time, but I would recommend should we be asked for monetary support, it would be a good use of Federal funds.

Mr. O'LEARY. I had a discussion with Mr. Hanfling on receipt of this memorandum, and he is here——

Mr. YATES. He can speak for himself.

Mr. O'LEARY. He can impart that to you.

Mr. YATES. How do you reconcile the two paragraphs?

Mr. HANFLING. Basically, there was a mistake; my mistake in having signed it in that way. The intent of my message to Mr. O'Leary was that FEA did not have funds to support such an institution, but the former Congressman asked what our response would be if Congress were to ask us if such funds should be made available by the Congress. My opinion to Mr. O'Leary was that this would be a good use of Federal funds to provide assistance to the State regulator.

IMPORTANCE OF STATE UTILITY COMMISSIONS

Mr. YATES. Why would it be a good use?

Mr. HANFLING. In my opinion, most of the major decisions on energy relating to electric and gas utilities are made at the State level. The complexity and magnitude of the problems far outstrip the ability of most of the State commissions to handle these problems. There are notable exceptions, of course, California, New York State, and the Illinois State Commerce Commission with Chairman Lieberman are able to handle these things. Chairman Lieberman is also the Chairman of FEA's State Regulatory Advisory Committee, and at his urging and his counsel in some of our advisory committee meetings, the State regulators have urged FEA to provide greater assistance to the States to handle many of the major issues. The National Association of Regulatory Utility Commissioners has attempted to approach the problem by establishing this institute which would provide direct support to all the State commissions. It is for those reasons and the basic fact that it will take time before most of these commissions are in a better position to make decisions in the energy area, that I personally feel this would be a good use of funds.

Mr. YATES. How much money do you think it ought to have?

Mr. HANFLING. I really haven't analyzed their budget.

Mr. YATES. Would you analyze it and put it in the record? The question comes to me whether or not in the budget you have, you don't have enough money for it. Is it worth reprograming? You said it would be a good use of funds. How good a use is it? When you compare it to other activities, is it one that deserves reprograming? Would you get that and analyze it and see whether it is possible?

Mr. O'LEARY. Let me say one word about that, Mr. Chairman. Probably the element of the national energy program that most needs shoring up is the capacity of the State regulatory commissions. They play an absolutely crucial role, much more important than FEA in many respects. Among them, they regulate the biggest industry in the country, the electric utility industry. Having been very, very close to a more or less standard State regulatory commission for the last 1½ years, I know they are not well equipped to discharge their responsibilities.

Mr. YATES. FEA has been pressing for some kind of programing which would persuade the electric utilities to really analyze the rate structures of the electric companies. And I am inclined to agree with you that the commissions must be cooperated with in this respect because they will be entering the orders, that either approve the voluntary efforts of the country or which require them to do it under appropriate State laws. How can they do it without the data? How can this be done without the basic data? Who does it best? Is it done best through this format of having the combination of all the regulatory rate commissions try to work it out, with their staff, or is it better for you to do it with some outside contractor?

Mr. O'LEARY. I think to the extent they participate in the process, they are going to be much more capable of taking it into account.

Mr. YATES. I think Mr. Stanton's clients have what seems to be a constructive initiative, and I wish you would analyze it for the record and see how much it justifies in funding, and to the extent that you can, tell us whether it needs new funding, or whether you want to reprogram for it.

[The information follows:]

STANTON LETTER

An analysis of the National Regulatory Research Institute (NRRI) proposal of the National Association of Regulatory Utility Commissioners (NARUC) has shown that while not all the programs are related to the ERD/FEA program responsibilities, there appears to be several opportunities to support this proposal. FEA could support the utilities research program and 50 percent of the regulatory methods research program. These two programs would constitute $591,000 of the total $2 million request or 30 percent support. While this support is not the requested level of 50 percent of total cost, it does represent an equitable interest in that FEA would be providing over 54 percent of all subcontracted research support to the NRRI and approximately 40 percent of all salaries and expenses requested. What would not be supported fully is the high indirect cost representing over 64 percent of all salaries and wages. This portion of the request requires additional data and analysis to receive proper consid-

eration. The source of the FEA support, as with any other worthwhile proposal presented for consideration this late in the budget cycle, would have to come in the form of supplemental funding to our current budget request. This would be necessary to fully support our other priorities that also must be funded from the limited financial resources in our budget request.

Mr. SENECA. I would like to add, Mr. Chairman, that in the conservation office budget, we do have a program which we call initiatives, which would provide a limited amount of technical assistance to the regulatory commission, and through that mechanism we are able to provide some expert technical assistance to the regulatory commissions.

BIAS OF FEDERAL BUREAUCRACY

Mr. O'LEARY. Mr. Chairman, the committee also should be aware of the bias against this sort of thing you find typically in the bureaucracy.

Mr. YATES. Why? Why would they be opposed to something like this?

Mr. O'LEARY. It is just that they really sort of despair of having the States act responsibly. There is a feeling that is deeply entrenched in the people in Washington that they do things so much better with so much wisdom from Washington that the States don't really count.

In this crucial area that bias is very important to understand.

Mr. YATES. Even if that were true, they still have to go to the State regulatory agencies to deal with the electric companies.

Mr. O'LEARY. That is right; the State regulatory agencies really regulate the local gas and electric companies.

IMPACT OF INTERVENTIONS

Mr. YATES. You apparently intervened in 23 cases so far, and you want to go to 30. What effect have your interventions had? Of course, the contested rate cases take 5, 6, 7, 10 years. Have you found the utilities contesting the cases or your initiatives?

Mr. SENECA. In the intervention program, we are there by invitation, and it has been on invitation of the public utility commission. However, because of the legislation, ECPA, the thrust of that program is changing and broadening in terms of how FEA gets into a ratemaking case. We can now be invited in by any participant in the case.

Mr. YATES. How happy are they to have you in?

Mr. SENECA. When they invite us in, I have to assume that they want us there.

Mr. YATES. The commission does, what about the utility?

Mr. SENECA. Yes; if the utility understands, and part of the problem is getting the utilities to the point of understanding what rate reform would do in terms of lessening the capital that they would have to put on line—I guess the direct answer to your question is it is a mixed bag.

ELECTRIC COMPANIES ATTITUDE TOWARD INTERVENTIONS

Mr. YATES. I assume that you would get opposition from the electric companies because they are in traditional patterns and modes and they

think they know a great deal more about what they are doing than you do.

Mr. O'LEARY. Mr. Chairman, in New Mexico, the entire personnel complement of the State public service commission is 19, including 3 commissioners. They have no internal audit capability to speak of. During most of the time I was in New Mexico, there was one attorney on the staff. He had, at the beginning of my tenure there, less than 1 year's experience in regulatory work, and in many ways, and I have said this quite publicly before, in their dealings with the regulated utility it was like taking candy away from a baby.

Mr. DUNCAN. Who was the taker and who was the takee?

Mr. O'LEARY. The utility in this case was the taker and the public service commission was the grantor.

Mr. YATES. We have been working on this for how many years?

Mr. SENECA. The program essentially got going in the latter part of 1976.

CHANGES MADE AS A RESULT OF INTERVENTIONS

Mr. YATES. What I am leading up to is how many commissions or how many companies changed their rate schedules on the basis of what you have found so far?

Mr. SENECA. I think there are a couple of things to keep in mind in terms of what we are after here. Through the load management activity of the demonstrations, we are trying to come up with information that will lead toward some national policy with regard to utilities. Now in terms of the implementation of that information, we are primarily trying to move through a technical assistance activity to support the public utility commission to understand certain load management or rate requirement activities. How many we can support is always a problem, because we are limited by both staff and resources, which prohibits our dealing with all the utilities. We can't reach all of them.

Mr. YATES. You don't have to, do you?

Mr. SMITH. I don't think we can tell you how many companies have changed rates as a direct consequence of our intervention, because the decisions and orders entered by the commissions are an outgrowth of all the information presented at the hearing. The objective of this program is to try to get what we view as some of the right kinds of considerations treated in the hearing and to try to get some of the right information into the hearing.

Mr. YATES. Would you put in the record a listing of those considerations that you want to achieve?

Mr. SMITH. Yes, sir.

Mr. YATES. I think that is essentially what we want to know.

[The information follows:]

UTILITY INTERVENTION CONSIDERATIONS

It is very difficult to specifically identify results from individual intervention activities, in large part because of the complex nature of the utility regulatory process. Utility rate proceedings typically comprise a wide range of diverse—although sometimes allied—interests, competing before a regulatory commis-

sion charged with setting just and reasonable rates on the basis of the broad public interest. In this context, it is very difficult to point to any one party's testimony or briefs as the determinative factor in any rate decision.

FEA submissions typically consist of direct testimony, defended on cross-examination, and often supplemented by briefs. The general thrust of FEA submissions does not change from case to case, although data and recommendations developed in the testimony are made as system specific as possible. FEA testimony typically addresses:

The economic and energy rationale for rate reform, in particular time-of-use rates, as part of a comprehensive conservation strategy;

Appropriate costing and pricing methods for determining such rates;

The costs of implementing such rate designs;

The benefits of time-of-use rates;

Practical recommendations for implementing a comprehensive utility rate reform and conservation program.

Mr. YATES. How many of the utilities know what you are trying to do?

Mr. SENECA. In terms of information dissemination, all of the utilities are aware of what the demonstration activity is within FEA.

COOPERATION OF UTILITIES

Mr. YATES. How much cooperation have you had from them?

Mr. SENECA. In terms again of the mix that we are looking at for the demonstration, we have good cooperation from the utilities where the demonstration is ongoing.

Mr. YATES. How long do these demonstrations last?

Mr. SENECA. Usually it takes us at least two funding cycles to go through a demonstration.

Mr. YATES. You mean 2 years?

Mr. SENECA. Yes; that is correct.

NUMBER OF CURRENT DEMONSTRATIONS

Mr. YATES. How many demonstrations do you have going now?

Mr. SENECA. At the present time, 16.

The fiscal year 1977 supplemental requests 10 more.

Mr. YATES. Sixteen at different places in the country?

Mr. SENECA. That is right.

Mr. YATES. When do you think you will have results?

Mr. SENECA. We are beginning to get results now. We have some preliminary information that is coming through now.

Mr. YATES. Telling you what, that you were right?

Mr. SENECA. To a certain extent, yes. We received preliminary data from 4 of the first 10 demonstrations that were funded and by June we hope to have received preliminary data from a total of 7. We expect up to 8 of the first 10 demonstrations to provide data by December, along with preliminary data from all 6 of the other demonstrations that were funded in the fiscal year 1977 base year.

Mr. YATES. Would you put a list of demonstrations in the record, with whom they are, and what the purpose of the demonstration is?

Mr. SENECA. I would be pleased to.

[The information follows:]

CURRENT UTILITY DEMONSTRATIONS: SCOPE AND PURPOSE

Utility generating plants produce electricity that is measured instantaneously in kilowatts of demand (Kw) and over time as kilowatt hours of energy (Kwh). Since electricity cannot be stored, utilities must install sufficient generating capacity to meet peak Kw power demand, whenever it occurs and irrespective of the total annual Kwh generation.

The extent of capacity utilization, usually measured in annual capacity factor (kw capacity/Kwh generation ÷ 8760 hours), largely determines the cost of service, the fuel type of electric generating plant, and the energy efficiency of generation.

Capacity utilization, in turn, is largely a function of annual load factor (peak Kw load/Kwh generation ÷ 8760 hours), which reflects the variations in the Kw demands imposed by customers upon the system. At present, the annual U.S. load factor is about 61%, substantially below the optimal level of 72-75%--which would ensure more efficient capacity utilization while still providing reduced but essential demand "valleys" for plant maintenance.

FEA and independent analyses have indicated that improving load factor to 69% by 1985 would have the following effects:

- reduce capital requirements for new capacity (FEA estimates $48 billion);
- reduce oil consumption for peaking and cycling generation (FEA estimates 275,000 to 1,300,000 barrels per day (BPD));
- reduce electricity costs (FEA estimates an 8% reduction);
- allow the substitution of coal-fired electricity, at acceptable energy and economic efficiencies, for direct burning of domestically scarce oil and natural gas.

The principal element of any "load management" strategy to increase load factor and capacity factor is time-of-use electricity pricing, i.e. rates that track time-varying costs and are higher than average during peak periods and lower than average during "valleys". In theory, time-of-use rates would decrease that portion of total consumption used during peak periods, thereby flattening the load duration curve and attaining the benefits summarized above.

In practice, however, time-of-use rates have not been instituted in the United States. Since such rates would require special metering to record not only total Kwh consumption, but also time of Kwh consumption (and, possibly, level and time of Kw demand), utility commissions have been unwilling to adopt these rates without some assurance of cost-effectiveness, particularly for residential customers. The key missing data element, and one that may differ from utility to utility, is the elasticity of Kw demand and Kwh consumption during peak periods, that is, will they actually decrease as peak period rates increase, and if so, by how much?

To gather this essential data, while establishing the feasibility of time-of-use rates, FEA is funding a number of demonstration projects. These projects involve implementation of the new rates in a structured experiment, with suitable control groups and consideration of key non-electricity-price variables, including demographics, weather, and the prices of alternative fuels. It is necessary to fund multiple projects for two reasons:

1. Utilities differ widely in customer composition, climate individual end-use loads, average rate levels and other critical respects. Findings on one system are not necessarily applicable to another.

2. Each demonstration is imperfect in one or more significant aspects. By comparing the findings from different projects, it is possible to substantially increase validity and identify the sensitivity of experimental differences.

Because of these needs, FEA has established a range of project classifications and is planning to fund at least two demonstrations in each classification. Beyond these experimental needs, moreover, there will be a need over the next few years for financial assistance, on a cost-shared basis, to selected utility commissions to defray the one-time, front-end costs and risks of actually proceeding to implement time-of-use rates, as contrasted with experimentation. A substantial portion of the funds requested for FY 1977-1978 would be used for those "implementation demonstrations," and would help cover initial planning, customer education, dual billing, and rate modification costs. Such demonstrations in, say, 5-10 States with differing utility characteristics would accelerate implementation in other jurisdictions.

In FY 1975, about $1.5 million was obligated for electric demonstrations, and in FY 1976 an additional $4.0 million. To date, 16 individual projects have been initiated, with 7 of these fully funded. Although none of the projects has yet been fully completed, preliminary data have been gathered from Vermont, Connecticut, Arkansas and Arizona. These data have been analysed by FEA and tentative conclusions reached.

These conclusions are presented in detail in the Congressional Rate Design Report required by Section 203 of P.L. 94-385. Briefly, they are:

- that peak period Kwh usage and Kw demand are sufficiently price-elastic to render time-of-use rates cost-effective;

- that total Kwh usage is somewhat lower under time-of-use rates;

- that customers can substantially reduce their bills by eliminating some consumption and moving some to off-peak periods.

In short, the new rates seem to conserve end-use energy, primary energy for electricity generation (oil, in particular), scarce capital, and generating capacity. It must be stressed, however, that these conclusions are tenuous at this point and applicable primarily to those utilities with characteristics comparable to the experimental systems.

More complete and transferable data will be available upon conclusion of the existing experimental projects and of such additional projects as may be needed to fill in the data gaps. As previously discussed, there is also an increasing need for financial assistance to accelerate acutal implementation of the new rates, as utility commissions begin to order their adoption.

FEA's electric utility demonstrations are funded under Cooperative Agreements, which are documents that highlight the fact that the contemplated activity will entail substantial involvement between FEA and the State government. It is also important to note that all demonstrations have included local public fund contribution. The funding history of this program (in thousands) is as follows:

PROJECT	FY 1975 FEA	FY 1975 LOCAL(1)	FY 1975 TOTAL	FY 1976 FEA	FY 1976 LOCAL(1)	FY 1976 TOTAL
Arizona	$210	$ 21	$ 231	---	---	---
Arkansas	210	19	229	160	16	176
Connecticut	230	27	257	130	13	143
California	---	---	---	355	146	501
Edmond, Ok	---	---	---	203	46	249
Los Angeles	170	980	1,150	350	1,067	1,417
Michigan	---	---	---	200	89	289
North Carolina	---	---	---	533	57	590
New York	---	---	---	237	24	261
New Jersey	160	16	176	555	57	612
Ohio	220	58	278	168	43	211
Puerto Rico	---	---	---	357	63	420
Rhode Island	---	---	---	275	38	313
Washington	---	---	---	281	40	321
Wisconsin	---	---	---	200	15	215
Vermont	360	77	437	---	---	---
TOTALS	$1,560	$1,198	$2,758	$4,004	$1,714	$5,718

1/ In some projects additional funds are being contributed by the involved utility(s) and other interested organizations.

Mr. YATES. It would be fine, too, if you could, and perhaps this is premature, to have a statement by the utilities saying what their reaction to it is.

Mr. SENECA. It is a bit premature. We have not yet started the program evaluation. One of the things I would bring to your attention, Mr. Chairman, is that in early March, we did send to Congress in accordance with title II of ECPA the report that was required on utilities. In that report is a summation of the demonstration activity to date as well as a number of other rate reform proposals, and we would be pleased to make that report available to the committee.

Mr. SMITH. Also, we would like to provide for the record, Mr. Chairman, the comments of the electric utilities advisory committee with respect to this report.

[The information follows:]

STATEMENT OF ROBERT GREENES, MEMBER OF THE AD HOC ELECTRIC UTILITY RATE PROPOSAL ADVISORY COMMITTEE OF THE FEDERAL ENERGY ADMINISTRATION—REGARDING THE PRELIMINARY REPORT DATED FEBRUARY 14, 1977, SUBMITTED TO CONGRESS BY THE FEDERAL ENERGY ADMINISTRATION IN ACCORDANCE WITH PUBLIC LAW 94-385

INTRODUCTION

The purpose of this brief statement is to reemphasize several points which I have expressed throughout my tenure as a member of the Advisory Committee. It should be understood that my remarks are not intended to undermine the preliminary report of FEA, for given the technical complexities of the subjects which the report addressed and the very short time frame in which the agency had to work, FEA did a remarkably good job. I do question, however, the approach taken in the report and the virtually absent discussion of certain critical aspects of the proper design of electric utility rate structures. I do hope that in the final report, due in May of this year, FEA will correct what I believe are limitations in the preliminary version.

THE PRIMER NATURE OF THE REPORT

Among other things, section 203 of Public Law 94-385 requires FEA to develop and submit to Congress "proposals to improve electric utility rate design" which "encourages energy conservation, minimize the need for new electrical generating capacity and minimize costs of electric energy to consumers". These proposals are to be submitted along with analyses of energy, generating capacity and capital savings which might ensue from the implementation of the proposals as well as analyses of the impact on the cost of electricity to consumers.

Based on my review of the preliminary report, it appears that FEA has seen its charge as necessitating the preparation of a broad-introductory document on electric utilities. The uninitiated might welcome and appreciate the primer, for it should serve as a good reference on electric utilities. However, I question the merits of such an approach given the complexities of rate design and the mandates of section 203. Several reasons form the basis of my apprehension. First, there are virtually countless books, articles, and other documents on the history, structure, performance, and operation of the electric utility industry, many of which have been written in recent times. Thus, I seriously believe that in large part the FEA preliminary report simply duplicates what has already been done. This is particularly true in view of the many generic and specific rate design proceedings currently being held by public utility commissions throughout the country, the testimony being developed in those proceedings, and the work being done in the joint EPRI-NARUC study. Frankly, I do not believe the idea of a primer comports with the mandates of section 203 since its language is narrow and targeted.

Although much has been written on the pricing of electrical services, the most critical issues, the remaining topics of my remarks, go unresolved since they have not been properly researched. For this reason, I believe it would have been appropriate to narrow the focus of the FEA report in order to maximize the

concentration of effort on the critical issues of: (1) the relationship between cost of service and rate design; (2) the allocation of capacity costs; and (3) the elasticity of kilowatt demand.

COST OF SERVICE AND RATE DESIGN

In chapter II of the preliminary report, reference is made of groups who have participated in rate reform proceedings throughout the country. No mention is made, however, of the fact that the industry of which I am a part, the fuel oil industry, has been involved in proceedings in New York, Pennsylvania, Maine, and North Carolina. The position taken by the industry has been that electric rates should be based on the costs of service, primarily marginal costs.

Aside from this oversight, I do not believe that the preliminary report adequately deals with the relationship between the costs of service and rate design. In the final report, I would hope that the following are provided:

(1) A definition and complete discussion of each of the various forms of rate design; how each of the rate designs are similar and dissimilar; and the cost of service basis for each of the rate designs;

(2) A definition and complete discussion of embedded costs, fully distributed costs, incremental costs, short-run marginal costs and long-run marginal costs; the relationship among these cost definitions; and a conclusion as to the proper definition of cost for rate design purposes; and

(3) A definition and complete discussion of the methods used for allocating customer, energy, and capacity costs among the various customers or across various times of the year under each of the definitions of costs in (2); how each of the allocation methods are similar and dissimilar; and a conclusion as to the proper cost allocation method for rate design purposes.

CAPACITY COST ALLOCATION

In designing electricity rates which are based on the costs of service, the thorniest problem rests with the allocation of capacity costs. Depending on the allocation method used in practice, one can justify either high or low rates for electricity used in a particular season, by a particular customer class, or for a particular type of service. This causes me great concern whether I sit as a representative of fuel oil marketers or as a member of the taxpaying public.

Although a dispute regarding capacity cost allocation apparently exists in the practical world, economists tell me that there is no dispute in the theoretical world. They say that capacity costs are joint costs and as such, they should be allocated based on the magnitude and elasticity of kilowatt demands placed on an electrical utility system. In practice, however, it appears that there are several serious problems with applying the basic theory. It is for this reason, so I am told, that a plethora of methods have evolved for allocating capacity costs. None of which, unfortunately, are truly acceptable from a theoretical standpoint.

In view of the critical importance of capacity cost allocation and the apparent dichotomy between theory and practice, and I respectfully urge that in the final report FEA set forth:

(1) The theory of joint capacity cost allocation with an understandable discussion of the role of demand magnitude; kilowatt demand elasticity and maintenance requirements.

(2) The practical problems with applying the theory; approaches for resolving the problems and recommendations as to the most appropriate method of allocating capacity costs given current practical limitations.

(3) The relationship between capacity cost allocation and the selection of those times of years designated as peak, intermediate-peak, and off-peak periods.

I have attached to my statement an article prepared by Drs. Ilco and Marchand on the question of capacity cost allocation which may be of help to FEA.

ELASTICITY OF DEMAND

It is my understanding that of all the important issues in the area of electric rate design, the most critical is the elasticity of kilowatt demand. This is the case because kilowatt demand elasticity is important for allocating capacity costs and for determining the capacity savings which will result from peak-load pricing. However, despite the importance of this concept, the preliminary report spends little time in discussing the meaning and importance of kilowatt

demand elasticity, how it can be measured, and the relationship between kilowatt and kilowatt-hour elasticities. In the final report, hopefully, this oversight will be corrected.

[The attachment referenced by Mr. Greenes is available, upon request, but is not printed here.]

Mr. YATES. What cooperation do you have from the commissioners? Is that embodied in the proposal by Mr. Stanton?

Mr. O'LEARY. Of the regulatory commission, they are excellent.

APPLIANCE PROGRAM

Mr. YATES. In the appliance program you have a $600,000 contract for consumer education. What will this involve?

Mr. SENECA. One of the problems we have is trying to get some education out to the people. In this instance, we are talking about appliance efficiencies and labeling of appliances, and we have to get out to the public the understanding that the program is going on. What we are primarily looking at, in large part, is the development of some media material for public service announcements.

Mr. SMITH. To teach them how to read labels, and what they mean, Mr. Chairman.

Mr. YATES. Where are you going, to the schools on that? We just heard about Aquinus.

Mr. SENECA. I think in the first instance, we talked about going to schools in terms of the total energy problem and bringing to people an awareness of conservation activity. The carryover would be through this kind of program to look for the labels, Mr. Chairman.

INDUSTRY REACTION TO APPLIANCE LABELING

Mr. YATES. What is industry's reaction?

By the way, the costs are increasing for the use of utility products. I would think this program would be well received by the public, wouldn't you?

Mr. SENECA. By the public, yes.

Mr. YATES. How about industry, that is different isn't it?

Mr. SENECA. Industry is cooperative from the standpoint of understanding that we have to move toward more efficient appliances.

Mr. YATES. Are you becoming kind of a consumers' union, then?

Mr. SENECA. No; not a consumers' union. Our target in this instance is looking toward energy conservation.

Mr. SMITH. But it is the same kind of activity.

Mr. YATES. Consumers' Union will tell you what the energy-efficient product is—which one has the best, for instance, in the field of automobiles.

Mr. O'LEARY. We are getting a very interesting reaction from industry. Industry is beginning to look on this as a marvelous thing for sales. And they are becoming very affirmative on this program and coming in from time to time saying why don't we get on with it.

ROSENBERG PROPOSAL

Mr. YATES. Sometime ago, you came in with a plan to provide mandatory insulation to homes served by gas utilities. Is that being extended to electric utilities, too?

Mr. O'LEARY. Mr. Chairman, that was a proposal known as the Rosenberg proposal. It wasn't a proposal to Congress; one of many lofted in this area, and it will be dealt with later in the spring.

Mr. YATES. April 20.

Would you place in the record, if I am not premature, a description of the methods you have under consideration including the financing of the payments and other pertinent information.

Mr. O'LEARY. We would be pleased to.

[The information follows:]

ROSENBERG PROPOSAL

The principles fundamental to this proposal are:

Conservation gas is gas supply made available from investment in conservation measures for customer homes. The three conservation measures utilized in this proposal are: (1) Insulation to Federal standards; (2) Automatic thermostat controls; and (3) Furnace efficiency modifications.

Where cost of conservation gas is less than cost of alternative gas supply, utility conservation is cost effective.

The cost of conservation gas should be included in utility cost of service and rolled into rates like other gas supply purchased or produced. (Rebates could be used where inequities exist for those who have fully insulated or who chose to do it themselves rather than have the utility install the conservation measures.)

A utility's conservation gas would be sold to its curtailed or new priority customers as determined by a public utility commission.

The conservation program would be implemented by a wholly owned subsidiary of the utility which would supervise and finance private companies manufacture and installation of the conservation measures.

The program, if implemented nationally over a 7-year period, would require an investment of about $8 billion and would provide the following anticipated benefits:

1.2 Tcf per year of conservation gas would be made available (energy equivalent of 130 percent of gas from the Alaskan gas pipeline or 39 major electric powerplants).

Customers can have lower heating bills ($1 to $3 billion annual customer savings).

Jobs will become available in communities (506,000 man-years of employment over a 7-year period, approximately 72,000 jobs per year).

Utilities would have an attractive business opportunity.

New gas customers can be served (up to 6 million additional residential heating hookups).

No Federal subsidies are required.

The Nation can reduce its energy dependence on foreign oil and gas supplies (energy equivalent of 550,000 barrels per day of imported oil costing $2.6 billion per year).

MORE MAN-YEARS THAN POSITIONS

Mr. YATES. On page 100, you show 389 positions for the total conservation and environment program, which is an increase over this year's level. Yet you show more man-years of effort than positions. When you expand a program, usually the reverse is true. How does it happen you are unique in this and innovative? Is this executive overtime?

Mr. HOWELL. No, sir. It would not be. We don't have any of that.

Mr. YATES. Would you put an explanation in the record?

Mr. HOWELL. Yes, sir.

[The information follows:]

CONSERVATION AND ENVIRONMENT POSITIONS VERSUS STAFF-YEARS

Most of the 389 positions requested in the fiscal year 1978 budget will be filled by October 1, 1977, if the Office of Conservation and Environment's fiscal year 1977 supplemental request (which would bring the Office's ceiling up to 356) is appropriated. The staff increases that will occur from fiscal year 1977 to fiscal year 1978 are in program areas such as weatherization and obligation guarantees that need immediate increased staffing to insure implementation. That is why, for example, 44 staff-years are requested for the 50 new regional positions of the obligation guarantee program; if these people are not hired soon after the beginning of the fiscal year, the actual guaranteeing of loans will be delayed beyond the current estimated start date of January 1, 1978.

The factor that causes our staff-year request to exceed our position request is the fact that in several areas—for example, the administrative, marketing, policy, conservation workshops and voluntary programs offices—end-of-year position ceilings are being reduced, necessitating some resources in these offices to provide for an orderly phaseout. The Office of Conservation and Environment will make every effort to place, where possible, personnel who are phasing out into positions that open up in new program areas.

Mr. YATES. You see it is much more simple than you thought.

Mr. SENECA. Mr. Howell has the ability to make complex things simple.

Mr. YATES. In contrast to others, it might seem, who make simple things complex, and I am not referring to you.

ENERGY RESOURCE DEVELOPMENT

Mr. YATES. Energy resource development on page 133, in your office of coal, you have six major programs listed. And, of course, the $64,000 question is how much do each of them contribute to the goal of increased coal production of 75 million tons a year?

Mr. HANFLING. I think we cannot quantify that.

Mr. YATES. Can or cannot?

Mr. HANFLING. Cannot.

Mr. YATES. You can tell us how much good they do, can't you?

Mr. HANFLING. We feel that they are doing quite a bit of good. The common body of knowledge to some extent is that the coal problem is only demand-limited, and if the demand were to go up, as we discussed yesterday and this morning, that the supply would very easily follow.

Upon looking into this in detail, the question that you asked yesterday for the record, which we will give you the number of mines, number of rail cars, number of shuttles, and so on, doesn't flow. What we have tried to do is segment the different parts of the supply cycle and look at it in an integrated system approach to see when the demand will, in fact, grow as a result of the coal conversion program and other actions that the Nation will take for itself.

Mr. YATES. Would you have an explanation for each of the six contributions?

Mr. HANFLING. Again, it is hard to quantify the coal mine expansion program.

Mr. YATES. Can you "qualtify"?

Mr. HANFLING. Yes; we can do that.

Mr. YATES. Is there such a verb as "qualtify"?

Mr. HANFLING. We will produce that for the record.

[The information follows:]

COAL PROGRAMS

The six Coal programs are:

1. Mine expansion

Coal production is expected to double within the next decade and 70% of this production will come from mines not now in existence. Because of the long lead times needed to plan and develop coal mines of the size and complexity envisioned, it is essential that the coal industry's expansion plans be measured to see if target coals will be attained. This program will evaluate the industry's production plans thru 1985, determine shortfalls and identify what additional steps are needed to achieve the overall production goal. After identifying any constraints which will prevent realization of the goal, policy recommendations will be designed to reduce or alleviate these constraints.

2. Coke Capacity

The production of steel (a basic industry) is dependent on coal and it is essential that supplies of coking coal (coke) be available for steel production. A preliminary study by FEA has revealed that within the next decade coke capacity may not be sufficient to meet steel demands. Many coke ovens are old and inefficient; 66% are over 20 years old. Proposed standards by OSHA and EPA standards could force the coke industry to close many of these older ovens. An early assessment must be made of present and future coke capacity and demand so that actions to overcome any potential deficit can be initiated at the earliest time. A deficit in coke production would act as a production constraint on the domestic steel industry and would adversely affect the U.S. balance of trade.

3. Indian Lands Coal Development Plan

This program is designed to provide technical assistance to Native Americans in developing coal resources located on their lands, the agreement to provide this technical assistance arose from a meeting in July, 1976 between FEA and an Indian Delegation. Indian lands contain billions of tons of low-sulfur coal; 38% of all coal production from Federal lands in 1975 was produced on Indian lands. The Office of Coal will provide assistance with respect to latest reclamation techniques, surface mining, socio-economic impacts and state of the art technology.

4. Transportation Distribution

One of the primary functions of this program is in support of ESECA requirements for conversion of major fuel-burning installations (MFBI) and other future consumption sources in that FEA must make findings that coal and transportation are available before conversion orders can be issued. In addition, FEA under its legislation, must ensure fair and efficient distribution of energy supplies.

Other projects include the Analysis of Conrails plans for rehabilitating the Northeast rail system and assess its budget to ensure coal lines are adequately financed. And, with a longer range objective to instituting a monitoring system as an early warning indicator to track railroad actions with respect to upgrading and expanding coal service in the West. The beneficial impact in terms of coal use from this program is estimated to be 24 million tons by 1978 which is about 23% of total projected production increase from 1975 and result in a savings of 95 million barrels of imported oil per year.

5. Metallurgical Coal

This program will identify and analyze bituminous coal resource data in order to quantify U.S. recoverable reserves of metallurgical grade coal. Coal seams will be identified and analyzed with respect to these properties, then the data categorized. An analysis will be made of the supply/demand picture through 1985 that will assist in establishing the basis for responsible use of production of this valuable resource.

This is of particular importance because over the past 5 years the U.S. has consumed an average 86 million tons of metallurgical coal annually and has exported about 48 million tons annually. The U.S. steel industry is dependent on this coal for steel making and the U.S. supplies 22% of the free world's supply of coking coal. The occurrence of metallurgical coal is small in relation to our total identified bituminous coal reserve base, however, information on reserves of this grade are sorely lacking.

6. Pennsylvania Anthracite

The primary objective of this program is to increase the production and consumption of Pennsylvania anthracite. The Governor's Energy Council was established by Executive Order in February 1974. This council is the Commonwealth's principal administrative authority for the management of energy use and conservation throughout the Commonwealth. Since the formation of this council, the Commonwealth has been one of the innovators in the production and use of coal. The coal policy coordinator of the council has been initiating new programs and coordinating current programs by obtaining cooperation of industry, affected public, State, and Federal Governments. The Federal Energy Administration with its knowledge of interagency capabilities has been assisting the Commonwealth through contacts being maintained with Mr. Dennis Supp, Coal Policy Coordinator of the Governor's Energy Council and his staff. During FY 1977, FEA attended meetings on the Pennsylvania Coal Model Management Advisory team and recently the Methane Development Conservation Committee (MDCC). In the latter part of last year, Mr. Supp was invited to present a paper at the FEA Coal Advisory Committee on demethanization of coalbeds and requested the members disseminate information on the MDCC activities. Through contacts such as these, the Office of Coal has been suggesting avenues of assistance to attain the Commonwealth's goal of complete utilization of their most viable energy source--coal.

COAL MINE EXPANSION RELATIONSHIP TO BUREAU OF MINES

Mr. YATES. How is your coal mine expansion program tied into the Bureau of Mines?

Mr. HANFLING. We deal with them closely. What we do on our part is monitor and try to look at some of the constraints and where applicable to try to assist in getting things moving.

INDIAN LANDS COAL DEVELOPMENT PROGRAM

Mr. YATES. I have a very deep feeling about the Indian lands coal development program, as I do about any of the resources of the Indians. How do you coordinate that? Are you encouraging the leasing of those lands, and how does this bear upon the trust responsibilities of the U.S. Government?

Mr. O'LEARY. That, of course, is a function of the Secretary of Interior. Our relationship to that enters into the newly constructed community of resource-owning Indian tribes, and we have established or are in the process of establishing a relationship with them. As you know, Chairman McDonald is the chairman of the group that is pulling together all of the Indian interest in this field.

Mr. YATES. Is he still chairman?

Mr. O'LEARY. As of today, my understanding is that he is still chairman. The institution is setting up an office either in Denver or Albuquerque. I think that decision is going to be made soon, and when that is done, we will have a liaison with them, and will work as sympathetically and closely with them as possible. Again, from my experience in New Mexico, I realize the enormous role that the Indians will play in future development of coal and uranium on their lands, and I think it is worthwhile that we begin——

Mr. YATES. Who is advising the Indians on this?

Mr. O'LEARY. They have a broad variety of advisors.

Mr. YATES. Experts?

Mr. O'LEARY. They are becoming much more sophisticated in this field, and that is a very recent innovation.

Mr. YATES. If they aren't good, they are going to sue you later on on the leases?

Mr. O'LEARY. That is right.

Mr. YATES. Which side are you on, Mr. Seneca?

Mr. SENECA. For the record, I am an Indian, and I am for the Indian position.

Mr. O'LEARY. And we may quote you.

Mr. YATES. He had the trust responsibility under the BIA. That is why I asked him that question.

PENNSYLVANIA ANTHRACITE PROGRAM

Now, how do you help Pennsylvania in its anthracite program?

Mr. HANFLING. Working with the Commonwealth, Mr. Chairman, to give them the kind of technical assistance and support necessary for them to do their program.

Mr. YATES. Do you volunteer your services, or do they call on you?

Mr. HANFLING. In this instance they called on us, as other States have done in either conversion programs or supply areas where they feel we can help them.

Mr. MCDADE. I don't know whether you are aware of it, but there was a meeting held with some of Dr. Schlesinger's people and the people who are the principal operators, or representatives of the operators, labor unions, et cetera, with respect to the future of anthracite in the April 20 message. We hope it will be more than just some consultation, because there is a resource there, and I don't know anybody who knows it better than you do as the new head of the FEA.

I believe you were the proponent originally of a stockpiling program as a potential for expanding anthracite, weren't you?

Mr. O'LEARY. I was the one who sold it all to the French.

ANTHRACITE AS AN IMPORTANT RESOURCE

Mr. MCDADE. Maybe now we can get you to do that here.

It ought not to be overlooked as a resource when we try to fit together this complex equation, because it does lie in an important geographic area, a highly populous, energy-short area. It offers expansion capabilities, by production expansion of high Btu, low-sulfur fuel that may fit into the puzzle of how we work out the energy problem. I really hope that—I know you are in conversation with Schlesinger about what the April 20 message is going to propose, and I hope FEA will make it known that anthracite is certainly a resource that should not be overlooked when they try to figure out the jigsaw puzzle.

Everybody tends to think from on high in this part of the world, and, therefore, a resource that has a relatively small amount of production, compared to national coal production, tends to get lost, but it is still a significant factor. It does have expandable capacity if the appropriate tools are used.

One that is suggested by the industry is the possibility of stockpiling it. Like other stockpile programs it is an easy thing to store and you don't lose it. It is not combustible, and you can keep it for indefinite periods of time easily. A lot of people in the industry feel if the Government was to say, in connection with its coal program, that they were going to begin to buy a certain amount for stockpiling for future uses that would provide the incentive to let them go to the market for money to buy the shovels, to open the mines and to put in the roads to to get more production.

I want to underline my concern that this particular part of the problem doesn't get lost when we get the message on the 20th.

Thank you.

LOAN GUARANTEE PROGRAM FOR LOW SULFUR MINES

Mr. O'LEARY. May I ask a question?

Mr. MCDADE. Yes.

Mr. O'LEARY. You know that Mr. Randolph has supported for some time a loan guarantee program for low sulphur mines. Does that have applicability in this case?

Mr. McDade. I think a loan guarantee program has potential, and Government stockpiling has potential, as does the use of conversion programs to attempt to take that production, increase it, and gasify it in an area that has natural gas shortages. A whole series of things have applications and a lot of that has been presented by a joint industry-labor committee to Mr. Schlesinger's office just a couple of weeks ago, and we sure would appreciate your looking at it from FEA's standpoint.

COAL DISTRIBUTION STUDY

Mr. Yates. You want $100,000 in contracts to study coal distribution systems. I would have thought industry knew how to ship cheaply, wouldn't you?

Mr. O'Leary. I think coal transportation may turn out to be the most difficult aspect of it.

Mr. Yates. Of course, it suddenly occurs to me we would expect the utility systems to know how to operate the utilities, too.

Mr. Duncan. Are you talking about pipelines as opposed to capacity of railroads?

Mr. O'Leary. No, that would be one thing clearly, but the capacity of the railroads and how they can improve their operations is one problem of a very longstanding and real concern. I think we just don't know enough about that now.

Mr. Duncan. You are getting into that aspect of it now, transportation.

Mr. O'Leary. Yes, we are.

RAIL TRANSPORTATION OF COAL

Mr. Duncan. And we have a zillion agencies and the Department of Transportation already studying that.

Mr. Hanfling. We are working with DOT. We have two studies going on. One is with ConRail integrated with the utilities using the coal. We have another project on western transportation with the regional offices in Seattle, San Francisco, and Denver. We have had some difficulty, but we wanted to increase our communications with the railroads themselves. I think next week we will be having a meeting in Minnesota with some of the western railroads to get some more specific ideas about what their plans are. It is a chicken-and-egg problem.

Mr. O'Leary. Mr. Duncan, during the last surge in coal demand it turned out you couldn't move it because there weren't enough railcars. The railroad industry is very reluctant, from what they know about the coal industry, to invest in coal cars. The patch-up has been that the utility industry has gotten into the railcar business in a big way. Pepco actually owns unit trains it uses to haul its coal in and out. It does that not because it wanted to, but because it had to. I think we might be running into more constraints as we move from 550 million tons consumed to something like three times that in the next 10 to 15 years.

Mr. DUNCAN. The railroads are pretty sick and this is a nice chunk of revenue to hand them if they have the capital capacity to take care of it. You are going to give us some help on the question of pipelines, then.

Mr. O'Leary. I would be glad to give you some help on the question of pipelines right now.

Mr. YATES. We have to vote now.

[Recess taken.]

Mr. YATES. Did you get an answer to your question?

Mr. DUNCAN. No. We were going to have a discussion on that.

Mr. YATES. Would you like to have it now?

FINANCIAL STATUS OF COAL TRANSPORTATION

Mr. DUNCAN. Yes; if it is convenient.

I sit on that Transportation Committee as the chairman did, too. They tell me the ones in the West are only a decade away from the same kind of financial proposition. It occurs to me if we can divert some source of revenue to it maybe we will avert that. Whatever comments you have on that vis-a-vis the pipelines I would enjoy hearing.

Mr. O'LEARY. I take with a grain of salt the projections that the coal-carrying railroads are in trouble now or prospectively. I think you need to take this down to specific railroads. The western long-haul roads have done very well. I was closely associated for some time with Union Pacific as a director of their coal-producing subsidiary and knew it very well.

The railroads are going to get a lot of business. That, however, should not preclude the addition of coal slurry pipelines into the arsenal. We are going to get ourselves in a situation where the rails are to be loaded 40 percent of the time on some of these railroads. That is a statistical conclusion.

HIGH RATE OF RAIL USAGE

Mr. DUNCAN. Forty percent isn't very high.

Mr. O'LEARY. When the rail is 40 percent occupied with traffic, it is a high rate of usage.

Mr. SMITH. There have already been some complaints from the smaller towns these lines run through about the frequency and the length of the unit trains hauling coal out of there now.

Mr. DUNCAN. Where are you talking about?

Mr. SMITH. In the upper Midwest and West. The Wall Street Journal had an article some weeks ago on the impact on the small towns of the constant stream of some 30 trains a day each being 25 to 30 minutes long.

Mr. YATES. I was behind one such train on my way to the airport.

Mr. DUNCAN. You are talking about grade crossings?

Mr. SMITH. Yes. In this particular case the railroad, as it does in a number of those communities, splits the town in half. Everybody hears the trains when they go through in the middle of the night.

Mr. O'LEARY. The fact is that wherever there is a railroad, it can underbid the coal slurry pipeline because all it has to do is cover its variable costs. In every analysis I have seen, and I have been in this particular loop since 1963 since the first coal slurry pipeline bill came up to the House, is starting de novo it is pretty much a tossup between building a railroad and pipeline. But if you have an existing railroad, it has the natural advantage. If you look back over the history of the coal slurry pipelines, the first one, the 108-mile line that went into Cleveland, was built because the railroad rate was very, very high, and when it disciplined the rate, they mothballed the pipeline. That function should be regarded as important, but above all, when we begin to move these very large volumes of coal into the natural gas producing part of the country, Texas, Oklahoma, and so on—we are going to get to that point where the existing transportation network is not going to be adequate for the job.

In that particular case, as I recall it, the proposed line of Bechtel crosses 47 railroads' right of way. There is no way, short of an act of Congress conferring authority on somebody in Government to do condemnation, that they are going to be able to buy their way across all the rights of way. This is something that should be in the arsenal.

Mr. DUNCAN. Thank you.

Mr. YATES. By way of diversion, on page 135 you have a line that reads "implementation of programs to insure adequate profitability and equipment availability to realize a high rate of oil exploration, development, and production."

How are you going to do that?

Mr. HANFLING. Again, it is assessing the kinds of things that Mr. O'Leary talked about.

Mr. YATES. This is a goal to be desired?

Mr. HANFLING. It is a goal——

Mr. YATES. The answer is "Yes."

Mr. SMITH. Yes.

Mr. YATES. Would you place in the record an explanation of how the work you are proposing to do in solar energy, synthetic fuels, solid waste and geothermal energy is different and not duplicative of the work ERDA plans to do.

[The information follows:]

DUPLICATION OF SOLAR, GEOTHERMAL AND
SYNTHETIC FUEL PROGRAMS

In general, all FEA and ERDA efforts are subject to the Memorandum of Understanding between the two agencies that was entered into on April 30, 1976. Formal procedures, involving an FEA-ERDA steering group at the Deputy Administrator level have been established to preclude duplication.

FEA's role in solar energy is defined in Section 110 of Public Law 94-385. This statute contains a specific prohibition against FEA engaging in "solar energy research, development, or demonstration actitivies." There is no single Federal agency that encompasses all the expertise, insight, and working relationships with the private sector that are essential to solar commercialization. Even under a projected Department of Energy, there will still be a number of different Federal agencies involved in solar commercialization (e.g., the Department of Interior's Bureau of Reclamation, with its potential involvement in the use of hydroelectric systems for storage of solar-generated electricity). FEA's commercialization endeavors will coordinate the diverse efforts of the Federal agencies, including ERDA, and bring them together in a single national plan for the accelerated commercialization of solar energy. This will carry out the intent of Congress in the statutory provision cited above. All major FEA solar commercialization projects, moreover, have been developed jointly in conjunction with the appropriate agencies, and this practice will be continued. FEA and ERDA's Solar Energy Division have established a coordination committee, which meets monthly, to ensure that work currently underway with FY 1977 funds is closely coordinated.

The FEA geothermal program is almost exclusively involved in coordinating and leading the efforts of other Federal agencies to overcome institutional barriers impeding development. FEA chairs the Institutional Barrier Panel of the Interagency Geothermal Coordinating Council, which is under ERDA's leadership. FEA, with its broad interface with regulatory and Federal land management agencies, is in a unique position to continue to make an effective contribution in this area. This work has been underway since January, 1976, with important participation from ERDA along with 10 other Federal agencies.

FEA's work in synthetic fuels and solid waste-to-energy is designed to ensure that these energy sources are viewed properly in the development of overall national energy policy. Secondarily, FEA will work to ensure that the several Federal agencies most directly involved (ERDA, FPC, Interior, and EPA) are properly coordinated and focusing on the non-technological aspects of development concurrently with other work that is underway.

Mr. YATES. Are there new technologies which appear to be innovative and about to be commercialized?

Mr. O'LEARY. In solar?

Mr. YATES. Yes.

Mr. O'LEARY. Yes, there are.

Mr. YATES. Would you describe those for the record when you get a chance?

[The information follows:]

New Solar Technologies Ready for Commercialization

Before addressing which technologies are ready for "commercialization"--it might be better to define and describe certain terms and concepts.

First, what is the difference between "commercialization" and "accelerated commercialization" as used in describing the FEA program?

Commercialization Versus Accelerated Commercialization

Commercialization by the private (non-government) sector may be defined as a process whereby a new type of product, system, technique, manufacturing process or service moves from a merely technology availability status to a status of marketplace acceptance, consumption, and profitability. The commercialization process is considered to be successful when the venture has proven to be economically viable and private capital represents the primary source of financing.

The process for the successful commercialization of a new system is long and complex. It begins at the conceptual stage with an idea or identified need for a new system, product, or service, or, through financial pressures or opportunities, the development of a new approach to a particular problem. From here it may proceed as follows:

- The "need or idea" must be further defined, the potential market assessed and engineering development, production, and marketing costs projected.
- If initial product costs and marketability appear viable, preliminary funding must be secured for initial efforts, and sources of extended financial support solicited.
- The regulatory environment must be examined and patent privileges defined.
- Market strategy and engineering/product development efforts are undertaken.
- The practicality of the new system must be demonstrated and its possible environmental impacts determined.
- Management actions are undertaken, e.g., site acquisition, tooling and industrial engineering, labor force training, etc.
- New venture groups, organizations, or operations may need to be formed to conduct a specific commercialization effort.

Accelerated Commercialization--a joint government-private sector process--might be defined as government actions that are taken to increase the rate, level, and breadth of both acceptance and utilization of a new type of product, system, technique, manufacturing process or service. The general objective of such government actions should be to achieve the maximum market penetration rate of the new type of system, at a given level of government expense, while minimizing any possible negative socio-political impacts of the system. Such government actions, in general, can take the form of:

- Stimulating market demand;
- Stimulating the early development of a viable, self-sustaining (i.e., not requiring government subsidies) industry/market infrastructure; and
- Mitigating, where possible, any technical, economic, legal, institutional or environmental constraints.

** It should be strongly emphasized that government actions in the form of accelerated commercialization policy and planning efforts must proceed concurrently, and not just sequentially, with government and private sector research, development, test and evaluation (R,D,T&E)* efforts. Concurrent action is necessary because, in many instances, market development requires a longer lead-time than does an R,D,T&E effort. For example, preparing the manufacturing industry, the marketplace, and the associated institutions for large-scale integration of wind energy generators into Federal hydro-electrical systems, let alone private utility systems, may take up to five years. However, the technology may be available in two to three years. In such cases effective Federal accelerated commercialization planning (i.e. in line with market development lead-times) should be initiated early enough to permit rapid implementation as soon as technical feasibility has been demonstrated.

Second, what aspects of "accelerated commercialization" is FEA currently addressing?

FEA is focusing its efforts--during FY 77--on developing the policies, plans, implementation strategies and program definitions for the accelerated commercialization of solar energy as opposed to actual implementation of major government actions.

Now, in addressing which solar technologies are ready for "commercialization"--I will describe the status of a few examples of such technologies:

- solar heating of buildings and domestic water -- These technologies are being commercialized today. About 2,000,000 square feet of solar collectors was manufactured and sold in 1976. Effective government action can be taken to accelerate this process. FEA is looking at a number of strategies for the accelerated commercialization of solar heating. These include: tax credits; the Solar Energy Government Buildings Program; loans/loan guarantees; and other measures. These measures are being addressed in a comprehensive manner in the "Solar Heating and Cooling of Buildings (SHACOB) Commercialization Report" now being prepared.

- photovoltaic energy conversion systems -- This technology is commercially available today for an increasing number of applications. A study which is now being completed for FEA under an interagency agreement between FEA and DOD entitled "DOD Photovoltaic Energy Conversion Systems Market Inventory and Analysis" indicates an existing large market for photovoltaics systems at $2-$4 per peak watt array cost. Companies can commit to this price today under volume purchases and special procurement arrangements. To accelerate development of a highly competitive, viable industry infrastructure capable of producing low cost photovoltaic systems, FEA will be preparing a "Federal Photovoltaic Utilization Program Policy/Implementation Plan". This plan would facilitate early, large-scale use of photovoltaic systems by the Federal Government (primarily DOD). Also, FEA will be addressing, in a comprehensive manner, the requirements for early transition to rapidly increasing domestic uses of these systems in the "Photovoltaic Accelerated Commercialization Plan".

- wind energy systems -- Small, dispersed wind energy systems have long been on the market. About 3,600 units are currently being sold each year. These units are primarily used for water pumping and electricity generation applications in rural areas. To rapidly expand the near term use of these systems, FEA and ERDA will be, in turn, expanding their respective programs to fully address the technical, economic, legal, and institutional problems limiting current usage. ERDA has a test center for small wind energy systems in operation. This test center will be providing a testing and certification service for industry, government and the public sector. Technical data developed by the test center will lead to certification of these systems. FEA, in conjunction with ERDA, will be developing a comprehensive commercialization plan for dispersed wind energy systems during this fiscal year.

---

* It should be noted that the "demonstration" as currently used in "RD&D" provides not only for the test and evaluation (T&E) of a system or technique, but also a practical demonstration of the system or technique to potential users. The latter function can significantly contribute to the commercialization process.

Regarding large wind energy systems, FEA, in conjunction with DOI, ERDA, and other concerned agencies, is continuing development of the Wind Energy Commercialization Plan--Part I, large-scale units. Further--growing out of this interagency effort and other related activities (e.g., DOI Western Energy Expansion Study, FEA Hydropower Task Force, etc.)--FEA will be developing a policy/implementation plan for a Federal Wind Energy/Hydroelectric Integration Program. The program would provide for large-scale integration of wind energy systems into the Federal Hydroelectric system. Cost effective use of these wind energy systems could be committed to in two years--pending certain government actions.

87-591 O - 77 - 35

LAKE MICHIGAN FEDERATION

Mr. YATES. Now we have a letter from Chicago, from Richard L. Robbins of the Lake Michigan Federation, dated March 14:

DEAR CONGRESSMAN YATES:

I was delighted to hear of your interest in Federal low-interest solar energy loans. You are probably aware that the Lake Michigan Federation completed 1 year ago a major study on new laws to encourage solar energy use at the local, State, and Federal levels. The study will soon be published by the American Bar Foundation and the National Science Foundation. It is part of our work to develop constructive solutions to Lake Michigan powerplant siting.

Meanwhile we have created a shorter version of the final study which I have enclosed for use by your staff. If we can be of further assistance (including revising your bill, which we would like to see), please get in touch with me.

Right now we are drafting incentives legislation for the State of Illinois Division of Energy which should help with the State. We also have some good resources on solar energy laws and programs around the country. Much of it has emerged out of our Center for Alternative Energy here in Chicago. (A description is enclosed.)

I would like to talk with you about some of the programs concerning Lake Michigan and solar energy in the near future. Do you think you would be available in Chicago during the next month for a 1-hour discussion?

I give this to you with the blessing of all the people of Chicago and I hope you can find someplace to use it.

ENERGY INDEPENDENCE AUTHORITY

Is the Energy Independence Authority proposed under the past administration still alive?

Mr. O'LEARY. No, Mr. Chairman.

SYNTHETIC FUEL PLANTS

Mr. YATES. Is it premature to build large synthetic fuel plants at this time?

Mr. O'LEARY. In my own view it is not, Mr. Chairman.

Mr. YATES. It is not? Do you want to go ahead?

Mr. O'LEARY. I think we should build one or two.

Mr. YATES. With an expenditure of how much money?

Mr. O'LEARY. They would cost the constructors probably $1 billion each.

Mr. YATES. Are you talking about the Four Corners project?

Mr. O'LEARY. Projects like that.

Mr. YATES. That is dead, isn't it?

Mr. O'LEARY. No. By no means.

Mr. YATES. Didn't I read last year they had decided not to go ahead with it?

Mr. O'LEARY. No. Westco, which intended to build in Four Corners, is very much alive. El Paso, the other one to be built there, is on hold.

Mr. YATES. What are you going to do about fouling the beautiful area?

Mr. O'LEARY. If the alternative is a steam-generating electric plant fired with coal, you do better with a coal-to-gas plant than vice versa.

AIR PURIFICATION

Mr. YATES. What are you going to do about purifying the air with the plant that is out there now?

Mr. O'LEARY. That problem is cured by dollars. Unfortunately the regulatory setup in that authority is not good.

Mr. YATES. Which authority is it?

Mr. O'LEARY. It is the Environmental Improvement Agency of the State of New Mexico. It threw an order against the Arizona Public Service plant that was subsequently overruled in the court. I think that this remains something that has to be fixed up. But that plant was designed back in the midsixties, and you can certainly do much better than that. Indeed, the Four Corners plant that has gone in since then has done much—the units, rather——

Mr. YATES. What are you going to do about the earlier units?

Mr. O'LEARY. They have to be cleaned up. I had an arrangement with Arizona Public Service whereby they would have cleaned it up. It was derailed by an action in the State because the State agency with authority in this field thought they could obtain new authorities from the State legislature in this last session. They did not obtain them. Hopefully the arrangement that I had with Arizona Public Service will now go into effect.

Mr. YATES. You can see that for almost a hundred miles.

Mr. O'LEARY. You can see it on a good day all the way over the Mexican border.

Mr. YATES. On a good day you can see it forever.

Mr. O'LEARY. That is a disgrace.

Mr. YATES. That is right.

COAL CONVERSION

What is the effect of Senate bill 977 by Senator Jackson on your program and plans? Would the increased coal required be available?

Mr. O'LEARY. Mr. Chairman, any reasonable timetable would be contemplated under that legislation. The coal would not be the constraint.

Mr. DUNCAN. What would be the constraint?

Mr. O'LEARY. Construction time for the new plants.

Mr. DUNCAN. Do you have to worry about environmental problems?

Mr. O'LEARY. We have thus far worked the ESECA and EPCA plans through with EPA. We would continue to work very closely with them. I think they are amenable.

Mr. YATES. Do you look for any plans beyond the current coal conservation program?

Mr. O'LEARY. Yes. You have just discussed the one we are looking for, the Jackson bill, which substantially modifies the current ESECA program.

RELATIONSHIP TO NUCLEAR FIELD

Mr. YATES. Are you in the nuclear field?

Mr. O'LEARY. In an advisory capacity.

Mr. YATES. ERDA is in it.

Mr. O'LEARY. It has a lot to do with it. Of course, there is a good bit of activity in the White House and the State Department in the nuclear field right now.

POWER RELIABILITY AND PRODUCTIVITY

Mr. YATES. What about the question of power reliability and productivity; are you studying this?

Mr. O'LEARY. Mr. Chairman, we are studying this. We have done a good bit of work with utilities attempting to gain a better understanding of reliability problems. I think we have a better grasp now.

INVOLVEMENT IN COGENERATION

Mr. YATES. Are you involved at all in cogeneration?

Mr. O'LEARY. We are moderately involved in cogeneration now. Later in the spring we will probably make a much heavier effort in cogeneration.

Mr. DUNCAN. What is cogeneration?

Mr. O'LEARY. That is the production of processed steam in an industrial setting while at the same time producing electricity. The electricity can then be put back into a network where, in effect, the industrial plant sells electricity to the utility for a portion of the day and receives electricity from the utility for another portion of the day.

Mr. YATES. Has there been any success in expediting a major energy project here?

Mr. O'LEARY. There has been one isolated success. Dow was very much interested in working with Mid-South back in the early 1970's in conjunction with a nuclear plant that Grand Gulf intended to build. At that time, the AEC had recently conferred upon it antitrust responsibilities, and I used those responsibilities to discuss this matter with Mid-South.

My recollection is that there was finally an accommodation that permitted a certain amount of cogeneration in that region.

Mr. YATES. You are doing studies in your financial planning incentives activity in coal, electric power, oil, and gas, which seem to be different than those being done by industry itself. Would you describe for the record how they differ.

Mr. O'LEARY. We will, Mr. Chairman.

[The information follows:]

FINANCIAL PLANNING INCENTIVES ACTIVITY

The studies identified in the financial planning and incentives areas deal primarily with developing a reliable financial data base for the coal, electric power, oil, and gas industries. Staff research during fiscal year 1976 and fiscal year 1977 has indicated a lack of comprehensive financial data bases for these industries or companies within the industries themselves, the trade associations, or the Government. While financial information is available on an industry basis or on a certain class of companies within an industry, it is typically extremely fragmented and the data are incompatible.

There is therefore a requirement to collect, edit, and validate the various financial reports. For example, financial, data for the electric utility industry are obtained from reports published by the Edison Electric Institute, Argus, Computant, various Wall Street brokerage firms, the Federal Power Commission, the Federal Trade Commission, Treasury, Interior and Commerce. These data, after being edited and validated, serve as the basis for the financial planning and analysis work done by the staff.

Mr. YATES. For the record would you explain the functions of the energy finance advisory committees.

Mr. O'LEARY. We shall, Mr. Chairman.

[The information follows:]

ENERGY FINANCE ADVISORY COMMITTEE

The Energy Finance Advisory Committee was established in April 1976 under the Federal Advisory Committee Act for the purpose of providing the Administrator, FEA, with advice on matters in highly complex financial areas in connection with duties imposed on the FEA by law and in regard to the financial aspects of other issues under study and development by the FEA.

The committee has been designated to meet approximately four times a year to provide independent advice to include the following:

The projected capital needs of the domestic energy industries.

The characteristics, conditions, and projected changes in the money and capital markets.

The financial disincentives to domestic energy development.

The effectiveness of Federal financial incentive programs to enhance domestic energy supply.

The committee will help promote a mutual understanding of the role of the Federal Government and the private financial community in developing energy resources.

ugust 19, 1976

ENERGY FINANCE ADVISORY COMMITTEE

E. C. Barfield
Manager of Corporate Planning
Exxon Company, U.S.A.
P. O. Box 2180
Houston, TX 77001
713-656-2685

Bob Burch
1077 Race Street
Denver, CO. 80206
303-751-5000

Milton A. Carlton, Jr.
Troutman, Sanders, Lockerman
& Ashmore
14th Floor, Candler Building
Atlanta, GA 30303
404-658-8000

Herbert B. Cohn
Vice Chairman of the Board
American Electric Power Co., Inc.
2 Broadway
New York, NY 10004
212-422-4800

J. E. Corette
Chairman of the Board
The Montana Power Co.
40 East Broadway
Butte, MT 59701
406-723-5421, ext. 2122

Frank H. Coyne
Executive Vice President
Finance and Administration
Burlington Northern, Inc.
176 E. Fifth Street
St. Paul, MN 55101
612-298-2500

Arthur C. Eschenlauer
Vice President
Morgan Guaranty Trust Company
of New York
23 Wall Street
New York, NY 10015
212-483-2323

Donald R. Evans
Vice President
Citibank, N.A.
399 Park Avenue - Tube 58
New York, NY 10022
212-559-8745

Raymond L. Golden, General Partner
Salomon Brothers
One New York Plaza
New York, NY 10004
212-747-7000

David P. Goodman
Managing Director
Morgan Stanley & Company, Inc.
1251 Avenue of the Americas
New York, NY 10020
212-977-4000

Shearon Harris
Chairman/President
Carolina Power & Light Company
P. O. Box 1551
Raleigh, NC 27602
919-828-8211

Dr. J. Herbert Hollomon
Center for Policy Alternatives
Massachusetts Institute of
Technology
23 Amherst Street
Room E40-234
Cambridge, MA 02139
617-253-1661

Alvin C. Johnson
Senior Vice President
First National Bank of Chicago
One First National Plaza
Chicago, IL 60670
312-732-3208

Charles Komanoff
Energy Projects Director
Council on Economic Priorities
84 5th Avenue
New York, New York 10011
212-691-8550

Cameron F. MacRae, Sr.
LeBoeuf, Lamb, Leiby, and MacRae
140 Broadway
New York, NY 10005
212-269-1100

Richard W. Manderbach
Senior Vice President
Bank of America
555 South Flower Street
Los Angeles, CA 90071
213-683-3448

Charles T. Maxwell
Cyrus J. Lawrence, Inc.
1115 Broadway
New York, NY 10006
212-962-2200

Eugene W. Meyer
Vice President
Kidder Peabody & Company, Inc
10 Hanover Square
New York, NY 10005
212-747-2000

Dr. Edward J. Mitchell
American Enterprise Institute
for Public Policy Research

Mailing address:
Professor of Business Economics
Graduate School of Business
Administration
University of Michigan
Ann Arbor, MI 48109
313-764-1269

William E. Pelley
First Vice President
Bankers Trust Company
P. O. Box 318
Church Street Station
New York, NT 10015
212-692-3172

Robert L. Pettigrew, Jr.
Vice President and Director
Wyoming Association of
Municipalities
3111 Hawthorne Avenue
Casper, WY 82601
307-235-1591

Philip R. Reynolds
Senior Vice President
The Travelers Insurance Company
One Tower Square
Hartford, CT 06115
203-277-0111

Alan Schwartz
Honigan, Miller, Schwartz & Cohn
2290 First National Building
Detroit, MI 48226
313-WO 2-6700

Arthur R. Seder, Jr.
Chairman
American Natural Service Company
One Woodward Avenue
Detroit, MI 48226
313-965-8300, ext. 2414

C. A. Stefl
Executive Vice President
Eastern Associated Coal Corp.
Koppers Building
Pittsburgh, PA 15219
412-288-8108

Irwin M. Stelzer
President
National Economic Research
Associates, Inc.
80 Broad Street
New York, NY 10004
212-747-3939

William R. Thomas
Senior Financial Vice President
Pacific Lighting Corporation
P. O. Box 60043, Terminal Annex
Los Angeles, CA 90060
213-689-3507

Maurice Van Nostrand, Chairman
Iowa State Commerce Commission
300 4th Street, 7th Floor
Valley Bank Building
Des Moines, IA 50319
515-281-5167

Richard Walker
Arthur Andersen & Company
69 W. Washington Street
Chicago, IL 60602
312-346-6262

Frederick J. Wells
Research Associate
Resources for the Future
1755 Massachusetts Ave., N.W.
Washington, D.C. 20036
202-462-4400

Edward R. Willett
Professor of Finance
Northeastern University
Room 703
120 Boylston Street
Boston, MA 02115
617-423-4863

Wallace W. Wilson, Vice President
Continental Illinois National
Bank & Trust Company of Chicago
Lock Box H
Chicago, IL 60693
312-828-2345, ext. 4340

Eric R. Zausner
Senior Vice President
and Managing Officer for Energy
Booz, Allen & Hamilton
4733 Bethesda Avenue
Bethesda, MD 20014
301-656-2200, ext. 505/506

Mr. YATES. You have a contract for $160,000 entitled "Financial Impact/Implications of Initiatives, Financial Techniques and Regulations on Business and Public Policy." These are for coal and coal-fired electrical powerplants. I think you ought to explain what that is for the record.

Mr. O'LEARY. We shall, Mr. Chairman.

[The information follows:]

CONTRACT TO STUDY DISINCENTIVES TO COAL PRODUCTION

According to the draft 1977 "National Energy Outlook" (NEO), coal demand is expected to reach 1.1 billion tons per year by 1990 (reference scenario). This represents a 83 percent increase in coal demand from the 620 million tons demanded in 1975. In order to finance the additional coal production through 1985, it is estimated in NEO that the coal industry will need to generate about $23 billion.

The purpose of the $160,000 contract will be to analyze the various financial and regulatory disincentives to the desired increased coal production and to evaluate various Federal incentive programs which could be implemented to stimulate coal production. Such potential incentive programs would include loan guarantees, direct loans, increased Investment Tax Credits, accelerated depreciation, etc.

SITING PROGRAM

Mr. YATES. What is the siting program of FEA?

Mr. O'LEARY. Mr. Hanfling will discuss that.

Mr. HANFLING. We are doing several things in siting. One, we are working with States and regions to help them develop State siting plans and programs in trying to streamline the State siting processes. We are doing most of those with the State of Maryland on coastal zone management program. We have some work going on with Region 10 in Seattle and Region 8 in Denver. We are also working with the GSA and the Department of Defense in helping to expedite the release of shutdown military installations in those instances where it is appropriate for them to be available for energy concerns.

Mr. YATES. I assume there are States and regions that do have legislation that is restrictive of energy projects. Is this a real problem?

Mr. HANFLING. Siting is probably one of the most important and real problems facing energy development. There are many States that have different legislation or actions in various stages of development that do preclude or make it difficult to site plants there.

Mr. YATES. What do you do?

Mr. HANFLING. One of the things we are trying to do is work with the States and regions to define their needs for energy facility development rather than having it be defined at some outside level. A specific example in this area would be work we have done with the New England Governors Conference, where we used our computer services to provide them with information to project what kind of energy facilities they will need from now until the end of the century. They are the ones who have to come up with that.

Mr. O'LEARY. There is legislation pending before the House Interior Committee that specifically addresses the point of nuclear siting. I think that hearings on that will be held soon. It is a very useful piece of legislation.

Mr. YATES. Good.

PLACEMENT OF ENVIRONMENTAL FUNCTIONS

Why do you have a separate environment group in energy resource development instead of having all environmental programs in your conservation and environment activity?

Mr. O'LEARY. Because each of these groups complements the program in that particular area, Mr. Chairman.

Mr. YATES. What is meant by a subprogram called "nonattainment?" How does it differ from "project expediting" under "electric power?"

Mr. O'LEARY. Nonattainment has to do with the air quality requirements under the existing air quality legislation, Mr. Chairman. Nonattainment is one of the problems we have to work with on a daily basis in connection with the coal conversion program.

Mr. YATES. How do you work with EPA on sulfate standards? It is their responsibility?

Mr. O'LEARY. It is their responsibility but we are, however, working with them very closely, especially in the last couple of months.

Mr. YATES. What do you do?

Mr. O'LEARY. We are dealing with EPA in trying to get together a sensible administration position on the Clean Air Act amendments to begin with so that the Clean Air Act amendments don't arise as a constraint on the coal conversion program.

Mr. SMITH. Being sure EPA is aware of the impact of any standards it might be considering, Mr. Chairman.

INTERNATIONAL ENERGY AFFAIRS

Mr. YATES. Lets turn to international energy affairs. You want $1.678,000 for that. How many people do you have in that program?

Mr. O'LEARY. There are 45 people. You mentioned yesterday the support of the International Energy Agency. That is one thing this program does. Also, we have at any given time a series of concerns with Canada which require us to be very much aware of what is going on there. We are providing analytical work with regard to the negotiating officials who are dealing in the international arena. We provide support to Dr. Schlesinger and to the President at the White House on energy issues that arise with international visitors.

We have had recently the Premier of Japan, and Prime Minister Trudeau visit. These visits require an enormous amount of analytical work in order to cover the energy issues which may arise. It is a heavily worked staff.

STATE DEPARTMENT ENERGY STAFF

Mr. YATES. Doesn't State have an energy office?

Mr. O'LEARY. They do, and there is a very strong working relationship between the two organizations.

Mr. YATES. Why do you need both? Why does State need one?

Mr. O'LEARY. Energy, Mr. Chairman, was the question that you just raised with regard to the environment, these are issues that just cut across all other considerations.

Mr. YATES. You can't resolve them by having one agency?

Mr. O'LEARY. I really don't think so. If you have a mission, it is like why does everybody have a computer.

Mr. SMITH. Let me give one example of the way this program operates in the regulatory area. When the Canadians announced their decline in the shipments of crude oil, the International Energy Affairs Office in conjunction with the State Department representatives actually conducted a number of the conferences with the Canadian Energy Board. They also support us in terms of the relationship between the board, their dealings with the staff about what we can expect.

They come to my people to get the technical impact and in turn work with the State Department in conducting the negotiations with the Canadians on this kind of issue.

OIL PRODUCING COMPANIES' FOREIGN RELATIONSHIPS

Mr. YATES. Does your agency follow the relationships between the oil-producing companies—not only OPEC but England, Norway, Soviet Union, Red China—and companies who exploit their resources for them?

Mr. O'LEARY. Yes.

Mr. YATES. Could you put into the record an explanation of lease arrangements these nations have with each of the oil companies?

Mr. O'LEARY. Yes, we can.

Mr. YATES. That is something I wanted to have for a long time.

[The information follows:]

OIL COMPANIES LEASE AGREEMENTS

In the United Kingdom, there are two types of license, one for exploration and one for production. An exploration license may be applied for at any time, and it lasts for 3 years on payment of an annual fee of £1000. It allows licensees to search for petroleum in all designated areas except those covered by production licenses. A production license is normally applied for only in response to an invitation published by the Secretary of State for Energy. It allows licensees to search for petroleum in a specified area or block. Five rounds of licensing have been held in 1964, 1965, 1970, 1971-72 and 1977. These licenses are initially valid for 6 years, subject to the licensee observing all the terms and conditions. They may be continued for a further period of 40 years, covering up to half the area originally licensed. The British National Oil Company (BNOC) may apply for either type of license at any time.

BNOC has a 51% option on all oil produced and agrees to buy it from the producers at market price. Companies with refineries in the U.K., such as Shell, Esso and BP, have contracted to buy back the government's 51% share at market price to use as feedstock in their refineries.

BNOC is recognized as a licensee and as the representative of the Government. As such, BNOC has rights to information and consultation regarding development and exploitation fully equivalent to those customarily enjoyed by co-licensees. It may also have a voice in making decisions affecting operation of the fields. However, BNOC's voting rights on boards of directors do not include either a veto or a controlling interest on any issue. In the recently concluded Fifth Round of Licensing, BNOC was designated as the operator in 6 blocks.

A 12.5% royalty is taken in kind, and is subtracted before the 51% BNOC share is calculated. On the balance, the participating companies pay a 52% corporation tax. Finally, after repaying themselves 175% of the cost of their original investment, the companies pay an additional 45% Petroleum Revenue Tax. On small fields, chances are that the PRT will never be paid, but it is expected to be a lucrative source of revenue from the largest fields. The average tax bite is estimated to total about 70%. BNOC is tax-exempt.

Companies must provide training for BNOC personnel in crude oil supply, transportation and refining operations in order to assist BNOC in fulfilling its statutory responsibilities as technical adviser to the Government.

Norway's concession system for the exploration and exploitation of its North Sea resources applies to all operations except those at Ekofisk where Phillips began to drill before the system was developed. The concession system is based on the assumptions that foreign companies should be encouraged to explore Norway's resources, but that exploitation of these resources should benefit Norway. Therefore, as much control as possible is being kept in Norwegian hands and is exercised through the state oil company, Statoil, and the Oil Directorate. A go-slow development policy has been adopted with the goal of keeping the ceiling on production at 10 times the domestic consumption, or a peak of 1.8 million barrels of oil equivalent daily.

The Ministry of Industry has executive responsibility for the petroleum sector of Norway. A subsidiary group, the Oil Directorate, works with the international oil companies, monitors the international supply situation, and negotiates purchases of petroleum products from foreign sources.

In concessions granted through 1975, Norway allowed the companies to handle development, but retained a "carried interest" of 50% once production started. Ekofisk is exempt, except that Phillips had to give Statoil a 50% interest in its pipeline to Teesside in England and in its terminal facilities there. Mobil, the operator of the huge Statfjord field, has had to relinquish a 50% interest in the field to Statoil. All foreign oil companies are expected to help with the technical training of Statoil employees.

The average tax bite taken by the Norwegian government from the foreign oil companies will be 57 to 66 percent. The companies pay a regular 50.8% corporate income tax, a royalty of 8-16% depending on the size of the operation, plus a special 25% profits tax. Before applying the 25% tax, firms are allowed a "free income" equal to 10% of their total investments. Statoil pays taxes like any other firm.

Concessions give the holder exclusive rights to prospect and produce oil and gas in the specific block for a period of 6 years, but they also obligate the holder to undertake a certain minimum exploration program. When this period expires the oil company has to return 50% of the area to the state, but may claim a 30-year extension of the rights to the remainder. By these rules the authorities have secured their opportunity to step into promising areas and take advantage of the finds made by others. The Norwegian government has also reserved key blocks for itself in between the concessions granted to foreign companies, awaiting further results to see if they are in promising areas. Statoil will probably be designated the operator in future blocks, particularly north of the 62nd parallel.

The policies of the USSR and the People's Republic of China have been the maximum reliance on domestic capabilities in the development of energy resources. Both countries have imported some Western technology, equipment and materials used in energy development, but all exploration, production and sales of energy in the PRC and most such activity in the USSR is carried out exclusively by State organizations. The USSR has recently undertaken joint exploratory efforts with U.S. and Japanese companies for oil and gas exploration in Siberia. The companies, however, perform as service contractors and, perhaps, as ultimate purchasers of energy, but hold no leases or concessions of any kind.

Mr. YATES. If my memory serves me correctly, doesn't Dome have a joint venture agreement with Canada?

Mr. O'LEARY. Dome is working in the Arctic.

Mr. YATES. That is right. What is your involvement in the Law of the Sea Conference? Any?

LAW OF THE SEA CONFERENCE

Mr. SMITH. Advisory to the State Department in terms of the energy implications of the provisions of the Law of the Sea Treaty being negotiated, sir.

STRATEGIC PETROLEUM RESERVE

Mr. YATES. Let's turn to the Strategic Petroleum Reserve. You want the sum of $3,018,933,000; right?

Mr. O'LEARY. And 37 cents.

Mr. YATES. All right.

You have an accelerated program here. Do you need authorization for it?

Mr. NOEL. Yes; we do.

Mr. YATES. What is the status of that?

Mr. NOEL. There will be testimony regarding the acceleration on Friday of this week. We will submit the package to you.

Mr. YATES. When the Administrator spoke yesterday and today I gathered the impression he really was in a hurry to get the oil into storage.

Mr. O'LEARY. I sure am.

Mr. YATES. Why is that?

Mr. O'LEARY. We are in a hurry because of the dire possibility that we face every day we are not filling this; that there will be an interdiction in supply with absolutely catastrophic consequences to the economy of this country.

AVAILABILITY OF STORAGE SITES

Mr. YATES. Are you in a position to act? Do you have the places to put the oil?

Mr. O'LEARY. Mr. Chairman, the guidelines given Mr. Noel is developing this request were 75 percent probability. That is a relatively high probability he can put that much oil in storage. Here we should err on the side of putting in just as fast as we can. We should not be constrained by financial considerations.

Mr. YATES. On page 21 of your plan in brief it is planned to have 500 million barrels in storage by the end of 1982 as well as 325 million barrels by the end of 1980 and 150 million barrels by the end of 1978.

Mr. O'LEARY. That indeed was the plan, Mr. Chairman. However, upon our review of the strategic storage position and of the strategic position of the United States, at the onset of the new administration, we concluded that storage was not being done with sufficient rapidity, and thence I asked Mr. Noel the question: How rapidly can you fill?

He came back with a somewhat lower number than that 250 million barrels by the end of 1978. I said, "If you pull out all the stops and we

assign a 75-percent probability to the fill," his answer was the 250 million.

Mr. YATES. How would that be stored?

Mr. O'LEARY. Wash salt structures.

Mr. YATES. Can you use Liberty ships for this?

Mr. O'LEARY. No. They are very limited. It is a 10,000-ton vessel.

Mr. NOEL. The environmental risk is just inordinate.

Mr. YATES. What is your schedule for acquisition of storage sites and construction facilities?

Mr. NOEL. We presently have made decisions on three sites. We are presently in active negotiation for acquiring those sites.

Mr. YATES. How many barrels can you put in them?

Mr. NOEL. The three we are talking about now would be 210 million barrels.

Mr. YATES. So that is 630 million barrels, right, by when?

Mr. SMITH. No, 210 million total.

Mr. YATES. I thought you meant each.

Mr. NOEL. No.

Mr. YATES. I was faster than you.

DESCRIPTION OF STORAGE FACILITIES

What kind of facilities are we talking about?

Mr. NOEL. Underground storage, one, possibly two limestone caverns, one in Ohio, one in Kentucky. We are talking about three salt dome structures, two salt mine structures to give us the capacity we need for the initial term?

Mr. YATES. Are these the same salt dome structures for disposal of nuclear waste?

Mr. NOEL. No, not at all. ERDA's technical requirements are significantly different than ours. They are not interested in the same domes.

Mr. O'LEARY. Mr. Chairman, may I tell you at this point last night Bill Snyder from Sandia, who heads their program, was in town and briefed a number of your colleagues. Recalling our discussion yesterday, I wondered if the next time he is here he could brief you. He is generally here every week or two and is really the authority in disposal of high-level nuclear wastes.

Mr. YATES. I didn't know there was any authority.

Mr. O'LEARY. He is first rate, very good.

Mr. YATES. We sure would welcome him because as of now, from the testimony of the Geological Survey, I am really not convinced.

Mr. O'LEARY. In that case I would very much like to bring you together.

Mr. YATES. Yes.

FOREIGN STORAGE SITES

In your December 15 report you say foreign storage sites are being considered for strategic petroleum reserves; is that true?

Mr. O'LEARY. There is some consideration being given to a site that on Palau would serve both the Japanese and our requirements.

Mr. NOEL. That is somewhat less attractive than the proposed Canadian-United States site.

Mr. O'LEARY. The Newfoundland site.

Mr. YATES. Is Canada willing to work with you?

Mr. O'LEARY. Yes, they are. Very much so.

Mr. DUNCAN. I was going to say to make it plural when that fellow comes in town so the rest of us can hear that, too.

Mr. YATES. We will bring him before the committee.

SECURITY OF STORAGE FACILITIES

Mr. DUNCAN. May I ask a question about security?

How deep are the storage domes?

Mr. NOEL. The shallowest area we are talking about would be in a mine 467 feet below the surfce. Generally speaking, the salt domes are 1,000 or so feet below the surface. In other words, there is an overburden of rock and various other materials on top so they are very, very difficult to pilfer. There is nothing to support combustion; they are really as secure as we know how to make them.

Mr. DUNCAN. Did you say you were considering storage in Palau even though you said it was somewhat attractive?

Mr. NOEL. I am not familiar with that site.

Mr. O'LEARY. There is a proposal that there be an addition to the strategic program that would put stocks in Palau to serve not only Japan but Hawaii as well. It is in conjunction with a deepwater port in order to take advantage of its capacities.

Mr. DUNCAN. Do they have salt domes?

Mr. O'LEARY. I don't know anything beyond what I have just said, Mr. Duncan.

SCHEDULE FOR PROCUREMENT OF OIL

Mr. YATES. What is your schedule for the procurement of oil?

Mr. O'LEARY. The first fill is in July, Mr. Chairman.

Mr. YATES. How are you going to procure it?

Mr. O'LEARY. We are going to use the Defense Fuels Procurement Agency initially.

Mr. YATES. For how much oil?

Mr. O'LEARY. For 10 million barrels.

Mr. YATES. For delivery when?

Mr. O'LEARY. In July, August, and September.

Mr. YATES. Is this going to be part of the April 20 statement?

Mr. O'LEARY. Mr. Chairman, this is before you now. No, it may be alluded to in the April 20 statement.

SOURCE OF OIL FOR STORAGE

Mr. DUNCAN. If the gentleman would yield?

Mr. YATES. Sure.

Mr. DUNCAN. Will you buy on the open market?

Mr. O'LEARY. They will buy competitively on the open market for this first chunk of the fill.

Mr. DUNCAN. With a mix of foreign and domestic?

Mr. O'LEARY. No. There are specifications. This will probably be Saudi light crude.

Mr. SMITH. But it will be imported oil.

Mr. O'LEARY. You want a very light versatile crude in storage because it will have to match with a broad range of refineries.

Mr. DUNCAN. Will subsequent acquisitions include foreign as well as domestic?

Mr. O'LEARY. I would say very little in the way of domestic is going to go into the stockpiling program.

Mr. DUNCAN. This will all be high-priced oil?

Mr. O'LEARY. If we take a barrel out of the domestic economy, it means an imported barrel anyway. I think probably we can better handle this from the standpoint of the logistics from a straight import.

PROFITABILITY OF STORAGE

Mr. DUNCAN. Have you studied the impact of the pricing at all? Actually, the storage should make you some money, shouldn't it?

Mr. O'LEARY. The storage in all likelihood will cost money. It may be that the rate of inflation on OPEC oil will exceed the interest charges on storage.

Mr. DUNCAN. You haven't any studies on it?

Mr. SMITH. It depends, Mr. Duncan, on when it is used and what the world market price for oil is at that time and what pricing policy you elect to employ when it is used.

If you make the assumption that when used it will sell at the OPEC market price, and make an assumption about the OPEC market price along the lines Mr. O'Leary indicated, the general inflation will go up faster than the costs of operating the storage and it could very well make money.

Mr. DUNCAN. Do you have a breakdown in your estimated costs of storage preparation?

Mr. NOEL. Yes.

Mr. DUNCAN. Put it in the record, will you.

[The information follows:]

ESTIMATE OF STORAGE SITE COSTS

The breakdown of funding for storage sites is given in the following chart which shows major activity costs for fiscal years 1976, TQ, 1977, and 1978.

STORAGE FACILITIES FOR 500 MMB PROGRAM

[In millions of dollars]

	1976 transition quarter	1977	1978	Total
Site acquisition	3.0	55.1	84.1	142.5
Design/construction		199.7	218.8	418.5
New Space development			72.9	72.9
Distribution systems and fill		43.6	89.5	133.1
Total (500 mmb)	3.0	298.4	465.6	767.0

Mr. DUNCAN. This, even though it is a terrifying figure, is just a transfer of wealth from one form to another?

Mr. O'LEARY. It is an investment that is absolutely crucial, I think, to the continued well-being of this economy.

Mr. DUNCAN. Thank you.

Mr. YATES. We understand you are going to buy at the prevailing average national price and give entitlements to those who sell you oil.

Mr. O'LEARY. That is right.

Mr. YATES. Would you place in the record an explanation of how this works?

Mr. O'LEARY. We shall, Mr. Chairman.

[The information follows:]

ENTITLEMENTS

The entitlements program equalizes feedback costs by putting everyone in the position as if he had purchased the national average amounts of price-controlled and noncontrolled oil. If 30 percent of all the oil refined in the country were price-controlled oil, each refiner would receive entitlements equal to 30 percent of the oil he refined. Each refiner would also incur a liability of one entitlement for each barrel of old oil that he actually refined. The value of an entitlement is the difference between the price of old oil and the price of imported oil. If a refiner had less than 30 percent old oil, and therefore higher prices, he would sell his excess entitlements for cash and reduce his effective cost. If a refiner had more than 30 percent oil and therefore lower costs, he would have to buy entitlements for cash and therefore raise his effective cost.

SPRO would count oil sold to the reserve as if it were refined and the seller would earn entitlements for the oil. If the national average were 30 percent old oil, a seller would earn 0.3 of an entitlement for each barrel of oil that he sold SPRO. If an entitlement were worth $7, the seller would be getting $2.10 from selling entitlements for each barrel of oil that he sold SPRO. If the sale price of oil to the SPR were $12.10 a barrel, SPRO would only have to pay $10 cash, and the seller would collect $2.10 from other refiners through the sale of his entitlement.

ENTITLEMENTS

Mr. DUNCAN. Mr. Chairman, what is an entitlement?

Mr. O'LEARY. When a person brings in a barrel of $13.50 oil, we will give him an entitlement that will bring it down to the prevailing price of oil within the United States.

Mr. SMITH. Entitlement is simply a right to refine a barrel of old crude oil the refiner has to have. Instead of having refiners price control and import oil among themselves, it is a ticket, in effect, that is bought and sold among refiners so they come out at the same price as if they had actually exchanged the oil.

Mr. DUNCAN. I don't see why that is involved with this storage.

Mr. O'LEARY. We are required under the terms of the authorization to do this.

Mr. SMITH. It is a policy decision to buy the oil for the storage program at the national average price. The effect of this, Mr. Duncan, is to require current consumers of petroleum product to bear in the form of higher prices, the difference between about $9 a barrel average domestic price and the $13 a barrel.

Mr. DUNCAN. For our storage program?

Mr. SMITH. Yes, sir. It is a way to shift some of the costs.

The cost is shifted from the Federal budget and the general taxpayers. The $4 out of the $13 will be paid not by general taxpayers as will the first $9, but by current users of petroleum products. The concept is, while the total national economy is in fact protected by the existence of the storage and it is an insurance against interruption, the most immediate beneficiaries of having that protection will be the users of petroleum products. They will benefit approximately in the ratio at which they are using petroleum products. So the largest users of petroleum products will benefit more than the smallest ones.

Mr. DUNCAN. They will get that back, then, when they draw out of this stockpile; is that correct?

Mr. O'LEARY. They are paying for their own insurance.

Mr. SMITH. In terms of having the stockpile available to them.

Mr. DUNCAN. This $2.50 credit?

Mr. O'LEARY. No, sir. That is a different transaction. Here is the way it works. The importer gets a ticket that permits him to buy a portion of a barrel of very cheap old crude for $5.25 instead of the market price.

Mr. DUNCAN. So when we sell this out of our stockpile we have no prearrangements for price reductions with respect to anybody?

Mr. O'LEARY. No.

Mr. DUNCAN. But that entitlement will entitle him to draw a barrel of that?

Mr. O'LEARY. No. The moment a broker or refiner brings it in, he gets an entitlement that he ships over to the refinery. The refinery, with that entitlement in hand, can exchange it for a barrel of cheap crude.

DIRECT PURCHASE FROM SAUDIS

Mr. DUNCAN. None of these acquisitions will be made by direct negotiation with the Saudis between their Government and ours?

Mr. O'LEARY. That is not barred. That may occur.

Mr. DUNCAN. But you don't plan to do it?

Mr. O'LEARY. On the initial fill that we are prepared to discuss today, the purchase will be on the basis of bid.

Mr. DUNCAN. From domestic importers?

Mr. O'LEARY. From U.S. citizens.

Mr. SMITH. The procurement will restrict the eligible people to U.S. citizens, companies or individuals.

Mr. DUNCAN. Why is that better than buying it direct from the Saudis?

Mr. SMITH. It may be that it is better to buy it from them, and we will find out later on. Initially, though, we want to start this up without a protracted negotiation.

Mr. YATES. Have amendments to the entitlement program been proposed?

Mr. SMITH. To accommodate this treatment, yes, sir.

Mr. YATES. What amendments have been proposed?

Mr. SMITH. The amendment that has been proposed would change the regulation to make a seller of oil to the strategic program eligible to receive entitlements and in turn to sell those to U.S. refiners to get his money.

ALTERNATIVE FINANCING METHODS

Mr. YATES. Have you looked at alternative methods of financing?

Mr. O'LEARY. There was the thought early on that we would do all the purchases straight at market. Also, there was the thought you would just do what has been done in Europe and force all the costs on industry.

Mr. YATES. Where do they store it?

Mr. O'LEARY. In Shell storage tanks near the refineries, near their industrial consumer plants.

Mr. YATES. You mean European countries are engaged in developing a strategic petroleum reserve?

Mr. O'LEARY. They have for the last 15 years been doing this on a conscious basis under their general NATO umbrella as well as the OECD umbrella. The European countries have developed a fairly sophisticated stocking program that requires people to maintain much heavier stocks than has been the case in the United States.

Mr. YATES. What happened in the last embargo?

Mr. O'LEARY. It was a cushion during the last embargo.

Mr. DUNCAN. Are you planning any similar activity as a supplemental to the storage program?

Mr. O'LEARY. In what context?

Mr. DUNCAN. Requiring industry to carry some of the storage.

Mr. O'LEARY. There is the possibiilty in the act of requiring industry to carry product stocks, and we are examining that now along with regional stocking which is currently being examined by Mr. Noel.

Mr. DUNCAN. You haven't issued orders?

Mr. O'LEARY. No.

Mr. DUNCAN. Wasn't a lot of capacity built on a voluntary basis?

Mr. O'LEARY. A lot of capacity is in on a voluntary basis. For example, we discussed earlier large storage capability with regard to propane. Why is that? It is because the gas flows all year round and the propane market is concentrated in winter, so it makes good commercial sense to do that. Whether that will meet a national security requirement is an open question.

INCREASES TO CURRENT INDUSTRY STORAGE CAPACITY

Mr. DUNCAN. Industry acquired additional storage just out of necessity during the embargo; did they not?

Mr. O'LEARY. After a number of threatened supply interruptions over the last few years, they have built stocks. However, you still find some fairly thin stock areas. In Massachusetts, for example, today's regular stock capacity of residual will run on a 14- to 17-day range, and in neighboring Vermont maybe 45 days. So you find variations all over the lot.

Mr. YATES. How many barrels of oil are you authorized to purchase?

Mr. O'LEARY. 250 million barrels.

AUTHORIZATION OF STRATEGIC PETROLEUM RESERVE

Mr. YATES. Are you authorized under the authorizing legislation?

Mr. O'LEARY. We are authorized to be up to 500 million barrels un-

der the authorizing legislation. We need, however, this initial authorization which was 150 raised to 250. Is that right?

Mr. NOEL. Yes, sir, actually we presently can go to 150.

Mr. YATES. I don't understand.

Mr. O'LEARY. The total contemplated under the existing authorization is one-half billion. We intend to raise that to a billion.

Mr. YATES. And now it is 500 million?

Mr. O'LEARY. Yes. The initial authorization is 150 million.

Mr. YATES. What do you mean by initial?

Mr. O'LEARY. December 31, 1978 level; authorized now is 150. We intend to seek authorization beginning next Friday, to raise that to 250 million. That is the basis for the appropriation here.

Mr. NOEL. The Congress gave us the opportunity to gain up to 150 million barrels and submit a plan. The plan is presently being reviewed by the Congress, and that is the authorization for the 500; then subsequently it would be amended to include the additional portion.

APPROPRIATION AUTHORIZATION

Mr. YATES. Here is the law, section 166:

There are authorized to be appropriated (1) such funds as are necessary to develop and implement the early storage reserve plan—including planning, administration, acquisition, and construction of storage and related facilities—and as are necessary to permit the acquisition of petroleum products for storage in the early storage reserve or, if the strategic petroleum reserve plan has become effective under section 159(a) for storage in the strategic petroleum reserve in the minimum volume applicable, and,

(2) $1,100 million to remain available until expended to carry out the provisions of this part to develop the strategic petroleum reserve plan and to implement such plan which has taken effect pursuant to section 159(a) including planning, administration, and acquisition and construction of storage and related facilities, but no funds are authorized to be appropriated under this paragraph for the purchase of petroleum products for storage in the strategic petroleum reserve.

Mr. O'LEARY. I am reminded we will have to seek additional authorization to go above 150. The 500 is currently not authorized, but it will be sought on Friday as well. One further point on this, Mr. Chairman——

Mr. YATES. Why Friday?

Mr. O'LEARY. We are beginning the authorization process then with Mr. Dingell.

The House Budget Committee has indicated that they have had some reservations about our capability of reaching this fill target, and I indicated to you earlier, so do we. There is a 75-percent probability. However, I think that the entire amount should be appropriated now.

Mr. YATES. Subject to authorization?

Mr. O'LEARY. Subject to the authorization, because it provides a very salutary message to the rest of the world that we are not fooling around with this; we are going as far as we can. The net effect of the overrun, in the event that we don't meet the target, is that it will simply push the fill a month or two into the next fiscal year.

Mr. YATES. Are you encountering opposition to the strategic petroleum reserve on the authorizing committee?

Mr. O'LEARY. No, but an exercise has been done that says you can't fill at this rate, and it may be we can't. Nonetheless, we should have the whole amount.

Mr. YATES. You would like to try. What about the attitude of industry on this?

Mr. O'LEARY. Industry understands the necessity for it, is relieved it won't have to pay for it directly, and is for it.

Mr. YATES. Will you place in the record a statement on how you propose to manage the program since you have had no previous experience?

Mr. O'LEARY. We shall.

[The information follows:]

MANAGEMENT OF STRATEGIC RESERVE PROGRAM

Although the FEA has had no direct experience with the underground storage of oil, there is a great deal of experience available in the private sector. There has been underground storage of hydrocarbons in the gulf coast region for 25 years. FEA has entered into contracts to obtain both engineering design and construction manager services from the private sector for the development of storage sites.

The agency is also relying on the expertise of other Government departments in two other key activities, site acquisition and oil procurement. FEA has entered into an interagency agreement with the U.S. Army Corps of Engineers for property appraisals and acquisition of storage sites. A similar agreement is presently being negotiated for the Defense Fuel Supply Center to act on FEA's behalf in the procurement of oil.

In this manner, FEA plans to draw upon experienced sources in developing the storage system.

Mr. YATES. Do you intend to have an overall management contractor other than FEA?

Mr. O'LEARY. No; we are working initially with the defense supply people.

Mr. YATES. 500 million barrels will be a reserve for how long?

Mr. O'LEARY. About a 6-month supply.

Mr. YATES. For our whole industrial and domestic economy?

Mr. O'LEARY. On the probable interdiction, it would be a partial 6-month supply.

VIABILITY OF INDUSTRIAL RESERVES

Mr. YATES. Why were not industrial reserves considered as a viable alternative?

Mr. O'LEARY. One of the points I referenced earlier was the possibility of forcing the stocking on the industry as done in Europe. This can be done cheaply. It is better managed if it is done in a coordinated fashion. There will be no "ifs," "ands" or "buts" about it.

Mr. YATES. Would that require a cost to the Government?

Mr. O'LEARY. It would require a cost to the economy probably, a higher cost to the economy than this program will. Everybody would be out building storage.

Mr. SMITH. It would have to be stored in a lot of little storage sites by each customer. Most of them would be above ground, and the economies of storing large volumes——

Mr. YATES. Do we have capacity to build such storage?

Mr. SMITH. It would take a long time to build that many tanks.

Mr. YATES. How tough is it to build a tank?

Mr. SMITH. It is not tough. We have to produce the steel, build them, and erect them, and the tanks leak and corrode, as they sit there year after year.

Mr. YATES. Is Mr. Noel a part of this program?

Mr. O'LEARY. Yes, sir.

Mr. YATES. Your plan, Mr. Noel, envisions industries transporting in an emergency. Do you anticipate problems in using that approach?

Mr. NOEL. No, sir, we don't.

SAFETY OF TANKER TRANSPORTATION

Mr. YATES. What is your assessment of tanker availability for transportation; tankers that don't crack up?

Mr. NOEL. We have done everything we can——

Mr. YATES. That gives you pause, doesn't it?

Mr. NOEL. It does. We have found as we got into this question that there are those in the industry who go through rigorous processes to determine whether or not the ships used are safe. Others are not nearly as careful. We have as part of our environmental planning for this project built into it certain economics to determine whether or not we are getting decent shipping availability.

The other side of it, as to whether the tankers are available, we have conducted a joint study, actually the Maritime Administration did the study for us, and it was their conclusion that adequate tankers are available.

We are continuing, as Mr. O'Leary said previously, to examine the distribution and supply system and all the rest. That will be further refined as part of our overall review of whether or not local storage is required. We will know more about that 6 months from now. Our tentative conclusion is that adequate tankers are available.

BRINE DISPOSAL

Mr. YATES. How serious a problem is brine disposal?

Mr. NOEL. It is a serious problem. It is one we think we have an answer to. We are working with NOAA to determine whether this brine can be disposed of at sea on two of the major sites. We think that is the best way to go. Deep injection, 5,000 to 6,000 feet into the sands, is an acceptable industry procedure that we can use. However, we think that disposal at sea is more attractive in terms of its long-term uses.

Mr. YATES. What about the possibility of oil leaks?

Mr. NOEL. There is very little chance of oil leak in the storage system as we intend to construct it. In the mines you are below the water.

Mr. YATES. That is what they say about tankers, too.

Mr. NOEL. It is a lot different. Those geological formations have been there for millions of years. Tankers are in motion.

HYDROCARBON EMISSIONS

Mr. YATES. What about hydrocarbon emissions?

Mr. NOEL. They will exist only at the point of entry into the system, as we unload a tanker.

Could I add one point to that, and that is that the EPA and we have concluded that the hydrocarbon emissions, proceeding as we propose, are significantly less than any other alternative, and for that reason they have used us as a model with respect to seadock in order to encourage them to go underground for their research tankage in much the same way as the LOOP and the FEA projects are proceeding.

LONG-LEAD PROCUREMENT

Mr. YATES. Are the long-lead procurement items a problem?

Mr. NOEL. Yes, sir, they are. But we find that pumps and pipe and virtually anything else we need are available for a price. We are trying to order them early enough so we don't pay a premium to get them quickly. Most pump manufacturers and valve manufacturers are willing to put people on overtime to get them for you in a shorter period of time.

Mr. YATES. Let's think about that for a moment and your electric power requirements for storage site construction. That is going to be a big item, too, isn't it?

Mr. NOEL. It is.

Mr. YATES. Are you going to have to compete in the regular market for the items that are essential to the strategic petroleum reserve, or are you going to be able to use any part of the defense production priorities? What kind of set-up is there going to be?

Mr. NOEL. We presently do not contemplate using the Defense Production Act for any materials we need, including supplies of electricity. We have a contract with Houston Power & Light to begin construction on a high-voltage line to be provided for our use in the Freeport, Tex. area.

Mr. YATES. I am not only thinking of that, but I am wondering in connection with your purchases. You start a program of purchasing to provide more than the capacity of the salt domes. You are going to have to go above ground to alternative storage.

Mr. NOEL. No; we have a plan which we would be happy to provide that lays this out.

Mr. YATES. Put it in the record.

[The information follows:]

LIKELY SYSTEM CONFIGURATION

[Approximate maximum storage space—in millions of barrels]

	Existing space		New cavities
	For use in ESPR[1]	For use in SPR[2]	For use in SPR
Bayou Choctaw	70	20	----
Bryan Mound	60	0	60
West Hackberry	60	0	95
Weeks Island	25	65	----
Cote Blanche	----	30	----
Ironton	10	10	----
Sulfur mines	20	5	----
Total	255	130	155

[1] Early storage reserve.
[2] Strategic petroleum reserve.

Note: The accelerated schedule provides for 250,000,000 barrels of oil to be stored by December 1978, and an estimated 500,000,000 barrels by the end of 1980. The Bayou Choctaw, Bryan Mount, and West Hackberry sites have already been selected as storage sites. Existing storage capacity at these 3 sites totals approximately 210,000,000 barrels. This chart shows a tentative fill schedule for these sites and a combination of other candidate sites which can meet the accelerated schedule.

Mr. YATES. Would you also place into the record a breakdown of the types of functions that employees will be furnishing in 1977 and 1978 under your jurisdiction?

Mr. NOEL. Yes, sir.

[The information follows:]

Functions of Federal Employees

Every effort has been made to keep the number of Federal employees to the minimum necessary for the timely and efficient conduct of the program. The nature of the program is ideal for a high level of contract funding activities as the program moves through the phases of analysis, design, site acquisition, construction, fill, maintenance, and standby operation of the reserve.

The functions of Federal employees during FY 1977 and 1978 are outlined in the following table.

- FUNCTIONS OF STRATEGIC PETROLEUM RESERVE EMPLOYEES -

FUNCTIONAL CATEGORY	FEDERAL MAN-YEARS FY 77	FY 78
o STORAGE FACILITIES	64	110
- Environmental Projects and Permits	13	17
- Site Acquisition	3	3
- Design and Construction	39	76
- Operations	9	14
- (Field)	(12)	(32)
o PETROLEUM ACQUISITION	6	12
o PLANNING AND ANALYSIS	37	39
- Planning and Analysis	31	33
- Industrial Programs	6	6
o PROGRAM MANAGEMENT AND REVIEW	21	21
o EXECUTIVE DIRECTION	7	7
o DATA AND PROCUREMENT SUPPORT	2	17
- Data	2	15
- Procurement	---	2
o GENERAL COUNSEL SUPPORT	---	12
o TOTAL	137	218
- (Headquarters)	(125)	(186)
- (Field)	(12)	(32)

Mr. YATES. Also provide a breakdown of the funding for storage sites in 1977 and 1978, showing the major cost elements, including site acquisition.

Mr. NOEL. Yes, sir.

[The information follows:]

BREAKDOWN OF STORAGE PREPARATION COSTS

A breakdown of the cost of storage preparation is given in the following chart which shows major activity costs for each storage site.

Bayou Choctaw, Bryan Mound, and West Hackberry have already been selected as storage sites. The remaining sites represent a combination of candidate sites which fulfill the requirements of the accelerated schedule.

STORAGE FACILITY COSTS FOR 500 MMB PROGRAM, FISCAL YEAR 1977–78

	Bryan Mound (63 mmb)	Bryan Mound expansion (66 mmb)	West Hackberry (61 mmb)	West Hackberry expansion (76 mmb)	Bayou Choctaw (94 mmb)	Weeks Island (89 mmb)	Cote Bianche (27 mmb)	Centrai Rock (14 mmb)	Ironton (21 mmb)	Total
Site acquisition	17.4	10.0	13.9	15.4	23.7	35.9	21.9	3.3	1.0	142.5
Design/construction	39.7	25.2	76.2	98.2	60.8	84.1	11.2	15.0	8.1	418.5
New Space Development		32.0		40.9						72.9
Distribution systems and fill	12.6	19.4	12.2	34.0	18.8	4.2	1.3	11.9	18.7	133.1
Total cost (500 mmb)	69.7	86.6	102.3	188.5	103.3	124.2	34.4	30.2	27.8	767.0

Note: These costs include operations and fill costs which occur during construction but do not include standby operations and maintenance costs after fill has taken place.

Mr. YATES. Would you explain why the prices estimated for the petroleum have increased since your first budget submission?

Mr. NOEL. We now include the most recent OPEC price increase.

Mr. YATES. I assume there may be increases as you go along.

Mr. O'LEARY. I think there will be.

Mr. YATES. So you have to get your purchases in as quickly as possible.

Mr. NOEL. That is correct.

Mr. YATES. What is OPEC going to do about this?

Mr. O'LEARY. This isn't enough increase in demand to have any significant impact on world price in and of itself.

NORMAL STORAGE OPERATING EXPENSES

Mr. YATES. What would be the normal operating expenses of a filled reserve?

Mr. NOEL. On the order of $20 million a year, sir.

Mr. DUNCAN. Of the total?

Mr. YATES. Or of one reserve site?

Mr. NOEL. I am talking about the total program.

Mr. YATES. $20 million a year of all the reserves? I guess I didn't state it correctly. What would be the operating expenses in connection with one salt dome storage site?

Mr. NOEL. It is roughly 50 cents per barrel for 15 years; divide that by 15, so 3 cents per barrel per year.

Mr. YATES. Mr. Dicks has a question.

CRITERIA FOR SELECTION OF TANKERS

Mr. DICKS. I want to go back to the tankers. I am curious about what in your environmental criteria you found out in terms of selection of tankers. That interests me.

Mr. NOEL. One of the things we found is that there is one major company that before it contracts for a ship, it actually sends a marine engineer out to inspect the ship.

Mr. DICKS. Who is that?

Mr. NOEL. The Exxon Co. There may be others. I know they do.

Mr. YATES. To make sure they have double hulls?

Mr. NOEL. They inspect it for seaworthiness. I am not sure what the total criteria is. They are presently being reviewed. The Coast Guard has indicated more stringent restrictions and regulations will be provided. We, as a baseline, will use those restrictions. In addition to that, we will require each supplier to the program to provide an environmental plan which will include the entire project as to how he intends to deliver.

Mr. DICKS. So you are going through with potential contractors an assessment of how they bring that oil in the country?

Mr. NOEL. That is correct.

FOREIGN INSPECTION OF TANKERS

Mr. DICKS. I commend you on that. I think we should make that requirement in the regular law. I have advocated in terms of foreign inspection that the Coast Guard inspect these tankers before they set sail. It seems to me it is ridiculous when the thing is sitting in the Straits of Juan de Fuca, we rush somebody out when we could have inspected the tanker before it came to this country. Do you have comments on that?

Mr. NOEL. Obviously we are concerned about it, and that is one of the reasons we built this plan into it. Frankly, not very much is known right now, and the reason I know about Exxon is we have done a canvass to find out what industry practices are. The practices, quite frankly, vary quite a bit. There are some that we feel are good models for us to follow, and we intend to work along those lines. There are others that very much concern us.

We are presently negotiating with defense fuel supply so we can conduct procurement in a way that it doesn't jeopardize the process, itself, but gets us what we want. We believe the way to handle that is at a bidders' conference, where we sit down with them and say we would like to review your environmental plan, and having done that, then the procurement will proceed.

On this first procurement, frankly, we simply don't know enough about how it can be done. This is kind of a test case. We have some ideas as to what we want to work out for this initial 10 million barrels. But we have as a baseline those requirements which have been established by the Coast Guard and others, such as Maritime. We really dealt quite extensively with the CEQ, EPA, and Maritime, and others on this question.

Mr. DICKS. I would suggest that the last three agencies that you mentioned may be a little bit stronger in terms of the concern than the first two. If the record up to date has any relevance, and I hope you would pay a little attention to them, because I think this is a very significant problem.

Mr. NOEL. We are not trying to lead the way in this.

Mr. DICKS. Why not?

Mr. NOEL. Frankly, we don't know enough about it. But after we have conducted three or four of these, we think we will be in a posture that we know considerably more about it than we do today.

Mr. DICKS. Thank you, Mr. Chairman.

GENERAL ACCOUNTING OFFICE STUDY

Mr. YATES. Have you read the study dated February 16, by the GAO?

Mr. NOEL. Yes, sir, I have.

Mr. YATES. What is your feeling about their recommendations?

Mr. NOEL. We disagree with them.

Mr. YATES. Do you? In what way?

Mr. NOEL. As a matter of fact, this study was presented to the Dingell subcommittee just after it was published, and Mr. Dingell charged Mr. Canfield and myself with getting together on a——

Mr. YATES. Conspiratorial basis?

Mr. NOEL. No; but at the present, we disagree on one subject and agree on two others.

Mr. YATES. Are there only three in here?

Mr. NOEL. Basically, yes. One has to do with alternative means for financing the reserve. One has to do with the information provided in the International Energy Agency, and the third with whether or not we take royalty and other types of oil.

DISAGREEMENT WITH GENERAL ACCOUNTING OFFICE

Mr. YATES. With which did you disagree?

Mr. NOEL. We still disagree on the royalty issue.

Mr. YATES. And agree on the other two?

Mr. NOEL. Yes, that is agreement at the staff level. Mr. Canfield and I are to be briefed jointly by our respective staff. That hasn't occurred, but that is where we are now.

Mr. YATES. I notice FEA believes using royalty oil for reserve is undesirable. That is the one you are talking about:

> The Federal Energy Administration believes that using royalty oil for the reserve is undesirable, but has no objection to using Elk Hills oil. The Agency's position on royalty oil is that its use would result in directly passing some of the reserve costs on to petroleum users since higher cost foreign oil would have to be obtained by the private sector as a substitute.

Mr. NOEL. When I say we disagreed on royalty, we disagree on Elk Hills. And that was the same issue.

Mr. YATES. Are you going to use limestone mines, too?

Mr. NOEL. We presently contemplate using one or two limestone mines for storage.

Mr. YATES. As experimental places?

Mr. NOEL. No, sir, they exist. The one that is most attractive to us is not in operation at the moment. We have not completed our environmental impact statement on that site. Therefore, I can't indicate to you that we have selected it. We have not selected it. But it is a very attractive site.

DEFENSE SUPPLY CENTER TO PURCHASE OIL

Mr. YATES. Who is going to do the buying for you?

Mr. NOEL. The purchase of the oil, itself?

Mr. YATES. Yes.

Mr. NOEL. The Defense Fuel Supply Center, as Mr. O'Leary stated, will probably do that for us. We do not yet have a signed agreement with them.

Mr. YATES. I have a series of questions relating to budget tables, salaries and expenses. May I provide you with those questions and ask you to answer them for the record?

Mr. O'LEARY. Yes, Mr. Chairman.
Mr. YATES. Mr. McDade?
Mr. MCDADE. No questions.
Mr. YATES. Mr. Duncan?

WASTE OF METHANE

Mr. DUNCAN. This may not be the proper agency to address, but we have talked in here about the recovery of what is now wasted methane from coal fields, and I don't know much about it, but I am concerned we are losing a great amount of helium that has potential value to this country. Do you have comments?

Mr. O'LEARY. Yes, in absolute terms, we are losing very, very large volumes of methane. As to its value, it comes out in very diffused form at extremely low pressures and in only rare instances is it commercial currently. The Bureau of Mines, ever since I was Director of the Bureau of Mines and put them into this business, has been researching that. There are now some few commercial sales in the last few years.

WASTE OF HELIUM

Mr. DUNCAN. I was interested particularly in the helium.

Mr. O'LEARY. And there are some few commercial sales now of heating methane, for heating purposes.

Mr. DUNCAN. But I am talking about the product helium.

Mr. O'LEARY. From coal mines?

Mr. DUNCAN. No; I am concerned about what appears to me a prodigious waste of a valuable resource.

Mr. O'LEARY. Again, there is an economic parameter to this. The Bureau of Mines in 1960 was authorized to enter into what they know as a helium purchase program. They began a series of contracts that are now being litigated. My own judgment is that it was a very ill-advised program. It was an open-ended kind of proposition that hadn't been very well thought through.

When you looked at it, you said to yourself,

Maybe there will be an enormous requirement for helium in the year 2000. Will there be enough in stocks to meet it?

And the answer was "no". And then you said to yourself, "If there were an enormous requirement, how would you get it?"

Mr. DUNCAN. Doesn't that have a potential in the energy field?

Mr. O'LEARY. Yes, it has a potential in conjunction with the fusion program. It may be that you want to operate at very, very low temperatures, and the charm of helium is its cryogenic applications. It permits you to get within 4° of zero. The next contender is nitrogen at 16°. In consequence, there may be some applications for helium that are unique. However, even a thousand years from now, when all the methane is gone, you can get helium from the atmosphere. So we are not talking about something when it is gone will be gone forever. There are alternatives.

Mr. YATES. Thank you. It has been an interesting hearing.

[Questions and answers submitted for the record follow:]

ADVISORY COMMITTEES

Question Please provide a comparison of the travel costs for the FEA Advisory Committees for 1976, 1977, and 1978 and how often each has met or plan to meet in those years.

Answer In FY 1976 and the transition quarter, Advisory Committee travel costs were $193,239. Travel costs for FY 1977 are estimated to be $200,000 with $270,000 identified in the FY 1978 request.

Advisory Committee Meetings

	1976	1977	1978
Consumer Affairs	14	8	5
Coal	2	3	4
Construction	1	3	4
Energy Finance	1	3	4
Electric Utility	3	3	4
Environmental	7	5	6
Food Industry	3	3	6
Fuel Oil Marketing	...	4	6
Gasoline Marketing	...	4	6
LP Gas	2	3	4
Natural Gas	1	3	4
Petroleum Natural Gas	...	...	4
State Regulatory	2	5	4
Transportation	3	...	...
Retail Dealers	4	...	...
Wholesale Petroleum	5	...	...
Total	48	47	61

In addition, there were 18 subcommittee meetings in FY 1976 and 52 estimated for FY 1977.

GENERAL COUNSEL POSITIONS/MANYEARS

Question. Please explain how you can get more manyears than positions in an expanding Office of the General Counsel.

Answer. The Office of the General Counsel will not be expanding in FY 1978 if the FY 1977 supplemental position request is assumed. If the FY 1977 supplemental position requirements are included, a reduction from FY 1977 (211 positions) to FY 1978 (193 positions) will result in more manyears than positions in FY 1978.

LEGAL REVIEW OF AUDITS

Question. Why do you expect an increase of 268% in major audits requiring substantial legal review in 1978?

Answer. There are two factors supporting the increase. The first is the number of audits planned in FY 1978 over those completed in FY 1976. In FY 1976, 1,921 audits were completed; in FY 1978, 5,164 audits are planned. All audits require a degree of legal support. The simplest require very little; whereas, complex audits may require many manyears of effort in the audit, order issuance, negotiation and settlement phases.

The second factor is the refocusing of the agency's compliance strategy in order to concentrate enforcement efforts on major firms. The application of FEA regulations to these large firms involves considerably more complex problems of regulation interpretation than the application of those regulations to small retailers or wholesalers. Accordingly, the nature of the major firm cases is anticipated to require substantially more involvement of legal personnel, due to this higher percentage of cases involving complex legal problems.

Question. How many audits is that?

Answer. There are 5,164 audits planned for FY 1978. Audits by industry sector are presented below:

Importers	-	116	
Crude Oil Resellers	-	94	
Independent Crude Producers	-	2,742	
Major Refiners	-	35	(on-going)
Small Refiners	-	33	
Natural Gas Liquid Plants	-	239	
Propane Resellers	-	500	
Propane Retailers	-	1,400	
TOTAL		5,164	

In addition, audits of resellers of products other than propane will be conducted for embargo period violations.

Question. How many people are involved?

Answer. Within the Office of the General Counsel there are 20 positions in Headquarters and 32 positions in the Regional Offices providing legal support to the Compliance program.

Question. What legal review do you do?

Answer. Our legal review is quite extensive. It consists of primarily three areas. First, there is legal review and advice provided at the initial stage of the case's development. Guidance is provided to compliance personnel on the general application of the regulations to the area of the industry to be audited. Further, specific questions regarding problems peculiar to one firm may be answered by legal personnel in order to assist in the audit. Should assistance in obtaining information be needed, legal personnel assist in subpoena preparation and the drafting of special report orders.

The second stage of legal involvement is the review of the completed investigation. At this point, legal personnel assist in the draft and issuance of the Notice of Probable Violation (NOPV) which commences the administrative process by which FEA may require remedies for violation of its regulations. This is a critical stage because of the need to precisely articulate the application of the regulations to the facts as the agency then understood them.

The third stage of legal activity commences with the review of the entire administrative record, including a firm's response to the NOPV, for the purpose of adjudicating the issues in the case. Whether the case is disposed of by Consent Order (where a firm voluntarily complies with FEA findings) or Remedial Order, the legal review must encompass the thorough analysis of the complete case in the context of applicable laws and regulations.

REGULATORY OGC (EXCEPT COMPLIANCE) POSITIONS/MANYEARS

Question. You reduced the number of positions of Regulatory OGC (Except Compliance) to reflect reduced requirements, yet you increase manyears of effort. Why?

Answer. At the end of 1977, it is assumed that the authorized 46 positions will be filled in the Regulatory (Except Compliance) program area. However, in FY 1978 the end of year position requirement is 34. This decrease from the end of FY 1977 to the end of FY 1978 will result in more manyears than positions as a consequence of phasing down.

87-591 O - 77 - 37

OGC PERSONNEL ASSIGNED TO C&E PROGRAMS

Question. Please provide a breakout of how many legal personnel are assigned to each of the various Conservation & Environment programs.

Answer. A breakout by program of the 35 Office of the General Counsel positions required for FY 1978 to provide legal support to the various Conservation & Environment programs is as follows:

Environmental Programs	- 4
State Programs	- 9
Appliances	- 3
Electric Utility Initiatives	- 2
Weatherization	- 2
C&E Other	- 5
Obligation Guarantees	- 10

GENERAL LAW, LITIGATION AND LEGISLATION POSITIONS/MANYEARS

Question. In General Law, Litigation and Legislation you again have more manyears than positions. Why?

Answer. More manyears than positions is a result of a reduction from 35 end year FY 1977 positions to 30 positions by the end of FY 1978.

LEGAL INVOLVEMENT IN UTILITY INTERVENTIONS

Question. You mention legal involvement in utility interventions on page 20. Please explain how this ties with intervention under Energy Conservation.

Answer. The Office of Energy Conservation and Environment has a program of interventions in electric utility proceedings before state regulatory commissions. This program is authorized by Section 204(2) of the Energy Conservation and Production Act of 1976. A typical intervention consists of the submission of expert testimony on rate design, sponsored by an FEA witness who appears for cross-examination. Cross-examination of other witnesses is sometimes undertaken by an FEA attorney, followed by the submission of briefs and reply briefs. The Litigation Division of the Office of the General Counsel handles the legal component of this intervention program. The legal component consists of basic litigation tasks including formulation of the mode of FEA's appearance in a particular case, assistance in the preparation of expert testimony, protection of the FEA witness while he is being cross-examined, arguing motions, cross-examination and filing of briefs, reply briefs, position statements and other legal papers. FEA has intervened in about twenty rate design cases.

Question. How many personnel are involved from OGC?

Answer. Two lawyers from the Litigation Division work on this program. Currently a substantial portion of these lawyers' time is spent on the program. It is likely that at least this level of involvement will continue in FY 1978.

Question. How many from Energy Conservation?

Answer. At present, three individuals from the Office of Conservation and Environment are involved in electric utility interventions. The FY 1977 Supplemental which is pending in Congress requests an additional 2 positions for electric utility interventions and 2 for gas interventions. In FY 1978, 5 positions are required for electric utility interventions and 2 positions are required for gas interventions.

ECONOMIC ANALYSIS OF ENERGY MANAGEMENT ACTIVITIES

Question In Management, under your Resource Management activity, please explain what "economic analysis of energy management activities" of the Agency is?

Answer This office was established in the fall of 1976 to provide quantitative analysis and analytical review of present and projected FEA programs, policies, and plans. The office assesses costs of ongoing energy and natural resource program administered solely or cooperatively by FEA; reviews proposed programs and advises Management on the suitability to the program objectives; performs independent economic evaluations, sensitivity and cost benefit evaluations; and cooperates in the development of mathematical and statistical models and other analytical tools and techniques. The office has monitored and critically reviewed studies performed by other FEA offices, advising on the validity of the analytical methods and techniques utilized and assessing the relevance of findings developed.

Examples of this type of effort concerning a major analytical review are the National Energy Outlook 1977; a detailed reconciliation of the Strategic Petroleum Reserve Plan and cost figures submitted to OMB; examination of the methodology and approach for the Energy Supply Planning Model and evaluation of the capabilities of the Project Independence Evaluation System (PIES) model. In addition, numerous issues such as the California Gravity Issue Entitlements Program have been reviewed by this office.

Question How many personnel are involved in this activity?

Answer There are six people involved in this activity.

AGENCY TRAINING

Question In "Personnel Management", p. 24, you request $72,000 for training seminars. What are you spending in 1977?

Answer During FY 1977, we expect to spend $34,000 for exective training seminars.

Question What do you expect to spend on training programs in total for the Agency in 1978 vs. 1977?

Answer In fiscal year 1977 we expect to spend at least $350,000 for direct training. In FY 1978 that total is $413,000. Of the increase, $38,000 is for exective training seminars.

ADMINISTRATIVE MANAGEMENT

Question. In "Administrative Management" you requested an increase of 5 positions in contracting. How many contracting personnel do you currently have?

Answer. The current on board strength of the Office of Procurement is 33 personnel.

Question. Please provide information comparing 1977 and 1978 workloads.

Answer. In FY 1977, it is anticipated that $773 million in contracts, $103 million in grants and intergovernmental agreements, and $7.3 million in small business contracts will be awarded. In FY 1978 the following workload is anticipated: $1,971.3 billion in contracts, $155 million in grants, obligation guarantees, and intergovernmental agreements, and $8.4 million in small business contracts. Based on a straight line projection of FY 1976 and FY 1977 actual procurement experience, the five

contracting positions requested are considered the absolute minimum for accomplishing the workload in FY 1978.

Question. How many of these people are involved in the weatherization program?

Answer. Of the 33 people currently in the Office of Procurement, three people are involved in the grant programs. With the added increase in the weatherization program ($65 million) and a substantial increase in the total number of grant awards, two contract administrators will be required for the business management of weatherization grant awards including analysis of financial reports and providing technical advice to grantees and field personnel. These two positions will assume full responsibility for the FEA business management of weatherization grants including coordination of replies to audit reports and closeout operational review to assure proposed acceptability of funds obligated for each grant.

Question. What will the 14 positions for the obligation guarantee program in conservation involve?

Answer. Staffing for the loan guarantee management function will provide loan repayment feasibility analysis and evaluation, negotiations, execution of a guarantee notes, financial management administrative support, and staff assistance to program elements within FEA concerned with the Loan Guarantee Program. The following staffing positions are required: one Supervisory Contract Specialist (Branch Chief), four Contract Financial Analysts, four Contract Administrative Specialists, three Financial Management Clerks, one Clerk-typist, and one Secretary. The specific functions to be performed are as follows: Develop, coordinate, publish and implement loan guarantee management policies and procedures. Provide loan guarantee management staff assistance to all elements within the headquarters and regional offices including consultation with respect to loan guarantee negotiation, funding, execution and administration. Maintain a centralized loan guarantee information system covering the funding, execution and administrative monitoring of all FEA loan guarantees. Perform a continuous review, analysis and evaluation of loan guarantee management operations. Establish and maintain FEA-wide loan obligation and loan repayment control systems necessary for effective loan guarantee management. Represent FEA with respect to loan guarantees with the Office of Management and Budget and other Federal agencies. Issue loan guarantee award notices, notices of amendment, supplements or revisions to previous loan guarantee awards, and accomplish termination for all loan guarantees awarded. Develop and implement training programs for all FEA financial and business management loan guarantee personnel.

SPECIAL SUPPORT FUNCTIONS

Question Please provide a breakdown of personnel for 1976, 1977, and 1978 by function within your "Special Support Functions".

Answer

	Positions		
	1976	1977	1978
Internal Review	22	25	29
Freedom of Information 1/	...	15	15
Equal Employment Opportunity	5	6	6
Total	27	46	50

1/ The Freedom of Information Office was located in the Office of Communications and Public Affairs in FY 1976.

INTERNAL REVIEW AUDITING CAPABILITY

QUESTION: Explain what improvements in operations have resulted from your internal auditing capability?

ANSWER: The internal auditing capability has provided:

1) Improvements in scheduling and accomplishing the compliance workload at the Regions.

2) Improved legal support at field offices.

3) Better controls for using and reviewing Quick Reaction Contracts.

4) Reduction in the dollar amount of outstanding travel advances.

5) Audit controls to review the effectiveness of the State Energy Conservation Program.

6) Improved use of personnel and better controls over Freedom of Information requests.

7) Elimination of duplication of functions in the Data Services Office and improved ADP systems documentation.

8) Collection of additional fees and recovery of duplicate refunds concerning the Mandatory Oil Import Program.

COMMUNICATIONS AND PUBLIC AFFAIRS

Question. Provide a list of the content and the cost of films produced under your "Communications and Public Affairs" activity.

Answer. The content of each of the below listed films is a theme of energy awareness and energy conservation. These films were seen by the following groups; 2,300,000 viewers, community and education groups; 19,460,000 TV; and 150,000 theatres.

TITLE		COST
"When The Circuit Breaks" (FY 1974)	Production	95,000
	Release Prints	36,000
"Don't Cut Us Off" (FY 1975)	Production	20,000
	Release Prints	15,000
"Up The Power Curve" (FY 1975)	Production	16,000
	Release Prints	17,500
	TOTAL	$199,500

Question. What is the breakdown of personnel by the various functions you describe in this area?

Answer. The following is a breakdown of personnel by various functions in the Office of Communications and Public Affairs.

Office of the Director	5
Media Relations	8
Minority Relations	2
Regional Liaison	2
Visual & Electronic Communications	15
Administrative Operations	10
Special Projects & Publications	16
TOTAL	58

Question. What were the 20,000 photographs distributed in 1977?

Answer. The 20,000 photographs distributed in 1977 consisted of photo reproduction of charts, reports, briefing materials, publications, slides, view graphs and photo stories carrying the energy awareness and conservation themes which were used by numerous newspapers throughout the country.

Approximately 1,000 newspapers per month and the major weekly news magazines receive the picture stories. These stories reached an estimated 40,000,000 people this year and are a cost effective way of encouraging energy conservation.

CONGRESSIONAL AFFAIRS

Question. In "Congressional Affairs", please explain what is included in "Provision of oral and written justification for energy or energy-related legislation."

Answer. The word "justification" is in error. More appropriate, this sentence should have read: "Provision of information on energy and energy-related legislation as requested by Members, staffs and Committees of Congress."

Question. In "Private Grievances and Redress" you again have more man-years than positions in an expanding activity. Explain.

Answer. There are several factors which contribute to this result:

First, the comparison is between an amended FY 1978 request and our unsupplemented FY 1977 base budget. Still pending before Congress is an FY 1977 supplemental budget request which seeks the restoration of 15 positions and 4 man-years to our FY 1977 resources. The request is necessary because one of the major assumptions underlying the FY 1977 budget - the complete deregulation of refined products - has not occurred.

The remainder which is equivalent to two man years of effort is designed to provide typing support in those FEA Regional Offices where the volume of work does not justify the use of a support person on a full-time basis.

Question. How many requests for exceptions from the FEA regulations do you receive?

Answer. Since January 1974 the FEA received 4,020 Applications for Exception. During the last twelve calendar months 1,668 petitions for exception relief have been received, or an average of 139 submissions per month.

Question. What are the most significant types of exceptions requested?

Answer. At the present time, the most significant type of exception relief sought appears to be that requested by a producer of crude oil who, in the absence of exception relief to permit him to charge higher prices for the crude oil which he produces, has an economic incentive to discontinue production from a property. This type of petition has a direct bearing on the volumes of domestic crude oil which will be produced and sold on a continuing basis.

Question. What types of exceptions do major integrated oil companies request?

Answer. The 15 major oil companies are vertically integrated and by their very nature are engaged in all aspects of the petroleum industry, from the production of crude oil to the retailing and even the consumption of refined petroleum products. Accordingly, the petitions for exception relief which the firms have filed relate to virtually every aspect of the FEA regulatory program, except those reserved specifically for small or independent refiners or where the major firms are otherwise excluded.

Question. What kind of exception relief do major refiners receive?

Answer. In each case where a showing is made by a major refiner that, under the applicable criteria established by the FEA in precedent cases, a serious hardship or a gross inequity is resulting from the application of FEA regulations, exception relief has been found to be warranted. There does not appear to be any type of exception relief which is unique to or generally accorded major refiners. Our records show that to date we have issued 552 exception decisions to major refiners. Of those Decisions, 236 or 42.59 percent were approved in whole or in part. By contrast, the FEA has to date issued a total of 2,820 decisions on exception applications filed by all firms. Of 1,302 or 47.95 percent of the decisions issued were approvals in whole or in part.

Question. Please explain why you feel that exception applications received under the "Allocation Program" and the "Pricing Program" will become more complex in 1978 than previous years.

Answer. Allocation Program:

During FY 1978, we anticipate that the Applications for Exception, Appeals and Applications for Stay which are submitted in this area will for the most part pertain to the Old Oil Entitlements Program. These submissions however will be considerably more complex than the typical filing which we are now receiving. This will occur as the level of sophistication and experience of the applicant firms increase. For example, the type of analysis with respect to Entitlements applications which we are now conducting turns on a comparison of a firm's historic profit margin and return on invested capital (ROIC) with the operating results which the firm projects that it will experience during its present fiscal year. The relief granted on this basis entails at a minimum one review of the firm's operations following the end of the fiscal year in which exception relief is awarded. The review is to determine whether the firm should subsequently be required to purchase or sell additional entitlements based on a comparison between the financial results which the firm actually realized and the projected operating results upon which the exception relief was granted. This type of review requires a time-consuming and exhaustive analysis of each firm's accounting techniques and the effect of any changes in a firm's reporting methods since it is likely that firms will use their discretion to reduce reported profitability and thereby gain additional exception relief which they would otherwise not obtain. The initial analysis described above relates only to small refiners which in many cases could be adversely affected by inadequate or untimely exception relief. Consequently, each application requires not only careful but very expeditious review in order to avoid serious hardship to the firm while its request is under consideration.

In addition to submissions from small refiners, we are experiencing increasing resistance on the part of larger firms to their obligations under the Entitlements Program and in in-

creasing number of challenges to the accuracy of a particular firm's obligations under the program. Because of the magnitude of the resources which a large firm can devote to such a filing and the complexity of the claims made, these applications also require substantial expenditures of time and effort.

Pricing Program:

As was indicated in the Justification for the staffing levels requested for the analysis of Pricing Cases during FY 1978, these submissions too are expected to be of greater complexity than those which we are now receiving. Applications for exception filed by crude oil producers are expected to constitute most of the Price related filings received during FY 1978. At the present time, an increasing number of these types of applications seek pricing relief in order to provide economic incentive for the applicant to: (i) drill additional wells on an existing producing property; (ii) install secondary or tertiary recovery operations on existing producing properties; or (iii) develop new producing properties. In each case the central question is what level of return is appropriate to induce the applicant to attempt to produce new or additional volumes of domestic crude petroleum without providing the applicant with windfall profits. In order to resolve this question we must consider factors such as the risks involved, the accuracy of internal rate of return projections, rising costs of investment, alternate investments, and the projected increased production involved. Each of these factors must in turn be weighed separately and collectively under various sets of assumptions as to the circumstances involved, i.e., the increasing selling price levels for domestic crude oil. In addition, since the type of price exception granted to crude oil producers is based on the firm's projected expenses and production, in order to measure the adequacy of the relief granted an exception in these cases is only granted on an interim basis, subject to review, and may be extended and adjusted upon reapplication. Therefore in the future the Office will also be resolving and updating all previous decisions which will in turn increase the total number of cases before the Office. Like the requests for exception from the provisions of the Old Oil Entitlements Program, these applications are most often submitted by small producing firms and time is usually a crucial element.

Question. On p. 41 you refer to a 150% increase in the number of compliance audits being performed in 1977 and 1978. 1,921 to 5,164 in 1977). How is this being accomplished with essentially the same level of personnel as in 1976?

Answer. In order to accomodate the increase of 150% in the number of compliance related petitions received, we have instead; (i) increased the number of professional staff involved in considering these types of petitions; (ii) increased the number of compliance related submissions and the total number of cases assigned to persons who have exhibited a high level of proficiency in compliance matters.

Question. What major changes have been made to accomodate the increasing load of compliance related activity ?

Answer. We have made no major changes to date. Based on their proficiency, certain of the PGR professional staff have simply been assigned more petitions, as the number of compliance related submissions increase. We believe that experience and additional effort will permit us to deal with all of the compliance related submissions filed during FY 1977 without any undue delay.

Question. Under "Coal Conversion" (p. 41), how many of the conversion orders already issued to utilities and others have been appealed? With what results? Do you expect a greater number of appeals to your newest round of orders?

Answer. Until the decontrol of residual fuel oil and the revocation of the provisions of 10 CFR Part 215 (Low Sulfur Petroleum Products Regulation) effective July 1, 1976, the FEA had received 103 submissions, including appeals, related to coal conversion. At the present time, no final Notices of Effectiveness (NOE) have been issued for prohibition orders against the burning of oil and gas. As a result, no appeals have been filed. However, we anticipate that virtually every industrial firm which receives NOEs and a significant number of the utility firms which receive NOEs will at a minimum file appeals. Assuming a continuation of current authority a substantially greater number of firms will be affected by coal conversion in the future than were in the past. Under these conditions we anticipate a greater number of submissions to result.

Coordination With Other Government Agencies

Question. In "Intergovernmental Relations and Special Programs", how do you coordinate your State and local government activities with those of the Energy Research Development Administration and Interior as they relate to energy.

Answer. One of the most significant responsibilities of the Federal Energy Administration is the development and implementation of arrangements for the participation of State and local governments in the resolution of energy problems. The Federal Energy Administration recognized early on that the pervasive nature of energy requires the active partnership of a number of agencies of government at the national, State and local levels. While the various agencies are engaged in distinct activities, they are related. Therefore, the Federal Energy Administration set out to establish mechanisms which would provide for State and local government participation and coordinate the efforts of Federal, State and local government.

At the headquarter level, the Federal Energy Administration employs two formal vehicles to coordinate its intergovernmental activity with that of other Federal agencies.

A. In December, 1975, an interagency committee was established under the auspices of the Energy Resources Council to coordinate the energy-related activities of its member agencies. The Energy Research Development Administration and Interior have been very active members of the Committee which was an outgrowth of the Federal Energy Administration's successful experience with its formal and systematic consultation process with State and local governments. The Committee's membership is comprised of the chief intergovernmental officials of agencies represented on the Energy Resources Council's Executive Committee. The primary objective of the Committee is to assure State and local government participation in the decision-making process.

B. The Federal Regional Councils, established by Executive order, are interagency bodies comprised of the principal regional officials of eleven major Federal agencies. Councils are located in each of the ten standard Federal regions and are responsible for intergovernmental relations and interagency program coordination. Guidance and direction for the Councils are provided by the Under Secretaries Group that is chaired by the Deputy Director of the Office of Management and Budget. Within the Council system, the Federal Energy Administration is the lead agency for energy. Interior is a member of the Federal Regional Council system, and the Energy Research Development Administration participates at the national level through the Under Secretaries Group.

To supplement these formal mechanisms, the Federal Energy Administration meets regularly with officials of other Federal agencies on an individual basis. Through these informal meetings, representatives of State and local government have the opportunity to discuss issues with Federal officials with program responsibilities.

Question. How does your activity here relate to your State grant programs in conservation.

Answer. The coordinated development of the State Conservation Program evolved as a result of the Federal Energy Administration's utilizing the Energy Resources Council's interagency committee discussed earlier and a special task force of appropriate Federal agencies which worked directly with the Federal Energy Administration's Office of Conservation and Environment. The States continue to play a significant role in the implementation of the conservation program through the National Governors Conference which established a conservation subcommittee to work with the Federal Energy Administration.

Consumer Representation Plan

In addition, the Office of Consumer Affairs/Special Impact activity relates directly to various State grant programs in conservation. For example, Consumer Affairs/Special Impact is participating in the development of regulations for the implementation of Energy Conservation and Production Act, $205 grants for Offices of Consumer Services. In addition, regional Consumer Affairs/Special Impact offices assist in providing liaison and information to consumer groups regarding all Federal Energy Administration conservation activities at the State and local level.

Question. Please explain what your "Consumer Representation Plan" is?

Answer. The Consumer Representation Plan 41 F.R. 189, pp 42787-42795 is the agency's procedure to enable persons who are affected by major Federal Energy Administration sponsored legislation, regulation, policy, decision or program action to have the opportunity to comment on the subject before a decision is reached, and to provide for consideration of these views in the agency's decision-making process.

It also provides a mechanism for giving the management of the agency a better understanding of consumers' concerns and view points. It provides a more convenient method for the public and consumer groups to focus their attention on issues of special and general concern within the agency.

Consumer Affairs/Special Impact has on-going responsibilities with respect to the implementation of the Plan.

Question. What are the States doing in this area?

Answer. The Consumer Representation Plan relates to activities specific to the Federal Energy Administration. While regional Consumer Affairs/Special Impact offices have the responsibility to facilitate access of individuals, consumer groups and local and State units of government to the Federal Energy Administration, states activities are not related to the Plan. State activities which improve consumer access to State agencies should be encouraged but are not relevant to the Plan.

Question. How would this type of activity relate to a program like Energy Research Development Administration's Energy Extension Service?

Answer. This type of activity is not directly related nor is it similar to the Energy Research Development Administration Extension Service Program. The Energy Research Development Administration program is intended to provide specific information, instructions and assistance to consumers in a manner similar to the activities of the Department of Agriculture Extension Service Program. The Consumer Representation Plan specifically relates to consumer access to and participation in the agency's policy-making process. Regional Consumer Affairs/Special Impact officers also have a direct responsibility to help consumers with energy-related problems, such as fuel-price and supply emergencies, by direct referrals to appropriate local area programs and resources.

Regional Consumer Affairs/Special Impact offices, particularly during the developmental stages of the Energy Research Development Administration program, will provide consumer referral and follow-up activities to the service and maintain on-going liaison with local program offices.

Contracts

Question. You have two small contracts listed on p. 47 relating to price effects on the elderly and handicapped. Aren't such effects covered by many of the other major studies you do on energy pricing?

Answer. These price effects which relate to specific segments of the consumer population with unique energy problems are not covered by other studies. More intensive research is necessary to identify the impact of various existing and alternative energy policies on these population sectors. Contract funds of a minor nature are necessary to assist in performing these activities which are not being duplicated within the agency or other government departments. As an example, specific study of the impact of utility rates and gasoline pricing on these population sectors is necessary for the development of agency policy.

Small Business Information Dissemination

Question. Wouldn't the type of information disseminated in the Small Business Energy Cost Reduction Program be the same as anticipated in an Energy Extension Service in the Energy Research and Development Administration?

Answer. No. The Energy Research and Development Administration Energy Extension Service has a different focus than that of Federal Energy Administration's Office of Small Business Energy Cost Reduction Program. Principally the Extension Service is designed to provide service to the individual household consumer in reducing energy use and cost. On the other hand Federal Energy Administration's Small Business Energy Cost Reduction Program has been specifically designed to deal with the small business sectors in which the conservation opportunities are highest and in which industry wide trade association participation offers a high probability of significant savings in energy and costs. The trade associations have taken on a self imposed burden of funding most of the activities, such as dissemination of approximately 1,000,000 energy guides and the sponsorship of 1,000 workshops and Federal Energy Administration's direct costs have been limited to training the instructors to conduct the trade association sponsored workshops.

Question. Couldn't information dissemination also be done through your existing State programs?

Answer. Yes, and we are working with State energy offices which will, in turn, work with trade association affiliates on the State and local levels that represent targets of opportunity for high potential energy savings, to promote the Program and conduct workshops. The Small Business Energy Cost Reduction Program is one program recommended by the Federal Energy Administration for possible inclusion in State energy conservation plans.

Program Development and Evaluation

Question. In "Program Development and Evaluation" activities, you say that this activity is not duplicative of activities in your "Office of Management". Please explain why the Program Devleopment activity is not duplicative and why it couldn't be done within your management activity? What are examples of issues you have already processed? Why would you expect as many as 35 issues per year?

Answer. The review and evaluation functions performed in the Office of Policy and Program Evaluation relate to policy and program issues outside of the budget preparation and execution processes and are therefore not duplicative of functions performed in the Office of Management. These functions were specifically transferred from the Office of Management to the Office of Policy and Program Evaluation to insure that program development in the Agency proceeded along guidelines established by the Administration's energy policy.

Examples of issues which have been processed through the Program Development Process are a proposal to establish a regional energy reserves data center, a proposal to centralize the Agency's utilities programs, a proposal to establish a regional program for technology transfer of energy resource development data to U.S. business and industry, and an issue paper on the organizational locus of the Strategic Petroleum Reserve function.

The reason 35 program development proposals are anticipated is that the Federal Energy Agency is still a relatively young agency. Legislation, therefore, affecting FEA's program responsibilities, tends to mandate significant alterations in agency programs. As an example, the Energy Policy and Conservation Act requires new programs for a strategic petroleum reserve, for appliance efficiency and labeling, for state energy conservation grants, for industrial energy conservation, for Federal energy management, and for pricing and allocation decontrol, as well as significant changes to existing programs.

At that time, the Agency had no such Program Development Process in place which made it extremely difficult to rationally analyze the impact of these new programs on the existing program structure of the Agency and provide for an Agencywide review of programmatic redirection. Management responsibilities in this area center on program justification for budget formulation purposes and on review of on-going program execution activities.

Program Evaluation

Question. What activities have you already evaluated in your "Program Evaluation" activity? With what results? Explain how this activity is different than your normal internal auditing capability?

Answer. In October 1976, the FEA reported to the Office of Management and Budget, that it would be performing eight in-depth program evaluations. These evaluations were to be of:

- o FEA's utility emphasis and program objectives
- o FEA's solar activities
- o FEA's conservation programs
- o Strategic Petroleum Reserves program
- o FEA's analysis functions
- o FEA's international activities
- o Natural gas activities
- o Further areas meriting evaluation.

Not long after this commitment was made, the fall elections resulted in an impending change of administration. The uncertainties surrounding possible changes in policies, programs and personnel within the FEA created a climate inimical to the conduct of such evaluations. The Office of Policy and Program Evaluation will be resuming these efforts as soon as work on the President's energy policy is completed so that evaluations can be rapidly completed to facilitate changes needed to effectively carry out the President's program.

At the time that FEA made its commitments to OMB under the Presidential Management Initiatives, the Agency outlined a distinction betweeen two types of program evaluations. In the words of that document, the first involves the analysis and monitoring of on-going programs to determine if they are meeting their implementation objectives, and to improve management and resource allocation. These evaluations usually result from the executive-level program implementation tracking system. These are performed by the Office of Management.

The second type of evaluation involves analysis of major programs to determine if national policy objectives are being achieved; to perform in-depth program reviews; and to determine if existing policies are appropriate or need revision. These are selective surveys, and not intended to cover every program area within FEA. Such surveys are performed principally by the Office of Policy and Program Evaluation.

Program Budget Evaluation

Question. Explain what you do in your "Program Budget Evaluation" activity.

Answer. This function operates in concert with the Office of Management to review budget proposals. The role of the review performed by the Office of Policy and Program Evaluation is twofold: to insure that the priorities established by the allocation of resources are consistent with the policy priorities of the agency and to insure that the results of program evaluations have been considered in establishing program activity levels delineated in the budget submissions.

Energy Policy Development

Question. Under "Energy Policy Development", please explain how program offices are included in the policy process. Please also explain how this office coordinates with other agencies with energy responsibilities.

Answer. The program offices are responsible for policy development regarding their specific responsiblities. The Office of Policy and Program Evaluation performs a coordination function which cannot be performed by any single program office. For example, P&PE insures that policy issues receive the attention of all relevant offices so that environmental impacts, consumer impacts, cross-cutting effects, etc. are fully recognized and addressed. Further, P&PE forms a central and integrated source of energy policy expertise and knowledge of ERC, Administration, Congressional and other policy considerations.

This office has in the past coordinated with other Federal agencies primarily through the mechanism of the Energy Resource Council. A similar coordination function is performed on a day-to-day basis with other Federal agencies, with relevant responsibilities. This allows the expression and consideration of complementary and competing viewpoints and interests in the formulation of energy policy. As an example, import limitations on liquid natural gas were developed through an ERC Task Force.

Policy and Program Evaluation/Congressional Affairs

Question. On p. 55 you state that reduction in the Congessional Affairs staff has increased workload in this office. Have you just transferred people from that staff to do that work? What is Congressional Affairs doing if you are doing the work in this Office?

Answer. No Congressional Affairs staff have been transferred to this office. The proposed reduction of personnel in the Congressional Affairs office has necessarily caused them to have an ordering of priorities with regard to the monitoring of energy-related legislative issues. It is, therefore, anticipated that this office may have to monitor and analyze events that occur in the Senate and House on those occasions when no Congressional Affairs staff may be available. Congressional contacts regarding all energy-related matters are a necessity in order to assess possible impacts on national energy programs by various legislative initiatives.

uestion. You also indicate that you review proposed legislation in this office. Congressional Affairs (p. 35) also says the same thing. Who does it?

Answer. The Office of Policy and Program Evaluation analyzes the provisions of energy-related legislation in order to assess the policy implications of such initiatives on a national energy program. Such a review is distinct from the role of Congressional Affairs which does not concern itself with policy review matters.

Policy and Program Evaluation/Regulatory

Question. What role does P&PE have in the regulatory appeal process?

Answer. Decisions and orders of the Office of Execptions and Appeals pose previously unresolved questions of regulatory policy. In order to insure that these decisions and orders are consistent with existing regulatory policy, a representative of P&PE participates in the review process on a regular basis.

Policy Issues Process

Question. You state on p. 56 that this office coordinates the Policy Issues for FEA, with approximately 40 issues expected in 1978. These issues sound exactly the same as those in your "Program Development" activity. (p.52) What is the difference, if any?

Answer. The difference between policy issues and program development issues is that the former process provides a mechanism for the determination of policy and the latter deals with proposed programs to implement already established policy. The policy decision-making system includes general policy, regulatory and legislative proposals. For example, during the past year, FEA has considered and rendered decisions on such measures as "the Eligibility of Bunker Fuel Export Sales for Entitlement Benefits," "whether or not FEA would support further hydroelectric development on the Snake River," and "California Crude Oil Price Differential problem."

Whereas the policy process can encompass inter-agency matters, program questions have more of an intra-agency focus. Examples of program development issues are a proposal to establish a regional program for technology transfer of energy resource development data to U.S. business and industry, and an issue paper on the organizational locus of the Strategic Petroleum Reserve function within FEA.

The purpose of the policy issues process is to assure that policy recommendations are reviewed and commented on by all relevant functional areas of the Agency. In this way, the Agency seeks to insure that policy decisions are consistent with mandates of the Administration and the Congress, and take into consideration major possible impact of policy on the environment, on the economy, and on such groups as minorities, the poor, the elderly and the handicapped.

The purpose of the Program Development Process is to assure that program proposals outside of the budget cycle are cost-beneficial, and present alternatives so that the Administrator can make the best decision regarding the programmatic manner in which National and Agency policies best can be accomplished.

Policy Development

Question. Almost all the efforts in policy development and policy analysis listed on p. 56 appear in some detail in other portions of your budget justification. Just what do you do differently in this office that the program offices and your management office do not already do?

Answer. The chief difference in the functions performed by the Office of Policy and Program Evaluation and those performed by other FEA offices is a difference of scope and of involvement.

In terms of scope, the analysts in P&PE represent all the interests and disciplines in the Agency in one location so that in its review functions, P&PE is able to analyze, review and also develop policy with the broader perspective of overall agency and national energy policy that takes into account but is not limited to particular program development objectives.

In terms of involvement, since the implementation of policy decisions lies with the program offices, the program offices are more likely to advance the narrow interests of that office. sometimes, either intentionally or inadvertently, excluding the viewpoints, analysis and insights of other important offices in policy development and review. P&PE assures, by its neutrality, that all relevant offices have an opportunity to comment upon policy issues which may affect their operations or the interests of their constituents.

AUTHORIZATIONS FOR FISCAL YEAR 1978

Question Considerable portions of your program are not authorized for 1978. What is the status of authorizing legislation?

Answer On Friday, April 1, the House Interstate and Foreign Commerce Committee, Subcommittee on Energy and Power will begin hearings on authorizations for FY 1978.

TUESDAY, APRIL 5, 1977.

NAVAL PETROLEUM RESERVES

WITNESSES

CAPT. ROBERT H. NELSON, CEC, U.S. NAVY, DIRECTOR, NAVAL PETROLEUM RESERVES
CAPT. H. ROBERT JONES, U.S. NAVY, ASSISTANT DIRECTOR, BUDGET AND REPORTS, OFFICE OF THE NAVY COMPTROLLER
COMDR. GORDON R. GILMORE, CEC, U.S. NAVY, DEPUTY DIRECTOR, NAVAL PETROLEUM RESERVES
COMDR. LAWRENCE W. VOGEL, CEC, U.S. NAVY, HEAD, OPERATIONS AND CONTRACTS DEPARTMENT
LT. COMDR. TODD J. REULING, JAGC, U.S. NAVY, DEPUTY COUNSEL
FRANK L. HOUTMAN, COMPTROLLER, NAVAL PETROLEUM RESERVES
ROBERT DAVIS, OFFICE OF BUDGET AND REPORTS

Mr. YATES. The hearing will come to order.

This is a hearing on the appropriation for fiscal year 1978 for the Naval Petroleum Reserves Special Account. Appearing in connection with that appropriation is Capt. Robert H. Nelson, CEC, U.S. Navy, Director, Naval Petroleum Reserves; Capt. H. Robert Jones, U.S. Navy, Assistant Director, Budget and Reports, Office of the Navy Comptroller; Comdr. Gordon R. Gilmore, CEC, U.S. Navy, Deputy Director, Naval Petroleum Reserves; Comdr. Lawrence W. Vogel, CEC, U.S. Navy, Head, Operations and Contracts Department; Lt. Comdr. Todd J. Reuling, JAGC, U.S. Navy, Deputy Counsel.

We have a biographical sketch of Captain Nelson and that may be made a part of the record at this point.

[Captain Nelson's biographical sketch follows:]

BIOGRAPHICAL SKETCH—CAPT. ROBERT H. NELSON, CEC, U.S. NAVY, DIRECTOR, OFFICE OF NAVAL PETROLEUM AND OIL SHALE RESERVES

Captain Nelson was born on July 21, 1924, in Burton, Ohio. He graduated from the Naval Academy in 1949 with a B.S. degree, received a B.C.E. in 1951 from Rensselaer Polytechnic Institute, and an M.S. in petroleum engineering from the University of Texas in 1962.

He is a member of the Society of American Military Engineers and a registered professional engineer—civil—in the State of Vermont.

Captain Nelson's duty assignments include 20 years experience in the continental United States and overseas as a design/construction manager and facilities engineer, and 3 years petroleum and oil shale experience as officer in charge, naval petroleum and oil shale reserves in Colorado, Utah, and Wyoming.

His personal awards include Legion of Merit and Bronze Star with Combat V.

Captain Nelson and his daughter, Natalie, reside in Woodbridge, Va.

Mr. YATES. Then we have a summary which may go into the record, together with Captain Nelson's statement.

[The summary and Captain Nelson's statement follow:]

SUMMARY

The appropriation under this title finances the day-to-day costs (except military personnel salaries) of exploration, operation, maintenance, and production of the three naval petroleum reserves, and the operation, maintenance, and predevelopment work on the three oil shale reserves, under the jurisdiction and control of the Secretary of the Navy. Funds for the operation and exploration of Naval Petroleum Reserve No. 4 in Alaska are included through June 1, 1977, at which time administration of this program will transfer to the Department of the Interior. The budget includes funds for civilian pay, consultant services, contract services for maintenance of oil field equipment and facilities, and for

necessary drilling operations, fuel, supplies, and equipment repair parts. Funds are included for exploring Naval Petroleum Reserve No. 1 in California, No. 3 in Wyoming, and the three oil shale reserves in Colorado and Utah.

Also included in the budget are funds for continuation of the development of Naval Petroleum Reserves Nos. 1 and 3 and continuation of the predevelopment effort plan at Naval Oil Shale Reserves Nos. 1 and 3.

The table below shows the totals for each fiscal accounting period from 1976 through 1978 including separate columns identifying moneys appropriated to the Department of Defense, and funds appropriated to the President for accomplishment of this program.

SUMMARY

[In millions]

Budget program	1976 (defense)	19TQ (defense)	1976 (supplement)	19TQ (supplement)	1977 (amend)	1978 FAP
A. NPR-1 and 2	$82.1	$40.0	$11.9	$10.8	$286.0	$178.8
B. NPR-3	.9	.03	11.5	4.5	17.3	24.9
C. NPR-4	33.2	6.9	.8	----------	100.5	----------
D. NOSR	.5	.2	----------	----------	1.3	1.3
E. Hqtrs	.9	.2	----------	.02	1.0	1.0
Total direct obligations	117.6	47.3	24.2	15.3	406.1	206.0

STATEMENT

Mr. Chairman and members of the committee, I appreciate this opportunity to appear before you to discuss the requested appropriation, naval petroleum and oil shale reserves for fiscal year 1978.

Four naval petroleum reserves and three oil shale reserves were created by separate Executive orders during the period 1912 to 1924. The creation of the reserves was subsequently confirmed by statute which sets forth their fundamental program and purpose. The statute directs the Secretary of the Navy, subject to approval of the President, to explore and develop the reserves for the production of a supplemental supply of oil when required for national defense. With the passage of the Naval Petroleum Reserves Production Act of 1976, the statute was changed to allow production of Naval Petroleum Reserves Nos. 1, 2 and 3, and transfers jurisdiction of Naval Petroleum Reserve No. 4 in Alaska to the Department of the Interior effective June 1, 1977.

When an oil shortage occurred toward the end of World War II, Congress called on the Navy to explore and develop its two most important reserves, Naval Petroleum Reserve No. 1, Elk Hills, Calif., and Naval Petroleum Reserve No. 4, located on the North Slope of Alaska. Naval Petroleum Reserve No. 1 was also authorized to produce 66,000 barrels of oil per day—BOPD—during the remainder of the wartime period. Considerable progress was made on these programs at both reserves, but they were terminated in 1953. Comparatively little further exploration and development was accomplished on the reserves until, in 1974, faced with another national oil shortage, Congress took action to explore and develop Naval Petroleum Reserve No. 1, and to explore Naval Petroleum Reserve No. 4, by passage of the Supplemental Appropriation Act of 1974 and by authorizing a separate appropriation commencing in fiscal year 1975. The exploration and development programs are currently being implemented. At Naval Petroleum Reserve No. 1, 17 exploratory wells and 447 development wells will have been completed by the end of fiscal year 1977. At Naval Petroleum Reserve No. 4, geophysical exploration surveys totaling 7,765 line-miles will have been completed by the end of fiscal year 1977, and a total of eight exploratory wells have been drilled. Materials and supplies needed for next winter's drilling program of seven wells already have been purchased for shipment on the 1977 annual supply barges to that arctic reserve.

With the passage of Public Law No. 94-258 on April 5, 1976, this office was charged with producing Naval Petroleum Reserves Nos. 1 and 3 at the maximum efficient rate and purchasing or acquiring 350,000 barrels of oil per day pipeline capacity.

Continuation of the exploration, development, and production programs at Naval Petroleum Reserves Nos. 1 and 3 makes up the major part of our 1978 budget request of $206 million. The budget is in four parts: $28.5 million for regular operations, $14.2 million for exploration, $101.7 million for development, and $61.6 million for production. (See the following table.)

FISCAL YEAR 1978

[In thousands]

	Operations	Exploration	Development	Production	Total
NPR-1 and 2	$25,479	$10,773	$82,595	$59,970	$178,817
NPR-3	1,770	2,861	18,655	1,620	24,906
NOSR's	240	560	500		1,300
Headquarters	972				972
Total	28,461	14,194	101,750	61,590	205,995

Operations—Fiscal year 1978

	Thousands
Naval Petroleum Reserves Nos. 1 and 2	$25,479
Naval Petroleum Reserve No. 3	1,770
Naval Oil Shale Reserves	240
Headquarters	972
Total	28,461

The regular operations budget provides for the following continuing programs:

(1) Maintenance of wells and facilities;

(2) Administration of oil and gas leases on Navy's land in Naval Petroleum Reserve No. 2, California;

(3) Management of the Naval Oil Shale Reserves located in Colorado and Utah, including management of grazing, timber, wildlife, and recreation; and

(4) Administration of the reserves and the utilization of petroleum and oil shale consultants.

Exploration—Fiscal year 1978

	Thousands
Naval Petroleum Reserve No. 1	$10,773
Naval Petroleum Reserve No. 3	2,861
Naval Oil Shale Reserves	560
Total	14,194

The exploration budget provides for the following programs in fiscal year 1978:

(1) The drilling of 8 exploratory wells at Naval Petroleum Reserve No. 1 including one deep-test well, and 15 exploratory wells at Naval Petroleum Reserve No. 3 to further define the limits of those fields; and

(2) Geologic evaluation and seismic survey of the Naval Oil Shale Reserves in Utah and Colorado.

Development—Fiscal year 1978

	Thousands
Naval Petroleum Reserve No. 1	82,595
Naval Petroleum Reserve No. 3	18,655
Naval Oil Shale Reserves	500
Total	101,750

The development budget provides for the following programs:

(1) The drilling and equipping of 132 alditional development wells, as well as installation of surface facilities to permit the maximum production of Naval Petroleum Reserve No. 1 in California. This is the last year funding is requested for the initial 5-year development program;

(2) The continuation of the development program in Naval Petroleum Reserve No. 3 in Wyoming, which includes acquisition of drilling equipment, installaiton of surface facilities, and the drilling of approximately 189 development wells in fiscal year 1978; and

(3) The continued implementation of a pre-development plan for the Naval Oil Shale Reserves.

Production—Fiscal year 1978

	Thousands
Naval Petroleum Reserve No. 1	$59,970
Naval Petroleum Reserve No. 3	1,620
Total	61,590

The funds requested for production are required for the following purposes:

(1) Lifting costs at Naval Petroleum Reserve No. 1 of 25 cents per barrel for approximately 47.8 million barrels of oil;
(2) Acquisition and/or initiation of construction of one or more pipelines between Naval Petroleum Reserve No. 1 and shipping points or refineries; and
(3) Lifting costs at Naval Petroleum Reserve No. 3 of 50 cents per barrel for approximately 3.2 million barrels of oil.
This concludes my statement Mr. Chairman. I shall be pleased to provide any additional information you may desire.

Mr. YATES. Captain, your statement is a part of the record. The total appropriation request is roughly $206 million. Is that right?

Captain NELSON. Yes, sir.

OIL PRODUCTION AND RESERVES

Mr. YATES. In connection with that program, the funds are going to the maintenance of wells and the administration of oil and gas leases.

What is the daily production on the petroleum reserves?

Captain NELSON. Starting with Petroleum Reserve No. 1, Mr. Chairman, the production on a good day when all wells are up, runs approximately 140,000 barrels per day, with approximately 122,000 of it being Navy oil.

Mr. YATES. What production do you forecast for the next fiscal year, the same or expanded?

Captain NELSON. It will be expanded. It will be a gradually growing production. We anticipate an income from that production of approximately $600 million for this coming year.

Mr. YATES. Do you know what the potential reserves are for the Pets?

Captain Nelson. When you say potential reserves, yes, sir. We have an approximation of that. The reserves are 1.2 billion barrels in Pet 1. It is approximately 1.2 billion barrels total, of which 1 billion barrels will be Navy oil. The ultimate production, most efficient rate at which we anticipate production to be, would be approximately 300,000 barrels of oil per day. That is with ultimate development.

OIL AUTHORIZATION

Mr. YATES. Is all the oil used for the Navy or do you sell oil to outsiders?

Captain NELSON. None of the oil is actually used for the Navy. We anticipate selling all the oil we produce.

Mr. YATES. Do you have contracts for the oil?

Captain NELSON. Yes, sir. We have contracts with 16 people right at the present time.

Mr. YATES. That is at reserves 1 and 2?

Captain NELSON. That is at NPR–1. At NPR–2 we operate under unit agreements whereby the unit operators have been in the past selling our oil for us and we take a royalty interest on it.

Mr. YATES. Is your royalty in cash or in oil?

Captain NELSON. It has been in cash in the past. We anticipate this coming year that we will move to taking it in kind because we see an extra $500,000 a year income accruing to the Federal Treasury if we do that.

Mr. YATES. Do you have that option under your agreement?

Captain NELSON. Yes, sir.

Mr. YATES. None of your oil is going to the strategic petroleum reserves as far as you know?

Captain NELSON. No, sir. Not at this time.

PRODUCTION COSTS

Mr. YATES. What is the cost of producing oil at NPR–1 and 2?

Captain NELSON. At NPR–1 the cost of production in past years has averaged 25 cents per barrel. We are finding now that some of the well casings are deteriorating, the cost of reinjecting the gas into the ground and handling the water have increased significantly. We anticipate this next year at NPR–1, the cost will be approximately 70 cents a barrel.

Mr. YATES. That much higher?

Captain NELSON. Yes.

Mr. YATES. What about NPR–2?

Captain NELSON. We don't really handle the costs of lifting down there and I don't have that number.

Do you have a number?

Commander VOGEL. No, sir. We just receive a royalty payment.

Mr. YATES. Who drills it for you? Is that a Husky operation too?

Commander VOGEL. At NPR–2 we have approximately six leaseholders on the Navy land and we receive approximately 12½ percent royalty from those.

Mr. YATES. How long are those leases?

Captain NELSON. At NPR–2 they are, as I understand it, until the field is drained.

ELK HILLS PIPELINE

Mr. YATES. What is the status of the pipeline at Elk Hills?

Captain NELSON. At the present time we are completing our draft environmental impact assessments for three potential routes. One would go north to Coalinga, one would go almost due south to the port of Port Hueneme, Calif., and the third one would go slightly east of south to Redlands, where it would tie in with the proposed Sohio Pipeline from Long Beach to Midland, Tex. Those DIES's should be completed by the end of this month. They will be submitted to the Council on Environmental Quality. Upon their approval, which we anticipate, we will then proceed to final impact statements which should be ready by October 1. At that time we would be ready to build a pipeline once they are approved and we have made a selection.

Mr. YATES. Is that the cost of $48 million?

Captain NELSON. That was just 1 year's appropriation for it. If we go the Redlands route, we anticipate $130 million approximately. If we go a shorter route, say down to Port Hueneme, it may be on the order of $73 million.

Mr. YATES. The Elk Hills development is proceeding pretty well, then?

Captain NELSON. Yes, sir. We feel it is proceeding, and while this year's drilling is slightly behind our schedule, we are coming along well with it. We have 12 drilling rigs on the location and they are proceeding.

Mr. YATES. How many do you plan for 1978?

Captain NELSON. We anticipate 132 wells at NPR–1 for 1978.

Mr. YATES. Any problems in connection with that?

Captain NELSON. No, sir.

Mr. YATES. Does it raise any environmental problems?

Captain NELSON. No, sir. We have looked at the environmental problems prior to developing this field, and have it well taken care of.

STATUS OF NPR–4

Mr. YATES. What about Navy Pet-4? As I recall, Husky is developing that for you?

Captain NELSON. Yes; that is correct.

Mr. YATES. So far you haven't hit any wells, have you, except for gas?

Captain NELSON. Just today, as a matter of fact, we think we may have hit a 30-foot-thick pay sand in an exploratory well that we are drilling right near the Arctic Ocean. We are currently drilling three exploratory wells, all of which are the most likely to succeed of the wells we have drilled thus far, and two of the three look very good. They look as though they would possibly be completable as producing oil wells.

Mr. YATES. How far down do you have to go to get oil?

Captain NELSON. These wells are to basement rock. Granite in that particular part of the country is at about 9,000 feet, so we anticipate drilling the full 9,000 feet on these wells since they are exploratory. We want to find out what is really there.

Mr. YATES. Which of the reserves will be turned over to the Department of the Interior?

Captain NELSON. Just Pet-4, the North Slope of Alaska.

TRANSFER TO INTERIOR DEPARTMENT

Mr. YATES. Will you be able to turn it over by June 1?

Captain NELSON. Yes, sir. We are moving on that. We are meeting with them regularly, not only with Interior but also with Office of Management and Budget, to be sure that all the numbers are exchanged properly and we will be ready to make the turnover on June 1.

Mr. YATES. Are there any Navy personnel to be transferred?

Captain NELSON. There are no Navy military personnel to be transferred. We are transferring some civilian billets, however.

OIL SHALE RESERVES

Mr. YATES. Where are the naval oil shale reserves? Are they in Colorado?

Captain NELSON. In Colorado and Utah, sir.

Mr. YATES. You have a contract for the production of oil from oil shale, I think with Paraho, haven't you?

Captain NELSON. I don't recall that we have a contract.

Commander GILMORE. No, sir. The Chief of Naval Material is accomplishing some research. They are producing some oil shale for research purposes but that is not out of our office.

Mr. YATES. What Navy office was that?

Captain NELSON. Chief of Naval Material.

Mr. YATES. Is he also handling all your oil shale?

Captain NELSON. No, sir. We handle the oil shale business in our office.

PREDEVELOPMENT PLANS

Mr. YATES. What is meant by your predevelopment plan?

Captain NELSON. The predevelopment plan is a plan for Naval Shale Reserve No. 1 located in Colorado, which is intended to set up a plan for developing the shale reserve there—in shale reserve No. 1—should the Congress ask us to do so.

For example, we hope to do some core drilling to determine where the water is; we would need to do this. We hope to do some drilling in shale reserve No. 1 to determine whether there is any gas supply which could be used to help make the kerogen, which is the shale crude, flow a little easier through pipelines. We hope to locate the depth of the richest beds in this predevelopment plan to where if you were to ask us when and how much will it cost, can you have a shale plant ready to deliver 100,000 barrels of oil per day, we could say we would put our plant right here; here is the shale bed that we would explore and develop to build this plant; here is the supply of our water, and here is how much you would need to develop this oil, here is where we would sell it, here are the pipelines we would plan to deliver it to, and here is how much it would cost to connect to that pipeline with our own line. It would be a complete package that would say what we need.

Mr. YATES. How much do you need for that package?

Captain NELSON. About $32 million, sir. That involves a lot of exploration too, environmental work also.

Mr. YATES. Do you have any idea as to how many barrels you can get out of that? What would full production cost?

Captain NELSON. A 100,000-barrel-per-day plant, $1 billion just as a guess.

Mr. YATES. Any estimates as to what that would cost per barrel?

Captain NELSON. That is 100,000 barrels of oil per day and scattered over the life of that particular reserve, which is about 12 billion barrels, 12½ cents a barrel. That is just writing off the cost of the plant.

Mr. YATES. That can't be right, can it?

Captain NELSON. I think so.

Mr. YATES. Occidental tells us they can produce——

Captain NELSON. Mind you, I just wrote off the initial cost of the plant, not operating costs.

MARKET PRICE OF OIL SHALE

Mr. YATES. All right. I am trying to get at what would you be able to sell your oil from oil shale for on the market. Do you have any idea as to that?

Captain NELSON. I can guess with you on that, Mr. Chairman. I think we are in the order of $14 or $15 a barrel right now actual production costs to get that on the market. It is nearly competitive but not quite.

Mr. YATES. We had Mr. O'Leary of FEA come in the other day. He predicted within the next 7 or 8 years the cost per barrel of oil fixed by OPEC would probably be close to $22 or $23. At that level you would be competitive.

Captain NELSON. Yes; provided our cost of living didn't kick the labor costs of oil shale production right up with it. That has always been the problem. I can remeber when this oil could have been produced for much less than the $14 a barrel. We thought with our crude oil prices up, this would be competitive but not so because of the high labor costs involved at the present time.

EXTRACTION PROCESS

Mr. YATES. Would your process be the retorted or the in situ?

Captain NELSON. We haven't really arrived at this determination.

That is part of this study cost, to arrive at the best possible means of producing the oil.

Mr. YATES. Would you be doing it yourselves or would it be by contract?

Captain NELSON. We would anticipate a research type of operation, perhaps additional research with a Government agency, perhaps not us but another portion of the future Department of Energy, but ultimately we would have a choice: We do it with private concerns or as a Government operation.

Mr. YATES. Where would this be located?

Captain NELSON. Probably in Colorado to start because that is where the richest oil shales are.

Mr. YATES. But you don't have any plant in Colorado?

Captain NELSON. Oh, yes, right in the vicinity of Rifle.

Mr. YATES. Wasn't the Navy in that plant originally?

Captain NELSON. Yes. The Navy and Interior. It has already been operated and a lot of the original research which oil companies have used to develop it even further was done by Navy and Interior in that plant.

Mr. YATES. As of what time would you be able to get oil from oil shale at $14 or $15 a barrel?

Captain NELSON. I would anticipate if we would start right now it would take about 7 years to develop.

EXTENT OF OIL SHALE RESERVE

Mr. YATES. What is the extent of the oil shale reserves? Have you any estimate?

Captain NELSON. Physically in acreage the shale reserve in Utah is the larger of the reserves. It is on the order of 90,000 acres. Physically, the shale reserves 1 and 3 in Colorado are 54,893 acres.

Mr. YATES. Are these considered to be rich oil shale?

Captain NELSON. Yes, sir. The Shale Reserve No. 1 in Garfield County, Colo., is especially rich in that regard. Many of the Mahogany Ledge shales there produce 20 to 25 gallons per ton of rock, which is a very good oil, very rich reserve.

The reserve in Utah is less rich but it does have some 20-gallon-per-ton production there potentially. A lot of the Utah reserve, however, would be in the order of 15 gallons per ton. We anticipate, for example, that out of those reserves we might take 12 billion barrels out of Colorado and 4 billion barrels out of Utah.

Mr. YATES. You are ready to go if you had the money?

Captain NELSON. Yes, sir. We are ready to start on that predevelopment plan.

Mr. YATES. How much did you say you needed for that?

Captain NELSON. A total of approximately $32 million.

Mr. YATES. How long would the predevelopment plan take?

Captain NELSON. Six years.

PERSONNEL INCREASES

Mr. YATES. Last year we set a limit of 113 positions for the Navy Pets. Your current allocation shows 195 positions. We wondered why the increase over the other amount.

Captain NELSON. We had asked for an 87-person increase in our numbers of people when we determined that we would actually use the facilities engineering command of the Navy to assist us in the construction of the gas plant and the pipelines at Elks Hills—it is a tremendous job—it is in their business-construction management. We asked them to participate with us, so we did add 87 people for that particular purpose, actually for the design and construction management.

Mr. YATES. I note your average grade went from 7.88 in the transition quarter to 9.85 in 1977 and 9.87 in 1978.

Captain NELSON. That is right.

Mr. YATES. That is rather a steep increase in such a short period of time. Can you tell us why this happened?

Captain NELSON. Yes, sir. A great percentage of those 87 people are highly qualified architects, engineers, and construction inspectors.

DIFFERENCES IN WELLS

Mr. YATES. What is the difference between wells drilled in the exploratory program and development wells?

Captain NELSON. An exploratory well is one where seismic or other indications have shown us a structure exists which could contain oil. We then drill into that structure in an effort to determine whether it does contain oil or not.

When you put a geologist on the ground and you run seismic surveys, really all he is telling you with his expertise is that there is a structure there and that with his background and knowledge it could have oil. You don't really know until you put a bit in that reserve and find out whether it is going to strike oil or not. That is an exploratory type of well.

Once we have done it and know that structure does contain oil, then we begin to develop it. At least we have a reasonable assurance oil is there. Then it is called a development well when we actually drill down to that same structure to begin to tap it.

STATUS OF NPR–2

Mr. YATES. What is the status of NPR–2?

Captain NELSON. NPR–2 is one where we have six lessees at Buena Vista Hills. It has been under production since the early 1920's. It will remain on production and is well down on its decline curve at this point.

Mr. YATES. How much longer will it last?

Captain NELSON. I imagine it will last—again this is just a guess on my part—20 more years. I think I have production estimates on what we will get out of that in those years.

Remaining recoverable reserves, total about 25,909,000 barrels, of which 9,940,000 will be Navy oil. When you get to the lower part of the decline curves the production rate is very low. It takes a long time to get those last 1 million barrels.

NATURAL GAS RESERVES

Mr. YATES. Do you have an estimate of the extent of your natural gas reserves on NPR–1 and 2?

Captain NELSON. Yes, sir. I think we have information on that.

Mr. YATES. Would you put that in the record.

[The information follows:]

ELK HILLS WET GAS RESERVES

Non-Associated Gas(1)

	Reserves (trillion cubic feet)
Dry Gas Zone	.220

Associated Gas(2)

	Reserves (trillion cubic feet)
Shallow Oil Zone	.044
Stevens Zone	.053
Subtotal	.097

Dissolved or Solution Gas(3)

	Reserves (trillion cubic feet)
Shallow Oil Zone	.113
Stevens Zone	.710
Carneros Zone	.930
Subtotal	.916

TOTAL WET GAS 1.233 trillion cubic feet

Definitions

(1) Non-Associated Gas: Gaseous hydrocarbons occurring as a free gas phase under original conditions in a reservoir not commercially productive of crude oil.(*) Non-Associated gas can be produced without the production of crude oil.

(2) Associated Gas: Gaseous hydrocarbons occurring as a free gas phase under original reservoir conditions in contact with a commercially productive crude oil reservoir.(*) Associated gas can also be defined as "gas cap" gas. Since "gas cap" gas provides a part of the motive force for production of crude oil, it would normally be produced only after crude oil depletion.

(3) Dissolved or Solution Gas: Gaseous hydrocarbons occurring under original reservoir conditions in solution with crude oil in a commercially productive crude oil reservoir.(*) Production of dissolved or solution gas can only be accomplished with the production of crude oil.

(*) Petroleum Production Handbook, Thomas C. Frick, McGraw-Hill, 1962

Mr. YATES. Do you have production of gas on either of the Pets?

Captain NELSON. Yes, sir. We produce gas as a routine. It is produced with the oil from the Stevens zone at NPR–1. It is our estimation that it should not be sold, and so therefore we return that gas after stripping the butanes, propanes and gasolines from it. We dry it out and put it back into the ground to maintain the pressure on that Stevens zone to increase the ultimate production.

Mr. YATES. Will your gas production be increased in 1978?

Captain NELSON Yes. It will increase as we increase the number of wells, but again we will reinject all of that gas into the oil reservoirs.

PERSONNEL INCREASES AT ELK HILLS

Mr. YATES. Can you tell us why you need the 15 additional positions at Elk Hills in 1978?

Captain NELSON. Yes, sir. As we begin to expand that field we have more and more need to determine just what reservoirs should be produced and at what rate. We need engineering personnel for that. We also are taking over from USGS at Pet-2. They have been doing all of our accounting for us. We feel the need to monitor that a little more closely and therefore we will add some budget and accounting people to monitor that operation a little more closely.

PRODUCTION COSTS OF WPR–3

Mr. YATES. What is the cost of producing oil from Pet-3?

Captain NELSON. The cost there, and we anticipate it will remain, is about 50 cents a barrel lifting costs.

Mr. YATES. Is that a big field?

Captain NELSON. It is considered a large field by U.S. standards but right now our reservoir contains probably 42 million barrels of producible oil, in our estimate. That is not a giant field.

Mr. YATES. Are you still developing the reserve?

Captain NELSON. Oh, yes, sir. We have five drilling rigs there drilling wells every day.

Mr. YATES. Do you need a pipeline at this field?

Captain NELSON. We already have a pipeline which serves that field.

Mr. YATES. Your exploratory program shows no more wells beyond 1977. Will those wells complete your exploration?

Captain NELSON At Teapot Dome, sir?

Mr. YATES. Yes.

Captain NELSON. We will explore Teapot Dome until 1982. Incidentally, it is commonly thought that Teapot Dome was pretty well drilled up during the Mammoth Oil Co. days, but that wasn't so. They got to 3,000 feet and they knew pretty well what was there but they never got to the lower horizon nor the south end of the field, and we think there are at least three potentially productive zones there we ought to look into very carefully.

NATURAL GAS IN ALASKA

Mr. YATES. Let's turn to Navy Pet-4 in Alaska. We were told that you had three gas wells producing for the town of Barrow.

Captain NELSON. Yes, sir. We have actually 10 wells up there we have drilled over many, many years.

Mr. YATES. All gas?

Captain NELSON. Yes, sir. They all were intended to support the native population, our research lab and other Government agencies at Barrow. This has been a matter of continuing concern for us, and we have tried to insure there is adequate gas. It is a life and death matter up there.

Mr. YATES. Is the news you received this morning of the strike, the favorable geologic formation, the first such information you have had?

Captain NELSON. Yes, sir, in this program. We have really been trying to hit a structure and it proves that the formation is moving up to the north of us, and probably to the north of us will be productive areas.

Mr. YATES. So your next step is drilling down further in that hole?

Captain NELSON. We will continue to basement in that hole at about 9,000 feet, where we will then have a choice of either cementing off the well or completing it in a favorable zone and producing it to determine what the real content of that well is.

Of course, that will be turned over to Interior on June 1, so it will be an Interior job to make that determination.

Mr. YATES. Let's hope you strike before you turn it over.

Captain NELSON. I think we will.

ADEQUACY OF FISCAL YEAR 1978 BUDGET

Mr. YATES. Is there anything else we ought to know, that you ought to tell us, or have we covered it pretty well? Are the funds you have asked for adequate for your purposes?

Captain NELSON. Yes, sir.

Mr. YATES. Did you ask for any more of the Office of Management and Budget? Did they cut you back?

Captain NELSON. They cut us back only in the shale reserve operation. They had made a cut there. We had asked for $12.4 million to do our predevelopment work at NOSR's 1 and 2 and they cut it back to the level funding with the prior year $1.3 million. In fairness to them—I came in after that fact—I think the big items in that budget were oil and gas exploration. Three wells were to be drilled at Shale Reserve No. 1 and three wells at Shale Reserve No. 2. It looked to them, we think now as we look back at it, as if we were trying to inaugurate another whole program at those two reserves rather than sticking with the shale business.

In reality we weren't. We simply wanted to find out if there was gas there that we could mix with the kerogen, so I believe they felt we were probably trying to produce a new thing, a new venture, and so they cut us. We can start the predevelopment plan with the $1.3 million.

Mr. YATES. Frank, the captain was telling us he is all ready to spend $32 million in Colorado on a predevelopment program of oil shale. It will take 6 years for completion. With the expenditure of $1 billion they can put a producing oil shale plant in. The plant would be located in the vicinity of Rifle. That is one of the items in the budget, the predevelopment fund of $32 million.

Mr. EVANS. $32 million for fiscal year 1978?

Captain NELSON. No, sir. In that particular program we had less than that, quite a lot less. It was a $32 million total program, of which approximately $12 million was requested of OMB in 1978.

Mr. EVANS. Over how many years would you need $32 million?
Captain NELSON. Over 6 years.

DEVELOPMENT CONCEPTS

Mr. EVANS. Using what concept?
Captain NELSON. We would determine the concept as a part of that program, sir. This is so fluid a situation that we would watch them all, proceed with what we thought was the best one.
Mr. DUNCAN. I thought it wasn't fluid; that was the problem.
Captain NELSON. That is part of the problem. Good point.
Mr. EVANS. How do you secure your acreage?
Captain NELSON. We own it. We have the up-front money already invested.
Mr. EVANS. How many acres do you have?
Captain NELSON. About 54,000 acres at the shale reserves in Colorado and 90,000 acres in Utah at Shale Reserve 2.
Mr. EVANS. What capacity are you going to design this for?
Captain NELSON. We would design it at the will of Congress; whatever it appeared it would need. We are thinking in round figures of a 100,000-barrel-per-day capacity at approximately $1 billion cost initial investment.
Mr. DUNCAN. $1 billion?
Captain NELSON. $1 billion, yes, sir. In about 7 years. If you were to say go today, we would probably take 6 to 7 years to do that.

CONTENT OF PREDEVELOPMENT PLAN

Mr. EVANS. Isn't it a little difficult to request specific funds until you have come down on the methodology you are going to use?
Captain NELSON. This is exactly the reason why we had this predevelopment plan which we estimated at a total cost of $32 million. In that predevelopment plan we would study the literature, investigate further and arrive at a best method of retorting or gaining the kerogen from the shale.
Mr. EVANS. That is going to cost you $32 million?
Captain NELSON. Yes, sir. We must also find a water supply so we will be drilling wells to find water, we will be drilling wells to possibly find gas on these reserves—a gas mixture could be used to make that kerogen more fluid.
Mr. EVANS. How did you arrive at the amount of $32 million?
Commander GILMORE. The predevelopment effort would be a deliberate planned effort to proceed, looking at all possible methods of retorting or an in-situ process to extract the oil from the shale, and then as we proceed along our predevelopment plan we would eliminate certain of these techniques that would not appear feasible at the naval oil shale reserves.
Simultaneously with this effort we would have to do our environmental work, we would have to assure that the research work is done, we would have to analyze pipeline requirements or transportation requirements for our crude shale oil, the impact on the city of Rifle and any other communities in the particular area. It is a major effort, and a major assessment would be required in order to push this oil shale program to a point where we could say we have looked at all the options, we have looked at all the impacts, here is the development program we would recommend to the Congress.

Mr. EVANS. You have determined the $32 million is what you are seeking in 1978?

Captain NELSON. No, sir.

Commander GILMORE. We had sought $12,415,000 for the 1978 program, as Captain Nelson had indicated a few minutes ago. OMB reduced to that level of funding for 1977 at $1.3 million.

Mr. EVANS. Do you have an explanation for the committee of the various figures that go to make up the $12 million?

Commander GILMORE. Yes, sir, we do. We would be pleased to discuss that to some extent if you like.

Mr. YATES. Please place it in the record.

[The information follows:]

At this time we would like to submit a clarifying statement as to the funding disposition of the Naval Oil Shale Reserves Nos. 1 and 3 predevelopment program and the Naval Oil Shale Reserve No. 2 predevelopment program. Earlier in the testimony, it has stated that $32 million was required for predevelopment of Oil Shale Reserves Nos. 1 and 3 in Colorado. Of this amount, approximately $4 million had been requested in fiscal year 1978. We received approximately $2 million in fiscal years 1976, 1977T, and 1977, and the remainder of the $32 million was to be requested through fiscal year 1982. At that time, we feel that a detailed development program for these reserves can be presented to the Congress and facilities acquisitions can proceed.

The majority of the funds that had been requested and denied by OMB were for Naval Oil Shale Reserve No. 2 in Utah. The request was for oil and gas exploration, and preparation of a predevelopment plan for that reserve.

Following is a breakout of funds initially requested for these programs and the appropriation request as presented to the Congress.

Original Budget Request Submitted to Office of Management and Budget (OMB) . . . $12.415 Million

Budget Reduction as a Result of OMB Review . . . $11.115 Million

Revised Budget . . . $1.3 Million

	ITEM		ORIGINAL BUDGET		REVISED BUDGET REQUEST		DIFFERENCE
I.	Routine Fixed Operations						
	A. BLM Surface Mgt at NOSR 1 & 3		47		47		0
	B. BLM Surface Mgt at NOSR 2		34		33		1
	C. BLM Wildlife Habitat Program		75		50		25
	D. Navy Office Operations (Colorado)		75		60		15
	Subtotal I.		231		190		41
II.	Routine Variable Operations						
	A. Vehicles and Operating Equipment		20		20		0
	B. Special Studies at NOSR 1 & 3		50		30		20
	1. Analysis of Potential Uses of Saline Water	15		15		--	
	2. Feasibility of Using IN-SITU at NOSR 1	15		15		--	
	3. Other Studies as Required	20		--		20	
	C. Special Studies at NOSR 2		35		--		35
	1. Preliminary Evaluation of Quantity and Quality of Oil Shale at NOSR 2	20		--		20	
	2. Preliminary Study of Hydrology	15				15	
	Subtotal II.		105		50		55

ITEM		ORIGINAL BUDGET	REVISED BUDGET REQUEST	DIFFERENCE
III.	Pre-Development at NOSR 1 & 3			
A.	Development Assessments	260	200	60
1.	Evaluation of Quality & Quantity of Oil Shale & Other Resources	20	20	0
2.	Evaluation of Current Status of Oil Shale Processing Technologies	20	20	0
3.	Evaluation of Current Status of Oil Shale Mining Technology	20	20	0
4.	Preliminary Plan for Land Use	20	20	0
5.	Analysis of the Economics of the Various Oil Shale Production Processes	20	20	0
6.	Preliminary Assessment of Environmental Impacts of Development	20	20	0
7.	Assessment of Roles other Government Agencies and Private Industry are playing in Development of Oil Shale	20	10	10
8.	Update the Pre-Development Plan	10	10	0
9.	Prepare an Outline for a Detailed Development Plan	30	--	30
10.	Outline a Two-Year Plan for Accumulating Environmental Baseline Data	20	20	0
11.	Preliminary Assessment of Equipment Acquisitions Required for Development	20	--	20
12.	Analysis of the Contract Options Available to Navy in Contracting for the Services Necessary for Development	20	20	0
13.	Preliminary Plan for Facility Siting	20	20	0
B.	Acquisition Administration	210	80	130
1.	Analysis of Additional Lands to be Acquired (rights of way, etc.)	40	20	20
2.	Analysis of Water Rights Acquisition Requirements	40	20	20

ITEM		ORIGINAL BUDGET		REVISED BUDGET REQUEST		DIFFERENCE	
III.	Pre-Development at NOSR 1 & 3 Continued						
	B. Acquisition Administration Continued						
	3. Analysis of Kinds & Quantities of Utilities which should be Acquired	40		20		20	
	4. Assessment of Needs for Railroad Rights-of-Way	20		--		20	
	5. Assessment of Materials Required for Development and Potential Lead Time Problems	30		10		20	
	6. Assessment of Needed Road Acquisition or Construction	40		10		30	
	C. Legal		80		20		60
	1. Consultant for Local & Special Problems Peculiar to the Oil Shale Industry	30		--		30	
	2. Various Filings of Permits, Data, etc., Required for Development	30		10		20	
	3. Water Rights Litigation	20		10		10	
	D. Contractor Support Staff		347		200		147
	1. Personnel	332		187.5		144.5	
	2. Travel & G&A	15		12.5		2.5	
	E. Construction of NOSR Field Office		200		--		200
	F. Prepare NOSR 2 Pre-Development Plan		60*		*		60
	Subtotal III.		1,157		500		657
IV	Exploration						
	A. Geotechnical		230		15		215
	1. Aerial Photography of NOSR 1 & 3**	2		2		--	
	2. Photogeologic Mapping of NOSR 1 & 3**	8		8		--	
	3. Topographic Mapping of NOSR 1 & 3**	5		5		--	

NOTE: * Being accomplished with FY 1977 funds.
** Part of Pre-Development Plan.

ITEM	ORIGINAL BUDGET	REVISED BUDGET REQUEST	DIFFERENCE
IV. Exploration Continued			
A. Geotechnical Continued			
4. Environmental Assessment Concerning Seismic Survey at NOSR 2	10	--	10
5. Conduct Seismic Survey at NOSR 2	205*	*	205
B. Geology	612	425	187
1. Design Plan for Oil & Gas Exploration of NOSR 1, 2, & 3	12	--	12
2. Survey & Compilation of Exisiting Geologic Literature Concerning NOSRs	12	--	12
3. Drill 4 Core Holes at NOSR 1 to Assess Quality & Quanity of Oil Shale**	508	400	108
4. Lab Analysis of Cores from 4 Core Holes**	40	25	15
5. Compilation of Stratigraphic Data Gained from Core Hole Program**	20	--	20
6. Compilation of Structural Data Accumulated for NOSR 1**	20	--	20
C. Hydrology**	220	120	100
1. USGS Surface Hydrology Monitoring Program**	60	60	--
2. Literature Survey of Hydrologic Data on NOSR 1 **	10	--	10
3. Analysis of Aerial Photography**	10	10	--
4. Pump Tests on 4 Core Holes to Evaluate Ground Water System at NOSR 1 **	130	40	90
5. Lab Analysis of Ground Water**	10	10	--

NOTE: * Being Accomplished with FY 1977 Funds.
** Part of Pre-Development Plan

87-591 O - 77 - 39

ITEM		ORIGINAL BUDGET	REVISED BUDGET REQUEST	DIFFERENCE
IV.	Exploration Continued			
D.	Oil & Gas Exploration at NOSR 1	1,560	--	1,560
1.	Survey of Existing Information Concerning Oil & Gas Accumulations in NOSR 1 Area	25	--	25
2.	Design Drilling Plan for 3 Wells	25	--	25
3.	Prepare EIS for Drilling Activity	40	--	40
4.	Drill 3 Wells 6,000 - 8,000 ft Deep	1,200	--	1,200
5.	Evaluate Wells Including Logging, and Coring of Each Well	240	--	240
6.	Complete Data Gained From Drilling Program	30	--	30
E.	Oil & Gas Exploration at NOSR 2	8,300	--	8,300
1.	Drill 2 Wells to Test Cretaceous Sediments (15,000 ft)	4,300	--	4,300
2.	Drill one Well to Basement	4,000	--	4,300
	Subtotal IV.	10,922	560	10,362
	TOTAL	12,415	1,300	11,115

NATURAL GAS AND OIL SHALE EXPLORATION

Mr. EVANS. That seems like an awful lot of money for just the front end.

Commander GILMORE. Part of that, sir, is involved with oil and gas exploration on both reserves, NOSR's 1 and 3 in Colorado and NOSR 2 in Utah because, as Captain Nelson indicated, the gas has been planned in connection with an oil shale development program. We had planned 3 wells at each of those locations. At NOSR 1 we had planned the 3 wells about $400,000 each and those would go to a depth of 6,000 to 8,000 feet. At NOSR 2 in Utah we had planned 2 wells at about $2 million each, going down to about 15,000 feet and one test to basement that would cost approximately $4 million.

Mr. EVANS. Has any gas been discovered by such means, as of this date, on your land there?

Commander GILMORE. We have not drilled for oil or gas on the reserves. The thrust belt area out in Utah is not far from our reserves and already portends some good potential structures for oil and gas on NOSR 2. There had been gas discoveries in the areas of NOSR's 1 and 3 in Colorado and we think there is a potential for gas on these reserves.

Mr. EVANS. This is free flowing gas, not developed as a result of retorting?

Captain NELSON. That is correct, sir. Conventional gas wells.

WATER NEEDS

Mr. EVANS. Do your figures also consider what you will have to do in terms of water, both locating it or buying it?

Captain NELSON. We would like to be self-supporting because we know there are so many demands on the Colorado River, if we could we would like to take nothing from it.

Mr. EVANS. Are you going to drill to see if you can find water from wells?

Commander GILMORE. Yes, sir. That is correct.

Captain NELSON. Yes, sir.

Mr. EVANS. It is bleak-looking country. I wish you luck.

Captain NELSON. There is some water. We know we can get some water from the reserve itself.

Mr. YATES. They have some very good divining rods, too.

Mr. EVANS. I hope you make that available to the people of Colorado because we would sure like to find some additional water.

Mr. YATES. Mr. Duncan?

Mr. McDade?

I have one more question. Pages 1–11 of your justifications shows that you expect to spend $65 million in 1977 for an off-reserve Navy pipeline system and $48 million in 1978, somewhat over $100 million. What happens to this expenditure if the final environmental statement for Elk Hills isn't completed by October 1? Do you still need all that money?

Captain NELSON. Yes, sir, we will still need all that money. It would just slightly delay the actual spending.

Mr. YATES. Thank you very much, Captain.

MONDAY, FEBRUARY 28, 1977.

GEOLOGICAL SURVEY

WITNESSES

WILLIAM D. BETTENBERG, ACTING ASSISTANT SECRETARY—ENERGY AND MINERALS
VINCENT E. McKELVEY, DIRECTOR
WILLIAM A. RADLINSKI, ASSOCIATE DIRECTOR
JAMES R. BALSLEY, ASSISTANT DIRECTOR—LAND RESOURCES
MONTIS R. KLEPPER, ASSISTANT DIRECTOR—ENERGY AND MINERALS
HENRY W. COULTER, ASSISTANT DIRECTOR—ENVIRONMENTAL CONSERVATION
DALE D. BAJEMA, ASSISTANT DIRECTOR—PROGRAM ANALYSIS
EDMUND J. GRANT, ASSISTANT DIRECTOR—ADMINISTRATION
JOSEPH S. CRAGWALL, CHIEF HYDROLOGIST
ROBERT M. LYDDAN, CHIEF, TOPOGRAPHIC DIVISION
RICHARD P. SHELDON, CHIEF GEOLOGIST
RUSSELL C. WAYLAND, ACTING CHIEF, CONSERVATION DIVISION
ROBERT H. HAMILTON, CHIEF, OFFICE OF EARTHQUAKE STUDIES
GEORGE D. DEBUCHANANNE, CHIEF, OFFICE OF RADIOHYDROLOGY
JACK J. STASSI, BUDGET OFFICER
FRANCIS M. WILES, DIRECTOR OF BUDGET, OFFICE OF THE SECRETARY
TERENCE EDGAR, DEPUTY CHIEF, OFFICE OF MARINE GEOLOGY
MILTON HACKETT, ASSOCIATE CHIEF HYDROLOGIST
DALE ZIMMERMAN, CHIEF, DIVISION OF MINERAL RESOURCES, BUREAU OF LAND MANAGEMENT

INTRODUCTION OF WITNESSES

Mr. YATES. The committee is called to order.

We are pleased again to have the hearing on the appropriations for the Geological Survey.

Appearing in support of that appropriation for fiscal year 1978 are the following: First of all we have Mr. William Bettenberg, who is Acting Assistant Secretary on Energy and Minerals for the Department of the Interior.

Then we have our friend, Mr. McKelvey, who is the Director of the Geological Survey, and Mr. Radlinski who is Associate Director and Mr. Balsley, Assistant Director for Land Resources; Mr. Klepper, Assistant Director for Energy and Minerals; Mr. Coulter, Assistant Director for Environmental Conservation; Mr. Bajema, Assistant Director for Program Analysis; Mr. Grant, Assistant Director, Administration; Mr. Cragwall, Chief Hydrologist; Mr. Lyddan, Chief, Topographic Division; Mr. Sheldon, Chief Geologist; Mr. Wayland, Acting Chief, Conservation Division; Mr. Hamilton, Chief, Office of Earthquake Studies; Mr. Debuchananne, Chief, Office of Radiohydrology; Mr. Stassi, Budget Officer, and Mr. Wiles, Director of Budget, Office of the Secretary.

STATEMENT OF MR. McKELVEY

Now we have Mr. McKelvey's statement which may go into the record at this point together with the justifications.

[The statement follows:]

STATEMENT OF V.E. McKELVEY, DIRECTOR, U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR, BEFORE THE HOUSE SUBCOMMITTEE ON APPROPRIATIONS FOR THE DEPARTMENT OF THE INTERIOR AND RELATED AGENCIES

Mr. Chairman and Members of the Committee:

I am glad to discuss with you the fiscal year 1978 budget proposal for the Geological Survey. The proposal involves two appropriations: Surveys, Investigations, and Research, for those programs which provide basic scientific data about the Nation's land, water and mineral resources, and for mineral evaluation and lease management activities on Federal and Indian lands, and a new appropriation entitled, Petroleum Reserves, which concerns exploration of the National Petroleum Reserve in Alaska (NPRA). The total Petroleum Reserve budget request, which would be for Funds Appropriated to the President, includes activities of the Department of the Navy and Federal Energy Administration in other areas. This budget request, however, addresses only that part of the appropriation concerned with the Geological Survey's work on NPRA.

The FY 1978 budget request for Surveys, Investigations, and Research is $353.6 million, an increase of $38.2 million over FY 1977. The increase consists of $38.8 million in net program increases; $1.8 million for increased pay, space, and employee compensation payments, and a decrease of $2.4 million representing funds made available in FY 1977 for the one-time replacement and repair of items damaged or destroyed in a fire at the Survey's Denver, Colorado, facility. Under the new appropriation for Petroleum Reserves, the Survey is requesting $209.5 million to continue the program initiated by the Department of the Navy to explore and assess the oil and gas potential of the National Petroleum Reserve in Alaska.

The major program increases and decreases in the FY 1978 request are listed in Exhibit 1. Let me summarize them.

SURVEYS, INVESTIGATIONS, AND RESEARCH

In recent years, the Survey's proposals for program expansion have been oriented largely toward the management of energy resource development on Federal lands and toward the assessment and identification of new sources of energy commodities. While these programs should, and are proposed to, continue with modest reinforcement, major new thrusts in the Survey's FY 1978 budget request address other important problems on which work has not progressed at rates adequate to meet national needs. Thus, the FY 1978 program strengthens the Survey's capabilities to prepare and disseminate topographic maps and related data in a

EXHIBIT 1

SUMMARY OF GEOLOGICAL SURVEY'S INCREASES AND DECREASES IN THE FY 1978 BUDGET REQUEST

SURVEYS, INVESTIGATIONS, AND RESEARCH

Topographic Surveys and Mapping	
Quadrangle Mapping and Revision	+ $ 3.5 million
Modernization of Mapping Technology	+ $ 3.0 million
Intermediate Scale Mapping	+ $ 3.0 million
Geologic and Mineral Resource Surveys and Mapping	
Earthquake Hazards Reduction	+ $16.3 million
Mineral Lands Assessment (including Wilderness)	+ $ 3.3 million
Coal Exploratory Program	+ $ 2.0 million
Reactor Hazards Research	+ $ 0.5 million
Volcano Hazards	+ $ 0.3 million
Regional Mapping and Analysis	- $ 1.5 million
Water Resources Investigations	
Baseline Water Quality	+ $ 1.4 million
Federal/State Coop Program (coal hydrology and water use data)	+ $ 2.1 million
Nuclear Energy Hydrology	+ $ 0.7 million
National Water Data Exchange (NAWDEX)	+ $ 0.4 million
Coal Hydrology	+ $ 0.2 million
Oil Shale Hydrology	- $ 0.07 million
Conservation of Lands and Minerals	
Regulation of OCS Operations	+ $ 2.0 million
OCS Seismic Risk and Sea Bottom Stability Studies	+ $ 1.4 million
Coal Regulation of Operations	+ $ 0.4 million
Land Information and Analysis	
Land Resource Data Applications	+ $ 0.25 million
General Administration	- $ 0.18 million
Facilities	+ $ 2.2 million

PETROLEUM RESERVES

National Petroleum Reserve in Alaska	
Exploration and Assessment	+ $196.0 million
Barrow Area Gas Exploration, Development, and Production	+ $ 11.5 million
Environmental Restoration	+ $ 2.0 million

timely manner in response to a wide variety of demands by planners and managers at all levels. It provides for substantial increases in efforts to study and mitigate damage from earthquakes and volcanic eruptions. It also reflects the growing national appreciation of the constraints the environment places on man's activities. Data to be collected in the proposed FY 1978 programs for OCS Seismic Risk and Ocean Bottom Stability, Reactor Hazards Research, Nuclear Hydrology and Baseline Water Quality will assist in better defining the nature of these constraints and provide basic data for uses ranging from the design of production rigs in the OCS to the storage of nuclear wastes. The FY 1978 request also recognizes the need to accelerate the assessment of mineral resources, including potential resources in areas proposed for designation as Wilderness Areas.

Highlights of the proposed FY 1978 budget in areas of increase are as follows:

Topographic Surveys and Mapping

The FY 1978 budget request for Topographic Surveys and Mapping is $59.8 million, a program increase of $9.5 million over FY 1977.

The increase will provide $1.5 million for expanded production of 1:24,000 scale topographic maps, $2.0 million for the acceleration of map revision, $3.0 million for multipurpose intermediate-scale base maps, and $3.0 million for much needed modernization of mapping technology. The increase is directed toward a National Mapping Program goal of providing accurate and consistent multipurpose base maps and related cartographic data to meet the needs of Federal, State, and local agencies. This effort to expand Survey's mapping capabilities and activities in order to meet more of the Nation's mapping requirements is in accord with the findings of the OMB Federal Mapping Task Force.

The Geological Survey's topographic maps and related data are used in a wide range of Federal, State, and local programs to meet the needs of planners and managers, and provide bases on which to plot other data. They are basic tools for land-use studies, Environmental Impact Statements, coastal area planning and management, county and local planning, flood insurance mapping, geologic mapping, mineral exploration, and many other activities.

Specific Federal agency applications include the Fish and Wildlife Service's Wetland Inventory program, the Department of the Interior's OCS and Federal lands resources management programs, the Soil Conservation Service's Prime and Unique Farmlands Program, State geologic mapping programs, and the Department of Defense's domestic training programs. Demands for such mapping products continue to grow.

The increase for FY 1978 will allow the Geological Survey to meet more priority map needs with increased output of the standard 1:24,000 scale mapping program in the coastal zone and known recoverable coal resource areas. By the end of FY 1977, about 69 percent of the conterminous United States will be mapped at the 1:24,000 scale.

The proposed program for FY 1978 provides for the revision of maps that have become out-of-date due to additions and changes in roads, buildings, stripmines, water features, shorelines, and boundaries. Current, up-to-date maps are required to support planning and decision-making in critical areas of change such as coastal areas, Standard Metropolitan Statistical Areas, and energy-related areas. The increased funding in FY 1978 also will allow the acquisition of various new modern mapping instrumentation to accelerate the map making process and provide a new generation of mapping products including map data in digital form and improved orthophoto products.

Geologic and Mineral Resource Survey and Mapping

The FY 1978 budget request for Geologic and Mineral Resource Surveys and Mapping is $119.4 million, an increase of $19.3 million. The request provides $16.3 million for program increases in Earthquake Hazard Reduction, $0.3 million for the upgrading of volcano monitoring networks on Mauna Loa, $0.5 million for acceleration of studies related to nuclear reactor siting, $1.3 million for the acceleration of mineral assessments of Wilderness lands, $2.0 million for a new program thrust to perform mineral assessments in the counterminous United States, $2.0 million for increased efforts to assess coal resources on Federal lands, and a $1.5 million reduction in Regional Geologic Mapping and Analysis.

The increase for Earthquake Hazards Reduction is the Geological Survey's element of a joint program of research with the National Science Foundation, recommended by a select advisory panel in a detailed report to the President's Science Advisor on September 15, 1976. The Survey's proposal provides for increased efforts in delineating and evaluating earthquake hazards with particular emphasis on areas of high seismic risk in California, Washington, Utah, and Nevada; research in earthquake prediction and the installation of experimental prediction instrumentation along the San Andreas fault near Los Angeles and San Francisco; and the refitting and maintenance of stations on the Worldwide Standard Seismograph Network with a modest expansion of the activities of the National Earthquake Information Service. The proposed increase provides a balanced program within the Survey between risk avoidance (hazard evaluation as an input to land-use planning) and risk mitigation (prediction efforts in densely populated areas). The program is also in balance with related activities of the National Science Foundation in earthquake engineering and socio-economic impacts.

The $0.3 million increase for Volcano Hazards Reduction is designed to put additional instrumentation on Mauna Loa to predict more accurately the major eruption that is expected in 1978 as determined from studies of the past eruptive history and the continuing physical changes observed in recent months.

The proposed increase of $0.5 million for Reactor Hazards Research is for regional geologic studies in the Eastern United States to support the review and evaluation of proposed nuclear reactor sites on behalf of the Nuclear Regulatory Commission. The Survey has performed over 100 of these reviews during the last 12 years.

The increases for mineral lands assessment are requested to enable the Geological Survey to meet the requirements of the Wilderness Act and to initiate regional mineral resource appraisals in the conterminous United States similar to those conducted under the Alaskan Mineral Resource Appraisal Program (AMRAP).

The $2.0 million increase for coal resource assessment is proposed for the coal exploratory program called for by the Federal Coal Leasing Amendments Act of 1975, which became effective in August 1976. The Secretary submitted the plan for this program to the Congress earlier this month as required by the Act.

Water Resources Investigations

The FY 1978 budget request for Water Resources Investigations is $68.6 million, an increase of $4.9 million over FY 1977. The request proposes $1.4 million for program increases for Baseline Water Quality; $0.4 million for the National Water Data Exchange; $2.1 million for the Federal/State Cooperative Program; $0.2 million for Coal Hydrology; $0.7 million for Nuclear Energy Hydrology, and a decrease of about $0.1 million in Oil Shale Hydrology.

The $1.4 million increase for Baseline Water Quality is required to add 100 stations to the National Stream Quality Accounting Network (NASQAN) increasing the network to 445 of the estimated design size of 525 stations. Data from the existing stations of the NASQAN were analyzed in the seventh annual report on environmental quality by the Council on Environmental Quality, and led the Council to say that the installation of the networks marked a milestone in water quality monitoring, giving for the first time a uniform capability to observe gross geographic patterns of water quality for the entire United States.

The proposed increase of $0.7 million for Nuclear Energy Hydrology addresses specifically the potential degradation of the environment associated with the disposal of low-level radioactive wastes and provides for analysis of the movement of radioactive materials in the hydrologic regime at two of the six waste disposal sites.

The $2.1 million proposed increase for the Federal/State Cooperative program--which involves 580 State, county, and local cooperators--will provide $1.0 million for the collection and analysis of water use data to fill a significant need for information bearing on water supply and demand problems as alternate uses of water become more competitive. The balance of the request will allow additional support for cooperative studies involving water needs for coal development, including coal conversion and transportation as well as coal extraction and land reclamation.

In the Federal program for coal hydrology, the studies of the availability of water from the Madison Limestone Aquifer have been advanced with the completion of the first test well at a depth of 4,355 feet; a second well is nearing completion. The $0.2 million proposed increase is needed to reinforce the acquisition of baseline water data in coal leasing subregions, identified by the Bureau of Land Management, to monitor changes in the hydrologic regime arising from coal development.

The National Water Data Exchange (NAWDEX), which is designed to provide a central point of access to information regarding the water data holdings of the numerous Federal and State agencies that collect water data, was implemented in FY 1976 and continues to expand its membership. The increase for NAWDEX of $0.4 million is requested to manage and disseminate data, provide increasing levels of user assistance, and improve guidelines and standards for handling and exchanging water data among member organizations.

Conservation of Lands and Minerals

The FY 1978 budget request for this activity is $72.2 million, a proposed increase of $4.1 million over the FY 1977 level. The request provides for an increase of $2.0 million to support Regulation of OCS Operations, $1.4 million for OCS Seismic Risk and Ocean Bottom Stability Studies, and $0.4 million for Regulation of Operations on coal leases on Federal lands.

The number of active OCS leases increased by 26% in FY 1976 and will increase by an estimated 13% in FY 1977. The $2.0 million increase for Regulation of OCS Operations is mainly required to respond to additional workload arising from previous lease sales off Alaska, the east coast, the west coast, and in the Gulf of Mexico.

Additionally, the Survey is proposing a $1.4 million program to analyze seismic risk and ocean bottom stability in present as well as proposed leasing areas to address engineering design in light of problems of environmental hazards. Previous efforts properly have dealt with the potential impacts of human activities on the environment but have not adequately addressed the potential hazards the OCS environment poses to human operations there.

The $0.4 million increase for Regulation of Operations on leased coal lands is required to expedite approval of mine plans on lands already under lease and to implement the provisions of new mining regulations (30 CFR 211) and the Federal Coal Leasing Amendments Act of 1975.

Land Information and Analysis

The FY 1978 budget request for this activity is $18.0 million, an increase of $0.3 million over FY 1977.

The requested increase, for Land Resource Data Applications, responds to increasing demands by the nonscientific user community for Survey technical information in interpreted formats. The Coastal Zone Management Act Amendments and other legislation have increased the challenges in communicating the Survey's findings to a concerned constituency in a manner in which those findings can be understood and employed in making decisions. The increase will be used to design additional specialized products and means of employing technical and scientific information in land-use planning and decisionmaking at State and local governmental levels.

In other activities in the Land Information and Analysis activity, the Survey is working to improve the Environmental Impact Analysis process required under NEPA by streamlining the preparation of Environmental Impact Statements (EIS), investigating improved methodologies for impact analysis, preparing guidance manuals and training programs for EIS teams, and documenting scientific results in EIS preparation and review efforts.

Facilities

The FY 1978 request is for $11.7 million, an increase of $2.2 million over FY 1977. The increase consists of $1.8 million for standard level user charges, facilities management and special building services, and $0.4 million for increased GSA space costs.

PETROLEUM RESERVES

The Survey's FY 1978 budget proposal of $209.5 million for NPRA exploration is a continuation of the program being conducted by the Department of the Navy which will be transferred to the Department of the Interior on June 1, 1977. The funds will be used to explore and assess the oil and gas potential of NPRA; to continue the supply of natural gas to native communities and Federal installations in the Point Barrow area; and to continue the program of environmental restoration in NPRA by removing debris left during previous operations.

While the request for the exploration of NPRA is based on firm assumptions made by the Department of the Navy regarding the level of effort that will be required, these assumptions may be altered by the results of current drilling in the north-eastern section (Zone A) of the reserve, as well as by new seismic exploration which will be completed between now and FY 1978. For example, the FY 1978 proposal provides for confirmation wells to be drilled in Zone A of the Reserve if wells drilled there in FY 1977 reveal the presence of oil and gas. If no oil or gas is found, the confirmation wells will not be drilled.

The FY 1978 proposal also provides for the initiation of exploration activities in other zones of the reserve. During FY 1977, the Department of the Navy is preparing the EIS which is required before the Survey's exploration activities may begin outside of Zone A in FY 1978.

That concludes description of the main features of our FY 1978 budget proposal.

RECENT DEVELOPMENTS

Before closing, Mr. Chairman, I would like to touch briefly on some recent developments that may be of interest to the Committee.

At our last appropriations hearing, members of the committee inquired about the level of international cooperation in earthquake prediction. A scientific delegation from the United States has since visited the Peoples Republic of China to study the basis for the successful prediction and evacuation activities that preceded the Haicheng earthquake of February 4, 1975. The visit was informative and we look forward to additional opportunities to learn about PRC approaches to earthquake prediction. It appears, however, that the development of a continuing cooperation program is dependent on further progress in the diplomatic field. Cooperative programs with Japan and the USSR are both active and fruitful.

At our last hearing, we also discussed the 35 centimeter uplift discovered in December 1975 in the Palmdale area of Southern California along the San Andreas Fault. Subsequently, we found that a broad area southeast of Palmdale had risen by as much as 45 centimeters. Just recently, Los Angeles County completed a new survey showing that Palmdale has sunk 18 centimeters in the last two years. We are unable to interpret these movements in terms useful in specific earthquake prediction, but we are convined that they reflect accumulating strain in an area that has been seismically quiet for 120 years, and that they are a basis for deep concern about the imminence of a great earthquake in this region.

During the last year, the Survey completed a prototype intensive river-quality assessment of the Willamette River in northwestern Oregon. The study was cited in a GAO report entitled Better Data Collection and Planning is Needed to Justify Advanced Waste Treatment Construction as an example of the kind of study which should be completed before multimillion dollar commitments are made to construct advanced waste treatment facilities. Estimates of the potential savings in the Willamette Basin run in tens of millions of dollars compared with a study cost of $500,000.

On November 6, 1976, a Pennzoil production rig in the Gulf of Mexico lost foundation support, toppled, sank, and disappeared as a result of a gas blowout. There were no personal injuries or pollution, but the event reinforces the need for better understanding of the combination of circumstances which lead to such failures. The experience shows that better drilling procedures and better information on sea bottom stability conditions are essential.

Substantial progress has been made in addressing the royalty accounting problems which were a significant issue in the Survey's FY 1977 budget request. Approximately 90 percent of all royalty statements are now mailed directly to lessees from the National Center, expediting the accounting for and deposit of royalty payments to the Treasury. In addition, the computer-based accounting system relieves manual reporting requirements by petroleum companies by allowing direct input from magnetic computer tape.

I am also pleased to report that the procurement of the digital image processing system at the EROS Data Center will be completed in FY 1977 and will be operational in FY 1978. This unique facility will allow the production of Landsat imagery products of significantly higher quality compared to current products and in substantially reduced time. We have also increased the price of products sold at the Center as part of an effort to recover the full costs of reproduction and distribution of such materials.

There is no need for me to report as a recent development the disastrous turn of the weather this year, for that is well known to everyone. Its ramifications in accentuating the shortage of natural gas with attending hardships from loss of industrial production, unemployment and plain discomfort, and in impending floods and drought, have been, and will be, far reaching in their effects. I call attention to it because it will call on nearly the full range of the Survey's capabilities and is bound to focus much of our efforts during the coming and following years--for example, in the appraisal of energy resources; the supervision of exploration and production on Federal lands; the assessment of water supplies, drought potential, and flood hazards and damage; and research on climatologic trends.

CONCLUSION

Mr. Chairman, these recent developments have occurred since the main lines of the FY 1978 budget proposal were first shaped several months ago. Nevertheless, they confirm the needs recognized in the preparation of the FY 1978 proposals, and emphasize the Nation's dependence on the earth and its resources. They highlight also the importance of the earth resource information gathering and research and Federal mineral management activities for which the Geological Survey is responsible.

This Committee and the Congress have been responsible in large part for the development of the Survey's ability to cope with problems in the earth resource field and we look forward to our discussions now of our FY 1978 proposals. I will be glad to answer your questions.

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Comparison of FY 1978 Appropriations Proposals
(Dollars in thousands)

Appropriation/Activity	Proposals to the Department May 15, 1976 Priority A	Priority B	Priority C	Priority D	Departmental Submission to OMB Total thru Nov 4, 1976	Subsequent Request for Pay Raise Requirements	Total Submission To OMB	President's Budget Submission to Congress January 1977
Surveys, Investigations, and Research: Alaska Pipeline Related Investigations	$ 321	$ 321	$ 321	$ 321	$ 321	$ 12	$ 333	$ 333
Topographic Surveys and Mapping	50,482	54,482	59.982	64,482	57,912	1,890	59,802	59,802
Geologic and Mineral Resource Surveys and Mapping	91,552	96,252	109,452	128,452	118,976	3,514	122,490	119,390
Water Resources Investigations	61,182	63,782	67.282	73 682	66,475	2,178	68,653	68,579
Conservation of Lands and Minerals	74,779	78,579	86,779	88,079	73,677	1,720	75,397	72,225
Land Information and Analysis	21,497	23,497	29,997	37,097	17,817	419	18,236	17,986
General Administration	3,647	3,647	3,647	3,647	3,844	143	3,987	3,587
Facilities	9,448	9,448	9,448	9,448	11,688	32	11,720	11,720
Total, Surveys, Investigations and Research	312,908 a/	330,008 a/	366,908 a/	405,208 a/	350,710	9,908	360,618	353,622
National Petroleum Reserve	185,284	185,284	185,284	185,284	209,541	--	209,541	209,541
TOTAL	498,192	515,292	552,192	590,492	560,251	9,908	570,159	563,163

a/ The proposal to the Department was based on the FY 1977 request to Congress. Subsequent to the request to the Department, but prior to the OMB request, amendments and Congressional add-ons in the amount of $21,588 thousand were made to the FY 1977 request. These adjustments make a comparison between the requests to the Department, OMB and Congress difficult.

1/24/77

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SURVEYS, INVESTIGATIONS, AND RESEARCH
(Dollars in thousands)

Employment 1977

Authorized Positions (S.I.R. Permanent)	7,570
Man Years of Employment (Total)	12,015 (Est.)
End of Year Employment (S.I.R. Permanent)	7,570 (Est.)

Appropriation 1977 - 1978

Appropriation, 1977			$315,455 a/
Inflation:			
Pay Increases	$ +349		
SLUC Rate Increase	+1,214		
Total Inflation		$+1,563	
Major Program Changes:			
Quadrangle Mapping	+1,500		
Quadrangle Revision	+2,000		
Modernization of Mapping Tech.	+3,000		
Intermediate Scale Mapping	+3,000		
Earthquake Hazards Reduction	+16,300		
Regional Mapping & Technology	-1,500		
Wilderness Mineral Surveys	+1,300		
Conterminous States Min. Surveys	+2,000		
Coal Resource Investigations	+2,000		
Data Collection and Analysis	+1,400		
Federal-State Coop Program	+2,100		
Nuclear Energy Hydrology	+700		
Regulation of OCS O&G	+2,000		
OCS Seismic Risk/Ocean Bottom	+1,400		
Standard Level User Charges	+820		
Facilities Management	+964		
National Petroleum Reserve	-1,800		
Denver Fire	-2,400		
Total Major Program Changes		+34,784	
All Other		+1,820	
Total Changes			+38,167
Appropriation Request, 1978			353,622

a/ Includes pay cost supplemental pending of $9,559 thousand.

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SURVEYS, INVESTIGATIONS, AND RESEARCH
(Dollars in thousands)

Employment 1976

Authorized Positions (S.I.R. Permanent)	7,036
Man Years of Employment (Total)	11,601
End of Year Employment (S.I.R. Permanent)	7,025

Appropriation 1976 - 1977

Appropriation, 1976			$272,836
Inflation:			
Pay Increases	$+11,832		
SLUC Rate Increase	+950		
Total Inflation		$+12,782	
Major Program Changes:			
Quadrangle Mapping and Revision	-1,200		
Small Scale and Special Mapping	+2,200		
National Cartographic Info. Center	+1,291		
Earthquake Hazards Reduction	-1,100		
Environmental Aspects of Energy	+1,200		
Regional Mapping and Analysis	-1,688		
Alaskan Mineral Surveys	+800		
Coal Hydrology Studies	+1,800		
Regulation of OCS O&G	+1,512		
OCS O&G Tract Sel. & Eval.	+6,333		
Reserve Inventory of OCS O&G Fields	+1,300		
Regulation of Fed. & Ind. O&G	+5,484		
Regulation of Fed. & Ind. Coal	+2,108		
Class.& Eval. of Fed. & Ind. Coal	+5,070		
EROS Digital Data Proc. System	+1,000		
EROS Landsat Equipment	-2,000		
National Petroleum Reserve	+1,800		
Denver Fire	+2,400		
Total Major Program Changes		+28,310	
All Other		+1,527	
Total Changes			+42,619
Appropriation,1977			315,455 a/

a/ Includes pay cost supplemental pending of $9,559 thousand

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SURVEYS, INVESTIGATIONS, AND RESEARCH
(Dollars in thousands)

Employment 1975

Authorized Positions (S.I.R. Permanent)	6,790
Man Years of Employment (Total)	10,463
End of Year Employment (S.I.R. Permanent)	6,772

Appropriation 1975 - 1976

Appropriation 1975			$251,546
Inflation:			
Pay Increases	$+7,418		
Total Inflation		$ +7,418	
Major Program Changes:			
Earthquake Hazards Reduction	+1,100		
Mineral Resource Information System	+1,000		
Mineral Surveys in Alaska	+1,000		
Coal Resource Assessment	+750		
O&G Resource Appraisal Offshore	+1,303		
Oil Shale Hydrology	+800		
Coal Hydrology - Madison Acquifer	+2,000		
Regulation of OCS O&G	+2,480		
OCS O&G Tract Sel. & Eval.	+1,420		
Regulation of Fed. & Ind. O&G	+1,630		
EROS Landsat Equipment	+2,000		
Total Major Program Changes		+15,483	
All Other		-1,611	
Total Changes			+21,290
Appropriation, 1976			272,836

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SURVEYS, INVESTIGATIONS, AND RESEARCH
(Dollars in thousands)

Employment 1974

Authorized Positions (S.I.R. Permanent)	5,964
Man Years of Employment (Total)	9,421
End of Year Employment (S.I.R. Permanent)	5,963

Appropriation 1974 - 1975

Appropriation, 1974			$ 172,324
Inflation:			
Pay Increase	$+6,766		
Reduction for one time pay costs	-1,442		
Total Inflation		$+5,324	
Major Program Changes:			
Geothermal Investigations	+6,245		
Class. & Eval. of Geothermal Resources	+805		
Regulation of Geothermal Operations	+855		
Energy Impact Evaluation	+2,600		
Orthophotoquad Production	+1,901		
Advanced Mapping Technology	+3,000		
Seismic & Geomagnetic Observations	+2,405		
Environmental Geology - Onshore Energy	+4,500		
Coal Environmental Analysis	+900		
Oil & Gas Resource Invest. - Onshore	+3,415		
Uranium/Thorium Resource Assessment	+2,850		
Energy Resources Data System	+1,400		
Alaska Mineral Resource Appraisal	+1,300		
Oil and Gas Resource Invest. - Offshore	+3,800		
Energy Related Offshore Environ. Prob.	+1,200		
Energy Related Offshore Expl. Assess.	+2,625		
Baseline Water-Quality Data	+1,800		
Oil Shale Hydrology	+1,200		
Coal Hydrology	+1,200		
Regulation of OCS Oil and Gas	+1,626		
Reg. of Fed. & Ind. Minerals	+850		
Class. & Eval. of Fed. & Ind. Coal	+1,380		
Reg. of Accelerated OCS O&G	+1,800		
Eval. of Accelerated OCS O&G	+8,700		
Completion of Studies - Sun Oil Lawsuit	-811		
Headquarters Lease Payments	+3,250		
Headquarters Oper. & Main.	+1,818		
Land Use Data and Analysis	+2,000		
Earth Resources Observation Systems	-755		
Reimbursement to GSA for Space & Serv.	+9,412		
Total Major Program Changes		+73,271	
All Other		+627	
Total Changes			+79,222
Appropriation, 1975			251,546

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SURVEYS, INVESTIGATIONS, AND RESEARCH
(Dollars in thousands)

Employment 1973

Authorized Positions (S.I.R. Permanent)	5,839
Man Years of Employment (Total)	9,094
End of Year Employment (S.I.R. Permanent)	5,839

Appropriation 1973 - 1974

Appropriation, 1973			$150,450
Inflation:			
Pay Increases	$+9,500		
Pay Increase-Retroactive	+1,442		
Total Inflation		$+10,942	
Major Program Changes:			
Energy Exploration Research	+1,035		
Federal-State Water Coop	+3,000		
Regulation of OCS O&G	+730		
OCS O&G Tract Selection & Evaluation	+1,040		
Reservoir Studies - Sun Oil Lawsuit	+811		
Earth Resources Observation Systems	-1,500		
Relocation of Operations to Reston, Va.	+5,700		
Total Major Program Changes		+10,816	
All Other		+116	
Total Changes			+21,874
Appropriation, 1974			172,324

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SURVEYS, INVESTIGATIONS, AND RESEARCH
(Dollars in thousands)

Employment 1972

Authorized Positions (S.I.R. Permanent)	5,759
Man Years of Employment (Total)	9,035
End of Year Employment (S.I.R. Permanent)	5,755

Appropriation 1972 - 1973

Appropriation, 1972			$131,050
Inflation:			
Pay Increase	$+5,135		
Total Inflation		$+5,135	
Major Program Changes:			
Geothermal Invest. and Eval.	+1,850		
Earthquake Hazards Reduction	+7,000		
Geologic Mapping of the OCS	+2,000		
Water Resources Investigations	+1,227		
Water Resources Investigations - Federal-State Coop	+1,000		
Earth Resources Observation Systems	+4,504		
Savings from Reduction in Personal Services	-6,192		
Total Major Program Changes		+11,389	
All Other		+2,876	
Total Changes			+19,400
Appropriation, 1973			150,450

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SURVEYS, INVESTIGATIONS, AND RESEARCH
(Dollars in thousands)

Employment 1971

Authorized Positions (S.I.R. Permanent)	5,615
Man Years of Employment (Total)	9,057
End of Year Employment (S.I.R. Permanent)	5,606

Appropriation 1971 - 1972

Appropriation, 1971			$114,603
Inflation:			
Pay Increase	$+2,329		
Total Inflation		$+2,329	
Major Program Changes:			
Missouri River Basin Studies Previously Funded by Bureau of Reclamation	+1,572		
Standard Quadrangle Mapping/NCIC	+1,800		
Geologic Mapping of Continental Shelf	+1,150		
Regulation of OCS O&G	+1,042		
Determination of OCS Maximum O&G Production Rate	+800		
OCS O&G Tract Selection & Evaluation	+1,608		
Earth Resources Observation Systems	+3,850		
Total Major Program Increases		+11,822	
All Other		+2,296	
Total Changes			+16,447
Appropriation, 1972			131,050

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SURVEYS, INVESTIGATIONS, AND RESEARCH
(Dollars in thousands)

Employment 1970

Authorized Positions (S.I.R. Permanent)	5,606
Man Years of Employment (Total)	8,975
End of Year Employment (S.I.R. Permanent)	5,460

Appropriation 1970 - 1971

Appropriation, 1970			$102,020
Inflation:			
Pay Increase	$+6,181		
Total Inflation		$+6,181	
Major Program Changes:			
Urban Pilot Area Studies	+450		
Alaska Pipeline Investigations	+600		
Standard Topo. Mapping/NCIC	+1,016		
Studies of Gold Bearing Regions	-1,000		
Water Resources Federal-State Coop	+1,398		
Water Resources Investigations	+707		
Regulation of OCS Oil and Gas	+1,394		
Earth Resources Observation Systems	+800		
Total Major Program Changes		+5,365	
All Other		+1,037	
Total Changes			+12,583
Appropriation, 1971			114,603

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SURVEYS, INVESTIGATIONS, AND RESEARCH
(Dollars in thousands)

Employment 1969

Authorized Positions (S.I.R. Permanent)	5,553
Man Years of Employment (Total)	9,019
End of Year Employment (S.I.R. Permanent)	5,544

Appropriation 1969 - 1970

Appropriation, 1969			$90,917
Inflation:			
Pay Increase	$+5,340		
Total Inflation		$+5,340	
Major Program Changes:			
Alaska Pipeline Investigations	+700		
Heavy Metals Program	-500		
National Water Data	+360		
Ground Water Appraisal	+380		
Repair of Stream Gaging Stations	-450		
Regulation of OCS Oil and Gas	+625		
OCS Tract Evaluation	+400		
Earth Resources Observation Systems	+3,900		
Total Major Program Changes		+5,415	
All Other		+348	
Total Changes			+11,103
Appropriation, 1970			102,020

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SURVEYS, INVESTIGATIONS, AND RESEARCH
(Dollars in thousands)

Employment 1968

Authorized Positions (S.I.R. Permanent)	5,712
Man Years of Employment (Total)	9,352
End of Year Employment (S.I.R. Permanent)	5,646

Appropriation 1968 - 1969

Appropriation, 1968			$ 86,919
Inflation:			
Pay Increase	$+2,319		
Total Inflation		$+2,319	
Major Program Changes:			
Quadrangle Mapping - Urban Areas	+350		
Oil Shale Resource Appraisal	+225		
Urban Area Flood Mapping	+290		
Repair of Stream Gaging Stations	+450		
Earth Resources Observation Systems	+200		
Total Major Program Changes		+1,515	
All Other		+164	
Total Changes			+3,998
Appropriation, 1969			90,917

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SURVEYS, INVESTIGATIONS, AND RESEARCH
(Dollars in thousands)

Employment 1967

Authorized Positions (S.I.R. Permanent)	5,549
Man Years of Employment (Total)	8,977
End of Year Employment (S.I.R. Permanent)	5,549

Appropriation 1967 - 1968

Appropriation, 1967			$ 81,609
Inflation:			
Pay Increase	$+1,420		
Total Inflation		$+1,420	
Major Program Changes:			
Quadrangle Mapping	+355		
Quadrangle Revision	+912		
Heavy Metals	+1,500		
Marine Geology	+300		
Water Resources Investigations	+824		
Water Resources Federal-State Coop	+1,290		
Travel Reduction	-500		
Total Major Program Changes		+4,681	
All Other		-791	
Total Changes			+5,310
Appropriation, 1968			86,919

PROBLEM AREAS

Mr. YATES. Mr. McKelvey, do you want to tell us how well the Geological Survey did last year? I know you have a long statement on it. We don't want to hear your statement because it is already in the record.

Tell us, do you have any particular problems that we ought to know about? Do you have any problems that money won't cure?

Mr. MCKELVEY. We have a long list of problems. For the benefit of our new administration we have prepared a briefing book, a copy of which I had given to the staff. Listed in the back of that are two or three pages of current problems.

NATIONAL PETROLEUM RESERVE IN ALASKA (NPRA)

Mr. YATES. Let's start with the first one.

The current problem, the preparation to take over the Navy's petroleum exploration programs of the national petroleum reserve in Alaska. What is the nature of that?

Mr. MCKELVEY. It is a very large effort, Mr. Chairman. It is an ongoing program now under the supervision of the Navy. We have to prepare to transfer that activity by June 1 and then supervise it. It is a very large order.

The program itself in fiscal year 1978 is projected to reach the level of $209.5 million. Considering the environment of the national petroleum reserve area, very hostile on the northeastern slope of Alaska, and then the assignment of exploratory drilling, we regard it as one of our most difficult tasks. But we are preparing for it.

SIZE OF NPRA

Mr. YATES. It is a large reserve, isn't it? This is Pet-4?

Mr. MCKELVEY. Yes, sir. It is an area the size of the State of Indiana.

Mr. YATES. Well, Indiana is not so large. Better Indiana than Texas.

Mr. MCKELVEY. 33,000 square miles, I believe.

PERSONNEL FOR NPRA

Mr. YATES. How many people does the Navy now have doing this work?

Mr. MCKELVEY. I believe about half a dozen.

Mr. YATES. And you are going to be able to do it with six people, too?

Mr. MCKELVEY. No. We are asking for a staff of 27.

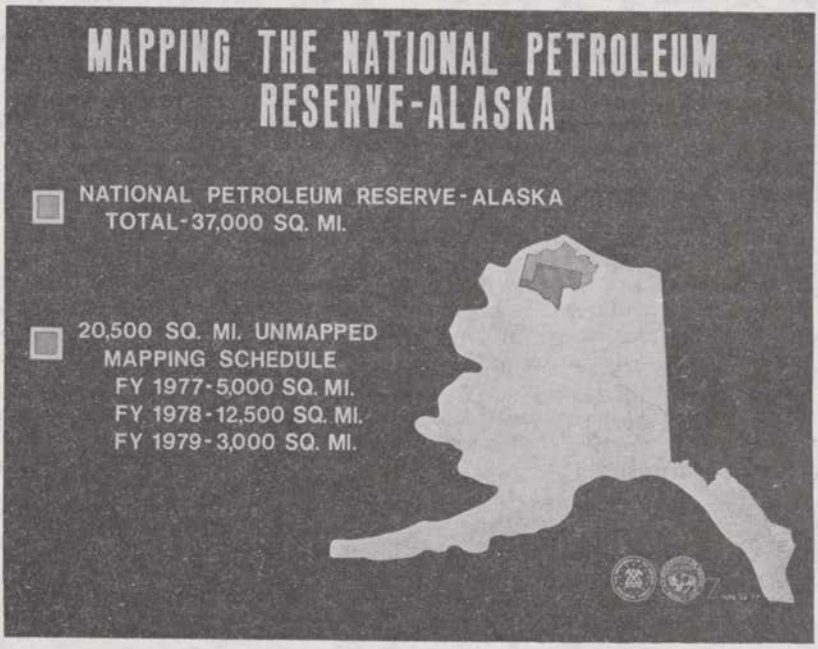
Mr. YATES. What are the extra 21 people for?

Mr. MCKELVEY. Well, the Navy itself had asked for additional people, but because of the transfer coming up, they had not pressed it. Also, they are able to draw on other personnel, uniformed personnel in the Navy to supplement the activity they have.

Also we will be taking over the exploration strategy, part of the task which the Navy had done through its contractors up until now.

MAPPING OF NPRA

Mr. YATES. You have a chart which has been displayed.
[The chart follows:]



This chart shows the general status of mapping within the National Petroleum Reserve in Alaska at scales needed to support exploration and development activities.

Mr. YATES. It shows up in the north the National Petroleum Reserve in Alaska, the total of 37,000 square miles. You have just added 4,000 square miles over Mr. McKelvey's statement. He had 33,000 square miles. So I guess we better not ask any more.

Mr. MCKELVEY. Maybe I was thinking of the size of the State of Indiana.

Mr. YATES. That shows 20,500 square miles are unmapped. That leaves 17,000 miles that are mapped.

Mr. MCKELVEY. Correct.

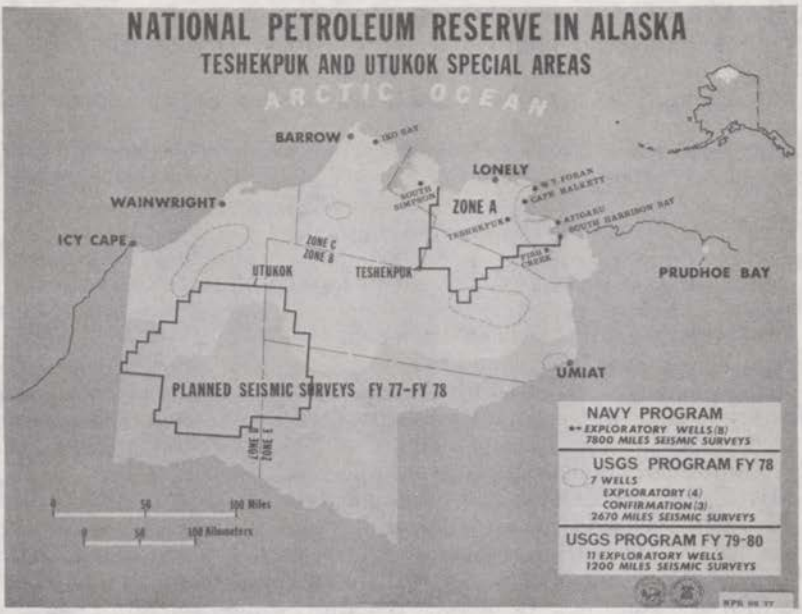
Mr. YATES. Then you have a mapping schedule showing you will map 5,000 square miles in 1977 and 12,500 in 1978 and 3,000 square miles in 1979. And you are going to be able to do that with 27 people?

Mr. MCKELVEY. The people that will be involved in that are not counted. This is done as part of our Topographic Division's activity.

NPRA ZONE A

Mr. YATES. We now have the exhibit which is zone A. What is zone A?

[The chart follows:]



This chart displays the current status of the Navy's evaluation and assessment program and the Geological Survey's planned program through fiscal year 1980.

Mr. McKelvey. Zone A is the area covered by an environmental impact statement in support of the ongoing exploratory program. That is the area where the Navy is presently drilling and where some additional holes may be drilled next year if there are discoveries in the wells already underway.

CIVILIAN HOLDINGS ON NPRA

Mr. Yates. Are there any civilan holdings in that area?

Mr. McKelvey. None that I am aware of.

Mr. Yates. The reason I asked the question is because of the possibility of civilian explorers tapping your reserves. There is no possibility of any outsiders tapping the Navy reserves here then?

Mr. McKelvey. Not presently.

Mr. Yates. Was it Elk Hills where you had Standard Oil on the outskirts?

Mr. McKelvey. In Elk Hills there is some privately held land within the broad area of the reserve. There is no possibility of that here. But in bordering areas there could be.

Mr. Yates. That is what I asked.

Mr. McKelvey. Prudhoe Bay is State land. That is under lease now, some of it.

Mr. Yates. Is there a possibility that Pet-4 reserves adjoin Prudhoe Bay's reserve or are there blockages between them?

Mr. McKelvey. That has been one of the hopes, of course, that the Prudhoe Bay trend might extend to NPRA. That is what the first drilling is designed at least in part to test.

Mr. Yates. That is probably what the Prudhoe Bay developers hope, too, isn't it?

Mr. McKelvey. Yes, sir, I am sure they would. But thus far it does not look as if that is likely.

OFFSHORE DRILLING

Mr. Yates. Is there any thought of having offshore drilling in that area?

Mr. McKelvey. It has been discussed.

Mr. Yates. Is it too difficult?

Mr. McKelvey. No, I think the State has made tentative plans for offshore leasing in the vicinity of Prudhoe Bay. I believe it has been discussed with respect to the offshore of NPRA. Perhaps I should ask Mr. Coulter to comment if you would permit.

Mr. Yates. Mr. Coulter, would you tell us what NPRA means?

Mr. Coulter. National petroleum reserve in Alaska. There is a State lease now working several miles offshore from an Ice Island drilling this winter. There is a call for nominations July 1977 in the Beaufort Sea on the present lease schedule.

Mr. Yates. Would you identify the Beaufort Sea on that chart, please?

Mr. Coulter. Right up in here.

Mr. Yates. That means northwest of Wainwright?

Mr. Bettenberg. That is off Prudhoe Bay.

Mr. Yates. Well, if there is any drilling offshore, you are going to do it then?

Mr. Mckelvey. No. The offshore drilling probably would be under the State.

Mr. Yates. You are talking about by the State off Prudhoe Bay. What about off of Pet-4?

Mr. McKelvey. I understand that land within the 3-mile limit is under State control.

Mr. Yates. Completely surrounding the State of Alaska?

Mr. McKelvey. Yes. If that is not correct, I hope Mr. Coulter will correct me.

Mr. Yates. Mr. Coulter shakes his head aye.

Mr. McKelvey. Beyond the 3-mile limit would be governed by the OCS Lands Act, I presume.

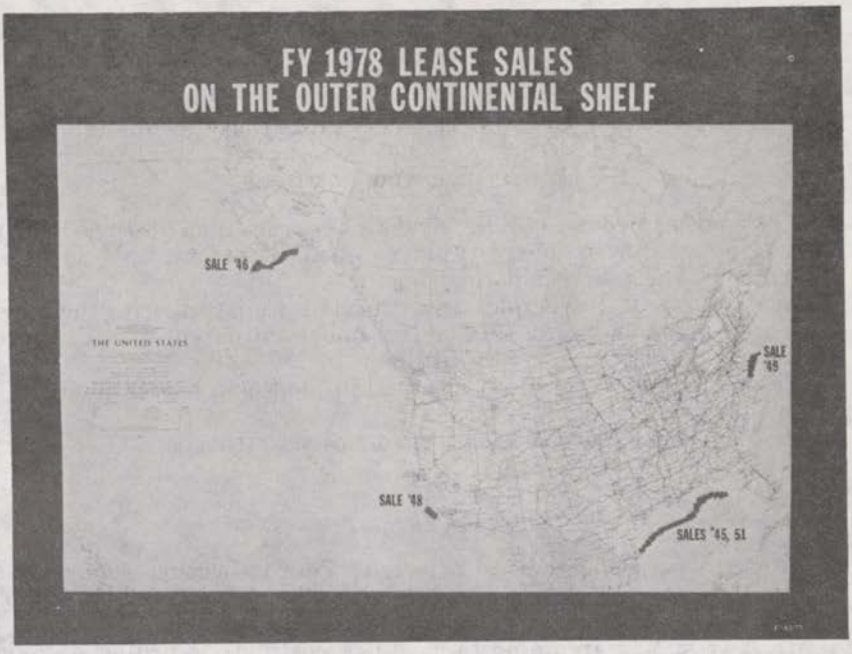
Mr. Yates. Is there a shelf out there?

Mr. McKelvey. Yes. I don't recall how wide it is, but there is a shelf—but—it is a very difficult environment, of course.

Mr. Yates. Yes. I would think it would be.

For the record we have a new chart or map showing the area of the shelf in pale blue surrounding the northern portion of it. I don't see that pale blue color to the west.

[The chart follows:]



The areas associated with the five proposed offshore oil and gas lease sales scheduled for the fiscal year 1978 are shown on this map.

Mr. McKelvey. Yes; it is very extensive. The shelf area of Alaska in total is extremely large, approaching that of the size of the State itself.

Mr. Yates. Will you have jurisdiction over the portion of the shelf that is beyond 3 miles?

Mr. McKelvey. That is correct.

Mr. Yates. And you are going to be able to supervise operations over that entire area with 27 employees?

Mr. McKelvey. No. The 27 employees apply only to the land area, the work planned in NPRA itself, onshore.

LOCATION OF PERSONNEL

Mr. Yates. Are any of the 27 employees for Washington or is this all for Alaska?

Mr. McKelvey. Three will be headquartered here and 11 in Menlo Park, Calif. The remainder, 13, will be headquartered in Anchorage, Alaska.

FUTURE ROLE OF NAVY AT NPRA

Mr. Yates. What happens to the Navy? Now you are to assume jurisdiction as of June 1, are you not?

Mr. McKelvey. Yes.

Mr. Yates. What happens; the Navy steps down?

Mr. McKelvey. That is correct, sir.

Mr. Yates. The Navy won't be in there any more?

Mr. McKelvey. No. Well, the ONR—Office of Naval Research—runs a laboratory at Barrow. Of course, that part of their operation will continue.

NAVAL ARCTIC RESEARCH LABORATORY

Mr. YATES. What is the nature of that laboratory?

Mr. MCKELVEY. It is an Arctic research institution. I am not personally acquainted with the kinds of activities that they undertake.

REQUEST FOR NEW POSITIONS

Mr. YATES. If you are taking over this operation as of June 1, why didn't you ask for your new employees in the supplemental? The bill may not have been signed by that time.

Mr. MCKELVEY. The employees we need in preparation for the takeover are funded under the 1977 budget under a different line. I believe we have in the 1977 budget $1.8 million.

Mr. YATES. Then you don't need additional employees? You have them onboard?

Mr. MCKELVEY. We will have them onboard by June 1.

Mr. YATES. I see. OK.

TRANSFER OF NAVAL PERSONNEL

Are Navy personnel to be transferred? Your indication is no, right?

Mr. MCKELVEY. Yes; there will be five slots transferred. I am not sure how many of them will come with people.

Mr. YATES. You are going to have five positions according to your justification. At G.S. 155 there are five positions to be transferred from the Navy on June 1?

GAS PRODUCTION FROM SOUTH BARROW FIELD

Mr. MCKELVEY. That is right. I mentioned the ONR activity because part of our responsibility given to us under the act is to produce gas from the South Barrow gas field for the community of Barrow and also for the laboratory. Our responsibility for that production stops at the point of outmetering from the reservoir or from the field.

From that point on, the laboratory has part of the responsibility for distributing the gas. That involvement will continue.

NAVY 5-YEAR EXPLORATION PLAN

Mr. YATES. The Navy had a 5-year plan, I guess it still has it?

Mr. MCKELVEY. That is right.

Mr. YATES. Are you going to change that or follow it?

Mr. MCKELVEY. We may change the strategy as the Navy itself might have done, based on the results of the drilling as it goes along. But the size of the program will continue, as directed by the act.

So we will continue the main aspects of the program even though, as I say, we may change exploration strategy depending on the results of the drilling.

NUMBER OF EXPLORATION WELLS

Mr. YATES. The Navy was contemplating drilling five exploratory wells. That is what they told us.

Mr. MCKELVEY. Five this year, that is correct. But next year the plan is for seven. The plan in total calls for 26 holes.

DRILLING OF WELLS

Mr. YATES. Who did the drilling? Has the Navy drilled the five?

Mr. MCKELVEY. They are in the process of drilling them. They have a contractor, the Husky Oil Co.

Mr. YATES. Will you use Husky, too?

Mr. MCKELVEY. Yes, we will, if they are willing to continue.

Mr. YATES. This is a change by the GS, isn't it?

Mr. MCKELVEY. Yes.

Mr. YATES. This is a new change of policy. Last year when I asked you about it, you didn't want to nationalize the oil industry, did you?

Mr. MCKELVEY. No, I did not want the responsibility for exploratory drilling nationally. I indicated that we would not object to drilling or having the funds to drill occasional exploratory holes, but that I did not think it would be appropriate for the Geological Survey to displace the petroleum expertise of the industry or to change itself into an exploratory organization.

But this assignment has been given to us. As I think I have assured you at other times, and in other conversations, that if we ever did have the responsibility, we would do our darndest to do it in the best possible way. That is what we will do here.

DISCOVERIES

Mr. YATES. Have any of the wells come in, any of the five?

Mr. MCKELVEY. I think only three have been completed and there have been no discoveries in zone A.

SOUTH BARROW GAS FIELD

There has been some drilling also in the gas field.

Just a week or so ago one of those wells did result in a discovery.

Mr. YATES. Where is the gas field?

Mr. MCKELVEY. I believe it is near Barrow.

Mr. MURTHA. Would the chairman yield?

Mr. YATES. Mr. Murtha?

Mr. MURTHA. How much did the three wells cost, the drilling?

Mr. MCKELVEY. Those were shallow wells. I don't think I could give you an estimate here, but Mr. Coulter may have it.

Mr. COULTER. The total Navy program this year is about $100 million. These are moderate depth wells. They are in the order of $10 million each.

Mr. MURTHA. Then you spent $10 million per well and didn't find a thing?

Mr. MCKELVEY. That is one of the reasons I never wanted to be a Government oil company.

Mr. MURTHA. Did you hear that, Mr. Chairman, they spent $10 million per well and didn't find anything.

Mr. YATES. Well, they struck gas. How much did you spend on gas?

Mr. MCKELVEY. The gas wells are much less expensive because they are shallow. This field is a shallow field, only about 2,000-feet deep. I think that they would be in the order of a couple of million dollars.

RESERVES IN SOUTH BARROW GAS FIELD

Mr. YATES. How much gas is in the reserve? Do you have any idea?

Mr. MCKELVEY. I don't believe—one of the things that we propose doing in 1978 when we take over responsibility is to undertake a reservoir analysis and come up with an estimate of reserves.

May I ask Mr. Coulter if there is any estimate?

Mr. YATES. Mr. Coulter, do you have any idea as to how much of a reserve has been encountered with that strike?

Mr. COULTER. With the present figures on a straight decline curve basis which is not the most definitive way of defining the reserves in the gas field, it looks as though there are 6 or 7 years of supply left at projected rates of usage in the Barrow area. But that is not a very dependable projection.

We would be most uncomfortable coasting along thinking we had 6 or 7 years' supply without making efforts to assure a future supply because that is it if the gas played out in the middle of the winter.

Mr. YATES. When you say 6 or 7 years' supply, it all depends on how much you use?

Mr. COULTER. That is right. I said projected usage.

Mr. YATES. How many billion or trillion cubic feet have you got there?

Mr. COULTER. The highest daily usage is about 3 million a day in the middle of winter. With about a 12 percent annual increase this gives you 5 to 6 years of supply.

So it is not an optimum situation. We would anticipate doing additional exploration and development in there to assure a long-range supply.

Mr. MCKELVEY. Three million a day would be roughly 1 billion cubic feet a year. Lasting 5 or 6 years, it would be 5 or 6 billion cubic feet. It is not a very large field.

Mr. YATES. Mr. McDade?

BARROW FIELD GAS PRODUCTION

Mr. MCDADE. Barrow is the point where the Navy had already brought a producing well into fruition, isn't it?

Mr. COULTER. The South Barrow field has been operating for about 10 years or so.

Mr. MCDADE. This is an existing area that has been producing gas for how long?

Mr. COULTER. Since about 1950.

Mr. MCDADE. What is the scope of your program—to try to define the amount of reserves that you have in this field?

Mr. COULTER. That is right.

Mr. MCDADE. You have not accomplished that yet?

Mr. COULTER. It has not been done to our satisfaction. What they have done is taken a long-range projection, taken the well pressures and the amount that has been produced and scaled that out over time and said, well, you have lost this much pressure for this many years of production and you have so much left.

Mr. MCDADE. You could have 10 times more or 10 times less?

Mr. COULTER. Absolutely.

Mr. MCDADE. You don't know yet?

Mr. COULTER. No sir, we don't.

NUMBER OF WELLS

Mr. McDade. How many wells do you have to put down to know?

Mr. Coulter. That is a matter of reentering the wells and getting bottom hole pressures and a comprehensive engineering analysis rather than this extrapolation procedure that the Navy used. There are 13 wells in the field now, about 6 good producers, a couple watered out, some of them dry holes.

So it takes a comprehensive engineering reservoir analysis to actually see what is there, what you can count on and what you need to look for to assure a supply in the future.

Mr. McDade. Supply for whom?

Mr. Coulter. For the village and the Government facilities.

GAS EXPLORATION

Mr. McDade. We are not talking about exporting gas?

Mr. Coulier. No. This is purely a local situation.

Mr. McDade. This is a local energy source consistent with the Navy operation at Barrow that began 15 years ago?

Mr. Coulter. Yes, and the village.

Mr. McDade. How many people in the village?

Mr. Coulter. 2,500.

CONTRIBUTION OF NPRA RESERVE TO NATION'S ENERGY NEEDS

Mr. McDade. When do we start attempting to define if that exists for the rest of the Nation? What have you done with respect to that so far? Are those the three holes that you drilled?

Mr. McKelvey. That is the purpose of the exploratory program that the Navy planned, to give an indication of the magnitude.

Mr. McDade. What can you tell us about that? What does it look like so far? What can you tell us about the Lower 48 and the gas crisis? What does this look like from the standpoint of future reliance on the part of the Nation?

Mr. McKelvey. With respect to what its contribution would be nationally?

Mr. McDade. Pet-4 and the areas you are working in?

Mr. McKelvey. There have been a wide range of estimates with respect to the potential in the NPRA ranging from 3 billion barrels to 33 billion and upward, actually. But no one knows yet.

Mr. Yates. Thirty-three billion?

Mr. McKelvey. Yes.

Mr. Yates. How big is the Saudi field?

Mr. McKelvey. The largest of the Saudi fields is about 55 billion or 60 billion barrels. But, of course, that is a super colossal field.

Mr. Yates. About 33 billion would be super colossal.

Mr. McKelvey. If there is 33 billion barrels of oil, that would be large indeed. On the other hand, it might be that the lower estimate of 3 billion is closer to the truth. We won't know until there is a lot of drilling undertaken.

Now it is conceivable that in the 26-hole drilling program that the Navy planned, a few of those holes would be enough to indicate the presence of a very large field, just as the early drilling at Prudhoe was sufficient to indicate the general size.

But actually 26 holes in an area larger than the State of Indiana isn't very many. It is quite possible that those 26 holes will be drilled and we still won't have a really definitive understanding of the amount of oil recoverable in NPRA.

PROVEN RESERVES AT PRUDHOE BAY

Mr. McDade. We can state proven reserves. We can look at Prudhoe Bay and I can ask you what the known or proven reserves are and you can tell me, right?

Mr. McKelvey. Yes. The proven reserves as reported by API are about 9½ billion barrels of oil and about 26 trillion cubic feet of gas. I understand that subsequent drilling may enlarge that estimate.

Mr. McDade. How many holes did we have to punch down to get that information?

Mr. McKelvey. I don't know, Mr. McDade, how many holes have been drilled or how many holes were necessary to reach that estimate. They have drilled development holes in preparation for production and possibly they have contributed some to the estimate. But my recollection is that is was something like two or three holes originally that led to the recognition of the fact that it was a very large field of several billion barrels.

Mr. McDade. That was based on the hot spot system and all these different methods you have developed for attempting to put holes in advantageous areas?

Mr. McKelvey. I am not sure, but they were guided holes, certainly. But that is an unusual situation also, where just a couple of holes will tell you that you have an extremely large field.

Mr. McDade. Maybe we will get lucky again.

Now you say you put three down and nothing happened. They were, of course, guided areas that looked to be promising spots?

Mr. McKelvey. Right.

PLANS FOR DRILLING IN ZONE A

Mr. McDade. In zone A what are you planning? How many are going to go down in fiscal year 1978?

Mr. McKelvey. In fiscal year 1978 our present plan is for only three confirmation wells in zone A if discoveries are made. If discoveries are not made, then at least the confirmation wells would not be drilled. Whether it would be possible to choose one or two other sites, I am not certain at this point. But we are planning, assuming the environmental impact statement which the Navy is preparing is completed on time, that the other holes in fiscal 1978 will be drilled within the areas outlined in green.

DRILLING IN PRUDHOE BAY

Mr. Coulter. Could I add something to put this in perspective? North of the Brooks Range there are approximately 100 wildcat wells.

Then there are a lot of development wells in Prudhoe Bay. Granted there was one discovery well at Prudhoe and a confirmation well which outlined that particular resource, but there are another 98 dry holes on the North Slope, also.

Mr. MURTHA. How much were they apiece, do you have any idea?

Mr. COULTER. Depending on when they were drilled, their drilling costs are the same as ours. We are drilling with the same drilling contractors, et cetera, that private industry uses.

Mr. MURTHA. That is almost $1 billion for drilling?

Mr. COULTER. Yes.

Mr. MCDADE. Are they still exploring the Prudhoe Bay area?

Mr. COULTER. Yes; and the entire State area between Pet-4 and the wildlife range.

Mr. MCDADE. If I were to attempt to sum it up, I would say now that you have drilled a series of holes, but you have not added anything to the known reserves in oil or gas for the Nation; is that right?

Mr. COULTER. That is correct for the three wells that have just been drilled.

Mr. MCDADE. All of them done, with your latest efforts to hit the hot spots?

Mr. COULTER. Yes. This work is still the Navy's, Mr. McDade, and it is with a contractor. But, I am sure they have used the most effective techniques and information available.

DISTANCE FROM NPRA TO PRUDHOE BAY

Mr. MCDADE. How far is it from the edge of Pet-4 over to Prudhoe Bay in a land distance?

Mr. COULTER. Sixty miles.

Mr. MCDADE. Thank you.

Mr. YATES. How far down have the Navy wells gone?

Mr. COULTER. They are 11,000 to 12,000 feet. They are intermediate holes.

PETROLEUM POTENTIAL

Mr. YATES. Are they promising at all or are they promising to be dry?

Mr. COULTER. They have found in the appropriate section, the section that bears oil at Prudhoe Bay, the sands in zone A have been tight, dirty sands that are not good. You have changed rock type from Prudhoe Bay into Pet-4, and those particular rocks that have been sampled are not good prospective reservoir rocks. You have from the seismic information nice looking structures, but when you drill in the structures there is good closure and the potential for a nice reservoir; but when you get into the reservoir sands, they are tight, dirty sands that won't hold oil so they are not good prospects.

We hope to find better prospects as we get into the other zones.

Mr. YATES. Does Husky agree with your appraisal?

Mr. COULTER. Yes.

SEISMIC AREAS

Mr. McDade. Are these your most attractive seismic areas?

Mr. Coulter. They are in the program so far and we will continue to drill the biggest closures that there are.

Mr. McDade. The most attractive sites?

Mr. Coulter. Yes, the biggest potential volume, but until you get in you don't know what the reservoir rocks are. We are trying to sample appropriate numbers of the biggest reservoirs and find out if there are appropriate rocks in those seismic closures or not.

LOCATION OF EXPLORATORY WELLS

Mr. Yates. Would you put that chart back up again, please? Where were the three holes drilled?

Mr. Coulter. These are the Navy areas. Last year Teshekpuk Lake, Fish Creek. They have finished South Harrison Bay. They are almost finished at Atigaru. They are still drilling on Cape Halcott and Foran. Fish Creek is the one they are starting on.

Mr. Yates. Which of the three did you talk about, the ones you said were unsuccessful?

Mr. Coulter. South Harrison Bay is finished. Atigaru has about bottomed out. The other three are now drilling. Teshekpuk Lake and Cape Halcott they did the year before. Both of those are dry and they are still drilling on the remaining three.

Mr. Yates. You know that zone C has gas because the Navy brought gas in Barrow.

Mr. Coulter. We know there is gas in the South Barrow field. The South Barrow field would be nice to have in your backyard in Pennsylvania, but would not be commercial in this area were it not for the population at Barrow.

OIL FIELD AT UMIAT

We know there is a nice oil field at Umiat, a shallow field.

Mr. Yates. How do you know?

Mr. Coulter. From the 1950 Navy drilling program. It is a shallow field. It is good, clean, high-grade oil. Again, if it were in your backyard in Texas it would be an excellent oil field, but it is simply too small to be commercial in this particular area.

The Prudhoe Bay discoveries are much deeper rocks than have ever been drilled in Pet-4. The intent of the Navy program is to sample those deeper rocks, the older reservoirs, to see if there are Prudhoe type deposits underlying these shallow oil fields that are now known in Pet-4.

Mr. Yates. How far down do the Prudhoe Bay wells go?

Mr. Coulter. 12,000 feet is about the main producer, but the average is in the order of 9,000 to 12,000 feet. That is about the same depth you are getting those Triassic and Mississippian rocks in zone A.

As you get down south they are much deeper. As you come to the foothills, it shallows out and you get the same rocks at shallower

depths. The hope is that at some place in the deep basin or the foothills you will get the recurrence of the clean, open sands and have good reservoir rocks in an appropriate structural configuration in either the central belt or the southern belt.

MINIMUM RESERVE SIZE FOR ECONOMIC RECOVERY

Mr. McDade. What is the minimum size reservoir you need to be economic in Alaska?

Mr. Coulter. Probably 3 or 4 billion barrels.

Mr. McDade. What about gas?

Mr. Coulter. I don't know. Gas without oil, except at Barrow you would need one awfully big reserve to make it worthwhile.

GAS RESERVOIR AT PRUDHOE BAY

Mr. McDade. What is it over at Prudhoe, considering the Arctic gas proposal?

Mr. McKelvey. About 26 trillion cubic feet.

Mr. McDade. How many years supply is that?

Mr. McKelvey. About 1¼, or something like that, at our present rate of consumption.

Mr. McDade. Nationally?

Mr. McKelvey. Yes.

Mr. Yates. We don't know what the reserves are, do we, if any. As of now there may not be any, right?

Mr. Coulter. Except for the small shallow ones which are noncommercial.

NAVAL PETROLEUM RESERVE NO. 4

Mr. Yates. Why was Pet–4 established?

Mr. Coulter. Primarily because there were oil seeps at the surface. At Cape Simpson there are known oil seeps that have been used by the natives and the early settlers for years. Based on shallow surface evidence like that, and analogies were elsewhere, this looked like a good petroleum province and maybe if they had located it a little bit this way—east—it wasn't a bad idea.

Mr. Yates. That is what the Israelis tell me, too, if the promised land had been about 50 miles east of there.

YEAR-AROUND DRILLING OPERATIONS

Mr. Yates. You are going to year-round operations, aren't you?

Mr. McKelvey. Yes, Mr. Chairman.

Mr. Yates. How much does this speed up the program?

Mr. McKelvey. It is not a matter of speeding up the program so much as it is the fact that the deep wells that are planned now cannot be completed in a single winter, so it is a matter of being prepared for a year-round operation.

Mr. Yates. How much more expensive is this?

Mr. McKelvey. The deep wells cost about $30 million.

Mr. Yates. Do you need any additional facilities?

Mr. McKelvey. Facilities will have to be constructed including year-round roads and airstrips, and so on.

Mr. Yates. Who does this, the contractor?

Mr. McKelvey. The contractor.

Mr. Yates. This is part of the 30 million?

Mr. McKelvey. No.

Mr. Yates. Mr. Coulter shakes his head "Yes."

Mr. McKelvey. It is part of the total contract.

Mr. Coulter. The $33 million for a deep well includes construction plus drilling.

Mr. Yates. Does this year-round operation have any effect on the environment? Do you have to get a new EIS?

Mr. Coulter. There will be an EIS prepared for this, yes, sir. Of course, there will be some effect because roads will have to be built and airstrips and so on. But we would hope that effect on the environment in a sense of deleterious effect would be very minor.

Mr. Yates. Are you going to increase the drilling activity? How many wells are you going to drill?

Mr. McKelvey. We are planning seven wells in 1978, not all of which may turn out to be drilled.

Mr. Yates. You are planning seven wells. Were the ones Mr. Coulter pointed out any of the seven? These are seven new wells? At what cost, $210 million? Is that the sum?

Mr. McKelvey. $209.5 million, yes, sir.

Mr. Yates. How deep do you go for a $30 million well?

Mr. Coulter. Over 16,000 feet.

Mr. Yates. Is it possible you may hit oil at 5,000 feet?

Mr. Coulter. Not the Prudhoe type. We can tell from the geophysics that the Prudhoe age reservoir rocks are much deeper in that central basin than 5,000 feet. The target reservoirs are deep in that central basin.

Mr. Yates. Will you need EIS statements for the seven wells?

Mr. Coulter. The Navy is completing an EIS on the remaining four zones and we will take over the program on the 1st of June with an EIS covering all the continuation of the program.

DEPTH OF WELLS

Mr. Yates. Are all seven deep wells or some medium wells?

Mr. Coulter. There are four deep wells in the central basin and three wells, confirmation wells, contingent on a discovery in zone A. If there is no discovery in zone A there will be no need for those three intermediate depth wells and they will not be drilled.

Mr. Yates. That is $30 million that you don't need, then?

Mr. Coulter. If there is no discovery.

FLEXIBILITY TO CHANGE DRILLING PROGRAM

Mr. McDade. Would the gentleman yield?

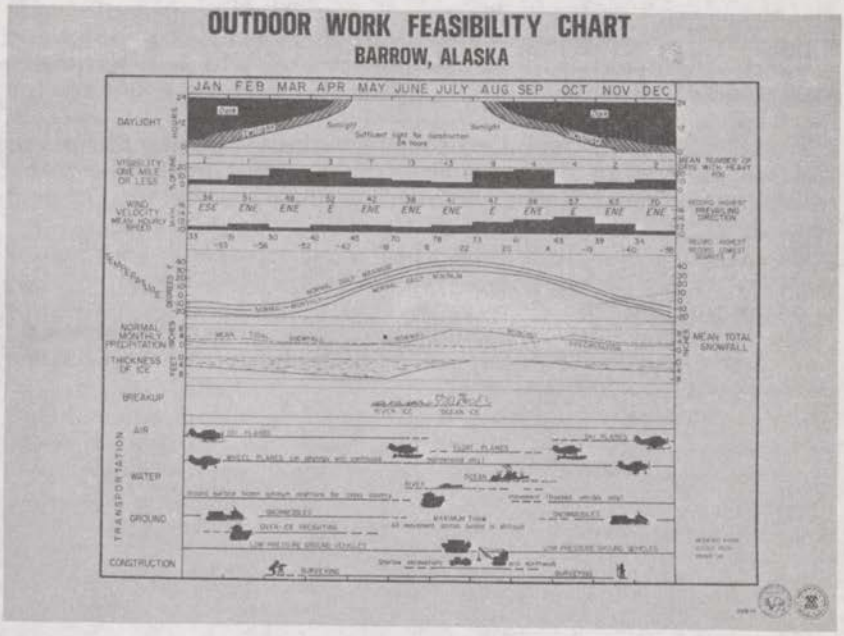
Don't you have a program to drill a confirmation well to try to move that money to other areas for exploratory purposes?

Mr. Coulter. If you will bear with me.

Mr. McDade. Yes.

Mr. Coulter. You get into a terrible scheduling problem as illustrated by this chart.

[The chart follows:]



This chart illustrates the different time frames in which equipment can operate on the North Slope. This constraint necessitates long leadtimes in procurement and shipment of equipment. Slippages that normally create little problem in other environs, cause program delays of a year.

Mr. Coulter. You have limited flexibility in the program. If indeed we can make a diversion, we will, but this is the critical aspect of the whole thing, the shipping season. There is about a 1 month shipping season. Everything has to go by barge from Seattle to the North Slope. Everything for the 1978 drilling program is now either in Seattle or on the way so it can leave on those barges in about the middle of May.

So all the advanced procurement is done. You have to lay out your sites in this spring, get them staked, and all permits and processing, and so on, and be ready to go right in as soon as it freezes up. You

are not allowed to move across the surface until after freezeup in the fall because you tear things up too badly. So everything has to be at your base camp all loaded and ready to move out, your site all prepared, by the time you get there.

This really diminishes your flexibility on going from one kind of program into another. If you are doing a confirmation well, you can probably do it out of the same camp that you have drilled this season's discovery, but if you have to put in a new wildcat someplace else, you are going to have to build a new camp. You can also stockpile your drilling rig at that discovery site and move it to the confirmation site. But if you don't have a discovery, you will bring it back to your base camp.

There are all sorts of logistics that are tangled up with these climatic and environmental restraints that really circumscribe your flexibility.

We can plan on the four deep holes and all the materials are ordered and everything is on the way, and we can handle those. But how much we can swap around from a confirmation to another wildcat is doubtful.

Mr. McDade. Yes; I guess so. That is very helpful to understand that.

Thank you.

Mr. Yates. Your justification really provides no detail on the cost of your year-round facilities for well drilling and for geologic activity. Will you put that in the record?

[The information follows:]

National Petroleum Reserve in Alaska
Costs for Seasonal and Year-round Drilling

Each well site requires a drilling pad, an airstrip, and a road to the water source.

Seasonal Drilling

For wells that can be drilled in one winter season the drilling pad is constructed from sand and gravel to a depth of approximately three feet. The access road to the water source is constructed of snow and ice and the airstrip is either built on a lake or constructed of ice and snow similar to the access road.

Year-round Drilling

The deep wells, which require year-round drilling, are being drilled when the surface is not frozen. This requires that the airstrip and the access road to the water source, in addition to the drilling pad, be constructed of sand and gravel. In addition to providing the required surface on which to operate, the sand and gravel must be of sufficient depth to insulate the underlying ground surface. Therefore, the depth varies between five and seven feet.

The estimated costs for drilling seasonal and year-round wells are as follows:

Average Costs for Seasonal and Year-round Drilling

Item	Medium Depth Well (Frozen season only)	Deep Well (Year-round drilling)
Construction & maintenance of drilling pads, roads, & airstrips	$1,667,000	$12,981,000
Transportation to Alaska of Construction and drilling materials (Cool Barge)	325,000	694,000
Communication & transportation within Alaska of materials & people	3,333,000	5,384,000
Drilling & drilling material	4,870,000	11,198,000
Field facilities (Camp Lonely)	522,000	1,547,000
Contractor & management costs	534,000	1,608,000
Total	11,251,000	33,412,000

DRILLING SCHEDULE

Mr. YATES. What is your schedule for developing information as to what you are going to find there? Do you have a schedule that you hope to adhere to?

Mr. MCKELVEY. We will attempt to follow the Navy's drilling schedule.

Mr. YATES. Will you be able to complete all the wells within the next few months?

Mr. MCKELVEY. No; the drilling schedule calls for a total of 26 wells over a 5-year period. I believe seven of those will have been completed at the time we take over.

Mr. YATES. How many months can you drill up there? Can you drill the whole year round?

Mr. MCKELVEY. For the shallow and moderate depth, drilling is done in the winter and can be completed in the winter season. But for the deeper ones it has to be a year-round operation.

What makes that difficult is not the drilling itself but the access to the drilling rig in the summer months when the ground is not frozen.

Mr. YATES. The Secretary's office is engaged in accumulating totals of known reserves. You can't tell me anything about PET–4, or can the Navy?

Mr. MCKELVEY. A small amount in the Umiat field, I think 50 or 60 million barrels, but that would be all.

FEA STUDY

Mr. YATES. FEA did a study of this area, I believe?

Mr. MCKELVEY. Yes; they did.

Mr. YATES. What did its study show?

Mr. MCKELVEY. I would call on Mr. Coulter for that if I might. I should say I do not believe it was a field study. It was a study of how development might be undertaken.

Mr. COULTER. It was primarily a study of various scenarios for production and development. If you found so much with such and such distribution, what would the breakeven point be on production, how would it be gotten out. In essence, how much would you have to find and what would be the general constraints on distribution in order to have an economic oil province.

HUSKY OIL CO.

Mr. YATES. What is your assessment of the job Husky has done so far?

Mr. COULTER. They seem to, as far as we can tell, have operated the contract very well.

Mr. YATES. Do they know what they are doing?

Mr. COULTER. Yes; and they have subcontractors, they have an organization called Tetratech, who is doing their seismic interpretations, and so on, for them. The meetings with both Husky and Tetratech have favorably impressed us with their capability.

Mr. YATES. You don't have to renegotiate the contract, do you?

Mr. COULTER. No; the language of the bill says we will assume all existing contracts.

NEW POSITIONS

Mr. YATES Would you provide for the record a breakout of the titles and salaries of the 27 new jobs?

[The information follows:]

GEOLOGICAL SURVEY
TITLE, LOCATION, GRADE, AND SALARY OF NPRA POSITIONS

Title and Location	Grade	Salary
Anchorage, Alaska		
Office of the Chief:		
1. Chief, Office of National Petroleum Reserve in Alaska	GS-16	$46,234
Plans and Management Office:		
1. Plans and Program Officer	GS-14	29,683
2. Administrative Officer	GS-12	21,123
3. Property Management Officer	GS-12	21,123
4. Clerk (Typing)	GS- 5	9,613
NPRA Operations Office:		
1. Chief, NPRA Operations	GS-15	43,923
2. Petroleum Engineer	GS-14	32,557
3. Petroleum Engineer	GS-13	26,738
4. Petroleum Engineer	GS-12	21,123
5. Civil Engineer	GS-12	21,123
6. Secretary	GS- 6	10,716
7. Clerk (Typing)	GS- 5	9,613
8. Environmental Specialist	GS-15	39,419
Menlo Park, California		
Exploration Strategy Office:		
1. Chief, Exploration Strategy	GS-15	39,419
2. Geophysicist	GS-14	29,683
3. Geologist	GS-14	32,557
4. Geologist	GS-14	30,641
5. Geologist	GS-13	29,168
6. Geologist	GS-13	28,358
7. Geophysicist	GS-13	25,118
8. Cartographic Technician	GS- 7	11,907
9. Administrative Assistant	GS- 7	14,979
10. Secretary (Stenography)	GS- 5	12,093
11. Clerk-Typist	GS- 4	10,255
Reston, Virginia		
NPRA Liaison Office:		
1. Physical Scientist	GS-15	40,545
2. Procurement Analyst	GS-13	25,118
3. Secretary (Stenography)	GS- 6	10,716

NEED FOR MORE EMPLOYEES

Mr. YATES. Why do you need 27 when the Navy only has 6?

Mr. MCKELVEY. As I indicated, the Navy actually is able to draw on uniformed personnel.

Mr. YATES. The Navy only used 5 civilians?

Mr. MCKELVEY. I guess 5 on a full-time basis, but I don't know how many they may have drawn on from time to time.

Mr. YATES. What would the 27 be doing?

Mr. MCKELVEY. The 27 will be doing three things: Supervising the production of gas from the South Barrow field, managing the contract with Husky and then developing the exploration strategy that will guide the drilling, and of course evaluating the results.

Mr. BETTENBERG. It may be useful to point out that the Navy doesn't have a geologic group that is working on reviewing the work of the contract or as far as where they drill. That is one of the key components in the survey operation.

SOUTH BARROW GAS FIELD OPERATIONS

Mr. YATES. You want $11,547,000 for the Barrow operation. Will any of your 27 positions be working in the Barrow gas production?

Mr. MCKELVEY. Not, I don't believe, stationed——

Mr. YATES. Will this be under their jurisdiction?

Mr. MCKELVEY. It will be under their supervision.

Mr. YATES. Would you place in the record a list of the gas production over the last 5 years.

Mr. MCKELVEY. From the South Barrow field?

Mr. YATES. That is all you have, isn't it?

Mr. MCKELVEY. Yes.

[The information follows:]

Gas production from South Barrow gas field

Fiscal year:	*Million cubic feet*
1972	725,851.5
1973	694,239.1
1974	727,042.0
1975	775,537.3
1976	828,951.8

PRODUCTION PLAN FOR SOUTH BARROW FIELD

Mr. YATES. Do you have plans for South Barrow field? There really isn't that much being produced that would warrant expanding that operation, is there?

Mr. MCKELVEY. The production isn't large but as Mr. Coulter indicated the projection for the life of the field is relatively short and the act directs an effort for continuing supply to the Barrow community. So it is important to develop additional reserves to satisfy that future need; 5 years is a very short time.

ENVIRONMENTAL RESTORATION

Mr. YATES. You want $2 million for environmental restoration. How does this compare to 1977?

Mr. McKelvey. I believe a similar amount may have been used in 1977 by the Navy.

Mr. Yates. Is this a continuing operation?

Mr. McKelvey. It won't continue for more than a few years, Mr. Chairman. The idea is to clean up the mess that was left in the past so that it could be completed in a few years. Two years additionally is projected.

Mr. Yates. Do you know whether or not any of the private operators are interested in drilling in Pet-4?

Mr. McKelvey. I would suspect from the interest in the North Slope in general there would be interest.

Mr. Yates. In other words, they are not particularly impressed by the fact that you have three dry holes so far?

Mr. McKelvey. I don't think that would impress anybody as knocking out an area the size of Indiana.

EMERGENCY PROCEDURES FOR COLLECTION AND ASSESSING GAS ROYALTIES

Mr. Yates. What are your other problems? You talk about the development of emergency procedures for collecting and assessing gas royalties. You don't have that problem yet, do you?

Mr. McKelvey. Yes; royalty gas. This is not with respect to South Barrow.

ROYALTIES IN KIND

Mr. Yates. If you were to receive your royalties in kind, how much gas would be available?

Mr. McKelvey. It would be, I believe one-eighth on-shore and one-sixth offshore.

Mr. Yates. I know that, but what is the total?

Mr. McKelvey. So what would the total be? We get 12½ percent.

Mr. Yates. Translate that in terms of cubic feet in the case of gas.

Mr. McKelvey. It would be 12½ percent of 1½ trillion cubic feet.

Mr. Yates. Is that all that is coming in from Government fields?

Mr. Bettenberg. That is onshore.

Mr. Yates. I know it is.

Mr. McKelvey. That is the onshore production from Federal leases, about 1½ trillion cubic feet annually. It would be about 200 billion cubic feet.

Mr. Yates. It wouldn't last very long, would it?

Mr. McKelvey. That is not very much. That is less than 1 percent of the national production.

Mr. Yates. You want to develop emergency procedures for collecting and assessing gas royalties in kind.

Mr. McKelvey. This is a question that has been posed to us by Congress. We do collect oil royalties in kind.

OIL ROYALTIES

Mr. Yates. Tell us what the oil royalties would be. What does it amount to in terms of dollars and barrels?

Mr. McKelvey. The amount of the Federal onshore production of oil doesn't come to mind. Maybe Mr. Wayland has that figure.

Mr. WAYLAND. The royalty for oil and condensate total is $198 million onshore and $401 million offshore for this last year. It will be about $600 million.

Mr. YATES. How many barrels is that?

Mr. WAYLAND. The quantity would be 470 for 11 months and therefore, say, a little over 500 for the year.

Mr. YATES. 500 barrels?

Mr. WAYLAND. 500 million barrels.

Mr. MCDADE. Is this on the onshore too?

Mr. WAYLAND. Yes; that is both onshore and offshore production. That even includes production from Indian lands. It is not much.

COST PER BARREL

Mr. YATES. How much per barrel is the royalty?

Mr. WAYLAND. Our average value right now is around $8.

Mr. YATES. That is kind of cheap, isn't it?

Mr. WAYLAND. It figures out to $7.80 per barrel for oil and condensate. This is approximately what we are getting right now. We have old oil and new oil mixed in.

Mr. YATES. What about offshore?

Mr. WAYLAND. That includes offshore.

Mr. YATES. That is everything?

Mr. WAYLAND. That is everything we collect, including Indian lands. The Indian fraction of that is about 5 percent.

FEDERAL OCS AND ONSHORE PETROLEUM PRODUCTION

Mr. YATES. What is the total production? How many barrels?

Mr. WAYLAND. 470 million barrels for the 11 months' period, that is oil and condensate, from OCS plus Federal onshore plus Indian lands.

Mr. YATES. I thought I understood you to say that annual royalties would be based on 500 million barrels per year. What I am asking is: What is the total production from which you derive the royalties?

Mr. MCKELVEY. That is total production. The royalty would be one-eighth of that.

1976 ROYALTIES COLLECTED IN KIND

Mr. RADLINSKI. I can read you the figures for 1976. There were 28.4 million barrels of royalty oil from the OCS.

Mr. MCDADE. What page are you on?

Mr. RADLINSKI. Page 145, and 9.8 million barrels of royalty oil from onshore.

Mr. YATES. That is 37.8.

Mr. RADLINSKI. Right.

Mr. YATES. The 500 million figure then is total production?

Mr. MCKELVEY. Total production onshore and offshore.

Mr. YATES. Of Government leases?

Mr. RADLINSKI. Right.

PRODUCTION OF GAS UNDER FEDERAL LEASES

Mr. YATES. What is the total production of gas under Government lease?

Mr. MCKELVEY. Six trillion cubic feet onshore and offshore. Wait. No, no.

Mr. BETTENBERG. That has to be too high.

Mr. MCKELVEY. Six trillion. It is 3½ trillion cubic feet offshore and 1½ trillion cubic feet onshore.

Mr. YATES. For all Government leases, right?

Mr. MCKELVEY. Right.

Mr. WAYLAND. Again, that includes Indian lands.

Mr. YATES. Including Indian lands. What does that mean?

Mr. MCKELVEY. Indian leases.

Mr. YATES. Any trouble with those leases? How much do the Indians receive for those leases?

Mr. MCKELVEY. Generally they get the same. I think the royalty rate has been the same generally in the past, but some of the tribes are now experimenting with other kinds of contracts besides leases.

Mr. YATES. Such as?

Mr. MCKELVEY. Such as profit sharing.

Mr. YATES. Asking contractors like Husky to do the work for them?

Mr. MCKELVEY. There may be some of that kind also, but there are some in which I think they are setting up profit-sharing arrangements where they give the right to the operator, to explore, and share in the profits on a 50–50 basis or maybe more.

Mr. YATES. Would that provide them with greater revenues?

Mr. MCKELVEY. That is their aspiration and there is a chance it will; yes.

Mr. WAYLAND. The current average price is 54 cents per 1,000 cubic feet of gas.

GOVERNMENT'S SHARE IN ROYALTIES

Mr. YATES. Is that what the Government share is?

Mr. MCKELVEY. The Government royalty under lease onshore is one-eighth of that.

Mr. YATES. Does that amount to 54 cents per thousand cubic feet?

Mr. MCKELVEY. The 54 cents is not the royalty. That would be the total price.

Mr. YATES. I thought that was the royalty.

Mr. WEYLAND. No; that is the value.

Mr. YATES. What is the 54 cents?

Mr. RADLINSKI. The total value of the gas.

Mr. MCKELVEY. That is the average selling price per 1,000 cubic feet.

Mr. YATES. Of gas that is sold from wells on Indian land?

Mr. WAYLAND. Yes.

Mr. YATES. What is on non-Indian lands?

Mr. MCKELVEY. The same. Onshore generally.

87-501 O - 77 - 42

OIL AND GAS RESERVES ON FEDERAL LANDS

Mr. YATES. Does the Geological Survey know the amount of reserves we have on Government lands for oil and gas? Have you provided that to the Secretary?

Mr. MCKELVEY. We have not made a detailed estimate of onshore reserves on Federal leases. We have made such estimates offshore. Offshore we have made general estimates of all of the fields in the Gulf of Mexico. But we are in the process of making reservoir-by-reservoir estimates. On that basis we have completed estimates, I believe, of about 100 of the OCS fields.

Mr. YATES. Out of how many?

Mr. MCKELVEY. Out of 300.

Mr. YATES. So you have finished about a third?

Mr. MCKELVEY. About a third.

Mr. YATES. When will you complete the remaining two-thirds?

Mr. MCKELVEY. I believe current capacity is about 75 a year, and this is one area that we may be wanting to step up in conjunction with the Secretary's intent to require additional drilling, as he may under section 3(c)(2) of the lease agreement, in order to achieve a more timely production.

GAS RESERVE ESTIMATES OF COMPLETED FIELDS

Mr. YATES. With respect to the 100 fields that you have completed, what was your estimate of the reserves of gas and oil?

Mr. MCKELVEY. I don't have that broken out but I do have our estimates of the total.

Mr. YATES. Total of the 300?

Mr. MCKELVEY. Right. That is of the order, as I recall, of about 32 trillion cubic feet. That report was just issued as of early January. I have a copy of it here, I am sure.

Mr. YATES. Thirty-two trillion cubic feet for all offshore fields?

Mr. MCKELVEY. Right. That includes both measured and indicated reserves.

Mr. YATES. But you still have two-thirds of that to confirm, haven't you?

Mr. MCKELVEY. Two-thirds of that does not represent reservoir-by-reservoir estimate, which is what we are aiming to do.

Mr. YATES. How does the actual figure compare with the estimate?

Mr. MCKELVEY. I don't have the basis for that comparison, Mr. Chairman, because I don't have the statistics for the 100 fields that have already been completed.

Mr. YATES. Who has that?

Mr. MCKELVEY. Our Metairie, La., office would have it, and we can supply it for the record.

[The information follows:]

COMPARISON OF ESTIMATES BEFORE AND AFTER COMPLETION OF RESERVE INVENTORY OF OCS FIELDS

Previous estimates had been made on only 75 of the 100 fields in which a recent reservoir-by-reservoir analysis has been completed as 25 of the fields are new.

In these 75 fields, the estimate made in October 1974 of original reserves was 1.07 billion barrels of oil and 17.6 trillion cubic feet of gas. The recent analysis of these fields showed reserves of 977 million barrels of oil or 91 percent of the earlier estimate and 17.8 trillion cubic feet of gas, 101 percent of the earlier estimate.

Mr. McKelvey. My impression is that it would not be a large difference between the field-by-field estimate and the reservoir-by-reservoir estimate for those same fields, but I would expect it to be somewhat different.

Mr. Yates. Has the Secretary requested a reservoir summary that you have completed today or are you waiting until you finish the 300 fields before you give him that information.

Mr. McKelvey. No, I don't believe he has been furnished with the results we have, but we have in process an identification of the nonproducing reservoirs in the larger fields which I expect to be able to give him within a day or two.

Mr. Yates. Of the nonproducing?

IDENTIFICATION OF NONPRODUCING RESERVOIRS

Mr. McKelvey. Nonproducing reservoirs in the larger fields.

The Secretary is interested, as I am sure you are, Mr. Chairman, and many others, in seeing what can be done to increase production in the short term in the Gulf of Mexico in hopes of avoiding the same kind of situation that we had this last winter.

So one of the ways in which that might be done most fruitfully would be to require production of reservoirs that have already been found but are not presently producing. I have asked the Conservation Division to identify those fields that contain 200 billion cubic feet or more, and that have nonproducing reservoirs, and to attempt to give us estimates of the magnitude of the reserves in those nonproducing reservoirs.

I chose 200 billion cubic feet because from the size distribution of fields in the Gulf of Mexico it appears that if you take fields larger than that, you will be looking at about 75 percent of the gas reserves and maybe one-sixth of the fields that have been found, say 50 fields.

Mr. Yates. How many nonproducing fields are there?

Mr. McKelvey. I think there are about 50 fields that are either not yet into production or are only in the very early stages of production, such that their reserves cannot yet be estimated at this time. But I am not talking about nonproducing fields. I am talking about really producing fields in which there are nonproducing reservoirs.

PRODUCING FIELDS WITH NONPRODUCING RESERVOIRS

Mr. Yates. How many such are there?

Mr. McKelvey. That I don't know, Mr. Chairman, and that is one of the questions that we are asking with respect to the larger fields. There are about 6,000 reservoirs identified thus far in the Gulf of Mexico.

Mr. Yates. Estimated reservoirs in excess of 2 billion cubic feet?

Mr. McKelvey. No, 6,000 total. Some of those would have perhaps only a relatively small amount of gas.

Mr. Yates. I am not sure I understood your statement. You have how many fields, 6,000?

Mr. McKelvey. We have about 300 fields. But within a field, Mr. Chairman, there can be many reservoirs. In the Gulf of Mexico we might differentiate two situations in which there are many reservoirs. One is where the rocks contain gas or oil at several different horizons. Maybe there will be a gas-bearing sand at a depth of 2,000 feet, another one at 8,000 feet, and another one at 10,000 feet, or possibly more than that, so that a well may penetrate more than one reservoir.

At any given time it may be that only one or two of those reservoirs out of three, five, or more may be into production. The usual practice is to produce from the deepest horizon first and when that is depleted, to move up the well and make a completion at the next highest horizon and produce from there.

That is a situation in which there are multiple sands in the vertical sense. In the Gulf of Mexico most of the fields are associated with salt domes. Where there has been a natural piercement of the rocks by a great mass of salt moving up from great depths. As that salt has moved up, it has domed rocks and possibly broken them into a number of separate blocks, separated by faults.

Those blocks separated by faults may be discrete reservoirs for an individual producing sand. A reservoir may be sealed off and have no communication with the same stratigraphic horizon in an adjacent block. It is a separate reservoir.

So in both vertical and horizontal senses there can be multiple reservoirs within a given field. This is part of our question to the Metairie office: In the very large fields, how many nonproducing reservoirs are there, what is their magnitude, and what is the availability of these already producing fields? There has to be a transportation system in fact, so what is its capacity, and so on.

NUMBER OF KNOWN RESERVOIRS

Mr. Yates. How many known reservoirs are there?

Mr. McKelvey. About 6,000.

Mr. Yates. These are not the reservoirs you spoke about in your previous reply; those were fields that were just coming in, and you weren't really including those reservoirs in the 6,000?

Mr. McKelvey. I mentioned there are some fields nonproducing or in the early stages of production, something like 50.

Mr. Yates. Are the reservoirs in those fields included in the 6,000?

Mr. McKelvey. I am not sure of that. I think to the extent that reservoirs have been identified in those fields they would be included in the 6,000 but the fields may contain more reservoirs than have been identified as yet.

Mr. Yates. As of now you have identified 6,000 reservoirs.

Mr. McKelvey. Right.

Mr. Yates. If a reservoir produces gas, you have a record of it?

Mr. McKelvey. Right.

Mr. Yates. Why wouldn't you have at hand information, then, of a nonproducing field? Why do you have to go out and get that information?

Mr. McKelvey. We have it in our Metairie office. For some of the reservoirs we may not have made individual reservoir estimates as yet. I have asked that in that case we make some sort of rough guess at least.

Mr. YATES. You know you have 6,000 reservoirs. Do you know how much gas is estimated to exist in these 6,000 reservoirs?

Mr. MCKELVEY. The proved reserve or demonstrated reserve figure that I mentioned a moment ago of about 32 trillion cubic feet, it is 32.7 trillion cubic feet.

Mr. YATES. Those are all producing?

Mr. WAYLAND. No.

Mr. MCKELVEY. That would be producing as well as nonproducing reservoirs. The reason some of them are nonproducing, I touched on a moment ago when I indicated that in the case of a multiple-producing horizon at depth they would produce only from the lowest, or they may have only recently been discovered.

Now, what will be looked at and may be required by the Secretary is the possibility of drilling additional wells to the other horizons.

NUMBER OF HORIZONS

Mr. YATES. Do you know how many other horizons there are in the 6,000?

Mr. MCKELVEY. No. For these large fields that is the kind of information we will be getting shortly.

Mr. YATES. Will you insert that in the record when you get it?

Mr. MCKELVEY. Yes.

[The information follows:]

NUMBER OF PRODUCING RESERVOIRS IN THE GULF OF MEXICO OCS

Of the estimated 6,000 reservoirs in the Gulf of Mexico OCS, 3,021 are currently in production, leaving 2,979 not in production. Of these not in production approximately 1,000 reservoirs are in 50 nonproducing fields currently undergoing exploration and development.

INTERSTATE SHIPMENT OF GAS

Mr. MCDADE. Will that information enable us to say precisely how much additional gas could be added to the interstate supply?

Mr. MCKELVEY. Not in itself. It will be a beginning, Mr. McDade. Because what will have to be looked at in addition to simply the knowledge of how much gas in nonproducing reservoirs will be new well completions, the availability of transportation capacity and then the economics. The language of section 3(c)(2) of the lease which gives the Secretary the authority for this says as follows:

OCS leases provide that operators "after due notice in writing to diligently drill and produce such other wells as the Secretary may reasonably require in order that the leased area or any part thereof may be properly and timely developed and produced in accordance with good operating practice."

I don't think it would be judged in this country as reasonable to require drilling that would cause the operator to lose money, so it will have to be looked at as to whether it is reasonable for the operator to drill and produce gas under present economic conditions. A judgment will have to be made.

PRICE OF GAS

Mr. MCDADE. What price is this gas?

Mr. MCKELVEY. Presently new gas is at $1.44 per 1,000 cubic feet.

Mr. McDade. I know that, but if we take one of these reservoirs and suppose the Secretary says it is time to open one of these new sections of it, is that gas dedicated to the interstate system at $1.44? At what price is it going to come out?

Mr. McKelvey. My impression, Mr. McDade, is that gas that comes out of a new well can be priced at the maximum, at $1.44. It is possible that this—and I can go only a little further without feeling the need to call on the Solicitor—it is likely in many fields that gas in these nonproducing reservoirs is already dedicated to a longer term contract.

Mr. McDade. You say it is likely?

Mr. McKelvey. It is likely; yes.

Mr. McDade. Why?

Mr. Bettenberg. We know that it is. That is the case at least in some of the fields examined in the recent study.

Mr. McDade. So we are talking about 6,000, and you are saying it is likely they will find gas, and dedicated gas, and therefore saleable at the lower price?

Mr. McKelvey. I really shouldn't attempt to answer that.

Mr. McDade. Oh, go ahead.

Mr. McKelvey. My impression is that it would be saleable at the higher price coming from a new well.

Mr. McDade. The $1.44?

Mr. McKelvey. Right.

Mr. McDade. I thought you indicated it is likely a lot would already be considered to be dedicated to the interstate market?

Mr. McKelvey. Much production is dedicated, and I suppose it would be the nature of the contract instrument itself that would possibly govern in the case of this kind of question.

Mr. McDade. Are they not uniform?

Mr. McKelvey. I believe there is a considerable variation in them, but I am not familiar with that first hand.

AVAILABILITY OF GAS UNDER CONTRACT

Mr. Duncan. Would you yield?

Are you talking about the contracts the producer might have with their customers and this gas might be subject to a long-term contract for supply to a customer over a long period of time and therefore not available as an incremental addition to our current supply for the new use?

Mr. McKelvey. That would be a possibility.

Mr. Duncan. That is what you are getting at?

Mr. McKelvey. Yes; but that is the kind of thing that has to be looked at, and it would have to be looked at lease by lease.

Mr. McDade. How long will it take to find that out?

Mr. McKelvey. I honestly don't know, Mr. McDade, but I am guessing that possibly within 2 or 3 months for at least some of the reservoirs, but it may very well be there will be a conclusion that is controversial. The company may not agree it is reasonable to make this requirement, or the company may be able to show or attempt to show that it would not be a good operating practice to attempt increased production from an individual field. I expect that the kinds

of things that can be done for next winter are relatively few in number, that you would not be able to install. Suppose a platform is already in existence and all of its slots are filled, it has capacity to drill 8 wells, or 12 wells, and all of those wells have been drilled and they are already producing from the lower horizons. One might conclude that an additional platform could be installed to tap the shallower horizons.

I would think there would be no possibility of completing such an action of that sort in time to be of help next winter.

Mr. McDade. Do we know the answer to that question?

Mr. McKelvey. The answer to that is the one we are also seeking in the sense that we are asking with respect to fields in which there are platforms, whether or not there are any vacant slots, where additional wells could be drilled.

Mr. McDade. We don't know that today?

Mr. McKelvey. I am sure our people in Metairie know it, but we haven't assembled the information.

Mr. McDade. How long ago did you ask them?

Mr. McKelvey. I asked them for this about Wednesday.

Mr. McDade. When do you expect to have it?

Mr. McKelvey. I hope within a few days.

But there are some fields in which the water is relatively shallow and where the field could be developed without the installation of a platform, and so fields of that sort are ones in which there would be some hope of increasing production for next winter.

I ought to point out, however, that while the Secretary is anxious and, I am sure, determined to do whatever we can to increase production in time to alleviate the situation next winter, the effect of the operations that can be carried out is not likely to be large in a national sense. I don't mean to deprecate it or to indicate that it is not important for that reason. Substantial increase in production may draw on several sources.

If you remember the game of musical chairs, where there are 100 chairs and 101 people, when the music stops everybody is supposed to sit down, 1 person is without a chair. There is a 1 percent shortage of chairs. So the actual shortage itself may not be larger either in the sense of percentage of total production but the Gulf of Mexico production produces only about 18 percent of the Nation's total.

GAS FROM THE GULF OF MEXICO

Mr. McDade. Isn't it true that a lot of that gas that comes out of the gulf goes to the critically short areas of the Nation?

Mr. McKelvey. Yes.

Mr. McDade. So when we say it is only 18 percent, it is still the foundation from Chicago east, isn't it?

Mr. McKelvey. Yes; along with some gas from Louisiana onshore and Texas. Texas and Louisiana and the gulf are the principal suppliers for the east. There is no doubt about that.

Mr. McDade. So it can have a tremendous impact?

Mr. McKelvey. I don't by any means want to indicate it is not worth pursuing, but I don't think we can look to the solution of the national

shortage in increased production during the coming year from the Gulf of Mexico. I think it is important to recognize that there is a real shortage of gas and it is important to be looking also at what can be done to alleviate that over time.

Mr. McDade. No doubt. I am sure of that. I was under the impression, however, that we were geared to attempt to make decisions at this very quickly if there was any flexibility. This is not the first winter we have had gas in short supply, but it certainly is the worst.

Mr. McKelvey. Right.

ENERGY POLICY AND CONSERVATION ACT

Mr. McDade. I rather thought that we were positioned to make sure if there was any elasticity in the system we are positioned to take advantage of it. I guess we are not.

Mr. McKelvey. I don't believe we are, Mr. McDade. Congress a year ago December, in passing the Energy Policy and Conservation Act included in that a provision calling for the Secretary of the Interior to determine the maximum efficient rate (MER) of oil and gas production for Federal lands, both onshore and offshore, and also for establishing a temporary emergency production rate for the same fields, and then providing that the President during an emergency could call for production at those maximum rates.

We have not yet developed the regulations or the procedures for doing that, simply because it is a very difficult problem to cope with. Frankly, we haven't figured out yet just how that should be done, and what procedures to follow. The act provided that it be in conjunction with or on the basis of hearings. In January we published in the Federal Register an announcement inviting comments on the procedures and on some proposed definitions of MER, and indicating that hearings would be held. Just a few days ago, on February 16, Secretary Andrus published another announcement establishing dates and places of the hearings and inviting comment also on a definition of the term.

I am not sure that that in itself—simply because the concept is nebulous at this time—would constitute the sort of mechanism you had in mind. For one thing, I don't know how it would apply to reservoirs that are not yet producing, the kinds that we have just been discussing, but it is possible that a combination of this sort of thing and the language in the lease instrument could be used to increase production on an emergency basis.

There might be other things that could be done, also. But I am sure that attempting to produce or increase production from existing reserves is only at most a stop-gap measure. We have to be looking beyond that for solutions.

Take the Gulf of Mexico, the 32.7 trillion cubic feet of reserves that I mentioned. The production rate there is about 3½ trillion cubic feet a year. That represents only a 10-year supply. Nationally that is about the same ratio, or the reserve to production ratio is about that, as well.

So, if you attempt to increase production because of a very cold winter, you are drawing down on the life of that supply and in any case you are looking at a very short life.

There has to be focus on ways of stretching out the supply on a long-term basis. Substitution of gas from other sources of energy, conservation, certainly are things that have to be looked at. Then, of course, ways to bring in new sources, either from conventional sources, the same kinds of deposits that are producing now, or from gas bearing sources that have not yet been brought on economically.

But certainly there is a real shortage of gas. It has to be addressed both on a short-term as well as a longer term basis.

MAXIMUM EFFICIENT RATE OF PRODUCTION

Mr. DUNCAN. Would you yield for one question?

Mr. MCDADE. Sure.

Mr. DUNCAN. Don't I understand there is a maximum efficiency rate of production so if we try to accelerate production from these reservoirs that we not only draw down the total reserve more quickly than you had planned, but by drawing it down rapidly you decrease the overall total recovery from your reserves? Do I make myself clear?

Mr. MCKELVEY. Yes, and that applies in some kinds of fields. It is turning out, however, that in the Gulf of Mexico many of the reservoirs are not rate sensitive, so that the real control comes as to how many wells it is economic to drill in order to extract a given reserve.

Mr. DUNCAN. Is that true in many of the other reservoirs?

Mr. MCKELVEY. I am not able to give percentage figures on this, but let me say on a qualitative basis both situations are known. There are certainly fields in which excessive rates of production have led to channeling and reduced substantially the amount that might have been recovered ultimately.

Mr. DUNCAN. I take it that is not an exact science then?

Mr. MCKELVEY. No, by no means.

Mr. DUNCAN. Thank you.

PIPELINE FACILITIES FOR TRANSPORTATION OF GAS

Mr. YATES. What about the question of transportation from the gulf. Suppose you find that more gas is available than you thought? Would you have any difficulty bringing it to shore?

Mr. MCKELVEY. That is possible in individual areas. That is one of the things that is holding back production from some leases that are not yet in production—completion of a pipeline to a platform that may be some distance from an existing pipeline.

Mr. YATES. Can you tell us about any of these? Where are they?

Mr. MCKELVEY. I could supply that for the record, Mr. Chairman. We have this kind of information for every lease that is nonproducing.

Mr. YATES. Do you have any indication as to how many such instances there are?

Mr. MCKELVEY. Where the leases are shut in awaiting the completion of a pipeline?

Mr. YATES. Yes, or transportation.

Mr. MCKELVEY. I don't know that I can put my fingers on that, but we can certainly supply that. I think that the situation in which

the lease production is waiting on the completion of some kind of facility, whether it is a platform or the transportation system, my recollection is that that is a rather substantial percentage.

[The information follows:]

OCS LEASES NOT PRODUCING DUE TO LACK OF PIPELINE FACILITIES

There are 17 extended term leases and 38 primary term leases shut in awaiting pipeline connections.

Mr. BETTENBERG. I can give you two examples, counterexamples. One is a lease off Galveston that the lessee is apparently able to produce and has not been able to work out arrangements on his gas line from the field to shore.

Mr. YATES. Who is the lessee?

Mr. BETTENBERG. I don't recall the name. It is not a major. The counterexample is one that——

Mr. YATES. Which company owns the pipeline?

Mr. BETTENBERG. There is no pipeline there right now. He wants to lay one.

Mr. YATES. He wants to lay it himself?

Mr. BETTENBERG. He wants one laid. I don't know whether he would lay it himself or have another company lay it. But, it is from the field offshore to the shore, to a collection point.

Mr. YATES. Is there a pipeline close by that he can tap?

Mr. BETTENBERG. Right now he is indicating in the reports that come in that he has an application on file for the line.

PIPELINE JURISDICTION

Mr. YATES. With whom? Who has jurisdiction? Is there a Government agency involved?

Mr. MCKELVEY. It would be the FPC, I suppose, for a pipeline.

Mr. BETTENBERG. Yes, from the well to the shore.

Mr. MCKELVEY. He would have to apply for a right-of-way from the Bureau of Land Management. But, he would also have to make application to the Federal Power Commission for it.

Mr. YATES. Does he need an environmental impact statement?

Mr. BETTENBERG. No, I don't think so.

Mr. YATES. For a pipeline?

Mr. BETTENBERG. Not there. Apparently the problem right now is that the route goes across a shipping channel and they are trying to resolve the safety issue on the shipping channel there.

Mr. YATES. GS has no responsibility for that?

Mr. BETTENBERG. Perhaps only to prod the fellow into quick action on the thing.

Mr. YATES. But you can't prod him into quick action if he can't get quick action out of BLM. Is there such a thing as a troubleshooter in the Department?

Mr. BETTENBERG. We are looking at the possibility of setting one up.

Mr. YATES. What are some of the Assistant Secretaries doing?

Mr. BETTENBERG. Right now trying to get a handle on the situation.

Mr. MCKELVEY. I suppose one can say there are many, many troubleshooters. When there is trouble, we all shoot at it.

Mr. YATES. Something like this requires action. If you have a gas field and all that is holding it up is transportation, I would think that is a problem sufficiently defined to permit some kind of immediate action.

Mr. MCKELVEY. Mr. Chairman, returning to your question about the significance of the facilities and lack of their availability, I don't have that information with respect to the number of platforms or the nonproducing leases. But, with respect to the producible shutin completions, of which there are 2,265, some 300 of those are shut in awaiting the availability of transportation or platform work.

Now, many of the others are shut in because of some other reason. They may have been sanded in and require a workover or the pressure may now be too low. They may be watered in or something of that sort and require additional work. But, just those waiting on transportation or platform facilities would be about 300 out of 2,265.

Mr. YATES. As many as 300 waiting for transportation?

Mr. MCKELVEY. These are completions.

Mr. YATES. These are completions of persons or firms that have known gas wells producing gas but who cannot market it because of no transportation.

Mr. MCKELVEY. That is right, because a platform has not been completed and become operational or something of that sort.

Mr. YATES. How much gas is involved?

Mr. MCKELVEY. I can't give you the amount.

SHUT-IN WELLS

Mr. YATES. Tell us about the five fields that the Secretary announced were the subject of an investigation because of capped gas wells. Did you find those or did somebody else find those?

Mr. MCKELVEY. My recollection, Mr. Chairman, is that four of them were identified by the consultant from Wilson & Associates, Mr. George Donkin, from an examination of Geological Survey records. They were picked out simply as examples of fields in which there had been a decline in production over the past year or so, a substantial decline, and also as fields in which there were known to be nonproducing reservoirs. The fifth was picked out by a Geological Survey employee in Metairie as another example that might be examined.

Mr. YATES. Why wouldn't you know about all these wells? If there is a reduction in the amount of production and an attendant loss of revenues to the Government, wouldn't you know about it?

Mr. MCKELVEY. Well, we might not, Mr. Chairman.

Mr. YATES. Why was the person who was under contract able to find them and you were not?

Mr. MCKELVEY. Well, we would certainly have been able to identify those examples.

Mr. YATES. But you didn't know it.

Mr. MCKELVEY. But that is different from what you said a moment ago.

Mr. YATES. I thought this was the basis for his investigation, the fact that the records indicated there was a reduction in production?

Mr. McKelvey. That is correct, a reduction in production or that there were nonproducing gas reservoirs in the field. But it was not established in advance nor was it established by the preliminary study that there was withholding of gas for a nefarious purpose. Every producer in the Gulf of Mexico is withholding gas because he can't produce it all at once.

You know, he has a 10-year reserve or something of that sort and his production plan calls for production over a period of time. But nevertheless there is public concern.

Mr. Yates. I happen to have watched a program on television in which Dr. Schwartz presented one viewpoint and a representative of Texaco took another. Dr. Schwartz insisted there was a great deal more gas available from the field and it could be transported in the Texaco pipeline to the shore. The Texaco representative tacitly admitted this by saying that he was not required by his contract with the distributor to furnish more than he furnished. The impression I received was that he could have furnished a great deal more and it could have gone into the pipelines.

But he said this was all that he was required to ship under his contract with the producer. Is this a sufficient answer? What if we need more gas? What if you have another situation such as they had in Ohio and Pennsylvania and the other places where schools and businesses were closed and people were thrown out of work?

I don't think it is a sufficient answer to say that he was only required to furnish a certain amount of gas to his consumer. It doesn't make sense to me. What can we do about examples of that kind?

SECRETARY'S POSITION ON ADDITIONAL DRILLING

Mr. McKelvey. Secretary Andrus has indicated that he will not hesitate to require additional drilling where it will be within the provision of the lease term to which I earlier referred. He has indicated also that he is going to be very tough in extending leases that are not yet producing and will make other efforts to see that they are brought into production earlier.

Mr. Yates. What happens when we have a disaster in the making such as we had in various parts of the country and it is known that the pipelines still have capacity for gas? What can G.S. do about it? Which of the agencies has jurisdiction for that kind of a situation? Is it G.S.?

Mr. McKelvey. I don't believe we have jurisdiction except as the Secretary gives it to us to require additional drilling. I am not saying that correctly. If the Secretary requires additional drilling, we would be the ones that would be carrying out those instructions.

Mr. Bettenberg. May I go back a step on that?

Mr. Yates. Do you volunteer to the Secretary that additional gas can be made available? Why do you have to wait for him?

Mr. McKelvey. If we knew additional gas could be made available, we certainly would volunteer that information, yes, sir.

Mr. Yates. Don't you know that now, really?

Mr. McKelvey. We know there is 10 years of reserves there. Everyone knows that.

CAPACITY AND UTILIZATION OF PIPELINES

Mr. YATES. You must know that there are certain pipelines to some of those reserves that are not operating at capacity? Who would know that?

Mr. MCKELVEY. We would not know that directly. The FPC would know that.

Mr. YATES. Don't you have to know that in addition to the FPC?

Mr. MCKELVEY. We would have to know that in addition.

Mr. YATES. Mr. Bettenberg?

Mr. BETTENBERG. It is probably not the case that there is gas that is sitting there ready to be produced so that somebody could turn a crank and fill the pipelines with it. The situation is a lot more complex than that. You have a field that is already producing, wells have been sunk and there may be a platform or a series of caissons or something like that there and the company is already producing. He may also have reservoirs that have been dedicated for service. In the case of Tiger Shoals it was around 1980, 1981, and 1982.

The question then becomes a much more difficult and sophisticated question of, can we require him to do more drilling which clearly won't help you in the middle of a crisis, but may help you a whole lot this next winter. That is what the Secretary has said that we will in fact require.

But it does require a sophisticated analysis to tell you how many wells to require, where to drill them, et cetera.

INCREASED PRODUCTION FROM EXISTING WELLS

Mr. YATES. We are not talking about that. We are talking about fields that are already in production.

The question that I am raising is whether there is a possibility of producing more gas from those known fields to meet an emergency?

Mr. BETTENBERG. The answer there is probably not or not very much.

Mr. YATES. Why?

Mr. BETTENBERG. The situation that Dr. Schwartz was talking about is one of these fields that was studied. He was in fact on the team. They are probably producing at or very near capacity from the wells that they have.

What Dr. Schwartz is alleging is that we should require the company to drill more wells.

Mr. YATES. No, I don't think he would say that and I don't think it is a fair conclusion to draw from his testimony because that would not have satisfied the last emergency because obviously the drilling of more wells at this time would not have been timely.

Mr. BETTENBERG. I testified jointly with him last Tuesday before Representative Moss. He indicated at that time that had we required that drilling last year and over the last several years——

Mr. YATES. That is something else again. You heard something I did not hear. That question is not appropriate. The question that I am inquiring about is where you have a field in production is it possible to bring additional amounts of gas from some of those fields into pipelines that are not full and transport it to areas where it is needed to avoid the kind of critical situations that were presented last winter?

Mr. BETTENBERG. You have to add one more condition and that is out of wells that are already drilled. I think you said fields in production.

Mr. YATES. I meant wells in production. I am talking about availability of gas, and the ability to drill additional wells is not what I am asking because that is for some time in the future.

Where you have a known producing well, what happens? Do we know what that well is capable of producing and do we know what the transporting line is capable of supplying?

GOVERNMENT'S AUTHORITY TO REQUIRE ADDITIONAL PRODUCTION

Mr. EVANS. May I pose a question on that?

Mr. YATES. Mr. Evans?

Mr. EVANS. When it is a well on Federal lands and it is being produced under a contract with the Federal Government, is there anything in that contract that gives the Federal Government authority over the quantity of gas that is produced at any point?

Mr. MCKELVEY. Mr. Evans, I believe it would be the lease term that I referred to earlier, section 3–C of the lease which provides that the Secretary may require the operators to drill additional wells.

Mr. EVANS. I am not talking about drilling. I am talking about producing from an existing well.

Mr. MCKELVEY. Producing from an existing well?

Mr. EVANS. That is what I am talking about. Is there anything in the lease that gives the Government any control over how much gas is produced annually or at any point from an existing producing well?

Mr. MCKELVEY. The general provision of the Energy Policy and Conservation Act with respect to establishing the maximum efficient rate and then giving the President authority under emergency conditions to require production at that rate would be the provision that would apply.

I don't believe that there is anything in the lease term itself that would give that direct authority.

Mr. BETTENBERG. That act is not operational right now, either.

Mr. EVANS. What does a lease specify in regard to a well on Federal property that is producing gas as to how much that gas is to produce? Under the leases could the lessee produce 1 year and turn it off the next for any reason? Could he produce half of his capability?

Mr. MCKELVEY. I expect he could. The restrictions that we have in an operational sense now are for the very opposite purpose. They are to control production so that it does not exceed a rate that might lead to damage to the reservoir.

Mr. EVANS. So, Mr. Chairman, it appears under the existing leases relating to wells on Federal lands that are producing gas at the present time that there is no current law in operation nor is there any provision in the lease that would allow the Federal Government to require the lessee to increase production in terms of the lease.

Mr. YATES. Is that true, Mr. McKelvey?

Mr. MCKELVEY. To my knowledge it is, sir.

Mr. YATES. Is your solicitor present?

Mr. MCKELVEY. I don't believe there is a representative here. I think perhaps it would be well to put this question to the solicitor. He might

interpret the fact that if the Secretary can require additional drilling, that logic would have it that he could require additional production from existing wells. But that is only logic.

I don't know how that fits with the law.

PROVISIONS OF LEASES COVERING PRODUCTION

Mr. YATES. What is the provision of the lease?

Mr. BETTENBERG. That is the provision in the lease.

Mr. MCKELVEY. Section 3(c) (2) of the lease provides that operators, after due notice in writing, diligently drill and produce such other wells as the Secretary may reasonably require in order that the leased areas or any part thereof may be properly and timely developed and produced.

Mr. EVANS. Here you are talking about producing additional wells, not producing additional gas.

Mr. YATES. Is there no other provision in the lease that relates to diligent production from wells in existence?

Mr. MCKELVEY. Not to my knowledge.

Mr. YATES. Who has a copy of a lease? Will you bring one at your hearing tomorrow?

Mr. MCKELVEY. We may have one.

Mr. YATES. We will have our lawyer look at it tonight.

Mr. MCDADE. Should we have a Federal law that would give the Government that authority on Federal lands, that is to say to require certain levels of production?

Mr. MCKELVEY. I suppose that is what is intended with the Energy Policy and Conservation Act, section 106, the MER.

Mr. MCDADE. What about it? Based on your experience, is that an effective goal to seek?

Mr. MCKELVEY. I guess I should say we don't have the experience yet, Mr. McDade. We have not as yet developed regulations for it.

AUTHORITY FOR MAXIMUM EFFICIENT RATE OF PRODUCTION

Mr. MCDADE. If you were going to start all over again and posit an energy shortage and be responsible for managing in an appropriate way the resources of the people as represented by the gas wells in the Gulf of Mexico, would you request that you be given that authority?

Mr. MCKELVEY. I don't think I would have felt it necessary to request it. You said based on my experience and I extrapolate that to mean the experience of the Geological Survey?

Mr. MCDADE. Yes.

Mr. MCKELVEY. Thus far we have not found evidence that operators are deliberately holding back awaiting a higher price. It is possible that some of them may. As Mr. Bettenberg indicated, we doubt from our knowledge of the production operations and situation with respect to the Gulf of Mexico that there are valves that could be turned on to yield higher production right now.

As you know, the Secretary within a day or two after he assumed office, sent a request to all operators both onshore and offshore lifting the MER restriction in our regulations which, as I say, is an MER established not to exceed damaging levels of production rather than for the purpose of achieving diligence, and releasing them from

that requirement and asking that they increase production to the maximum extent possible and asking them also to inform him of what they expect would be the result.

The result of that tabulation for the offshore was an expected increase in production, I believe, of about 170 million cubic feet per day, but not all of that would be attributable to the lifting of the MER requirement.

I am not sure from the nature of the response that we were able to identify exactly how much would come from that effort, from the elimination of that requirement. Possibly instead of 170 million cubic feet per day maybe 60 or 70 from that and the remainder from other things that they might have been able to do. That is about 1 to 2 percent of the total production coming from the Gulf of Mexico.

It is possible, I believe, as has been explained to me, that that in part would result from their very best effort to get the most out of the well. Fine tuning is a phrase they use in the industry.

We have such records, Mr. McDade. Since 1975, we have required that operators notify us of any well that is shut down for a period of longer than 5 days. That is, a well that we defined as a major producer.

Our definition was that it would produce more than 200 barrels of oil per day or 4 million cubic feet of gas. Both of those cutoff values are below the average production so that requirement goes down to wells that produce less than the average amount.

So, any major well that is shut down for more than 5 days has to be reported to us along with the reasons it is being shut down and other such data.

Of course, we monitor on a continuing basis the wells that are producing or that are shut in. I have here a summary of major wells shut in in the period of 1976 and since they started keeping this kind of record, which I believe would have been April 18, 1975. This report is for the period October 30 through November 1976. In the 1½ years that the order has been in effect, there were a total of 1,102 major producing wells shut in.

During that same period 965 were restored to production. 125 remained shut in during this reporting period itself, 81 wells were shut in in that period and 66 were restored to production.

The accumulated number of wells that were reported plugged and abandoned were four and those temporarily abandoned were eight.

We have the reasons for every one of those wells being shut in. Some wells were being gravel packed so the rig is on the platform. When the rig is on the platform, the wells are automatically shut in for safety purposes. Another group were shut in because of repairs to low pressure separation systems, et cetera.

Our records don't indicate that wells are shut in for capricious or nefarious purposes. The question might be asked, and has been asked, is our inspection force capable of checking out those reasons? Has the operator falsified his report to us? There I have to say we probably don't have an adequate force to verify all of these reports, but these reports are submitted to us on forms on which there is a penalty or perjury clause. I don't think it is a high likelihood that operators would be deliberately falsifying this kind of information, but it is a point.

It is possible that it would be desirable to have a force with the capability of verifying that kind of report.

In sum, Mr. McDade, to get back to your question which was directed to the Survey's experience, to our knowledge we have not identified instances in which there is a basis for believing that there is deliberate withholding of wells capable of producing larger amounts.

Certainly there has been deliberate withholding in the sense of not producing from certain reservoirs. Whether that relates to deliberate withholding as a part of a sensible production and development plan or a desire to simply lay back is much more difficult to determine.

I think it is appropriate that that question be looked at in more detail, but certainly our own regulations that relate to conservation provide that there shall not be drilling of unnecessary wells, not because we just want to save the operator money, but as a matter of conservation in the larger sense.

I am not able to say that there are no operators in the Gulf of Mexico that are not producing as much in total as they might, but our experience simply doesn't provide a basis for thinking that the shut-in problem is of a large order of magnitude.

What I have concluded myself, and I think many others in the Geological Survey have independently, is that that conclusion isn't enough because it is not satisfying some people concerned with the problem.

You may recall reading Senator Metzenbaum's letter to the Secretary of the Interior in which he gave a lot of the reports indicating that there was deliberate withholding. He, in the concluding part of his letter, said, in essence, Mr. Secretary, I am unable to verify whether there is a basis for these allegations or not, but I think you ought to send a crash team to the Gulf of Mexico and see whether there is a basis for this.

When I read that myself, I immediately called in several of my associates and we discussed it. Our conclusion was, yes, by gosh, that is what is needed. There should be an investigation by a blue ribbon panel to lay the question open or to settle the question one way or another because of the amount of wheel spinning going on relating to that. The number of people thinking that this is the solution to the gas shortage is so great that it is worth a definitive investigation on the part of a totally independent party.

It should be made by someone other than the Geological Survey or the Department of the Interior or the Federal Government. It should be made by an outside team of experts in hopes it can be settled one way or another.

REGULATIONS GOVERNING OCS OIL AND GAS

Mr. YATES. I have a press release from the Department of the Interior dated November 11, 1976. It begins as follows: "Regulations governing Outer Continental Shelf, OCS, oil and gas operations have been revised to insure greater diligence in the development and production of Federal OCS leases, the U.S. Geological Survey announced."

Mr. MCKELVEY. This was, I believe, referring to order no. 14, which was developed to establish procedures with respect to the extension of

leases beyond their primary term and requiring operators to document the reasons for a request for a suspension. That is done and again we have for every lease——

Mr. YATES. It talks about production; not only development but production. We were wondering a few minutes ago as to whether you had the right to compel diligent production.

Mr. BETTENBERG. That applies to leases that are not now producing.

Mr. YATES. It doesn't say so.

Mr. BETTENBERG. OCS Order 14 does, though. What the order attempts to do is lay down criteria by which someone——

Mr. YATES. Order 14 says approval of suspension of production. How do you have suspension of production if you don't have production?

Mr. MCKELVEY. That is possibly a confusing terminology but a lease is permitted to remain in effect as long as it is in production beyond its 5-year term. If it is in production then the lease continues to apply and applies as long as it remains in production.

But, for it to go beyond its 5-year term without being on production, and remain in effect, there must be a suspension of the production requirement. That is what is meant there.

DURATION AND EXTENSION OF LEASES

Mr. YATES. In view of the fact that you already answered one legal question, let me give you another. A lease is for five years.

Mr. MCKELVEY. That is right.

Mr. YATES. Do you have any discretion about renewing the lease?

Mr. MCKELVEY. Yes.

Mr. YATES. Why can you not as a condition for renewal require due diligence in production as well as development if there is any question about it?

Mr. BETTENBERG. I don't know the answer to that, but we are checking that.

Mr. MCKELVEY. Mr. Wayland informs me that leases are extended by production, not renewal. The difference I expect would——

Mr. YATES. I think you ought to bring a lawyer to answer some questions.

Mr. BETTENBERG. The question would be when you originally write that lease, if you could put additional stipulations in.

Mr. YATES. I am talking about all the companies that are in existence that have their leases coming up for extension. Is there anything such as a renewal or are they automatically extended?

Mr. MCKELVEY. They are automatically extended if they are already in production.

Mr. YATES. You mean forever?

Mr. MCKELVEY. As long as they are producing.

Mr. YATES. No way you can shut them off?

Mr. MCKELVEY. I don't know, push may come to shove.

RESERVE INVENTORY

Mr. YATES. You mention in the justifications:

In fiscal year 1977 the concern over accurate and defendable estimates of oil and gas reserves—resulted in the introduction of a program to compile an accurate inventory of reserves in developed and developing OCS oil and gas

fields. The program is designed to provide a continually updated inventory of oil and gas reserves on Federal OCS leases.

This information is used by the administration and the Congress, to plan future energy policy and regulate OCS operations. In fiscal year 1977 determination of the reserves for approximately 75 of the 300 oil and gasfields in the Gulf of Mexico will be accomplished. I think you said you had 100?

Mr. McKelvey. I think about 100 already completed.

Mr. Yates. Then you go on to say:

Approximately 75 will be completed each subsequent year through fiscal year 1980, with reserves in those fields previously inventoried being continually updated as additional production data is obtained. The effort will be directed to other areas as development proceeds.

You don't want any program increases in this area?

Mr. McKelvey. As of the time the budget justification was drawn up, sir, that was the case, but that was what I was referring to earlier when I started the discussion about the shut-in wells.

Mr. Yates. This says you have 54 people on the program, which is what you had last year and the year before.

Mr. McKelvey. I believe it was only begun the year before.

Mr. Yates. You have the same number of people.

I would think the Congress would want to have this information. I would think the Secretary would as quickly as he could get it. I ask, therefore, whether your estimate of doing 75 a year for the next several years is really duly diligent production.

Mr. Bettenberg. You might recall the Secretary indicated we are taking a completely new look at the requirements.

Mr. Yates. How shall this committee act then?

Mr. Bettenberg. We are in the process of developing an amendment.

Mr. Yates. An amendment to the budget.

Mr. Bettenberg. Yes.

Mr. Yates. Shall we wait until you develop it? How many amendments will you have?

Mr. Bettenberg. Only one.

Mr. Yates. No other amendments to the whole document?

Mr. Bettenberg. I think the President has already submitted a whole series of those. But, the Department, apart from that Presidential effort, is reviewing the leasing situation and right now what we are looking at is the question of how much should we step up the reserve calculations, what kind of effort will it require to get into those leases that are now in production where we may want to acquire desirable wells.

Mr. Yates. And the determination of MER's on Federal leases?

Mr. Bettenberg. Yes. That is a part of that.

THIRD PARTY INSPECTIONS

Mr. Yates. Is a part also the development of third party inspection on OCS? What does that mean?

Mr. McKelvey. That means, Mr. Chairman, that we would ask the operator to make inspections corresponding to a schedule and a procedure, of things that we would require be inspected and reported on, and that this inspector would be one possibly within the same company but in a different division and not under the control of the production manager; or a contract inspector might be employed.

It is hardly thinkable that we would have the personnel capacity at any time to inspect some 2,000 platforms on a daily or even a weekly basis.

Mr. YATES. What you are asking for then is for help?

Mr. MCKELVEY. We are saying it makes good sense for the operator itself to inspect its operations in a rigorous way and that it would make good sense——

Mr. YATES. For what purpose?

Mr. MCKELVEY. For safety of operations.

Mr. YATES. Isn't that putting the fox in the chicken coop?

Mr. MCKELVEY. That is why we ask that the inspection be by a third party.

Mr. YATES. I thought you said it made no sense.

Mr. MCKELVEY. I mean to have it for the company's own purposes it makes good sense that there be frequent and comprehensive inspection.

Mr. YATES. But not by the company itself?

Mr. MCKELVEY. If by the company, by a different division in the company. Some companies have their own environmental and safety monitoring organizations that are not under the control of the people they inspect.

VALIDATING SAFETY VIOLATIONS

Mr. YATES. Suppose there is a violation by a company of safety regulations. What happens?

Mr. MCKELVEY. If there is?

Mr. YATES. Is OSHA in on this?

Mr. MCKELVEY. It could be.

Mr. RADLINSKI. OSHA is not validating the safety of operations.

Mr. YATES. Who is?

Mr. RADLINSKI. GS. Third-party inspection would supplement the GS inspections. Private industries inspect their operations continually.

Mr. YATES. Wouldn't it be better to have one company do the inspection of another company's operation?

Mr. RADLINSKI. We would like to supplement our data We want to develop a procedure whereby the operator would do the inspecting according to our standards and record the results in our format. It wouldn't replace the inspection responsibility that we already have.

Mr. YATES. How well are you performing the inspection responsibility? If you are asking for help you don't think you are doing a good job. Is that correct?

Mr. RADLINSKI. It is like policing any type of operation, Mr. Chairman. You can always use additional help. We think the safety record in the last few years speaks well for the efficiency of the safety inspection system.

Mr. YATES. If that were true, why do you ask for additional help?

Mr. MCKELVEY. We are asking for additional help because we believe that it can be further improved that way——

RECOMMENDATIONS FOR IMPROVEMENT OF SAFETY REGULATIONS

Mr. YATES. Will you put into the record what your recommendations for improvement of OCS safety regulations are.

[The information follows:]

Actions for Improvement of OCS Safety Regulations

The recommendations for improvement of safety in OCS oil and gas operations being pursued by the Geological Survey are summarized as follows:

1. Research and Development. An R&D program has been formulated to supplement industry and academic efforts to identify technologies and operational practices where additional research and development efforts might reduce the likelihood of accidents and procedures.

2. OCS Standards. The Geological Survey has established a program to develop standards for safety and pollution-control equipment, hazardous operation procedures, personnel, and pieces of equipment which comply with these OCS standards.

3. OCS Order Development. The Geological Survey is continuing to issue new OCS Orders in areas of existing operation and in frontier areas to assure greater safety in operations.

4. System Design Analysis. A program has been formulated to require the operator to conduct a "systems analysis" on each new platform or major renovation of an existing platform. Geological Survey personnel will be required to verify that such analyses are performed correctly and properly interpreted.

5. Structural Verification. The Geological Survey is developing a program which assures the integrity of fixed drilling and production facilities, avoids pollution, and protects personnel from harm due to structural failures.

6. Drilling and Production Compliance Inspections. The Geological Survey is developing revised inspection procedures to allow for more frequent inspections of operator equipment and procedures. These revisions include initiating a self-inspection program by the operators in addition to Geological Survey inspections. A computerized inspection system is also being developed to more easily identify the more frequent safety violations and those which need to be reviewed more frequently.

7. Equipment Failure Reporting and Analysis. The Geological Survey intends to implement a requirement that all operators in the OCS conduct a complete inventory of the equipment used in oil and gas operations and maintain such an inventory in the future. From this information, an analysis will be made of the performance and failure frequencies of OCS oil and gas equipment.

8. Safety and Pollution Awareness. The Geological Survey is cooperating with the oil and gas industry in developing a program to ensure that all personnel - operator and Federal - are aware of the need for safety and pollution-prevention on the OCS and the results of failures in these areas.

9. Audit and Review. A program providing for periodic internal audits of ongoing procedures and actions has been formulated to identify problem areas in field offices activities and assure compliance and consistency with overall Geological Survey efforts.

Mr. BETTENBERG. Stepping back to the additional resources item, we may be back requesting a small number of additional inspectors for checking certain things related to production, but primarily what we are talking about is petroleum engineers and economists to do the calculations onshore.

Mr. YATES. This says OCS offshore. I would think that we would want to help you in this field if you are not doing an adequate job, because platforms are a prospect of great danger. If the safety job isn't being done properly, we want to know it, and we want to know what should be done in order that the job be done well. Have you asked for additional personnel?

REQUEST FOR ADDITIONAL PERSONNEL

Mr. MCKELVEY. Not in this budget.

Mr. YATES. Is this going to be the subject of amendment too, Mr. Bettenberg?

Mr. BETTENBERG. Which part of it?

Mr. YATES. On safety. I asked whether you asked for additional personnel. He said you need additional personnel. I now ask whether he has asked for it, and he says no.

Mr. MCKELVEY. Let me check.

Mr. BETTENBERG. We don't have under review at this time any proposal for additional people for safety purposes.

Mr. MCKELVEY. We are asking for 20 additional people.

Mr. YATES. What portion of the justifications should we look at?

Mr. MCKELVEY. You should look at page 102.

Mr. YATES. You want 20 additional people for OCS regulation. That has to do with safety?

Mr. MCKELVEY. That is our lease management and supervisory responsibility.

Mr. YATES. If we give you 20 additional positions, that is all you need for absolute safety in the operation?

Mr. MCKELVEY. No, I can't say that, Mr. Chairman.

Mr. YATES. Why do you ask for only 20, then?

How many did you ask OMB for?

Mr. MCKELVEY. I think that is what we asked——

Mr. YATES. I don't know whether the Secretary knows about this, but I am sure he would want to know about safety.

Mr. BETTENBERG. I am sure he would. As I understand it, this is purely for program expansion as it relates to expansion into other areas, beyond the Gulf of Mexico.

Mr. MCKELVEY. I meant other OCS areas besides the Gulf of Mexico.

Mr. YATES. If you open the Atlantic, you mean?

Mr. MCKELVEY. The Atlantic and the Gulf of Alaska, and so on.

Mr. YATES. Those are still closed?

Mr. McKelvey. No. In the Gulf of Alaska we are not yet operating but there is drilling in progress.

Mr. Yates. How many do you need for each of those?

Mr. McKelvey. I don't know that I can give you that. I will have to supply it for the record.

[The information follows:]

DISTRIBUTION OF NEW OCS POSITIONS BY AREA

The 20 position increase requested in the fiscal year 1978 budget for regulation of OCS oil and gas operations will be assigned to the following geographic areas:

Area:	*Number of positions*
Atlantic OCS	+7
Gulf of Alaska OCS	+7
Pacific OCS	+6
Total	+20

Mr. Yates. I also want to know what you asked OMB for.

Mr. McKelvey. Thirty-six.

Mr. Yates. Why did they cut you back? Did they tell you?

Mr. McKelvey. I don't believe they did, Mr. Chairman.

ADEQUACY OF PRESENT STAFF

Mr. Yates. Is the committee correct? Do you think this is a critical area, or is it not?

Mr. McKelvey. It certainly is.

Mr. Yates. It must be, because you are asking for help, aren't you? You can't handle it with present personnel?

Mr. McKelvey. We think it can be much better if we are able to extend——

Mr. Yates. You can say it can be done better with the help of third-party inspection. What if we were to set up some kind of third-party inspection, would you still need those 20 people?

Mr. McKelvey. Yes. Because what we are proposing is essentially or in part, to inspect the inspector and the job——

Mr. Yates. Are you proposing to let the companies inspect themselves and you are going to inspect that inspector?

Mr. McKelvey. We are not proposing to let the companies inspect themselves in the way in which you imply.

Mr. Yates. You said you had one division of the company inspect the other division.

Mr. McKelvey. If that were set up in a way in which the production division had no control over the division that would be making the inspection, I would think that would be satisfactory, but in any case we would still be inspecting what they are doing.

Mr. Yates. Even if you get 20 people, you think it still would not be enough?

Mr. McKELVEY. We believe a more effective job could be done. But as Mr. Radlinski indicated, it is very difficult to judge just what is adequate when it comes to inspection, the same as it is difficult to judge how large a police force ought to be. But our judgment is that a much, much more effective job could be done if we had a system in which we were able to inspect inspectors conducting an inspection according to a prescribed procedure.

Mr. YATES. Do you want to draft a statement and insert it in the record at this point of what you propose?

Mr. McKELVEY. Yes, sir.

[The information follows:]

OCS THIRD PARTY INSPECTION PROCEDURES

The purpose of third-party inspections is to enhance the efforts to identify undesirable trends and to provide solutions with respect to safety and pollution control in day-to-day operations. Third-party inspectors are defined as either: (1) personnel employed by the operator who are not directly responsible for the operation they are inspecting and who report directly to management or (2) personnel who are employed by an outside firm with which the operator or group of operators contract inspection services.

Operators are required by the OCS orders to inspect their equipment at prescribed intervals. The third-party inspectors will document the results. All production facilities will be inspected at least quarterly. Results of each inspection will be recorded on forms provided by the Geological Survey, certified by the operator, and submitted to the appropriate Geological Survey District Supervisor.

Third-party inspection data will be coded for inclusion in the Platform Inspection System of the Gulf of Mexico OCS Operations to permit its retrieval separately from inspection data collected by USGS inspectors.

It should be emphasized that the third-party inspections are not intended to substitute for USGS inspections but are to supplement them.

OCS PIPELINE SAFETY

Mr. YATES. The committee wants to know what you want to do in this respect. You have the Office of Pipeline Safety and Geological Survey involved in the inspection of OCS pipelines. What does that mean? Do you want to have the concurrent jurisdiction?

Mr. RADLINSKI. A memorandum of understanding was recently signed at the Department level specifying the respective responsibilities of the Office of Pipeline Safety and the Department of the Interior. We now need to work out whether the Department of the Interior is going to inspect those pipelines that are under the jurisdiction of the Office of Pipeline Safety. We understand they have no inspectors for this job, Mr. Chairman.

Mr. YATES. You are going to work for them?

Mr. RALINSKI. In effect.

Mr. YATES. You can't have a statutory responsibility for this because the statutory responsibility is in the Office of Pipeline Safety?

Mr. RADLINSKI. That has been determined, yes, for those pipelines that extend to the shore from the outlet flange of the platform. In

other words, beginning at the point where the pipeline takes off horizontally to the shore, with some exceptions, is the responsibility of the Office of Pipeline Safety.

Mr. YATES. And they have no inspectors and they have asked GS to do it?

Mr. RADLINSKI. Yes.

Mr. YATES. Just inspection of the flange?

Mr. RADLINSKI. No; the inspection of the pipelines that go from the platforms to the shore.

Mr. YATES. They take it up to the shore?

Mr. RADLINSKI. They have the responsibility for most of the pipelines. In other words, the distance traversed from the platform to the shore.

Mr. MCKELVEY. What we are concerned about, Mr. Chairman, is there are several thousand miles of pipelines out there——

Mr. YATES. But the Office has that statutory responsibility?

Mr. MCKELVEY. That is right.

Mr. YATES. Would you be paid for it?

Mr. RADLINSKI. We have made that proposal, but that has not been worked out.

Mr. YATES. Temporarily at least that has not worked out, has it?

Mr. RADLINSKI. Temporarily we were inspecting the pipelines as we were prior to the signing of this memorandum.

Mr. YATES. Will you put a statement in the record as to where that stands and what your responsibilities are.

[The information follows:]

Status of Inspection of Pipeline

Pipeline related facilities on production platforms in the Gulf of Mexico OCS are currently inspected by USGS field operations personnel in conjunction with normal production platform inspections. No distinction is made between Department of the Interior (DOI) jurisdictional and Department of Transportation (DOT) - Office of Pipeline Safety (OPS) jurisdictional pipelines during the inspections. All pipelines and associated equipment on the platforms are inspected. Underwater inspections of pipelines are not made at this time. However, aerial observations are made during the course of helicopter flights to and from the platforms. In the event a violation is noted during the overflights or platform inspections, appropriate actions are taken which include notifiying DOT in the event the problem occurs on DOT jurisdictional pipelines.

Under the May 6, 1976, Memorandum of Understanding (MOU) between the Department of Transportation (DOT) and the Department of the Interior (DOI) relating to offshore pipelines, DOI has responsibility for establishing and enforcing the design, construction, operation, and maintenance regulations for those pipelines extending upstream from the outlet flange at:

1. each facility when hydrocarbons are produced, or,

2. each facility where produced hydrocarbons are first separated, dehydrated, or otherwise processed,

3. whichever facility cited in 1 or 2 is farther downstream.

To implement the MOU, the Secretary of the Interior sent a letter to the Secretary of Transportation dated August 27, 1976, (copy attached).

The Secretary of Transportation responded by letter dated November 9, 1976, (copy attached).

The two Departments are currently trying to resolve the difficulties arising from the MOU.

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

OFFICIAL FILE COPY

OFFICE POCS
SURNAME
DATE 8/19
OFFICE PDB
SURNAME
DATE 8/19/76
SURNAME
DATE 8/25/76
OFFICE
SURNAME
OFFICE
SURNAME
OFFICE
SURNAME
DATE
OFFICE
SURNAME
OFFICE
SURNAME
DATE

Dear Mr. Secretary:

On July 22, members of our respective staffs met to discuss implementation of the Memorandum of Understanding (MOU) between our Departments regarding offshore pipelines, which we signed on May 6, 1976. Agreement was reached that a document would be drafted jointly to clarify details of the various implementation actions.

Your plans for the immediate promulgation of regulations for offshore pipelines within DOT's regulatory responsibilities were made known at this meeting. It was also noted that the Notices of Proposed Rulemaking and the subsequent comment and analyses for these regulations were accomplished prior to the signing of the MOU of May 1976 that resulted in clarification of the manner in which the authorities of DOT and DOI will be exercised for pipeline specifications. While we appreciate the great deal of effort expended during a lengthy process that these regulations represent, we believe that their promulgation should be delayed until technical comment from DOI specialists is considered. Preliminary evaluation of these regulations indicates that they are not sufficiently comprehensive in establishing requirements for pollution prevention. In addition, these regulations do not allow for stipulations on pipeline construction and operation in leases or permits, as may be necessary on a site-specific basis. Such stipulations would result from requirements developed in the environmental analyses that precede all offshore sales, or subsequently as a result of exploratory and lease development analyses. In the absence of an agreement that DOI should impose such unique stipulations, it appears that a set of regulations, that can take as long as eight months to amend, are to be considered sufficient to deal with any situation that might arise. Such an assumption could well lead, we believe, to unacceptable delays in OCS development or to practices that may be environmentally unacceptable. I do wish to make very clear, however, our commitment to the spirit of the MOU that DOT control the regulations that specify pipeline safety considerations for those lines "shoreward of the flange."

We are prepared to provide our technical input almost immediately to help improve the regulations and suggest that DOT propose the method for best accomplishing this. For the reasons stated, in the interim between the effective date of the DOT regulations and the promulgation of amendments

thereto, DOI may find it necessary to add more stringent requirements to pipeline easement permits in order to insure adequate protection of the environment and the maintenance of system integrity for platform safety.

On the issue of inspection and enforcement, it is clear that neither of our Departments has sufficient staff or resources at present to perform an adequate job. Inasmuch as the resources to inspect and enforce must be included in future budgets, we suggest that they all be included in the budget of DOI where the infrastructure for a comprehensive inspection program already exists. This would avoid the problems that are sure to arise from having two inspection forces for the same pipelines. If you do not agree, then it would be best if DOT assume the full inspection and enforcement responsibility for the pipelines it regulates, while the Geological Survey will do likewise for those pipelines under the jurisdiction of DOI.

We are confident that with full cooperation and understanding, the implementation document can resolve those issues that were not covered in sufficient detail in the MOU.

Sincerely yours,

/S/ ERNEST FRIZZELL

Acting Secretary of the Interior

Honorable William T. Coleman, Jr.
Secretary of Transportation
Department of Transportation
Washington, D. C. 20590

cc: Cesar DeLeon, DOT

EGS-WARadlinski:pfm:8/10/76 860-7411
REWRITTEN: RAKaram:bm:8/19/76

cc: Secretary's File
Secretary's Reading (2)
AS/EM (2)
G.L. Turcott, BLM
R. Karam, PD&B
J. Holtkamp, SOL
EGS-MS 114, Reston, Va.
Director's Chron, MS-114
102 Chron

THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

NOV 9 1976

NOV 10 P12:14
OFFICE OF THE SECRETARY
DEPARTMENT OF THE INTERIOR

Honorable Thomas S. Kleppe
Secretary of the Interior
Washington, D.C. 20240

Dear Mr. Secretary:

In response to Under Secretary Frizzell's letter of August 27, 1976, concerning the regulation of offshore pipeline facilities, the final rules for offshore liquid and gas pipeline facilities were published by DOT's Materials Transportation Bureau on August 12, 1976 (41 FR 34035) and August 16, 1976 (41 FR 34598) respectively.

These regulations apply to offshore pipelines within DOT's responsibility under the recently signed DOT/DOI Offshore Pipelines Memorandum of Understanding (MOU). Copies of the notices of proposed rulemaking and drafts of the final rules were provided to your staff for comment during the rulemaking process, but unfortunately, DOI comments were not received.

As you know, the primary purpose of the recently developed MOU is to avoid duplication of Federal regulatory efforts as well as the attendant imposition of different and conceivably conflicting Federal requirements for the same pipelines. In view of our commitment to the spirit of the MOU, I trust that for pipelines within DOT's responsibility under the MOU, DOI will not require applicants to comply with regulations which are not prescribed by DOT.

We believe that the DOT regulations for offshore facilities are adequate to cover all known safety and pollution situations involving the design, construction, operation, and maintenance of offshore facilities under the Department's jurisdiction. However, should the DOI in its review of each application determine that a situation exists that is not covered by existing DOT regulations, we urge that you promptly advise us of the situation for appropriate resolution. Such a resolution could result in DOT issuing an order imposing specific additional or more stringent requirements. The DOT regulations would be amended to provide for the exercise

of such specific rulemaking authority in special circumstances. This approach would have the benefit of controlling unacceptable practices, with which we are both concerned, while maintaining full regulatory responsibility in one Department.

As to inspection and enforcement, I agree that our two Departments should not have separate inspection forces for the same pipelines. We do not agree that all resources should be in the DOI budget, but believe that each Department should develop plans and resources to carry out its respective responsibilities as specified by the MOU.

I have asked the Materials Transportation Bureau to work with your staff as diligently as possible in carrying out the purposes of the MOU. Thank you very much for the cooperation of DOI in this important program.

Sincerely,

William T. Coleman, Jr.

Mr. YATES. Will you need additional personnel?

Mr. MCKELVEY. We would certainly need additional personnel for that.

Mr. YATES. Have you asked for it?

Mr. MCKELVEY. No, sir, because the jurisdictional matter with the Office of Pipeline Safety has not been worked out.

Mr. YATES. At such time as it is worked out you might want to ask the Congress for additional funds?

Mr. MCKELVEY. Yes, sir.

TAR SAND DEPOSITS

Mr. YATES. The resolution and definition of the status of leasing of tar sand deposits possibly leading to the elimination of tar sand deposits. What is the problem there?

Mr. MCKELVEY. Tar sands presently are covered by a separate lease, I believe, Mr. Chairman. There have been instances in which there has been confusion as to the applicability of an oil and gas lease that may conflict with a tar sand lease.

Mr. YATES. How will that be resolved?

Mr. MCKELVEY. We think it will take legislation, but I believe that has been drafted.

Mr. YATES. It has been drafted and proposed for passage by the Congress?

Mr. MCKELVEY. I am not sure whether it has been passed——

Mr. YATES. It has not been passed yet?

Mr. BETTENBERG. The legislative counsel's office is working on it.

Mr. YATES. We are recessed until 10:30 a.m. tomorrow.

TUESDAY, MARCH 1, 1977.

COAL PREFERENCE RIGHT LEASES

Mr. YATES. We turn now to coal.

You want to develop methodology for determining commercial quantities of coal under preference right lease applications. What does that mean?

Mr. MCKELVEY. Mr. Chairman, about a year ago, Secretary Kleppe decided on a new coal leasing policy for Interior, under which preference right leases would be processed, but the test of discovery would be based on proof that the applicant had discovered coal in commercial quantities, which would be defined to include all of the costs, including environmental costs, that were involved; prior to that, proof of discovery was based on comparability of the property with other producing mines in the region. But this new requirement called for a much more comprehensive evaluation of the coal, and its value. This chart shows the areas covered by the requests.

[The chart follows:]



The number and general location, by State, of pending coal preference right lease applications in the central and western regions are shown on this chart.

Mr. McKELVEY. The second problem listed there, really very much related to that, is the problem of evaluating coal for establishing the minimum acceptable bid in a lease sale. Both problems involve determination of estimates, for example, of the future price of coal, of discount rates, and general procedures. The development of that general procedure, did pose a considerable problem, but we are well along towards the completion of it in both instances.

COAL ROYALTIES

Mr. YATES. What about the question of royalty?

Mr. McKELVEY. The question of royalty was addressed by the Coal Leasing Amendment Act which sets a new and higher royalty, I believe 12 percent, than had been the case in the previous law.

INTERPRETATION OF REQUIREMENTS FOR COAL EXPLORATION

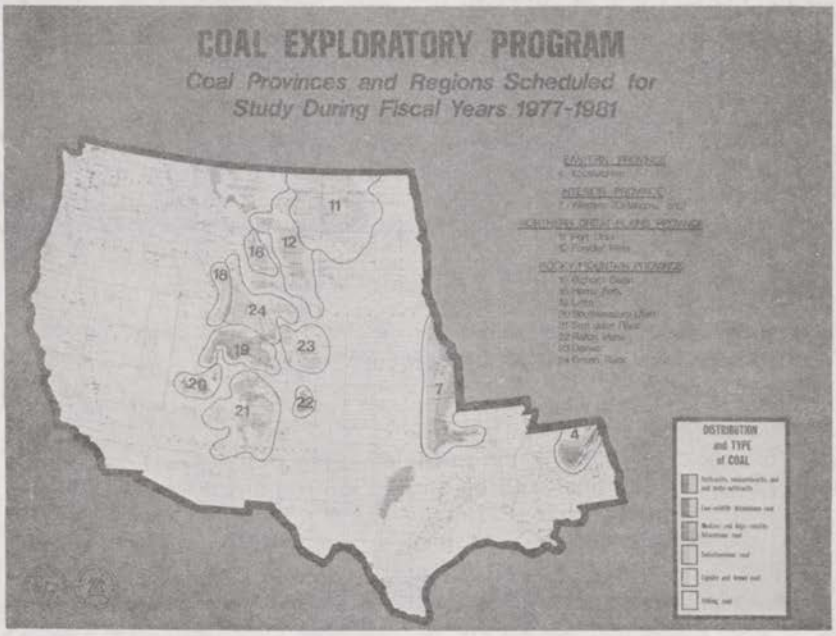
Mr. YATES. Then you have a possible disagreement with Congress over the interpretation of requirements for coal exploration.

Mr. McKELVEY. The word disagreement, I suppose, may be the wrong term here, for there would be no intent, as might be implied by that term, to take a different view than the Congress intended.

Mr. YATES. It's a question of different interpretations.

Mr. McKelvey. Right. The Coal Leasing amendment called for, among other things, the development of a coal exploration program, and called also for the Secretary to submit to Congress a coal exploratory program plan, within six months of the date of the act. This chart shows the areas to be studied in 1977–1981.

[The chart follows:]



This map shows areas containing federally owned coal deposits where the coal exploratory program will focus during the first 5 years. This acceleration of ongoing activities is in response to the Federal Coal Leasing Amendments Act of 1975, Public Law 94–377.

Mr. McKelvey. That plan was drawn up on the basis of an interpretation that Secretary Kleppe gave at the time a decision was reached as to how to proceed with that.

You may recall that when that bill, which was passed over the President's veto, was sent to the President, Senator Metcalf and Mrs. Mink wrote to the President urging him to pass it, and described some of the terms of the legislation. With respect to the coal evaluation program, in that letter, they recognized that the Geological Survey had already begun exploration and the letter said, "the Department had been seriously handicapped in determining the actual value of coal tracts which are leased."

However, through the Geological Survey, it has begun to correct this deficiency. In fiscal 1975, $1.9 million was spent for stratigraphic drilling and other evaluations of Federal lands. According to the amended budget request now pending before Congress, Interior's

program would increase from a projected $2.5 million to $7.6 million for 1977.

The Department has stated that "expansion of this program is necessary to supply the Government with additional data to facilitate the coal leasing program." Section 7 of the bill essentially extends and codifies the ongoing evaluation program carried out by the Geological Survey by directing the Secretary "to evaluate—the known recoverable coal on Federal lands."

So they implied that Interior was already doing, or had begun to do, what the bill called for, but in considering the question, the Secretary decided that probably the spirit of the Congress, or the spirit of the law that Congress passed, called for us to do more than we had actually been doing in the reconnaissance appraisal of coal, and consequently the coal exploratory plan which was drawn up called for an additional $2 million to be spent, largely for drilling, in addition to what was underway. The budget we have presented to you reflects that plan.

Mr. YATES. OK. Let's go vote and come right back.

[A short recess was taken.]

COMINCO ROYALITY PAYMENTS

Mr. YATES. Tell us about the Cominco royalty overpayments; why does that bother you?

Mr. MCKELVEY. It is simply a problem as to what to do, Mr. Chairman. The basis for determining the value of phosphate rock at the mine mouth was redetermined about a year ago. The problem with western phosphate rock is that most of the producers don't sell it. They produce it and process it themselves, and in most cases actually sell the final products. They are completely vertically integrated and so phosphate rock is not sold. So how much is it worth?

Mr. YATES. I mean in order to determine a royalty.

Mr. MCKELVEY. Right. In order to determine royalty.

Mr. YATES. Why don't you do it on the basis of the final product?

Mr. MCKELVEY. The final product, of course, has much value added.

Mr. YATES. I am sure they wouldn't object to paying the Government on that basis, would they?

Mr. MCKELVEY. It turned out that whereas most of the companies had been paying royalty on a value that was lower than that reached under the new procedure, Cominco had been paying more. So the question was whether or not they should be refunded for overpayments or not, and that question has gone to the Solicitor. I forgot to mention, Mr. Chairman, we brought our lawyer with us today, Mr. Spinner Findlay, of the Solicitor's Office.

Mr. YATES. Where is Mr. Findlay?

Mr. FINDLAY. Right here.

Mr. MCKELVEY. Next to him is Dale Johnson of the Bureau of Land Management, in case we get into questions in that area.

DUE DILIGENCE

Mr. YATES. Mr. Findlay, have you had occasion to check on the question of whether the phrase "due diligence" applies to production as well as to development in the leases?

Mr. FINDLAY. Which leases are you referring to?

Mr. YATES. Offshore oil-producing leases.

Mr. FINDLAY. Yes; it is our opinion that it could apply to production as well as drilling. There is a provision in our lease which could be interpreted that way.

Mr. YATES. OK. We are glad to know. There was some question raised about it yesterday. Now we have an authoritative determination. Thank you.

MAXIMIZING MINERAL RESOURCE RECOVERY

You also are concerned about the development of technical and regulatory procedures for maximizing mineral resource recovery from multiresource land, and rightly so. Would you put a statement on that into the record as to what the problem is?

Mr. MCKELVEY. Yes.

[The information follows:]

MINERAL RESOURCE RECOVERY FROM MULTIRESOURCE LAND

By law a tract of Federal land can be leased for development for several different commodities simultaneously. Difficulties can arise when one lessee wants to start developing a lease that conflicts with another lessee's development plans for the same land. In order to maximize recovery and minimize conflicts, procedures for multiple resource leases must be established for each area so affected.

For example, in Eddy and Lea Counties, N. Mex., this problem arose when oil, gas, and potash leasing took place on the same lands. In order to resolve this problem, rules for concurrent operations were developed and published in the November 5, 1975, Federal Register, as follows:

Office of the Secretary

EDDY AND LEA COUNTIES, N. MEX.

OIL, GAS, AND POTASH LEASING AND DEVELOPMENT WITHIN POTASH AREA

For the purpose of revising the rules for concurrent operations in prospecting for, development, and production of oil and gas and potash deposits owned by the United States within the potash area and for the purpose of revising the designated potash area to which the amended provisions are to be applicable, it is ordered as follows:

I. The order of the Secretary of the Interior dated February 6, 1939 (4 FR 1012), withholding certain lands in New Mexico from application or lease under the oil and gas provisions of the Mineral Leasing Act of February 25, 1920 (41 Stat. 437), as amended, which order was revoked by order of the Secretary of the Interior dated October 16, 1951 (16 FR 10669), shall continue to be revoked. The lands described in said order dated February 6, 1939 (except the E½SE¼, sec. 24, and the E½E½, W½SE¼, S½SW¼, sec. 25, T. 20 S., R. 29 E., N.M.M., which were withdrawn from all forms of entry by Public Land Order No. 569, 14 FR 1086), which were opened for oil and gas leasing by said order dated October 16, 1951, shall continue to be open for oil and gas leasing. This order shall not affect the current status of land with respect to its being withdrawn from, or open for, entry or leasing.

II. Subject to the provisions of I, above, the provisions of the order of the Secretary of the Interior dated May 11, 1965 (30 FR 6692–93), and the Potash Area designated therein are revised to be as specified herein.

III. General Provisions—A. Issuance of Oil and Gas Leases.

The Department of the Interior reaffirms its position that the lease stipulations contained in the order of May 11, 1965, adequately protect the rights of the oil and gas, and potash lessees and operators.

Therefore, each successful applicant for a noncompetitive oil and gas lease, and any party awarded a competitive lease, for lands included in the designated potash area will be required, as a condition to the issuance of such lease, to execute a stipulation to the lease as follows:

1. No wells will be drilled for oil or gas except upon approval of the area oil and gas supervisor of the Geological Survey, it being understood that drilling will be permitted only in the event that it is satisfactorily established that such drilling will not interfere with the mining and recovery of potash deposits, or the interest of the United States would best be subserved thereby.

2. No wells will be drilled for oil or gas at a location which, in the opinion of the area oil and gas supervisor, would result in undue waste of potash deposits or constitute a hazard to or unduly interfere with mining operations being conducted for the extraction of potash deposits.

3. When it is determined by the area oil and gas supervision that unitization is necessary for orderly oil and gas development and proper protection of potash deposits, no well shall be drilled for oil or gas except pursuant to a unit plan approved by the area oil and gas supervisor.

4. The drilling or the abandonment of any well on said lease shall be done in accordance with applicable oil and gas operating regulations including such requirements as the area oil and gas supervisor may prescribe as necessary to prevent the infiltration of oil, gas, or water into formations containing potash deposits or into mines or workings being utilized in the extraction of such deposits.

The area oil and gas supervisor in any action taken under part A, items 1, 2, 3, and 4 shall take into consideration the recommendations of the area mining supervisor of the Geological Survey and the applicable conservation rules and regulations of the Oil Conservation Commission of the State of New Mexico.

B. *Renewal or Extension of Oil and Gas Leases.*—As a condition to the granting of any renewal or extension of any existing lease embracing lands included in the designated potash area, the lessee will be required to execute a stipulation identical to that specified in part A, items 1, 2, 3, and 4 hereof.

C. *Potash Leases.*—All potash permits and leases hereafter issued or existing potash leases hereafter renewed for Federal lands within the designated potash area, shall be subject to a requirement either to be included in the lease or permit or imposed as a stipulation, to the effect that no mining or exploratory operations will be conducted that, in the opinion of the area mining supervisor, would constitute a hazard to oil or gas production, or that would unreasonably interfere with the orderly development and production under any oil or gas lease issued for the same land.

D. *Minable Reserves.*—1. Each potash lessee will file annually by January 1 with the area mining supervisor a map or maps on which has been delineated the following information with respect to the Federal potash leases which it then holds:

a. The areas where active mining operations are now in progress on one or more ore zones.

b. The areas where mining operations have been completed on one or more ore zones.

c. The presently unmined areas which are considered to contain a minable reserve in one or more ore zones, that is, those areas (enclaves) where potash ore is known to exist in sufficient thickness and quality to be minable under present day technology and economics.

d. The areas within these enclaves which are believed to be barren of commercial ore.

The area geologist of the Geological Survey, in consultation with the area mining supervisor, will review the information submitted in this regard and make any revisions in the boundaries of the proposed minable reserves (potash enclaves) which are consistent with the data available at the time of such analyses.

The area geologist and area mining supervisor will commit their initial findings to a map or maps of suitable scale and will thereafter revise that map or maps as necessary to reflect the latest available information.

E. *Oil and Gas Drilling.*—1. It will be departmental policy to deny approval of most applications for permits to drill oil and gas tests from surface locations within the potash enclaves established in accordance with part D, item 1 hereof. Two exceptions to this policy will be permitted under the following conditions:

a. Drilling of vertical or directional holes will be allowed to take place from barren areas within the potash enclaves when the area mining supervisor determines that such operations will not adversely affect active or planned mining operations in the immediate vicinity of the proposed drillsite.

b. Drilling of vertical or directional holes will be permitted to take place from a drilling island located within a potash enclave when: (1) there are no barren areas within the enclave or drilling is not permitted on the establishing barren area(s) within the enclave because of interference with mining operations; (2) the objective oil and gas formation beneath the lease cannot be reached by a well which is vertically or directionally drilled from any permitted location within the barren area(s); or (3) in the opinion of the area oil and gas supervisor, the target formation beneath a remote interior lease cannot be reached by a well directionally drilled from a surface location outside the potash enclave. Under these circumstances, the area mining supervisor will, in consultation with the area oil and gas supervisor, establish an island within the potash enclave from which the drilling of that well and subsequent wells will be permitted. The area mining supervisor in establishing any such island will, consistent with the data supplied by the area oil and gas supervisor regarding present directional drilling capabilities, select a site which will minimize the loss of potash ore. No island will be established within 1 mile of any area where approved mining operations will be conducted within 3 years. To assist the area mining supervisor in this regard, he may require affected potash mining operators to furnish a 3-year mining plan.

2. In order to protect the equities between oil and gas lessees while at the same time reducing the number of oil and gas wells which operators propose to drill in the potash area, the area oil and gas supervisor will make greater use of his prerogative to require unitization. Unitization will be mandatory in those cases where completion of the proposed well as a producer would result in the drainage of oil and gas from beneath other Federal lands within a potash enclave. Thus, unitization will be prerequisite to the approval of any well which is (1) located adjacent to an enclave (within a quarter of a mile if an oil test or one-half mile if a gas test) and which is to be drilled vertically to the prospective formation; (2) to be directionally drilled from an adjacent surface location to bottom in a formation beneath an enclave; or (3) to be vertically or directionally drilled from a barren area or island within an enclave. Any unit plan hereafter approved or prescribed that includes oil and gas leases covered by this notice shall include a provision embodying in substance the requirements set forth in part A, items 1, 2, 3, and 4 hereof.

3. The Department will cooperate with the New Mexico Oil Conservation Commission (NMOCC) in the implementation of that agency's rules and regulations. In that regard, the Federal potash lessees shall continue to have the right to protest to the NMOCC the drilling of a proposed oil and gas test on Federal lands provided that the location of said well is within the State of New Mexico's "Oil-Potash Area" as that area is delineated by NMOCC Order 111, as amended. However, the Department will exercise its prerogative to make the final decision of whether to approve the drilling of any proposed well on a Federal oil and gas lease within the potash area.

4. Applications for permits to drill vertical tests for oil and gas at locations that are in the potash area but outside the State of New Mexico's "oil-potash area" and which do not directly offset an enclave (within a quarter mile of an oil test or within one-half mile if a gas test) will be routinely approved by the area oil and gas supervisor after review by the area mining supervisor.

F. *Access to maps and surveys.*—1. Well records and survey plats that an oil and gas lessee must file pursuant to applicable operating regulations (30 CFR Part 221), shall be available for inspection at the office of the area oil and gas supervisor, by any party holding a potash permit or lease on the land on

which the well is situated insofar as such records are pertinent to the mining and protection of potash deposits.

2. Maps of mine workings and surface installations and records of core analyses that a potash lessee must file pursuant to applicable operation regulations (30 CFR Part 231), shall be available for inspection at the office of the area mining supervisor by any party holding an oil and gas lease on the same land insofar as such maps or records are pertinent to the development and protection of oil and gas deposits.

3. Maps of potash enclaves shall be available for inspection in the office of the area geologist, area mining supervisor, and area oil and gas supervisor. Copies of such maps will be available through local reproduction firms in Roswell, N. Mex.

G. *Definition.*—The word "potash" as used herein shall be deemed to embrace potassium and associated minerals as specified in the Act of February 7, 1927 (44 Stat. 1057).

IV. The lessee of any existing lease in the designated potash area may make such land subject to the rules and regulations of part III above by filing an election to do so, in duplicate, with the Land Office, Bureau of Land Management, Santa Fe, New Mex. Except to the extent herein modified, the general regulations contained in 43 CFR part 3100 (governing the leasing and development of oil and gas deposits) and part 3500 (governing the leasing and development of potash deposits), shall be applicable to the lands covered hereby.

V. The designated potash area is described as follows:

NEW MEXICO PRINCIPAL MERIDIAN

T. 22 S., R. 28 E.,
Secs. 25 and 36.
T. 23 S., R. 28 E.,
Sec. 1.
T 19 S., R. 29 E.,
Secs. 1 and 2;
Secs. 11 to 15 inclusive;
Secs. 22 to 26 inclusive;
Secs. 35 and 36.
T. 20 S., R. 29 E.,
Secs. 1 and 2;
Secs. 11 to 15 inclusive;
Secs. 22 to 27 inclusive;
Secs. 34 to 36 inclusive.
T. 21 S., R. 29 E.,
Secs. 1 to 5 inclusive;
Secs. 10 to 15 inclusive;
Secs. 22 to 27 inclusive;
Secs. 34 to 36 inclusive.
T. 22 S., R. 29 E.,
Secs. 1 to 5 inclusive;
Secs. 8 to 17 inclusive;
Secs. 19 to 36 inclusive.
T. 23 S., R. 29 E.,
Secs. 1 to 17 inclusive;
Secs. 21 to 28 inclusive;
Secs. 33 to 36 inclusive.
T. 24 S., R. 29 E.,
Secs. 1 to 4 inclusive.
T. 18 S., R. 30 E.,
Secs. 8 to 17 inclusive;
Secs. 20 to 29 inclusive;
Secs. 32 to 36 inclusive.
T. 19. S., R. 30 E.,
T. 20 S., R. 30 E.,
T. 21 S., R. 30 E.,
T. 22 S., R. 30 E.,
T. 23 S., R. 30 E.,
T. 24 S., R. 30 E.,
Secs. 1 to 18 inclusive.
T. 19 S., R. 31 E.,
Secs. 31 to 36 inclusive.
T. 20 S., R. 31 E.,
T. 21 S., R. 31 E.,
T. 22 S., R. 31 E.,
T. 23 S., R. 31 E.,
T. 24 S., R. 31 E.,
Secs. 1 to 18 inclusive.
T. 19 S., R. 32 E.,
Secs. 25 to 28 inclusive;
Secs. 31 to 36 inclusive.
T. 20 S., R. 32 E.,
T. 21 S., R. 32 E.,
T. 22 S., R. 32 E.,
Secs. 1 to 12 inclusive.
T. 19 S., R. 33 E.,
Secs. 21 to 36 inclusive.
T. 20 S., R. 33 E.,
T. 21 S., R. 33 E.,
T. 22 S., R. 33 E.,
Secs. 1 to 12 inclusive.
T. 19 S., R. 34 E.,
Secs. 19 and 20;
Secs. 29 to 32 inclusive.
T. 20 S., R. 34 E.,
Secs. 3 to 10 inclusive;
Secs. 15 to 36 inclusive.
T. 21 S., R. 34 E.,
Secs. 5 to 8 inclusive;
Secs. 17 to 20 inclusive;
Secs. 29 to 32 inclusive.

The area described, including public and nonpublic lands, aggregates 491,915.71 acres, more or less.

VI. This Order shall be effective on November 5, 1975.

KENT FRIZZELL,
Acting Secretary of the Interior.

OCTOBER 7, 1975.

In other geologic basins of the West, there are conflicts between oil and gas, coal, phosphate, sodium minerals, or oil shale leases. No general law or regulation is appropriate. Each basin should be and is being considered as a special case. The most appropriate rules and regulations for concurrent operations are and should be tailor-made for the situation existing in the basin. Not all rules or regulations need to be formalized as the one in New Mexico has been. In many instances, accommodation between lessees evolves sequentially as exploration and development proceeds, and major confrontations requiring the intervention of the survey's supervisors are thus avoided.

TRIBE MINERAL RESOURCE EXPLORATION AND PRODUCTION

Mr. YATES. Then you want to develop procedures to assist the Indian tribes in resource exploration and production under nonlease arrangements——

Mr. MCKELVEY. As I mentioned yesterday.

Mr. YATES. You will be acting in the role of adviser then, won't you?

Mr. MCKELVEY. We want to help, but we have a problem there of sometimes being asked to go beyond what is really our area of competence. But still we want to give them the maximum.

Mr. YATES. You don't mean competence, you mean jurisdiction.

Mr. MCKELVEY. I mean also competence, because, you know, we are not businessmen, and to determine what would be the best business arrangement for the tribe may be what we are requested to advise on.

Mr. BETTENBERG. When you have your hearing for BIA, you will see a substantial funding increase for mineral surveys in the Bureau of Indian Affairs. Most of that work is being actually performed by the Geological Survey and the Bureau of Mines.

Mr. YATES. How do you get paid for something like that?

Mr. MCKELVEY. On a reimbursable basis.

Mr. YATES. The Indians will pay you?

Mr. MCKELVEY. Yes.

Mr. YATES. What if they are poor?

Mr. MCKELVEY. I believe the funds come from the Bureau of Indian Affairs.

Mr. YATES. How much of this do you do? Certainly you ought to do a great deal more than you are doing.

Mr. MCKELVEY. I don't know the amount.

Mr. BETTENBERG. I can give you some relative orders of magnitude based on recollection. I think it's perhaps just under $2 million in fiscal year 1977 and we are proposing to move that up to about $8 million next year. So, it's a very substantial increase. It's a new program. It's in its second year now, and we are proposing to expand it substantially.

Mr. YATES. I am talking about the work you do just for the Indian tribes. I assume that is what your answer was.

Mr. BETTENBERG. Yes, it's funded through BIA and most of the money goes to the Geological Survey and Bureau of Mines.

Mr. YATES. Of course, this is what Interior should have been doing a long time ago.

Mr. BETTENBERG. I would think so.

BLM ORGANIC ACT

Mr. YATES. Then you have authorization for mineral lands assessment under the BLM Organic Act. You are going to have to do a lot of work under that, aren't you?

Mr. MCKELVEY. Yes. That act calls for mineral assessment on BLM wilderness area lands, and it specifies by the Geological Survey and Bureau of Mines, implying the continuation of the sort of assessment we do on the wilderness area now.

FEDERAL-STATE COAL AGREEMENTS

Mr. YATES. Your next one is a most interesting one; to complete negotiations with States on drawing Federal-State agreement, 30 CFR 211, 75. I notice you don't list this in connection with your OCS and onshore oil and gas leases. Don't you have any questions pertaining to State cooperation under oil and gas leases, offshore and onshore? Why is this only coal? I would think you would have to worry about coming to some agreement with New Jersey, for example.

Mr. MCKELVEY. Oh, yes, and we have done a great deal and are doing more.

Mr. YATES. No problems associated with that?

Mr. MCKELVEY. Well, there have been in the past, but I think they are diminishing. But with respect to coal, the Secretary has actually completed an agreement with several States calling for a State role in the supervision of reclamation activities. Then you have to get a policy decision from the Secretary on the minimum royalty to be charged for sodium or potassium, and then you have a decision on the procedure for approval of mining plans.

EARTHQUAKE HAZARDS MITIGATION

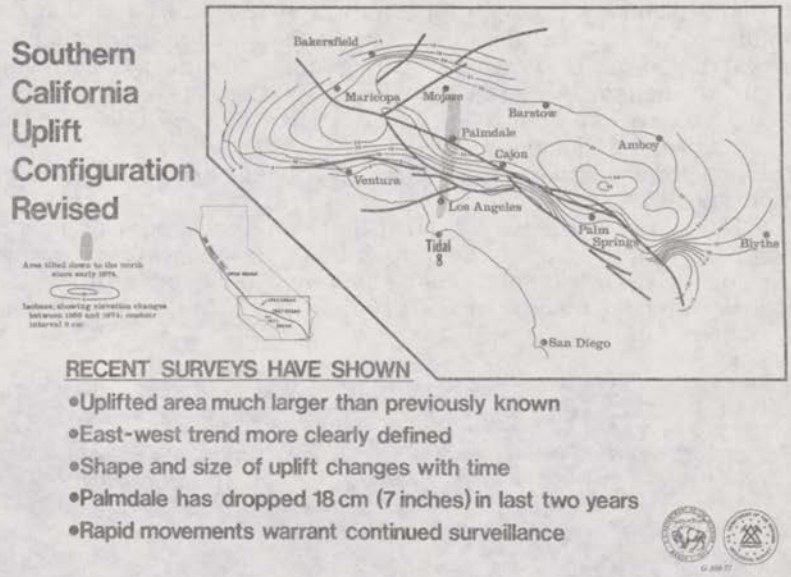
Mr. YATES. Yes, I would think so. Now, you have hazard mitigation. You have got to determine the significance of the southern California uplift as an earthquake precursor. You had that question before you last year too. Why is it still pending?

Mr. MCKELVEY. We have been continuing studies and monitoring various phenomena there that might be precursor phenomena, but we haven't as yet been able to draw any conclusion as to what is happening.

Just within the last couple of weeks a new level line was completed by Los Angeles County surveyors that showed that Palmdale, which

is more or less at the center of the uplift as first determined, has actually sunk by about 18 centimeters in the last 2 years as shown in the chart here.

[The chart follows:]



The U.S. Geological Survey has combined recent survey results and newly acquired older geodetic data with earlier results to render a revised, extended configuration for the southern California uplift. The revised map shows that the uplift that developed between 1959 and early 1974 extended from Point Arguello eastward to the Arizona border, a distance of roughly 600 km, with a midway width of about 150 km between Bakersfield and Los Angeles. In addition, level surveys just completed by the National Geodetic Survey and the Los Angeles County Department of County Engineer have shown that at least part of the area has gone back down 50 to 70 percent since early 1974.

Mr. YATES. I am still not used to meters. What is that in inches?

Mr. MCKELVEY. About 7 inches. And so it's a very puzzling phenomenon, and we simply have not been able to reach any conclusion as to its significance.

We have found that the uplift extends over a larger area than we had evidence for at first, and we believe that it does represent in one way or another an accumulation of strain in the San Andreas fault system. But, as to what it means in terms of a time when another break may occur there, we have been unable to determine.

FUNDS FOR EARTHQUAKE STUDIES

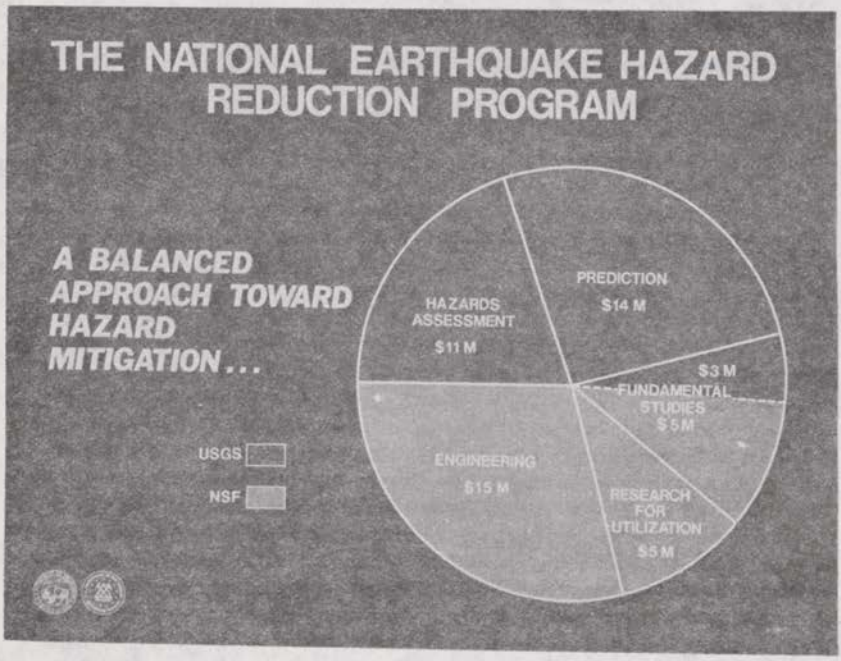
Mr. YATES. Well, the Washington Post of Sunday, February 20, had an article with the headline, "United States to Embark on Search for Ways to Predict Quakes" and it says that, "The Federal Government plans to embark this year on a major research effort aimed at developing within the next decade a reliable method for predicting all major earthquakes." It says that you are going to engage in this expedition with the help or in association with the National Science Foundation, and you are expected to spend more than $800 million over the next 10 years on earthquake studies.

Are you going to spend it or is the National Science Foundation going to spend it?

Mr. MCKELVEY. The proposal, Mr. Chairman, is that the earthquake hazard reduction program be sponsored by the Geological Survey and the National Science Foundation on about an equal expenditure basis.

I believe we have a chart of the proposal for 1978 now before you.

[The chart follows:]



A balanced approach toward mitigating earthquake losses requires a broad range of studies in several scientific and engineering disciplines. This diagram represents the planned distribution of increased funding for earthquake research by the National Science Foundation (lower position of pie) and the U.S. Geological Survey (upper position of pie). At the request of the Science Adviser to the President, this plan was formulated by an external Advisory Group on Earthquake Prediction and Hazard Mitigation, together with a joint special staff planning group from USGS and NSF.

Mr. MCKELVEY. It calls for expenditure on the part of the Geological Survey of about $28 million, and a nearly similar amount, about $25 million, on the part of NSF for fiscal year 1978.

Mr. YATES. How do you get $800 million within the next 10 years?

Mr. MCKELVEY. I am not familiar with the $800 million figure.

Mr. YATES. The National Science Foundation must be spending it if you are not familiar with it.

Mr. MCKELVEY. I would suppose that would be the cumulative cost of the program over 10 years. This program, Mr. Chairman, is based on recommendations of a blue ribbon panel appointed by the President's Science Adviser last summer, and it proposed levels of funding starting with fiscal 1978 that would increase at least during the early years of the period. If this program were to continue just at the 1978 level for 10 years, of course, that would amount to a total of $500 million. I expect that $800 million may be the cumulative total based on the program as mapped out by that advisory committee.

LETTER FROM GILBERT F. WHITE

Mr. YATES. Now, one of the members of that committee was an old friend of mine by the name of Gilbert F. White, who has some distinction in the field of geography.

Mr. MCKELVEY. Yes, indeed.

Mr. YATES. He is now in the National Hazards Research and Application Information Center in Boulder, Colo.

He sent a letter to me, dated February 8, which letter will go into the record at this point.

[The letter follows:]

NATIONAL HAZARDS RESEARCH AND APPLICATIONS
INFORMATION CENTER,
February 8, 1977.

HON. SIDNEY YATES,
U.S. House of Representatives,
Washington, D.C.

DEAR SID YATES: Last year Dan Beard said that he would arrange for me to talk with you about the work which I have been doing on natural hazards research in the United States, but we never worked out a mutually convenient time. It would have been good to compare notes on what has happened since the days of O. & S. at Chicago, and I hope that the opportunity will present itself one of these days.

Meanwhile, I write to suggest a few questions which you might consider posing at the time that you carry out hearings on the appropriations for the U.S. Geological Survey with respect to its earthquake studies. You may recall that the Survey has received a major increase in the recommended level of funding for earthquake studies based on a report on "Earthquake Prediction and Hazard Mitigation" prepared in the office of the science adviser on September 16, 1976.

As a member of the Advisory Panel on Earthquake Studies for the Survey I have had opportunity to review the plan of action, and I have been concerned that the new program be organized so that it gains the maximum return for the taxpayer in terms of moving constructively to reduce earthquake vulnerability in the United States.

I am not at all convinced that, with the present set of priorities and the tentative plans for the program, this will be achieved. My general thinking is outlined in the attached copy of testimony which I gave before the House Committee on Science and Technology last summer. In essence, I think there is danger that the Survey with the best of intentions and with the finest of scientific talent will give priority to studies which have large theoretical and long-term importance but which will not pay as much attention as would be desirable to immediate steps promising larger payoff in reducing earthquake damage and loss of life.

I attach a few questions which it occurs to me it might be useful to pose to the Survey whenever you hold your hearings on their budget submission. The

results might give you a better idea of the public impact of their program and might also sharpen the Survey's own thinking as to its role.

All good regards.

Sincerely,

GILBERT F. WHITE.

ACHIEVEMENT OF PROGRAM BENEFITS

Mr. YATES. He suggests a few questions which I shall ask. First, to what extent is the achievement of the benefits which are anticipated under the expanded program of earthquake research dependent upon action by other Federal agencies or by State and local agencies?

Mr. MCKELVEY. Well, the benefits finally do indeed depend in very large part on the actions of civil authorities at the State and local level.

Mr. YATES. What about other Federal agencies?

Mr. MCKELVEY. And to an extent, I think to a very large extent, on a number of other Federal agencies, such as the Small Business Administration, to say nothing of the Federal Disaster Assistance Administration, and organizations that are concerned more directly with disasters.

Mr. YATES. Is that for a program of earthquake research? That is really for the aftermath after an earthquake.

Mr. MCKELVEY. That is for the utilization of the results.

Mr. YATES. He is talking about earthquake research.

Mr. MCKELVEY. This is what Dr. White is concerned about, and we talked about it at our recent advisory committee meeting in Menlo Park in early February. He expressed some of his concerns, and I think makes a very good point that it's not just the research that counts but the development of the capability simultaneously of the means to make full use of the results.

When we discussed this at our meeting a couple of points were made with respect to Dr. White's comments. One is that there are already, in fact, in place many lines of communication between those doing the research and the Federal organizations that would utilize it.

The expression was used that there are pipelines, but there isn't much in the pipe, and so it's perfectly true that if you don't develop the capability you have nothing to communicate.

Another point that was made is that the new legislation sponsored by Senator Cranston calls for the establishment of, I think it's called, an earthquake advisory committee or something of that sort—in any case, establishing at a very high level a mechanism for coordinating the efforts in disaster mitigation clear across the Government. And we certainly recognize that the capability to use the information has got to be developed or the information itself may be of no value. But at the same time the direct part of our program is in the development of the capability.

We have, incidentally, one of our geographers stationed at Boulder this year, working with Dr. White in this general area. Part of the funds that are provided for the National Science Foundation, of the $5 million shown for research for utilizaiton, is intended to be devoted to the social and economic aspects of this problem.

So it's not one that is going unattended or unnoticed.

FEDERAL AGENCIES INVOLVED IN EARTHQUAKE STUDIES

Mr. YATES. I don't recall in that very comprehensive answer that you gave any mention of Federal agencies that would be engaged in earthquake research.

Mr. MCKELVEY. I only mentioned a couple that would be engaged in the utilization of information. I mentioned the Small Business Administration.

Mr. YATES. Dr. Stever was the head of that panel, and he thought the National Science Foundation would be well to be in it, and apparently you and the National Science Foundation, according to Dr. Stever, expect to spend over $800 million. But that's different from Dr. White.

PROJECTS CONTRIBUTING TO REDUCING EARTHQUAKE LOSSES

Let's go back to his questions; he says:

What in your judgment are those projects which would be most likely at an early date to significantly contribute to reduction of vulnerability to earthquake losses in the United States?

What are those projects?

Mr. MCKELVEY. At a very early date?

Mr. YATES. There are obviously projects which you have.

Mr. MCKELVEY. Yes.

Mr. YATES. Are there projects which other agencies may have that may fall in this category?

Mr. MCKELVEY. I am not sure about other agencies that I would be able to identify.

Mr. YATES. If you have information about other agencies, put it in the record, but let's hear what you have to say about your projects.

Mr. MCKELVEY. To save time, may I ask Dr. Hamilton to speak to this?

Mr. YATES. Dr. Hamilton?

Dr. HAMILTON. The part of the program that will have the most immediate payoff is this part here termed "hazard assessment." And this involves the mapping of active faults and the determination of how the ground is likely to shake in the event of an earthquake.

This information is a direct input to agencies such as the Nuclear Regulatory Commission, the Department of Transportation, and so on, agencies that have to design structures today.

Mr. YATES. What about highways?

Dr. HAMILTON. That is the Department of Transportation. It goes on and includes the Veterans Administration, General Services Administration, any Government agency that has jurisdiction over the construction of facilities. And this information is needed now, because facilities are being built now.

Mr. YATES. What projects do you have in that area?

Mr. HAMILTON. We have a number of projects that can be broken into two categories. One would be geographically oriented and the projects include, for example, studies of the San Francisco Bay area, the delineation of areas of unstable ground and of active faults.

OTHER FAULT LINES IN CALIFORNIA

Mr. YATES. When you say the mapping of active faults——I know about the San Andreas fault. Are there faults other than the San Andreas?

Mr. HAMILTON. Yes; quite a few. In the Bay Region, for example, the San Andreas is this strand that comes right through here.

Mr. YATES. Can you identify it so the record is clear about what you are talking about?

Mr. HAMILTON. It passes along the coast of California between the mainland and Point Reyes. It passes about 4 miles west of the Golden Gate Bridge, comes ashore at the Daly City region of San Francisco, and continues on down along the western margin of the San Francisco Bay.

Mr. YATES. Where are the other faults?

Mr. HAMILTON. Other faults in this area are the Hayward Fault which runs along the east side of the bay in the Berkeley Hills area and the Calaveras Fault, which runs down to the east of the San Francisco Bay region and joins the San Andreas in the vicinity of Hollister.

In reality the fault zones are made up of interlaced faults that form the main boundary of the floor of the Pacific Ocean, that is moving to the Northwest at a rate of about 2 inches a year relative to the main part of the continent.

FACILITIES BUILT ON FAULTS

It's very important to recognize the location of these faults because they are the sources of the vibrations, and in the event of an earthquake, of movement of the ground would displace any facility that was built on them. There are about 40 schools and hospitals built right on the trace of the Hayward Fault in the east bay area.

Mr. YATES. Were they built with knowledge that they were going to be built on the fault?

Mr. HAMILTON. They were built before the detailed knowledge was available that might have guided them away. But they were built, some of them were built after there was a generalized knowledge. So, this is one of the problems that Dr. White would be alluding to, that our mission does not stop with generating information, that we have to assure that the local agencies make use of the information.

Mr. YATES. All right.

Mr. HAMILTON. So this would be just the example. And the other areas where there is significant earthquake hazard and where the communications pipeline exists to absorb our information are indicated here, the red areas on this map of the United States indicating the zones of highest seismic risk.

AREAS OF HIGH SEISMIC RISKS

Mr. YATES. Are there faults in those areas? Why do you identify them as areas of highest seismic risk?

Mr. HAMILTON. These are the areas where the frequency of occurrence of earthquakes has been highest in historic times.

Mr. YATES. Going back how far?

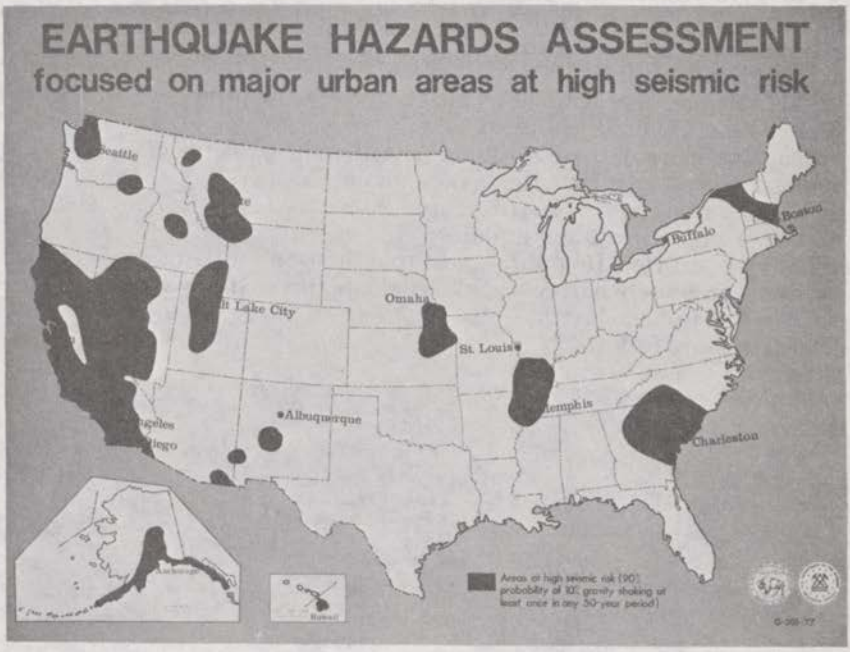
Mr. HAMILTON. This is primarily based on history. So it goes back several hundred years, depending on when the particular part of the country was settled. We supplement that information with information from the geological record; that is, what the geologists can deduce about the last time a fault moved and its degree of activity relative to other faults.

In the Western United States you have quite a few faults that are exposed to the surface. You can actually go out and see the ground rupture, and so the problem is somewhat more straightforward in the West.

We think we can proceed straight ahead with the development of information for the major urban areas in the West. Seattle, San Francisco, Los Angeles, San Diego, Salt Lake City, and so on.

The problem in the East is somewhat different in that the faults are not exposed at the surface. And so it becomes a problem of trying to identify the earthquake generating structures at depth, and it's a much more difficult problem. This chart shows areas of major focus.

[The chart follows:]



Areas where the historical record indicates there is a high or moderate chance of severe seismic shaking in the next 50-year period are shown in red. In many of these areas, particularly in the populous Eastern and Midwestern States, there are no systematic investigations presently underway.

Federal Government responsible for:

technique development,
demonstration projects,
national seismic risk assessment, and
regional earthquake hazard mapping and evaluation.

State and local governments share in regional studies, but concentrate on local and site specific hazard assessment for land-use planning and zoning.

Mr. McKelvey. But it's a serious problem because some of the largest earthquakes in our history have occurred in the East: the great earthquake in southern Missouri in 1811 and 1812—some of the largest that have ever occurred in the United States, Charleston in 1886, and Boston in 1755. A critical aspect of this is that many

of the energy facilities in the United States, particularly nuclear reactors, are located in the eastern part of the United States.

So it's a more intractable problem, and in many respects a more serious problem.

EXPLANATION OF EARTH PLATES

Mr. YATES. For my own information, tell me what a plate is.

I happened to see a documentary on earthquakes and they talked about the movement of plates either during earthquakes or preceding earthquakes.

Mr. HAMILTON. Well, it's been found in the last decade that the outer shell of the Earth is divided up into about a dozen plates.

Mr. YATES. What is a plate?

Mr. HAMILTON. A plate is a segment of the Earth's shell that moves more or less intact. That is, it shifts around on the outer shell of the Earth, more or less as a unit.

Mr. YATES. Is it like a turtle's plate?

Mr. MCKELVEY. Mr. Chairman, you might imagine, say, an egg or a sphere-shaped object, and of which the surface is broken by cracks, such that let's say there are 10 or 12 unfractured segments of the shell. And then imagine that those are moving with respect to one another. That is similar to the Earth's crust.

Mr. YATES. How big is a plate?

Mr. HAMILTON. It could be a couple thousand miles across. The diagram that is there before you shows the plates that have been identified on the crust of the Earth.

[The chart follows:]

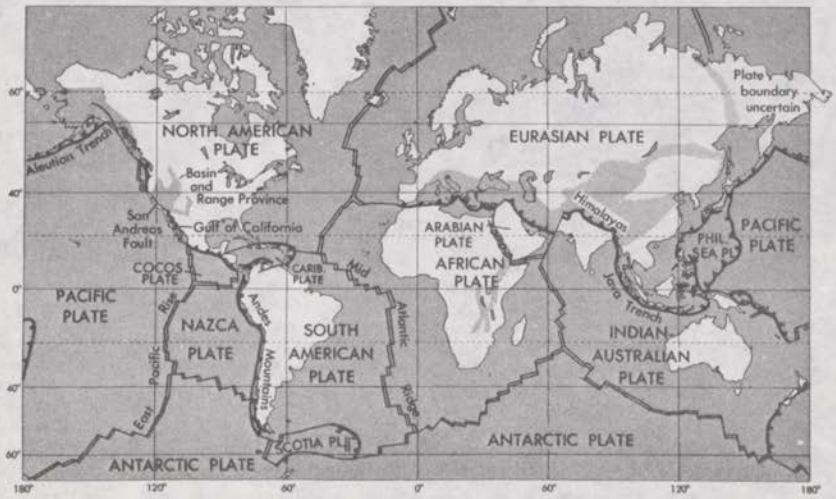


FIGURE 13.—Lithosphere plates of the world, showing boundaries that are presently active. Double line: zone of spreading, from which plates are moving apart. Line with barbs: zone of underthrusting (subduction), where one plate is sliding beneath another; barbs on overriding plate. Single line: strike-slip fault, along which plates are sliding past one another. Stippled area: part of a continent, exclusive of that along a plate boundary, which is undergoing active extensional, compressional, or strike-slip faulting. Compiled and adapted from many sources; much simplified in complex areas.

Mr. YATES. They are huge then, aren't they?

Mr. HAMILTON. Yes, they are, and material comes up from the interior of the Earth along the ridge axis and solidifies on the outer shell of the Earth, and then the new crust moves away from the ridge axis. Where the plates collide, and where they slip past each other is the locus of the earthquakes. It turns out that the San Andreas Fault is a major boundary between the Pacific plate and the North American plate.

You will notice on this chart that there are no plate boundaries that are identified in the eastern United States, which is part of our problem. We do not know at the present time how to fit the eastern earthquakes into the global pattern of earthquakes. We think that the eastern earthquakes are caused by some kind of a flexing or a stressing within the plate due to flexure in the plate, but at this stage we really don't know.

EURASIAN PLATE

Mr. YATES. Apparently you don't know very much about the Eurasian plate either, do you?

Mr. HAMILTON. That's right. The Eurasian plate seems to be very complicated, especially China, a very active earthquake zone in China, but it doesn't exhibit a major plate boundary.

Mr. YATES. Which is a contrary to the theory, isn't it?

Mr. HAMILTON. Well, there is a lot we don't know. The theory has evolved in the last decade, and the theory is useful in that it accounts for the worldwide distribution of volcanos and earthquakes and mineral resources, but it does not yet explain in detail the earthquakes that occur within a continent.

EARTHQUAKE PREDICTION—STEVER REPORT

Mr. YATES. Dr. Stever in the article says:

> Earthquake prediction has emerged from the realm of soothsaying to become a serious scientific endeavor with a significant likelihood of a short-term technological breakthrough.

Would you agree with that?

Mr. HAMILTON. If by short term he means within the next decade.

Mr. YATES. That is what he says he means, that the breakthrough may well occur within the next 10 years. He said:

> The new Federal funding is going to permit us to gather the data necessary for pretty reliable prediction within a decade. If the research goes well we should be able to predict the time, location, and magnitude of earthquakes in time to permit precautionary measures.
>
> Geologists who share Stever's optimism point to seismological advances in China, where corps of 5,000 to 10,000 Government forecasters and millions of amateur People's scientists have accurately predicted two major earthquakes.
>
> The most dramatic Chinese success came in the Haicheng earthquake of 1975. The quake was forecast 5 hours before it occurred, providing time to evacuate nearly 1 million people.

That's pretty good, isn't it?

Mr. HAMILTON. Yes.

CHINESE EARTHQUAKE PREDICTION CAPABILITY

Mr. YATES. Are the Chinese better than we are in this?

Mr. HAMILTON. The Chinese have made a massive commitment to earthquake prediction. I was privileged to travel there in October of

1974 and learned about their efforts, and they have deployed instruments throughout the country, and in the sense of instrument deployment, the Chinese are ahead. But in terms of concepts and understanding of earthquakes I think we are at a comparable level.

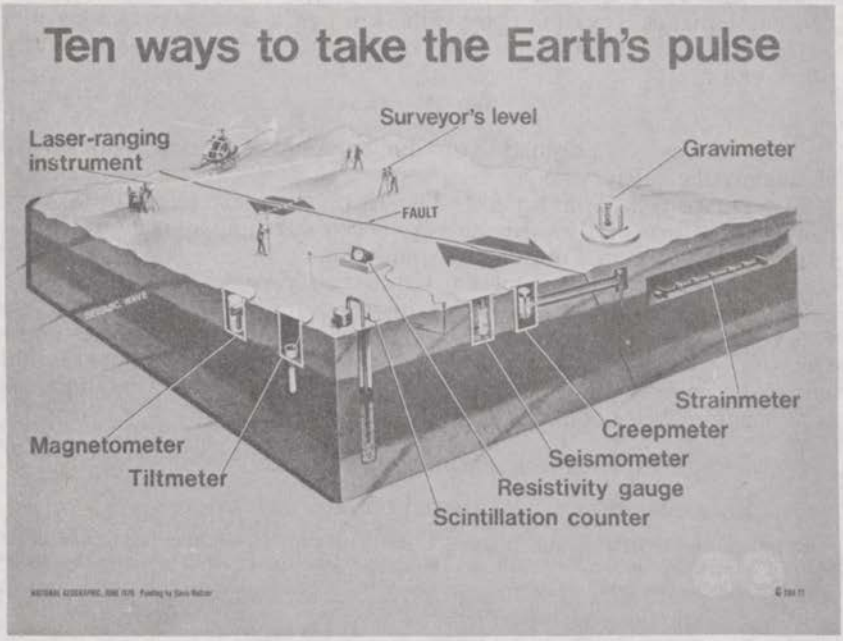
Mr. YATES. Where are they ahead in terms of instrument deployment? Do they have more or better instruments than we have?

Mr. HAMILTON. They have more instruments and more manpower.

Mr. YATES. What is the cost of an instrument?

Mr. HAMILTON. A typical one as you see on the chart here might be about $5,000.

[The chart follows:]



The instruments shown in the diagram detect and measure anomalies in the Earth's crust which may be earthquake precursors, and provide the present basis for earthquake predictions.

Mr. YATES. Why don't we have more of them?

Mr. MCKELVEY. Well, we are getting more of them now.

Mr. YATES. You say we are getting more of them now. Why don't we have them?

Mr. HAMILTON. We have been limited.

Mr. YATES. By funds?

Mr. HAMILTON. By funds.

Mr. YATES. It's amazing how many places that turns up, the limitation on your funding, and every time I ask you a question in other hearings as to whether you needed more money you always told me "no."

Mr. MCKELVEY. Well, I think perhaps not in so many terms.

Mr. YATES. Will you some day tell the committee how much money you thing you actually need to do the work? In my judgment you are one of the most important agencies in Government and you ought to be funded accordingly.

MOBILIZATION EFFORTS BY CHINESE

On this earthquake problem, for example, you come in and tell us China is ahead. Why is China ahead? They have more instruments and more people devoted to it. I don't know whether it would be possible to put together a corps like the Chinese volunteer corps. But if you have something in the nature of an emergency, I would think that perhaps a number of civilians out in the California area might be willing to contribute their time to help you.

Mr. MCKELVEY. We are exploring that. The possibility of using high school students is being looked into. This chart shows some locations of major earthquakes in 1976.

[The chart follows:]



This map shows the distribution of some 1976 earthquakes that were significant because of their size or because of causing major damage or loss of life. The total casualty estimates for 1976 includes 32,900 to 38,600 dead, exclusive of those from the Tangshan, China, earthquake for which the most recent figures indicate more than 500,000 dead.

Mr. YATES. How are you doing that? What do you mean by exploring it?

Mr. HAMILTON. Following our visit to China we became impressed by the efforts the Chinese were making, by the earthquake they successfuly predicted in February of 1975. The scientists, through their

long-term observation, identified the Haicheng area of Northeastern China, where they predicted the earthquake, actually, as an area of intensive study. Following the identification and recognition of various anomalous phenomena, they then mobilized a large number of amateurs in the area.

They had them making observations of water well levels, changes in electric current, and strange animal behavior.

Now, we believe many of the observations that the people were being asked to make were not very scientifically sound observations, but many of them were valuable observations. But the important factor was that when it came time to actually take action with regard to the prediction, the masses were already mobilized and were sympathetic to government instructions as to what they should do.

For example, at one stage, in December before the February prediction, the peasants were asked to move outside and they slept outside for a couple of nights. And they generally, according to the Chinese, were not up in arms about having to move outside and then having no earthquake occur.

Mr. YATES. Yes, but they knew what the possible consequences were, didn't they, and they knew and undertook that responsibility. But let's go back to the question of funding.

ADEQUACY OF FUNDS FOR EARTHQUAKE PROGRAM

You say you are moving in that direction. Have you got adequate funds now for your work in this budget?

Mr. MCKELVEY. It depends on the rate at which we attempt to develop the capability.

Mr. YATES. Dr. Stever speaks of $800 million spent during the next 10 years. Is your program geared to that?

Mr. MCKELVEY. I believe that would be the cumulative total of the program at the middle level recommended by the committee. The committee recommended programs at three levels, a low, medium and high, and the level that we are proposing is the middle.

Mr. YATES. When we look at your chart, USGS total shows $10.5 million requested for fiscal 1977. In fiscal 1978, we have A, B and C levels of $18.5 million, $27.9 million, and $44.8 million respectively.

Mr. MCKELVEY. It is the B level.

Mr. YATES. Then we come to fiscal year 1979 and the middle level is $37.8 million. When we come to 1980 the middle point is $46.1 million. Is that rate of progression adequate?

Mr. MCKELVEY. It is adequate for the target of achieving a prediction capability within about 10 years. And from a practical standpoint, Mr. Chairman, I believe—you know, you can't solve lots of problems just by increasing expenditures. You have to have time to develop the capability.

I think that the middle level, particularly in the early years, is an appropriate one.

Mr. YATES. I have been hearing you say this for 8 years, though.

What you are doing is playing OMB's game, aren't you? Suppose instead of having $11 million this year, you had $11 million 10 years ago, and had moved up at this rate of progression?

Mr. MCKELVEY. We would be much further advanced. But this budget, Mr. Chairman, represents the Federal Government's first full

commitment to the development of an operating earthquake hazard reduction program.

Mr. YATES. And you are satisfied with it?

Mr. MCKELVEY. I am satisfied with the level that is being proposed for this year.

Mr. YATES. Is Mr. Hamilton satisfied with it?

Mr. HAMILTON. I think it represents a reasonable level of support.

Mr. YATES. "Reasonable" being adequate?

Mr. HAMILTON. The three options laid out in the Stever report were all considered by that committee to be money well spent. They felt that the top option, option C, would be about the most that could be poured into the program and absorbed.

Mr. YATES. Were there any Californians on this committee?

Mr. HAMILTON. A few.

Mr. YATES. And they agreed with that?

Mr. HAMILTON. Yes.

Mr. YATES. OK.

Mr. HAMILTON. The option B level was judged by many people to be a reasonable acceleration of the program, taking available resources.

FUNDS FOR MONITORING SHUT-IN WELLS

Mr. YATES. As you know, we are not experts on this committee. We have to take your word for what is adequate. We are waking up 6 months later finding out you didn't ask us for enough money. Mr. Andrus is sending people out to the gulf to find out whether any gas wells were capped. I asked you that question last year, and I asked you that question the year before. Then I see it is stated in the paper that you just didn't have enough money to do the operation.

Mr. MCKELVEY. Well, we had enough money, Mr. Chairman—when you asked me last year—if we had enough funds to monitor the shut-in situation, and I said we did and that was a correct answer at that period.

I showed you yesterday some of the records that we have, and could show you more. We have the information on the status of every well on Federal land, and information on the status of every Federal lease. But, if it comes to be a question of adopting a different policy, such as the Secretary has indicated he would with respect to diligence and the use of that provision under lease term section 3(c)(2), then that takes additional effort and capability. The Secretary has recognized that, and has told me and has mentioned in the public——

Mr. YATES. You have a different Secretary now.

Mr. MCKELVEY. Yes.

Mr. YATES. With a different attitude.

Mr. MCKELVEY. With a different policy.

EARTHQUAKES

Mr. YATES. OK; let's go back to earthquakes, then. I asked you the question, what in your judgment are those projects which would most likely at an early date significantly contribute to the reduction of vulnerability to earthquake losses in the United States. Have you answered that?

Mr. HAMILTON. Yes, Mr. Chairman.

PROJECTS CONTRIBUTING TO REDUCING EARTHQUAKE LOSSES

Mr. YATES. All right, let me ask you the next question. Which of the research projects included in that program would offer prospects of contributing to reduction in earthquake losses, even though you do not achieve at an early time a capacity to predict the coming of earthquakes?

Mr. HAMILTON. In this category of hazard assessment, which is the development of information for the design of structures, and for land use, and in this category of engineering, which is how to build a building so it won't fall down, all of that information will be applicable, even if prediction never succeeds.

EXTENT USGS FUNDING WOULD REDUCE OTHER FEDERAL EARTHQUAKE FUNDING

Mr. YATES. And those are the two programs you want to give as your answer.

To what extent do you think the increase of funding for this program by the USGS will reduce funding for studies on earthquake problems currently available to agencies other than the National Science Foundation?

Mr. MCKELVEY. We are concerned about that. It should not reduce the funding with respect to any of those other agencies.

EARTHQUAKE PROGRAMS IN OTHER FEDERAL AGENCIES

Mr. YATES. Tell me first which other agencies are funded for this program and what they are doing.

Mr. MCKELVEY. I can give you a list.

Mr. YATES. Are there many?

Mr. MCKELVEY. There are several. Within Interior, the Bureau of Reclamation has, I don't believe any funding this year, but it has an interest because of dam safety.

Then the NSF. And in the Department of Commerce, NOAA has a responsibility for tsunami warnings—tsunamis result from earthquakes at sea. The National Bureau of Standards is concerned with building safety. They are spending $100,000 currently on this.

TSUNAMI WARNING PROGRAM

Mr. YATES. Let me ask you a question on the tsunami. You would know more about that than they would, wouldn't you?

Mr. MCKELVEY. We transmit the basis for possible tsunami warnings to them. Except that they do continue to operate three seismic observatories themselves.

OTHER FEDERAL AGENCY EARTHQUAKE PROGRAMS

Then there are several agencies within HUD that are concerned. Also within the Department of Defense, which is concerned with nuclear preparedness and emergency response in general.

The Corps of Engineers is concerned with dam safety and harbor safety, military installations and so on. The Advanced Research

Projects Agency also supports work that contributes to knowledge about earthquakes and seismicity.

NASA is another one. They are concerned with the development of geophysical measurements from satellites. The Nuclear Regulatory Commission, concerned with reactor siting as it may be affected by earthquake hazards. They are spending about $3.5 million a year on this. Then the Veterans' Administration has been concerned about the safety of veterans hospitals.

Then within the General Services Administraiton there are agencies concerned with building design and with Federal emergency preparedness.

The Small Business Administration I had already mentioned. It is concerned with reconstruction and relief financing, and the Department of Transportation is concerned about highway safety, bridges, and so on.

EXPENDITURES BY FEDERAL AGENCIES

Mr. YATES. Is that all of them? You don't know what the total expenditure is?

Mr. MCKELVEY. Yes; we do have an estimate. It is of the order of several million dollars.

Mr. YATES. For all those agencies, only several million dollars?

Mr. MCKELVEY. Total.

NATIONAL SCIENCE FOUNDATION PROGRAM

Mr. YATES. What is the National Science Foundation doing?

Mr. MCKELVEY. They are sponsoring——

Mr. YATES. Fundamental studies, research for utilization, and engineering?

Mr. MCKELVEY. That is right.

RECESS

Mr. YATES. All right. Let's go vote while you relax. Take a break for 11½ minutes.

[Brief recess.]

STEVER COMMITTEE COMMENTS ON OTHER FEDERAL AGENCIES' EARTHQUAKE PROGRAMS

Mr. YATES. So far we have just touched the surface of earthquakes. We have not gone underneath the surface, have we?

Mr. MCKELVEY. Mr. Chairman, in response to your last question about other agencies, and whether or not their work would continue, I might point out that the report of the Stever committee, in the preface in the second paragraph, says:

> In focusing on the programs of these two agencies, we would be remiss in not pointing out the importance of related activities of other agencies, which we assume will continue and be strengthened. We have sought their advice and comments on this plan, and received valuable inputs from them.

And then it lists the agencies involved.

I might say, too, Mr. Chairman, that those agencies have all appointed representatives who attend the meetings of our Earthquake

Advisory Committee. It has resulted in an extremely good coordination in our respective programs, and some of the pipelines that I spoke about are well established as a result of that.

GOOD CONTROL OF EARTHQUAKE PROGRAM PROBLEMS

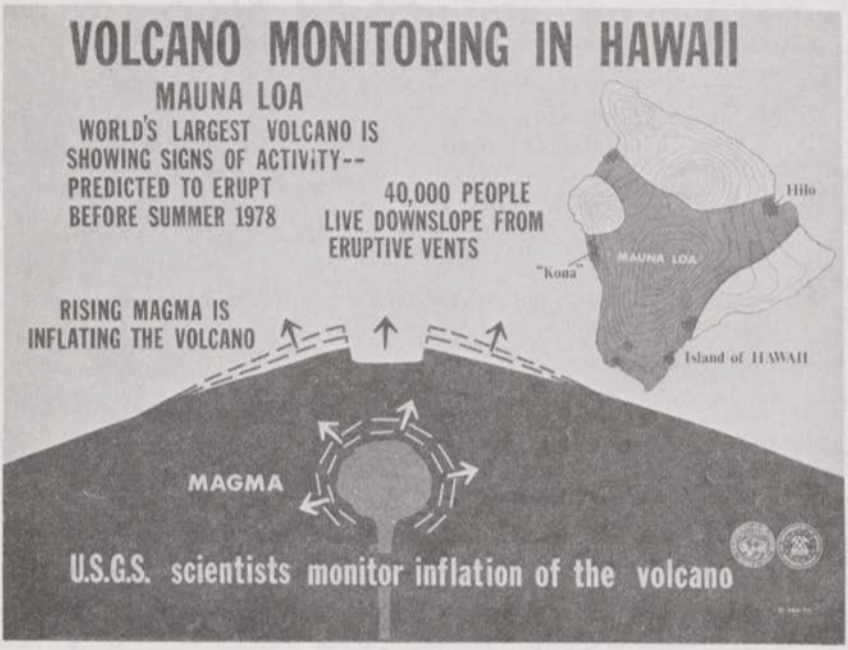
Mr. YATES. That is good. As a matter of fact, I get the impression that you have a better handle on this than you do on Outer Continental Shelf and onshore oil and gas. The problems that you have listed as current problems on hazard mitigation. I think are pretty much under your control, aren't they?

For example, we talked about the uplift. Then the second problem—improving accuracy of prediction of the next Mauna Loa flank eruption. That is out in the Hawaiian Islands. Then you also have the development of procedures for issuing and communicating hazard warnings and notices. You touched on that a little bit. We will touch more on it later.

Identification of landslide prone areas, and the development of techniques for predicting slope failure. You are involved in that?

Mr. MCKELVEY. This chart, Mr. Chairman, shows the location of Mauna Loa on the island of Hawaii.

[The chart follows:]



A major eruption of Mauna Loa Volcano on the island of Hawaii before July 1978, has been predicted by USGS scientists on the basis of an analysis of the volcano's past eruptive history. This eruption, which is likely to occur along Mauna Loa's northeast rift zone, could destroy parts of the city of Hilo 30 miles (48 kilometers) to the east.

DAM SITING

Mr. YATES. The Ryan committee is proposing to assign GS responsibility for damsite selection and design review. What is the Ryan committee? The gentleman from California?

Mr. MCKELVEY. Yes, sir.

Mr. YATES. That also follows a dam catastrophe, doesn't it? This probably followed the breaking of that last dam.

Mr. MCKELVEY. Yes.

Mr. YATES. Do you have any responsibility for siting dams?

Mr. MCKELVEY. No, we do not. The Bureau of Reclamation does that.

I have been talking recently with the Corps of Engineers about the need for better communication during the siting process because though we don't have capability for assessing the utility of specific sites in an engineering sense, we do have capabilities that the other agencies do not have in assessing the regional geologic picture.

DIABLO CANYON NUCLEAR REACTOR

Mr. YATES. Now tell us what the status is of the Diablo Canyon nuclear reactor.

Mr. MCKELVEY. I will ask Mr. Coulter to respond to that.

Mr. YATES. Are they going ahead with the construction?

Mr. COULTER. They are redoing the engineering analysis. There has been a fault recognized closer to the plant than was in the original design provisions. This requires higher design constraints on the plant. They are reassessing the existing design to see whether it will conform with the higher earthquake figures, or whether some modifications to the plant will be necessary in order to comply with the new design.

ROLE OF GEOLOGICAL SURVEY IN DETERMINING REACTOR SITES

Mr. YATES. You say they are doing this. Have they called you into the picture at all?

Mr. COULTER. We are the ones that set the higher design earthquake.

Mr. YATES. Is it earthquake-proof now as a result of your design?

Mr. COULTER. We didn't do the design. We set the size of the earthquake to which the design must be resistant. The NRC is now reevaluating to make sure it will stand that higher earthquake.

Mr. YATES. Let's contemplate that for 1 minute. That is an interesting chart. What happens if the design isn't accurate?

Mr. COULTER. Then they will have to go in and strengthen various components. They do their design analysis component by component, and they may have to actually go back in and beef up various elements of the structure in order to withstand the higher design basis earthquake.

Mr. YATES. Is there a possibility that they can make that structure earthquake-proof?

Mr. COULTER. Yes. The difficulty with that particular one is that it is much more difficult to go in and upgrade the structure after it is virtually complete than it is to design it de novo for a larger earthquake. So, there is a backfitting procedure——

Mr. YATES. You mean they are now trying to retrofit it?

Mr. COULTER. That is right. They are analyzing it to see if it will withstand the bigger earthquake, and demanding retrofit in any components that don't comply.

ADEQUACY OF DESIGN

Mr. YATES. How does NRC know if the design is adequate?

Mr. COULTER. Well, there are design analysis procedures which are part of a computerized system. You feed a model earthquake into your design configuration and make sure that the various components will not go beyond the failure point with the design inputs you feed into it.

COST OF RETROFITTING REACTOR

Mr. YATES. You don't know what the cost is likely to be, do you?

Mr. COULTER. The cost of reanalysis and retrofit is very high.

Mr. YATES. How can the reactor be economical, then?

Mr. COULTER. Well, it is less costly than abandoning a completed structure.

POTENTIAL OF MELT-DOWN

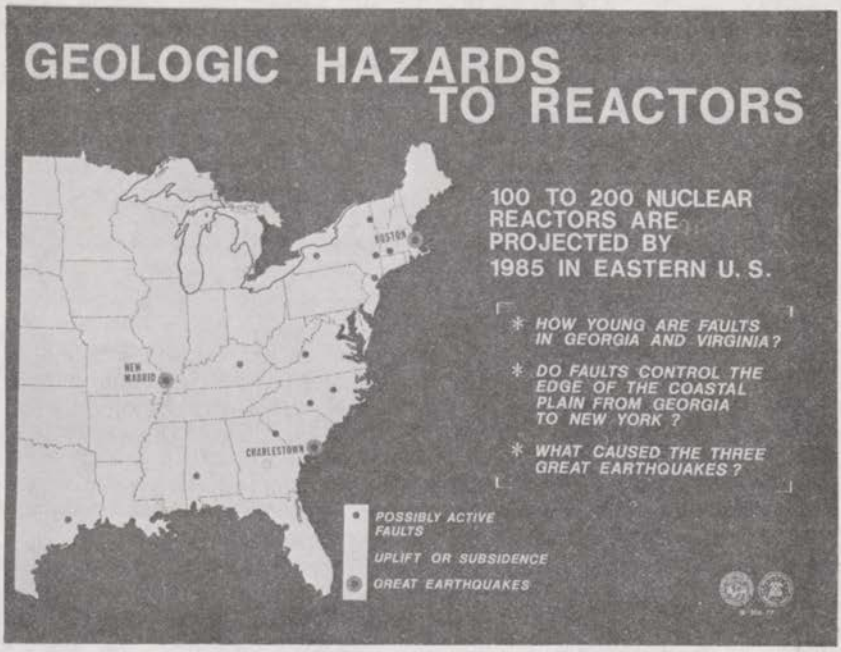
Mr. YATES. What happens in the event that it is not earthquake-proof? Is there a possibility of a melt-down?

Mr. COULTER. There is a high degree of conservatism in the whole design procedure, so that you overdesign at every sequence, at every step in the sequence of design, and actually you are compounding conservatism. So, the original design was extremely conservative, and it appears that in most components the original design for a lesser earthquake is indeed quite adequate to withstand the higher earthquake.

GEOLOGIC AND SEISMOLOGIC ANALYSIS OF REACTOR SITES

Mr. YATES. Now, what about all the sites that are listed on the chart that you have just posted, called "Geologic Hazards to Reactors"? Have you looked at each of those sites?

[The chart follows:]



The need for nuclear power reactors is greatest in the Eastern United States and the understanding of geologic hazards in this area is very inadequate. The reactor hazards research program has recently identified many faults in the East that conceivably are active, and also has identified two areas of uplift or subsidence that may be due to tectonic forces. Evaluating the potential hazard to reactors of such faults and other indications of tectonism must be accelerated in order to avoid delays in reactor site selection, construction, and licensing.

Mr. COULTER. Yes. In essence, the geologic and seismologic analysis of each plantsite is submitted to us for our review, and we go over them to make sure that indeed they have taken the largest earthquake that could reasonably be expected to occur in each of those localities, and fitted that into their design procedure.

EARTHQUAKE SEVERITY PREDICTION

Mr. YATES. I see.

Is there ever an earthquake that is unreasonably severe by your predictions? Do you ever have an earthquake that exceeds the historical indicia?

Mr. COULTER. In this particular procedure, we don't take just the historical earthquakes.

Mr. YATES. When you say "this particular procedure," "this," you are pointing to the chart. The term "this" does not appear in the record.

Mr. COULTER. In respect to reactor siting, we take the maximum earthquake which has occurred in a geologic province and move it to the reactor site. We don't assume it will always occur—for example the Charleston earthquake will always occur at Charleston. We move it as close to the site, as near to the site from Charleston, as possible before you cross a major geologic boundary.

CALCULATION OF SEVERITY OF EARTHQUAKES

Mr. YATES. How do you calculate the strength of an earthquake? What is that device that has the tremors?

Mr. COULTER. In essence it is a strong motion, seismograph——

Mr. YATES. Is it the Richter scale?

Mr. COULTER. For design purposes, you use an instrument with a different scale that records ground motion, actual accelerations in the near field, close to the source of the earthquake. The long period seismographs that are on the worldwide net go off the scale if they are close to a major earthquake.

But, there are strong motion accelographs which are located throughout the country, and those record the actual ground motion accelerations in the near field, close to the source of the earthquake. That is the kind of records that are used for design of facilities.

Mr. YATES. Is that better than the use of the Richter scale?

Mr. COULTER. The Richter scale is a different scale for a different purpose.

Mr. YATES. As I understand it, doesn't that measure the strength of an earthquake or a tremor?

Mr. COULTER. It measures the relative size, but what we are worried about is, let's say, for a magnitude seven earthquake, what actual ground motion you would get right close to the epicenter. You don't really get that from the Richter scale. The Richter scale gives you a relative size of all earthquakes wherever they may occur. The Richter scale is predicated on records from a standard calibrated instrument—100 kilometers from the epicenter.

INTENSITY OF EARTHQUAKES

Mr. YATES. Is it possible, for example, to have an earthquake at Charleston, where I see a reactor dot on that chart—is it possible to have an earthquake of the intensity and destruction of the recent Chinese earthquake there?

Mr. COULTER. I think somewhat less.

Mr. YATES. It is not possible to have one the size of the Chinese earthquake? Based on historical analyses it is not, is what you are saying?

Mr. COULTER. All right. The near field ground motion of a Charleston earthquake would probably be quite close to the recent Chinese earthquake.

Mr. YATES. Is the recent Chinese earthquake considered to be one of the catastrophic ones that had maximum ground motion?

Mr. COULTER. No.

Mr. YATES. All right. What earthquake would have maximum ground motion?

Mr. COULTER. The 1964 Alaskan.

Mr. YATES. Is it possible to have a 1964 Alaska earthquake at Charleston.

Mr. COULTER. No.

Mr. YATES. Why?

Mr. COULTER. Because the type of major plate boundary, the Alaskan earthquake was a plate boundary earthquake. Charleston is representative of interplate earthquakes, and the great earthquakes, the magnitude eight and above earthquakes, are characteristically located on the major plate boundaries.

They are not low intensity earthquakes by any means. But, it is a different size range of earthquakes from the plate boundary earthquakes.

Mr. YATES. Does a major earthquake like the Alaskan earthquake ever take place other than at the plate boundaries?

Mr. COULTER. No, sir.

If you look at figure 17 in here, this is the location of the major earthquakes.

[The chart follows:]



FIGURE 17.—World map showing the location of earthquakes of magnitude 8.0 and higher, 1897–1976. These great earthquakes occur primarily along convergent or strike-slip plate boundaries and in zones of compressive or strike-slip deformation within continents. Data from the "World Seismicity Map," compiled by Arthur Tarr and printed by the U.S. Geological Survey in 1974, with newer locations added.

Mr. COULTER. If you compare it with the plate boundary chart, you will see that the great earthquakes are on the plate boundaries.

Mr. YATES. And there has been no deviation from that at all?

Mr. COULTER. No.

Mr. YATES. Not in one instance?

Mr. COULTER. No.

Mr. YATES. OK.

RIO GRANDE RIFT—NEW MEXICO

Mr. McKELVEY. I might say, though, Mr. Chairman, in answer to your question of whether there can be earthquakes of a greater magnitude than indicated in the historical record—I think if historical is interpreted to be human history, then that certainly is the case.

An example of this is coming out of the studies that we are doing with respect to the Rio Grande rift in New Mexico. There is a fault there, along the face of the Sandia range that over time has had a total displacement of about 20,000 feet. Recent studies have documented the time of movement of some of the slips that took place along that fault. They have done this by identifying caliche zones which only form at the surface. They are dateable——

Mr. YATES. What is a caliche zone?

Mr. McKELVEY. Calcium carbonate rich soil that forms in some arid regions. Soil is formed at the surface—then later presumably following a slip of the fault, covered by sediment, and in some places they have found as many as four or five of these separated by 20 to 30 feet vertically. No one was around when those slips took place, so we don't know whether they took place gradually by creep, or suddenly in a fault break.

But, assuming they took place suddenly, as some of the faults in that general western basin range region do move, the intervals between those caliche zones represent, I believe 20,000 to as much as 70,000 years.

So, there would be—if that took place as a single movement, a magnitude 7 earthquake probably, or even greater, which is higher than the historical record would show as having taken place in that region. Yet, the recurrence interval is extremely long.

This is the kind of thing that we are trying to learn about so that we can add the evidence from geologic history to that of recorded evidence of human history in evaluating some of these hazards.

MAXIMUM GROUND MOVEMENT AT DIABLO CANYON

Mr. YATES. OK.

Now, Mr. Coulter has testified that GS has given NRC information as to what the maximum ground movement is likely to be at Diablo Canyon, is that correct?

Mr. COULTER. Yes.

Mr. YATES. And it is pretty intense, isn't it?

Mr. COULTER. Yes.

Mr. YATES. Because you are at a fault boundary at that position, right? Is that correct?

Mr. COULTER. Close, yes.

Mr. YATES. Well, close enough so that you can get an Alaska-type earthquake, right, as a possibility?

Mr. COULTER. Forty kilometers away. This gets quite complicated. There is a fault about 10 kilometers from the plant which will have a lesser earthquake. That is the controlling earthquake.

IMPACT OF A NUCLEAR MELTDOWN RESULTING FROM AN EARTHQUAKE

Mr. YATES. Now, you then testified that NRC has the responsibility of taking that data and translating it into architectural terms so that

the reactor will withstand the possible earthquake. I would hope that it would go even beyond the maximum in order to protect the structure of that reactor.

In the event it does not do that, and there is a meltdown during an earthquake, what can happen to the nuclear material? Is this something that goes into the ground, and into the center of the earth? Has anybody ever estimated what would happen if a nuclear reactor had a meltdown at the site of a fault that was in motion?

Mr. COULTER. There are still a lot of safeguards. It would be possible to exceed the design basis earthquake and have various component failures, and there still is the emergency core, cooling system and a lot of redundant safety systems.

Mr. YATES. I know that. I am giving you a question—if there is a meltdown at the time of an earthquake at a site like Diablo Canyon, what happens?

Mr. COULTER. Then the core materials would melt out through the bottom of the containment and be into the natural environment.

Mr. YATES. Into the ground?

Mr. COULTER. Yes.

Mr. YATES. Do we know what is in that fault? How many kilometers away from the fault are you there?

Mr. COULTER. Ten.

Mr. YATES. So you don't worry about the material going into the fault?

Mr. COULTER. It wouldn't go into the fault. But, it probably would go into the water table.

DESIGN STANDARDS OF NUCLEAR REACTORS

Mr. DICKS. Will the gentleman yield, just for one quick question. Isn't it true that the Nuclear Regulatory Commission, when they design these plants, they go far beyond, in terms of the engineering capabilities, than just meeting the requirements, of meeting this earthquake.

Mr. YATES. That is what we are trying to find out.

Mr. DICKS. I think we ought to get this on the record—the engineering goes far beyond that. They plan for tremendous earthquakes and beyond anything that would even be possible in that area. Isn't that accurate?

Mr. COULTER. Well, there is conservatism injected into the system at every stage of the way, so at the ultimate design phase, you have pyramiding conservatism.

Mr. DICKS. In other words, if you say it is going to hit 7.5 on the Richter scale, they don't build it at 7.6. They build it at a much higher rate of safety in order to protect against this. It is done in a very conservative fashion. Isn't that correct?

Mr. COULTER. That is true. The situation at Diablo is a little different because the initial design was 6.25. A new fault was discovered after the design which has a potential close in of a bigger earthquake, and this is now a matter of reanalyzing the design to see whether any retrofit is necessary.

It is quite possible that the original conservatism in the design will take care of the larger earthquake. That is what is being determined.

Mr. DICKS. I would agree with the chairman—we would certainly want it to be built safely.

Mr. YATES. Let me ask this question, then. Do you have a function to perform after you give them the information on what is the greatest possible ground movement? How does NRC know that the design information which is predicated upon the information you have given them is adequate to protect the building?

Mr. COULTER. Because through working together we have a prescribed format in which we give them the ground motion parameters, and know how they will apply that in their design analysis.

So, there is considerable interaction between the engineers and the seismologists in order to make sure not only that they understand the input functions we are giving them, but that those input functions will not be misunderstood.

Mr. YATES. Does NRC report back to you after it receives the evidence on the design to obtain your opinion as to whether or not the new designs are adequate?

Mr. COULTER. We always sit in on the ACRS hearings where both the seismology and the design are reviewed.

ADVISORY COMMITTEE ON REACTOR SAFETY

Mr. YATES. Would you define for the record what ACRS is?

Mr. COULTER. The Advisory Committee on Reactor Safeguards. It reviews every design before they can issue a construction permit or operating license, whichever it is. We sit in on those proceedings.

Mr. YATES. I see. So, we should admonish you about not knowing all about the Andreas Fault in the first instance, shouldn't we?

Mr. COULTER. No. In this case it was an offshore fault that new technology developed——

Mr. YATES. Discovered subsequent to your original conclusion.

Mr. COULTER. The technology that discovered that offshore fault had not been developed at the time the plant was originally approved for construction.

FUTURE TECHNOLOGY

Mr. YATES. Is it possible that in 1 year or 2 years, as a result of the increased appropriations this committee is going to make available to you, that your technology will increase further, and that the information you are now giving to NRC may be obsolete and inadequate and erroneous?

Mr. COULTER. I would simply hope not.

Mr. YATES. I would hope not, too. But, that was your hope originally; wasn't it?

Mr. COULTER. Yes.

Mr. DICKS. You have talked about this new technology. What was it?

Mr. COULTER. There was subbottom profiling technology for discovering offshore faults.

Mr. DICKS. Who did this? Who conducted this? Was that your agency?

Mr. COULTER. No, this is actually oil company surveys that did it, and then we sent people out and confirmed their results.

Mr. DICKS. Maybe we should give the money to the oil companies, Mr. Chairman.

Mr. YATES. We already do.

Mr. DICKS. There is no debate about that.

REACTOR SITING

Mr. YATES. You have a chart of the eastern half of the United States there as far as reactors are concerned. Do you have one for the Western part?

Mr. BALSLEY. No.

Mr. YATES. Are there no reactors being built on the west coast? None over faults, other than Diablo Canyon?

Mr. COULTER. This is 10 kilometers from the fault.

Mr. YATES. Are those all over faults?

Mr. COULTER. No.

Mr. BALSLEY. Those are faults.

Mr. DICKS. I thought reactors were on each of those faults.

Mr. BALSLEY. The reactors are not shown on this chart.

Mr. YATES. You have geologic hazards pertaining to reactors. Where are the reactors?

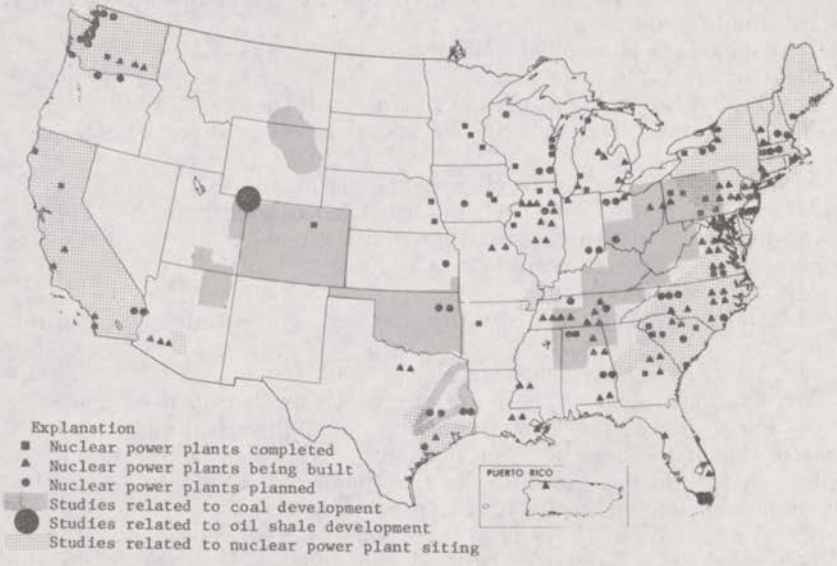
Mr. BALSLEY. They are projected.

Mr. YATES. Where are they projected?

Mr. DICKS. Where are the sites?

Mr. MCKELVEY. On page 46 of our budget justification, Mr. Chairman, there is a map that shows the location of nuclear power plants in various stages of development.

[The chart follows:]



Map of locations of research projects related to environmental aspects of energy resource development.

Mr. YATES. You don't show them with reference to this chart, do you? You don't have the location of the faults on that one, do you?

Mr. MCKELVEY. No, we do not.

Mr. YATES. Isn't there something missing?

Mr. MCKELVEY. If the committee would like, we can add these—we can add the reactor sites to that map.

REACTOR SITES IN EASTERN UNITED STATES

Mr. YATES. Let's talk a minute, then.

Are any of the reactors being constructed in the eastern part of the United States over faults?

Mr. COULTER. Not over active faults.

Mr. YATES. Is Charleston an active fault?

Mr. COULTER. There is no identifiable——

Mr. YATES. There is no plate boundary there?

Mr. COULTER. There is no plate boundary.

Mr. YATES. And therefore Charleston shouldn't have a ground movement, should it?

Mr. COULTER. No. There is no evidence of late stage differential movement at the surface. There is an earthquake generating structure.

Mr. YATES. You have got geologic hazards to reactors. So you have whetted our appetite. Immediately, you are raising a red flag, aren't you? Otherwise what is the purpose of that chart? It is to tell us, look, there are possibly geologic hazards to reactors in the Eastern United States. But you didn't show where the reactors are.

Now, let's take the Virginia one. There is a reactor being built where there is a red dot, right? There is on the map on GS 46. GS 46 shows one of the little pyramids as having been built where that dot is. I will point it out to you.

It is one on the Chesapeake Bay.

Mr. COULTER. Yes.

Mr. YATES. So you have a reactor being built there.

Mr. COULTER. The reactor is actually down here. These are locations——

Mr. YATES. These are referring to offshore now.

Mr. COULTER. No. The red dots are locations with faults that are being investigated to make sure there has been no recent activity. There is no evidence of recent activity on any Eastern fault.

Mr. YATES. How recent?

Mr. COULTER. Well, this is within the last several hundred thousand years.

Mr. YATES. That is recent enough.

Mr. COULTER. And so these are areas that are being investigated to make sure indeed that that particular phenomenon does not pose a reactor hazard—these are not hazards to reactors. These are areas where investigations are underway to make sure that that particular phenomenon is not a hazard to reactors in that place.

Mr. YATES. Well, there is another one in New York, isn't there? When was the Charleston ground movement? It was within the last——

Mr. COULTER. But there was no fault rupture.

Mr. YATES. You are talking of fault ruptures.

Mr. COULTER. There was no displacement of the ground surface along the fault. There was strong shaking but no surface displacement.

GROUND MOTION NEEDED TO BREACH REACTOR HOUSING

Mr. YATES. How strong must the shaking be before the structure housing a reactor would be breached? It all depends on the structure, doesn't it?

Mr. COULTER. Yes.

Mr. YATES. And on the movement of the ground?

Mr. COULTER. Let's say you have located a reactor along the San Andreas Fault——

Mr. YATES. We have one there, yes— 10 kilometers away.

Mr. COULTER. If it were precisely on the San Andreas, and you got differential movement of the ground, this would indeed rupture the containment of the reactor, no matter how strong the shaking was. If the foundation is moved under the reactor, that would rupture it.

That is one type of danger from earthquakes.

There is a potential, if it were insufficiently designed, that off the fault just the strong shaking itself would damage something in the reactor to the point that you would have a failure.

So, there are two different phenomena. The Western United States has the potential of differential offset on faults. And no reactor in the Western United States is near a fault that might have differential ground movement.

In the Eastern United States, there is sufficient concern. It was always thought that no fault ever moved at the surface during an earthquake. We are reexamining that to make sure it is indeed the case.

There is no bona fide evidence of surface offset related to earthquakes in the Eastern United States.

COMMITTEE CONCERN ABOUT REACTOR SITING

Mr. YATES. All right. Would you put up the San Andreas Fault chart, please? You have San Diablo down at the bottom, near Los Angeles, right?

Mr. BALSLEY. It is like this kind of a fault, except it is much farther south.

Mr. YATES. All right. Then you have a reactor being built slightly north—northeast of the Diablo Canyon. I wonder whether that is not on a fault. According to your chart, page 46, there is another reactor being built above Diablo Canyon.

Mr. COULTER. Northeast. No; that is out in the valley. And the San Andreas is approximately equidistant between those two.

Mr. YATES. What is your other one that goes up north?

Mr. COULTER. Calveras and Haywood join the San Andreas just south of the San Francisco Bay.

Mr. YATES. The committee is concerned with the construction of nuclear reactors, and the possibility of rupture through ground move-

ment. We know about Diablo Canyon. So far you indicated to this committee that Diablo Canyon is the only one that is the subject of possible rupture, if indeed it is, that has required special care.

There is no other reactor in the country, according to the Geological Survey, where this is likely to occur. Mr. Coulter shakes his head yes.

Mr. McKELVEY. Yes.

Mr. YATES. Mr. McKelvey shakes his head yes.

NUCLEAR REACTOR SITES IN WASHINGTON STATE

Mr. DICKS. Mr. Chairman, I would like to ask a question. I am a little concerned about that answer. In the State of Washington, as I understand it, there were a number of reactors, particularly one planned by Puget Power, that has been delayed or they have had to go back to the drawing board because of new seismic information that was not available when they were planning that particular reactor. I think we are talking about the one on the Skagit, and when there is also one down on the Wynooche. Both of those were reviewed or one or the other was reviewed because of new information. Is that accurate?

Mr. COULTER. We have never signed off on either of those reactors yet. They are still under review.

Mr. DICKS. You are still involved in that review process?

Mr. COULTER. Yes.

Mr. DICKS. Are there any others in the State of Washington that you are interested in at this point?

Mr. COULTER. There is WPPSS 1 and 2, and Skagit.

Mr. DICKS. So all three of those are under review?

Mr. COULTER. Yes.

TOPOGRAPHIC MAPPING BY CONTRACT

Mr. YATES. We are moving slowly through your problems.

Now we turn to mapping.

"Shift to contracts to accomplish program objectives within personnel ceiling." What you are talking about is that you have a big backlog, and in order to catch up you want to go to ouside contracts and grants, right?

Mr. McKELVEY. We are having an expanding program——

Mr. YATES. You don't want to do it all in-house?

Mr. McKELVEY. We are not able to do it all in-house now.

Mr. YATES. How much can you do in-house? What percentage would you say?

Mr. McKELVEY. I think Mr. Lyddan may have the figures.

Mr. LYDDAN. The two things that are moving us toward more contract work are the personnel ceiling problem, and our desire to give the contractors a try at this to see if they can produce mapping that is acceptable in quality and equal or less in cost.

COMPARISON OF ECONOMICS AND EFFICIENCIES OF CONTRACTING

Mr. YATES. Is it more economic and efficient to do this by contractor, than in-house?

Mr. LYDDAN. The only problem is that mapping is difficult to check and test because it is spread over large areas; it could be a very costly operation. If we find that some contractors fall short as far as accuracy and quality is concerned, then we will have to do extensive testing, and that will be expensive; the aggregate cost might turn out more than it would be in-house.

I think you also raised a question about percentage of the work we could do in-house. We are capable, except for personnel ceiling restrictions, to expand at a considerable rate to take on added work. But we have moved toward contracting during the last 3 years from about a $2 million level last year to a $3.5 million level for the current year. In the budget proposed for 1978 we expect this will move up to about $10 million.

MAPPING BACKLOG

Mr. YATES. How far behind are you? How much of a backlog do you have?

Mr. LYDDAN. We have yet to complete the basic mapping for about 30 percent of the country. We have no notion of doing that all in 1 year or a few years. We expect to move along as rapidly as we can to complete basic mapping; to keep the maps revised; and to meet some new map requirements which have emerged.

Mr. YATES. How much additional money would it cost to do the work in-house?

Mr. LYDDAN. If you mean in comparison to having it done by contract, we hope there won't be any appreciable difference in doing it by contract or in-house. What we are planning to have the contractors do is the kind of work for which procedures are well established.

REASONS FOR CONTRACTING TOPOGRAPHIC MAPPING

Mr. DICKS. The question I wanted to ask is: Why do you have to do this contracting out? Are these legislatively mandated personnel ceilings or is this an executive policy?

Mr. LYDDAN. There are no legislatively mandated personnel ceilings that apply to this work.

Mr. DICKS. So this is strictly the policy of the administration, to limit the number of people that you can have to do this work, which forces you then to contract out, is that right?

Mr. LYDDAN. That is correct.

COST STUDIES TO EVALUATE CONTRACTING OF MAPPING

Mr. DICKS. Have there been any cost studies to indicate that it's more cost efficient or cost effective to contract out this work than hire additional personnel?

Mr. LYDDAN. Not in recent enough times for the comparison to be useful. Back in the 1950's we had quite a bit of work done by contract and at that time we concluded that the costs were appreciably greater.

QUALITY OF MAPS CONTRACTED

Mr. DICKS. How about the quality of the work in the 1950's, was it better or worse that your expectations?

Mr. LYDDAN. The quality of the work was adequate where we accepted the work and paid for it. There were some cases in which we required the contractor to do some of the work over to make it acceptable, but in all cases where the work was accepted and the maps published, they were adequate. They were up to standards.

OPINION REGARDING CONTRACTING OF MAPS

Mr. DICKS. In your personal and professional opinion, would it be better to do it in-house than contracting it out?

Mr. LYNDAN. That is a difficult question.

Mr. DICKS. I am not asking for the administration's position. I am asking for your own personal and professional viewpoint.

Mr. LYDDAN. It's a matter of the extent to which we can depend on the contractor for doing acceptable work. The commercial mapping field is a rather highly competitive one. And there are a great number of firms in that field. Some are old and well known and others are new, and we are not sure yet to what extent we could trust the quality of the work without extensive testing. This is the thing that makes your question difficult to answer.

Mr. DICKS. It sounds to me you are not persuaded this is the way to go.

Mr. LYDDAN. Not persuaded this is the entire way to go, no sir.

Mr. DICKS. All right. Thank you, Mr. Chairman.

COORDINATING MAPPING REQUIREMENTS OF FEDERAL AGENCIES

Mr. YATES. You talk about identification of focal points for the program to coordinate large scale mapping now being funded by HUD, EPA, and other agencies.

Do you not have such a focal point in the program now?

Mr. MCKELVEY. If there is a focal point I expect it would be the Geological Survey. The Federal mapping task force to which we have referred from time to time, in a major study sponsored by OMB in 1973, made as one of its recommendations that the Federal mapping activities that are now scattered throughout a number of Federal agencies be consolidated, but that has not yet been accomplished.

Mr. YATES. It might be a source or possibility of saving some money; correct?

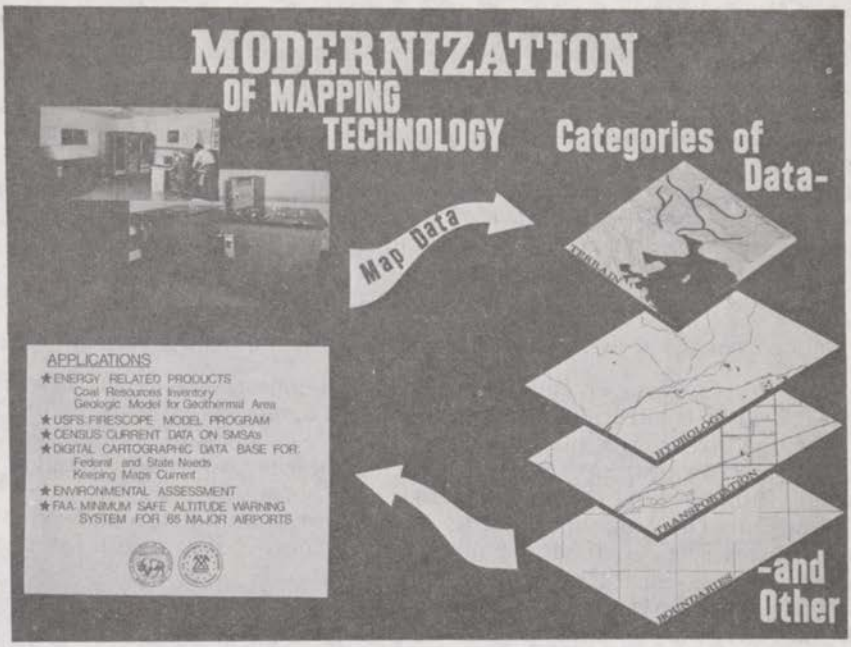
Mr. MCKELVEY. It's a possibility; yes.

CARTOGRAPHIC DATA IN DIGITAL FORM

Mr. YATES. Developing a capability to accommodate the rapidly increasing requirements of agencies for cartographic data in digital form. What does this mean?

Mr. MCKELVEY. This is a growing problem and one addressed in our budget request for fiscal 1978 under the heading of modernization of mapping equipment as show on this chart.

[The chart follows:]



Modernization of mapping technology is needed in order to produce and provide the variety of map products that will meet national map users' needs. Modernization involves the purchase of new equipment, updating existing equipment, and developing new mapping techniques. This graphic represents an example of modernization—a new product—a map data in digital form which has been produced by a new mapping system.

Mr. McKelvey. What is becoming possible, and in fact is already possible, is to digitize the information that is shown on a topographic map, so that the map information, you might say, is in the computer. By this means the elevation of the ground surface at any given point, or along any given line can be drawn from the computer in the form of a graphic or a printout. Thus if you are planning to or thinking of constructing a highway along some given route, you can ask the computer not only for a vertical profile, but how much cut and how much fill would be required to attain a certain grade.

These are some of the kinds of uses that can be made of digitized map information, and the need for it is increasing rapidly.

Of course, a map shows several kinds of information which can be pulled out separately if all of that information is digitized and stored in a computer. You might want a map that simply shows the location of the streams or simply shows the transportation net, or just the civil boundaries or something of that sort. And it increases by orders of magnitude the flexibility of the use of traditional map information.

EROS MULTISPECTRAL SCANNING

Mr. Yates. We have increased the money spent in EROS a lot, and you are discussing the future EROS data center, with possible discontinuance of multispectral scanning. Will EROS replace this multispectral scanning?

Mr. McKelvey. No; what has been proposed, Mr. Chairman, is that Landsat D—that is one of the satellites launched for the purpose of acquiring earth resource information, that Landsat D be equipped with a new kind of equipment called the thematic mapper, which will replace the multispectral scanning equipment, which is now the principal equipment it carries. There is not present funding for the multispectral scanner. And that, we think, would pose a considerable problem because there are, in fact, many users now of the multispectral imagery obtained from Landsat I and II. And how that is going to be resolved remains to be determined, but it would be a mistake in our view to discontinue the multispectral scanner capability.

GEOLOGICAL SURVEY PROGRAM TO REDUCE DROUGHT PROBLEMS

Mr. Yates. Now we turn to water, and I must say I experience a great deal of frustration in trying to interest agencies that come before this Committee in the importance of water.

We need to gear up tremendously for the energy program, and I would think we have to do as much in the field of water.

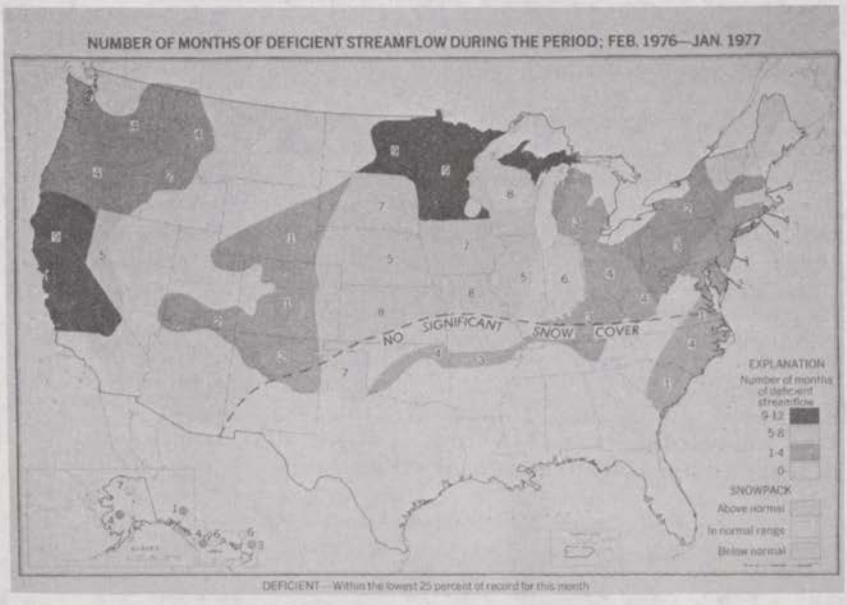
Certainly the drought occurring in the West is an indication of some inadequacy somewhere on our part. I don't know if it's enough to say the weather is causing this and let it go at that.

Isn't there anything the Geological Survey can do to help with respect to the drought?

Mr. McKelvey. Well, yes, Mr. Chairman.

We have a chart showing information with respect to the status of stream flow across the country.

[The chart follows:]



Streamflow in the United States has been considerably below normal for extended periods over much of the country. It reflects serious drought conditions, especially in the north-central and western parts of the Nation.

Mr. McKelvey. We would be the principal source of information about streamflow and its condition and also about ground water and the change in ground water levels, where that may be taking place.

Mr. Yates. We see pictures of reservoirs in the newspapers, the ground underneath is cracking, and they no longer have water.

Mr. McKelvey. Right.

LOCATION OF GROUND WATER

Mr. Yates. Where is the ground water there? Do you know?

Mr. McKelvey. In most cases we would have information on that.

Mr. Yates. Is it possible to sink a well at that point?

Mr. McKelvey. It may be.

Mr. Yates. Why don't you try it then?

Mr. McKelvey. Well, we wouldn't do it ourselves, but we may be able to recommend ground water sources as auxiliary sources of supply.

GROUND WATER SOURCE OF SUPPLY

Mr. Yates. Let's stop at that a minute. We have a drought condition, and you say you may be able to recommend ground water as auxiliary sources of supply. If that is true, why haven't you done it in the face of one of the great droughts in the history of the country?

Mr. McKelvey. We have cooperative programs, Mr. Chairman, with, I guess, approaching 600 State and local water agencies across the country, and we are working with them constantly.

Mr. Yates. Let's go back to the reservoirs where the ground is broken because of the drought. Would sinking a well under that surface help?

Mr. McKelvey. Well, it might.

Mr. Yates. Why don't they try it then? Why doesn't somebody try it? Apparently nobody is, are they?

Mr. McKelvey. It would depend on the location as to whether or not there is an aquifer present.

Mr. Yates. Where did we see pictures of these horrible reservoirs? You could go almost anywhere in the West and find this drought, couldn't you? Does this mean that where the drought occurs now there is no ground water underneath that area?

Mr. McKelvey. No; by no means.

Mr. Yates. Why doesn't somebody sink a shaft or dig a well or do something?

Mr. McKelvey. Let me ask Mr. Cragwell, our chief hydrologist, to tell of our activities in this area.

Mr. Yates. All right.

MONITORING OF DROUGHT CONDITIONS

Mr. Cragwell. Mr. Chairman, we are quite active in the monitoring activities of this developing drought. As our Director has said, we work very closely with those agencies, State and local, through the cooperative program, who do have the responsibility for furnishing water for various purposes, and we help them in two ways.

When a drought emergency builds, as it is now, through much of the West, we are working at a much higher intensity trying to measure what water there is, where it is available, and what quantity, and what quality, at a much higher and more intensive level than when things are normal.

It's more important, and we are working with greater numbers, so more effort is required to know where it is.

Second, we provide continuing technical assistance to help a town or water management district or others through the cooperative program to go for supplemental ground water supplies.

Now, in some of these major water projects, the alternatives for ground water supply are not of such an extent in some areas that they could yield what people are used to getting from a huge impoundment. But our larger impoundments, according to our later reports, are not in general that desperate through the West, other than California.

They are at or somewhat below normal. The real concern is, as I understand it, the very low snow accumulations through much of the Western States, so that next year they will be in a much more desperate situation than they are now.

So, it is what is impending that concerns us all more so than what we have right now.

EXISTING DROUGHT CONDITIONS

Mr. YATES. I had a contrary view, I must say. I listened to BLM testify, and listened to the BIA testify, and Mr. Duncan testified as to the condition of the forests out West and the impending fire hazard out there because of the lack of water. That is a present danger.

Mr. CRAGWELL. In California, yes, sir.

Mr. YATES. And other parts of the West too. Mr. Duncan is from Oregon. I don't know what the condition is in Washington, but I suspect it's the same out there.

Mr. DICKS. It's worse.

Mr. YATES. If that is true, they are looking for water. Now, apparently they haven't had the water they usually have because of the lack of snow in the mountains and the lack of rain. What do you do out in the Northwest? Are there aquifers, is there underground water available that they ought to know about? Of course, you have the mountains there, I guess, and I don't know whether you can go underneath them. Can you go underneath mountains to get water?

Mr. MCKELVEY. It depends.

Mr. YATES. Let's take Oregon or Washington.

Mr. MCKELVEY. It depends on the aquifer, I would think.

GROUND WATER MAPS

Mr. YATES. Do you have a map that indicates where the ground water is?

Mr. McKelvey. We do have such information. I am not sure if it's been completed for California, but we have published, been publishing in the last 2 or 3 years synopses by States and regions of the availability and distribution of ground water over the entire country.

We are well advanced in that.

Mr. Cragwell. May I add a point?

Mr. Yates. Why do we have this condition then? Why isn't there some attempt to tap the underground water where you have no water on the surface? Why must we say there is an impending danger next year when the surface is being blown away in Texas and it's being blown away in Minnesota?

Mr. McKelvey. Yes; there are parts of the country where it's serious now. There is no doubt about that. But what Mr. Cragwell is saying is it is going to be worse.

Mr. Yates. All right.

Mr. Cragwall. May I add a point?

I was at a meeting last week where a delegation from North Dakota did not come because they were so bogged down with applications for well-drilling permits that they were too busy to come to talk about the problem.

So, what you are saying is taking place. There is a tremendous upsurge in applications to the State people who control water rights, which we don't, they do, for drilling more wells.

I think this alternative measure is being pushed very rapidly in most of the dry States.

Mr. Yates. I am of the impression you do have maps that indicate the location of ground water throughout the country.

Mr. McKelvey. Yes.

Mr. Yates. Do your maps also show how far down the ground water is?

Mr. McKelvey. In most instances that information, if not directly readable from the map, would be available.

Mr. Yates. Is it too expensive to tap that water?

Mr. McKelvey. That would depend on the volume of water that might be available and the depth and so on. Some of it would probably be too expensive to tap. But it's an alternate source in many areas.

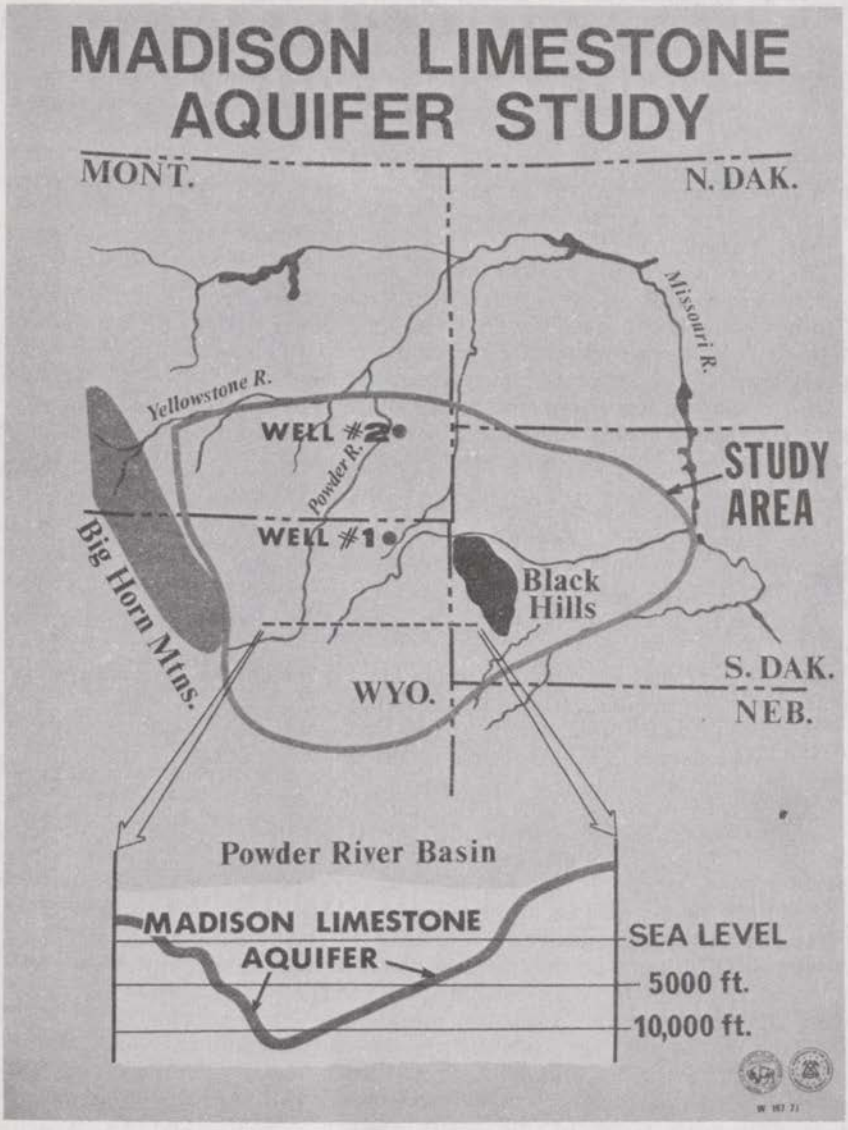
GEOLOGICAL SURVEY RESPONSIBILITIES FOR WATER

I should perhaps, just for the record, Mr. Chairman, indicate the extent of our responsibility in this area. We are basically a factfinder, if you like, about the Nation's surface and underground water resources. We don't have a responsibility for the control or the development of water supplies, however, much of our information is directed at that purpose, but through the agencies with whom we cooperate.

Now, an exception is one authorized in our budget in which we are attempting to assess the water resources in the Madison Aquifer in Wyoming and adjacent parts of Montana, South Dakota, North Dakota, and therefore we have been drilling some wells, one of them

completed already at a depth of about 4,500 feet, and another one nearly completed at a greater depth, at around 10,000. This chart shows the area under study.

[The chart follows:]



The Madison Limestone underlying parts of Wyoming, Montana, the Dakotas, and Nebraska may be capable of providing a significant portion of the total water requirement for coal development in the area. The aquifer system is being tested and modeled to permit evaluation of the impacts of water withdrawals and the extent to which such water use is permissible in light of water quality and drawdown restrictions.

Mr. McKelvey. The first well did identify a very large aquifer, and Mr. Cragwall can supply more detail about this.

Mr. Yates. Would you define for the record what you mean by aquifer?

Mr. McKelvey. I mean a permeable rock formation, the interstices of which are filled with water and from which water can be drawn.

But that information is being taken advantage of, and a water supply developed from that for the town of Gillette. Now I can't say more about it, but Mr. Cragwall I am sure, could elaborate briefly on that.

MADISON LIMESTONE AQUIFER

Mr. Yates. Mr. Cragwall, do you know the size of that aquifer, or do you still have to make further soundings or dig more wells?

Mr. Cragwall. The purpose of our project is really to build a model of this aquifer so we can predict its yield and depth and all of the things you need to know in developing water supplies.

When we finish testing in the two holes presently being drilled, we will know whether we need another two or three or four holes to fill the gaps in, and hence refine this model. So, right now we can't say how many more test wells we need to get to those specific answers.

But, we will know a lot better when we do some further testing on our No. 1 hole, when we complete No. 2 hole in the next few months, and do further testing on it. But our best estimate now is we will probably need about three more test holes in other areas to round out our knowledge and then be able to build a predictive model.

DISCOVERERS OF MADISON LIMESTONE AQUIFER

Mr. Yates. How did you know Madison Limestone Aquifer existed?

Mr. McKelvey. It's been known a long time.

Mr. Yates. How was it found, by miners? Who discovered the Madison Limestone Aquifer?

Mr. McKelvey. I don't know its history. It might have been discovered by miners or farmers, ranchers drilling small shallow wells.

Mr. Dicks. We don't know.

Mr. McKelvey. I don't know its history.

Mr. Dicks. Well, does this gentleman know?

Mr. Cragwall. We feel that a good bit of the knowledge about the Madison has come through oil exploration, which has been under way out there for some time.

Mr. Dicks. If the Chairman will allow me, why did you do this aquifer study?

Mr. Yates. They were directed by Congress to do it 2 years ago.

I am trying to find out, because Congress knew, we all knew about the Madison Limestone Aquifer, how the Madison Limestone Aquifer was discovered?

You say probably because of oil drilling. They drilled for oil and found water.

Mr. CRAGWALL. The knowledge of what is underground is an evolutionary process, geologists work on it, people drill wells for water, and water comes along, and you gradually, over a period of time, build up a mass of knowledge through data and inference which leads you to conclude a hypothesis that by golly, it looks like we have a pretty good water supply down there, and we will do more work.

That is what happened to the Madison. When we came up with the energy research and a need for more water for the slurry pipeline, it was our thought and others that perhaps enough water could be pumped from the Madison to provide for the slurry pipelines without taking agricultural water to do it.

So, in effect, it provided a new alternative source of water in the energy push, and that is what gave emphasis to the study.

NEED FOR ADDITIONAL FUNDS

Mr. YATES. Can we find some rationale for that too, to offset the impending doom you describe as taking place next year? Can we, either in our 1977 supplemental appropriation or in our 1978 appropriation bill provide you with funds so that you can make immediate experiments out West where the drought is occurring to discover water underground?

AQUIFERS IN WEST AND SURVEY JURISDICTION

You said you had maps that indicate there are areas under the drought area that are as filled with possibilities of providing water as the Madison Limestone Aquifer.

Mr. MCKELVEY. There may be. I am not personally informed.

Mr. YATES. Now, you said a few seconds ago that your jurisdiction is limited. But is it? The President is declaring these areas disaster areas, so the Federal Government moves in with assistance.

If the Federal Government moves in, it seems to me you have an expanded jurisdiction, and if the disaster is caused by water and if the Geological Survey can make a contribution, you ought to be making one.

Mr. MCKELVEY. We are making a contribution in the form of providing information about the distribution of ground water resources.

Mr. YATES. All right then.

You say you are helping by giving them information. Then nobody is trying to tap the water, are they?

Mr. MCKELVEY. I think from what Mr. Cragwall said, just the opposite is the case.

Mr. YATES. They are drilling wells in North Dakota.

Mr. CRAGWALL. I used that as one example.

Mr. YATES. What are they doing in California?

Mr. CRAGWALL. In California where water is tight in even normal situations, I think they are going to practice a lot of conservation.

Mr. YATES. I know. They are doing it. They are not allowing people to take more than one bath a week.

Mr. CRAGWALL. Because ground water in much of California is already highly developed.

Mr. MCKELVEY. Much of the ground water potential in California is already being drawn on and has been drawn on extensively in the past.

Mr. YATES. So the drought is on the top of that?

Mr. MCKELVEY. Possibly overdrawn in some areas.

WATER PROJECTS IN WASHINGTON AND OREGON

Mr. DICKS. Would the gentleman yield?

What about in Washington State, what have you done specifically in Washington or Oregon?

Mr. MCKELVEY. With respect to ground water, Mr. Dicks, I am not personally able to say. I don't know if Mr. Cragwall can or not, but we can certainly supply this information for the record.

Mr. CRAGWALL. We will be glad to supply it for the record, but we have had very strong programs for many years in both Washington and Oregon. We have a good knowledge of ground water potential.

[The information follows:]

ACTIVITIES IN OREGON AND WASHINGTON AS A RESULT OF THE DROUGHT

In addition to drawing on the strong existing background to furnish hydrologic information and pursuing current pertinent investigations, Geological Survey representatives are working with State, local and Federal officials in Washington and Oregon to assist with planning to combat the effects of the drought. This is being done through contacts at the working level. As a result, the Survey, in consultation with cooperating agencies, is deferring some on-going work and focusing its efforts to provide essential information on water quality and the location, distribution, and quantity of surface- and ground-water resources.

Some recent actions in this regard are as follows:

Oregon

The District Chief has had a number of consultations regarding the drought with Governor Straub's staff, including Executive Assistant Loren Kramer and Ms. Janet McClellan, Assistant for Natural Resources.

As the result of discussions with the Oregon Water Resources Department additional effort has been mounted by both agencies to collect specific information on streamflow and ground-water levels.

In cooperation with the Department of Environmental Quality, an accelerated program of measuring surface- and ground-water characteristics and collecting water-quality samples has been undertaken in the Tualatin basin.

In cooperation with the Coos Bay-North Bend Water Board, experiments are being performed with an analog model to assist in projecting potential effects of the drought considering various water-management alternatives.

Other agencies with which the Geological Survey is working in Oregon are:

Oregon Department of Fish and Wildlife	Oregon State Highway Commission
City of Corvallis	City of Eugene Water and Electric Board
City of Lakeside - Lakeside Water District	City of McMinnville - Water and Light Department
City of Portland - Department of Public Works	City of Portland - Department of Public Utilities
Coos County - Board of Commissioners	Douglas County - Board of Commissioners
Lane County - Office of the Chief Administrator	Burnt River Irrigation District
Confederated Tribes of Umatilla Indian Reservation	Confederated Tribes of Warm Springs Indian Reservation
Multnomah County - Board of Commissioners	Rogue Valley Council of Governments
Columbia Region Association of Governments	Bonneville Power Administration
Bureau of Land Management	Bureau of Sport Fisheries and Wildlife
U.S. Department of Agriculture - Soil Conservation Service Forest Service	Corps of Engineers
Bureau of Reclamation	Environmental Protection Agency
Housing and Urban Development - Federal Insurance Administration	Bureau of Indian Affairs

Washington

The District staff met with representatives of the Department of Ecology on March 4. Attending were the Director, Wilbur Hallauer, and his staff, John Spencer, Glen Fiedler, and Gene Wallace. The Department asked the Geological Survey to help study four specific problems in the Yakima Valley where the drought is severe. The activities to be undertaken are as follows:

1. Evaluate the potential for new ground-water supplies in the Ahtanum/Moxee sub-basins

2. Assess the potential for developing water from mines for irrigation at Cle Elum and Roslyn

3. Assess the potential for ground-water supplies from gravel aquifers in Kittitas Valley

4. Provide assistance to the Department of Ecology by attending meetings with farmers, irrigation districts, and others involved in developing irrigation supplies

The Acting District Chief, WRD-USGS, is an ex-officio member of the Governor's Ad Hoc Executive Water Emergency Committee on Drought Conditions (11 State Agencies and ex officio members of three federal agencies including USGS).

In meetings early in February with the Department of Ecology, our staff agreed to accelerate measurements of streamflow, water levels in wells and collection and analysis of water quality samples.

Additional effort is going into snow survey data analysis. The data is processed through mathematical models to predict runoff for various snow conditions. This is of fundamental concern to the power companies and other agencies including the Corps of Engineers.

Experiments are being performed on existing hydrologic models to evaluate drought effects in conjunction with proposed development of alternative supplies.

Other agencies with which the Geological Survey is working in Washington are:

Washington State Department of Fisheries	Washington State Department of Game
Washington State Department of Highways	City of Port Angeles
City of Seattle Department of Lighting Water Department	Municipality of Metropolitan Seattle
City of Tacoma Department of Public Utilities Department of Public Works	Public Utility District No. 1 of Chelan County
Public Utility District No. 1 of Douglas County	Public Utility District No. 1 of Pend Oreille County
Inter-County River Improvement	King County Department of Public Works
Skagit County	Board of County Commissioners Whatcom County
Clark County - Public Utility District	Cowlitz County - Public Utility District
University of Washington - Fisheries Research Institute	Town of Fircrest
Spokane Tribe of Indians	Yakima Tribal Council - Confederated Tribes and Bands of the Yakima Indian Nation
City of Bellevue - Public Works Department	Skokomish Tribal Council

87-591 O - 77 - 47

Tulalip Board of Directors

Pacific County Board of County Commissioners

Swinomish Tribal Senate

Makah Tribal Council

Quileute Tribal Council

Suquamish Tribal Council

Corps of Engineers

Bureau of Reclamation

Energy Research and Development Administration

Housing and Urban Development - Federal Insurance Administration

Chehalis Tribal Council - Chehalis Indian Reservation

Quinault Resource Development Project - Quinault Indian Reservation

Lower Elwha Tribal Council

Port Gamble Tribal Council

Quileute Tribal Council

Bonneville Power Administration

State Department - International Joint Commission

U.S. Department of Agriculture - Forest Service

Environmental Protection Agency

Bureau of Indian Affairs

Mr. DICKS. Have you talked to anybody in the Governor's office or anybody in the executive branch since this drought has started?

Mr. CRAGWALL. We work continually, day to day with the water agencies in both States.

Mr. DICKS. Who specifically? What water agency?

Mr. CRAGWALL. Well, it's the State water engineers office in both States. They are our key cooperators. And I am presently right now amassing input information from our field offices regarding the stepped-up activity and the money requirements for those activities to either come forward with a supplement or an amendment or both.

WORK WITH OTHER FEDERAL AGENCIES

Mr. DICKS. Good for you. May I ask another question?

I am getting to some specifics now. Are you working with the Bureau of Reclamation within the Department of the Interior?

Mr. CRAGWELL. In the Pacific Northwest we have interagency water groups, including the Bureau of Reclamation, Bonneville Power, Columbia River Basin Commission and State agencies involved.

Mr. DICKS. Have they had a meeting on this issue?

Mr. CRAGWALL. We meet monthly and more often on the water supply. I talked to some of the people the other day and that's why I happen to know. In spite of the very threatening drought, the Bonneville system of water reservoirs is not yet critical, but they are worrying about its becoming critical. Now, remember, the Bonneville system is not used primarily for irrigation, it's used primarily for hydroelectric power.

Mr. DICKS. It's the Yakima system we are worried about.

Mr. CRAGWALL. I am sure it's low.

Mr. DICKS. It's 6 percent of historical average.

Mr. CRAGWALL. But I think we are very well on top of knowing what the water situation is, and what the potential alternatives are for doing something about it.

INSTITUTIONAL PROBLEMS REGARDING OWNERSHIP AND CONTROL OF WATER

Now, we do have one problem in ground water that has not been mentioned. In many States the institutional problems surrounding who owns and controls ground water is different from going into a river. The States have pretty good authority over river flows, but you get down almost to property rights in many States regarding ground water. So the institutional arrangement for just going out wholesale and drilling holes in the ground is not possible in many States.

Mr. DICKS. You have a lot of Federal lands out there, don't you, and a lot of State land in Washington?

Mr. CRAGWALL. Incidentally, there are continuing and growing controversies between the Western States and the Federal Government, over who has the water rights control on those public lands. And we are not at all sure that the Federal Government has the control of the water rights on those public lands, sir.

WATER INVENTORY OF FEDERAL LANDS

Mr. DICKS. Have you inventoried the Federal lands to see what additional water resources you might have on the Federal lands?

Mr. CRAGWALL. We have, I would say, a moderately good knowledge of the Federal lands where water is potentially a good resource.

Mr. YATES. The States will take it.

Mr. CRAGWALL. There are many areas in the public lands like the Northern Rocky States when the energy crises came along, where our data base was not as good as we would have liked it, and that is why we have stepped up data programing for energy in those States.

ADEQUACY OF FUNDS AND PERSONNEL

Mr. DICKS. Let me ask you this question: What I think we would like for you to do is to do more.

Now in order to do more what would you have to have?

Mr. CRAGWALL. We need money and people. They are the two resources to get a job done.

Mr. DICKS. You provide technical expertise, don't you, and information to the States, isn't that your major role?

Mr. CRAGWALL. That is our major role

Mr. DICKS. In order to do more, are you going to need more assistance during this crisis?

Mr. CRAGWALL. If we do much more, we have one of two choices, and we always exercise this first choice in a drought or flood emergency.

We stop doing the normal program and concentrate on the emergency. So that is one way. We recruit manpower, together with techniques like hiring seasonal people to help in the work, and overtime and all of the things you normally do.

But if the drought looks like a continual drought of multiyear duration, then we are going to need a significant level of new resources to do a significant level of increased activity.

Mr. DICKS. Of helping the States?

Mr. CRAGWALL. Yes. Now we have the mechanism of helping the States through the 50–50 cost-sharing, and we have some of these States already appropriating more money. So we will need matching money if we are to implement it.

Mr. DICKS. If the States appropriate more money, then you have to come up with more money at the Federal level?

Mr. CRAGWALL. That is right.

FEDERALIZATION OF WATER PROBLEMS DUE TO EMERGENCY

Mr. DICKS. Now do you think we ought to federalize this?

Mr. YATES. What do you mean, make the Federal Government pay for all of it?

Mr. DICKS. Make the Federal Government take over instead of a State-by-State program, because of the national emergency. If it's

going to be a continual drought that is going to go on for a number of years, should the Federal Government take this program over because of the national consequences here, and be much more aggressive in terms of things, of doing things like this and searching for water?

Mr. CRAGWALL. I don't think so. I think the States have the control over water rights, the law is with the States, it's where the local people can make their determinations. We think we have an ideal program where we work in concert with the States, and hence, help them solve their local problems and meet their demands for water.

I think we sort of have an ideal partnership arrangement in the cooperative program for dealing with what you talk about.

CORPS OF ENGINEERS

Mr. DICKS. Doesn't the Corps of Engineers play a role here too?

Mr. CRAGWALL. The Corps of Engineers has a construction mission for water projects primarily with flood control and navigation, and with land-use planning as relating to flooding.

Mr. DICKS. Do you coordinate with them?

Mr. CRAGWALL. We do most of the water factfinding for the corps that they need, yes, sir. They put $10 million a year with us to do the water work we are talking about.

Mr. DICKS. General Peal was before the Public Works Subcommittee the other day and he suggested we might want to give the corps more authority in this area, to look for municipal and industrial water to develop that resource. What do you think about that?

Mr. CRAGWALL. They would have good capacity for that kind of work, yes, sir.

RESPONSIBILITY FOR EXPLORATION AND DEVELOPMENT OF WATER RESOURCES

Mr. YATES. Who has that responsibility now? You have, haven't you?

Mr. MCKELVEY. For the development of water resources?

Mr. YATES. No; for the gathering of information.

Mr. CRAGWALL. But I understood you to say the digging of wells and building of major dams. And it it's a construction mission, the corps is hard to beat, yes, sir.

Mr. DICKS. The corps suggested that one of the things they might do, in this water crisis, is to try and help us develop new sources of municipal and industrial water.

Mr. YATES. That would be fine. I think any agency that can do that is to be commended and encouraged.

What is GS's responsibility with respect to national supplies of water? Do you have any?

Mr. McKelvey. Yes, indeed. This chart shows the extent of the national stream quality accounting network.

[The chart follows:]



The national stream quality accounting network (NASQAN) is designed to provide a uniform, continuing measure of the quality of U.S. rivers. Design size: 525 stations.

Mr. McKelvey. We are the principal Federal agency with respect to information on the Nation's water resources, both surface and underground, both discharge and amount, and also water quality.

Mr. Yates. You don't have any responsibility toward the preservation of it, just the furnishing of information.

Mr. McKelvey. That is correct. But as an example, you mentioned the Corps of Engineers, perhaps you heard the TV spot recently, it might have been last evening, in which there was discussion of the water situation right here in Washington, D.C., pointing out that there is not the reserve of capacity in the Washington area in the event of an extended drought, and mentioning that the Corps of Engineers has at times proposed several dams in the area.

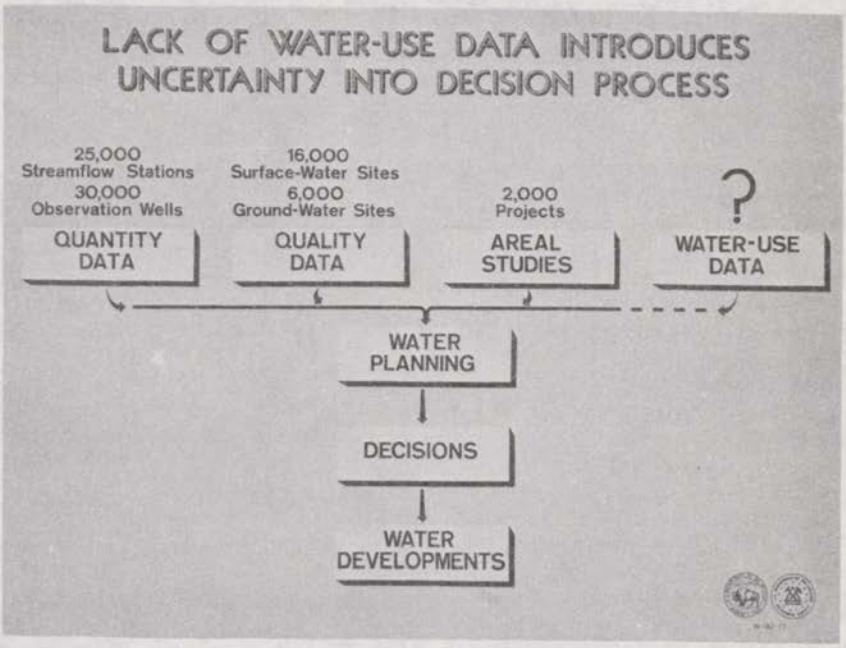
One alternative that we have developed is the identification of significant ground water resources in the coastal plain east of Washington, where a very large resource exists that could be developed through ground water wells, an extensive well field, either as an alternative or supplement.

That possibility is certainly a significant one.

Mr. YATES. Now, a chart has been placed above us.

Mr. MCKELVEY. This chart shows, Mr. Chairman, the various kinds of information relating to water.

[The chart follows:]



Water-use data, which are lacking, are required to support the decision makers in their selection and location of water development projects. The data are needed to determine which areas in the country are potentially water-short and which are capable of sustaining additional developments.

Mr. YATES. That's a very good chart. What you are trying to tell this committee is that we are running out of water, aren't you?

Mr. MCKELVEY. What we are trying to tell with this chart is that data on water use, on what water is actually used for, are simply not available, whereas they are an important input into planning and decisionmaking with respect to water resources.

Mr. YATES. Who is supposed to gather that data?

Mr. MCKELVEY. Thus far that kind of information has been gathered only on a local basis, here and there, and nationally by the Geological Survey, but on very much of a reconnaissance basis, giving only the very broadest breakdowns of what water is used for municipal versus irrigation, versus industrial and so on, but without any further information on what water is used for in more specifics. And one of the proposals in our 1978 request is that we begin a program, a cooperative

program with the States in which data on water use would be acquired more systematically and in more detail, and we believe that those kinds of data will be useful and give us much greater flexibility than we have now, and greater power in confronting situations such as the one we have been discussing, drought, when water becomes in short supply.

We may be having to look at the use to which water is put in individual areas, with an eye toward where it can be reduced for this purpose and what would be the consequences of a reduction in water availability for specific uses.

But, of course, that is only one of the applications of this kind of information.

WATER RESEARCH

Mr. YATES. We are cutting down on our research on recovering good potable water from brackish water, we are cutting down on our research for the conversion of sea water into potable, drinking water. We are cutting down on our research respecting saline conversion. Does that make sense? Our population is growing and we have enormous population shifts to California, to the West, to the South, and greater charges upon the water by increased masses of people changing their locations in the country.

Mr. MCKELVEY. Certainly water supply is going to be of increasing concern to the future, over the long term, I suspect.

RESPONSIBILITY FOR ADEQUACY OF WATER SUPPLY

Mr. YATES. You don't have anything to do about worrying about that, do you? You just provide the information as it occurs? You don't worry about future supplies?

Mr. MCKELVEY. I am a citizen of this country the same as you are.

Mr. YATES. You aren't when you are testifying, you are just the head of GS. And as the head of GS you don't have to worry about that, do you?

Mr. MCKELVEY. We don't have the responsibility for providing water.

Mr. YATES. But somebody should have. Who has the responsibility?

Mr. MCKELVEY. In the Federal Government, I expect it would be primarily the Corps of Engineers and the Bureau of Reclamation.

Mr. YATES. What about the Office of Water Research and Technology?

Mr. MCKELVEY. The Office of Water Research and Technology funds a research program that includes the R. & D. done with respect to saline water, and I have to confess, Mr. Chairman, that I am not personally informed on the progress that has been made in that area in recent years.

Mr. YATES. Well, we are informed, and we have an opinion that there is not as much progress being made as there should be.

COORDINATION OF INTERIOR WATER PROGRAMS

Mr. DICKS. Mr. Chairman, it bothers me a little bit that we have these various agencies within the Interior Department working on this prob-

lem, but I don't sense there is a tremendous amount of communication or cooperation in getting together on this problem. I would just hope that the Office of Water Research would be involved with you in terms of advising the States about new technologies.

Mr. BETTENBERG. The Office of Water Research and Technology does coordinate with the Geological Survey's Water Resources Division. They also work with the Bureau of Reclamation.

Mr. YATES. Why doesn't Mr. McKelvey know about it then? He said he wasn't that familiar with the operation.

Mr. MCKELVEY. I am just not familiar with what progress has been made recently in the saline water conversion, Mr. Cragwall may be.

Mr. YATES. I see.

Mr. BETTENBERG. My understanding of the situation of what has been terminated——

COMMITTEE CONCERN ABOUT WATER PROBLEMS

Mr. YATES. This committee is very much concerned about the water problem. Mr. Cragwall is very much concerned about the water problem. That was indicated here today. He points out that we may be on the threshold of a multiyear drought.

Where is the Nation going to get water for all the parts of the Nation, then? I want to hear from somebody in a high-level position in the Department of the Interior on this. If it is Mr. Chris Ferrand, we ought to know about it. If it is Mr. Andrus, that's fine. But somebody ought to tell this committee what the Department of the Interior wants to do about our water problems. The appropriations for the Office of Water Research and Technology are being reduced. Two of its installations——

Mr. BETTENBERG. I think they are being increased.

Mr. YATES. Over the years they have been reduced. I am not talking about this year. Maybe it has been increased minutely. But, we do know all the installations of the office are being closed—the ones at Wrightsville Beach and Roswell are being closed. Others have been closed over the last few years. It is generally represented that private industry can now pick up the slack.

Mr. BETTENBERG. I think that is with regard to those water systems, desalting systems, that are energy intensive.

Mr. YATES. What does that mean?

Mr. BETTENBERG. Those that require oil, natural gas, and those sorts of things. The Office of Water Research and Technology has retrenched and is now working primarily on membrane-type technology, which is not terribly expensive.

CONVERSION OF BRACKISH AND SALT WATER

Mr. YATES. What do we do about the conversion of brackish water and the conversion of salt water?

Mr. BETTENBERG. What they are working on now is membrane technology, that doesn't use a lot of energy to be able to desalt that water.

Mr. DICKS. And they are contracting out the rest of the work. That is what they told us.

Mr. BETTENBERG. They are contracting all of it out. They always have.

Mr. YATES. They had their own installations.

Mr. BETTENBERG. Those were run by contractors and contractors did most of their testing at those places.

Mr. YATES. But the point is, we now have a level of $22 million of contracting out. Most of them are with membranes, and some of them were with the reverse osmosis process.

Mr. BETTENBERG. Same thing.

ADEQUACY OF WATER RESEARCH PROGRAMS

Mr. YATES. There are variations of it that they are trying to look into. But the question I should like to ask is whether, in view of what seems to be a growing need for water in a growing nation, we are doing enough research.

Are there other departments doing this?

Mr. BETTENBERG. I don't want to allege that there is enough going on because I am not well enough informed about that. But this morning, for instance, at Public Works, where Mr. Dicks was, we heard Bonneville's testimony on an energy reduction program to save water in the northwest, a 10-percent energy reduction. The Bureau of Reclamation has been working with water users throughout the West.

BUREAU OF RECLAMATION

Mr. YATES. What is the Bureau of Reclamation doing about recovering brackish water—anything?

Mr. BETTENBERG. They are building a very large——

Mr. YATES. A conversion for saline water on the Colorado River. What about seawater?

Mr. BETTENBERG. No, they are not working on seawater.

Mr. YATES. Who is?

Mr. BETTENBERG. The only one that I know of——

Mr. YATES. Is Israel and Saudi Arabia, maybe, right?

Mr. BETTENBERG [continuing]. Is the Office of Research and Technology.

ADEQUACY OF WATER PROGRAMS

Mr. YATES. We had them up here. I must say that I didn't get an optimistic impression of where they are going with their program. Really, we had nobody on a higher level in Interior coming in and telling us what was happening there. I think Mr. Wiles sat off in the corner and listened to the testimony. It seemed to me to be a fading program, really, rather than one that ought to be encouraged. I must say I am very unhappy about it. I would hope that some of my unhappiness would rub off on Interior so that we can have somebody come in who will tell me that my pessimism is totally unwarranted.

Mr. DICKS. Mr. Chairman, I would just like to add a footnote. I think what concerns me also is there doesn't seem to be a sense of urgency. Everybody comes up here and just testifies. There is no one saying we ought to get going and do something.

RESPONSIBILITY FOR WATER PROGRAMS AND PROBLEMS

Mr. YATES. I don't know whether the agencies that come before this subcommittee are the ones who deal with it. I am trying to find out just where the responsibility begins and ends for GS. I know that, as Mr. McKelvey points out, they make an inventory of water resources. That is what it amounts to; right?

Mr. MCKELVEY. Yes.

Mr. YATES. And that is where your responsibility begins and ends, both surface and under the surface?

Mr. MCKELVEY. That's right.

Mr. DICKS. I just make a point. I hope that if that is the problem we are having, that this agency undergoes zero base budgeting because as I understand from Mr. Lance, I was at a meeting where he was talking about that, part of the concept is to fix responsibility, accountability, with somebody in an agency for an issue like water.

What it sounds like to me is nobody down at the Department of Interior has the responsibility or the accountability for the Nation's water supply.

Mr. YATES. And it would seem to me if any department had that responsibility it would be Interior; wouldn't it, Mr. Bettenberg?

Mr. DICKS. Or EPA. They have that big waste treatment——

Mr. BETTENBERG. They have a large part of the responsibility for water quality, certainly.

Mr. YATES. Interior has a responsibility. Would you find out what EPA is doing and what Interior is doing? We had a meeting at the White House this morning on the restructuring of our new energy agency and everything was covered except water.

Apparently water is not a critical part of energy. I didn't see that anybody in that whole structure had any water responsibility. Do you remember that?

Mr. BETTENBERG. No. There is none. We retain control over the water in Interior.

Mr. YATES. So Schlesinger doesn't have to worry about water, then?

Mr. BETTENBERG. We still have to worry about water.

Mr. YATES. OK. I want to find out whether you are worried about it. Are you?

Mr. BETTENBERG. Yes. I have spent a good number of hours with Bonneville.

Mr. YATES. OK. But we are not in Bonneville. There are other parts of the country.

Mr. BETTENBERG. I have also spent a fair amount of time with Southwest Power down there.

WELLS IN NORTH DAKOTA

Mr. YATES. We share Mr. Cragwall's worries about water. I don't think the digging of wells in North Dakota will solve it, do you, Mr. Cragwall?

Mr. CRAGWALL. Not in the long run.

Mr. YATES. Mr. Cragwall, check with North Dakota and see whether any of those wells came in, will you, and how much water they provided.

Mr. CRAGWALL. I am not sure it can happen as quickly as you are time framing it there. It takes time to drill a well and develop it. But, we will certainly find out.

[The information follows:]

RECENT DEVELOPMENT OF WATER WELLS IN NORTH DAKOTA

The number of applications for well-drilling permits in North Dakota has grown significantly, starting in 1976, as the result of the current drought. The North Dakota State Water Commission reportedly has issued permits as follows:

Calendar year:	*Number of permits issued*
1971	74
1972	86
1973	130
1974	180
1975	164
1976	271
1977 (January and February)	70

Essentially all wells for which permits were issued in 1976 have been drilled. The typical permit is for drilling wells to irrigate about 300 acres. The average yield from each well is approximately 1,000 gallons per minute.

The State Water Commission advises that the detailed information furnished by the Geological Survey through the Federal-State cooperative program is the sole basis for evaluating applications and determining suitable locations for the wells.

Mr. YATES. All right. But North Dakota better do it or they are going to have their surface land blown away, aren't they?

Mr. CRAGWALL. The thing about ground water is it is a good supplemental water supply, particularly municipal.

But because of the many ownership and institutional constraints, it is very difficult to develop large irrigation projects with ground water.

Mr. YATES. We would like to get a good thorough briefing on this water problem, and find out who is doing what, and who is spending what. If EPA has the responsibility and is engaged in it, we want to know about that, too.

We have now finished discussing your problems, haven't we, as you have revealed them——

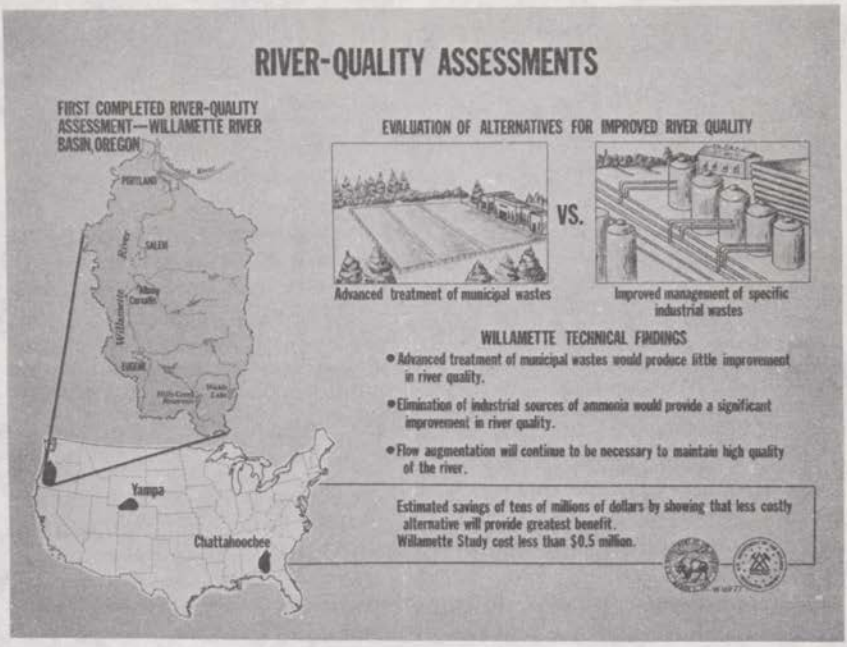
RIVER QUALITY ASSESSMENT RESEARCH

Mr. MCKELVEY. Well, there is one other that relates to water, Mr. Chairman.

Mr. YATES. The national agreement on methods of water data acquisition? Is that what you are talking about?

Mr. McKelvey. No. I was referring really to the translation of results of river quality assessment research into improved procedures for water pollution control as shown on this chart.

[The chart follows:]



An intensive river-quality assessment of the Willamette River basin, Oregon demonstrated the practical benefits of a scientific evaluation of proposed programs for managing river quality. Tampa and Chattahoochee studies are underway.

WILLAMETTE RIVER BASIN STUDY

Mr. McKelvey. We have completed recently a pilot study of the Willamette River basin in Oregon, which I think has shown extremely significant results. What the study has shown is that some of the requirements or approaches to maintaining river quality that have been legislated, requirements that would be applied on a sweeping basis, such as the advanced treatment of municipal sewage, would not be necessary to maintain river quality in the Willamette River.

More selective measures which could be accomplished at a much lower cost on the Willamette, where this study cost about $500,000—the savings achievable in not constructing the advanced sewage waste treatment plants would run into the tens of millions of dollars, just for that one basin.

But nationally, the savings that could be achieved through this kind of approach might very well be in the billions of dollars.

Mr. Yates. How did you happen to get into that?

Mr. McKelvey. This particular study was one that came as a result of discussions with our own Federal Water Data Advisory Committee—the general problem—

Mr. Yates. That is what I am trying to find out. That is what I have been pushing on for the last 15 minutes—trying to find out how you can use water again.

You say that the United States expects to spend $8.3 billion for improvement of municipal wastes without knowing how much it will improve water quality.

I was under the impression they were already doing this. Orange County, Calif. is doing it with their plant. They have waste treatment. They are doing it. I thought this was the common thing all over the country.

Mr. McKelvey. In some places it may be necessary, but what this study shows is that in many other places, a more selective set of actions, determined after investigating the regimen of the specific river basin may be possible and fully effective.

Mr. Yates. Take a look at what you said. "Advanced treatment of municipal waste would produce little improvement in river quality. Elimination of industrial sources of ammonia would provide a significant improvement in river quality. Flow augmentation will continue to be necessary to maintain the high quality of the river." Isn't that what EPA should be doing?

Mr. McKelvey. EPA is directing their effort at the actual control of pollution. This is a research study to determine what would need to be done to maintain the quality of the Willamette and the results here I think are going to be applicable to some other areas.

We have underway two additional studies now of a similar type, one on the Chattahoochee and the other on the Yampa.

SELECTION OF YAMPA AND CHATTAHOOCHEE RIVER BASIN STUDIES

Mr. Yates. How does it happen you picked the Yampa and the Chattahoochee? Why don't you pick the Great Lakes?

Mr. McKelvey. I will ask Mr. Cragwall to answer that.

Mr. Yates. Mr. Cragwall, why those instead of the Great Lakes?

Mr. Cragwall. Well, in working with our advisory committee, which are an aggregation of the country's experts in this area, it was thought that we should take 10 typical river basin environments, representing different parts of the country, and different water quality conditions, so we could in effect develop a state of the art and a procedure for looking at a river basin scientifically with respect to cleaning up the water.

Out of that came 10 or 12 basin proposals, and we have implemented those in the best priority we could. We started with the Willamette because the data base is excellent, because a high degree of pollution control had already been exercised. We had good back data so we could look before, during and after, and in effect build a model that was predictive as to what you could do to gain additional clean water objectives.

We selected the Yampa because it is yet an undeveloped basin, that would be undergoing considerable energy development, which is a

big factor in pollution. We picked the Chattahoochee because it had a set of Southeastern-type problems—heat, dissolved oxygen, and other problems typical of that part of the country.

AUTHORITY FOR STUDIES

Mr. YATES. How do you happen to be getting into this? Where is your authority?

Mr. CRAGWALL. We have always been the basic factfinder on water quality. It has been a part of our basic authority.

Mr. YATES. Why don't you do studies on conversion of saltwater, then?

Mr. CRAGWALL. Well, that is an engineering problem predominantly.

Mr. YATES. Why isn't this an engineering problem?

Mr. MCKELVEY. It is a process development problem.

Mr. CRAGWALL. This modeling——

Mr. YATES. You say that your jurisdiction covers water quality.

Mr. MCKELVEY. Yes; that is true.

Mr. YATES. What about brackish water?

Mr. MCKELVEY. We study brackish water and have identified brackish water sources.

RESEARCH ON CONVERSION OF BRACKISH WATER

Mr. YATES. Why don't you do research on conversion of brackish water?

Mr. MCKELVEY. For the same reason we don't develop a nuclear reactor. We are not an R. & D. agency.

Mr. YATES. You do no R. & D.?

Mr. MCKELVEY. We do research, but we do not do R. & D. in the sense of technology development.

Mr. YATES. Why don't you do the research on it then?

Mr. MCKELVEY. We do research on water quality, but not on the development——

Mr. YATES. Not on brackish water quality?

Mr. MCKELVEY. Yes; we do, indeed.

Mr. YATES. Where do you do this?

Mr. MCKELVEY. Well, wherever we have identified it.

Mr. YATES. What part of your budget is concerned with this?

Mr. MCKELVEY. I expect this would show up, our individual projects would show up in a number of parts of our budget.

Mr. YATES. Well, when we go through your budget, will you identify them for me? I am trying to find out who is doing this research. I thought the Office of Water Research and Technology was doing it.

[The information follows:]

GEOLOGICAL SURVEY INVESTIGATIONS RELATED TO BRACKISH AND SALINE WATERS

Many Geological Survey investigations in the field program are concerned in part with the location and characteristics of saline water in streams and aquifers. Studies of this type are underway in Alaska, Alabama, California, Colorado, Florida, Kansas, Louisiana, Massachusetts, Mississippi, Montana, North Carolina, New Jersey, New Mexico, Nevada, New York, Pennsylvania, Puerto Rico, South Carolina, Texas, Utah, Virginia, Washington, and West Virginia.

The purpose of most of these projects with respect to saline water is to evaluate and predict the potential effects on related freshwater supplies. Although the principal focus often is on saline water as a contaminant, other aspects are also considered. The nature of the investigations usually requires development of knowledge of its source, quantity, distribution and movement in response to various natural forces and developmental activities. Typical studies include the following:

Determination of the extent of intrusion and migration of seawater in coastal aquifers;

Evaluation of the characteristics, extent and potential effects of brines in oil and gas fields;

Assessment of the potential for waste storage in subsurface zones of brackish and saline waters;

Monitoring the location of the freshwater/saltwater interface in estuaries;

Determination of the characteristics, extent, and effects of saline water naturally occurring in inland geologic formations;

Appraisal of alternatives to develop optimum utilization of ground water while preventing degradation by seawater intrusion;

Determination of the effects of urbanization on the hydrologic environment including seawater intrusion;

Evaluation of the characteristics and movement of saline ground water in coal regions;

Evaluation of the membrane properties of clays as related to fluid pressures and osmosis with direct application to desalination;

Computer simulation of flows in estuarine networks;

Mineral-water interaction in saline environments;

Spatial distribution of chemical constituents in ground water; and

Transition metal geochemistry of natural waters, including saline systems.

Other studies are specifically designed to assist cooperators in the Federal-State program by locating sources of brackish ground water for desalting processes to produce additional supplies of fresh water. In Florida, for example, this type of activity is underway in Lee County and in the keys.

There is no specific program element that encompasses all activities in the area of saline and brackish waters, but because of their widespread effects on the hydrologic environment such studies are found in a number of places in the budget. As background, in fiscal year 1977 investigations related to saline water are estimated to be funded as follows: Federal program and critical national water problems, about $1.5 million; Federal-State cooperative program, about $3.3 million. (This does not include funds for operation of all data-collection stations that may furnish additional information.) In addition, other Federal agencies are funding more than half a million dollars of work in this area. Some of these agencies are BLM, EPA, Corps of Engineers, NPA, and ERDA.

In the budget for fiscal year 1978 studies that focus in part on saline water are expected to be found in the following elements:

Federal program:
- Data collection and analysis.
- Regional water resource appraisals.
- Hydrologic investigations on public lands.

Federal-State cooperative program:
- Coal hydrology.
- All other programs, including critical problem studies.

Critical national water problems:
- Coal hydrology.
- Nuclear energy hydrology.
- Ground water recharge.
- Subsurface waste storage.
- Estuarine studies.

Mr. McKelvey. They are doing research on the conversion of brackish water—but on the identification of the sources and the quality——

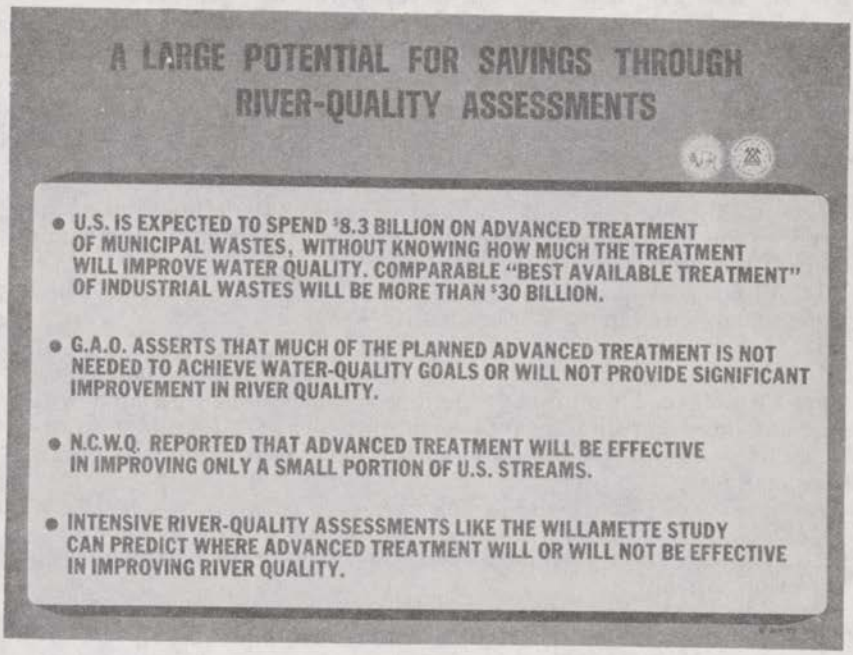
Mr. Yates. That is not research, that is development, isn't it? It is applied research, let's put it that way. It is not basic research.

Mr. McKelvey. It would depend on the project.

Mr. McDade. We have billions of dollars being committed, as you know, on waste water treatment. In fact, I believe it is the biggest single public works project in the history of the Nation.

Now, as I read that chart, it sounds to me as though our decision-making process in the opinion of the Survey has gone awry, is that right?

[The chart follows:]



Benefits of the scientific rather than the legalistic approach to river-quality management was demonstrated in the Williamette River basin, Oregon, by predicting the consequences of optional management strategies.

Mr. McKelvey. I don't know that we would draw that as a conclusion yet, Mr. McDade. But I think what we have found from this study is that the decisions with respect to installment of treatment facilities should not be done according to some national standard that would be set, but on the basis an examination of the needs and opportunities with respect to individual river basins.

Mr. McDade. In other words, the legislation that sets a national set of standards applicable to every river in the country is a mistaken way to proceed, is that your judgment?

Mr. McKelvey. I believe that would be our conclusion at this point. It would depend on how the legislation were written or the standard set. But to establish rigid standards for sewage treatment for example might be a mistake in terms of what could be accomplished by other and possibly less costly approaches.

ALTERNATIVES TO RIGID SEWAGE TREATMENT STANDARDS

Mr. McDade. For example, what are the kinds of less costly approaches?

Mr. McKelvey. With respect to the Willamette, we found that advanced sewage treatment would not be necessary—that focusing on an industrial plant as the source of a particular contaminant, in this case ammonia, would be an effective approach. We found, for example, that because of the nature of the Willamette, the formation and development of algae growth is not a problem there—it is an active enough system with a rapid enough current so that algae do not tend to develop there, and things of that sort.

Each river basin has its own signature, if you like, with respect to its quality and the dynamics of the system.

Mr. McDade. So you are not ready to take the findings of the Willamette study and apply them on a national scale?

Mr. McKelvey. Not the technical findings themselves, but I think that we would be able to say on a national basis that this kind of approach to the analysis of river quality problems is effective, and would be effective if used on a widespread basis.

Mr. McDade. And that contrasts with the current approach, which I guess is mandated in the Water Quality Act?

Mr. McKelvey. I believe that is correct.

Mr. McDade. I can't conjure up the current benchmarks that we use.

Mr. Cragwall. I would say the objective has been legislated with such mandates as technology by such and such a date, and zero discharge of pollutants by such and such a date. It is primarily a legislative mandate.

COORDINATION WITH EPA

Mr. McDade. Have you shared the findings with the Environmental Protection Agency?

Mr. Cragwall. Yes. In fact, in the Willamette we worked very closely with them and with the State water control people. In fact, one of our men who headed up this project has now moved over on an intergovernmental transfer basis to work with the State of Oregon and EPA in taking the next steps.

CONCURRENCE OF EPA AND OREGON IN SURVEY FINDINGS

Mr. McDade. Did EPA and the State of Oregon agree with your findings?

Mr. Cragwall. Yes.

Mr. McDade. Where do we go from here? If the Geological Survey and EPA and the State have agreed that the legislative mandated method of dealing with various kinds of discharges into a body of water is not the best decisionmaking process, what is going to happen next?

Mr. McKelvey. Well, I think this question ought to be reviewed by Congress, and we would be——

Mr. McDade. Are you at the point where anybody has submitted recommended legislative changes to EPA or to any committee of the Congress?

Mr. McKelvey. I don't believe that has taken place yet.

EXPANSION OF STUDY TO OTHER RIVERS

Mr. McDade. Do you have to do this same kind of technical study on every river in the country?

Mr. McKelvey. It would be a massive job, and a job that would probably be too large for any single organization to undertake.

What we would hope would be that the methodology that we would develop could be used by the State and local organizations that are involved so that the job could be spread out.

SUMMARY OF METHODS USED IN WILLAMETTE STUDY

Mr. McDade. Could you sum up that methodology for me? What is the methodology that you use as contrasted to the legislative mandated methodology? Is that what you contrast it with?

Mr. McKelvey. Well, the methodology that we used, I think, would be encompassed in the title of the program, and that is river quality assessment, in which we would——

Mr. McDade. That doesn't tell me much. From a layman's point of view, who has to talk to the EPA and vote on their budget for waste water treatment plants, and bearing in mind the caveat that there may be a much better way to get this job done in terms of water quality—what I am interested in knowing—if you would rather not do it now that is all right with me. But, I would like to get from you some indication of what your recommendations are.

Mr. McKelvey. We would be happy to supply that, Mr. McDade. The results of this study are published now in about 15 chapters of a circular, which number I can't recall now. We will add that in the record. But the results are published and the methodology is fully described.

In essence, Mr. McDade, what has been involved is a study of the water quality, the chemistry, biology of the river, the sources of the contaminants, the change in water quality, including disssolved oxygen and so on, in various parts of the river, and analysis of discharge and inflow as related to seasonal changes in water quality and so on.

It has been a case of studying the anatomy of the river.

COMPLETION OF WILLAMETTE STUDY

Mr. McDade. When did you complete this, Doctor?

Mr. McKelvey. The field work was completed about a year ago, and the reports have been coming out in publications in the last few months.

It is getting some notice. There is an article here in the Journal of water pollution control titled "USGS Tries New Approach in Willamette Study," describing some of the results and so on.

REVIEW OF EPA PROCEDURES

Mr. McDade. Are we at the point where the Environmental Protection Agency is going to review its procedures, do you know?

Mr. McKelvey. I am not aware of the extent to which they will review their procedures. But they are certainly fully cognizant of this. If I could just read the last paragraph of the article:

> The Willamette study is perhaps the most innovative approach to understanding the processes that control river quality undertaken so far. USGS hopes the

initiative shown by the study in exploring new methods and approaches will stimulate further research in this area, and that application of the principles presented will assist resource managers throughout the country.

I think it is a very significant study, with very large national implications.

Mr. McDade. Yes; we would like to try to follow it up with EPA. In fact, they are in my other committee testifying right now. If I may have a copy of that, I would be grateful to you. We will follow it up with them, and may call on you for additional advice. I don't want your 15-chapter study, but if you have an executive summary I would like it.

[The information follows:]

Methods and Results of River-Quality Assessments

In 1972, the U.S. Geological Survey began a pilot program of river-quality assessments. The objectives of the program are (1) to define the character, interrelationships, and apparent causes of existing river-quality problems, and (2) to devise and demonstrate the analytical approaches and the tools and methodologies needed for developing water-quality information that will provide a sound technical basis for planners and managers to use in assessing river-quality problems and evaluating management alternatives.

In the sense of a specific river basin, river-quality assessment is the science and art of a process involving seven steps: (1) identifying the significant problems of major importance in the basin; (2) analyzing the hydrology; (3) deciding upon assessment methods appropriate to each problem; (4) collecting data relevant to each problem by intensive investigations and synoptic surveys; (5) analyzing the data for cause-effect relationships, formulating and calibrating predictive methods by which changes in river-quality parameters can be projected, and verifying the predicted results against observed conditions; (6) forecasting the impacts on river quality of various planning alternatives; and (7) presenting the results of river-quality assessment in a usable manner, understandable to planners and decisionmakers.

An intensive pilot assessment of the Willamette River Basin, Oregon addressed such topics as the need for maintenance of high-level dissolved oxygen in the river including effects of reservoir release patterns on downstream river quality, algal growth potential, occurrence and distribution of trace metals, and the significance of erosion potential to proposed land and water uses. The Willamette assessment has been completed and the results are being reported in a series of U.S. Geological Survey circulars (U.S. Geological Survey Circular 715 A–M).

In order to develop the approaches and methodologies for some of the basin problems not encountered in the Willamette River Study, the U.S. Geological Survey started two additional intensive river-quality assessments on April 1, 1975. One of the assessments is of the Upper Chattahoochee River Basin, Ga., and the other is of the Yampa River Basin, Colo.-Wyo. Both assessments are in the field investigative stage and are scheduled for completion in the spring 1978 and September 1977, respectively.

The Chattahoochee Basin study is addressing problems related to thermal loading and heat dissipation; wastes from concentrated urban-industrial areas; flow pulsations resulting from hydropower production; and sediment sources, transport characteristics, and deposition. The Yampa Basin study is addressing problems related to resource development for energy production—primarily, the impact on river quality of coal extraction and conversion processes.

The most noteworthy finding of the Willamette assessment was that cross-the-board advanced waste treatment was not the answer to the problem of meeting stringent water-quality standards established for the river. Rather, the elimination of two industrial discharges of oxygen-demanding ammonia would solve the problem. The General Accounting Office (1976)[1] estimated that the results of the study potentially could save tens of millions of Federal, State, and local dollars.

---

[1] "Better Data Collection and Planning Is Needed To Justify Advanced Waste Treatment Construction." GAO Report CED–77–12, Dec. 21, 1976.

The Willamette assessment found that existing water-quality data generally are inadequate for defining the critical cause-effect relationships that control river-quality problems and that intensive, synoptic surveys will be required in most river basins to develop an adequate information base for managing key river-quality problems. The study illustrated the fact that rigid nationwide standards and regulations are likely to result in unneeded expenditures in some river basins and in undesirable quality in others. The study concluded that the proper balance can be attained for each river basin only through an intensive, coordinated assessment that is keyed to local problems and conditions.

Mr. McKelvey. You might be interested in the summary chapter.

Mr. McDade. Will you send it to me?

Mr. McKelvey. Yes; we will.

Mr. McDade. Thank you very much.

Mr. Yates. All right. Let's adjourn temporarily and we will let you know when we want you back.

Tuesday, March 15, 1977.

RESUMPTION OF HEARINGS

Mr. Yates. The hearing will be in order.

This is a continuation of the hearing of the Geological Survey. Mr. Bettenberg is here in spirit, but not in person. Dr. McKelvey is here; Mr. Radlinski; Mr. Balsley, land resources; Mr. Klepper, energy and minerals; Mr. Coulter; Mr. Bajema, program analysis; Mr. Grant, administration; Mr. Cragwall, our water expert; Mr. Lyddan, topographic division; Mr. Sheldon, the chief geologist; Mr. Wayland; Mr. Hamilton of the earthquake studies; and Mr. Debuchananne, office of radiohydrology—radiohydrology, what is radiohydrology? Is this the divining rod?

Mr. Debuchananne. It is working with the use of radioisotopes in the tracing of water, and also the effects of waste disposal on water supplies.

Mr. Yates. How would waste disposal in water supplies be affected by radiology?

Mr. Debuchananne. The waste products are dissolved by percolating ground waters, and the waste nucleides are then carried in the ground water to a point of discharge where they can get back into the biosphere.

Mr. McKelvey. The "radio" refers to radioactive.

Mr. Yates. You mean radioactive wastes?

Mr. McKelvey. Radioactive wastes.

RADIOACTIVE WASTE DISPOSAL

Mr. Yates. What are you doing about disposing of radioactive wastes from nuclear plants?

Mr. Debuchananne. We are looking at the disposal of commercial low-level waste in the six commercial sites throughout the country.

Mr. Yates. Low level wastes. That doesn't refer to the disposal of wastes from the nuclear plants, does it?

Mr. DEBUCHANANNE. This is in part part of the waste from the plants.

Mr. YATES. But low level. What is the distinction between low level and—is it medium or high level?

Mr. DEBUCHANANNE. By definition, there are high level wastes, which are those waste products which come from the reprocessing of nuclear fuel elements. Low level wastes are all other wastes which are not high level wastes. Basically, the difference is in the heat generative properties of the wastes.

Mr. YATES. Does that relate to the half-life?

Mr. DEBUCHANANNE. It is not directly related to it. High level wastes have long half-lives, long longevity, but they occur in both high and low level wastes.

CLEANUP OF ENEWETAK

Mr. YATES. Were you consulted with respect to the clearing up of Enewetak?

Mr. DEBUCHANANNE. No, sir.

Mr. YATES. Who would be consulted on that? Apparently ERDA was consulted.

Mr. DEBUCHANANNE. I would assume ERDA was.

Mr. YATES. Do they have a radiohydrologist, too, or don't you have to be a radiohydrologist for something like this?

Mr. DEBUCHANANNE. They have contractors who are hydrologists, who have worked in the field of radioactive materials in water.

Mr. YATES. You mean private contractors?

Mr. DEBUCHANANNE. Private contractors, or more likely they would be the contractors who run the national laboratories, such as Hanford, and Oak Ridge.

Mr. YATES. Thank you very much for an illuminating answer .

WITNESSES

Then we have Mr. Stassi, the budget officer, and hidden somewhere is Frank Wiles.

Mr. MCKELVEY. He will be along a little later.

Mr. YATES. OK.

PEOPLE'S REPUBLIC OF CHINA EARTHQUAKE PROGRAM

Now, on page 7 of your statement, Dr. McKelvey, you talk about discussions with the People's Republic of China. Is this with respect to earthquakes?

Mr. MCKELVEY. Yes, Mr. Chairman.

VISIT TO CHINA BY MR. EDWARD CHAO

Mr. YATES. Have you discussed anything else with them—in politics?

Mr. MCKELVEY. Not politics. One of our geologists, Mr. Edward Chao, who was born in China, and whose folks still live there, has made two visits there in the last couple of years, including one from which

he has just returned that was a couple of months' duration. On this visit he was able to contact some of the geological organizations in the People's Republic of China, exchange information with them, and brought home many of their publications.

Mr. YATES. Is this only on earthquakes?

Mr. MCKELVEY. No, this had to do with all kinds of work that they are doing in the general field of geology.

Mr. YATES. Such as what—petroleum?

Mr. MCKELVEY. I believe that he contacted geological organizations concerned with petroleum, with minerals, geologic mapping, mineralogic studies, and a variety of topics, as well as the subject of the earthquake of July 28, 1976.

Mr. YATES. I am looking at a paper that has been given to us on earthquake research in China. You had members of the American Seismology delegation—Frank Press, Mary Bullock, Robert Hamilton, William Brace, Carl Kisslinger, Manuel Bonilla, Clarence Allen, Lynn Sykes, and Barry Raleigh, apparently from your shop.

Mr. MCKELVEY. Yes.

Mr. YATES. Leon Kopoff, Ray Clough, Roy Hofheinz—I don't see Mr. Chao mentioned.

Mr. MCKELVEY. No, he was not a member of either delegation.

Mr. YATES. Mr. Chao filed a report on his trip with you?

Mr. MCKELVEY. He has just returned, and we are in the process of arranging briefings from him. He was the first American to visit the Chinese Academy of Geological Sciences of the State Bureau of Geology, which is usually not open to foreign visitors at all. He spent 7 days visiting the Institute of Geochemistry of Academia Sinikan Kwai Yang, a city in southwest China.

As I say, he will be giving us briefings, and others will also, on the results of his visit.

Mr. Hamilton was a member of the first delegation, the report of which you were reading. The second one went last June, and was headed by our Barry Raleigh, who was also a member of the first delegation.

PAYMENT OF TRAVEL EXPENSES

Mr. YATES. Who pays the travel expenses?

Mr. MCKELVEY. We paid the travel expenses.

Mr. YATES. Of Mr. Chao as well?

Mr. MCKELVEY. I believe Mr. Chao's first visit he paid for himself. But, I think we paid for his second.

Mr. YATES. Why would he pay for it himself?

Mr. MCKELVEY. On the first visit he went primarily on his own. He wanted to visit his parents, who were about 85 and 87 at that time. But, he took advantage of his trip to make initial contacts with other Chinese geologists.

He received, I believe, his undergraduate degree in geology in China, and then came to the United States to do graduate work, and stayed on afterward. But, many of the leaders of the geological organizations in China now were classmates of his and acquaintances as a youth. So, he had a good opportunity for initial contact.

ROMANIA EARTHQUAKE

Mr. YATES. Since you and I last met across this table, we have had an earthquake in Romania.

Mr. MCKELVEY. Yes.

Mr. YATES. Where is that map of yours showing the plates?

Mr. MCKELVEY. I believe that was in the annual report.

Mr. YATES. You have a chart of it, too.

PAYMENT OF EXPENSES FOR CHINA VISIT

Mr. MCKELVEY. Mr. Chairman, while you are looking at that, let me just correct something for the record. I said the Geological Survey paid for the delegations. The National Academy of Sciences paid the expenses for those trips.

Mr. YATES. They have more money than the Geological Survey.

TECTONIC PLATES

Looking at the picture on page 41 of your 1976 annual report, that horizontal plate is going across the Mediterranean Sea.

Mr. MCKELVEY. Yes, the boundary of the Eurasian plate touches southern Europe on the north side.

Mr. YATES. The reason I raise this is because I find it confusing, in this sense. When last you testified, and Mr. Coulter testified before this committee, almost all the very hot and hard earthquake activity, was along the plates.

Now, we don't find Romania along the plates. You had a plus 6 or plus 7 Richter scale earthquake.

Mr. MCKELVEY. It wouldn't be far, Mr. Chairman, from the boundary.

Mr. YATES. How far?

Mr. MCKELVEY. Let me ask Dr. Hamilton.

Mr. YATES. How far away from your plates is that, Dr. Hamilton?

Mr. HAMILTON. Well, the map that Mr. Mohrman is bringing in is one that I could refer to help.

NUCLEAR REACTOR SITING

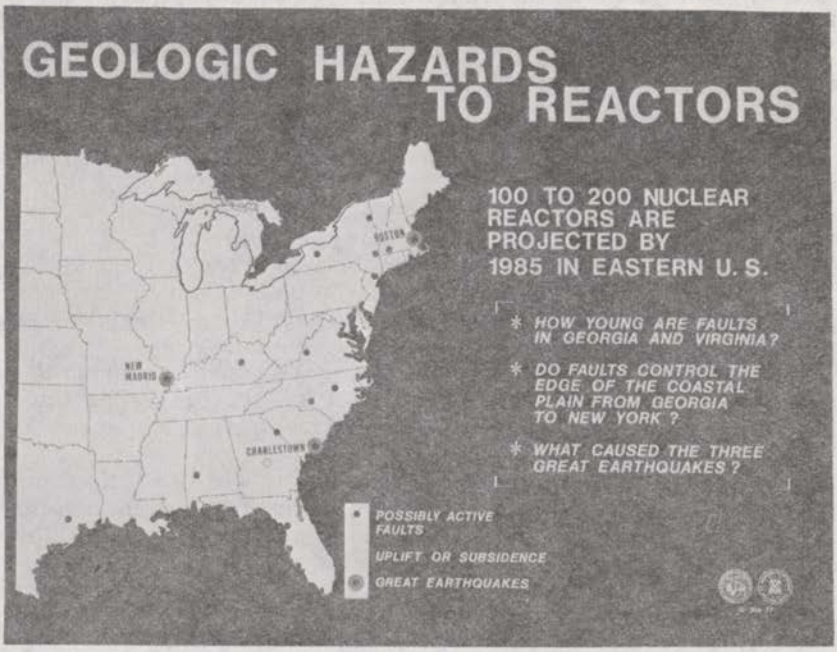
Mr. YATES. OK. Let me give you the background for my question, as to why I am concerned. The reason I am concerned is because we were talking about the building of nuclear reactors away from plates. The impression I have—and you may want to correct it—as a result of the hearings last time is that it is relatively safe to build reactors away from the plates.

If you can get an earthquake of that size away from the plate area, then you can get it in the United States away from the plate area, too, can't you?

Mr. MCKELVEY. Oh, yes. We have had earthquakes of that size and larger.

Mr. YATES. I see you have an overlay that corrects the map of last time as shown on this chart.

[The chart follows:]



The need for nuclear power reactors is greatest in the Eastern United States and the understanding of geologic hazards in this area is very inadequate. The reactor hazards research program has recently identified many faults in the East that conceivably are active, and also has identified two areas of uplift or subsidence that may be due to tectonic forces. Evaluating the potential hazard to reactors of such faults and other indications of tectonism must be accelerated in order to avoid delays in reactor site selection, construction, and licensing.

Mr. YATES. Let the record show that even the Geological Survey makes progress. We now have a chart showing the location of nuclear reactors and proposed stations for nuclear reactors in the eastern part of the United States, and where they would be located with reference to potential geologic hazards. Now we have Mr. Hamilton who is going to tell us why we don't have to worry about that.

LOCATION OF ROMANIAN EARTHQUAKE

Mr. HAMILTON. The earthquake that struck Romania occurred in that green cluster, right there, right at that point.

Mr. YATES. How would you describe that point for the record?

Mr. HAMILTON. The green cluster indicates a grouping of earthquake activity at intermediate depth. That is between 71 and 300 kilometers. Now, it turns out that the earthquakes in this area of Ro-

mania occur almost always in the range of 100 to 150 kilometers deep—that is 60 to 90 miles. This is a very persistent cluster.

Mr. YATES. That is 60 to 90 miles to what?

Mr. HAMILTON. In depth, from the Earth's surface. And the cause of these earthquakes is related to——

Mr. YATES. May I interrupt to ask you whether these lines to which I am pointing—I don't know how else to identify them—are plate lines?

Mr. HAMILTON. No, that is the border of Romania.

Mr. YATES. Where would a plate be? Would it be along the Mediterranean Sea here?

Mr. HAMILTON. In the Mediterranean, the general plate boundary runs more or less through the Mediterranean region.

Mr. YATES. And how far is that from the area of the earthquake?

Mr. HAMILTON. The general trend of the plate boundary covers a zone that is several hundred kilometers wide, and the earthquake area would be on the northern margin of that plate boundary.

In this particular region, the plate boundary is not as sharply defined as it is on other regions, for example over here. It is a fairly complex crunching together of Africa, which is moving to the north relative to Europe.

Now, there is a mountain range that lies in northwest Romania called the Carpathian Mountains. There is an area in southeastern Romania called the Black Sea plate, that is moving generally to the northwest, and it is where the Black Sea plate moving to the northwest collides with the Carpathian arc, the lithosphere, that is, the crust of the Earth, is shoved down into the interior of the Earth. That is thought to be the cause of this particular earthquake cluster.

So, the earthquake activity is directly related to plate tectonics. The reason it is not as clear in this area is because the interaction of these plates is very complicated in this region. You can see the very clear lineation of epicenters along the San Andreas Fault, the Aleutians, and Japan, and on down the western Pacific Ocean. The Mediterranean is just a more complicated area.

EARTHQUAKES IN THE UNITED STATES

Mr. MURTHA. The red spots are what?

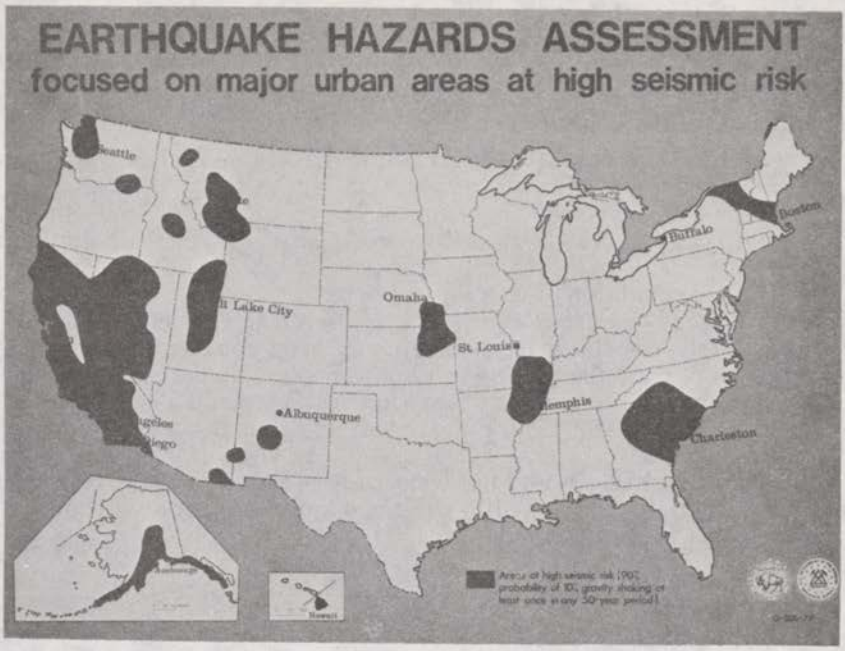
Mr. HAMILTON. Earthquakes?

Mr. MURTHA. You mean we had earthquakes in the eastern part of the United States? They must be very minor.

Mr. HAMILTON. Some of the most damaging earthquakes that ever occurred were in southeastern Illinois, Missouri, in 1811 and 1812. There have been earthquakes in Charleston and near Boston.

This map on the poster, which is a map showing the seismic risk of the United States, illustrates this point.

[The chart follows:]



Areas where the historical record indicates there is a high or moderate chance of severe seismic shaking in the next 50-year period are shown in the dark areas. In many of these areas, particularly in the populous Eastern and Midwestern States, there are no systematic investigations presently underway.

Federal Government responsible for:

Technique development;
Demonstration projects;
National seismic risk assessment; and
Regional earthquake hazard mapping and evaluation.

State and local governments share in regional studies, but concentrate on local and site specific hazard assessment for land-use planning and zoning.

Mr. HAMILTON. The red areas are the areas judged to be of relatively high seismic risk.

NUCLEAR REACTOR SITES IN SEISMIC AREAS

Mr. YATES. Are there any reactors being built in the areas of seismic risk?

Mr. HAMILTON. Yes, there are reactors being built in seismically active areas. For example, along the coast of California there are reactors. Relative to, say, North Dakota and South Dakota, those areas are of higher seismic risk. But, of course, the design of the reactors is supposed to take that into account.

Mr. MURTHA. Why do they build them there? Because that is where the power is needed?

Mr. HAMILTON. Well, often the reactors, like on the coast of California, are built there for water as coolant, and also because the populated areas are where the energy is needed.

CONSULTATION WITH SURVEY REGARDING REACTOR SITING

Mr. YATES. I am still asking the question: Are you consulted with respect to the location of reactors? By you, I mean the Geological Survey?

Mr. MCKELVEY. Yes, Mr. Chairman, and I will ask Dr. Coulter to elaborate on that process.

Mr. YATES. He elaborated once for us. Last time I think I asked him that same question, and he wasn't worried at all, as I recall. Is that right?

Mr. MCKELVEY. I don't think that is correct.

Mr. YATES. If you are worried—I want to tell you, Doctor, just as a policeman tells somebody he picks up, anything you say may be used against you because there is, as you know, a very, shall I say, hot controversy raging in this country about nuclear reactors. Their location with respect to possible injury as a result of an earthquake should be considered, too.

Mr. COULTER. Yes, sir, and our concern is to insure that the reactors proposed are indeed designed to accommodate the largest earthquake that can occur in that particular area.

EARTHQUAKE MAGNITUDES EXCEEDING PREDICTION

Mr. YATES. May I ask you a question?

Mr. COULTER. Yes, sir.

Mr. YATES. Has any actual earthquake exceeded your predictions of the size of an earthquake in a particular area? Have you said that in a particular area we think the extent of an earthquake would be so and so, and have you had to eat those words later on when an earthquake exceeded that scale?

Mr. COULTER. There have certainly been none in the historic record which have exceeded the conservative level that has been used for the design of reactors.

Mr. YATES. That is not what I am asking you.

Mr. COULTER. Reactors are not designed for the biggest historic earthquake. They are designed for the biggest historic earthquake in a general region which has occurred, plus a large safety factor to accommodate——

Mr. YATES. You haven't really answered my question. I asked you, have you ever predicted the maximum size of an earthquake in a particular area and then found later, when an earthquake occurred, that it exceeded that prediction?

Mr. COULTER. No; but I don't think that is a definitive answer, because we haven't done a reactor-type appraisal for every part of the country.

Mr. YATES. I am asking my question without respect to reactors.

Mr. COULTER. I don't think that question is pertinent to the subject of reactors because that appraisal is more conservative than a general prediction would be.

Mr. MCKELVEY. Mr. Chairman, I think that we can answer the question no, in a certain sense.

Mr. YATES. In a certain sense?

Mr. MCKELVEY. That is right.

Mr. YATES. What sense?

Mr. McKelvey. In the sense that such an event has not occurred since we have been doing this.

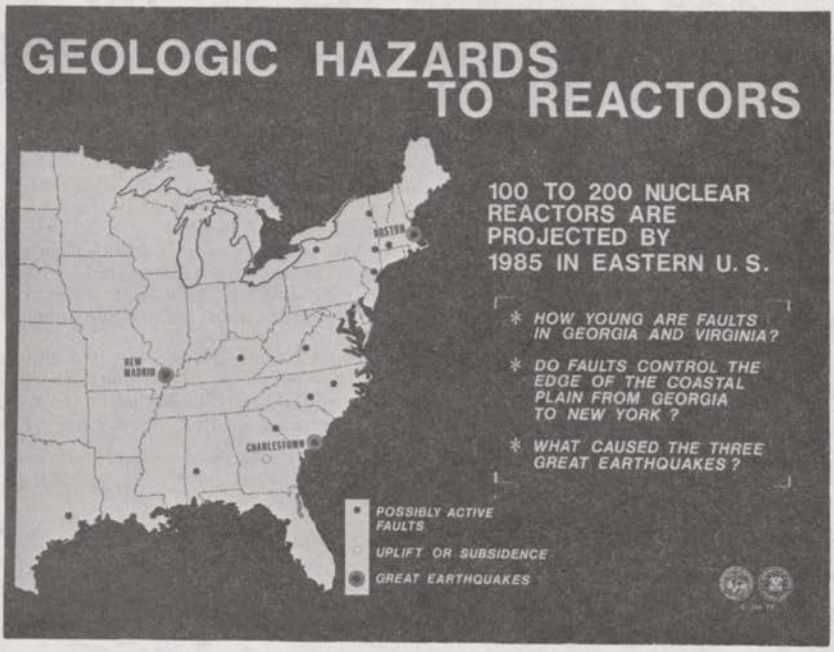
Mr. Yates. It occurs to me, Dr. McKelvey, if I keep asking you these questions, which are of tremendous interest to this committee and to the people of the country, of course, because of potential hazard, we will never get through with the appropriation hearing.

Mr. McKelvey. It is a very interesting topic.

LOCATION OF NUCLEAR REACTORS IN RELATION TO FAULTS

Mr. Yates. I am concerned. I am glad you put that on the chart.

[The chart follows:]



The need for nuclear power reactors is greatest in the Eastern United States and the Understanding of geologic hazards in this area is very inadequate. The reactor hazards research program has recently identified many faults in the East that conceivably are active, and also has identified two areas of uplift or subsidence that may be due to tectonic forces. Evaluating the potential hazard to reactors of such faults and other indications of tectonism must be accelerated in order to avoid delays in reactor site selection, construction, and licensing.

Mr. Yates. What does that indicate to you, Dr. McKelvey? Anything of any hazard, or any danger? It is called potential geologic hazards to reactors. What are we to learn from that chart? That there are certain reactors that are located in areas that may be subject to earthquakes?

Mr. McKelvey. It shows the location of reactors, and shows also the faults that are possibly active, and in which there would need to be concern about the location of a reactor and its design.

Mr. YATES. Would you do me a favor? Would you also advise the committee as to which reactors deserve special consideration in their construction because of their location in an area that might be the subject of an earthquake? Not here, but would you put that in the record?

Mr. MCKELVEY. Yes.

[The informtion follows:]

NUCLEAR REACTORS SUBJECT TO SEISMIC ACTIVITY

Under a longstanding agreement with NRC, USGS has reviewed, upon request, the geologic and seismic data supplied by applicants in support of permit applications for nuclear power generating facilities. The USGS review has provided background to NRC, to be used in their determination of whether a particular site fulfills the requirements of the Geologic and Seismic Siting Criteria for Nuclear Power Reactor, 10 CFR Part 100, Appendix A. A brief summary of the requirements covered by these regulations is contained in enclosure A.

To date, the sites listed on enclosure B have been reviewed by USGS and subsequently approved by NRC as being in compliance with the regulations. To the best of our knowledge, all of the above sites met the requirements set forth. Applications for additional sites such as Corral Canyon, Bolsa Island, Cape Mendicino, and Bodega Head, which initial appraisals indicated would not meet the requirements of the criteria have subsequently been withdrawn.

In rare instances, such as Diablo Canyon, new data became available subsequent to the initial review of USGS. These new data have been submitted to NRC as supplementary reports to provide a basis for reevaluation by NRC to determine whether or not the installations are still in compliance with the regulations or will require design modifications to comply.

The NRC Seismologists and Geologic and Seismic Siting Criteria require extensive consideration of the earthquake potential at every proposed nuclear site. Consequently, all sites are designed to withstand an earthquake of some size. Thus, the design of each plant, regardless of where it is located, should have approximately the same level of conservatism in it.

SEISMIC AND GEOLOGIC SITING CONSIDERATIONS FOR NUCLEAR FACILITIES [I]

by

H. W. Coulter,[II] H. H. Waldron,[II] and J. F. Devine[III]

SYNOPSIS

The seismic and geologic conditions affecting a site must be carefully evaluated before adequate engineering design can be developed for a proposed nuclear facility. Some of the current procedures and some of the seismic and geologic criteria being used in the United States in evaluating the suitability of proposed sites for nuclear facilities are presented. Especial emphasis is given to a discussion of earthquake criteria, and of procedures used for determining design bases for earthquake-produced vibratory ground motion anticipated at the site, and for determining whether--and to what extent--the facilities need be designed to withstand surface faulting.

INTRODUCTION

The seismic and geologic aspects of siting are important factors that should be considered in selecting and evaluating sites proposed for any major industrial plant, particularly those sites proposed for nuclear facilities. The possibility of an uncontrolled release of radioactive material into any part of the environment, owing to damage of a nuclear facility by an earthquake, constitutes a serious potential hazard to the health and safety of the public, particularly in the immediate vicinity of the facility. The current trend is toward the construction of larger and larger nuclear-fueled generating units, and toward the multiple installation of these larger units at single sites. As these generating units increase in size and number at a site, comparable increases also can be expected to occur in their structural complexities, in their potential impact on the environment, and in the amount of total capital that must be invested at a single site.

I Publication authorized by the Director, U.S. Geological Survey, and Administrator, National Oceanic and Atmospheric Administration.

II Geologists, U.S. Geological Survey, Washington, D.C., and Denver, Colorado.

III Geophysicist, National Oceanic and Atmospheric Administration, Rockville, Maryland.

Before the suitability of a proposed site for a nuclear facility can be evaluated, and before the engineering design criteria can be established for the proposed facility, the engineering geologist and the engineering seismologist must provide comprehensive descriptions and evaluations of the local and regional geologic, tectonic, and seismic conditions of importance to the safety and environmental changes, and of the physical properties of the rocks and soils underlying the site. Without such detailed knowledge, the design engineer cannot be fully cognizant of the geologic conditions at the site, or of the kinds of potential problems at the site that might influence the foundation design and subsequent performance of the plant structures. These data also provide the basis for determining the maximum expectable earthquake intensity at the site and the potential for surface faulting occurring at or in the immediate vicinity of the site.

The size of the area to be investigated and the scope of the investigations usually will be determined by the type and size of the proposed facility, by the pertinent local and regional geologic and seismic environments, and by the potential hazard of the proposed facility to public health and safety. Ideally a site should be in a geologically stable area; i.e., one that is low in seismicity, free of active faults, underlain by competent foundation materials, and free from the possible adverse effects of other geologic hazards, such as subsidence, uplift, tilting, flooding, landsliding, volcanism, and liquefaction. Deficiencies in any of these environmental aspects must be recognized by the design engineer and adequately compensated for in the engineering design of the facility.

The purpose of this paper is to describe briefly some of the procedures and criteria currently being used in the United States by the Atomic Energy Commission in its evaluations of sites proposed for nuclear facilities, with respect to geology and seismology (1). These procedures and criteria have been developed from experience accumulated during the past several years by the Atomic Energy Commission and its advisors (namely, the U.S. Geological Survey and the National Oceanic and Atmospheric Administration) and the utility industry and its consultants, in evaluating the geologic and seismic conditions at a large number of sites throughout the United States. Because evaluations of many of the geologic aspects of siting for nuclear facilities may differ very little from those for other types of major industrial siting--except perhaps in the scope of the investigations, and in the degree of conservatism applied to the design bases for nuclear facilities--this paper will be concerned mainly with the seismic aspects of siting, and especially with some

of the earthquake criteria. These criteria have been developed with an appreciation of the fact that the current state-of-art in the earth sciences does not now provide us with any large amount of precise information about earthquake occurrences and effects.

CURRENT PRACTICE

The Atomic Energy Commission is charged with the responsibility of evaluating the suitability of sites proposed for nuclear production or utilization facilities in the United States, with respect to the natural environmental characteristics of the site, including seismology, geology, hydrology, and meteorology, and with respect to the adequacy of the design bases established by consideration of these environmental characteristics. Natural environmental conditions that might affect the site include such phenomena as: shaking from earthquakes, surface displacement on faults, and other ground cracking; subsidence, tilting, landslides, and other earth movements or failures; hurricanes and other violent winds; floods and water waves, volcanic activity; erosion; ground-water conditions; and potential changes in the physical state of the naturally occurring materials underlying the site.

In order to provide reasonable assurance that a nuclear facility can be constructed and operated at a proposed site without undue risk to the health and safety of the public, the Atomic Energy Commission requires that a preliminary safety analysis report be submitted for review and evaluation. The report must include a description and a safety assessment of the site on which the facility is to be located, with appropriate attention given to the natural environmental conditions affecting the facility design, and with sufficient data included to justify the design basis for the facility.

In developing the aseismic design of the major plant structures, the engineers are concerned both with the elastic design of the structures, for no loss of function, and with the elasto-plastic design of the structures, for a safe and orderly shutdown. Thus, the design bases for nuclear facilities normally include a consideration of the potential occurrence of two different earthquakes, each with specific intensities of ground motion. These two earthquakes commonly are referred to as the "operating basis earthquake" and the "safe shutdown earthquake."

The current philosophy concerning the selection of the operating basis earthquake is to permit the licensee to select, without specific approval by the Atomic Energy Commission, the earthquake to

87-591 O - 77 - 49

which the plant will be designed to remain functional. In most cases this "operating basis earthquake," or OBE, is considered to be either the maximum earthquake that has occurred at or in the vicinity of the site, or that has been experienced at the site, in historic time, and which might reasonably be expected to occur again during the life of the plant. Shutdown of the facility, then, is required if vibratory ground motion occurs, at any time during the life of the plant, which exceeds that specified by the OBE, or which results in maximum ground motion greater than 5 percent of gravity, if no OBE is specified. Before the plant can again become operable, the licensee must demonstrate, however, that no functional damage has occurred to features necessary for the continued safe operation of the plant.

The selection by the licensee of the safe shutdown earthquake, or SSE, on the other hand, must be agreed upon and approved by the Atomic Energy Commission. The SSE, which also has been termed at various times as the maximum potential or maximum credible earthquake, most probably has not occurred in the vicinity of the site during historical times. Instead, it is determined by a detailed determination and evaluation of the geologic conditions, tectonic structures, and seismicity of the site and the region surrounding the site within a radius of at least 200 miles. For this earthquake the facility should be designed so that all features of the facility necessary to protect the health and safety of the public will remain functional, both during and after the earthquake. Stresses in the structural components are permitted to enter the plastic range, and although the structure may suffer partial to even severe damage, the design must be such as to allow for a safe and orderly shutdown beginning with the seismic event. In addition, all safety-related structures, systems, and components must be designed to withstand the effects of vibratory motion of at least 50 percent of the SSE, in combination with other appropriate loads well within elastic limits.

SEISMIC AND GEOLOGIC CONSIDERATIONS

The earthquake potential of a proposed site is an especially important consideration for a large nuclear facility. Vibratory ground motion accompanying major earthquakes can cause extensive damage to plant structures and component parts, particularly to those structures erected on subsurface materials with poor earthquake-response characteristics. Also, because these earthquake-induced ground motions can be felt by every feature of a facility, complex multiple failures can occur.

Both the vibratory ground motions that could result from a major, nearby earthquake and the potential for surface faulting at the site must be evaluated, not only for the obvious direct effects upon the plant itself, but also for any possible indirect effects on the site, such as a loss of cooling water supply or a decrease in stability of the foundation materials underlying the site. The earthquake response of the material underlying and surrounding the facility and its possible effects on the foundation stability of the facility is an important consideration in site evaluation. Gross failures may arise from such varied adverse phenomena as differential compaction; subsidence, uplift, or collapse; landsliding; and liquefaction--to list only some of the more important effects.

DETERMINATION OF THE SEISMIC AND GEOLOGIC DESIGN BASES

The first step in determining the vibratory ground motion that might be experienced at a site consists of a thorough review of the seismic and geologic history of the site and the region in which the site is located. This review entails a compilation and evaluation of all historical earthquakes, including their dates of occurrence and highest intensities, that are known to have affected the site, or that could reasonably be expected to have affected it. The maximum historical earthquake is determined from an evaluation of the historical record of these earthquakes; only minor consideration is given to the general geology and regional tectonic structures at this time. Such an evaluation should also consider non-tectonic events, such as mine bumps or cave-ins, that should perhaps be eliminated from the record. The earthquake with the highest intensity recorded or calculated on the foundation material at the site commonly is selected as the operating basis earthquake.

The next step is to determine the safe shutdown earthquake. For this earthquake it is necessary to review and evaluate in detail, not only the seismic history of the region, but also the local and regional geologic conditions and the characteristics of major tectonic structures underlying the site and the region surrounding the site, including the tectonic history of the area. Particular attention, of course, must be given to faults, and other tectonic structures in the vicinity of the site that might influence the earthquake potential at the site.

Where possible, epicenters of historically reported earthquakes are correlated with known or postulated tectonic structures. If an earthquake has occurred on a tectonic structure which passes through or in the vicinity of the site, it is postulated that this same

earthquake also could occur at any place along the tectonic structure, including at the point closest to the site. An earthquake which might reasonably be expected to produce the maximum intensity within the foundation materials underlying the plant, and which is related to such a tectonic structure, is then selected and designated as the safe shutdown earthquake.

If epicenters cannot be reasonably correlated with known faults or with a specific tectonic structure in the area, they are identified with a seismotectonic province. A seismotectonic province is defined as a region characterized by both equipotential seismicity and a unity of geologic structural features. The boundaries of the province are determined through a regional analysis of the geologic and tectonic environments and the seismic history. For such cases, it is assumed that earthquakes with intensities comparable to those characteristic of the province could occur anywhere within the province including the immediate vicinity of the site. The maximum earthquake selected that might conceivably occur anywhere in the province, then, becomes the safe shutdown earthquake.

The effects on the structural components of the facility, of the two postulated earthquakes selected for design purposes, are determined by the use of a response spectrum corresponding to the ground accelerations estimated for the site. Ideally these ground accelerations should be based on instrumental recordings from strong-motion seismographs installed in the area. However, owing to the rather limited number of ground-motion acceleration records in critical areas, the accelerations commonly are estimated based on intensity values assigned to the design earthquakes, using the Modified-Mercalli Intensity Scale (MM) of 1931 (2). Despite the fact that an earthquake intensity is a subjective measure of ground shaking, and is not an engineering measure of acceleration, numerous attempts (see Barosh (3) for a review of the literature of this subject) have been made to establish quantitative correlations between earthquake intensities and accelerations; all of these correlations, however, should be used with some caution. One example of a correlation between acceleration and intensity is shown in figure 1. The correlations shown on this figure appear to be provisionally valid, where short epicentral distances are involved, for estimating average maximum acceleration values that result from given intensities up to intensity VIII(MM). For intensities higher than VIII(MM), other factors, such as duration, may alter this empirical relationship.

In the foregoing discussion, the earthquake intensities and accelerations determined for the site were assumed to have been recorded

on, or calculated to have occurred on competent foundation materials, such as bedrock or other well-consolidated material. Where the proposed nuclear facility will be located on other than competent bedrock or well-consolidated material, the initially selected ground accelerations must be multiplied by a soil amplification factor in order to obtain the final acceleration used for design. This amplification factor, which may range from slightly more than one to as much as five, is determined from an evaluation of the physical and engineering properties of the materials underlying the site. At present the criteria for determining what this soil amplification factor should be largely are empirical. Further investigations of the problem currently are being conducted by or for the Atomic Energy Commission.

SURFACE FAULTING

Surface faulting generally is not a problem throughout much of the United States, but there are many places in the western U.S. where the possibility of differential surface displacement due to faulting must be considered in evaluating a site. Unfortunately the period during which measurements have been made of large earthquakes and of surface faulting in the United States is extremely short by geological standards. Insufficient data, therefore, are now available to permit the development of any precise relationships among earthquake magnitude, fault-zone width, subsidiary faulting, and probable relative displacement. Thus, the general criteria on surface faulting, as developed to date from these limited data, of necessity, are both conservative and somewhat arbitrary; and they may be difficult to apply at some specific sites.

In general these criteria include requirements for additional detailed investigations of all significant geologic structures greater than 1 mile long, any part of which falls within certain specified distances from the site, and for the determination of whether these geologic structures have been active in the past, and thus, are potentially capable of future surface displacement. Determination of whether or not a fault is considered to be active is based on several lines of evidence, chiefly those relating to its history of prior displacements. Most faults show evidence of repeated movement; some are known to have had recurrent movements for millions of years, while others may show evidence of recurrent movements occurring only for a few thousands to hundreds of thousands of years. For nuclear-facility siting some of the criteria defining fault activity have been arbitrarily selected; for example, a fault is considered active if evidence indicates that movement along it has occurred at least once

in the past 35,000 years, or more than once in the past 500,000 years.

In order to determine whether a nuclear facility must be designed to withstand the effects of surface faulting, the location of the site with respect to geologic structures capable of surface displacement must be considered. Because one of the best guides to the location of future faulting is the location of past faulting, all Quaternary fault traces in the vicinity of the site are mapped in detail and determinations made as to whether any of these traces are also traces of active faults. The maximum width of the zone of potential faulting is determined from the mapping of the active fault traces. Because surface faulting sometimes has occurred beyond the previously mapped limit of a fault zone, the maximum width of the fault zone under consideration must be increased by a multiplication factor, but in no instance shall the determined width of the fault zone be less than one-half mile. The multiplication factor, which is dependent upon the largest magnitude earthquake which might be related to the faulted structure, has been selected to range from 1 to 4 times the determined width of the fault zone. This larger width, then, delineates a zone, called the zone requiring detailed faulting investigations, within which the possibility of surface faulting must be considered. If a nuclear facility is to be located within this zone, the engineering design must assume that the potential displacement associated with surface faulting can occur in any direction and under any part of the facility; it also must consider the estimated rate at which surface displacement may occur.

CONCLUSIONS

The generalizations given in this paper represent some of the current geologic and seismologic criteria and considerations used for evaluating nuclear power plants and nuclear fuel processing plant sites in the United States. Although the geologic and seismic considerations involved in the siting of these nuclear facilities are similar to those involved in the siting of other types of major industrial facilities, the higher degree of potential hazard of nuclear facilities necessitates that a more conservative approach be used in their evaluation. Especial care and emphasis must be placed on evaluating the problems of foundation stability, shaking due to earthquakes, and surface faulting. Until more data are available on earthquakes and on surface faulting associated with earthquakes, the criteria for their consideration are preliminary and intended as an interim guide only.

Despite the value of these criteria in providing useful guidelines for geologic and seismic siting considerations, it will always be necessary to make careful evaluations of the geological characteristics of each individual site, not only with respect to the adequacy of the material underlying the site to support the proposed facility, but also with respect to the potential for surface faulting at or adjacent to the plant site. The existing criteria, therefore, should be applied in a flexible but still conservative manner, depending on the local site conditions, and revised as needed or as new and more precise earth-science data become available.

ACKNOWLEDGMENT

This paper is based largely on investigations and reviews of nuclear facility sites done in cooperation with and supported by the U. S. Atomic Energy Commission.

BIBLIOGRAPHY

(1) U.S. Atomic Energy Commission, 1971, Seismic and geologic siting criteria for nuclear power plants (proposed Appendix A to 10 CFR, Part 100): Federal Register, vol. 36, no. 228, p. 22601-22605.

(2) Wood, H.O., and Neumann, F., 1931, Modified Mercalli intensity scale of 1931: Seismal Soc. America Bull. v.21, no. 4, p. 277-283.

(3) Barosh, P. J., 1969, Use of seismic intensity data to predict the effects of earthquakes and underground explosions in various geologic settings: U.S. Geol. Survey Bull. 1279, 93 p.

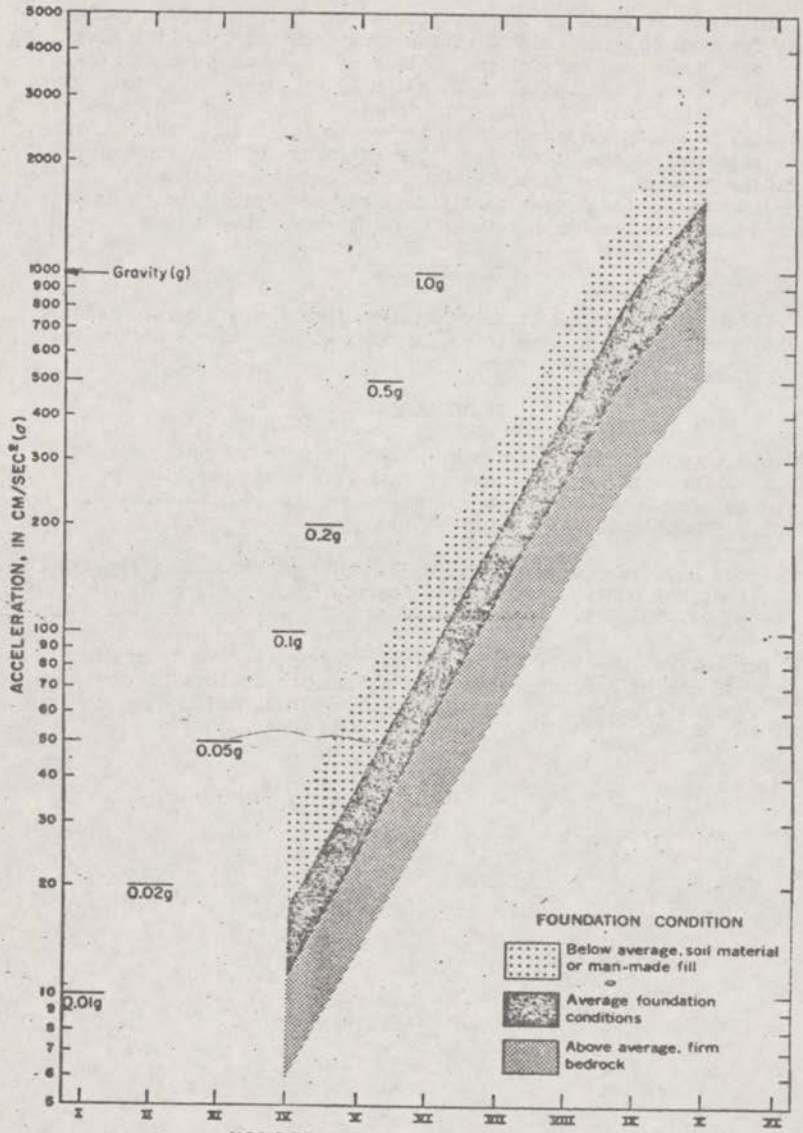


Figure 1.--Acceleration vs. Intensity

NUCLEAR POWER REACTOR SITE APPLICATIONS PARTICIPATED IN BY USGS

Dresden Nuclear Power Station, Morris, Ill.
Yankee Nuclear Power Station Rowe, Mass.
Indian Point Station, Indian Point, N.Y.
Enrico Fermie Atomic Power Station, Lakoona Beach, Mich.
Peach Bottom Atomic Power Station, Peach Bottom, Pa.
San Onofre Nuclear Generating Station, San Clemente, Calif.
La Crosse Boiling Water Reactor, Genoa, Wis.
Haddam Neck Plant (Conn. Yankee), Haddam Neck, Conn.
Oyster Creek Nuclear Power Plant, Toms River, N.J.
R. E. Ginna Nuclear Power Plant, Ontario, N.Y.
Millstone Nuclear Power Station, Waterford, Conn.
H. B. Robinson Plant, Hartsville, S.C.
Monticello Nuclear Generating Plant, Monticello, Minn.
Point Beach Nuclear Plant, Two Creeks, Wis.
Palisades Plant, South Haven, Mich.
Humboldt Bay Power Plant, Eureka, Calif.
Oconee Nuclear Station, Seneca, S.C.
Browns Ferry Nuclear Power Plant, Decatur, Ala.
Quad-Cities Station, Cordova, Ill.
Surry Power Station, Gravel Neck, Va.
Turkey Point Station, Turkey Point, Fla.
Vermont Yankee Generating Station, Vernon, Vt.
Pilgrim Station, Plymouth, Mass.
Fort St. Vrain Nuclear Generating Station, Platteville, Colo.
Copper Nuclear Station, Brownville, Nebr.
Zion Station, Zion, Ill.
Fort Calhoun Station, Fort Calhoun, Nebr.
Salem Nuclear Generating Station, Salem, N.J.
Prairie Island Nuclear Generating Plant, Red Wing, Minn.
Maine Yankee Atomic Power Plant, Wiscasset, Maine.
Kewaunee Nuclear Power Plant, Carlton, Wis.
Crystal River Plant, Red Level, Fla.
Rancho Seco Nuclear Generating Station, Clay Station, Calif.
Calvert Cliffs Nuclear Power Plant, Lusby, Md.
E. I. Hatch Nuclear Plant, Baxley, Ga.
D. C. Cook Nuclear Plant, Bridgman, Mich.
Beaver Valley Power Station, Midland, Pa.
Arkansas Nuclear One, London, Ark.
Diablo Canyon Nuclear Power Plant, Diablo Canyon, Calif.
Brunswick Steam Electric Plant, Southport, N.C.
Sequoyah Nuclear Power Plant, Daisy, Tenn.
D. Arnold Energy Center, Palo, Iowa.
J. A. Fitzpatrick Nuclear Power Plant, Scriba, N.Y.
North Anna Power Station, Mineral, Va.
St. Lucie, Fort Pierce, Fla.
Trojan Nuclear Plant, Ranier, Oreg.
Davis-Besse Nuclear Power Station, Oak Harbor, Ohio.
J. M. Farley Nuclear Plant, Dothan, Ala.
Salem Nuclear Generating Station, Newbold Island, N.J.
Limerick Generating Station, Pottstown, Pa.
W. H. Zimmer Nuclear Power Station, Moscow, Ohio.
Shoreham Nuclear Power Station, Brookhaven, N.Y.
W. B. McGuire Nuclear Station, Cowans Ford, N.C.
Forked River Nuclear Generating Station, Forked River, N.J.
LaSalle County Nuclear Station, Seneca, Ill.
Bailly Generating Station, Dunes Acres, Ind.
Watts Bar Nuclear Plant, Spring City, Tenn.
Waterford Generating Station, Taft, La.
Virgil C. Summer Nuclear Station, Broad River, S.C.
Aguirre Nuclear Power Plant, P.R.
Clinch River Nuclear Power Station, Clinch River, Tenn.

Susquehanna Steam Electric Station, Berwick, Pa.
Washington Public Power Supply System, Richland, Wash.
Shearon Harris Nuclear Power Plant, Bonsal, N.C.
Grand Gulf Nuclear Station, Port Gibson, Miss.
Catawba Nuclear Station, Lake Wylie, S.C.
Seabrook Nuclear Station, Seabrook, N.H.
Allens Creek Nuclear Plant, Wallis, Tex.
Bellefonte Nuclear Plant, Scottsboro, Ala.
Boardman, Oreg.—Site withdrawn, change location to Pebble Spring, Oreg.
Braidwood Station, Braidwood, Ill.
Clinton River Nuclear Power Station, Clinton Ill.
Comanche Peak Steam Electric Station, Glen Rose, Tex.
Douglas Point Generating Station, Nanjemoy, Md.
Greenwood Energy Center, Greenwood, Mich.
Islote (NORCO), P.R.
Power Burst Facility National Reactor Testing Station (AEC), Idaho.
Perry Nuclear Power Plant, Perry, Ohio.
River Bend Station, St. Francisville, La.
San Joaquin Nuclear Project, Wasco, Calif.
Summit Power Station, Summit, Del.
Vidal Nuclear Generating Station, Vidal, Calif.
Alvin W. Vogtle Nuclear Plant, Waynesboro, Ga.
Palo Verde Nuclear Generating Station, Wintersburg, Ariz.
Skagit Nuclear Project, Sedro Woolley, Wash.
Pebble Springs Nuclear Plant, Arlington, Oreg.
Byron Station, Byron, Ill.
Sterling Power Project, N.Y.
Sun Deser Nuclear Plant, Blythe, Calif.—alternate site was withdrawn in favor of Blythe
Sun Desert, Parker, Ariz.
Atlantic Generating Station, Little Egg Inlet, N.J.
Recycle Fuels Plant, Anderson, S.C.
Marble Hill Nuclear Generating Station, New Washington, Ind.
Hartsville Nuclear Plant, Hartsville, Tenn.
Nine Mile Nuclear Station, Scriba, N.Y.
Arkansas Nuclear One, Russellville, Ark.
West Valley Nuclear Fuel Services Reprocessing Plant Addition, West Valley N.Y.
Three Mile Island Nuclear Station, Goldsboro, Pa.
St. Rosalie, La.
Barnwell Nuclear Fuel Plant, Savannah, S.C.
Midland Nuclear Generating Plant, Mich.
Tortugero, P.R.

Mr. YATES. And I will tell you what I propose to do with it. I propose to send that statement of yours to the Nuclear Regulatory Commission and ask whether or not in their consideration of the application for the construction of the reactor, and in the actual construction, special consideration was given to that reactor.

Mr. MCKELVEY. I think their answer would be affirmative because we are consulted in the approval of reactor design.

Mr. YATES. Let's just find out—it might be they didn't listen to you—because it requires additional cost by the contractor, doesn't

it, to strengthen the construction of the reactor, in order to withstand possible earthquakes.

Mr. McKelvy. Yes; it may, but that has been done.

Mr. Yates. What has been done?

Mr. McKelvey. Where additional requirements have been necessary, they have been fulfilled.

Mr. Yates. How do you know that? Do you know that as a matter of fact? Do you know that the construction took into consideration in each instance your recommendation?

Mr. McKelvey. I guess I would have to say I am speaking from hearsay, Mr. Chairman, but that is my understanding.

Mr. Yates. OK. I think we better check it out, don't you? Just to see whether or not they listen to you fellows.

Mr. McKelvey. Sure.

Mr. Yates. OK.

NUCLEAR REACTOR IN VIRGINIA

In your files, do you happen to have the series of articles that appeared in the Washington Post respecting the construction of the reactor in Virginia, and the necessity for taking into consideration the possibility of its being in an earthquake zone? Do you have that in your files? I think there was sufficient detail to show who was supposed to do what, and who didn't listen to who.

Mr. McKelvey. As I recall that, Mr. Chairman, there was a failure on the part of Vepco to report a fault that they had observed in the construction.

Mr. Yates. Please provide that for the committee and let the committee follow up on that.

[The information follows:]

ARTICLES AND STATEMENT ON VEPCO NUCLEAR REACTOR

At the north Anna site, USGS had appraised the fault system and concluded that it was "noncapable" in terms of the NRC siting criteria (copy of USGS report, enclosure A). The subsequent issue, which gained widespread publicity, (enclosure B) was raised by virtue of a technical regulatory matter not a question of ultimate safety of the site. The issue dealt with the fact that the applicant had encountered an element of the original fault system in the foundation excavation for the plant and had not reported this fact to the NRC. Hence, the matter involved an alleged failure to comply with NRC technical reporting requirements, not with the question of compliance with the siting criteria.

The question remains: "Is it possible for the design basis earthquake for a particular facility to be exceeded?" The answer to this is, yes, there is a finite possibility, but because of the very conservative, worst-case assumptions incorporated into the determination under the regulations, the likelihood of this occurring is very small.

North Anna Power Station, Units 3 and 4, Louisa County, Va., AEC Dockets 50-338 and 50-339

SUMMARY REVIEW—GEOLOGY

This report covers the review by the U.S. Geological Survey of geological information for the North Anna Power Station, units 3 and 4, Va. This report summarizes: (1) the results of previous reviews related to units 1 through 4; (2) the developments in the supplemental review begun in August 1973, of the investigations by the applicant with respect to the age of the last movement of the faults at the site; and (3) the present conclusions of the review as of March 14, 1974. Detailed status of review comments on past reports and responses of the applicant since the beginning of the supplemental review, were transmitted to W. P. Gammill (AEC) by E. H. Baltz (USGS) on October 4, 1973, December 4, 1973, and February 28, 1974. Completed status of review comments regarding the data provided by the applicant between January 14 and 30, 1974, are appended at the end of this report.

PREVIOUS REVIEW OF REGIONAL GEOLOGY

Previous reviews of the preliminary safety analysis report were conducted, at the request of the AEC in 1969 by H. H. Waldron (USGS) for the geologic aspects of units 1 and 2. The site was examined by H. H. Waldron on September 11, 1969, about 4 months prior to the start of excavation for units 1 and 2 in January, 1970. Draft reviews were provided to AEC on August 7, 1969 and January 15, 1970, and a final review on units 1 and 2 was transmitted at AEC request on July 30, 1970.

The preliminary safety analysis report for units 3 and 4 was reviewed at AEC request between January and May 1972. The site was not visited. A draft review was provided to AEC on May 26, 1972. A final review was transmitted at AEC request on December 15, 1972.

The parts of the USGS final reports on units 1 and 2 (July 30, 1970) and units 3 and 4 (December 15, 1972) that are concerned with regional geology are the same. These parts are quoted in full below.

"The site is located in the central part of the Piedmont plateau physiographic province. The site area is underlain by metamorphic rocks of uncertain age, chiefly medium to high-grade gneisses and schists that have been folded into northeast-trending anticlines and synclines. Residual soils, derived by weathering in place of the underlying rock, mantle the crystalline rocks to depths that range from a few inches to as much as 125 feet and average about 40 feet."

"There are no identifiable active faults or other recent geologic structures that could be expected to localize earthquakes in the immediate vicinity of the site. Details regarding either local or regional geologic structures, however, are very poorly known. In general, major structural features all trend northeast, parallel to the Appalachian trends. These major features include several large elongated folds and some faults and shear zones; none of these tectonic features, however, is believed to have been active since Mesozoic time."

"Several of these ancient structural features occur in the vicinity of the site. The most important appear to be those that lie southwest of the site and whose trends may be projected into, or within a few miles of the site area; they include the Arvonia syncline, the Columbia syncline, and the Richmond Basin. The closest mapped fault is a postulated, unnamed fault, the trace of which lies 5 to 6 miles east of the site (Reed, 1970, p. 440); it forms the contact between the belt of predominantly metamorphic sedimentary rocks, which underlies the site, and a belt of predominantly igneous rocks farther east."

Our review of data provided by the applicant since August 1973, and data on regional geology in published literature continue to indicate that the major geologic features of this part of the Piedmont are very ancient. Faults having evidence of geologically young movements at or near the ground surface have not been reported in the Piedmont in the vicinity of the North Anna site. A few cases of post-Triassic faults with reported small displacements (several feet) of Tertiary and possibly Quaternary strata have been noted in the literature at places in the vicinity of the fall line between the Piedmont and the Atlantic Coastal Plain east of the site. Some shearing of a Triassic diabase dike was noted by Hopkins (1970, p. 58) in western Louisa County.

REVIEWS OF SUPPLEMENTAL GEOLOGY

In June 1973 the Geological Survey was notified by AEC that possible faults (designated zones A, B, C, and D by the applicant) had been discovered in excavations at the North Anna site. Aspects of these faults have been the subject of our supplemental reviews of detailed site and local geology.

The supplemental investigations of the site by the applicant have been conducted to develop information regarding the faults in the bedrock beneath and among the excavations for the four units of the North Anna Power Station. The results of these investigations have been transmitted to the U.S. Atomic Energy Commission by the Virginia Electric & Power Co. (VEPCO) between August 17, 1973, and January 30, 1974.

On August 17, 1973, the report, "Supplemental geologic data, North Anna Power Station, Louisa County, Va.," by Dames & Moore, was transmitted to AEC by VEPCO; shortly thereafter our review of the geology of the excavation and vicinity began.

At a meeting on September 20, 1973 with the applicant and applicant's consultants, a review of this report was discussed by AEC and USGS. Four main concerns on the part of AEC staff members and USGS (represented by E. H. Baltz, J. F. Devine, and F. N. Houser) were developed. The USGS draft supplemental review transmitted to W. P. Gammill on October 4, 1973, by E. H. Baltz summarized the areas of concern as follows:

"Four general subjects do not appear to be adequately known for evaluation: (1) The age of the last movement of the northeast-trending faults (A and D) detected in excavations for units 3 and 4; (2) the possibility of other faults in the site area; (3) the competence of the rocks and gouge adjoining, or in, faults A and D where present below the individual sites; and (4) the potential influence of Lake Anna on the stability of faults A and D or any other local fault."

The reasons for emphasizing these four subjects were further discussed:

"The evidence suggests that faults A and D are old; however, the age of the last movement is not known. Mapping at significantly greater detail than presented to date could determine whether faults A and D are parts of a fault zone or system in which more conveniently detable faults could be found, and could determine the location of any other faults that might occur near the planned locations of other class I plant structures.

"The nature and competence of faults A and D is seen to range in width and intensity of fracturing in the limited exposures of excavations for units 3 and 4. Because of the spatial relations of these faults with the preexcavation borings, little or nothing is known of their width or competence beneath the units.

"The analysis of potential influence of Lake Anna on the structural stability should take into account the possibility of other faults in the site area or outside of it. The causal association of future microseismic activity, if any, with other faults than A and D will be possible only if the structural geology is more thoroughly known."

Specific requirements for investigation were enumerated by R. L. Ferguson, AEC, in a letter requesting additional information that was transmitted to VEPCO on September 21, 1973. The questions and concerns were responsed to by VEPCO and its consultants in reports transmitted to AEC by VEPCO on October 15, 1973, and November 5, 1973. The applicant's responses to questions 2.24 (age of last movement on fault), 2.25 (additional trenching), and 2.26 (detailed geologic mapping) given in the November report were reviewed by the USGS. The USGS review of this report indicated that the age of last movement on fault A had not been determined definitively, and that further work was still necessary.

The applicant's reports, dated January 14 and 30, 1974, were provided in response to requirements by the AEC in a meeting on December 19, 1973. These responses had been partly reviewed by February 14, 1974, when a status of review report was transmitted by E. H. Baltz (USGS) to W. P. Gammill (AEC). A completed review of these responses is attached to this report as appendix A.

Faulting investigation.—The following summarizes briefly the investigations conducted by the applicant to determine the age of the last movement on the faults beneath the site and the Geological Survey's conclusions to date with regard to these investigations.

The applicant undertook a detailed investigation of the faults A, B, C, and D beginning prior to June, 1973. This investigation has provided much information on the geologic structure, petrology, rock type distribution, mineralogy and alteration. The applicant's investigations to date can be grouped into five approaches to the question of the age of the last movement on the faults beneath the site:

(1) Reconnaissance geologic mapping of the site and study of regional geology.

(2) Detailed geologic mapping of the excavations to document location of structures and relative ages.

(3) Potassium-argon age dating of adularia from joint sets.

(4) Topographic and geomorphic identification of faults, or lack, thereof.

(5) Soil and saprolite investigations.

A discussion of these five studies follows:

(1) Reconnaissance geologic mapping. The applicant's rather extensive coverage by reconnaissance mapping of the site area and the detailed study of the structure in the excavations in his report of August 17, 1973, covering investigations started before June 1973, went far to define the structural history and environment as background for further study of the faults beneath units 1 through 4. The local mapping is of a reconnaissance nature and, as such, gives the general distribution of the rocks involved. The mapping provides a theoretical basis for understanding the faults, and it provides some information that bears on determining the nature and extent of the faults in the excavations and on the possibility of other faults that might be near the site. No evidence of geologically young faulting was discovered, but the reconnaissance nature of the mapping does not establish definitively that the latest age of movement of faults A through D was Triassic or older.

(2) Detailed geologic mapping. The excavations have been studied and mapped extensively (report dated January 30, 1974). In the case of fault A in Units 3 and 4, the mapping was in considerable detail (August 17, 1973, report). Trench exploration that was done after the studies in the excavations for units 3 and 4 provided the needed exposure for intensive study of the soil and for a general description and mapping of the saprolite and fracture relationship. Additional trench exploration, east of unit 1 was also studied and mapped in considerable detail (reports dated November 5, 1973, and January 30, 1974). This work records the ages of near-vertical joints and several small faults (all having the general trend N. 10° W.–N. 10° E.) relative to the ages of the A through C faults.

(3) Potassium-argon age dating of adularia-filling joints. This approach still lacks several segments of information to make the potassium-argon age definitive for establishing the age of the last movements on faults A through D. The general hypothesis advanced by the applicant is that: (a) a joint set trending N. 10° W.–N. 10° E. and dipping at a high angle is persistent and identifiable throughout the site excavations; (b) that this set transects and, in a few places, offsets the A through C faults; and (c) that adularia filling the joint set has been dated by the potassium-argon method as 230 and 270 my old.

The segments of lacking information are discussed as follows:

(a) Joints transect, and several small faults offset, faults B and C, and a few joints transect fault A. However, quite a number of joints that could be assigned to the N. 10° W.–N. 10° E. set do not transect some of the faults. This possible conflict of relative age could indicate an overlap in the period of activity for the A through D faults, and the period of fracture formation for the joint set, but this possibility is not considered critically.

(b) The geologic locations the samples for which potassium-argon dates were obtained is only generally identified by the applicant.

(c) The physical condition of the adularia is not known. For example, it is not known whether the adularia is deformed by movements on the faults.

(4) Topography and geomorphology. The topography and geomorphology of the site area and the region were studied by the applicant (reports dated November 5, 1973, and January 30, 1974) to determine if there was any evidence of faulting that might be useful for age dating purposes. Although a number of lineations are described by the applicant (mainly in informal submittals received about February 14, 1974), none were ascribed by him to faulting. One northeast-trending lineation that intersects the Lake Anna northwest of the dam possibly

represents the aeromagnetic-aeroradiometric lineation described by Neuschel (1970). The elevations of peneplain remnants are described by the applicant as indicating the maximum amount of stream downcutting by the present drainage system.

Although these studies cannot be said to restrict the age of latest movements on the faults to the Triassic or earlier, there appears to be no evidence of scarps or offsets of various geomorphic features that might indicate geologically young movements on faults A through D.

(5) Soil and saprolite investigations. The relations of the soil and saprolite were described by mapping and sampling done in trench 3 (report dated August 17, 1973). The fault in that trench is correlated with fault A by the applicant and is said to be a fossil fault (report dated November 15, 1973), in that it occurred prior to saprolization.

Since the rate of saprolite formation may be a useful approach for determining its age as discussed below, its age relative to the faulting becomes of critical importance and should be confirmed. The degree of textural and structural integrity of the minerals of the saprolite might provide a viable approach to determining whether the saprolite has been disturbed by fault movements. Samples of soil studied from horizons B_3 † and C1 (VEPCO August 17, 1973 report, section 108, trench 3) show no deformation of the phyllosilicate minerals or the interlocking texture in the ped surfaces indicating that faulting preceded soil formation in these horizons. There is a need to determine whether similar relations exist in the saprolite below the C horizon at a depth where it can be demonstrated that the saprolite has not been affected by mineralogic or textural changes associated with soil-forming activities. The soil horizons above the fault, that were studied in thin sections (VEPCO August 17, 1973 report) may have had younger mineralogic alteration (due to soil formation) superimposed on older saprolite minerals.

Evaluation of the applicant's rates of erosion (Q2 42, report dated January 30, 1974) shows them to be comparable to rates developed from other experience. If these rates are considered with respect to saprolite thickness and to the mode of formation, they might be used in conjunction with saprolite thickness for an estimate of age. Then, providing the faulting can be shown to be definitely pre-saprolite, a minimum age of faulting could be established.

Two extreme interpretations of age are that the saprolite is precretaceous (Hunt, 1972) and the other, that saprolite has formed in equilibrium with erosion sion—in short, that the base of saprolite lowers as material is removed from the overlying soil. This latter extreme would, of course, give the more recent ages. Using the applicant's stated rate of erosion of 0.83 inches per 10 years as the rate of down-wasting of saprolite, then 80 feet of saprolite (applicant gives 60–100 feet thickness in report dated August 17, 1973) would have taken over a million years to form. If, for more conservatism, the rate were doubled to 1.66 inches per 10^3 years, 80 feet of saprolite would represent over 500,000 years of time. Should this approach seem to the applicant to offer promise, it is suggested that the rates of erosion and saprolization, and, as suggested previously, the relative age of the saprolite and faulting be reviewed and presented.

SUMMARY OF CONCLUSIONS ON GEOLOGIC REVIEW

The Geological Survey has reviewed data on regional and site geology presented by the applicant, data on regional geology in the literature, and has examined geologic features exposed in excavations at the North Anna site. These reviews to date continue to indicate that the major geologic features of this part of the Piedmont are very ancient.

The applicant has undertaken a detailed investigation of the faults A, B, C, and D at the site since June 1973 and has provided a large amount of additional information on the geologic structure, petrology, and geochemical dating at the site. The various lines of evidence and reasoning presented by the applicant could reasonably be interpreted, collectively, as indicating that fault zones A through D are ancient and relatively minor features. However, we are not able to conclude, from data on the site presented by the applicant, that the last movements on all the faults have been proven definitively to be Triassic or older as postulated by the applicant. As mentioned previously in this review, a few cases of small-scale, post-Triassic faulting have been reported in the literature of the Piedmont-Coastal Plain region, especially in the vicinity of the Fall Line border of the two

provinces. Some shearing of a Triassic diabase dike has been reported in western Louisa County. These reported occurrences have provided the reasons for our careful scrutiny of data on the A through D faults, although the reported occurrences are distant from the site.

On the other hand, none of the evidence presented to date indicates geologically young movements on faults A through D at the site. There is no evidence of scarps or offsets and physiographic and geomorphic features that might indicate young or repeated movements on the faults. Although we are not able to conclude that the evidence presented by the applicant is definitive in connection with the postulated geologic antiquity (at least 1 million years) of the soil overlying the faults, there is no doubt that the soil was formed after the latest faulting exposed in trench 3 just west of the reactor excavations.

Additionally, on a regional basis, it should be kept in mind that tectonic ground-surface displacement on faults has not been reported to occur during historic earthquakes in the eastern United States, except in the Mississippi Valley in the vicinity of New Madrid, Mo.

We believe that one of the applicant's lines of investigation—the study of the saprolite—should be pursued further. It is recommended that additional investigations be undertaken by the applicant to confirm, if possible, whether saprolite-mineral textures in and adjacent to the faults have been disturbed by fault movements. Additionally, further consideration should be given to data on the rate of saprolite formation in the Piedmont-Appalachian region, as discussed earlier in this review, to provide conservative estimates of the minimum age of the saprolite at the site.

SEISMOLOGY

The review of the seismologic data submitted by the applicant indicates that no significant seismic events have occurred since the report on the site seismicity (March 13, 1970 letter from ADM Don A. Jones, Director, Coast and Geodetic Survey to Mr. Harold L. Price, Director of Regulation AEC) that would cause a change in the conclusions of that report. In addition, there have been no known seismic events that could be demonstrated to have a direct relationship with any known or inferred faults in the area of the site.

With regard to the question 2.27 of Mr. R. L. Ferguson's letter of September 21, 1973, to the Virginia Electric and Power Co., and the answer provided by Vepco in Mr. Stanley Ragone's letter of October 15, 1973, the multiple environmental circumstances are defined for the dams and reservoirs which have reservoir associated seismic activity do not exist at the North Anna reservoir. Thus it is highly improbable that the reservoir will initiate seismic activity on any of the faults in the area. However, the microearthquake monitoring program should be followed closely to insure quantitative and qualitative data recovery with a timely disclosure of results.

If these results should indicate a significant increase in the level of seismicity or a concentration of activity that could be interpreted to have a direct relationship with any of the faults in the area, appropriate measures should be taken.

LITERATURE REFERENCES CITED

Hopkins, H. R., 1960, Geology of western Louisa County, Va: Cornell University unpublished doctoral dissertation.

Hunt, C. B., 1972, the Geology of soils: W. H. Freeman and Co., San Francisco, 344 p.

Neuschel, S. K., 1970, Correlation of aeromagnetics and aeroradioactivity with lithology in the Spotsylvania area, Virginia: Geol. Soc. America Bull., v. 81, p. 3573–3582.

Reed, V. C., Jr., 1970, Tectonic map of the central and southern Appalachians, in Fisher, G. W., Pettijohn, F. J., Reed, J. C., Jr., and Weaver, K. N., eds., Studies of Appalachian geology: central and southern: New York, Interscience Publishers, 440 pages.

[From the Washington Post, Sept. 22, 1973]

QUAKE CHECK ORDERED AT NUCLEAR PLANT SITE

(By Hal Willard)

Builders of the nuclear powerplant on the shores of artificial Lake Anna in Louisa County, Va., were ordered yesterday to try immediately to find out if the lake itself could cause an earthquake.

The nuclear plant, about 85 miles southwest of Washington, is the only one in the country being built over a geological fault. There is a small body of evidence that artificial accumulations of large amounts of water—apparently over existing geologic faults—have triggered earthquakes.

Geologists say the extreme water pressure seems to "lubricate" a geologic fault and causes the land to slide.

The order was directed to the Virginia Electric and Power Co., by the Atomic Energy Commission. Plant construction is allowed to continue because the situation is not yet regarded as dangerous.

Nuclear powerplants are supposed to withstand all but the most severe earthquakes. No plants have been subjected to actual earthquakes, and there is the possibility a severe earthquate could allow lethal radiation to escape.

Vepco also was ordered to establish a permanent earthquake monitoring network as soon as possible. It would record tremors or rumblings in the earth and provide information about possible quakes.

The AEC, the U.S. Geological Survey and the advisory committee on reactor safety want to know four things: Whether the Lake Anna fault is inactive, whether it has been inactive long enough to make it virtually impossible to reactivate, whether Lake Anna has enough water to activate the fault and cause a damaging earthquake, and the extent of the fault.

The AEC order came during an investigation of Vepco to determine whether the utility withheld information about the geologic fault 3 years ago in the process of obtaining permission to start construction of the first two of four planned nuclear reactor units along Lake Anna, which was created by damming the north Anna River.

Vepco officially reported the presence of the geologic fault to the AEC the day after public hearings ended last May on nuclear reactor units three and four, which are to be built adjacent to units one and two. Vepco said the fault was found during excavation for unit three.

It subsequently developed that three Virginia geology professors had determined that there was a geologic fault uncovered during excavation for unit one in 1970. They reported it to Vepco. Vepco geology consultants say they did not regard the phenomenon as a fault, but a seam, so they did not report it to the AEC.

Geologists from the U.S. Geological Survey also went to the site and reported no geologic fault. That was in September 1969, soon after excavations started. The three professors made their findings in February and March 1970, when excavation was further along. The Geological Survey geologists never returned to the site.

The professors' claims are what caused the AEC investigation of Vepco. The three are John Funkhouser of John Tyler Community College in Chester, Va., who made the discovery, and Bruce Goodwin and Stephan Clement of William and Mary, who confirmed it. All three have given sworn statements to the AEC.

It is not yet known precisely where the geological fault goes, how far it goes, or how deep it goes—nor is it known whether it is a single fault or part of a system of several faults.

Furthermore, the science of relating artificial bodies of water and geologic faults is new and very little is known about it.

A National Academy of Sciences publication entitled "Earthquakes Related to Reservoir Filling," cites case histories of earthquakes in several parts of the world that seem to have been caused by artificial bodies of water. The list of sites includes Lake Mead, formed by Hoover Dam on the Nevada-Arizona border.

But the publication points that the question of cause and effect, and under what conditions, "remains to be resolved."

The AEC is asking Vepco to try and help resolve it.

Possible North Anna Fine—Vepco: Let Users Pay

(By Hal Willard)

A vice president of Virginia Electric and Power Co., testifying after company management was accused of errors in judgment, said yesterday that if a proposed $60,000 fine is levied against it in the North Anna nuclear powerplant case, it should be paid by consumers instead of stockholders.

The vice president, C. M. Stallings, said a fine should be classified as an operating expense and used as part of a case for electricity rate increases "just like (the cost) of training a switchboard operator or a security guard is."

Stallings testified during the second day of a hearing before the Atomic Safety and Licensing Board, which has found Vepco guilty of 12 counts of making false statements concerning the geological fault beneath the North Anna station.

The staff of the Nuclear Regulatory Commission recommended on Wednesday that Vepco be fined $60,000, which would be the maximum penalty in this case and the higher ever imposed for violations of nuclear power regulatory standards.

The hearings were called specifically on the matter of whether to penalize Vepco for its violations, and if so, in what way. In addition to the staff recommendation, the North Anna Environmental Coalition, which originally brought the charges against Vepco, recommended that the utility's license to construct North Anna be revoked.

The State of Virginia, a party to the case, recommended a fine but did not specify how much. Vepco itself recommended that it not be penalized beyond the official notification of violations.

Before Stallings testified yesterday, Edson Case, deputy director of the office of nuclear reactor regulation for the commission, said "improvements are needed in the management" of Vepco.

Asked by board chairman John A. Farmakides what Vepco should do to prevent a repetition of the North Anna situation, Case said he could advise only that top management be brought in on "everything, but I would rather Vepco propose what it plans to do and we approve it. What kind of reporting and auditing system have they got? Look into the qualifications of individuals."

Case was critical of the fact that even though Vepco studied geological features at North Anna for several years with the idea that they might be faults, the question was not reported to the commission until May 1973. He said whether or not to report the geological situation was a decision for "business management" that should not have been left to geologists.

Case said he takes a serious view of the Vepco violations because they "strike at the heart of the regulatory process," which depends to a large extent on companies themselves discovering safety problems at nuclear power stations and reporting them immediately to the commission.

The commission has an inspection process but each company also is required to have a "quality assurances" program to oversee construction and operation of a nuclear powerplant.

Much of the hearing centered on the staff's and the environmental coalition's insistence that Vepco be penalized heavily because its record of violations is the worst in the country. This would be its third civil penalty and no other utility has had more than one. The board decision is expected this summer.

At the hearing, the commission accused Vepco of yet another failure to report a "significant deficiency" at North Anna—this time a pumphouse that settled more than predicted by Vepco.

Settling of a building is particularly significant because of the potential instability of the ground represented by the geological fault. The commission says Vepco knew about the excessive settling in December 1972, but did not report it until April 16, 1975. The case has not been resolved.

Vepco insisted during the hearing that it has tried to comply with commission regulations and withheld no information willfully. In arguing against revocation of its license, the company said it would cost $728 million to abandon the North Anna site, a cost that would have to be borne by rate payers "or the company would become insolvent * * *."

VEPCO PAYS $31,900 FINE FOR A-FAULTS

(By Hal Willard)

The Virginia Electric and Power Co. yesterday paid a $31,900 fine imposed by the Nuclear Regulatory Commission for 30 violations discovered in an investigation of construction practices at the North Anna nuclear powerplant.

Vepco called the fine "unnecessary, improper, and unwarranted."

The investigation was begun in August after three unidentified individuals made charges of improper procedures, poor quality construction, and other irregularities at the North Anna plant in Louisa County about 75 miles from Washington.

NRC spokesmen said the probe was divided into four phases and still is not complete. The fine was imposed on the basis of violations already found.

Vepco President T. Justin Moore, Jr., said that although the company disagreed with the penalty it was not appealing because that action would not be in the "best interest" of Vepco and its customers.

Vepco now is in the position of having received the three largest fines ever imposed in civil actions by the NRC or its predecessor, the Atomic Energy Commission.

Vepco paid a $38,000 fine in 1973 for violations of Government regulations. It has been told to pay a fine of $32,500 for making "material false statements" concerning the geologic fault beneath its North Anna plant, but has appealed that to the courts.

Most of the violations that caused the most recent, $31,900, fine involved pipe installation and improper welds, poor bolt supports and similar construction problems. However, the NRC staff report said it was more concerned about the "management weaknesses" that the violations revealed than the actual poor workmanship.

Ernest Volgenau, director of the NRC's Office of Inspection and Enforcement, said earlier he would not recommend that Vepco receive an operating license for North Anna until it demonstrated it had taken "corrective action" for its management problems as well as for the construction deficiencies.

[From the Washington Post, Feb. 12, 1977]

WORK SUSPENDED ON TWO OF VEPCO'S EIGHT NUCLEAR PLANTS

(By Paul G. Edwards)

RICHMOND, FEB. 11.—The Virginia Electric & Power Co. today suspended work on the final phase of its ambitious nuclear power program and company officials said they may cancel the construction of nuclear plants altogether if Federal regulations make them uneconomical.

Top officers of the giant utility said they made the decision to delay construction of two nuclear generating units on the James River in Surry County because new projections of nuclear demand indicate that they will not be needed for at least 1 year after their previously scheduled 1986 and 1987 completion date.

"In this country that sired the nuclear industry it takes 11 years to build a nuclear power generating station," William L. Proffitt, senior vice president for power, said. "In other countries, it takes half that time at no sacrifice in safety."

As examples of the causes of regulatory delays, Proffitt cited the formal hearings that precede issuance of construction and operating permits and hearings that often involve persons who intervene to oppose nuclear plants. In addition to the hearings, he said, "We have a continuing relationship with regulatory personnel during construction that requires almost daily design changes."

"Each plant is custom reviewed," he said. "We thought the process would become standardized as experience built up, but it has not."

"In inflationary times like these, you add an ungodly amount of money to the cost of a generating station with that kind of delay. It is a sad commentary on this country that we can't benefit our customers with cost savings just because of the time frame" imposed by regulation.

Vepco operates two nuclear units, Surry I and II, at the Surry County station and is nearing completion of two others, North Anna I and II, in Louisa County. Two other units, North Anna III and IV are under construction but the company announced today that their completion has been delayed by unrelated events and the dates pushed back from 1981 to 1982–83.

Even if Surry units III and IV are eventually canceled, Vepco still will have a greater dependence on nuclear power than most other large utilities in this country.

About 25 percent of the company's total energy output now is generated by Surry I and II and the North Anna units are expected to raise nuclear generation to 50 percent of the total output next year.

Vepco made its nuclear plans in the early 1960's when utility officials decided that the lower prices for nuclear fuel would more than offset the high cost of constructing nuclear powerplants.

Despite construction and operating problems and growing national offensive against nuclear power for safety reasons, skyrocketing prices for coal and oil have helped Vepco officials continue to justify their nuclear commitment.

Uranium prices are rising and Westinghouse Electric Co., primary supplier of nuclear fuel to Vepco, is currently trying to cancel its long-term contracts that were based on the old, low prices.

However, Proffitt said, fuel supply problems did not figure in the decision to suspend work on Surry III and IV. He also said that Vepco officials have made no judgment that coal-fired generating stations may now become more economical than nuclear-powered stations because of the possibility that pollution standards for coal burning may be relaxed.

Vepco has been fined by the Nuclear Regulatory Commission for construction violations at both its Surry and North Anna stations, but Proffitt also denied that these fines played any role in the utility's decision to suspend work at Surry.

The suspension apparently will give Vepco time to assess the energy and environmental policies of the new Carter administration and how they will bear on the nuclear construction program.

Although Vepco's nuclear program has been under attack by environmental groups. Proffitt said fear that the new administration will be more attentive to such groups "was not a big factor in our thinking."

Among the charges made by environmentalists against Vepco is one that they have risked a radiation accident by building the North Anna plant over a geological fault. The NRC concluded that the fault poses no risk to safe operation of the plant but fined Vepco for failing to report its discovery of the fault in a proper manner.

Vepco President T. Justin Moore said in a prepared statement that "lack of a coordinated national energy policy" and "conflicting regulatory pressures" have contributed to the problems of electric utilities.

In the aftermath of the Arab oil embargo, Federal energy officials pressured utilities to convert from oil to coal as a fuel for generating stations, but Federal and State environmental officials refused to relax coal emission standards.

Vepco so far has spent about $45 million on engineering and construction of the suspended Surry units, but this is only 2.5 percent of their estimated final cost of $1.8 billion.

Nuclear units being planned for completion in the 1980's now have a projected cost of about $1,000 per kilowatt of power they will produce. A kilowatt is enough power to operate an average-size hair dryer.

Proffitt said projected costs for large coal-fired units "are not far behind that" but added, "The big difference is we could wait until 1982 before starting a coal-fired station and have it on line by the time we could complete Surry III and IV."

[From the Washington Post, May 29, 1975]

Nuclear Panel Urged To Fine Vepco Heavily

(By Hal Willard)

The staff of the Nuclear Regulatory Commission recommended yesterday that the Virginia Electric & Power Co. pay the largest fine in the history of the peacetime atom for making false statements about the geologic fault beneath its North Anna nuclear powerplant.

The recommended fine is the maximum allowed by law—$5,000 on each violation, for a total of $60,000 on the 12 counts on which Vepco was found guilty last April 4 by the Atomic Safety and Licensing Board. The board was hearing accusations brought by the North Anna Environmental Coalition and supported in part by the NRC staff.

No other utility company has ever been fined the $5,000 maximum on more than one count, and only one company has received that penalty. In addition, this would be Vepco's third civil penalty for violations in regard to its nuclear program and no other company has been found guilty of more than one.

The NRC staff recommendation came at a hearing before the Safety and Licensing Board called to determine the penalty to be levied.

The coalition recommended outright revocation of Vepco's license to build four reactors at North Anna. The Commonwealth of Virginia recommended a fine, but did not specify how much. Vepco itself recommended that it be let off without penalty.

The material false statements made by Vepco to the NRC all referred to Vepco's claimed unawareness of the geologic fault before it was reported to the NRC. Vepco was declared innocent of making the false statements willfully.

The board probably will not make a decision about the penalty until the end of June.

[From the Washington Post, Feb. 28, 1977]

A-ENERGY CERTAINTIES ARE REPLACED BY CAUTION

(By Hal Willard)

The absolute certainties about the benefits of nuclear energy that dominated electric utility company thinking in the 1960's have been replaced here by caution and concern about the costs, the attitude of government, and by lower forecasts of consumer need.

The Virginia Electric & Power Co. has suspended work on two nuclear units at Surry on the James River.

The Potomac Electric Power Co. has delayed the development schedule of a proposed two-unit nuclear plant at Douglas Point on the Potomac River in Charles County, Md.

The Baltimore Gas & Electric Co. has all but finally decided for the foreseeable future against building a nuclear plant at Perryman on the Chesapeake Bay, northeast of Baltimore.

The top executives of all three companies stressed, in separate interviews, that their hedging on nuclear power for the future was not caused by any lack of faith in it as an economical and safe source of energy.

Rather, they are concerned about what Chairman C. Edward Utermohile, Jr., of B. G. & E. calls political—not nuclear—risk," what President T. Justin Moore, Jr., of Vepco calls "climate" for nuclear powerplant construction and what Chairman and President W. Reid Thompson of Pepco calls the "overall picture."

It is possible to deduce from the executives' remarks that nuclear foes, who lose virtually every battle, may be winning the war by sheer dogged persistence in one public hearing after another.

"We don't like to look at it from a 'winning or losing' standpoint," protested Bernard C. Trueschler, B.G. & E. president. "We weigh the evidence available to us, analyze the economics and make a decision."

The economics of building and operating nuclear powerplants are heavily influenced by actions of antinuclear organizations and individuals who intervene in the hearing process required to obtain nuclear plant licenses.

While the leaders of all three companies said they are firmly convinced that the Nation's future energy well-being depends on nuclear power and coal—the current general policy of utility companies—they are willing to forestall further construction for the time being.

B.G. & E. and Vepco already have a vast investment in and a great reliance on nuclear energy, but Pepco has made only a relatively small investment in its Douglas Point plans.

B.G. & E. now is operating one nuclear unit at Calvert Cliffs in Calvert County on the Chesapeake Bay and is testing the second unit there.

The company said the nuclear unit saved consumers $50 million in 1975 through the use of nuclear power rather than other fuels. During the first 10

months of 1976, the nuclear unit produced more than 40 percent of the electricity generated by the company and saved 400 million gallons of oil and $68 million in fuel charges, the company said.

While these are encouraging figures, the company noted that when it announced its Calvert Cliffs plans in 1967, it expected to have one nuclear unit operating in 1973 and the second operating in 1975, at a total cost of $300 million.

As it turned out, the first unit began operating in 1975 and the second unit isn't ready yet—and the total cost will be $750 million. Utilities figure that any plant they begin work on now will cost $1 billion for each nuclear unit.

There appears to be no precise method of measuring who or what causes such nuclear plant delay or cost overrun. Once there is delay, inflation becomes a major factor. Government regulators often have discovered errors in design or construction, manufacturers have made design improvements, legislators and regulators have tightened safety standards.

The Calvert Cliffs plant was fought every step of the way by the Chesapeake Environmental Protection Association, an organization formed in 1969 for that specific purpose. CEPA still is watchdogging every move B.G. & E. makes and presently is arguing over the temperature of the water that the plant is disgorging back into the bay.

All parties agree that CEPA's years-long tenaciousness has been at least partly responsible for changes in State and National Government standard and regulations for nuclear powerplants and even landmark court rulings requiring that environmental considerations be part of the official licensing process.

The same thing has happened to Vepco, particularly over its plans to build a four-unit nuclear plant at North Anna in Louisa County. The North Anna Environmental Coalition, based in Charlottesville, began full-scale opposition in 1973 and continues to fight Vepco in public hearings and in court. Its impact has been significant.

Vepco built its first nuclear plant at Surry and during 1975 the two operating units there saved from $75 million to $125 million, depending on whether coal or oil was figured as the fuel that was replaced, the company said.

But Surry has been plagued with mechanical problems that have caused lengthy shutdowns and cut deeply into power production the company had counted on. Nevertheless, Surry produced 21 percent of Vepco's generation in 1976, Vepco President Moore said.

He said the company hopes that when the first two units at North Anna start producing power—expected to be this year and next—nuclear energy will be generating about 50 percent of Vepco's electricity.

Vepco plans had called for two more units at both North Anna and Surry, but now the Surry plans have been suspended.

Vepco's "seers into the future," headed by Executive Vice President Stanley Ragone, feel that six nuclear units—two at Surry and four at North Anna—may prove to be enough.

Ragone explained that Vepco's forecasts of increased consumer demand have been scaled down drastically from the actual increases in the 1960's and early 1970's, as have been those of B.G. & E. and Pepco. For the next decade, Vepco sees growth in usage of no more than 3 to 5 percent a year.

This means that population growth is leveling off and, the leaders feel, company conservation messages are beginning to have an effect on consumers.

Ragone noted that because of the huge cost of building nuclear plants, they must be operated as much as possible to be economical. Therefore, the company wants nuclear power to supply only its constant electricity need, or between 50 and 60 percent of its total electricity produced.

North Anna 1 and 2 originally were scheduled to start generating in 1974 and 1975 and the cost was figured in 1972 at about $1 billion for all four units. Now, it is expected that North Anna 1 will be started this year, the second unit next year and the third and fourth in 1983 and 1984. The cost has doubled.

Vepco said the doubling of the cost of its nuclear units and the delays in their construction were caused by a lack of construction manpower, changing Government standards, unanticipated increased safety requirements, environmental and other interventions in public hearings, necessary repairs to the steam generator supports, Nuclear Regulatory Commission requirements that already constructed components be changed, labor disputes and the 6-month halt in construction in 1974 because of the utility's financial problems.

Despite all, Vepco leaders said they feel they have until about 1980 to watch developments to decide finally whether to build more nuclear units. Pepco also is playing a watching and waiting game with its proposed Douglas Point plant while proceeding with the preliminary—and economically expendable—design work, environmental studies, site justification and the public hearing process, which began last summer.

B.G. & E., on the other hand, feels that if it is to meet customer needs it must start soon with another major plant—if not nuclear at Perryman, then coal somewhere else. Executives of the three companies agreed that the need for public hearings and Government permits has increased for coal plants to the point that they now must allow about 8 years to put one in operation. Nuclear plants take 10 years or so.

B.G. & E's Chairman Utermohle is blunt about his company's worry over Government attitude. With two openings now on the Nuclear Regulatory Commission and a third coming up in a few months, Utermohe said. "A great deal depends on the philosophies and attitudes of the people appointed to the Commission."

[From the Washington Post, Sept. 12, 1975]

Vepco Fined $60,000 for A-Plant Fault

(By Hal Willard)

The strongest penalties ever imposed on the nuclear power industry were levied yesterday against the Virginia Electric & Power Co. for violations in connection with construction of its four-reactor plant over a geologic fault in Louisa County.

The Atomic Safety and Licensing Board fined Vepco $60,000, the maximum allowed by law, and set up stringent conditions that the company must meet to maintain a nuclear license for its North Anna plant.

Vepco characterized the decision yesterday as "novel" and said the company "expects to appeal."

In the history of the use of nuclear energy only nine civil penalties have been levied against power companies. Vepco has received three of them. No other company has received more than one.

"In view of the licensee's high rate of civil penalties," the ASLB said, "* * * the staff (of the Nuclear Regulatory Commission) is requested to evaluate the licensee's performance indepth to determine whether additional monitoring * * * is needed beyond that employed in the routine follow ups to violations and infractions."

Vepco was convicted of making 12 "material false statements" to the NRC in reference to the geologic fault. In essence, they were that Vepco said there were no faults at the North Anna site and none were suspected. All parties, including Vepco, now agree the fault exists.

The law says a fine of $5,000 is the maximum that may be imposed for such a violation; 12 violations equals $60,000.

Three conditions were imposed with the fine.

The chief executive officer of Vepco shall issue "a statement of policy expressing the strong commitment" of Vepco to "fully discharge all of its responsibilities, duties, and obligations" under the Atomic Energy Act and NRC rules and regulations * * *. The ASLB also said it wants Vepco to state that it understands the need for NRC evaluation of all safety matters. This must be issued within 30 days.

Vepco shall prepare a management evaluation and analysis of its entire current oganizational structure from the point of view of its effectiveness in implementing the statement of policy required above. The ASLB said it wants to make sure Vepco has the management characteristics needed to provide the necessary confidence in the ability of Vepco to implement its statement of policy.

Vepco shall analyze and report on its contract policy with those contractors it hires for projects requiring permits or licenses from the NRC. The intent of the board is to assure that contractors employed by the licensee are committed and clear as to theis obligations and responsibilities * * *

The geological conditions at the North Anna site were investigated by Vepco consultants in 1968 and 1969. They said they found no fault. An outside geologist found the fault in 1970 and Vepco's consultants confirmed the fault in May 1973.

Vepco said yesterday: "Naturally, we are disappointed because, as all parties agreed, the statements made by Vepco were believed to be true at the time they were made. There was never any intent to mislead or deceive anyone."

The ASLB addressed itself to that point: If Vepco were permitted to avoid responsibility because its agents or its independent contractors failed to inform it of material information, it could thwart the purpose of the Atomic Energy Act, which includes protecting the health and safety of the public.

All nuclear powerplants are designed to withstand earthquakes. However, none have been subjected to an earthquake so the design isn't proven. It is feared that if the design failed, lethal amounts of radioactivity might be released from a nuclear plant.

The presence of a geologic fault means the earth has moved at some prior time—and the likelihood is greater that it will move again there as opposed to a location that has always been stable.

Previous official Government actions have declared the North Anna site safe under the NRC criteria, which stipulates that geologic evidence show the earth has been stable for at least 35,000 years. The north Anna site, most geologists agreed at hearings there, has been stable for millions of years.

However, most also said that nuclear powerplants should not be built on geologic faults, just in case.

The safety board's decision is the culmination of efforts by a citizens' environmentalist group, the North Anna environmental coalition, that brought the existence of the fault to public attention in August 1973, and has pushed for action against Vepco ever since.

The environmental coalition brought the original charges of making material false statements against Vepco, citing 19 violations. The NRC staff agreed on 12 violations and proceeded with the case.

Vepco had reported existence of the fault to the NRC in May 1973. The late Dr. John Funkhouser, a professor of geology at John Tyler Community College in Chester, Va., discovered the fault in February 1970, and said in a deposition to the NRC that he reported his findings to the Vepco engineer Herbert Engelman, Jr., on the site.

Engelman testified at a hearing that he didn't remember being told, and Vepco officials testified that he never reported the Funkhouser discovery to the company.

The truthfulness and completeness of information provided by the power companies to the NRC goes to the very heart of the regulatory process, the safety board said. The NRC depends on quality assurance programs within each power company to back up its own inspections in an effort to guarantee safety.

In its statement yesterday, Vepco said "if ultimately the company is required to pay the fine, it would be excluded as an expense for rate-making purposes."

Company officials originally had testified at a safety board hearing that and fines would be charged to rate paying customers, but the Virginia Corporation Commission said fines must be paid out of profits.

The safety board's report was signed by chairman John B. Farmakides and John F. Wolf. The third member, Lester Kornblith, Jr., filed an opinion dissenting in part, and declaring that he felt there were only four material false statements, but that one was so blatant it should carry a $75,000 fine.

NORTH ANNA A-PLANT ADVANCES IN BATTLE FOR FEDERAL LICENSE

(By Hal Willard)

The Government's panel of nuclear safety experts has recommended that the Virginia Electric and Power Co.'s North Anna nuclear plant the Nation's most beleaguered nuclear facility, be licensed to produce electricity next spring, providing that several outstanding issues are resolved.

The outstanding issues include charges that Vepco suffers from management weaknesses and faulty leadership and a claim that it is only because of great good luck that significant safety problems don't exist at the North Anna plant.

The accusations against Vepco came Thursday from Ernst Volgenau, director of the Nuclear Regulatory Commission's office of inspection and enforcement, following a 4-month investigation into construction practices at the nuclear site.

Volgenau appeared before the NRC's Advisory Committee on Reactor Safeguards (ACRS), a group of technical experts hired as consultants to insure that nuclear plant owners document plant safety before they begin generating electricity.

In a sometimes heated exchange involving Volgenau, Vepco representatives, ACRS members and other NRC staff spokesmen, Volgenau, cited problems he said were caused by the corporate management of Vepco and bad onsite supervision. He said, "We're determined to see it fixed."

The Volgenau investigation was ordered by NRC Chairman Marcus A. Rowden after information was received from three individuals identified as employees at the site that there were construction irregularities and failures to follow NRC standards at North Anna.

Volgenau's written report, released earlier, cited 30 infractions of rules and regulations at the North Anna site in Louisa County, Va., 75 miles southwest of Washington. It recommended that Vepco be fined $31,900.

Vepco has protested strongly against the fine and stated at the ACRS meeting it is conducting its own investigation to determine the underlying reasons why some workmen performed substandard work.

We want to know their motives and if necessary we will take legal action, Vepco official Ashby Baum said.

Vepco Senior Vice President W. L. Proffitt said at least one case is known in which a supervisor had a clear drawing of the way the work was to be done and did it another way.

Vepco also defended itself against Volgenau's charges that inspection procedures were weak at North Anna by submitting testimony from a consultant who examined the system and found it on a par with systems used by other utilities.

This was countered by testimony from an ACRS consultant who agreed essentially with the findings of the Volgenau investigation.

Although Volgenau has reported results of the probe, further phases of it are continuing, including actions to verify the quality of construction already completed as well as that still under way.

In addition, NRC project manager Alexander Dromerick cited five other outstanding issues, but said none pose major problems and he expects all to be resolved soon.

They include a need to modify the design of wall supports in the containment area for spent fuel. Until the Government makes decisions about storing nuclear waste and reprocessing it for reuse, most utilities have to store amounts of spent fuel on-site.

Another problem involves the coding system used to measure pressure on pipes and other components serving the nuclear reactor.

Even with these resolved, however, Vepco still doesn't have clear sailing to its operating license. A recent hearing by the Atomic Safety and Licensing Board on Vepco's operating application has been extended at the behest of the North Anna Environmental Coalition, arch-foe of Vepco's nuclear program. No date has been set for the extended hearing.

The coalition contends that the operating record of Vepco's Surry plant, which has encountered significant difficulties during its 4 years of producing power, coupled with the construction record at North Anna, disqualifies Vepco from the use of nuclear energy.

VEPCO IS FINED BY NUCLEAR ENERGY

(By Hal Willard)

The Nuclear Regulatory Commission fined the Virginia Electric and Power Co. $32,500 yesterday for making seven material false statements about the presence of a geologic fault beneath its North Anna nuclear powerplant.

The NRC ruled that an omission of information from a license application for the powerplant constituted a material false statement.

Silence can be remarkably expressive, a fact recognized in literature, in the law of evidence and in ordinary usage, the commission said in levying the second largest fine in nuclear regulatory history.

The largest fine, for $38,000, also was levied against Vepco in 1973, for a series of violations of governmental regulations.

Vepco responded immediately to the ruling by filing an appeal in U.S. District Court in Richmond, a company spokesman said.

The NRC ruled that in three instances Vepco had emitted information about the geologic fault beneath the plant being built in Louisa County, Va., 75 miles southwest of Washington, and had submitted wrong information—but not wilfully—four times.

Testimony at several hearings on the case showed Vepco consultants first considered the possibility that a fault existed in 1968 and that geologists from two Virginia colleges found the fault in 1970 and told Vepco employees about it. However, Vepco did not inform the NRC about it until May 1973.

Yesterday's ruling did not involve safety. The NRC decided previously that the fault did not constitute a danger to the health and safety of the public because it was more than 35,000 years old. Geologists agree the fault is millions of years old.

However, Paul Roper, a geologist hired by Vepco, made a series of reports about the fault and one, according to yesterday's NRC ruling, indicated that the fault might be reactivated.

Existence of the Roper reports was not made known to the NRC until the hearings.

The North Anna Environmental Coalition, a citizen's group, originally charged that Vepco had made 24 material false statements. Eventually, the NRC staff agreed there were 19.

After hearings, the NRC Atomic Safety and Licensing Board found Vepco guilty of 12. Vepco took the case to the NRC's appeal board, which cut the 12 to 4. The commission itself decided to review the case.

In yesterday's ruling, the NRC agreed with the four violations found by the appeal board and restored three more.

Much testimony during the several hearings on the case dealt with the meaning of "material false statement" and with the intent of Congress when it put the language in the Atomic Energy Act.

In the end, the NRC said Congress was trying to protect the health and safety of the public and any information available to that end should be part of the record in a case.

The NRC now has found utility companies in the United States guilty 18 times of making substantial violations of regulations and levied fines, an NRC spokesman said. Vepco has received three fines, including the two highest.

Commonwealth Edison of Illinois also has been fined three times, with two of the fines ranking third and fourth behind Vepco's.

Metropolitan Edison of New York has received two fines. No other utility has been fined more than once.

[From the Washington Post, June 6, 1976]

NUCLEAR UNIT ALTERS VEPCO FINE

(By Hal Willard)

The Nuclear Regulatory Commission has stayed an appeals board ruling that reduced a record $60,000 fine against the Virginia Electric and Power Co. for

making "material false statements" about a geologic fault beneath the North Anna nuclear power plant being built in Louisa County, Va.

In putting aside the ruling until further order of the commission, the NRC instructed Vepco, the North Anna Environmental Coalition, and the NRC staff to submit new briefs on specific legal points by June 25 and set July 2 as the deadline for reply briefs.

The NRC action—the sixth review of a case ordered in its nearly 18 months of existence—was described by a spokesman as "fairly unusual."

The Government already has decided that the geologic fault itself—caused by an earthquake many million years ago—is not of sufficient danger to warrant stopping the nuclear plant. However, the efficiency of Vepco management and the reliability of the utilities' self-inspection system the NRC relies on for the safety of nuclear plants were brought under question by the geologic fault issue.

The Environmental Coalition, and subsequently the NRC staff, at one time accused Vepco of hiding the geologic fault's existence from the NRC.

After lengthy hearings, the Atomic Safety and Licensing Board found Vepco had made 12 material false statements and imposed the $60,000 fine. The ASLB appeals board reduced the finding to four material false statements and the fine to $17,500.

[From the Washington Post, Dec. 16, 1976]

GAO Asked To Extend Vepco Probe

(By Hal Willard)

A Senate subcommittee has asked the General Accounting Office to expand its probe of Virginia Electric and Power Co. construction problems at its North Anna nuclear powerplant to include the "close business ties" between Vepco and its chief contractor, Stone & Webster.

Senator Lee Metcalf, Democrat from Montana, chairman of the Subcommittee on Reports, Accounting and Management, said in a letter to GAO that the ties could be a factor in the substandard work on the nuclear project, 75 miles southwest of Washington in Louisa County.

Quoting Government reports, Metcalf said the Stone family of Stone & Webster held 53,700 shares of Vepco stock; that Stone & Webster organizations had consulting arrangements with 63 major electric and gas utilities; and that most utility companies do not obtain competitive bids before hiring a contractor.

A report by the Energy Research and Development Administration shows that as of last January Stone & Webster, of New York City, was listed as the contractor for 25 nuclear powerplants either operating, under construction, or being planned. Only the giant Bechtel Corp. had more listings: Sixty one.

Metcalf also alleged that Stone & Webster had received a $16,670,000 contract with Long Island Lighting Co., with whom it had director interlocks, despite the fact that it was not the low bidder, or even the second lowest bidder.

According to information filed by Vepco with the Federal Power Commission, it had 124,873 holders of a total of 67,346,344 shares of common stock on December 31, 1976.

The Stone family, Whitney Stone and his wife Anne of New York City, are the only individuals among major Vepco stockholders, according to an analysis of Vepco stockholder lists by the subcommittee staff. Their 53,700 shares, worth $812,212.50 at Tuesday's stock market closing, are exceeded in number only by large financial institutions throughout the country.

Stone, Stone & Webster's chairman, said that "We do work for them (Vepco), but we're not close to them at all and don't want to be. They're a great company and a well-run company. I haven't the foggiest idea how we stand on the ownership list." He declined further comment.

Only two Virginia institutions are listed among major stockholders, United Virginia Bank and First and Merchants Bank of Richmond, the subcommittee said.

Metcalf asked GAO specifically to report on Stone & Webster's consulting arrangements with electric and gas utilities and which—if any—of those arrangements were subject to competitive bidding.

He also asked for information on any other business relationships between utilities and Stone & Webster affiliates, subsidiaries, or company officers and their families.

Metcalf cited the Nuclear Regulatory Commission staff recommendation, made last week after an investigation of nearly 4 months, that Vepco be fined $31,500 for 30 alleged violations of Federal regulations during construction of the proposed four-unit nuclear powerplant in Louisa.

He also noted that Vepco has been fined for previous irregularities at North Anna. Vepco has been cited for more alleged violations than any other electric utility in the country.

GAO already is investigating the effectiveness of the system for inspecting construction used by Vepco and Stone & Webster. The probe ran concurrently with one by the NRC, which was instigated by charges from three persons that wholesale violation of regulations was occuring. GAO's report is expected early next year, a source said.

When the North Anna investigation began in mid-August, GAO was in the midst of a check of the NRC's overall quality assurance program, which calls for self-inspection by utility companies to insure that NRC standards are upheld.

DROUGHT

Mr. YATES. Now, we turn to page 9, and your very alarming paragraph. I want you to comment further on it.

You say:

There is no need for me to report as a recent development the disastrous turn of the weather this year, for that is well known to everyone. Its ramifications in accentuating the shortage of natural gas with attending hardships from loss of industrial production, unemployment and plain discomfort, and in impending floods and drought, have been, and will be, far reaching in their effects.

I call attention to it because it will call on nearly the full range of the Survey's capabilities and is bound to focus much of our efforts during the coming and following years—for example, in the appraisal of energy resources; the supervision of exploration and production on Federal lands; the assessment of water supplies, drought potential, and flood hazards and damage; and research on climatologic trends.

You are absolutely right in calling that to the attention of the committee. Now I ask you whether or not in keeping with your warning, the budget you have submitted to this committee represents the full scale of appropriations which will permit you to do the kind of a job to protect this country against all the dangers that are inherent in that statement of yours.

Mr. MCKELVEY. I don't believe it does, Mr. Chairman.

Mr. YATES. All right. Let's find out where it is deficient.

SUPPLEMENTAL REQUEST FOR DROUGHT FUNDS

Mr. MCKELVEY. We are in the process of preparing proposals that would amend it, and——

Mr. YATES. Why didn't you include it in your supplemental, then?

Mr. MCKELVEY. Well, we will be——

Mr. YATES. If it is large, we ought to get to it as soon as we can.

Mr. MCKELVEY. Also under consideration is a supplemental.

Mr. YATES. We are all through with our supplemental. Is the administration thinking of a second supplemental?

Mr. MCKELVEY. It is my understanding, Mr. Chairman, that if this can be prepared and approved within the next couple of weeks.

Mr. YATES. All right. You say you are in the process of preparing this. Does this mean that you are in the process of submitting it to the Department, or you and the Department are in the process of submitting it to OMB? Where is it in the process?

Mr. MCKELVEY. At this point, it is in the Department.

Mr. YATES. Is it out of the Geological Survey?

Mr. MCKELVEY. Yes, sir.

Mr. YATES. OK. Then you are in a position to tell us what the proposals are, then, aren't you?

Mr. MCKELVEY. Yes, Mr. Chairman.

Understand, these have not been approved by the Department or by OMB.

Mr. YATES. I know they are not approved.

Let's find out what you have asked the Department for in each of the areas which you considered to be essential in protecting the Nation from the hazards which you have itemized.

Mr. MCKELVEY. For the drought, Mr. Chairman, we are asking for $1.9 million as a supplemental for fiscal 1977, and we are proposing $3.9 million additional as an amendment to the 1978 budget.

Mr. YATES. For the drought. What does that mean? Where are you going to put that money? Where does the $1.9 million go? Is that for Mr. Cragwall's water research surveys, or is it to go for the chief geologist or conservation? Where do you want the $1.9 million?

Mr. MCKELVEY. That will be in our water resources activity.

AREAS TO BE ADDRESSED WITH SUPPLEMENTAL FUNDS

Mr. YATES. What are you going to do with it?

Mr. MCKELVEY. A considerable number of activities will be involved. As a matter of fact, we have prepared a matrix here showing the problems that are going to be addressed and the areas in which they will be involved. Perhaps we can submit that.

Mr. YATES. Do you have sufficient copies for the other members of the committee? If not, I will ask the clerk to make a photostat of it so that all members of the committee will have a copy.

Mr. MCKELVEY. We have the copies, sir.

[The information follows:]

3/14/77

DROUGHT PROBLEMS	Number of States	Arizona	Arkansas	California	Colorado	Idaho	Illinois	Indiana	Iowa	Kansas	Massachusetts	Michigan	Minnesota	Missouri	Montana	Nebraska	New Mexico	Nevada	North Carolina	North Dakota	Ohio	Oklahoma (northern)	Oregon	South Dakota	Texas (northern)	Utah	Virginia	Washington	Wisconsin	Wyoming
Deficient stream flow	29	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Number of months deficient in last 12			5	10	5	5	6	7	8	8	6	9	10	9	5	8	5	6	5	10	5	5	5	9	7	5	5	5	10	5
Flow of Large Rivers Deficient	9						X		X					X	X				X	X	X									
Below normal ground water levels	24				X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X		X	X	X
In lowest 25% of record	9			X		X					X	X	X					X										X	X	
Deficient snow pack	16	X		X	X	X			X	X				X	X	X	X	X		X			X	X		X		X	X	X
Reservoir contents of major systems below normal	12			X	X	X			X	X			X		X	X	X	X	X	X		X	X	X	X			X	X	X
"Dust bowl" conditions (wind erosion)	4				X					X												X			X					
Reduced production of hydro power	9			X		X				X					X		X					X	X		X			X	X	X
Threat of fires	11	X		X	X	X									X		X	X					X			X		X		X
Curtailed recreational opportunities	13	X		X	X	X									X	X		X		X			X	X		X		X	X	
Waterfowl habitat use curtailed	6				X								X		X	X				X				X						
Threat to fish population	4				X															X			X					X		
Wells gone dry	16			X	X		X	X				X	X	X	X	X		X		X	X		X	X				X	X	X
Streamflow quality deterioration																														
Subsidence caused by lowered ground water levels	2				X																				X					
Water conservation measures imposed	1				X																									
Agricultural losses (including unemployment)	16				X	X	X	X	X	X		X	X	X	X	X				X		X			X			X	X	X
Declared disaster areas	1											X*																		
TECHNICAL ASSISTANCE PROVIDED BY USGS (ONGOING)																														
Monitor and evaluate current and developing conditions																														
a. Surface-water quantity and quality	29	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
b. Ground-water levels and quality	29	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
c. Location of fresh-water/salt-water interface	10	X		X							X								X	X			X		X	X	X			
d. Project effects of continuing drought	6			X			X						X							X							X	X	X	
Evaluate potential for alternative sources of supply	18	X		X	X	X	X	X	X	X		X	X	X	X	X				X			X	X				X	X	
a. Surface water	4		X	X										X														X		
b. Ground water	15	X		X	X	X		X	X	X		X	X		X	X				X			X	X					X	
c. Saline water resources	2		X	X																										
Evaluate potential for redeveloping existing supplies																														
a. Reservoirs (effective use of remaining storage)	10			X		X							X		X	X				X			X	X				X	X	
b. Ground-water wells	21	X	X	X	X	X		X	X	X		X	X	X	X	X			X	X			X	X		X		X	X	X
c. Status of snowpack	11			X		X						X	X		X				X				X			X		X	X	X
Project effects of additional water-supply development on the hydrologic system																														
a. Statistical analysis	18		X	X	X	X	X	X		X		X	X		X	X		X		X			X	X		X		X	X	
b. Digital or analog modeling	9			X	X			X	X	X													X					X		
Assisting Governor's office	4			X																X			X					X		

*3 Counties in Upper Peninsula declared disaster area by SBA.

DROUGHT PROBLEMS

Mr. YATES. Drought problems. The deficient stream flow, flow of large rivers deficient, deficient snow pack, reservoir contents, dust bowl, reduced production of hydropower, threat of fires, threat to fish population, wells gone dry, and so forth, and so forth.

Now, those are the problems. Then you have another area in which you have technical assistance provided by USGS. Surface water quantity and quality, ground water levels and quality, location of freshwater saltwater interface, project effects of continuing drought, evaluate potential for alternative sources of supply, surface water, ground water, saline water resources, evaluate potential for redeveloping existing supplies, reservoirs, ground water wells, status of snow packs, project effects of additional water-supply development on the hydrologic system, statistical analysis and digital or analog modeling.

WATER STORAGE PROJECTS

Mr. DUNCAN. Would you yield, Mr. Chairman?

Mr. YATES. Sure.

Mr. DUNCAN. Those technical assistance items, are those the ones you propose to spend this $1.9 and $3.9 million on?

Mr. MCKELVEY. Those would be the kinds of activities involved.

Mr. DUNCAN. I don't see any item down there for closing water storage projects presently under construction. How much of that money is going to be spent to close up some more water storage projects in the drought area?

Mr. MCKELVEY. That is not our responsibility. Mr. Duncan, and I would assume none of this money would be spent for that purpose.

Mr. YATES. How will the closing of those water projects affect your work?

Mr. DUNCAN. It is working against what you are doing, isn't it?

Mr. YATES. That is a leading question.

Mr. MCKELVEY. I would suppose——

Mr. DUNCAN. I am trying to help the witness a little bit. He is having difficulty with this line of questioning.

Mr. YATES. Objection sustained. Did you want to reply to my question, rather than Mr. Duncan's?

Mr. MCKELVEY. It could affect our work in those local areas.

Our primary responsibility has to do with collection of water data, and I am sure that we are probably actively collecting water data related to plans for construction in at least some of those projects. If a specific project were terminated, it might terminate some special monitoring activities that would have gone on otherwise.

I am not able to speak with any specificity.

COOPERATIVE EFFORTS TOWARD DEALING WITH DROUGHT

Mr. YATES. If I remember Mr. Cragwall's testimony, you are not only concerned about the present drought, but you are concerned about what is going to happen next year as well, a continuation of the drought next year.

Now, who has the greater contribution to make toward dealing with the drought, you or the Weather Service. I know that you both have a contribution to make, but I wonder what they do? Do they do the predicting, and you act upon their predictions? How does this process work? What I am leading up to is there ought to be a cooperation between every agency of Government that is important in this.

Now, presumably the Weather Bureau is going to tell you you are not going to get rain and not going to get snow. You are going to take that prediction of the Weather Bureau and act on it. Are there other agencies going to act on that?

Mr. McKelvey. Other agencies will act on it in a remedial sense.

Our concern is with the provision of information on surface stream flow, and on levels of ground water, soil moisture, other information of that type dealing with water supply itself.

NOAA, as you say, is responsible for weather forecasting and also for the measurement of actual precipitation. On that basis, NOAA is the Agency that makes predictions with respect to floods. But, we work very closely with them in the field, and there is a good interchange of information and cooperation. I think I have also mentioned before——

COOPERATION WITH NOAA

Mr. Yates. How is that cooperation and close working evidenced?

Mr. McKelvey. I will ask Mr. Cragwall to elaborate on that.

Mr. Yates. I would like to know.

Mr. McKelvey. Let me just say in the overall we have a very active coordinating committee with NOAA that meets once a month, and has for the last 5 years. It is cochaired by Mr. Radlinski, and the Associate Administrator of NOAA. Not only in that area, but in other areas, it has proved to be a very effective means of coordinating.

Mr. Yates. Let's hear how you do it.

Mr. McKelvey. There is as a part of that committee a Subcommittee on Hydrology, which coordinates in this particular area. But, at the field level, I will ask Mr. Cragwall to describe it.

Mr. Yates. Mr. Cragwall. What do you do in NOAA?

Mr. Cragwall. Our work with NOAA involves both directions. Our network of stream flow stations, for example, become the inputs to them in flood forecasting. In other words, they use our stations as basic input information for making forecasts. Then when they make a forecast, that helps to tell us where we have to step up the tempo of our work.

So, it iterates in both directions—in the matter of dealing with both forecasts and what the situation is.

STREAM GAGING STATIONS

Mr. Yates. When you say your stations, Mr. Cragwall, what do you means? What do you mean by a station?

Mr. Cragwall. A station is a point on a stream at which—it is represented here in the water quality network. At each of these stations we measure continuously streamflow, and stream height, or stage, as we call it.

Mr. Yates. For the record, you are pointing to a chart entitled "National Stream Quality Accounting Network."

[The chart follows:]



The National Stream Quality Accounting Network (NASQAN) is designed to provide a uniform, continuing measure of the quality of U.S. rivers. Design size: 525 stations.

Mr. CRAGWALL. We have a configuration of sites at which we have installations on the streams of the country that give us on the streams a continuous measure of streamflow rate, discharge of the stream, in cubic feet per second or million gallons a day, if you will, and the height of that stream. That data flows into NOAA's system, by which they estimate and predict flood heights moving down through river systems during time of flood.

In other words, our data system is the basis for their predictions of floodflows.

Mr. YATES. Is it also the basis for the predictions on drought?

Mr. CRAGWALL. Our streamflow characteristics, as we look at them now, and we see streams receding—we do certain statistical work that says this stream is going to get so low if it doesn't rain for so many days—that also becomes an input into what they say about the drought, along with the climatic prediction because the two have to go together.

ADVISORS TO PRESIDENT ON DROUGHT

Mr. YATES. Who is the head of the service which tells the President what the drought will be, or what the conditions will be? Is it NOAA or you?

Mr. CRAGWALL. Both. We are now working jointly on a committee with people right at the White House this week, doing that very thing.

Mr. YATES. I see.

Mr. DUNCAN. That is a stream quantity accounting network rather than quality.

Mr. CRAGWALL. I am just using this map to illustrate a configuration. But, as for streamflow we have a configuration of some 18,000 points across the United States at which we measure streamflow, and at about 6,000 of those same places we measure water quality. This chart is merely illustrative.

GROUND WATER SUPPLIES

Mr. DUNCAN. And you are also doing that work with ground water supplies, too.

Mr. CRAGWALL. That is right.

Mr. DUNCAN. You have a network of those already in place?

Mr. CRAGWALL. A large network of those. In addition, I might add, in ground water we do most of the predictive modeling. We build digital and analog models of ground water systems that allows us to say if you double the pumpage from this particular aquifer, the results will be this in the water level.

Mr. DUNCAN. And you have got stations with salt water interceding and you can tell where that interface is.

Mr. CRAGWALL. That is right. You watch very closely the salt-fresh water interfaces, both underground and in estuaries.

REASON FOR ADDITIONAL FUNDS FOR DROUGHT

Mr. DUNCAN. Why, then, with this system in place—and I think you ought to be proud of it, and I am sure you are—do we need extra money to monitor and evaluate current and developing conditions? You are doing that all the time anyway.

Mr. CRAGWALL. Yes, sir, but we have also stepped-up activities in the field when we have either a flood or a drought. We have to put a lot more men in the field and many more hours to get the answers. In a drought we start measuring many streams on which we don't have a station. There are thousands of streams that we don't gauge regularly.

But, when we have a drought, we try to splatter the area to get information, because those data become the design data to cope with the next drought. So, we try to get double or triple the number of measurements of streamflow during the drought period as we do during normal periods.

DATA GATHERING AUTOMATION

Mr. DUNCAN. Is the data fed electronically into a computer without the assistance of an observer at those stations?

Mr. CRAGWALL. Yes and no. We have several thousand of the 18,000 stations that are set up to report either by radio or satellite or other devices, such as telephone systems, to give us real time data. Of course, the National Weather Service has their 2,000 stations that they use telemetered in in this manner.

But, we have some on the telephone observer reports, and some we pick up with our own field forces. So, we have a general mix. The real time part of the system is growing rapidly as water becomes more difficult to manage.

INCREASED WATER MONITORING DURING DROUGHT

Mr. DUNCAN. So, there really is a need to expand your monitoring function during a time of drought or a time of flood.

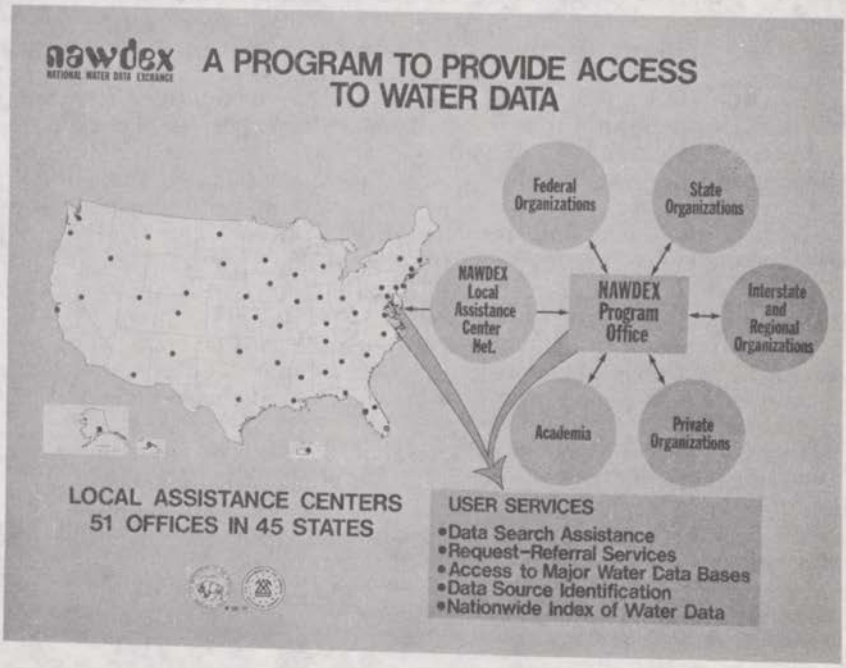
Mr. CRAGWALL. Absolutely. I would say during a time of drought, in the average State we will average four times as many points while the water is low as we do during a normal period because that again becomes the information on which to make engineering designs for water projects of all kinds in the years ahead. This is a period in which we get the real crucial design data.

EVALUATION OF POTENTIAL FOR ALTERNATIVE SUPPLIES OF WATER

Mr. DUNCAN. Haven't you constantly, as a part of your ongoing work, and don't other agencies, State agencies as well as Federal, constantly evaluate the potential for alternative sources, and augmenting existing supplies of water?

Mr. CRAGWELL. Yes, and that is the other stepped-up activity that we propose with this extra money, is that everybody is working a lot harder now, bringing those alternative possibilities into action for communities and water systems. Mr. Chairman, this chart shows local assistance centers throughout the United States.

[The chart follows:]



The National Water Data Exchange (NAWDEX) is a program to provide access to water data. NAWDEX is composed of water-oriented organizations voluntarily working together and supported by a nationwide network of local assistance centers to provide users of water data with data-search assistance, request-referral services, access to major water data bases, identification of sources of water data and a nationwide index of water data.

Mr. DUNCAN. We are not talking here about bringing them into action. I would feel much more comfortable if you were. This just indicates further evaluation.

Mr. CRAGWALL. No, no. We have a technical assistance element there which is to help people in the State agencies that are managing and developing water, to help them discern and evaluate——

Mr. DUNCAN. There is more to your supplemental program, that Dr. McKelvey has reluctantly been testifying about, than is on this sheet.

Mr. CRAGWALL. I thought the technical assistance element was on it.

Mr. DUNCAN. The headings are monitor and evaluate, evaluate, evaluate. I don't see any action. That is what worries me about the program. We ought to have been evaluating, and I am sure you are because I have been down and seen what you are doing, and I can understand the need in a crisis to do more of it. But, I would sure like to see some action in there.

Can you address yourself to——

Mr. MCKELVEY. This is the first step of the action, Mr. Duncan, in which we provide information to other agencies, including State and local organizations, that is the basis for action that is within their sphere of responsibility.

We have, as a matter of fact, received many requests—and Mr. Cragwall can elaborate on this—but we have received many requests from the State and local organizations for that kind of assistance and advice.

IMPACT OF CLOSING WATER STORAGE PROJECTS

Mr. DUNCAN. I got diverted from my line of questioning a few minutes ago. Is there anything you can see as an expert in this field of hydrology, water and water supply—is there anything you can see at all in the program to close down the construction of these water storage projects in the drought afflicted areas that is going to assist you in any way in meeting your responsibility to provide water to the people of those areas? Is there anything at all that you can see in that program which the administration now has underway to close these water storage projects down that is going to help you?

Mr. MCKELVEY. Mr. Duncan, those projects are actively being reviewed. The criteria under which they are being considered have been announced by the Secretary. What the outcome of that review will be, no one knows.

Mr. DUNCAN. I didn't even ask you that. Dr. McKelvey, and perhaps I am embarrassing you because of your position in the administration. Perhaps I ought to relieve you of that embarrassment, and I will. But, I would just like to say that I cannot see one shred, one iota of evidence that the closure of any one of those projects is going to assist, and it seems to me the evidence is overwhelming and self-evident and obvious to anybody that closing water storage in the water short areas of this country can do nothing but aggravate the effects of the drought.

I cannot see one single thing that that program of closures is going to do to help you. As a matter of fact, we are spending money to restudy projects that have been studied and passed by the Congress

of the United States, the political decisions made, and in most instances they have survived the judicial process, attack after attack.

In the face of the worst drought in history, it seems to me to be almost ludicrous—and I don't see how I can defend it to my taxpayers in my district—to give you $1.9 million more in a supplemental, and $3.9 million in 1978 to alleviate the water problems, while at the same time they are spending money downtown to close up the storage projects that you are going to try to study, to see how to collect and distribute ground water.

Mr. YATES. If I may answer for Dr. McKelvey, may I say that I would think that activity is doubly important right now, in view of the closure. He has to scurry around and find water. Isn't that correct, Dr. McKelvey?

Mr. MCKELVEY. That could be an effect, yes.

Mr. DUNCAN. So, what you are really saying, Mr. Chairman, and Mr. McKelvey is agreeing with you, is that this program of the administration is aggravating the problem, and we have to spend more money, not just to solve nature's problems, but to solve nature's problems aggravated by the administration's actions.

Mr. YATES. In a sense, I would say that is true.

Mr. DUNCAN. OK; so, I think you and Mr. McKelvey have answered my question. There is nothing in that program that is helping, and a lot that is hurting. One of the reasons we have put supplemental money in is because of what we are doing downtown.

Mr. YATES. Is that a possibility, Dr. McKelvey?

Mr. DUNCAN. You may have the witness. I don't think I would have gotten an answer without your help, Mr. Chairman.

BUREAU OF RECLAMATION WATER PROGRAMS

Mr. YATES. Let's go into the budget.

The budget is apparently giving some of the responsibility which I thought was yours and NOAA's, to the Bureau of Reclamation.

I am reading from the budget for fiscal year 1978, "Special Analyses," page 307:

> The efficient allocation and conservation of scarce water and water related resources will be studied by the Bureau of Reclamation. Studies directed toward better understanding of basic principles of hydrology necessary for the appraisal and evaluation of the Nation's water resources including the effects of underground waste storage will be undertaken by the Office of Water Research and Technology. Special studies will be conducted by the Bonneville Power Administration involving electrical energy planning, the development of new transmission and equipment design concepts to improve system performance development of new power systems control techniques.

Where does the Bureau of Reclamation come into this?

Mr. MCKELVEY. Mr. Chairman, the Bureau of Reclamation is a water management agency and responsible for the development of projects having to do with irrigation.

COLORADO RIVER DAM

Mr. YATES. With due respect to my good friend, Mr. Duncan, I saw a documentary a few nights ago of what the effect of the dams on the

Colorado River had been on the Colorado River. I wonder whether or not, while many of these projects have conserved some water, it has also resulted in fouling up the water that exists in the river, at least in the instance of the Colorado River, to the point of where we now have to construct a nuclear-powered plant to purify the water before it goes to Mexico.

Is my understanding of it correct?

Mr. McKelvey. I am not sure what action will be taken to achieve the purpose you mentioned. But, I am aware that there is a considerable problem with respect to the salinity of the water in the lower Colorado, and that action is going to have to be taken to purify it.

LEASE OPERATION AND EVALUATION BUDGET NEEDS

Mr. Yates. All right.

So far, with respect to the question that I asked you about before, we have only got $1.9 million for water resources for the 1977 budget, and $3.9 million water resources for the 1978 budget.

Now, what else have you asked for?

Mr. McKelvey. We have not asked for anything else as a supplemental, Mr. Chairman, but we are in the process of requesting additional funds for 1978 in several areas that have to deal with our responsibilities for lease operations and lease evaluation on Federal lands.

Part of our problem in developing those proposals is knowing or trying to determine just what is appropriate to be done.

MAXIMUM EFFICIENT RATE OF PRODUCTION

I think we discussed with the committee earlier the requirements of the Energy Policy and Conservation Act with respect to the determination of maximum efficient rate of production and a temporary emergency production rate as called for in that act.

Mr. Yates. How much?

Mr. McKelsey. It has not yet been determined exactly how that will be done, and so we are uncertain as to just what the level of expenditure might be.

Mr. Yates. How much did you ask the Secretary for?

Mr. McKelvey. We have given a preliminary estimate to Assistant Secretary Bettenberg of a total of about $4 million, but we are still in the process of discussing that and are uncertain ourselves as to what it ought to be.

VERIFICATION OF SHUT-IN WELLS

The same has to do with the question of verification of shut-in wells and the attention that is being paid to suspensions on shut-in leases. The extent to which we ought ourselves to verify information that is supplied to us by the operator is a difficult thing to judge. As you may know, the Secretary is in the process of forming an investigative panel to carry out the second part of the investigation that he initiated shortly after he took office.

REQUESTS FOR SUPPLEMENTARY FUNDS

Mr. YATES. I must confess to some disappointment with this reaction after the very eloquent and alarming statement that you made. I repeat it:

> I call attention to it because it will call on nearly the full range of the Survey's capabilities and is bound to focus much of our efforts during the coming and following years—for example, in the appraisal of energy resources, the supervision of exploration and production on Federal lands, the assessment of water supplies, drought potential, and flood hazards and damage, and research on climatologic trends.

To answer my question, you say you have asked the Secretary for $1.9 million for the 1977 budget and $3.9 million for the 1978 budget and possibly $4 million more for the petroleum program in the face of all that possible damage to our economy.

Mr. MCKELVEY. I gave you only one of the elements. The total that we are discussing with respect to the lease management and evaluation program is about $17.3 million. But, again I would stress, Mr. Chairman, that at this particular point we are uncertain ourselves as to what that level ought to be, and we are looking to this committee or a panel that is going to be formed—we are hoping they will provide some guidance.

Mr. YATES. For the moment at least you are just viewing with alarm.

Mr. MCKELVEY. We are doing more than viewing with alarm. We are actively working with these problems.

Mr. YATES. Are you waiting for the Secretary's group to tell you what to do?

Mr. MCKELVEY. I am hoping they will give some guidance by the time they are finished as to how to approach some of these problems that we are having.

Mr. YATES. How have they been considering it?

Mr. MCKELVEY. The panel has not yet been formed—I am not sure at this point—the Secretary has asked for advice from many sources—as to just how the team will be formed and how it will be composed. I expect the reason he did that is that so much depends on the public perception of what is done in this area. It is very important to find out what the public thinks are the best approaches.

Mr. YATES. Are you going out and holding hearings on it? Is that what you mean?

Mr. MCKELVEY. We are having hearings with respect to the MER regulations. They are in progress right now. I don't know that hearings will be held in conjunction with the Secretary's second phase study.

As I say, that panel or team has not yet been formed, and plans for its work have not yet been fully laid out.

Mr. YATES. I notice in this morning's paper the Secretary came out with a statement.

FISCAL YEAR 1978 BUDGET INCREASE

Mr. MCKELVEY. Mr. Chairman, just to conclude the last topic before we get onto the newspaper article, I might say that that statement

that I made was partly in support of the request that we are making in fiscal 1978, which is in total is substantial. I am also looking ahead, recognizing that many of these problems are going to not only continue, but possibly worsen. But I think the request we are making in 1978, an increase totaling $38.2 million is one of the largest that has ever been made in our SIR program, $209.5 million is for the National Petroleum Reserve activity. Our 1978 request covers many of the items that we are talking about. As a matter of fact, some 18 items of increases are involved in that $38.2 million request.

Mr. YATES. On pages GS–11 and 12 of your justification there is a statement of how you arrive at the increase. The increases and decrease total up so that the amount you will be working with is $353,622,000.

Mr. MCKELVEY. That is correct.

Mr. YATES. That is enough?

Mr. MCKELVEY. Not counting the request for the petroleum reserve in Alaska, $209.5 million.

Mr. YATES. You have become a big outfit all of a sudden, half a billion dollars.

Mr. MCKELVEY. Our total funding, putting in reimbursable funds from other organizations and our State cooperative, is about $675 million.

PAST 10 YEARS' BUDGETS

If I may, Mr. Chairman, I will elaborate on that. You asked us as a part of the prehearing preparation to submit to you a statement of the annual increases that have been made in our budget over the last 10 years. We furnished tables to you showing that information. I think it is both interesting and highly significant. In that period since 1967 our SIR budget shows a total increase of $273 million, and if we discount that for inflation we would subtract $78 million of that, but that still leaves $195 million increase in program over that period. But whereas, say in fiscal year 1967 we were at the level of roughly $81 million, it is now $353 million, a very substantial growth, and a growth that I believe reflects the growing importance of problems having to do with the earth, the adequacy of resources, the physical environment, the appropriate use of land and so on. All of these problems I think are becoming central and recognized to be central to the Nation's welfare. Some of them, of course, are becoming difficult to handle. But basic to the solution of those problems is knowledge about the fundamentals, about the magnitude and distribution of all kinds of resources, about the character of the land, and the nature of geologic processes. Intelligent attack on any of the kinds of problems that we have been discussing begins with improved knowledge.

ADEQUACY OF BUDGET REQUEST

Mr. YATES. Is there any respect in which you consider the GS budget to be deficient in terms of amounts necessary to carry on any of your responsibilities?

Mr. McKelvey. I believe the budget that we are proposing, Mr. Chairman, is at an appropriate level. You have often asked about what we would turn down. This year our request as it went to the Department was, with few exceptions, which I think I indicated previously, granted at the level which we submitted.

As I indicated, it does represent a very substantial increase.

BUDGET REQUEST TO DEPARTMENT

Mr. Yates. You were kind enough to give us a table showing where you had suffered reductions in the request originally made, and apparently you suffered most from Secretary Kleppe, because your priority D table of $450 million was reduced to $350,710,000. That was allowed to be increased to $360,618,000 when it went to OMB. OMB approved it at a level of $353,622,000. This is without reference to the amount for the National Petroleum Reserve.

When we look at the reductions which the Secretary made, you suffered a reduction of $7 million in Topographic Surveys and Mapping, $10 million in surveys and mapping for Geologic and Mineral Resources, $7 million in Water Resources Investigation. It seems strange with the drought on that should be cut.

Mr. McKelvey. That was a year ago.

Mr. Yates. Didn't we have a drought a year ago?

Mr. McKelvey. Not anywhere near the present national extent.

Mr. Yates. Conservation of Lands and Minerals was cut by $14 million. Then Land Information Analysis was cut by $20 million.

Mr. McKelvey. That was the highest priority. Notice, Mr. Chairman, that our budget request to the Department was given in terms of four levels.

Mr. Yates. Now you tell us the amount you have now, $563 million, including the National Petroleum Reserve budget, is adequate except for the additional $38 million that you are requesting of the Secretary; is that correct?

Mr. McKelvey. The $563 million includes——

Mr. Yates. Is the $38 million in this figure?

Mr. McKelvey. Yes.

Mr. Yates. So if the committee were to give you $563 million you would be surprised and delighted?

Mr. McKelvey. I would be very pleased, Mr. Chairman.

Mr. Yates. We will have to analyze the budget carefully and see where we think it may be deficient or excessive.

WASHINGTON POST ARTICLE ON LEASE PRODUCTION

In this morning's newspaper the Secretary is quoted as saying to the lessees from the Federal Government on offshore leases, and I suppose it is applicable to onshore leases, produce or lose your leases. Is that correct?

Mr. McKelvey. As I understand it, Mr. Chairman, he is saying, show me a developmental program or you will not be allowed to suspend——

Mr. EVANS. To extend, you mean?

Mr. MCKELVEY. It amounts to an extension, Mr. Evans, but what it is, it is a suspension of production that allows the operator if it is granted to continue the lease.

Mr. YATES. I'm reading from the headlines. Apparently that was a misconstruction. The headlines in today's Post:

PRODUCE OR LOSE LEASE

Interior Secretary Cecil D. Andrus is ordering oil and gas companies to agree to strict production schedules or face the unprecedented penalty of losing their leases on offshore drilling sites.

Andrus has told one company to begin pumping natural gas from its gulf coast site by the fall of 1978 or forfeit its lease with the Federal Government. When the leaseholder, Aminoil Oil Co. of Winston-Salem, N.C., asked for a 6-month extension in order to locate a drilling rig, Andrus gave it only 4 days. The company promptly located a rig.

The Interior Secretary has scheduled a review of 60 other leases in the Gulf which are not producing oil or gas and are scheduled to expire in the next few months. In each case, he could refuse to extend the lease, unless its holder agrees to a fixed date for production.

Normally, the extension of a lease is a virtually automatic decision made by a regional supervisor of the U.S. Geological Survey. No gulf coast lease has been canceled since drilling on Federal offshore property began there in 1954. Andrus has ordered a review of all 60 by a departmental task force and has served notice he will make the final decision on renewing or canceling each lease.

His action is part of an overall Interior Department plan to press oil and gas companies for increased production in the Gulf.

So I guess the record of all the companies since 1974 has been a good once because there has been no threat to cancel leases at all.

Mr. MCKELVEY. Mr. Chairman, the word cancellation I believe is used——

Mr. YATES. Loosely.

Mr. MCKELVEY. Loosely or improperly in that article. A lease that is in production cannot be canceled except by court action.

Mr. YATES. What about lack of diligence?

Mr. MCKELVEY. It is possible under section 3(c)(2) of the lease form which gives the Secretary the option of requiring additional drilling to achieve timely and proper development of the lease. Regulations also provide that he may reasonably require additional drilling to achieve timely and proper production.

If his order were not followed—if it would be determined under certain circumstances it would be reasonable to require additional drilling and the operator refused that—then I believe that would be a basis for cancellation of the lease, although it might very well be decided in court.

But the action that is referred to here is not merely cancellation. These leases are up for an extension and they simply will not be extended if the term is not met.

INTENT OF SECRETARIAL ORDER

Mr. YATES. What you are saying is that Secretary Andrus' order was directed solely to companies which are faced with expiration of their leases within a relatively short time?

Mr. McKelvey. That is right. It is a matter of not extending them unless they agree to satisfactory development programs.

Mr. Yates. What about companies that still have several years to go on their leases and which are not producing? This order of Secretary Andrus does not apply to them?

Mr. McKelvey. It would not be a basis for terminating the lease if it is still in its primary term.

Mr. Yates. You mean 5 years?

Mr. McKelvey. Five years is the primary term.

Mr. Yates. What about the due diligence factor?

Mr. McKelvey. We should have brought our lawyer today.

Mr. Yates. Would you ask counsel to examine my question and provide an answer for the record.

[The information follows:]

DILIGENCE PROVISIONS OF OCS OIL AND GAS LEASES

The Outer Continental Shelf Lands Act provides that oil and gas leases shall "be for a period of 5 years and as long thereafter as oil or gas may be produced from the area in paying quantities, or drilling or well reworking operations as approved by the Secretary are conducted thereon." 43 U.S.C. section 1337(b). The 5-year term offers the initial incentive for an OCS oil and gas lessee to diligently explore his lease and put it into production. The act does not specifically require diligence during these 5 years, but the risk of failing to do so is clearly on the lessees' shoulders.

Under his general leasing and regulatory authority in section 5 of the act, the Secretary has promulgated a regulation requiring a lessee "to diligently drill and produce such other wells as the Secretary may reasonably require in order that the leased area or any part thereof may be properly and timely developed and produced in accordance with good operating practice." 30 CFR 250.33(b). In addition, under the act the Secretary is authorized to include in the lease, when it is issued, such terms and provisions as he desires. Using this authority the Secretary has included in section 3(c)(2) of the lease, language with the same effect as 30 CFR 250.33(b). These authorities may be used during the initial 5 year term as well as thereafter.

Beyond the 5 year primary term, a lease may continue in existence only if it may be produced in paying quantities or if drilling or well reworking operations are being conducted on the lease. Regulations require that interruptions in production be diligently corrected by drilling or reworking operations and that drilling or reworking operations at the end of the primary terms or beyond be diligently conducted with no lapse of more than 90 days. 30 CFR 250.35.

OCS LEASE STATISTICS

Mr. McKelvey. May I give the committee some statistics that I think would be of interest?

Mr. Yates. The committee is always interested in your statistics.

Mr. McKelvey. Since 1954 on the Outer Continental Shelf in the Gulf of Mexico there have been a total of 2,434 leases issued. There are 1,700 in effect presently, so a total of 734 leases have been terminated for one reason or another in that period.

Just in the last year we received 100 written requests for suspensions to allow the operator to continue a lease beyond its primary term. We received 14 additional by way of oral inquiry.

NEW ORDER FOR OCS LEASES

I think I mentioned to the committee that we have been requiring—and have a new order in fact that went into effect the first of the year that gives specifics of the kinds of justification for the suspension of a lease. The operator has to meet those terms or the lease will not be extended. On the basis of discussions with our oil and gas supervisors, the 14 that made an oral request saw that it would be of no avail to submit a written request and justification and didn't pursue it further.

Of the 100 that made written requests, 85 were considered to meet the requirements for additional development; 12 additional were approved on the basis of modifications that we required and were accepted by the applicant. So this process has been going on in a way not at all as reported in that Washington Post article. There have in fact been terminations on the basis of lack of development plans or proof of development plans, insufficient justification for suspending a lease.

I think what the Secretary is doing is requiring a tighter schedule than may have been required in the past and a much more specific schedule. Whereas we have given a suspension for 6 months or a year, as I understand it, he is planning to set up a timetable whereby certain things will be accomplished by specific dates. Lack of accomplishment, except I suppose under reasons that might be justified in special instances, would be a basis for terminating the lease.

Mr. EVANS. Over what period of time do those figures apply?

Mr. MCKELVEY. The figures that I gave you with respect to the OCS as a whole date from 1954 when leasing first began, to November of 1976.

NUMBER OF TERMINATED LEASES APPEALED

Mr. EVANS. During that period of time some 700 leases terminated in one way or another?

Mr. MCKELVEY. That is right.

Mr. EVANS. Were any of the terminations objected to or taken to court?

Mr. MCKELVEY. I don't believe any of them were, Mr. Evans. There are a variety of reasons for terminations, including lack of discovery. I am not sure there have been any, and I suppose not many have been terminated because the field was depleted.

DISPOSITION OF OCS DATA

Mr. EVANS. When a lease is terminated does the Federal Government have a proprietary interest in information that is discovered during the life of the lease?

Mr. MCKELVEY. The information I believe becomes public when the lease is terminated.

Mr. EVANS. Would you check with your counsel if there is any doubt to make sure that is correct for the record.

Mr. MCKELVEY. I will be glad to.

[The information follows:]

DISPOSITION OF DATA UPON LEASE TERMINATION

The information from terminated leases, becomes public in accordance with the provisions of title 30 CFR 250.97 which states that:

"A. Geophysical data, processed geophysical information, interpreted geophysical information and interpreted geological information (as defined in sec. 251.3 of title 30), which are submitted pursuant to the requirements of this part shall not be available for public inspection without the consent of the lessee so long as the lease remains in effect, or for a period of 10 years after the date of submission, whichever is less, unless the supervisor with the approval of the Director determines that earlier release of such information is necessary for the proper development of the field or area.

"B. Geological data and analyzed geological information (as defined in sec 251.3 of title 30), which are submitted pursuant to the requirements of this part shall not be made available for public inspection without the consent of the lessee as long as the lease remains in effect or for a period of 2 years after the date of submission, whichever is less, unless the supervisor with the approval of the Director determines that earlier release of such information is necessary for the proper development of the field or area."

OUTSTANDING LEASES

Mr. EVANS. How many leases were outstanding?

Mr. MCKELVEY. 2,434.

NUMBER OF INVOLUNTARY TERMINATIONS

Mr. YATES. Were any of the terminations involuntary?

Mr. MCKELVEY. I am sure that many of them were, yes, involuntary in the sense that a request for an additional extension was not approved.

DEPARTMENTAL ACTION ON ORDER 1 THROUGH 14

Mr. YATES. Has anybody in the Department taken a position with respect to orders 1 through 14 which were issued January 1977?

Mr. MCKELVEY. They are under continual review and revision, Mr. Chairman.

OIL SPILLS

Mr. YATES. Let's talk about oil spills. On May 5 last year, Dr. McKelvey, you made a statement to the New York State Legislature:

The probability of damage to New York beaches from oil spills stemming from offshore production is small.

New York will of course share in the benefits of any large discoveries of oil and gas which may be made in this area, but it seems unlikely that New York coastal land will be required for any major additional processing or distribution facilities.

Then in concluding you say:

The risk of a large oil spill is extremely small though it can never be completely eliminated—but neither can the chance of a much larger spill from a tanker. If substantial amounts of oil are discovered, the substitution of pipelined OCS oil for a part of the oil moved in by tankers would likely result in a net reduction of the risk of oil pollution now being experienced.

Then you cite a couple of studies that were made. Then we note that on February 17 of this year District Court Judge Weinstein is quoted in the newspaper as saying:

The Interior Department ignored the rights and practical effects of local governments that might restrict drilling operations in their jurisdictions: failed to consider the environmental impact of oil pipeline routes from the continental shelf, overstated oil and gas production estimates and understated the cost of production.

Would you care to comment on the judge's findings? Is the judge correct?

Mr. McKELVEY. Mr. Chairman, as you know, the Secretary is appealing the judge's decision.

Mr. YATES. I guess that speaks for itself. Is that what you are trying to say?

Mr. McKELVEY. Yes.

Mr. YATES. You would rather not speak?

Mr. McKELVEY. I think what I said to the New York Legislature, from which you quoted, is substantially correct. I think the chance of a spill from offshore drilling reaching New York beaches is very small. As you may know, the prospects for petroleum lie a considerable distance offshore and south of Long Island, and we have analyzed on the basis of wind and current data what the trajectory of a spill from various locations would be. I have forgotten the details of that for the New York area. But most of the spills by far in that kind of analysis go to the south and a long way south.

Mr. YATES. You mean the tides take them?

Mr. McKELVEY. Right.

ADEQUACY OF NUMBER OF PERSONNEL

Mr. YATES. Let me ask you a question. In 1967 the GS received $81,609,000 for its work. You had 5,549 employees. Your estimate for fiscal year 1978 employment is 7,570, roughly 2,000 more employees, yet your appropriation has been increased from $81 million to $353,622,000, an increase of $272,013,000.

Mr. McKELVEY. Yes. That is a very significant increase.

Mr. YATES. It is an enormous increase, and it raises two questions. Do you have enough employees to administer the program and how do you keep track of all your operations? You are responsible for everything that happens. How do you keep track of all the details?

Mr. McKELVEY. I burn a lot of midnight oil, Mr. Chairman, and I have a lot of good help. But, Mr. Chairman, what has happened in that period is that there has been an increased substitution of machines

for people, and I am not able to say quantitatively what the effect of that has been, but I am sure it is substantial. In some of our programs that are production related such as map preparation and printing, it shows very clearly. There is a substantial increase in productivity related to improved methods and equipment. But I suppose the biggest part of that reflects the fact that we are doing much more through grants and contracts than we did in 1967.

CONTRACTS AND GRANTS WORKLOAD

Mr. YATES. That is the answer. You have personnel ceilings and you are putting out the work by contracts, aren't you?

Mr. MCKELVEY. We are proposing $108 million to be spent that way in 1978.

Mr. YATES. Is that the best way to do your work? Apparently you think it is the only way to do your work in view of the personnel ceilings.

Mr. MCKELVEY. That is correct.

ADEQUACY OF WORK UNDER CONTRACT

Mr. YATES. Would you be better off if the personnel ceilings were lifted? Would that provide for a more efficient and economic operation?

Mr. MCKELVEY. Of course, that is very difficult to answer, Mr. Chairman. I think that we recognize in many areas that it is appropriate; it would be even if we did not have any personnel ceilings at all, to do part of our work through the use of other organizations.

I didn't mention, for example, when I mentioned contracts, the NPRA budget of $209.5 million, most of which will be spent through contracts. I am sure under no circumstances would we want to undertake that work——

CONTRACTOR FOR NPRA WORK

Mr. YATES. Who is doing that work, Husky?

Mr. MCKELVEY. The Husky Oil Co., Yes.

Mr. YATES. Did you pick Husky without competitive bidding?

Mr. MCKELVEY. The Navy picked Husky and I am not aware of the circumstances under which they chose that organization.

Mr. YATES. Is Husky a subsidiary of some company?

Mr. MCKELVEY. I believe it is one of the larger independent oil companies.

Mr. COULTER. Husky-Alaska is a subsidiary of Husky Oil Co., which is a large independent oil company.

Mr. YATES. Is your contract with a contractor or with Husky?

Mr. COULTER. It is with a division of Husky which was set up specifically to handle this operation.

Mr. MCKELVEY. Much of our aerial photography is contracted.

NEED FOR CONTRACTING

Mr. YATES. What contracts do you put out that might be done as well or better by employees of the GS? Can you give us some examples?

Mr. MCKELVEY. Yes. I could ask Mr. Hamilton to elaborate on this. We give many grants for research in the earthquake area. There again we are giving those grants to highly competent people. We are diversifying, you might say, the intelligence that is going into the program. The universities have great strength in that particular area. I think even if we had no personnel ceilings we would always want to do some of that, to enlist the support of many people in the academic community.

Mr. YATES. So that is not an example, then?

Mr. MCKELVEY. It is an example of something we could do ourselves and maybe if we had no personnel ceilings——

ADDITIONAL PERSONNEL REQUIREMENTS FOR EARTHQUAKE PROGRAM

Mr. YATES. Does Mr. Hamilton need additional employees?

Mr. MCKELVEY. Yes. We are requesting additional employees in the earthquake area.

Mr. YATES. Do you still, even with the additional employees the committee may give Mr. Hamilton, want the outside contracting? What will those employees do?

Mr. MCKELVEY. We want to expand our own part of the program but we also will have to expand the number of people that are involved in monitoring grants and contracts.

Mr. YATES. Who does it now? Mr. Hamilton all by himself?

Mr. MCKELVEY. No. Some of Mr. Hamilton's people and of course our contracts personnel. But the volume that will be done through grants and contracts will much increase and the workload will increase that is related to that.

OTHER EXAMPLES OF CONTRACTING

You asked for examples of what we would perhaps like to do ourselves but can't. We are presently in our water resources co-op program making an effort to increase the amount of work that will be done by the cooperator rather than ourselves. Traditionally we have with some exceptions done the bulk of the work even though the cooperator paid for it. But because of the personnel ceilings and the desire to restrain growth in Federal personnel, we are examining what parts of that could be done possibly by the State or local cooperator or done in some other way. It is giving us a problem.

EMPLOYEES IN FEDERAL-STATE COOPERATIVE PROGRAM

Mr. YATES. How many employees are involved in that program?

Mr. MCKELVEY. The total number in the Federal-State cooperative program is about 1,700 or 1,800 people. I can give you the exact figure in the record.

Mr. YATES. Please do.

[The information follows:]

EMPLOYEES IN WATER RESOURCES FEDERAL-STATE COOPERATIVE PROGRAM

Direct Federal appropriations support 853 employees and State funds support 712 employees, for a total of 1,565 permanent employees in the Federal-State cooperative program.

CAPABILITY TO ADMINISTER GROWING PROGRAM

Mr. YATES. Has your program growth to this magnitude affected your ability to administer your responsibilities?

Mr. MCKELVEY. I don't feel that it has, Mr. Chairman.

TOPOGRAPHIC SURVEYS AND MAPPING

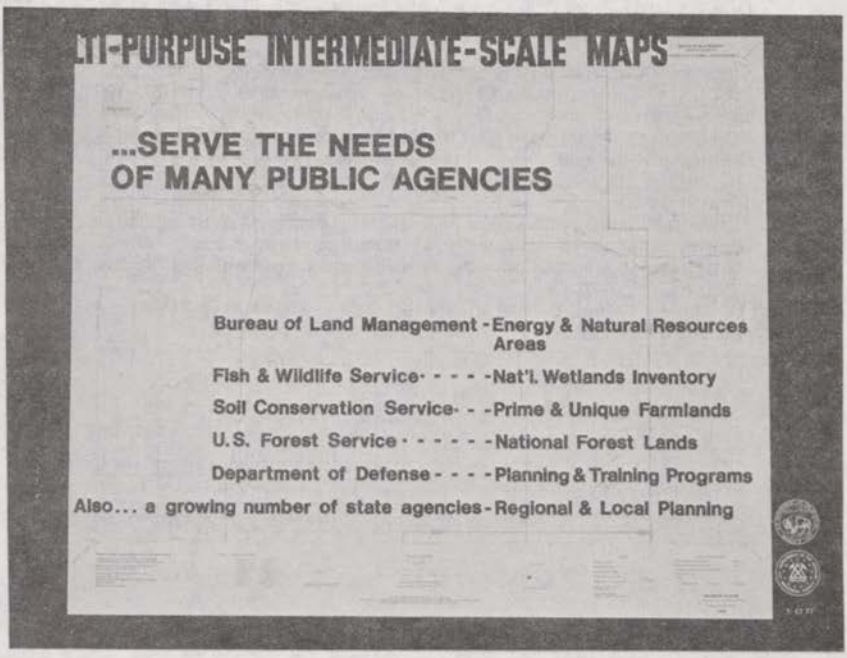
Mr. YATES. Let's turn to page 20 of your justifications, topographic surveys. You indicate the objective of your program is to prepare and make available multipurpose maps, fundamental cartographic data to meet the new and expanding needs of the Nation.

What are such needs?

Mr. MCKELVEY. They are of a considerable variety, Mr. Chairman.

Mr. YATES. You have a chart that may be of help.

[The chart follows:]



The intermediate scale map program involves the preparation of multipurpose base maps which meet the needs of many users. Examples of important uses are listed for several Federal agencies. Once the initial set of basic map data is prepared, any number of users can depict their own special information on stable base reproductions to produce the desired map product. Having these multipurpose base maps eliminates duplication of base mapping at the intermediate scale range.

Mr. McKELVEY. This chart refers to the intermediate scale maps for which we are requesting an increase of about $3 million. The purpose of this chart is to indicate how they serve the needs of several Federal as well as State agencies. All of those listed, you might say, have been very aggressive and positive in their requests for maps of these scales.

TYPES OF MAPPING NEEDS FOR COUNTRY

Mr. YATES. Why not put into the record a list of all the kinds of mapmaking and maps the country needs as you see it?

Mr. McKELVEY. I would be glad to do that.

[The information follows:]

TOPOGRAPHIC MAP SERIES, SCALES AND PRINCIPAL USERS

The ever expanding need for accurate and up-to-date maps can be related very closely to increased attention the Nation must give to the use of its lands and resources. Decisions on areas of high national concern such as energy, water, and the environment requires reliable information on the classification, location, and extent of these resources. This information must be displayed in various levels of detail so that adequate consideration may be given to national, State, and local concerns—thus the need for a systematic variety of base maps.

To illustrate, base maps are needed in energy areas for:

Support of exploration, development, and reclamation planning.

Display of the location and effect of energy developments on land and water resources.

In coastal zone areas for:

Assessment of alternative uses of natural resources.

Display of the extent and type of natural and man made features.

In urban areas for:

Planning transportation and utility systems.

Display of land use and zoning regulations.

Displaying the geographic aspect of census and social statistics.

Critical water areas for:

Assessing flood-prone areas and displaying the extent of these areas.

Determining runoff volumes and characteristics.

Planning for intensified use, storage, and transmission of available water.

A listing of the principal uses and users of the major map types produced by the Geological Survey follows:

MAJOR MAPS AND MAP PRODUCTS, U.S. GEOLOGICAL SURVEY

PRINCIPAL FEDERAL MAP USERS	7.5' Topographic Quads	Orthophotoquads	Intermediate-Scale Maps	1:250,000-Scale Maps	National Park Maps	State Base Maps	U.S. Base Maps	National Atlas	Land-Use Maps	Aerial Photos	Satellite Imagery Maps	Digital Data
Agricultural Stabilization and Conservation Service	○	○	○					○	○			○
Bureau of Indian Affairs	○	○	○			○	○	○	○			○
Bureau of Land Management	○	○	○	○		○	○	○	○	○		○
Bureau of Mines	○	○	○	○		○	○		○			
Bureau of Outdoor Recreation	○	○	○	○	○	○		○	○			
Bureau of Reclamation	○	○	○	○	○	○		○	○			○
Bureau of the Census	○	○	○	○			○	○	○			○
Coast Guard	○	○	○	○					○			
Corps of Engineers	○	○	○	○		○	○	○	○			○
Customs Service	○	○	○			○			○			
Department of Defense	○	○	○	○	○	○	○	○	○	○		○
Energy Research & Development Ad.	○	○	○	○	○	○	○	○	○	○		○
Environmental Protection Agency	○	○	○	○				○	○	○		○
Federal Aviation Administration	○	○	○	○	○		○	○	○			○
Federal Highway Administration	○	○	○	○		○		○	○			○
Federal Power Agencies	○	○	○	○	○	○	○	○				○
Fish and Wildlife Service	○	○	○	○	○	○	○					○
Forest Service	○	○	○	○		○	○	○	○	○		○
General Services Administration	○	○	○	○								
Geological Survey	○	○	○	○	○	○	○	○	○	○		○
Health, Education and Welfare	○	○	○					○				
Housing and Urban Development	○	○	○					○	○	○		
International Boundary Commissions	○	○	○	○		○	○			○		
Library of Congress	○	○	○	○	○	○	○	○	○	○	○	
NASA	○	○	○	○	○	○	○	○		○	○	○
National Ocean Survey	○	○	○	○	○	○	○			○		○
National Park Service	○	○	○	○	○	○	○	○	○	○		
National Science Foundation	○	○	○	○	○	○	○	○	○	○	○	
National Weather Service	○	○	○	○		○	○	○		○	○	
Postal Service	○	○	○	○		○	○	○				
Regional Commissions	○	○	○	○	○	○		○	○	○	○	○
Soil Conservation Service	○	○	○	○						○	○	
Tennessee Valley Authority	○	○	○	○						○		
PRINCIPAL NON-FEDERAL MAP USERS												
State, County & City Planners	○	○	○	○	○	○		○	○	○		○
Highway Departments	○	○	○	○		○		○	○	○		○
Petroleum Companies	○	○	○	○		○		○		○		○
Railroads	○	○	○	○		○		○		○		
Lumber and Paper Companies	○	○	○	○						○		
Consulting Engineers & Surveyors	○	○	○	○						○		○
Geologists	○	○	○	○	○	○	○	○	○	○	○	○
Communication Companies	○	○	○	○		○		○		○		○
Public Utilities	○	○	○	○						○		○
Land Developers and Realtors	○	○								○		○
Mining Companies	○	○	○	○						○		
Private Mapping Companies	○	○	○	○	○	○	○	○	○	○	○	○
Tourists and Outdoor Sportsmen	○	○	○		○							
Recreational Industries	○	○	○	○			○					
Scouts, Campers and Hikers	○	○	○		○				○			
Farmers, Ranchers	○	○	○						○			
Universities & Colleges	○	○	○	○	○	○	○	○	○	○		
Councils of Government	○	○	○	○								

MAJOR MAPS AND MAP PRODUCTS, U.S. GEOLOGICAL SURVEY

PRINCIPAL MAP USES	7.5' Topographic Quads	Orthophotoquads	Intermediate-Scale Maps	1:250,000-Scale Maps	National Park Maps	State Base Maps	U.S. Base Maps	National Atlas	Land-Use Maps	Aerial Photos	Satellite Imagery Maps	Digital Data
Natural Resource Inventories	○	○	○	○	○	○	○	○	○	○	○	○
Coal Evaluation and Assessments	○	○	○	○		○	○		○			○
Strip Mining and Land Restoration	○	○	○	○		○				○		○
Land Energy Exploration	○	○	○	○			○			○		
Range and Timber Management	○	○	○	○	○	○			○	○	○	○
Coastal Zone Management	○	○	○	○	○	○	○		○	○	○	○
Locations for Deep Water Ports			○	○								
Oil, Gas & Coal Lease Management	○		○	○		○	○					○
Water and Drainage Studies	○	○	○	○	○			○	○	○	○	○
Regional Planning & Development	○	○	○	○	○	○		○	○	○	○	○
Land Reclamation Studies	○	○	○	○		○			○	○		○
Environmental Impact Studies	○	○	○	○		○				○		
Geologic Mapping	○	○	○	○	○	○	○	○	○	○	○	○
Land Use Studies & Classification	○	○	○	○				○	○	○	○	○
Display of Soils Classification	○	○	○	○				○		○	○	○
Planning of Transportation Routes	○	○	○	○	○	○		○	○	○		○
Planning for Park Areas	○	○	○		○	○		○	○	○		
Wilderness Studies	○	○	○	○	○	○		○		○		○
Flood Prone Area Displays	○	○	○	○						○		○
Disaster Relief & Assessment	○	○	○	○		○			○	○	○	
Storm Evacuation	○	○	○	○		○				○		
Earthquake and Land Hazards	○	○	○	○						○		
Fire Protection and Control	○	○	○	○	○					○		○
Land Ownership Display	○	○	○		○		○			○		○
Meteorological Data				○		○	○	○		○	○	
Law Enforcement	○	○	○	○	○					○		
Border Surveillance	○	○								○		
Census--Population, Game, etc.	○	○	○		○		○	○		○		○
Base for Urban Surveys	○	○								○		
Tax Evaluation & Assessments	○	○	○	○		○			○	○		
Sewer and Waste Treatment Studies	○	○								○		○
Regulatory Activities	○		○							○		○
Utilities, Planning and Expansion	○	○	○	○	○	○			○	○		○
Health & Welfare Geographic Studies				○				○				
Zoning	○	○	○							○		
Industrial Development	○	○								○		
Nuclear & Hydroelectric Power Sitings	○	○	○	○		○				○		
Location of Communication Sites	○	○	○	○	○	○				○		
Schools and Student Distribution	○			○				○				
Real Estate and Subdivision planning	○									○		○
Marketing Studies	○	○	○	○		○		○		○		
Base for Commercial Maps & Displays	○	○	○	○		○	○	○		○		○
Source to Derive Digital Map Data	○	○	○	○	○	○			○	○	○	
Military Exercises and Training	○	○	○	○						○		
Other Military Requirements	○	○	○	○			○	○		○		○
Metropolitan Airport Safety	○	○								○		○

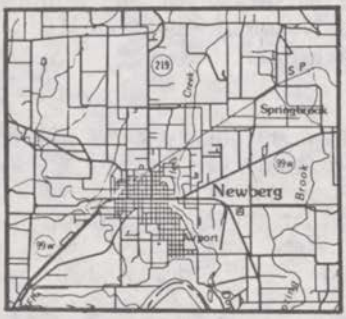
Distinction Between Map Scales of the U. S. Topographic Series:



MORE DETAIL

1:24,000-Scale (1 inch = 2,000 feet)
Area Shown = 1 square mile

These maps cover approximately 57 square miles and are used where detailed land surface information is required. They are used for energy and mineral exploration, for natural resource and water management, for agricultural and census area statistics, for outdoor recreation activities, and for many engineering studies and surveys. Approximately 54,000 maps are required to cover the conterminous U.S.



1:100,000-Scale (1 inch = 1.5 miles)
Area Shown = 16 square miles

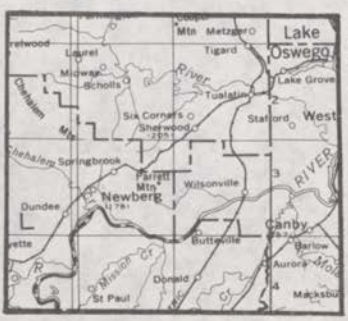
Each of these maps cover an area equal to 32 of the 1:24,000-scale maps from which the content is derived. These maps are used for countywide or broad area studies where less extensive detail is required. They are used as a multi-purpose base for displaying various information, such as, important farmlands, wetlands, Federal land ownership and subsurface mineral rights, and for State and county management planning. Approx. 1,800 maps are required to cover the conterminous U.S.



1:250,000-Scale (1 inch = 4 miles)
Area Shown = 107 square miles

Each of these maps covers an area equal to 128 of the 1:24,000-scale maps and contain significantly less detail. These maps are used for broader area or regional planning. They are used for water resource studies, for civil defense and disaster relief coordination, and as bases for air pollution, aeronautical charts, land-use, and weather records. Approx. 450 maps are required to cover the conterminous U.S.

LESS DETAIL



1:500,000-Scale (1 inch = 8 miles)
Area Shown = 415 square miles

These maps generally cover a State and are used to display studies, inventories and management activities requiring detail appropriate to a statewide overview. They are also used to help in locating interstate utilities, to delineate drainage basin boundaries and as a base to prepare State Highway and other maps. They are available as a planimetric, topographic, or shaded-relief edition.

IMPORTANCE OF MAPS

Mr. McKELVEY. The Department of Conservation and Economic Development of Virginia put out a booklet in 1973 which describes the uses that are made of topographic maps. That was done in connection with a cooperative program of mapping at a scale of 1:24,000, completing coverage of the entire State of Virginia. I am very much aware of the importance of the availability of these maps for many uses in his State.

In that booklet, as I recall, he identified something like 800 specific uses of topographic maps. I will not give that kind of detail in our statement.

Mr. YATES. Mr. Murtha.

MAPS PREPARED FOR UNITED STATES ONLY

Mr. MURTHA. These maps you make are only of the United States?

Mr. McKELVEY. Antarctica and the United States. We have done mapping of the Antartica financed by the National Science Foundation and we have done mapping in the trust territories.

Mr. MURTHA. Is that by request?

Mr. McKELVEY. Yes.

Mr. MURTHA. If you wanted a map of a foreign country where would you get the map? You don't get involved in that at all?

Mr. McKELVEY. No; if asked for a foreign map, we would see if it is available through our own library, and then the Defense Mapping Agency, of course, does mapping in some foreign areas.

Mr. MURTHA. You don't provide worldwide maps for defense?

Mr. McKELVEY. No.

Mr. MURTHA. Only for the United States?

Mr. McKELVEY. Yes.

We have done topographic mapping in other countries as a part of the AID program, but we have no responsibilities for world coverage.

CONTRACTING FOR TOPOGRAPHIC MAPPING

Mr. YATES. I notice in the justifications appearing at page 21 there are among your cost factors contracts for $1,175,000. That is out of $30 million. Will that work be done under contract?

Mr. McKELVEY. I will ask Mr. Lyddan to provide this.

Mr. YATES. Would you rather this be in-house if you had the choice?

Mr. LYDDAN. If you will permit me, Mr. Chairman, I would like to explain our involvement in contract mapping. It goes back 20 years or so. At that time the commercial firms in mapping which had been doing large-scale mapping for engineering and related purposes claimed they could do our kind of mapping cheaper than it was done in-house. We had some work done by contract at that time, and then made a rather careful cost analysis which indicated to us that this claim was not correct. We stood on that for many years, although I should say not to the satisfaction of the commercial people who felt they were not given a fair chance at that work. I decided, when I became Division Chief, that we would see if they could do this work cheaper, faster, or better, as they were claiming. I was not so sure that all of that would turn out to be true; that I was willing to layoff people in order to free up money to give this a try. But as we lost people through normal reduction we did move into contract work.

Now I think we are beginning to gain some meaningful experience in this connection. It is a little early for me to be sure this is the way to go for a substantial part of our work in the future. It may depend on the extent to which we have to invest money in testing and inspecting. If we have to do a lot of that, the chances are the aggregate cost will turn out to be more. I hope it won't turn out that way.

Mr. YATES. Thank you.

GLOSSARY OF MAPPING TERMS

Mr. Duncan.

Mr. DUNCAN. Would you mind putting in the record at an appropriate spot a glossary of terms related to mapping, quadrangle, topographical, and other terms. Just very briefly so the uninitiated will know a little more what you are talking about.

Mr. McKELVEY. I would be happy to do that.

[The information follows:]

GLOSSERY OF MAPPING TERMS

automated mapping instruments. Instruments, machines, and equipment that increase productivity and accuracy and reduce human effort, fatigue, and fallibility. Examples include inertial surveying systems, almost completely automatic; electronic distance-measuring instruments, far more accurate and productive than measuring with tapes or chains; stereoscopic instruments equipped with auxiliary devices that encode and record data in digital form for processing by computers; analytical stereoplotters linked directly to computers to prepare maps from unconventional photographs that cannot be used in ordinary instruments; a photomapping machine that can simultaneously produce an orthophotograph and a contour plot (recorded on photographic film) and a digital terrain model (recorded on magnetic tape); and precise plotting machines that can draw many types of maps under control of magnetic tapes prepared by a computer.

base map data. Map data that are normally produced in preparing general-purpose maps. Base map data can be available as individual features, such as roads, streams, and contours, or in combinations. Data categories are:

(1) Reference systems--geographic and other coordinate systems, except the public land survey network.

(2) Hypsography--contours, slopes, and elevations.

(3) Hydrography--streams and rivers, lakes and ponds, wetlands, reservoirs, and shorelines.

(4) Surface cover--woodland, orchards, vineyards (general categories only).

(5) Nonvegetative features--lava rock, playas, dunes, slide rock, and barren waste areas.

(6) Boundaries--political jurisdictions, national parks and forests, military reservations, etc. (does not fully set forth land ownership or land use).

(7) Transportation systems--roads, railroads, trails, canals, pipelines, transmission lines, bridges, tunnels, etc.

(8) Other significant manmade sturctures, such as buildings, airports, and dams.

(9) Geodetic control and other survey monuments and landmark structures and objects.

(10) Geographic names.

(11) Orthophotographic imagery.

bathymetric data. See bathymetric map under map.

cartographic data. Information normally gathered and shown on maps. The specific data depend on the scale and purpose of the map.

Large-scale maps can show highly detailed information, but small-scale maps must generalize or omit information.

county format. A map limited to the area of an individual county, with shape determined by the county boundaries. (See also Intermediate-scale series under map series.)

digital data. Information expressed in numerical terms for computer input, storage, processing, and output.

digital cartographic data base. Numerical data representing spatially-relatable physical features (natural, artificial, or both) that can be used in computations, statistical analysis, and graphical output.

map. A representation on a plane surface, at an established scale, of the physical features (natural, artificial, or both) of a part or the whole of the Earth or any heavenly body, by means of symbols and labels and with the means of orientation indicated. A map may emphasize, generalize, or omit the representation of certain features to satisfy specific requirements. The type of information which a map is primarily designed to convey is frequently used in adjective form to distinguish it from maps of other types.

base map. A map containing the fundamental framework for adequate geographic reference and positioning of information that may be drawn or overprinted on it. It contains only the common essentials generally found on a wide variety of maps of comparable scales.

compiled map. A map incorporating information collected from various sources, not produced by surveys for the map considered. Most small-scale maps of large areas are compiled maps.

bathymetric map. A map delineating the form of the bottom of a body of water, or a part of it, by bathymetric contours, which show depths.

engineering map. A map showing information essential for planning an engineering project or development and for estimating its cost. An engineering map is generally a large-scale map of a comparatively small area or of a route. It may be entirely the product of an engineering survey, or reliable information may be collected from various sources and delineated on a base map.

general-purpose (multipurpose) map. A map providing a large amount of general information for widespread public use.

planimetric map. A map presenting only the horizontal positions for the features represented; distinguished from a topographic map by the omission of relief in

measurable form. Planimetric maps may show bench marks and/or elevations of significant features.

published map. A map printed and stocked for general distribution.

quadrangle map. A map of a quadrangle area. See quandrangle.

special-purpose map. A map meeting limited objectives, emphasizing or representing certain classes or types of imformation. Typical examples are the geologic map of the United States; the shaded-relief map of Massachusetts, Rhode Island, and Connecticut, and a State index map.

topographic map. A map presenting the horizontal and vertical positions of the features shown, distinguished from a planimetric map by the addition of relief in measurable form. A topographic map generally shows the same features as a planimetric map, but contour lines or comparable sympols are used to show mountains, valleys, and plains.

map inspection. Comparing published maps with new aerial photographs to determine whether the maps need to be revised.

map maintenance. Reprinting and maintaining map stocks.

map revision. The updating and correcting of a map to reflect changes that occurred since the original survey or latest revision. Four types of revision are used, the choice depending on the requirements of individual quandrangles or projects.

complete revision. Correcting all deficiencies in planimetry and relief features, including improvement of accuracy, vertical and/or horizontal, to result in a class-1 map that meets current specifications in all respects.

standard revision. Updating and correcting a map to reflect changes that have occurred since the original survey or latest revision. The accuracy of the existing map is preserved, and current specifications for map symbolization, content, and format are generally applied.

limited revision. Correcting specified map deficiencies only. (Usually applied to updating certain major features specified for each project, or limited to certain types of features within portions of a project area.)

interim (photo) revision. A type of limited revision in which changes, additions or deletions, are determined by comparing the original map with recent aerial photographs. Only limited and specified deletions or changes are made, and the added data are combined on a single plate and printed in purple. The revised data are not field checked.

map separates. The components of a map, divided according to type or class of features and/or printing color. Professional users can select elements and combine them with other data to produce special maps meeting specific needs.

map scale. The relationship between a distance on a map and the corresponding distance on the Earth. Map scale may be expressed as an equivalence, usually by different units (1 inch = 1 mile); as a numerical fraction or ratio (1/63,360 or 1:63,360); or graphically, by a bar scale.

The terms large scale, intermediate scale, and small scale are relative, depending on the point of view of the maker or the user. For the National Mapping Program, the following scale ranges are defined:

large scale. Scales of 1:25,000 and larger.

intermediate scale. Scales between 1:25,000 and 1:250,000 but particularly 1:100,000.

small scale. Scales of 1:250,000 and smaller.

map series. A family of maps conforming generally to the same specifications or having some common unifying characteristic. The term National Topographic Map Series is used to designate collectively the several quandrangle and other map series of the United States and its dependencies. Principal individual series are defined as follows:

7.5-minute series. The series of maps having quandrangle dimensions of 7.5 minutes in both latitude and longitude, the bounding parallels and meridians being multiples of 7.5 minutes. The series includes the few maps whose boundary lines are offset or extended to cover islands, irregular coastal features, or areas needed to extend map coverage to political boundaries.

15-minute series. The series of maps at 1:62,500 scale having quandrangle dimensions of 15 minutes in both latitude and longitude, the bounding parallels and meridians being multiples of 15 minutes. The series includes the few maps whose boundary lines are offset or extended to cover islands, irregular coastal features, or areas needed to extend map coverage to political boundaries.

Alaska 1:63,360 series. The series of maps of Alaska at the scale of quandrangles having dimensions of 30 minutes in latitude and 1° in longitude, the bounding parallels being multiples of 30 minutes and the bounding meridians being multiples of 1°; or (b) at 1:100,000 or 1:50,000 scale of individual counties, the limits of coverage being county boundaries (county format).

1:250,000 series. The series of maps at 1:250,000 scale generally having quandrangle dimensions of 1° in latitude and 2° in longitude. This series includes those maps whose boundary lines are offset or extended to cover islands, irregular coastal features, or areas needed to extend map coverage to political boundaries. In Alaska the quandrangle boundaries are 1° in latitude and 2° to 3° in longitude; in Hawaii the quandrangle dimensions are 1° in latitude and 1°30' to 1°35' in longitude.

State series. The series of maps of the individual States, usually at scales of 1:500,000 and 1:1,000,000. Some of the smaller States are combined on one sheet. State maps usually are printed in 3 editions: base, topographic, and shaded-relief.

International Map of the World series. The United States portion of the International Map of the World (IMW), at 1:1,000,000 scale, with quadrangle dimensions of 4° in latitude and 6° in longitude (12° for Alaska). Elevations and contours are in meters.

orthographic projection. A projection of points by straight lines from a point at an infinite distance from the plane of projection.

orthophotograph. A photograph derived from perspective photographs and equivalent to a photograph made by orthographic projection. In a perfect orthophotograph, there are no displacements of images because of tilt or relief.

orthophotomosaic. An assembly of orthophotographs, precisely controlled, to form a uniform-scale photographic representation of a portion of the Earth's surface.

orthophotomap. A photomap prepared from an orthophotograph or a precisely controlled assembly of orthophotographs. It is generally published in standard map format. It incorporates special cartographic treatment, photographic line enhancement, color separation, or a combination of these.

orthophotoquad. An orthophotograph or orthophotomosaic in standard quadrangle format, with a mininum of cartographic enhancement.

quadrangle. A figure of 4 sides and 4 angles formed by parallels of latitude and meridians of longitude; in mapping, the format of most series of standard topographic maps. The dimensions are not necessarily the same in both directions. The map of such an area is termed a quadrangle map.

semiautomatic recording components. Accessories to normal instruments, which encode and record data while the operator follows normal operating procedures.

RATE OF TOPOGRAPHIC MAPPING

Mr. YATES. You talk about a compressed period to support several activities. What do you mean by compressed period?

Mr. MCKELVEY. I guess we mean simply a short period. That probably could have been written better.

Mr. YATES. What is the present rate of topographic map production?

Mr. MCKELVEY. About 90,000 square miles a year of new quadrangle mapping. At the proposed level of mapping for the intermediate scale, I will ask Mr. Lyddan if he has that.

It is on the chart. In 1977 the intermediate scale mapping will be covering about 700,000 square miles and in 1978 about 975,000 square miles.

Mr. LYDDAN. I don't have a square-mile figure for the intermediate scale mapping.

Mr. DUNCAN. That includes mapping the unmapped areas plus bringing the other ones up to date?

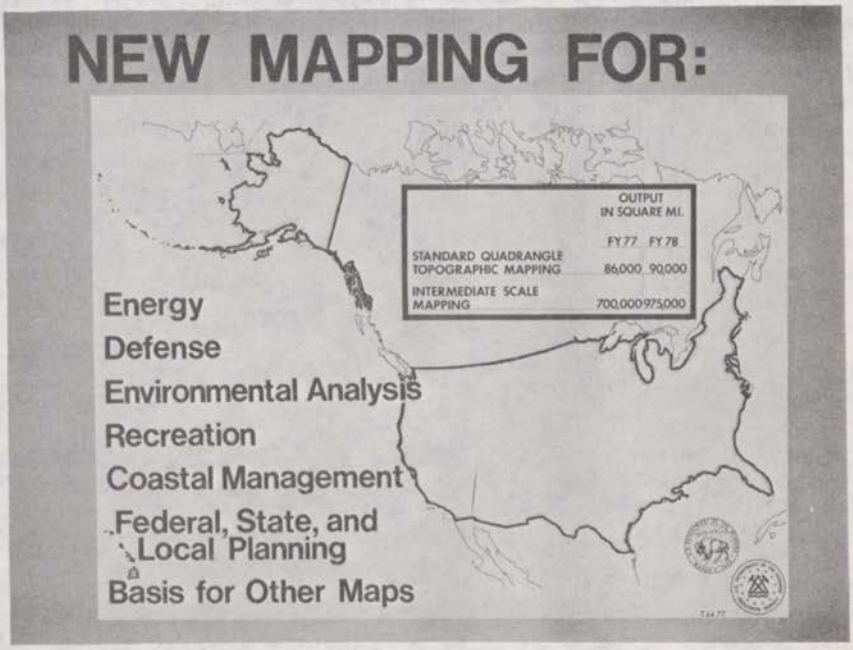
Mr. MCKELVEY. Our request includes both map revision, $2 million of our request, and $1.5 million is for mapping of a scale of 1:24,000, and $2 million is for the intermediate scale mostly at a 1:100,000.

COVERAGE OF UNITED STATES BY STANDARD MAPPING

Mr. YATES. At the rate of 1:24,000 how long will it take to map the United States?

Mr. MCKELVEY. We are estimating that in the mid-1980's we will complete it, Mr. Chairman. This chart, Mr. Chairman, illustrates the uses of new mapping.

[The chart follows:]



New topographic quadrangle maps are needed to meet national priority needs in energy related and national resource areas and to complete the mapping of unmapped areas of the conterminous United States. The new intermediate-scale maps which have a high priority need are prepared from existing 7.5-minute topographic quadrangle maps.

Mr. YATES. Should that be expedited?

Mr. MCKELVEY. I think we are very pleased with the increase that we are allowed to request this year. This is, of course, an area of judgment. What we are doing to get complete coverage is filling in the blank spots that will not be covered with new mapping with orthophotoquads. I am not sure we have an example with us this year, but an orthophotoquad consists of aerial photographs that have been rectified so they are true scale. To those aerial photographs can be added some actual topographic and contour lines. But just the planimetric version is extremely useful for many purposes. For some purposes, a photograph or a rectified aerial photograph is better than a topographic map. There are other purposes for which it is inadequate because it does not provide elevation information. We expect to have the entire country covered either with the standard 1:24,000 topographic map or with the orthophotoquads by 1978.

Mr. YATES. Let's come back at 1:30.

[Recess.]

TUESDAY, MARCH 15, 1977.

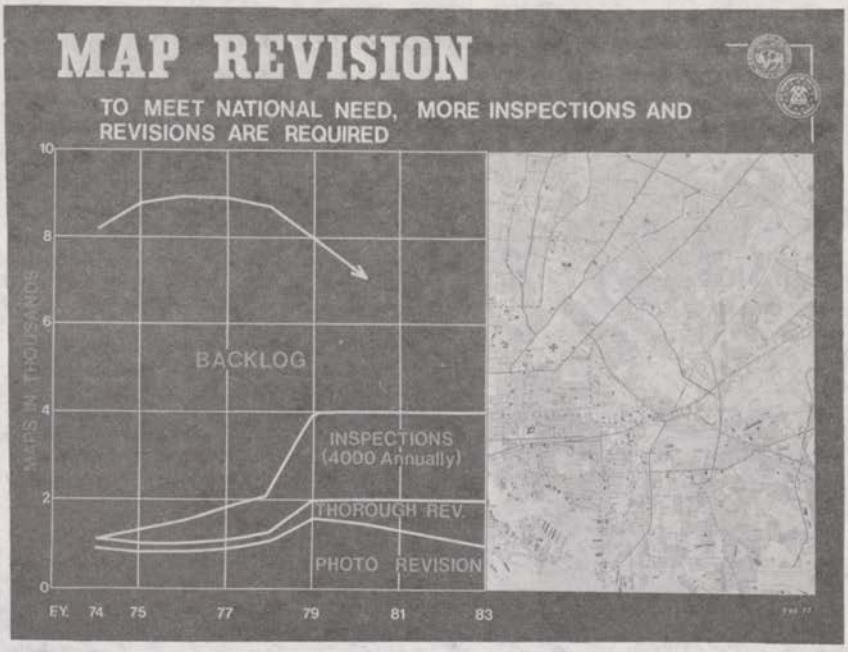
AFTERNOON SESSION

NEW AND REVISED MAPPING

Mr. YATES. What is the relationship between new topographic maps and topographic map revision?

Mr. KCKELVEY. New topographic maps, Mr. Chairman, mean areas mapped for the first time or mapped the first time at a particular scale. However, maps, particularly in populated areas, tend to become out of date with new construction of various kinds, and so they need to be revised from time to time. This chart shows the status of our mapping revision program.

[The chart follows:]



The map revision program involves periodic photoinspection and revision of existing 7.5-minute maps. The photoinspection process determines which maps require revision. Currently, there is a backlog of about 9,000 maps which require photoinspection. To meet user needs, it is necessary to reduce the backlog by inspecting and revising more maps annually and a greater number of maps will require more thorough revision to improve content and accuracy.

Mr. McKELVEY. We try, in our map revision program, to accomplish at least what we call an interim revision, which is a revision based on aerial photography rather than new field work every 5 years, at least that frequently.

REDUCTION FOR MAPPING IN FY 1977 BUDGET

Mr. YATES. All right.

In your 1977 budget, you wanted a reduction of $2.2 million for quadrangle mapping and revision. Now you want an increase of $3.5 million. You cut it by $2.2 million, and now you want to increase it $3.5 million. It is kind of a 180° reversal; isn't it?

Mr. McKELVEY. Well, those were the constraints of the 1977 budget, we were more pleased——

Mr. YATES. Your priorities didn't include those; right?

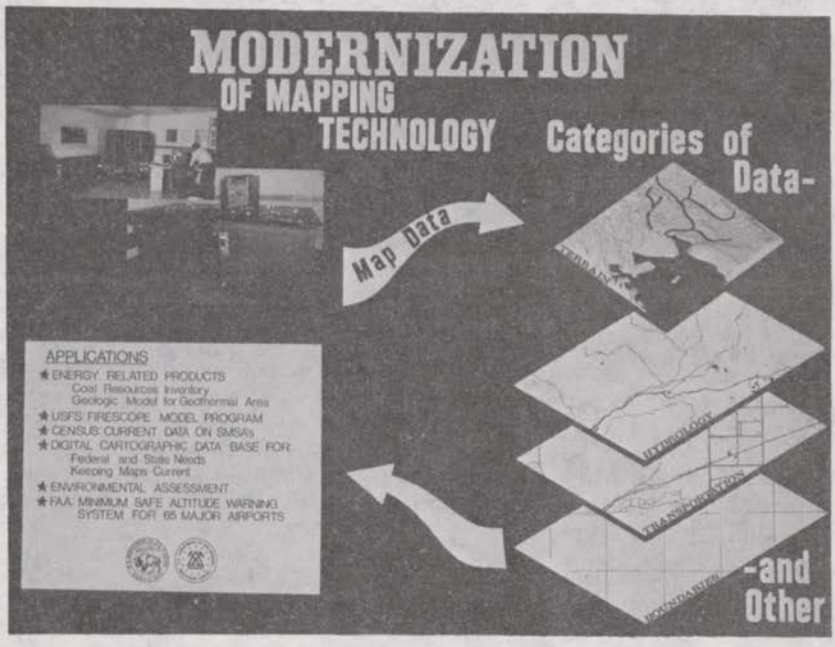
Mr. MCKELVEY. The administration's priorities last year did not include that.

MODERNIZATION OF MAPPING TECHNOLOGY

Mr. YATES. Now, on page 22 of the justifications, you want an increase of $3 million for modernization of mapping technology. You also say you will be purchasing instruments in 1977. What is your plan for modernizing your mapping technology?

Mr. MCKELVEY. The main thrust, Mr. Chairman, is to be able to digitize maps, and to improve the efficiency and the effectiveness of our mapping operations as shown on this chart.

[The chart follows:]



Modernization of mapping technology is needed in order to produce and provide the variety of map products that will meet national map users' needs. Modernization involves the purchase of new equipment, updating existing equipment, and developing new mapping techniques. This graphic represents an example of modernization—a new product—a map data in digital form which has been produced by a new mapping system.

Mr. YATES. You told us about this in the last hearing; didn't you?

Mr. MCKELVEY. Yes, briefly, I think.

DURATION OF TOPOGRAPHIC MAPPING PROGRAM

Mr. YATES. How long do you expect this program to continue?
Mr. MCKELVEY. The topographic mapping program?
Mr. YATES. Yes.
Mr. MCKELVEY. I think it should continue forever.
Mr. YATES. Because of the revisions?
Mr. MCKELVEY. Yes, sir.
Mr. YATES. So, it is very difficult to compute what you anticipate the total cost of the program will be for that reason?
Mr. MCKELVEY. Yes.

CONSULTING FOR MODERNIZATION OF MAPPING

Mr. YATES. Who are you consulting with to determine the best way of automating your programs, so you get the most out of your equipment?
Mr. MCKELVEY. The Defense Mapping Agency has done a great deal of research in this area. We work very closely with them. Then we have had contacts with the mapping community on a very wide basis. We have sponsored symposia on the topic to which experts from all over have been invited and participated. I think that we have had the benefit of the best existing expertise.
Mr. YATES. Mr. Duncan asked you about the different kinds of maps. I think perhaps in amplifying your answer to this question, you ought to tell him and the community how each is different, the special purposes for which the map is used, and why each series is so distinct, so that what you prepare for one purpose cannot be used for another purpose.
Mr. MCKELVEY. We will do that.

OTHER AGENCY MAPPING

Mr. YATES. Is there a difference between the maps you prepare and the work done by BLM in its cadastral survey program?
Mr. MCKELVEY. Oh, yes. It is entirely different, Mr. Chairman.
Mr. YATES. Is it different from the work done by the National Ocean Survey?
Mr. MCKELVEY. Yes. The National Ocean Survey does no topographic mapping. They make bathymetric maps of the sea bottom.
Mr. RADLINSKI. The Forest Service does some topographical mapping as well. But, it is done to uniform standards, in order that we can utilize the product in the national mapping program.

87-591 O - 77 - 53

ADVISORS FOR MAP MODERNIZATION

Mr. YATES. That makes sense. Regarding your modernization of technology program, do you have an advisory group that recommended your proposal?

Mr. MCKELVEY. Not in a formal sense.

Mr. YATES. You just shopped around for advice?

Mr. MCKELVEY. Yes, in the ways that I described.

RESEARCH AND DEVELOPMENT MAPPING CONTRACTS

Mr. YATES. Why do you need research and development contracts to carry out the work?

Mr. MCKELVEY. In the mapping program?

Mr. YATES. Yes.

Mr. MCKELVEY. I don't know that we have any.

Mr. YATES. I thought Mr. Lyddan stated earlier, in explaining why some work was not done in-house, that there was some contention on the outside that they could do it cheaper than it could be done in-house.

I think that is the answer to the question. But, those were not research and development contracts, were they?

Mr. RADLINSKI. Mr. Chairman, the Geological Survey has always been a leader in the development of mapping technology and mapping instrumentation. We have always maintained a research and development program within the topographic division.

Now, with respect to the modernization of mapping technology, much of that equipment was recommended as a result of a study that was done under the aegis of OMB. A task force studied that problem for almost a year, with representatives from various mapping agencies and determined that some of the highly sophisticated instrumentation that was being used in Department of Defense programs should be used in the civil mapping programs as well.

Mr. MCKELVEY. The research and development contracts that are referred to here, Mr. Chairman, I can't describe. Perhaps Mr. Lyddan can do it now. Otherwise, we can supply it for the record.

Mr. YATES. Supply it for the record.

[The information follows:]

Research and Development Contracts for
Modernization of Mapping Technology

Map Scanner Digitizer

A scanner digitizer is needed to quickly scan existing maps and produce digital data ready for computer processing. At present there is no commercial or government capability to do this satisfactorily. The proposed research contract is to develop an automated-scanner digitizer and associated computer programs to rapidly and economically convert the existing inventory of approximately 35,000 topographic maps to digital form. The development of a successful map scanner digitizer will significantly accelerate the Survey's capability to provide digital cartographic data.

High Density Digital Data Recording System

The proposed research and development contract is to investigate techniques for the archival storage of large volumes of digital data for use in digital cartographic applications. Magnetically recorded data suffer deterioration after extended storage, and requires considerable space for large volumes of data. Recent developments in laser, computer and video technology give promise of solutions to these problems and will be the subject of the proposed research.

Automated Image Correlation Equipment

This equipment is needed to electronically scan aerial photographs and identify, categorize, and prepare in computer compatible form the various categories of map data. Research is proposed to modify and adapt this technology for use in map compilation equipment. Present compilation equipment requires map operators to superimpose the photographs. The proposed equipment will allow this to be done automatically, thus reducing manpower requirements.

Laser Press Plate Maker

The graphic arts industry has developed laser technology for preparing press plates for printing. The equipment automates a very time-consuming and labor intensive procedure. The proposed research is to adapt and modify this technology to meet the more demanding standards of map printing so that press plates can be prepared directly from digital data.

Photogrammetric Digital Data Recording System

This equipment is added to conventional map compilation instruments to permit the collection of digital data from the stereomodel at the same time the map is compiled. Equipment to do this is available, but a small research effort is required to increase operational efficiency and accuracy.

Automated Map Inventory System

A contract is proposed to design a modern map inventory system to increase the efficiency of storing and handling maps and processing orders for map sales. This is necessary because of the ever increasing number of different maps in the Geological Survey inventory and the growing volume of orders.

Preparation of Computer Programs

A large variety of general-purpose and equipment-related computer programs are required to implement modernized techniques. For example, programs are required to manipulate digital map data to change scale, combine various features such as roads and buildings to produce combined maps, produce standard map symbols on automatic plotters, and compute areas. Most of these programs will be prepared through contract.

OMB MAPPING TASK FORCE STUDY

Mr. YATES. Is a copy of the OMB study available?
Mr. RADLINSKI. Yes.
Mr. YATES. Would you make it available to the committee, please?
Mr. RADLINSKI. We will, sir.

METRIC MAPPING SERIES

Mr. YATES. Your press release of November 5, 1976, indicates the all-metric map series was begun by Geological Survey. Is that a new series of maps?

Mr. MCKELVEY. We are going to metrication, Mr. Chairman, as called for by the Congress in passage of the Metric Conversion Act of 1975.

Mr. YATES. Does that require new mapping?

Mr. MCKELVEY. Eventually it may, but what we are doing is in States that there is no objection to the shift, we are simply doing all new mapping in the metric system. We have not begun to tackle the conversion of existing maps into the metric system.

With respect to the intermediate scale mapping, as I mentioned, most of that is 1 to 100,000. and all of that is going to be in the metric system regardless of what State it is being done in.

ELEMENTS OF MAPPING MODERNIZATION

Mr. YATES. On pages 25 to 29, you talk about the modernization program. Would you place in the record how each of the elements of the program ranks in priority order, the time frame in which element will be completed, and the cost of the elements.

Mr. MCKELVEY. Yes, Mr. Chairman.

[The information follows:]

RANKING/TIMEFRAME/COST OF EACH ELEMENT OF MODERNIZATION OF MAPPING TECHNOLOGY

[In thousands]

Priority	Element	Fiscal year—				
		1978	1979	1980	1981	1982
1	Prepare new equipment to produce digital map data and convert existing map data into digital form	$500	$500	$1,000	$1,000	$1,500
2	Upgrade existing equipment with semiautomatic and digital data processing accessories	500	500	500	500	.....
3	Develop software and associated instruments to improve present technology	1,000	800	500	500	500
4	Design new map inventory and map ordering system	500	500	.....	.....	.....
5	Design, implement, and maintain a digital cartographic data base	500	700	1,000	1,000	1,000

Mr. YATES. $3 million was provided in fiscal year 1975 for advanced mapping technology. Has that money been used up?

Mr. MCKELVEY. Oh, yes.

INTERMEDIATE SCALE MAPPING

Mr. YATES. You want $3 million for intermediate scale mapping. When do you expect to complete this program?

Mr. MCKELVEY. I will ask Mr. Lyddan for an estimate of that, Mr. Chairman, but I can just say that if the program goes forward at this level, about one-third of the country will be mapped in that series by the end of fiscal year 1978.

May I ask Mr. Lyddan to make an estimate about the future?

Mr. LYDDAN. Our target, Mr. Chairman, is 1981 for the completion of the intermediate scale mapping, based on the proposed 1978 level.

Mr. YATES. How much will the program cost upon completion?

Mr. LYDDAN. Well, I will have to provide a total figure for the record, Mr. Chairman.

[The information follows:]

COST TO COMPLETE THE INTERMEDIATE-SCALE MAPPING PROGRAM

Including funds previously appropriated, we estimate that approximately $30 million of appropriated funds will be expended for the completion of the initial mapping of the conterminous United States at the intermediate scale. Other funds from Federal agencies and State cooperative agreements will also be used to prepare multipurpose base maps of this series.

DENVER FIRE

Mr. YATES. OK.

Now, in 1977, $2,400,000 was made available because of the Denver fire damage. What is the status now of the structures and items that were destroyed in that facility?

Mr. MCKELVEY. They are being replaced, Mr. Chairman. The building itself has been thoroughly cleaned out, and a new roof put on by GSA this winter. But, I believe GSA is not immediately going ahead toward the complete renovation of that space. I believe it will be a year or so until they do that.

In the meantime, we have occupied additional space in the Stephenson complex, about 15 minutes away from the Federal center. I will ask Mr. Grant to tell where we are on that, but GSA is in the process of advertising for the construction of laboratory space to replace what we lost in the fire.

Mr. Grant?

Mr. GRANT. That is correct, Mr. Chairman. If GSA is successful the award will be granted in June. I believe June 15 is the estimated date for award, and occupancy would follow 8 to 10 months thereafter with replacement space as a result of the fire.

PAY COST ANNUALIZATION

Mr. YATES. How many days are you annualizing for pay costs?

Mr. STASSI. I believe there is one pay period, Mr. Chairman, not covered by the pay raise.

Mr. YATES. One pay period.

REDUCTION OF IN-HOUSE PUBLICATION SERVICES

On page 33, you show a reduction of inhouse publications, with an 11-position decrease, but no dollars, and you say you are going to increase the use of outside contracts for publication services instead. Why the change?

Mr. MCKELVEY. I didn't understand the question, Mr. Chairman.

Mr. YATES. On page 33 you say you are reducing inhouse publication services and decreasing the number of positions by 11.

Mr. MCKELVEY. Well, we have been asked to do that.

Mr. YATES. Who asked you?

Mr. MCKELVEY. OMB.

Mr. YATES. What publications will you contract out?

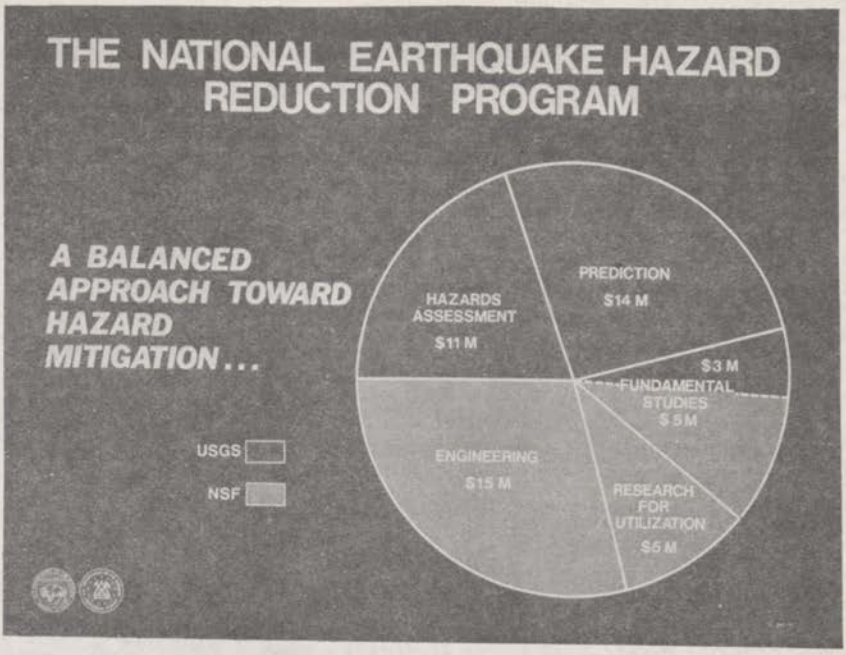
Mr. MCKELVEY. It will be maps. When you said the publications that we would contract out, there may be other services involved also. But, I understand for these 11 positions it would be maps.

EARTHQUAKE BUDGET REQUEST

Mr. YATES. All right. Let's turn to hazards, geologic and mineral resources. You want $11 million for hazard delineation and evaluation. According to the justifications, your earthquake geologic hazards survey will be completed and then you are going to extend your evaluations to the eastern part of the United States, which have high seismic risks. How much of the $11,051,000 will be obligated for each of the programs identified on page GS–35?

Mr. MCKELVEY. I believe we have a chart, Mr. Chairman, that shows how our earthquake hazards funds will be distributed.

[The chart follows:]



A balanced approach toward mitigating earthquake losses requires a broad range of studies in several scientific and engineering disciplines. This diagram represents the planned distribution of increased funding for earthquake research by the National Science Foundation (lower position of pie) and the U.S. Geological Survey (upper position of pie). At the request of the Science Adviser to the President, this plan was formulated by an external Advisory Group on Earthquake Prediction and Hazard Mitigation, together with a joint special staff planning group from USGS and NSF.

Mr. McKelsey. Our total request is for an increase of $16.3 million, and we divide that into three principal areas—$6.4 million for those hazards delineation and evaluations, $9 million approximately to develop the prediction capability, and then $854,000 to fund our seismic networks and information services.

The increases we requested in those three programs would bring them up to $11 million for hazard delineation, $14.3 million for prediction and $2.6 million for data and information services.

REGIONAL SCALE EVALUATION

Mr. Yates. How long is it going to take to complete the regional scale evaluation for the western urban area?

Mr. McKelvey. I will ask Mr. Hamilton to speak to that. But, when you say complete—I suppose one would say possibly never because it is like other things that have to do with the acquisition of information about the earth and earth processes. It is a continual process of acquiring new information and evaluations.

Mr. YATES. On page GS-35 you say, "To complete the regional scale evaluation."

Mr. MCKELVEY. I said that in one sense the word "complete" would not be appropriate.

Mr. YATES. And yet in another sense it would be.

Mr. MCKELVEY. Let me ask Mr. Hamilton to respond to this question.

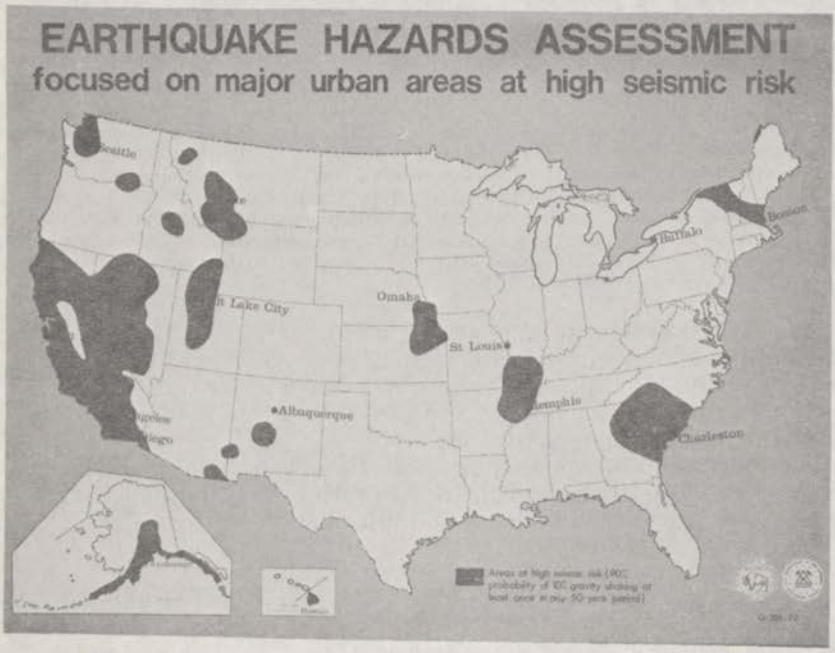
Mr. YATES. Mr. Hamilton?

Mr. HAMILTON. Probably the best way to answer that question, Mr. Chairman, is with reference to the report that was prepared for the President's Science Adviser. On page 74 of that report, under option B, which is the one that was selected, you will see that most of the evaluations on the west coast will be completed through the 1982–1984 interval.

Mr. YATES. And then you turn your attention to the East.

Mr. HAMILTON. The studies in certain parts of the East will be going on at the same time. For example, those of us from California consider St. Louis and Memphis to be the East. This chart shows areas of high seismic risk?

[The chart follows:]



Areas where the historical record indicates there is a high or moderate chance of severe seismic shaking in the next 50-year period are shown in the dark areas. In many of these areas, particularly in the populous Eastern and Midwestern States, there are no systematic investigations presently underway.

Federal Government responsible for:

Technique development;
Demonstration projects;
National seismic risk assessment; and
Regional earthquake hazard mapping and evaluation.

State and local governments share in regional studies, but concentrate on local and site specific hazard assessment for land-use planning and zoning.

Mr. YATES. Mr. Duncan considers Utah to be in the East.

Mr. HAMILTON. There are areas in the East—Boston, Buffalo, and Charleston——

Mr. YATES. That is the Eastern East; isn't it?

Mr. HAMILTON [continuing]. That would not be completed under this option before 1984, but would be completed thereafter.

Mr. YATES. OK. Take a break while we go vote.

[Brief recess.]

EARTHQUAKE GEOLOGIC PROCESSES THAT PRESENT HAZARDS

Mr. YATES. What do you mean when you say you are going to increase studies of specific earthquake geologic processes that present hazards? What do you mean by increase them?

Mr. MCKELVEY. Increase the studies, Mr. Chairman, increase the amount of work that goes into the study of the problem.

Mr. YATES. Would you place in the record an amplified answer on that, as to what is proposed to be done?

Mr. MCKELVEY. Yes, Mr. Chairman.

Mr. YATES. I am sure the committee agrees that this work is of vital importance. We would like to know what you propose to do in order to meet the challenge.

[The information follows:]

NATURE OF INCREASED STUDIES OF SPECIFIC GEOLOGIC PROCESSES THAT PRESENT HAZARDS

The studies will focus on the effects of earthquakes resulting from fault movement and ground shaking. The processes primarily include rupture of the ground surface and ground failure. Landsliding, liquefaction, spreading and settling are important phenomena. The studies will deal with the factors that control the occurrence of the hazards and methods for mitigating their effects.

EASTERN EARTHQUAKE MAGNITUDES

Mr. YATES. Now, on page 39 you say the damaged areas around eastern earthquakes have been larger than those around western earthquakes?

Mr. MCKELVEY. That is true, Mr. Chairman.

Mr. YATES. What are we talking about in the East and West—the Eastern United States?

Mr. MCKELVEY. Yes.

Mr. YATES. And earthquakes are tougher in the East than the West?

Mr. MCKELVEY. The characteristics of the crust are such that it simply transmits seismic energy better and to longer distances in the East than in the West.

TECTONIC PLATE BOUNDARIES

Mr. YATES. You don't have the plates in the East, though, do you?

Mr. MCKELVEY. The East is part of a plate. It is part of the North American plate. But, it is not near a plate boundary. Plates cover the entire Earth's crust. The entire Earth's crust is broken up into plates, Mr. Chairman.

Mr. YATES. Perhaps I should have said that the plate boundaries are in the West and not the East.

Mr. MCKELVEY. The plate boundary of the North American plate is along the Pacific Coast.

Mr. YATES. If you and I were to go out West, or even the East, could you show me a plate?

Mr. MCKELVEY. We are on a plate right here.

Mr. YATES. You mean you look at the ground and it is a plate?

Mr. MCKELVEY. The entire surface of the earth is composed of plates. We are a part here of the North American plate.

Mr. YATES. How big is the plate?

Mr. MCKELVEY. A couple of thousand miles across for some of the large ones, and some are much smaller.

Mr. YATES. That is as precise as you can be.

Mr. MCKELVEY. I could give you the dimensions of all of them for the record, if you would like.

Mr. YATES. Dimensions of all the plates? They are shown in the maps. You have a South American plate and above that the North American plate. I assume all that area is one plate, between the boundaries?

Mr. MCKELVEY. Between the boundaries, right. You see the Cocos plate, Mr. Chairman, is relatively small.

Mr. YATES. And the Eurasian plate is very large?

Mr. MCKELVEY. Yes and the North American plate is very large.

BASIS FOR EXISTENCE OF TECTONIC PLATES

Mr. DUNCAN. Do you know those exist, or is that simply a theory? Is this connected with continental drift?

Mr. MCKELVEY. Yes, and seafloor spreading. Both of those are part of the plate tectonic process. What happens is that the plates move primarily because of the formation of crust along the oceanic ridges. You notice on page 41 of the 1976 annual report the mid-Atlantic ridge, for example—that consists of a rift valley along which volcanic material is coming up and forming new crust, spreading out on both sides.

As it does, the seafloor actually spreads, those two plates are moving apart from each other. As shown in the diagram on the next page, what happens at the other end of the plate is that it passes beneath another continental mass, or in some parts of the world two plates are coming together, forming the Himalayan Mountains, for example—a case where two moving masses are actually colliding.

Mr. YATES. That is the easiest way to go to the top of Mount Everest, if you are on an appropriate plate.

Mr. MCKELVEY. Some plates, instead of moving beneath another continental mass, at least for a time, may ride up over it.

MOVEMENT OF TECTONIC PLATES

Mr. YATES. Are the plate boundaries fixed?

Mr. MCKELVEY. No.

Mr. YATES. Can you have a breakout of another plate boundary somewhere?

Mr. MCKELVEY. I am sure that is the case. I don't think that there is any place where that could be observed presently. But, it certainly has taken place over geologic time. At one time about 200 million years ago, all the continents were grouped together.

Mr. YATES. How do you know that?

Mr. McKelvey. And they split apart. It has been a long process of geologic research into geologic history. It is based on observations in many disciplines of earth sciences.

ORIGIN OF TECTONIC PLATE CONCEPT

Mr. Yates. Who gave the name "plate" to this concept?

Mr. McKelvey. I am not sure. Possibly Mr. Hamilton or Mr. Sheldon remember who first used the term.

Mr. Yates. This is before your time?

Mr. McKelvey. No, no. I am almost as old as the concept of continental drift. In fact, I think I am.

Mr. Yates. On page 39:

The reality of continental drift was reasonably well established during the 1930's, as Alexander Du Toit of South Africa and others followed up on the pioneering work of a decade and more earlier by Alfred Wegener of Germany and Emile Angand of Switzerland.

So, that's where it started.

The distribution of indicators of past climates—for example, the presence in now tropical India, of continental glacial deposits of the same 300-million-year age as fossilized tropical reefs and equatorial forests in lands now in the Arctic—required that the continents had moved slowly around the globe.

IMPACT OF CONTINENTAL DRIFT ON WEATHER

It raises the question in my mind, is our drought and the change in weather, this terribly cold winter that we have had, happening as a result of a similar movement?

Mr. McKelvey. I doubt that——

Mr. Yates. Or is that too soon?

Mr. McKelvey. Right. But, of course, climatic changes of greater magnitude have taken place, some of them related certainly to continental drift, and others related to different phenomena. I doubt that the changes during the ice age, of which there were several periods of glaciation with interglacial temperate periods—I doubt that they were related to seafloor spreading or continental drift.

Mr. Yates. My attention has just been called to the Smithsonian magazine for January and February of 1975, articles that are entitled, "A Revolution Called Plate Tectonics Has Given Us a Whole New Earth," and "Plate Tectonics has a lot to tell us about the present and future earth." I remember years ago, when I was a member of the independent offices subcommittee, we were discussing and making appropriations for the International Geophysical Year and a professor came in and told us about the possibility of the polar ice cap melting, in which case Florida would be inundated.

Mr. McKelvey. Yes.

Mr. Yates. Is that happening?

Mr. McKelvey. I am sure it has happened at times in the past.

Mr. Yates. You better tell that to the Florida land speculators.

Mr. McKelvey. Of course, the opposite has happened, also, in which case the continental ice cap has increased, and there has been glaciation in this country as far south as southern Illinois.

Mr. Yates. This is fun to listen to and speculate on. But, at this rate we won't be through with your budget until Christmas.

IMPACT ON EARTHQUAKE PROGRAM OF ACHIEVEMENTS BY OTHER ORGANIZATIONS

To what extent are the achievements of the benefits that you anticipate under your expanded program of earthquake research dependent upon action by other Federal agencies or by State and local agencies?

Mr. McKelvey. A real reduction in earthquake hazards will depend a great deal on other organizations, and particularly State and local organizations, because they are the ones that, first of all, have the civil authority to direct actions on the part of the general population, and they are also the ones who set the building codes.

Then there is a long list of other Federal organizations that have a role. Of course the National Science Foundation, along with the Geological Survey, will be a principal source of funds for research. But, beyond that, several of the other departments will have a significant role.

For example, the Department of Housing and Urban Development houses the Federal Disaster Assistance Administration, and will have the responsibility for research on policy development.

TOTAL FUNDING FOR EARTHQUAKE PROGRAM

Mr. Yates. What is the total amount of money being spent within the Government on earthquake research with respect to hazards delineation, prediction, and data and information services?

Mr. McKelvey. We have that information, but I am not sure——

Mr. Yates. Does Mr. Hamilton know?

Mr. Hamilton. The total amount being spent for research at the present time in fiscal year 1977 is $21 million, and that is by the National Science Foundation and the U.S. Geological Survey.

Mr. Yates. How much of that do you spend?

Mr. Hamilton. $11 million.

CHINESE EXPENDITURES FOR EARTHQUAKE PROGRAMS

Mr. Yates. Do you have any idea how much the Chinese are spending on something like this?

Mr. Hamilton. No; we don't have any dollar estimates, but it would have to be substantially more.

Mr. Yates. The same order or greater?

Mr. Hamilton. It would have to be an order of magnitude larger because of the much larger commitment of manpower. But, it would be impossible to tell.

Mr. Yates. There is no way of pricing the use of their men?

Mr. Hamilton. And also their effort is so much incorporated in the political process, it would be hard to extract it.

OTHER AGENCIES INVOLVED IN EARTHQUAKE PROGRAM

Mr. Yates. Are there agencies involved other than GS and the National Science Foundation?

Mr. Hamilton. On the research side, those are the two agencies. But there are other agencies that have certain types of studies that bear on our program. For example, Advanced Research Project Agency.

Mr. Yates. Will you put in the record a statement as to which agency is doing what in connection with the earthquake program?

[The information follows:]

Federal Agency Responsibilities for Earthquake Prediction & Hazard Mitigation

Agency/ Department	Bureau	Operations	Research
DOI	USGS	Hazards Assessment Vulnerability Studies, Prediction, National Earthquake Information Service, Geologic Catastrophe Warnings	Basic and Applied Geological & Geophysical Studies in Support of Operations
	BuRec	Dam Safety	None
NSF		None	Basic Geophysical Studies, Earthquake Engineering, Land Use, Tsunamis, Insurance, Public Policy Utilization
DOC	NOAA	Tsunami Warning, Environmental Data Service	None
	National Bureau of Standards	Limited Aspects of Building Standards	Building Safety
HUD	Federal Insurance Administration	Hazard Insurance (Possibly future Earthquake Coverage)	None
	Federal Housing Administration	Minimum Property Standards for FHA Financing	None
	Policy Development Research	None	Vulnerability Studies, Land Use, Existing Structures
	Federal Disaster Assistance Administration	93-288 Disaster Preparedness, Planning and Recovery, State Plans Assistance	None
DOD	Defense Civil Preparedness Agency	Nuclear Preparedness, Emergency Response	None

	Corps of Engineers	Dam & Harbor Safety, Military Installations	Dam Safety
	Other	Installation Safety	Mission Related Seismology
	Advanced Research Projects Agency	None	Detection and discrimination of underground nuclear explosions
NASA		None	Satellite Geophysical Measurements
NRC		Reactor Licensing and System Safety	Earthquake Hazards of Reactor Sites
VA		Hospital Safety, Removal, Repair	None
GSA	Public Buildings Service	Building Design, Management	None
	Federal Preparedness Agency	Federal Emergency Preparedness Planning	None
SBA		Reconstruction and Relief Financing	None
DOT		Highway Safety	Long Span Bridge Design
State		Foreign Relief	None

MAP SHOWING MOVEMENT OF TECTONIC PLATES

Mr. YATES. Do you by any chance have a map which shows the location and direction and speed of movement of the plates? Is there such a map?

Mr. HAMILTON. I was talking about this earlier, and I agreed to prepare a map for the committeee that would show that, based on some articles that have appeared in the literature. There is not a general map available. But, such information is published in the scientific literature. preparation of such a map is possible.

[The information follows:]

Location and Direction of Tectonic Plates

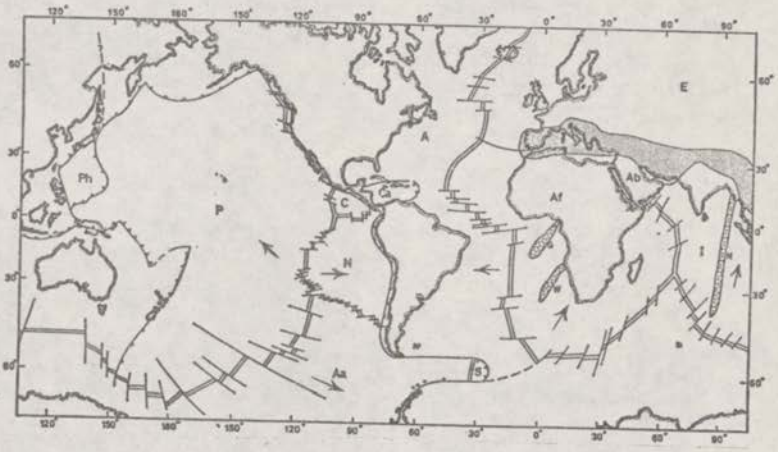


FIGURE 8.—The present system of plates. Ridges: double lines; trenches: toothed lines; transform and strike-slip faults: single lines. A: American plate; Aa: Antarctic plate; Ab: Arabian plate; Af: African plate; C: Cocos plate; Ca: Caribbean plate; E: Eurasian plate; I: Indian plate; N: Nazca plate; P: Pacific plate; Ph: Philippine plate. The Alpine-Himalayan Tertiary collision zone is stippled. Aseismic ridges: open stipple. W: Walvis ridge; G Cameroun line; N: ninety East Ridge; S: Scotia arc.

Relative Velocity of Plate Boundaries

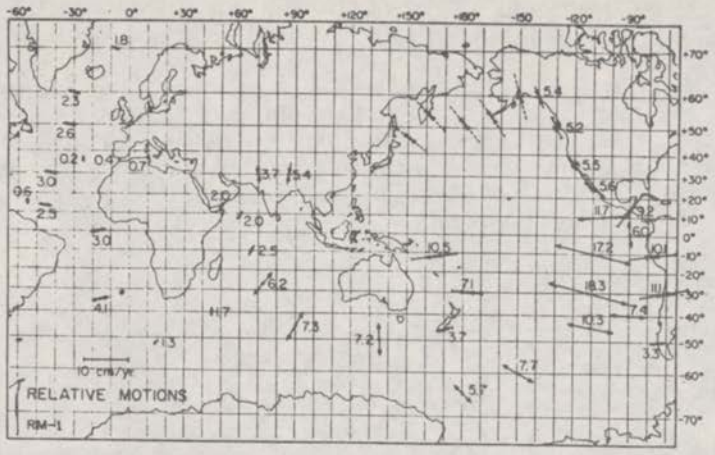
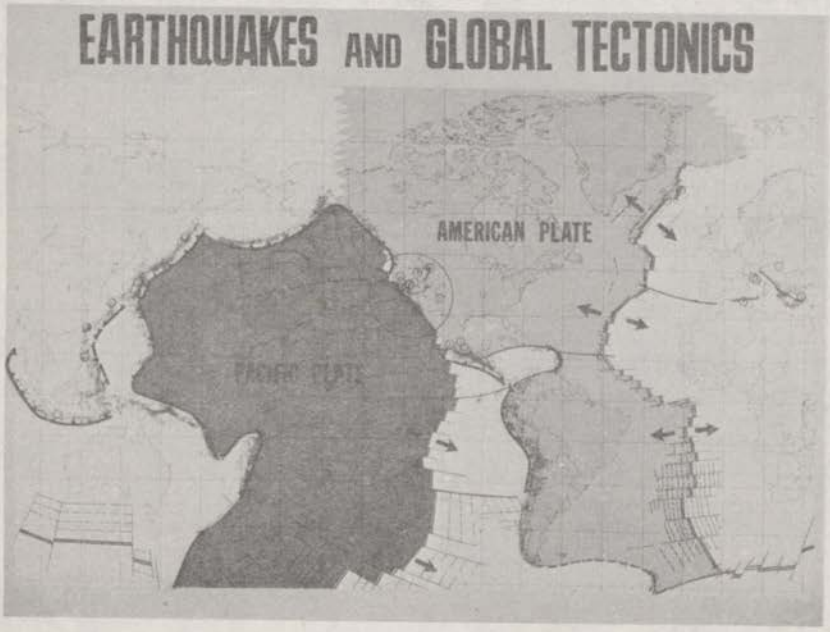


FIGURE 9.—Relative motions computed from model RM1 at selected points on plate boundaries. Numbers indicate total relative velocities in centimetres per year. Arrows indicate convergent, divergent, or transcurrent relative motion. Relative motions are drawn symmetrically for reasons of convenience only.

American and Pacific Tectonic Plates



EARTHQUAKE RESEARCH BY DR. RUTH SIMON

Mr. YATES. All right.

It would appear that you are willing to sponsor research of a nature that several years ago would have been considered ridiculous, as a result of the Chinese experience in research prediction where they have large armies of people observing different natural phenomena which have a high correlation with eathrquake activity.

For example, here is an article that appeared in the Evening Star. "Cockroaches Serve to Predict Quakes." It says:

> Don't mash those cockroaches that may be scooting around your kitchen cabinets. A member of the U.S. Geological Survey says they may be helpful in predicting earthquakes.
>
> The notion usually draws a snicker, but Dr. Ruth Simon, who is studying the connection between animal warnings and earthquakes, says she's used to the jokes.
>
> Simon said she has installations of cockroaches in three active California earthquake areas. There are two boxes of cockroaches with three of the insects in each box. As the cockroaches walk around the box, they touch sensors that set off spikes on a data sheet. At the end of 24 hours, the spikes are tallied.
>
> Using the spikes, Simon has found that there are certain times when the cockroaches are busy and other times when they're sedentary.
>
> Before an earthquake of small intensity there's a marked increase in activity, Dr. Simon said.

Fascinating. How many collections of cockroaches do you have?

Mr. HAMILTON. That is our total cockroach capability right now.

Mr. MCKELVEY. Harnessed or unharnessed, Mr. Chairman?

ANIMAL BEHAVIOR RESEARCH FOR PREDICTION OF EARTHQUAKES

Mr. YATES. Are there other stories that you could tell about denizens of the animal kingdom who are helping in this prediction, other than the cockroaches? I know they use mice and birds in the mines in detecting gas, for example.

Mr. HAMILTON. We are sponsoring one other study at UCLA using rodents, and the Chinese of course have reported a wide range of strange animal behavior.

Mr. YATES. Like dogs barking, cats leading their kittens to open fields, snakes leaving their holes—these are all earthquake signs.

Mr. HAMILTON. That is right. Stanford University recently reported that they were able to correlate unusual behavior in primates with some small earthquake activity very nearby.

Mr. MCKELVEY. We sponsored a symposium on this topic recently, Mr. Chairman, and the results of that have been compiled.

Mr. YATES. I suppose we have to analyze our ideas of what is unreasonable. I must confess that I was kind of surprised when I read about the Navy program to get the dolphins either to talk or to get classified information from other countries.

Apparently they are able to train the dolphins to do some of these things—just as Dr. Simon is looking to the cockroaches to see what sensors they have.

Mr. McKELVEY. Well, there certainly have been many reports and many observations of unusual animal behavior preceding earthquakes, and I guess certain other phenomena as well. But there is a lot yet to be learned about it. I don't think that anyone has shown or learned yet what the actual mechanism is.

ORIGIN OF DR. SIMON'S RESEARCH STUDIES

Mr. YATES. How did she happen to stumble on the cockroaches?

Mr. McKELVEY. I am not aware.

Mr. YATES. Dr. Hamilton, how did she happen to think about the cockroaches, and undertake that as an experiment.

Mr. HAMILTON. Ruth Simon thought of that herself. She is a scientist at our office in Golden, Colo. She is working on a Ph. D. in biology at Colorado University. This idea developed out of her research studies at Colorado University. The reason cockroaches were selected is that they have highly developed nervous systems, and they also have great staying power. They can stay in confined quarters for years at a time, with nothing more than a little bit of water and very small amounts of food.

So, it is a type of an insect that is suitable for this type of study.

Mr. YATES. How did she happen to think of using them for earthquakes?

Mr. HAMILTON. She had read up on the literature on unusual animal behavior, and thought that any kind of an animal that had a sensitive nervous system perhaps could be detecting such phenomena. So, on her own she generated this study, and has been carrying it on for several years.

Mr. YATES. More power to her. Did she win her Ph. D.?

Mr. HAMILTON. No, she is still working on it.

COMPLETION OF REGIONAL SCALE EVALUATION OF EARTHQUAKES

Mr. YATES. What are you doing to complete the regional scale evaluation of earthquake hazards?

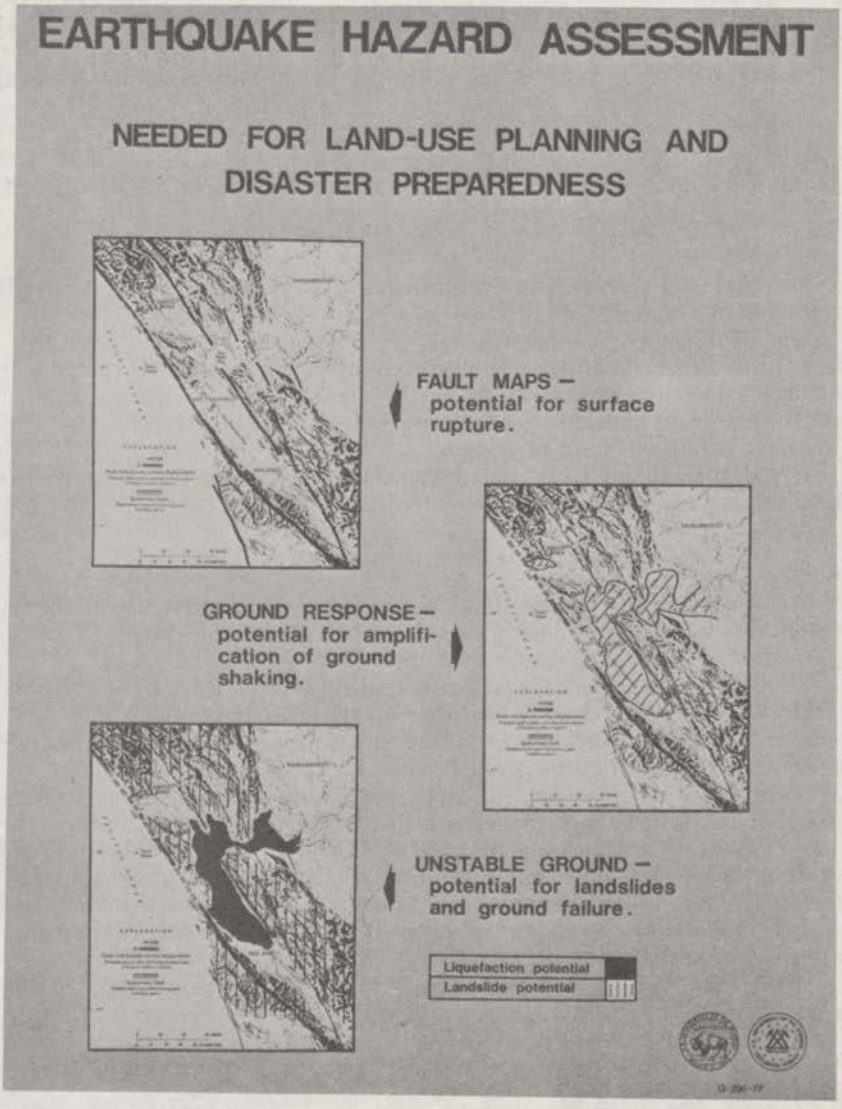
Mr. McKELVEY. Again, I will ask Mr. Hamilton to enlarge on that.

Mr. HAMILTON. The areas we are working on are the major urban areas of high seismic risk. These include Anchorage, Seattle, San Francisco, Los Angeles, San Diego, Reno, Salt Lake, Butte, the general Albuquerque region, and these general areas in the central United States—Omaha, St. Louis, Memphis—and in the Eastern United States, Charleston, and Boston. Plus there is a zone that comes down the St. Lawrence Valley that would affect Buffalo.

So, these are the general areas where the hazard exists, and the types of studies that are done. The Federal Government's role is mainly to carry out National seismic risk and regional seismic risk, assessment whereas local seismic zonation is a State and local responsibility.

So, we are preparing maps on a scale of about 1:125,000 or 1:250,000 that show the location of faults in the region. This is an example of a map prepared for the San Francisco Bay region.

[The chart follows:]



This chart illustrates three maps which delineate conditions that contribute to earthquake hazards. Such information is required to make earthquake hazard assessments.

Mr. HAMILTON. These would be the areas where it would be possible for the ground to rupture.

In addition, we prepare maps of areas where the ground could be expected to shake with very high intensity. That is, bedrock doesn't shake nearly as much as poorly consolidated mud.

Then we also map the types of failure that could occur. For example, some soil when it shakes liquefies and spreads. Other soils are subject to landslides, so we produce maps that show potential for landslides. Other type of failure might be slumping or spreading or just general differential settlement. Our intention is to prepare for each of these major urban areas for the next 8 years such regional scale maps that would provide the local and State governments with essentially a framework upon which they could carry out their more detailed work.

COMMUNICATION WITH OTHER AGENCIES

Mr. YATES. I assume you are improving communication between all the agencies engaged in this work?

Mr. MCKELVEY. Yes; we are.

I think I mentioned that we have an advisory committee that meets at least twice a year and all of the Federal agencies with an interest in this program have designated representatives who attend each meeting that usually lasts 2 or 3 days.

It has turned out to be an extremely good forum for communication among the various agencies involved.

CALIFORNIA UPLIFT

Mr. YATES. You told us about the uplift from southern California when you were last in here. You described what you proposed to do there. How much is that going to cost?

Mr. MCKELVEY. I believe we are spending on the order of $2 million.

Mr. YATES. What do you hope to gain from that study?

Mr. MCKELVEY. We hope that we can find out what is happening and have some ability to predict when the next event is going to be. We are monitoring several of the phenomena that have been recognized or thought to have a potential of being precursory to an earthquake. We very much hope that we will be able to make a better prediction than we are able to now, and recognize precursory signals other than the change in the surface configuration, which we think is possibly a precursory signal itself, but we hope to observe others that may allow us to know when it is coming.

Mr. YATES. Would you put a description of the programs into the record.

[The information follows:]

SPECIAL STUDIES UNDERWAY ON THE SOUTHERN CALIFORNIA UPLIFT
(Dollars in Thousands)

Title of Study	Institution Conducting Study	FUNDS In-house	Contracts
1. Leveling surveys	USGS	$ 80.0	$ 30.0
2. Analysis of levelling data	USGS	141.0	
3. Trilateration surveys	USGS	85.0	
4. Modification of 2-color laser	U. of Washington		20.0
5. Dry tilt and alignment arrays	UCSB		40.0
6. Dry tilt stations around the tiltmeters	USGS	20.0	
7. Alignment arrays	USGS	25.0	
8. Laser strain meter	UCSD		40.0
9. Finite element studies of strain	Cornell		35.0
10. Strain measurement using aerial photos	Texas A&M		10.0
11. Creepmeter installation	USGS	30.0	
12. In-situ stress by overcoring	U. of Arizona		40.0
13. In-situ stress meter	Terratek		38.5
14. Borehole stress meters	U. of Michigan		26.0
15. In-situ stress by hydrofracturing	USGS	60.0	
16. Regional gravity surveys	USGS	60.0	
17. Gravity surveys along profiles	Earth Sci. Engr.		50.0

Title of Study	Institution Conducting Study	FUNDS In-house	Contracts
18. Superconducting gravimeter	UCSD	$	$ 23.6
19. Telluric studies	MIT		56.0
20. Magnetometer surveys	San Bernardino		12.2
21. Magnetometer installations	UCLA		50.0
22. Magnetometer installations	USGS	40.0	
23. Seismic network operation	Caltech		15.0
24. Seismic network operation	USGS	20.0	
25. Study of travel-time anomalies	UCLA		50.0
26. Study of teleseismic travel-time at Fort Tejon	CIRES		15.0
27. Southern California Data Center	Caltech		210.0
28. Water level monitoring	CALESCO		40.0
29. Water level monitoring	USGS	25.0	
30. Deepwell monitoring (seismic radon, water level, turbidity, temp.)	USC		110.0
31. Radon, helium, & geochemical monitoring	UCSD		10.0
32. Animal predictor studies	UCLA		23.0
33. Tectonic geomorphology	U. of Arizona		35.0
34. Mapping of the San Gabriel Fault	CDMG		15.0
35. Study of Quaternary rocks Cajon to Valyermo	UC Riverside		25.0
36. Geomorphic studies of San Andreas	UCSB		40.0

	Title of Study	Institution Conducting Study	FUNDS In-house	Contracts
37.	Study of Pleito fault	Foothill-DeAnza	$	$ 15.0
38.	Santa Susana-San Cayetano-Red Mountain fault system	Ohio U.		20.0
39.	Southern California tectonics	USGS	100.0	
40.	Prediction of structural effects	Blume & Assoc.		50.0
41.	Quaternary geology of the L.A. Basin	USGS	50.0	
42.	Ground response in L.A. vicinity	USGS	85.0	
43.	Integration of predictive methods	J.A. Wiggins Co.		18.9
44.	Socioeconomic studies	UCLA		24.8
45.	Interinstitutional communication	USGS	13.0	
46.	Contingency		26.0	52.0
			$860.0	$1240.0

$2.1 Million

CAPABILITY FOR PROCESSING DATA ON EARTHQUAKES

Mr. YATES. How much will you spend on improving the capability for processing and analyzing data?

Mr. MCKELVEY. I will ask Mr. Hamilton if he has it.

Mr. YATES. Do you have how much you are going to spend on that or do you want to put it in the record?

Mr. HAMILTON. I would like to put it in the record, Mr. Chairman.

[The information follows:]

COST OF IMPROVING THE CAPABILITY FOR PROCESSING AND ANALYZING DATA

Out of the increase of $9,033,000 for prediction, approximately $1 million will be spent for processing and analyzing data.

WORLDWIDE STANDARIZED SEISMOGRAPH NETWORK

Mr. YATES. Also will you compare that with your request for $854,000 for data information service and to operate the worldwide standardized seismograph network.

[The information follows:]

COMPARISON OF EARTHQUAKE DATA PROCESSING AND ANALYZING FUNCTION

Out of the increase of $854,000 for data and information services, about $300,000 would be used for processing and analyzing data from the Worldwide Standardized Seismograph Network. This includes, for example, improvements in the rapid determination of the location and magnitude for each significant earthquake around the world. This information is released to the public and the media within an hour or less after the occurrence. Of the $9,033,000 increase for earthquake prediction studies, $1 million will be used for processing and analyzing data. The data processing and analysis included in prediction deals with information collected from special instrument systems operated to help arrive at a prediction capability.

The data processing and analysis included in the two segments of the earthquake program are concerned with different sources of data and are for different purposes as well.

COST OF EARTHQUAKE LABORATORY AND MODELING

Mr. YATES. Also, how much do you propose to spend on providing a laboratory and theoretical basis for physical matters of the earthquake process? Do you know what you hope to obtain from this study?

Mr. HAMILTON. From the laboratory and physical studies?

Mr. YATES. Yes.

Mr. HAMILTON. One of the problems of earthquake prediction is that if we wait until we observe an earthquake it could be decades and also the destruction will have already occurred and the lives lost. So our strategy is to try to learn from the smaller earthquakes and extrapolate our experience to the larger ones. The laboratory and theoretical studies are to provide the basis for the extrapolation.

PROJECT VELA

Mr. YATES. How much will this differ from the Project VELA program?

Mr. HAMILTON. The Project VELA program is concerned with the detection of underground nuclear explosions and their discrimination from earthquakes, so this is aimed at actually predicting earthquakes.

Mr. McKelvey. That program did a great deal to advance the science of seismology.

BUDGET RELATIONSHIP TO EARTHQUAKE PREDICTION RESULTS

Mr. Yates. You have three levels of prediction. What could you do at the C level prediction that you are not able to do at the B level in terms of expenditures? In other words, you say there is a direct correlation between the amount of money you spend and the amount of results you get.

Mr. McKelvey. Yes.

Mr. Yates. Do I interpret your chart correctly?

Mr. Hamilton. This is in the study on earthquake prediction and hazard mitigation dated September 15.

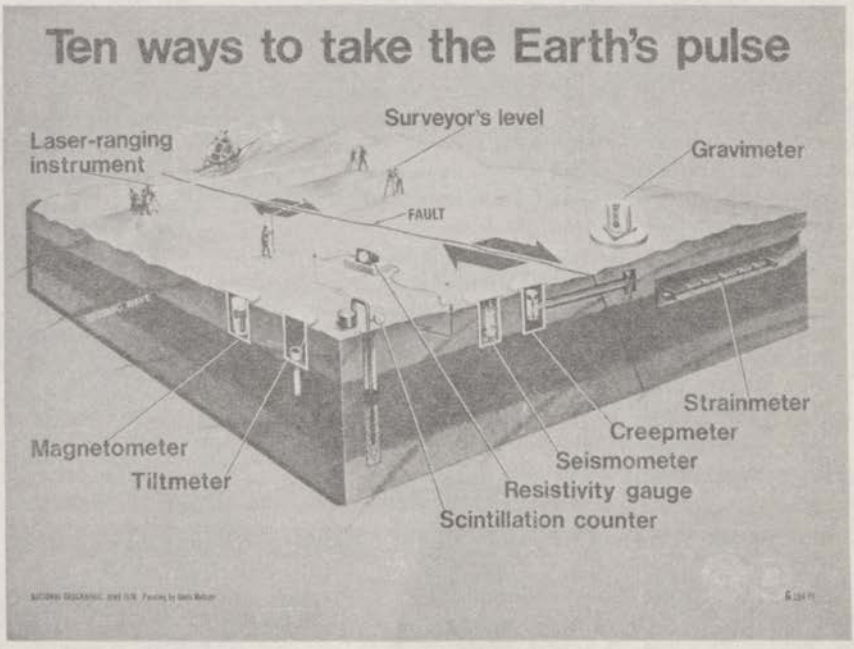
Mr. Yates. As I understand the chart that appears preceding page 37, there is a relationship between the amount of funds you spend and the amount of benefits you expect to derive from the program.

Mr. Hamilton. That is right.

Mr. Yates. Explain that to us. What do you get out of a column C proposal that you don't get out of a column B proposal?

Mr. Hamilton. The main problem in earthquake prediction is to obtain observations of earthquake precursors that could provide the basis for a prediction capability; that is, we simply have to observe a number of earthquakes and the phenomena that precede them, unusual seismic activity, and so forth.

The following chart illustrates how an area is monitored.



The instruments shown in the diagram detect and measure anomalies in the Earth's crust which may be earthquake precursors, and provide the present basis for earthquake predictions.

Mr. HAMILTON. The number of earthquakes that you observe in a given period of time is directly proportional to the number of instruments you deploy and that is closely related to the amount of money that you spend. So the main effect of going from our current program to option B will be to shorten the time from 25 to 10 years, the time needed to observe 10 earthquakes of magnitude 5 or larger with dense instrumentation.

Mr. YATES. Suppose they go from B to C; what is the time reduction?

Mr. HAMILTON. The way to analyze that is by using that table at the top of page 58.

Mr. YATES. All right.

Mr. HAMILTON. At the B level of the program we will be spending about $14 million a year on prediction, so that means if you look at the second row there the annual program cost would be somewhere between level 3 and level 4.

Mr. YATES. Yes.

Mr. HAMILTON. That means that the years to observe these earthquakes will be somewhere between 10 and 8.

The effect of going up in cost to the C level would be to shorten that time to about 5 years.

Mr. YATES. Is that absolute or is that a guess?

Mr. HAMILTON. There are a lot of assumptions involved. It is based on assumptions about the rate of earthquake occurrence assuming that the rate in the future in certain areas will be the same as in the past—and it is based on assumptions that the earthquakes will occur where we anticipate they will occur.

ROMANIAN EARTHQUAKE

Mr. YATES. Did you anticipate the one in Romania?

Mr. HAMILTON. The one in Romania occurred in an area that had been identified as a seismically active area and exactly in an area where similar earthquake activity had occurred in the past. But there was no precursory phenomena that I am aware of that warned that earthquake was coming in the short time scale.

Mr. YATES. Does the Government of Romania have any studies in the field, as China has and as we have?

Mr. HAMILTON. Romania has a good earthquake program but they have not launched a major effort aimed at prediction such as Japan, the Soviet Union, the United States, and China.

Mr. YATES. One wonders why. I suppose they will now. It always takes an earthquake to shake them loose.

Mr. HAMILTON. Most earthquake programs are launched in hindsight.

CHINESE EARTHQUAKE

Mr. YATES. Did the Chinese know the Chinese earthquake was going to happen?

Mr. HAMILTON. They did not predict the last one, the Tangshaw earthquake, but there are reports that in hindsight they have now

identified some anomalies that did precede that. The one they predicted occurred in February of 1975 at Haicheng.

CONCERN ABOUT CALIFORNIA UPLIFT

Mr. YATES. Are you concerned about the recent uplift on the west coast?

Mr. HAMILTON. Yes, I am concerned about it. This is an area that has not experienced an earthquake in 120 years, a great earthquake. It is an area that lies astride the San Andreas Fault where we know stresses undoubtedly have been building up and there simply has to be the potential there for a great earthquake. What we can't say is whether it is going to happen this year or 10 years or 20 years from now.

Mr. YATES. When are you going to be able to say that?

Mr. HAMILTON. That is what our 10-year research program is aimed at, trying to develop a prediction capability. I think with the instrumentation that we have installed in this area, if we begin to see unusual earthquake activity beginning in areas where we haven't seen it before, if we begin to see gradual fault movement on faults that have not moved in the recent past, if we observe increased tilting on certain instruments, and so on, we will have a pretty good idea that an earthquake is coming sooner rather than later.

As to whether we will be able to give a precise prediction, that depends very much on progress in the prediction program.

RECENT EARTHQUAKE ACTIVITY

Mr. YATES. Has there been more earthquake activity during the last 12 months than there has been for, say, the preceding 12 months?

Mr. HAMILTON. No, there hasn't been. That is a question we have been asked a lot because of the increased death toll. But in an average year there are about 18 earthquakes in the world of magnitude 7 or larger. The number in 1976 was almost exactly that. It was right in line with the long-term average, but the difference was these recent earthquakes occurred near population centers.

Mr. MCKELVEY. An average of 18, Mr. Chairman, has not been departed from very much. The records show that the annual number is very close to that, fluctuating very little, maybe 16 in one year and 19 in another, but it is not like it goes down to 10 and up to 30.

The same is true with respect to volcanic eruptions. Actually of similar magnitude in the case of volcano eruptions, I think about 21 or 22, or something of that sort.

RECURRENCE PATTERN FOR EARTHQUAKES

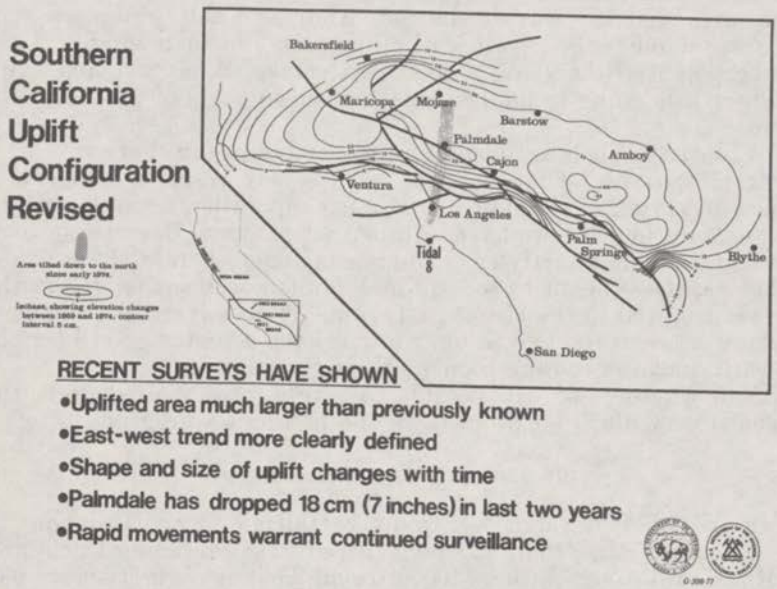
Mr. MCDADE. What about occurrences of earthquakes; is there a recurrence pattern too?

Mr. HAMILTON. Earthquakes in geologic time; that is, over thousands of years, tend to come and go in episodes. For example, in China, where we have the longest historic record, which is several thousand years of record, we see there will be certain regions that

will be active for several hundred years and then will quiet down. They may pick up later on.

Recently we have had a very successful trenching operation across the San Andreas Fault and we have been able to find evidence for 11 great earthquakes on the San Andreas Fault in the last 2,000 years, which establishes an average recurrence of 11 in 2,000 years. This chart shows the area of the uplift.

[The chart follows:]



The U.S. Geological Survey has combined recent survey results and newly acquired older geodetic data with earlier results to render a revised, extended configuration for the southern California uplift. The revised map shows that the uplift that developed between 1959 and early 1974 extended from Point Arquello eastward to the Arizona border, a distance of roughly 600 kilometers, with a midway width of about 150 kilometers between Bakersfield and Los Angeles. In addition, level surveys just completed by the National Geodetic Survey and the Los Angeles County Department of County Engineer have shown that at least part of the area has gone back down 50 to 75 percent since early 1974.

Mr. HAMILTON. Studies on the San Andreas indicate that the recurrence interval could be in the range of 75 to 300 years.

POPULATION OF POTENTIAL EARTHQUAKE AREAS

Mr. MCDADE. Would you take a minute and explain the chart. I don't know what you are pointing to with the reds and the blues. Let me ask you, what is the population in the potentially impacted area that you are showing?

Mr. HAMILTON. I think the total population of California is about 25 million people and I guess half of them live in southern California,

so I suppose we are talking about 12 or 13 million people that would be in this whole general region.

IDENTIFICATION OF EARTHQUAKE AREAS

Mr. McDade. Explain what you are trying to depict by that.

Mr. Hamilton. This is an area of southern California that covers the area from the south central part of the State down to the southern border. This is the coastline here, and Los Angeles located here [indicating]. The San Andreas Fault runs along like so [indicating blue line] and the red section of the fault, this part right in here, is the section that last broke in 1857 and has not broken since.

These other lines, blue and red, are active faults that have been identified in the area. This is the section of the fault that broke in 1952, the Bakersfield earthquake that caused heavy damage.

This is the section of the fault that broke in 1971 in the San Fernando earthquake.

The contour lines, which I realize you can't read from there, show that this area right in here [indicating] over the time period 1959 to 1974 has risen by about 35 centimeters, which would be about 14 inches, in this area the land has risen by as much as 45 centimeters, which would be about 18 inches.

What we have seen is a broad land uplift over about a 15-year period extending through a good part of southern California that more or less has as its southern boundary this part of the fault system.

A subsequent survey that was just completed about a month ago from Los Angeles out to Mojave showed that right along this line [indicating green line] within the last 2 years the level has dropped about 7 inches. So the picture is emerging that this whole area is going up and down like pistons, in that there has been fairly rapid and episodic land uplift measured in inches and up to feet. The reason this is cause for concern is that such landlifts have preceded earthquakes in the past.

There was one in Japan in 1964 and some evidence of uplift that preceded the San Fernando earthquake, but also there have been land uplifts without earthquakes. At this time we can't say this definitely means an earthquake is coming but it is cause for concern.

There is other evidence that indicates that associated with the land uplift there has been shearing, that is, horizontal deformation. We can determine this from triangulation surveys. So the case is fairly strong that there is reason for concern.

CONCERN OF LOCAL AUTHORITIES

Mr. Yates. Do the local authorities know of your concern?

Mr. McKelvey. Yes; they do, Mr. Chairman.

Mr. Yates What are they doing about it?

Mr. McKelvey. They are doing a great many things. I have been impressed with the response. We met with the staff of Governor Brown almost a year ago exactly, including the Chairman of the Seismic Safety Commission.

Mr. Yates. Off the record.

[Discussion off the record.]

Mr. McKELVEY. Following that meeting at which we described what had been observed at Palmdale and expressed our concern and the basis for it, the California Seismic Safety Commission issued a resolution calling for various kinds of actions on the part of various State agencies and from time to time we get reports on the progress on all of that.

They have been extremely active. They have done things such as investigate overpasses and bridges to identify those that might require strengthening; the same with reservoirs. They have done more mundane but maybe just as important things such as developing radio commercial and TV statements that help to educate people about the hazard and what to do.

Recently we received an analysis of what the State of California is spending on all aspects of work related to earthquake hazard reduction, and it is a substantial figure.

I am not sure I have it around but I can supply it for the record. It is on the order of $16 million.

DATA EXCHANGE WITH CHINESE AND RUSSIANS

Mr. YATES. Mr. McDade.

Mr. McDADE. Are we still engaging in the exchange of scientific information with the Chinese and Russians?

Mr. HAMILTON. The exchange with the Soviet Union is ongoing, and we have a formal program with them.

Mr. McDADE. No constraints because of appropriations or otherwise?

Mr. HAMILTON. That is right.

Mr. McDADE. What do you do with the Chinese, if anything?

Mr. HAMILTON. In the case of the Chinese we have had two formal delegations that visited China, one in October of 1974, and one in June of 1976; and one Chinese delegation has come here. We are interested in pursuing further contacts with them but we are hampered by political problems. They are unwilling to go further until political problems are resolved.

Mr. McDADE. So the Russian one is quite active; the Chinese is still in the planning stage.

Mr. YATES. What are the Soviets doing? You talked about what the Chinese are doing. Do the Soviets have an earthquake group like the United States engaged in this activity? Is their research of the same order as ours?

Mr. HAMILTON. The Soviet program is of a comparable level with ours, perhaps a little more extensive. They began their program in 1949 following an earthquake that buried a town in south central Asia.

They have been successful in certain aspects of prediction. They were the first ones to report a type of anomaly where there were changes in the speed of seismic waves through a region. They reported that about 10 years ago. They haven't to our knowledge successfully predicted an earthquake in advance and evacuated people, but they have observed some very important precursors.

UPLIFT IN OTHER PARTS OF THE WORLD

Mr. YATES. Have they had uplifts of the kind you had in California?

Mr. HAMILTON. I am not aware of a case.

Mr. YATES. Have there been uplifts in other areas of the world?
Mr. HAMILTON. There was one in Japan in 1964.
Mr. YATES. Preceding an earthquake?
Mr. HAMILTON. Yes.

FUNDS FOR HAZARD DELINEATION AND EVALUATION

Mr. YATES. How much of the $6,413,000 will go for hazard delineation and how much for evalution?

Mr. HAMILTON. Mr. Chairman, those really go hand in glove. In the process of delineating the hazards you carry out the evaluation. It is not something that is separable.

FUNDS FOR WORLDWIDE STANDARDIZED SEISMOGRAPH NETWORK

Mr. YATES. You want $854,000 to establish a program of station maintenance. How much will be involved in that program?

Mr. HAMILTON. Out of that $854,000 there would be about $300,000 that would be, I believe, associated with the worldwide standardized seismographic network.

Mr. YATES. How many stations will you maintain?

Mr HAMILTON. There are about 116 stations in the worldwide network—I think about 30 are domestic—and the ones we are talking about upgrading include both domestic and foreign.

Mr. YATES. Would you place in the record a statement showing where they are located.

[The information follows:]

Location of the Worldwide Standardized Seismograph Network



DATA AND INFORMATION SERVICES

Mr. YATES. How much will you spend on improving the quality and usefulness of information provided to researchers and the public?

Mr. HAMILTON. The remainder of the $854,000, which would be about $550,000, would be devoted toward the development of improved data products and also on research that would have that as its aim.

VOLCANO HAZARDS

Mr. YATES. You want a $300,000 increase for volcano hazards. You say that a major eruption on Mauna Loa is predicted to take place before 1978. In the absence of definitive action this eruption could destroy parts of the city of Hilo. What definitive action are you plannning?

Mr. MCKELVEY. Definitive action is the investigation of two kinds. One, to bomb the flows that may come from the rift zone for the purpose of allowing them to spread the lava and then have to take a new course so that the lava front does not advance itself.

The Air Force has done experimental bombing with that objective in mind. It was a technique that was tried, as I think I recall, with some success during the 1930's. It has also been proposed by the Corps of Engineers that a vital dam be constructed, but there is the possibility at least that such an effort would not be successful.

VOLCANO ERUPTIONS

Mr. YATES. What causes a volcano to erupt? Do you know? You indicate earthquakes take place along the plate faults. What makes for eruptions by a volcano? Does it relate to the plate activity?

Mr. MCKELVEY. It may. There are volcanoes that are located along the mid-Atlantic ridges. Others are thought to be associated with hot spots and deepening in the Earth's crust, and possibly that is simplistic, but nevertheless with respect to the volcanoes in the Pacific, it appears as the crust has moved; the volcanoes have moved offsite, so to speak and simply no longer are active. Those in the eastern part of the Pacific are not now above water, for example. They are in the form of what are called guyots that are not only dead but have no surface expression any more.

But as you go further west toward Hawaii, the depth of the crust of these volcanoes decreases and you find some that are above the sea water level. So it has been suggested that those changes including the now extinct volcano were over a hot spot, and as the crust moved they moved away from it. We don't really know much about what actually causes most volcanic eruptions. Again in simplistic terms, one can say it is the buildup of heat and pressure in a magma chamber deep beneath the earth's surface that finally can no longer be contained. What we have learned is that there are precursory phenomena with respect to some volcanoes at least, and Mauna Loa is one that can be observed.

The ground surface actually tumefies. It swells as lava comes up into the volcano.

Mr. YATES. A kind of regurgitation?

Mr. MCKELVEY. Right. There is a lot of seismic activity as the lava moves up.

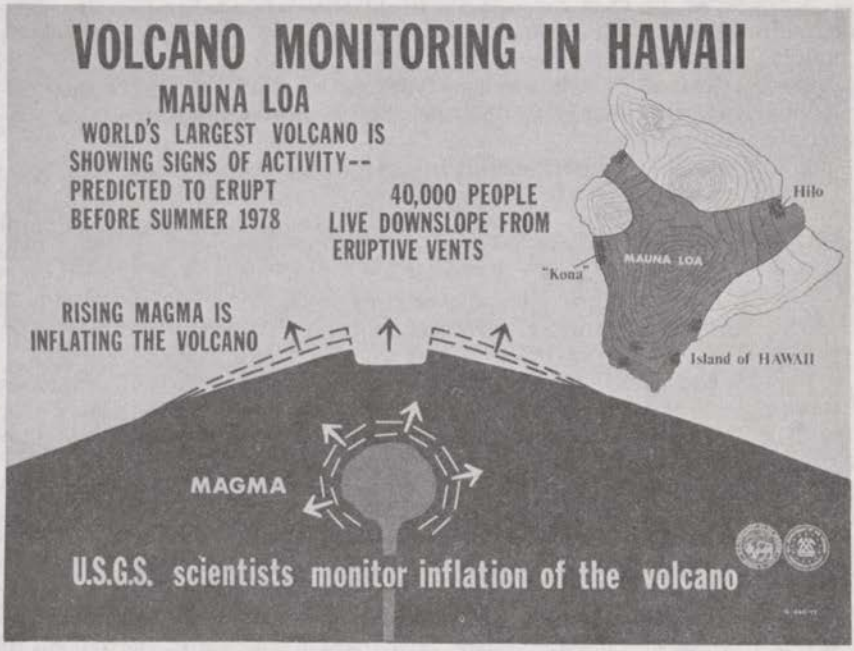
VOLCANO MONITORING STATIONS

Mr. YATES. Do you have a monitoring station there?

Mr. MCKELVEY. Yes. We have a number of kinds of monitoring stations there, and we are proposing with the increase to add additional ones.

Mr. YATES. Does that chart indicate you have 6 monitoring stations? I notice you have 6 black spots.

[The chart follows:]



A major eruption of Mauna Loa Volcano on the Island of Hawaii before July 1978, has been predicted by USGS scientists on the basis of an analysis of the volcano's past eruptive history. This eruption, which is likely to occur along Mauna Loa's northeast rift zone, could destroy parts of the city of Hilo 30 miles (48 km) to the east.

Mr. MCKELVEY. Those are just population centers.

SIZE OF MAUNA LOA

Mr. YATES. Is Mauna Loa as large as that chart would indicate?

Mr. MCKELVEY. Yes.

Mr. YATES. That is not the size of the crater?

Mr. MCKELVEY. No; but Mauna Loa is one of the Earth's major features. It is an enormous mass, and it rises some 35,000 feet, as I recall, from its base, which is on the ocean floor, so I think it probably could be described as the earth's largest mountain. It is a very major feature.

NEED FOR ADDITIONAL VOLCANO FUNDS

Mr. YATES. What will you be able to collect with the $800,000 that you can't collect with the $300,000 in the base?

Mr. MCKELVEY. This has to do with the additional stations, tiltmeters, and other kinds of equipment that will be used to monitor present eruption activity.

KRAKATOA

Mr. YATES. Where is Krakatoa?

Mr. MCKELVEY. Krakatoa is in Indonesia.

Mr. YATES. They had a spectacular eruption from that, didn't they?

Mr. MCKELVEY. Yes.

Mr. YATES. I know in the SST flight they kept telling us even the earthquake from Krakatoa did not disrupt the upper atmosphere as much as we said the SST would.

Mr. MCKELVEY. Krakatoa is a different kind of volcano than those in the Hawaiian Islands. The ones in the Hawaiian Islands do not erupt explosively.

Mr. YATES. It is kind of a meltdown?

Mr. MCKELVEY. In a sense, yes.

Mr. MCDADE. There is a weather study, too, that relates to climate change based on earthquake eruptions. I suppose everybody has their own concepts these days.

Mr. MCKELVEY. I am not aware of that.

Mr. MCDADE. I think the record will survive without our discussion of that.

Mr. MCKELVEY. It is interesting. These explosive kinds of eruptions have put a great amount of dust in the air that goes around the world and in a remarkable sense for a year or two afterwards as that dust spreads around the world.

NUCLEAR POWER REACTORS

Mr. YATES. You are requesting an additional $500,000 for the environmental aspects of the energy program to provide a total of $7,089,000 for this program. The increase will allow expansion of reactor hazards research directed toward identification and evaluation of geologic processes that pose hazards to nuclear power reactors. How much of the increase will go to that item?

Mr. MCKELVEY. $500,000 will go towards the reactor.

Mr. YATES. The full amount?

Mr. MCKELVEY. Yes.

Mr. YATES. You also indicate on page 36 of the justifications that this will be used to expedite geologic appraisal of faults and other evidence of crustal movement as potential hazards to reactors in the Eastern United States. How much are you presently spending on this program?

Mr. MCKELVEY. The present program I believe is about $3.1 million.

OTHER AGENCY FUNDING

Mr. YATES. Do you have any idea what other agencies are spending?

Mr. MCKELVEY. I will ask Mr. Coulter if he is able to guess on that. I don't believe anyone is doing what we are doing in this particular area. What we are attempting to do is to identify the regional phenemona,

active faults in particular that may influence the selection of a site and do it before the site is actually selected and someone goes to work and spends a lot of money and then it turns out to be a bad site. We are in essence trying to identify favorable as opposed to unfavorable areas such that reactors can be sited safely right from the outset.

Mr. YATES. What does NOAA contribute to the program?

Mr. MCKELVEY. I am not aware that NOAA does.

Mr. YATES. How about ERDA?

Mr. COULTER. NRC has about $3.5 million in a related program in some of this particular research. There is a research element in NRC that sponsors similar work on this and some elements of this program.

SEISMIC MEASUREMENT OF FAULT LINES

Mr. YATES. How good a measure of seismicity is a fault line?

Mr. MCKELVEY. Seismicity is a fault line?

Mr. YATES. Yes. Would you say it is a good measure?

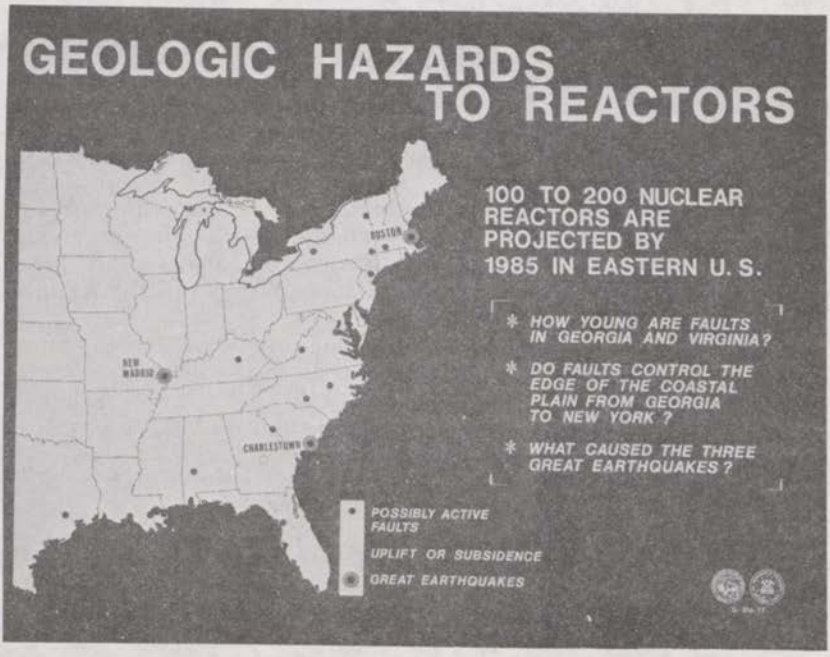
Mr. MCKELVEY. If it can be shown that it is an active fault, that there has been movement on it not just in historic time but in geologically recent time, it can be an extremely good indicator of a seismically active area. Such identification can be made on the basis of geologic evidence.

FAULT MOVEMENT ON ATLANTIC SEABOARD

Mr. YATES. Is there evidence of fault movement along the Atlantic seaboard?

Mr. MCKELVEY. I will ask Mr. Hamilton to speak to that, but I believe that no active faults have been identified along the Atlantic coastline as yet. The chart shows possible fault locations, in the Eastern United States.

[The chart follows:]



The need for nuclear power reactors is greatest in the Eastern United States and the understanding of geologic hazards in this area is very inadequate. The reactor hazards research program has recently identified many faults in the East that conceivably are active, and also has identified two areas of uplift or subsidence that may be due to tectonic forces. Evaluating the potential hazard to reactors of such faults and other indications of tectonism must be accelerated in order to avoid delays in reactor site selection, construction, and licensing.

Mr. COULTER. Perhaps if I can dwell on this for a moment. These are the faults in Eastern United States that can be delineated on a map of this scale. There are many more but these are the ones that we will show. Now, it was thought for many, many years that there was no surface movement in recent times on eastern faults. Periodically a report comes in that somebody has found evidence of recent surface movement on an eastern fault. That is the basis for this program.

We have tabulated all the reports of this kind of phenomena, and we have selected various elements within these reports to give detailed examination as indicated by the crosses. So far we have not been able to establish any recent geologic movement on eastern faults but it is of sufficient concern that we have mounted this program to make sure that that long held opinion can be verified. To date we have found none.

Mr. MCKELVEY. There has been seismic activity as we have talked about, with the earthquakes at Charleston and Boston and St. Lawrence Valley, so there may be a fault that has not been identified as having any surface expression.

RELATIONSHIP WITH OTHER PROGRAMS

Mr. YATES. What is your relationship with other Federal and State agencies in carrying out this program? Do you work with National Science Foundation?

Mr. MCKELVEY. I don't believe on this program we have.

Mr. YATES. You work with NRC?

Mr. MCKELVEY. We work closely with NRC.

ENERGY LANDS RESEARCH

Mr. YATES. On page GS–45, Energy Lands Research, investigations include stability of high walls and spoil banks. You work with MESA then, don't you?

Mr. MCKELVEY. Yes, and we have had specific cooperative projects with MESA, but I am not able to say whether any are in progress.

Mr. YATES. You say the programs are concentrated in the Rocky Mountain and Northern Great Plains States. Why not in the Appalachians?

Mr. MCKELVEY. I guess, Mr. Chairman, mainly because of the interesting new development in the Western coals is going to be where a lot of the new action is.

Mr. YATES. So you are going where the action is?

Mr. MCKELVEY. Yes, sir.

STUDIES IN STRIPMINING AREAS

Mr. YATES. You indicate studies under this program are devoted to the places where there are extensive tracts of strippable coal that face

large-scale development. What is the status of these studies? Do you have any preliminary conclusions as to what ought to be done in this program?

Mr. McKelvey. We have done considerable mapping, identified hazards of various kinds that need to be taken into account, geochemical aspects, for example, that have identified possibly toxic substances associated with various kinds. I could give a statement of progress on that.

Mr. Yates. That will be helpful.

[The information follows:]

Statement of Progress: Energy Lands Program

The Energy Lands Program of the Geological Survey, which was initiated in 1975, collects, interprets and disseminates geologic, hydrologic, geochemical and related information about areas of the United States that are now, or soon will be, impacted by large-scale energy extraction. Research presently is concentrated on environmental aspects of coal and oil-shale development, and in the western United States. This geographic concentration of effort is in response to the following four circumstances: 1) the geographic area between Montana and Arizona contains nearly one-half the Nation's coal reserves; most occurs in thick beds under thin overburden, and is easily recoverable; 2) imminence of rapid development on a very large scale, 3) the delicate and highly geographically varied environmental setting, and 4) the complexity of surface and subsurface ownership involving extensive Federal interests. Further, the Federal Coal Leasing Act of 1975 indicates the National interest in coal-bearing areas of the West.

Most projects in the Energy Lands Program emphasize the regional environmental geologic analysis with special emphasis on mapping and active geomorphic processes. Reports and maps that result from these investigations are designed to assist in analyzing and solving environmental problems associated with energy extraction and land reclamation; planning, siting, and construction of energy utilization, conversion, and distribution facilities; and related urbanization. Major accomplishments in FY 1976 and FY 1977 include the following:

1) Publication of numerous maps and reports, including surficial geologic, terrain-interpretative, water availability and quality, engineering geologic, and statewide energy resources maps. Many additional maps and reports are in preparation or are near publication.

2) Response to Congressional requests for information on alluvial valley floors as they might be affected by strip-mining for coal, including performance of rapid field reconnaissance mapping of alluvial valley floors in forty-eight 1 1/2' quadrangles in the Montana part of the Powder River Basin, and making the maps available to the Congressional Staff and the public.

3) Compilation of state-of-geologic-knowledge reports on the southern Utah and western North Dakota coal regions, and contribution of subject expertise on several other regions for use in preparation of Regional Environmental Impact Statements by the Department of the Interior.

4) Performance of continuing investigations into the baseline geochemistry of the Powder River Basin and several smaller coal basins in the Western interior. Results of these studies will serve to define the natural baseline geochemical situation (before mining occurs), and will assist in monitoring post-mining effects and reclamation potential.

5) Issuing of a folio of detailed planning maps of the Gillette area, Wyoming, and of the entire Powder River Basin which show geologic, hydrologic, and other earth science influences on coal recovery, and the energy facilities of the Basin.

6) Completion of surficial geologic mapping in the eastern Powder River Basin and start of preparation of derivative and interpretive reports. Engineering-geologic studies in the western Powder River Basin continue, including completion of specialized sections of the studies.

7) Continued investigations, including completion of many reports and maps, of other western coal basins, including redirection of some investigations toward preparation of folio maps of coal regions.

8) Mapping of slope stability conditions in a significant portion of the Central and Western Appalachian coal basin in Ohio, Pennsylvania, and West Virginia; including first identification of large active and incipient landslides in urban and suburban areas of the Appalachian Bituminous Coal Region, and issuance of detailed maps of especially hazardous areas.

9) Monitoring and administration of grants to State geological surveys or universities in Oklahoma, Texas, Colorado, Kansas, Wyoming, West Virginia, and Ohio, and development of new grants for appraisal of environmental geologic problems of their lands by appropriate State geological surveys and universities.

10) Initiation of new projects in coal-bearing areas of the San Juan Basin, Alaska, and Montana-North Dakota; a nationwide project describing carbonate rocks for SO_2 scrubbing; a climatic study of the Four Corners coal-bearing region; and a grant to the Arkansas Geological Commission to inventory and assess environmental aspects of strip-mined lands in the Arkansas Valley.

ARCTIC ENVIRONMENTAL STUDIES

Mr. YATES. On page GS–47 you want $414,000 for Arctic environmental studies. You say that your accomplishments include completion of surficial-engineering geology maps of the entire prime Arctic gas pipeline route, one third of the proposed gas pipeline route from Fairbanks to the Canadian border, and two 1:250,000=scale quadrangles in the Brooks Range, where studies in support of investigations for the trans-Alaska oil pipeline are underway.

How do these studies tie in with the study being carried out by the Office of the Secretary?

Mr. MCKELVEY. These are studies having to do with identification of hazards and possible problems in these pipeline corridors.

Mr. YATES. What are you going to do with the caribou?

Mr. MCKELVEY. We haven't addressed that as a part of this study.

Mr. YATES. Every article I have seen about the Arctic pipeline worries about the caribou but you are not worried about them. This is the MacKenzie Valley but not the Arctic pipeline route?

Mr. MCKELVEY. I guess that is actually called the gas Arctic.

Mr. YATES. But you don't have to worry about the caribou?

Mr. COULTER. We feel the most important thing is to keep the product in the pipeline. That will do more harm than minor disruption of the caribou patterns.

Mr. YATES. Wasn't the pipeline placed across the caribou roaming grounds?

Mr. COULTER. The pipeline crosses several caribou migration routes. It is buried where it crosses the routes so it won't interrupt the migration.

Mr. YATES. I suppose the study is being conducted by the Fish and Wildlife or BLM rather than by you. You just look at the geology.

EIS FOR ARCTIC GAS PIPELINE

When will the data be available so that the environmental impact statement can be prepared?

Mr. MCKELVEY. Some of the data are already available, Mr. Chairman, and I will ask Mr. Coulter to expand on that.

Mr. COULTER. The environmental impact statement on all three of the routes have now been prepared. It is going through a process of hearings in FPC and the Interior. The next phase will be a detailed examination of the designs of whoever is the successful applicant on the route. Additional data will be required for assessing the design of the pipeline to make sure that it is compatible with conditions that occur along the route.

ENGINEERING GEOLOGY

Mr. YATES. All right.

In the justification you discuss the engineering geology program which would appear to be very close to the earthquake hazards and prediction program. Is there a relationship between the two programs?

Mr. MCKELVEY. They are coordinated by the engineering geology program. We are concerned about problems and hazards that go be-

yond that associated with earthquakes. In specific areas we may be concerned with hazards that are related to earthquakes such as landslides and mudslides and so on.

LANDSLIDES

Mr. YATES. You talk about landslides. Have you come to a preliminary conclusion as a result of this compilation and publication?

Mr. MCKELVEY. On the compilation of the landslide map we have published a preliminary version of that nationally, identifying the regions in which landslide hazards are particularly prevalent, and we have done some more detailed studies in a number of areas.

Here are some publications of recent date, one dealing with landslides in Allegheny County, Pa., and we have done similar studies in parts of Colorado, and so on, on a more detailed basis.

TETON DAM

Mr. YATES. Were you responsible for the failure of the Teton Dam?

Mr. MCKELVEY. No; we were not.

Mr. YATES. Did you have anything to do with the Teton Dam?

Mr. MCKELVEY. No.

Mr. YATES. Was that strictly Bureau of Reclamation?

Mr. MCKELVEY. Bureau of Reclamation. We did call attention to the fact that the area is seismically active, the Intermountain Belt, in which earthquakes are not uncommon, the recent earthquake in the Malade area of southern Utah and the Hebgen Lake earthquake of several years ago.

DAMS NEAR SEISMIC ACTIVITY

Mr. YATES. Are there other dams located close to seismic activity?

Mr. MCKELVEY. Yes; I am sure there are. I think the Teton Dam was not located on a fault, and there was in fact no seismic activity in the area, no seismicity in the area for I believe 2 years preceding it. When we called attention to the fact that the area was seismically active and there was a possibility of generating earthquakes by reason of the crustal loading associated with the filling of the reservoir, the Bureau of Reclamation asked us to put in some stations in the vicinity to monitor seismic activity.

I think I am correct in my recollection that there were no earthquakes recorded in the region over magnitude 2, which is extremely small, and only one of those in the preceding 2 years. You may have noticed that the independent blue ribbon panel concluded that while the site chosen posed problems, basically there was nothing wrong with the site. It didn't cause problems that could not be engineered around.

REGIONAL MAPPING AND ANALYSIS

Mr. YATES. Let's turn to page GS–50, regional mapping and analysis. You are reducing it by $1.5 million. Why are you reducing it again? You did so in the last budget.

Mr. McKelvey. We are reducing that in the fiscal 1978 proposal in order to focus that effort on minerals investigations and in essence it is really an extension of the same kind of work, or much of it, but focused on areas that are generally favorable for the occurrence of mineral resources of various kinds.

The minerals program increases by $2 million with $500,000 of it new funds and $1.5 million redirected from this effort.

Mr. Yates. Are the distinctions between your earthquake evaluation and oil and gas prediction programs and your mineral lands assessment program real or are they separated only for budget purposes?

Mr. McKelvey. I think the distinction is a real one.

That is not to say certain kinds of basic work and problems are not involved in all of them. Any studies having to do with the Earth, of course, need to take account of some very basic things about it, configurations of the Earth's surface and structure and examination of the rocks beneath it, and some of the techniques that may be involved in the search for mineral deposits may be very similar to those used in assessment of oil and gas resources.

But they have basically different purposes, and for many of them the actual site of the investigation on a geographic basis is considerably different.

INTERCHANGE OF PERSONNEL AMONG PROGRAMS

Mr. Yates. Is there any way to tell who is working on each individual program in view of the fact they are all so related?

Mr. McKelvey. I am not sure I understand the question.

Mr. Yates. There seems to be such a similarity between the programs. Don't you interchange people within the programs?

Mr. McKelvey. We do to a certain extent, Mr. Chairman. As one investigation enlarges and another one declines, we may shift people from one program to another. But the skills that are involved in many aspects of our earthquake hazard reduction program are basically highly specialized, and we have seismologists there who would not be very good at oil and gas appraisal at all.

On the other hand, we have geophysicists that are involved in various aspects of our oil and gas studies who even though they are geophysicists are specialized in the interpretation of seismic profiles, and so on, who don't know very much about seismology, yet there can be a certain amount of movement between those and other groups.

ACCURATE DATING OF EARTH MATERIALS

Mr. Yates. Doctor, would you place in the record a statement as to why accurate dating is important in gaining an understanding of the Earth's geology?

Mr. McKelvey. I would be glad to, Mr. Chairman.

[The information follows:]

Need for Accurate Geologic Dating

Accurate geologic dating is fundamental to accurate Earth history. Basically, dating allows us to determine the relationship of one rock to another, permits esti-

mates of past and present rates of Earth movements, and of processes which form valuable minerals and fuels and affect the land surface we live on. Accurate dating can help determine the rate at which ground water is being replenished, so that it can be used wisely. Determining the rate and direction of ground water flow is also very important to safe waste disposal. Dating helps determine the rate at which icebergs from a glacier will enter a bay in Alaska and become a hazard to oil tankers. Accurate dating of ocean floor basalts was critical to developing the theory of plate tectonics which, incidentally, has given us vast new insight into Earth movement, earthquake distribution, location of ore minerals, and many other facets of earth dynamics. Another example: The new amino acid dating technique is being used in coastal California to determine recency of faulting and its implied earthquake hazard. Predictability in oil exploration is often based on dating of rocks by their fossils. Knowing that some uranium minerals are much older than the rocks in which they occur tells us to look for the original concentration of the uranium minerals in rocks the same age as the minerals themselves. Knowing the rate of deposition and erosion of sediment in a particular bay by dating the sediment may help planning for large port facilities. Accurate dating of rocks formed during different climatic regimes may help us estimate patterns of climate variations in the future. These are but a few examples of the many ways in which accurate dating is important to an understanding of the Earth's history.

WILDERNESS MINERAL SURVEYS

Mr. YATES. The justifications, page 54, indicate you want an additional $1,300,000 for wilderness mineral surveys. How will this program relate to the inventory of public lands required to be conducted by the Bureau of Land Management?

Mr. MCKELVEY. This program does not address the consequences presently of the BLM Organic Act. That act calls for a mineral appraisal of BLM wilderness lands to be made by the Geological Survey and the Bureau of Mines, much in the same fashion as does the Wilderness Act that preceded it. But that is not reflected in the 1978 budget. The act was just passed in the last part of 1976 and BLM is in the process of identifying the areas that would be involved, and we are looking forward to the first significant budgeting in that budget in 1979.

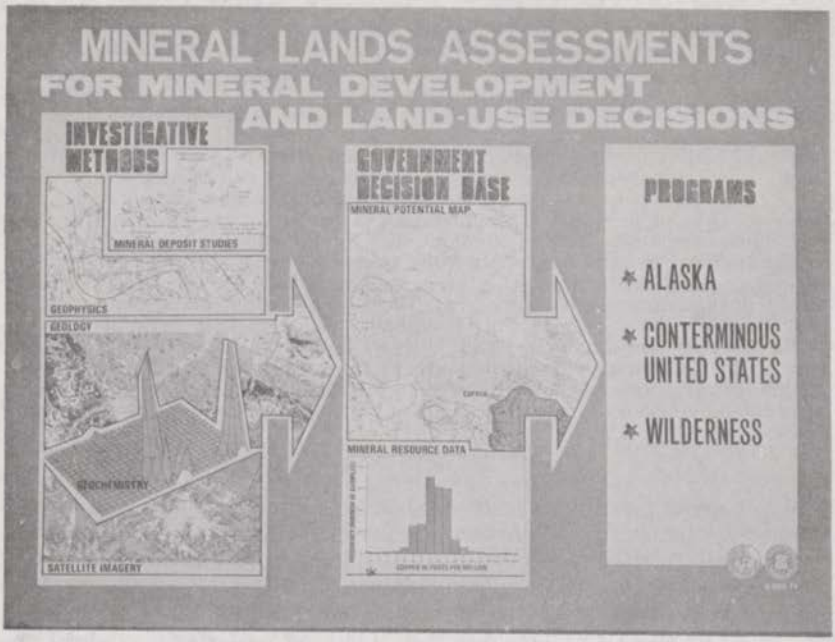
WILDERNESS PROGRAM INCREASE IN SUBSEQUENT YEARS

Mr. YATES. You indicate that the increased funding will permit you to double the assessment to about 1.5 million acres in 1978. Will you be requesting additional increases for this program in subsequent years?

Mr. MCKELVEY. For the wilderness minerals survey program, apart from what will be involved in the BLM land appraisal that I just spoke about, the level of funding that is requested in the 1978 budget is sufficient to allow us to complete the requirements of the various acts involved.

From time to time Congress has proposed additional lands for inclusion in the wilderness system and it is possible actions of that sort, as well as inflation, may require us to ask for additional funds somewhere between now and 1984 for this program. This chart illustrates some of our activities in this area, Mr. Chairman.

[The chart follows:]



The investigative methods indicate the types of geoscience studies used in mineral resource assessments. This provides the information for a mineral potential map and for mineral resource data from which Government decisions can be made. This program is underway in Alaska and for the wilderness areas and is in the beginning stages in conterminous United States.

Mr. McKELVEY. But the level proposed here is sufficient to allow us to complete what the law requires us to do.

METHOD OF CONDUCTING SURVEYS

Mr. REGULA. Is most of this done, Dr. McKelvey, by aerial survey, infrared, or do you do it by on-ground inspection including actual drilling of test holes?

Mr. McKELVEY. We don't do any drillings, Mr. Regula, but we do use virtually all other kinds of methods of minerals prospecting and identification. Most of the work is done on site reconnaissance. Methods are used to be sure, including aerial photographs, and satellite imagery, geophysical surveys often, and geochemical sampling.

AVAILABILITY OF DATA

Mr. REGULA. Is this work on public record so if there are private lands adjacent to it the information will be available?

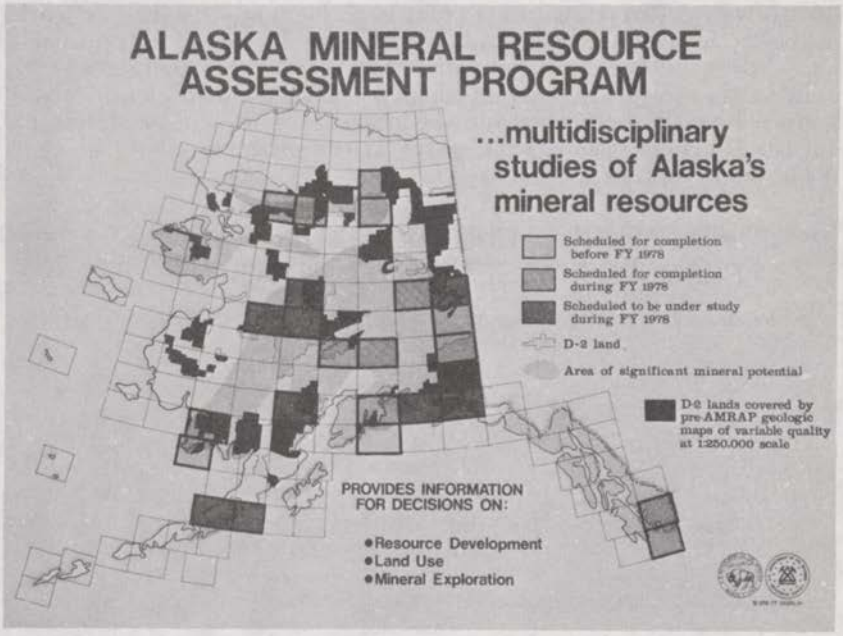
Mr. McKELVEY. Yes, it is. We publish what we release on open file. We report essentially as soon as it is completed, and these are joint reports with the Bureau of Mines. Then we also publish it.

MINERAL POTENTIAL OF ALASKA

Mr. REGULA. What portion of Alaska, in your judgment, is fairly well evaluated for mineral potential?

Mr. McKelvey. If I may, I will ask Mr. Sheldon to speculate about that, and that is what either of us would have to do. We would have to, I suppose, define our terms. Certainly not very much of Alaska I think could be considered as having been prospected in great detail. On the other hand, prospecting has taken place all over the State, and for the D–2 lands, which comprise about 80,000 acres, we are expecting to cover that with reconnaissance mineral appraisal over its entirety by next year. And about 55 percent of that area will have been covered at larger scales by geologic maps of one kind or another, and about a quarter of it, as I recall, will have been studied at larger scale and in more detail. This chart, Mr. Chairman, illustrates areas of activity.

[The chart follows:]



The program is a multidisciplinary study of Alaska's mineral resources. The D–2 lands are shown in solid and areas of significant mineral potential are shown in a stripple pattern. At a scale of 1:250,000, these 10 quadrangles are scheduled for completion before fiscal year 1978, 6 quadrangles are scheduled for completion during fiscal year 1978, and 9 quadrangles are scheduled to be under study during fiscal year 1978.

Mr. Regula. What is the total acreage of Alaska?

Mr. McKelvey. Approximately 385 million acres.

Mr. Regula. Do you think that there would be potentially vast mineral resources in Alaska that we are unaware of at the present time?

Mr. McKelvey. I am sure there are, Mr. Regula.

Mr. Regula. Thank you, Mr. Chairman.

MINERAL SURVEY REPORTS

Mr. YATES. With respect to the funding of the mineral survey, would you furnish the committee with one of the reports you published for 1977?

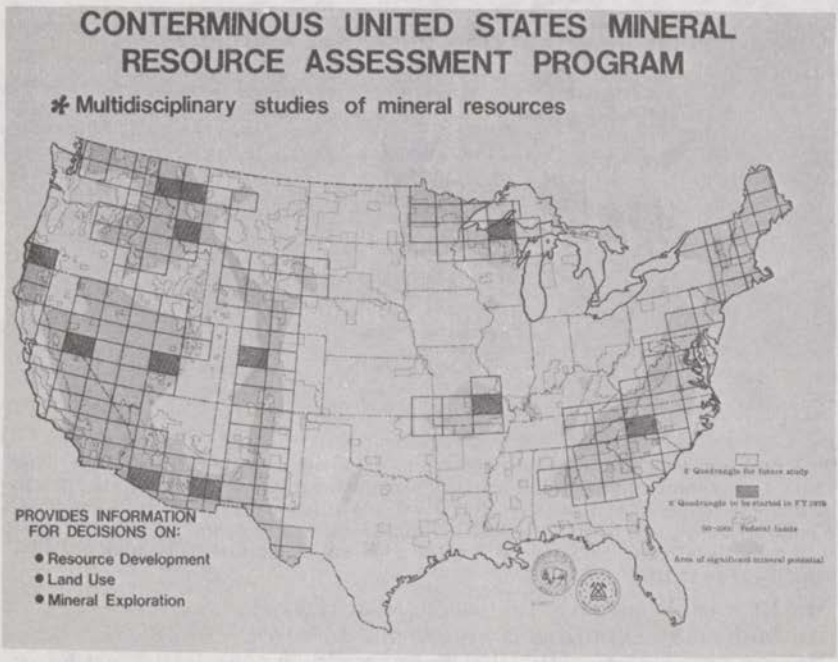
[Note: The report was filed with the committee.]

CONTERMINOUS STATES MINERAL SURVEYS

Mr. YATES. Now, you want an additional $2 million for Coterminous States Mineral Surveys. How does it relate to the inventory program to be conducted by BLM, which among other things is to identify values of public land?

Mr. MCKELVEY. This is the program to which I referred when I said we were redirecting funds from geologic mapping. In our work in Alaska, focused on D–2 lands mainly, we developed an approach that, while it involves map scales of 1:2,50,000, synthesizes several different kinds of approaches that melded together aid in identification of areas broadly favorable for the occurrence of various kinds of minerals. This chart shows the status of the program.

[The chart follows:]



The map of the Conterminous United States shows areas containing 50–100 percent Federal lands (in solid light gray), areas of significant mineral potential (in a stripple pattern), and 12°2° quadrangles (1:250,000 scale) to be started in fiscal year 1978 (patterned), and quadrangles that have potential for future study (open).

Mr. MCKELVEY. What we are proposing to do now, because that has been regarded as a very useful approach, is to begin applying that approach in the conterminous United States.

Coincidentally, because many of the areas that we propose are indicated on this chart as being in the West, they will involve lands under the control of BLM and I would assume would contribute to the appraisal of the potential in those areas. But they are not focused on Federal lands and so the central purpose, rather than simply assessing the resource potential, which is the problem that BLM is involved in, is to positively identify areas favorable for exploration.

Mr. YATES. When do you expect you will have complete coverage of the public lands in the conterminous 48?

Mr. MCKELVEY. Of the public lands—let me say again this program is not focused on public lands. That would be a part of the BLM land problem. And I guess I would have to supply that for the record.

Mr. YATES. Would you do that. And also supply what you expect the cost of the program will be.

Mr. MCKELVEY. Yes.

[The information follows:]

CONTERMINOUS STATES MINERAL RESOURCE ASSESSMENT PROGRAM

We have identified 170 quadrangles for consideration for study under the conterminous States mineral resource assessment program. These 170 quadrangles were selected primarily on the basis of their mineral potential and secondarily on their containing significant tracts of Federal lands. Of these quadrangles, 125 contain about two-thirds of all Federal lands in the conterminous United States. Study of these 125 quadrangles and assessment of their resource potential will cost between $200 and $225 million. At the fiscal year 1978 rate of funding, $4 million, it will require an additional 55 years to complete these 125 quadrangles. The other one-third of the Federal lands in the conterminous United States are in areas of low mineral resource potential. The conterminous States mineral resource assessment program is not, however, a substitute for the more detailed mineral surveys of BLM roadless areas as specified in the BLM "Organic Act," but the program will greatly aid in the identification of those areas requiring additional study and in determining the level of study necessary to provide an adequate estimate of their mineral values.

Mr. YATES. I suppose you anticipate additional funds in subsequent years for further study. You won't finish it in 1 year.

Mr. MCKELVEY. Oh, no, sir.

ALASKA MINERAL RESOURCE ASSESSMENT PROGRAM

Mr. YATES. Now, you want $4,552,000 for the Alaska mineral resource assessment program. When do you expect you will complete that program?

Mr. MCKELVEY. Well, that program will continue for a long time. But we are targeting to complete, or to provide comprehensive information on the D–2 lands in time for congressional action that I believe must come before December 18, 1978.

COMPLETION OF WILDERNESS PROGRAM SURVEYS

Mr. YATES. On page GS–56 of your justifications you say 15.8 million acres will remain to be surveyed in wilderness areas after 1983. What are you going to do about that acreage? You will still have 15 million acres to survey.

Mr. MCKELVEY. That is true. And that will be done.

Mr. YATES. What do you mean that will be done? When will you do the 15 million acres?

Mr. McKelvey. In subsequent years.

Mr. Yates. How many subsequent years?

Mr. McKelvey. It would depend on the level of funding. But if we continue at this level, it will be about 10 years.

Mr. Sheldon. At the rate that the program is going on, you can see that line, and if you project it on out, it will be roughly about 10 years when it would reach the top of the chart which shows the total amount of lands that ought to be assessed.

Mr. Yates. Are you being pushed to complete your surveys on the wilderness areas?

Mr. McKelvey. We attempted to reach the funding, Mr. Chairman, that would allow us to at least meet the requirements of the Act.

OBJECTIVES OF CONTERMINOUS STATES MINERAL ASSESSMENTS

Mr. Yates. On page 58 you discuss the conterminous States mineral assessment program. You identify six newly focused objectives. How much of the $2 million will be used on each of these objectives? Do you want to put that in the record. And how much of the total of $3.941 million will be used for each of those objectives?

[The information follows:]

CONTERMINOUS STATES MINERAL ASSESSMENT PROGRAM

The six newly focused objectives of the conterminous States mineral assessment program are not mutually exclusive but are attained concurrently through an integrated study. They are not separable nor can these objectives all be attained independently. The relative mix of the different objectives will vary considerably from area to area depending upon a number of factors, including: Adequacy of existing data bases, complexity of the geology of the area, magnitude of existing resource development, mineral potential of the area, and nature of the land-use problems requiring resolution. Therefore, the cost of fulfilling each objectives cannot be given separately.

CRITICAL MINERAL COMMODITIES

Mr. Yates. For critical minerals commodities you want $1.604 million, the same as the 1977 level. On page 59 you indicate the objective of this program is the collection of worldwide data on the geologic occurrence and availability of mineral commodities. You indicate the major activities of the program are to construct, maintain and enlarge world commodity resource files, synthesize and apply new concepts for the identification of sources.

Well, we have a program of the Bureau of Mines in which they request a supplemental appropriation of $50,000 for fiscal year 1977 to make a worldwide assessment of mineral potential and how that potential would be impacted by the resources represented by the ore-bearing nodules in the deep ocean areas of the world.

Mr. McKelvey. That is for the deep ocean analysis.

Mr. Yates. In other words, yours is not like that?

Mr. McKelvey. We have no funds requested in our budget for deep ocean minerals now.

MINERALS FOR ENERGY PRODUCTION

Mr. Yates. You want $616,000 for the program of minerals for energy production. And you indicate the major achievements of this

program are the publication of professional papers, contour maps and an analysis of tonnage-grade relationships of nickel deposits and a new estimate of world nickel resources.

What uses have been made of these products to date?

Mr. McKelvey. That, I am not sure of, Mr. Chairman.

Mr. Yates. Have they contributed to reaching energy self-sufficiency?

Mr. McKelvey. I am sure they have contributed to understanding about the importance of taking account of mineral supplies in conjunction with energy development, particularly the high technology energy development that is beginning to take place and certainly will take place in the future.

MINERAL INFORMATION SYSTEMS AND RESOURCE ANALYSIS

Mr. Yates. Well, now, on page Geological Survey 61 we meet DORIS. No, we met DORIS on page GS–60.

Mr. McKelvey. For the first time.

Mr. Yates. And DORIS has got a CRIB.

Mr. McKelvey. These are information systems.

Mr. Yates. Yes. I think you ought to insert in the record how the program works, both with respect to the CRIB and DORIS.

[The information follows:]

Explanation of DORIS and CRIB Mineral Information Systems

The computerized resource information bank (CRIB) of the Geological Survey was conceived and designed to support basic mission programs that require primary data on mineral occurrence, resources, production, land classification, and mineral location. CRIB serves as a storage and retrieval system for the USGS, for other Federal agencies, including the Tennessee Valley Authority, U.S. Forest Service, Bureau of Mines, and the Bureau of Land Management, and for several State agencies. These cooperative agreements with the Geological Survey have greatly expanded the size and scope of CRIB. CRIB is one valuable source of data for integrated problem-solving procedures.

Such a problem-solving procedure is found in the decision-oriented resource information system (DORIS) developed by the Geological Survey. The system provides output as needed for a specific inquiry or policy decision, based upon alternative assumptions, and updates results based upon new or additional information. The decision oriented capabilities of DORIS are developed in four major fields related to commodities: (*a*) geological availability, (*b*) technological availability, (*c*) general economic availability, and (*d*) alternate sources of supply of resources. Data from several data files, including CRIB, are accessed by one of several resource modeling programs such as models for long-term supply studies, search and occurrence, exhaustion, impact and requirements, and resource availability.

Thus, DORIS will provide a means to assess the impact that existing data has on a decision. Such a capability will insure continuity in decisionmaking and provide hindsight assessment of policy decisions.

NATIONAL MINERAL POLICY DECISIONS

Mr. Yates. Who makes national mineral policy decisions?

Mr. McKelvey. That would be the Secretary, Congress and the President.

Mr. Yates. Have you any information as to how much of the products of this system they utilize—DORIS and the CRIB?

Mr. McKelvey. Yes. I will ask Mr. Sheldon to expand on this. These information systems are under active development. They are available to the general public, other Government agencies.

Mr. YATES. Is this your responsibility or the responsibility of the Bureau of Mines?

Mr. MCKELVEY. Keep in mind that we have a different focus. We both deal with minerals. But by and large the Bureau of Mines deals with minerals production, and then with development of minerals technology of various kinds. Our part of the field deals with resources before they are mined and the identification of their distribution and potential magnitude and so on. So we complement each other in our studies in the minerals field.

RESOURCES PROCESSES RESEARCH

Mr. YATES. How does the program for resource processes research deal with your other mineral assessment programs? Do you want to put that in the record?

Mr. MCKELVEY. All right.

[The information follows:]

RELATIONSHIP OF THE MINERAL RESOURCE PROCESSES RESEARCH PROGRAM TO OTHER MINERAL PROGRAMS

The resource processes research program provides baseline geoscience data concerning ore-bearing environments that are essential in a variety of resource activities including the conterminous States mineral resource appraisal program and the Alaska mineral resource appraisal program. The resource processes research program and the resource appraisal programs differ both in scale and in objective. The resources processes research studies are detailed geological, geophysical, and geochemical field and laboratory investigaions of ores and of known mineralized districts and regions in order to learn as much as possible about the geologic environments in which mineral resources occur. The Alaska mineral resource appraisal program and the conterminous States mineral resource appraisal programs are reconnaissance studies of broad areas to determine their resource potential. These areal mineral resource appraisal programs provide geoscience data for the area being studied which are then integrated with data on the occurrence of ore deposits, as derived from the resource processes research program, to produce a resource appraisal of the area. Data from the resource processes research program also provide input for the commodity assessments conducted under the critical commodities program and are used by the minerals industry to increase the effectiveness and efficiency of their exploration activities.

RELATIONSHIP OF RESOURCE PROCESSES RESEARCH TO OTHER MINERAL PROGRAMS

Mr. YATES. Now, on page 61 you say the principal activities of the program include geological, geophysical and geochemical field investigations in areas that have a high potential for new and conventional types of mineral deposits. It would appear that there is a direct relationship of this program with the mineral assessment of conterminous States.

That is why we want you to explain the relationship of this program to the Alaska resource assessment program and the conterminous resource assessment program.

I think you better put that in the record, too.

Mr. MCKELVEY. All right.

Mr. YATES. Also, would you provide for the subcommittee one of the reports that you published in fiscal 1977.

Mr. MCKELVEY. Yes, sir.

Mr. YATES. And a map of the type produced by this program, along with your interpretive material, so we can see what it looks like.

[Note: The information was supplied to the committee.]

RESOURCE TECHNIQUES IN GEOCHEMISTRY AND GEOPHYSICS

Mr. YATES. Now, you want $4,308,000 for a program called resource techniques in geochemistry and geophysics. You say that analysis of soil and rock samples from northeastern Minnesota show a 29-kilometer-long linear nickel-copper anomaly within the Duluth gabbro. What is a gabbro?

Mr. MCKELVEY. It is an intrusive igneous rock.

IGNEOUS ROCK

Mr. YATES. Would you tell Mr. Regula what an igneous rock is.

Mr. MCKELVEY. That is a rock that has cooled from a molten state, volcanic rock, or rocks in which the magma came out to the surface and the rock has cooled at the surface. And intrusive igneous rocks, or plutonic igneous rocks, as they are sometimes called, have solidified within the crust before they reach the surface.

Mr. REGULA. Is this information useful in determining mineral deposits?

Mr. MCKELVEY. Very much so, yes—because various kinds of minerals are associated with various kinds of rocks, and the igneous rock habitat, if you like, is a very important one for the occurrence of many kinds of minerals, especially metallic minerals.

VALUE OF SERVICES TO PRIVATE INDUSTRY

Mr. REGULA. What would you estimate the value of your services to private industry to be in helping the private sector locate minerals and develop minerals?

Mr. MCKELVEY. I would estimate them to be very high. I noticed this afternoon in the recess a bottle of oil over on the table there in the corner that I had given Dave Wilson a few years ago when he was in OMB and which he asked me that very question. And that bottle of oil comes from Prudhoe Bay. And I told him that that discovery could be traced back to the work of the Geological Survey.

Mr. YATES. You mean that bottle of oil?

Mr. MCKELVEY. That bottle of oil could be traced back to the work of the Geological Survey.

Mr. YATES. Performed when?

Mr. MCKELVEY. It began in that area, as I recall, around the 1920's. The Survey was the agency that identified this province as having petroleum potential, and the Naval Petroleum Reserve No. 4 was defined on the basis of that information.

Mr. YATES. Mr. Regula, you know how they arrived at that conclusion? They saw oil seeping through the surface.

Mr. MCKELVEY. That was part of it. There were some oil seeps in the area. And a good deal of the oil around the world has been found on that basis.

Mr. YATES. OK.

Mr. McKelvey. The kind of work we have done has served to provide a basis for intelligent prospecting and exploration. We don't very often discover mineral deposits per se in the course of our work, although we have discovered a great many. But the maps and information we produce are used and used very extensively by industry in the exploratory work they undertake.

FUNDS FOR RESOURCE TECHNIQUES IN GEOCHEMISTRY AND GEOPHYSICS

Mr. Yates. Now, you want a program called resource techniques in geochemistry and geophysics. Why don't you ask for an increase in that?

Mr. McKelvey. It is a question of balancing our priorities this year.

Mr. Yates. And you have other priorities. You just want to continue to do what you have done.

Mr. McKelvey. Well, for the time being.

COAL RESOURCE ASSESSMENTS

Mr. Yates. All right. Now, you want $2,619,000 for coal resource assessments. That is the same as the 1977 program level. I would have thought this would have been a more important program than you indicated because of the amount of money requested. Is this because this was speeded up in 1977?

Mr. McKelvey. Yes; it has been accelerated. But we are requesting $2 million for a coal exploratory program called for by the act.

COAL RESOURCE STUDIES

Mr. Yates. Now, on page 64 of the justification you describe coal resource investigations, and you say the data are entered in the national coal resources data system. What happens when these activities are completed?

Mr. McKelvey. The information that is acquired, Mr. Chairman, will serve many purposes.

Mr. Yates. It will serve the Bureau of Mines particularly and they will say that their data serves you.

Mr. McKelvey. That is true. Our systems are meshed in such a way that we can make use of each other's data.

Mr. Yates. Would you place in the record how you go about making a coal resource study from start to finish.

Mr. McKelvey. Yes.

[The information follows:]

Method of Making Coal Resource Study

A Coal Resource Investigations study begins with a determination that coal exists in the area proposed for study and that the probable amount of coal resources warrants the investment of funds and manpower required for a complete coal resource assessment. If these prerequisite conditions are met, the study leader then reviews all pre-existing data concerning the area's coal resources and determines how much additional data of various types are needed to make a comprehensive resource assessment.

Most of the new data are obtained from field surveys, which include mapping all coal beds exposed at the surface, measuring the thickness of these beds and their enclosing rocks, describing the geologic structure (folds and faults) of the area, determining the depositional environments of the coal beds and their enclosing rocks as an aid in projecting the subsurface extension of coal beds, collecting samples of coal and rocks at many localities and, if additional subsurface data are required, drilling core holes at predetermined locations.

In the laboratory, the coal samples are analyzed geochemically to determine the quality of the coal, including its heating value, moisture and ash content, sulfur content, and content of up to 60 minor and trace elements. In the office, the geologic data collected in the field are plotted on geologic maps and cross-sections to ascertain the thickness, structural configuration and areal extent of the coal beds. Additional field data are then gathered if the maps indicate that more information is needed for an accurate interpretation of the geology and coal resources of the area. A final set of maps, cross-sections and correlation diagrams are prepared, which, together with the results of the geochemical analysis, are the basis for determining the coal resources in the area.

The actual determination of coal resources begins with a classification of the coal according to its depth of occurrence, its rank, heat value, percentage of ash, and sulfur and trace element content. Other factors to be considered are the reliability of the new data, the ownership of the land surface and subsurface minerals. The calculation of tonnages of coal in each of these various categories is done by computer, the data having previously been entered into the computer-based National Coal Resources Data System. The computer not only can determine the amount of coal in a specific area and for a specific category, but it also can generate coal bed maps for all these categories. The many maps, charts, tables and diagrams are then assembled, together with a written report, into a folio, which is made publicly available.

NATIONAL COAL DATA SYSTEM

Mr. YATES. On page 65 you indicate that phase II of the data system is being implemented. When will it be completed?

Mr. MCKELVEY. May I ask Mr. Sheldon to answer that.

Mr. SHELDON. That is something like mapping. It is a process that probably will go on as long as coal is an important energy commodity. And phase II of the program consists of entering point data. For example, when you get a drill hole out in the middle of a basin, we will enter in the coal resource data bank thickness of coal, the amount of overburden, we will enter in the quality of the coal, both in terms of trace elements and other potential pollutants as well as potential resources. We will enter in the Btu content of the coal and ash content and so forth. And then as a result of accumulating all of these point sources of information, you can analyze those aerially and calculate the resources of the coal in terms of how much and so on.

COAL STRIP MINING

Mr. REGULA. Mr. Chairman—will this information be important in the event a Federal strip-mining bill is passed?

Mr. SHELDON. I think it would be extremely useful, because the information, such as the amount of overburden and the amount of coal that is left behind under certain mining plans and so forth, you would be able to analyze that.

COAL MINING TECHNIQUES

Mr. REGULA. Is most of the western coal strippable rather than either by drift or shaft mining?

Mr. SHELDON. Most of it is not strippable. Most of it is underground. What they are looking at right now—it is deeper underground than would be feasible to strip. Whereas most of the reserves they are looking at right now, or the areas they are looking at now, are the strippable ones.

Mr. REGULA. But there are vast reserves in western coal that would be available through either drift or shaft mining aren't there?

Mr. SHELDON. Yes, sir.

Mr. REGULA. There is not too much of that type of activity there at the present time.

Mr. SHELDON. No, because it is much cheaper to strip. However, there is a larger environmental cost to the stripping.

Mr. REGULA. Are the roof characteristics such that underground mining can be used in the western coal fields?

Mr. SHELDON. For some areas; it depends upon how mature the rock is, that is, how deeply it has been buried in the geologic past. In the East you ordinarily have fairly good roof rock conditions, whereas out West, in some of the younger basins, there are not good roof rock conditions. In some other Western areas there are fairly good roof rock conditions.

PROBLEMS WITH UNDERGROUND MINING IN WEST

Mr. McKelvey. One of the problems, Mr. Regula, with underground mining in the West—and this really is a problem for the Bureau of Mines—there are many thick coal beds, and it is not possible to mine the full thickness of those beds by current methods. And then there are in some areas multiple beds of coal, so that there would be several beds with interbedding, maybe just a few feet or tens of feet. But that also poses a problem in the total recovery of coal.

COAL HYDROLOGY

Mr. Regula. You wouldn't have the water problems there, though, would you? The hydrology is such that the underground water is much less.

Mr. McKelvey. No, it would depend on the specific area. But some coal beds are aquifers in themselves. They are broken up enough to have a rather high permeability and make good aquifers. Others, of courses, will be totally dry.

FEDERAL COAL LEASING EXPLORATION

Mr. Yates. You want $2 million for Federal coal leasing exploration, which is a new program. How is this different from what has been done in the coal assessment program under coal resource investigation?

Mr. McKelvey. Of course it will contribute——

Mr. Yates. Not only contribute, but it is the same thing, isn't it?

Mr. McKelvey. No; it is designed in response to the requirements as they were interpreted by the former Secretary of the Interior, in the Federal Coal Leasing Amendment Act. And it is designed as regional reconnaissance. Most of the funds requested will be spent on drilling and to define the extent of both near-surface and deeper coal. So eventually it will make possible a better assessment and contribute better data than would be available otherwise.

Mr. Yates. This data is going to be entered in the National Coal Resource Data System.

Mr. McKelvey. Yes.

ONSHORE OIL AND GAS RESOURCE INVESTIGATIONS

Mr. Yates. Now, you want $5,445,000 for onshore oil and gas resource investigations. And on pages 65–66 you want research directed toward improving resource assessment methodology as necessary to insure that new estimates of the Nation's petroleum resources are as accurate and comprehensive as possible.

RESOURCES AND RESERVES

Well, I immediately think of your reliance on the information of the American Petroleum Institute, American Gas Association. This money is to do it on your own?

Mr. McKelvey. Mr. Chairman, we have I think distinguished for the committee in previous years between reserves and resources, in which reserves include——

Mr. YATES. Yes, you have. Resources are speculative and reserves are almost speculative, but more known.

Mr. MCKELVEY. Reserves consist of deposits of oil, gas, or whatever, that have been discovered and that can be produced under current economic and technologic conditions.

Now, onshore we don't make estimates of reserves. In the past AGI has made estimates of reserves for gas and the American Petroleum Institute for oil. The Bureau of Mines has at times made estimates of reserves for other kinds of minerals and occasionally in conjunction with some specific programs, and we have ourselves. But generally we focus on resources, including deposits of the same quality as those that are producible now, but are not yet discovered, as well as deposits that are subeconomic in terms of the ability to utilize them presently. They may become economic in the future. And so we have utilized estimates of API and AGA for proved reserves, but the estimates that we make are our own and go beyond that into another field.

Now, of course, we use information that has been generated by industry but that is by and large raw data that does not have an interpretive twist to it.

GEOLOGICAL SURVEY CAPABILITY FOR RESERVE ESTIMATES

Mr. YATES. Well, does GS have the capability for providing data on reserves that is more accurate than the information provided by the oil-producing companies themselves?

Mr. MCKELVEY. Generally for reserves onshore we do not. But offshore, where we receive all the information that is generated by the companies, we are now making such reserve estimates and we have in the aggregate better information on the OCS than any individual company.

RESOURCES NEEDED TO DEVELOP RESERVE ESTIMATING CAPABILITY

Mr. YATES. What will it take to develop such a capability, or don't you think you ought to have that capability?

Mr. MCKELVEY. Well, for the OCS we currently have about 54 people, I believe. This is in our conservation of lands and minerals programs. I believe we have about 54 people involved in that effort, and it is one of the efforts that very likely will be expanded in conjunction with the needs that we talked about earlier.

With respect to the onshore, there has been a task force at work under the leadership of OMB, that completed its report a month or so ago, addressing the problem of how to supplant industry estimates of oil and gas, and it has concluded that FEA ought to have the leadership with support from the Geological Survey and the Bureau of Mines. It is a very large order to actually acquire the data and make the estimates yourself.

You may recall that the act that established FEA gave them authority to requisition data of any kind from energy companies, including oil and gas companies, and also required of it an initial independent estimate of oil and gas resources. And for that, FEA chose to request operators to submit estimates of the oil and gas in their own holdings, and, as I recall, did some spot checking of the results.

The results of that were within a few percent of the estimates produced by AGA and API. Whether or not the question of how to undertake such studies in the future involves such choices in the extent to which you try to get industry to do it, but in a way in which you can check and let them know that you are not going to be fooled by a phony estimate and the extent to which you do it yourself.

ACCOMPLISHMENTS OF ON-SHORE OIL AND GAS RESOURCE INVESTIGATION PROGRAM

Mr. YATES. I didn't see in your justifications any statement of your accomplishments during 1976 or 1977. Will you put a summary of those in the record.

[The information follows:]

ACCOMPLISHMENTS OF OIL AND GAS RESOURCE INVESTIGATIONS PROGRAMS

During fiscal year 1976, the Geological Survey's oil and gas resource investigations program completed a major study for the Federal Energy Administration in which methods were developed for estimating future oil and gas discovery rates, required for petroleum resource economic studies. Resource appraisals were made for five offshore areas in support of the Department of the Interior's OCS leasing program, and regional studies in petroleum geology were completed for the Chama-South Wilderness Area in the San Juan Basin, Colo., and the Bob Marshall Wilderness Area in Montana, the Arctic Wildlife Refuge and National Petroleum Reserve-A in northern Alaska. Using a new technique developed in 1975, 2,000 samples were analyzed for their content of organic material in support of regional petroleum resource appraisal investigations, and 3,100 km of seismic data were processed and analyzed as part of resource assessment studies on the Atlantic OCS. In cooperation with the Energy Research and Development Administration, a 5-year program was initiated to characterize geologically the fractured black shales in the Appalachian basin, in support of the ERDA gas stimulation program. In fiscal year 1976, the Oil and Gas Resource Investigations program generated 150 published articles, papers, geologic maps and cross sections, and administrative reports.

In fiscal year 1977, pilot studies to estimate the field size distribution for undiscovered petroleum resources will be completed for the Gulf of Mexico, the Permian Basin and the Baltimore Canyon Trough area of the Atlantic OCS. Such field size distribution studies are a prerequisite for further development work by the Bureau of Mines on models for future oil and gas development.

Organic analyses will be made of about 4,000 samples of potential oil and gas source rocks in support of regional petroleum resource appraisal studies. Developmental work on a new small-diameter borehole gravity meter has been finished, and 20 borehole gravity surveys have been conducted. On behalf of ERDA, a substantial amount of work has been accomplished on a reconnaissance study of tight gas sands in the Green River Basin, the Uinta and Piceance Creek Basins of Colorado, Utah and Wyoming. During the period, 170 published reports, geologic maps and cross sections, abstracts, and administrative reports will be completed.

PETROLEUM RESOURCE REPORTS

Mr. YATES. You say 190 petroleum resource reports will be released in fiscal 1978. Would you furnish the subcommittee a copy of a report that was drafted in 1977 and 1976 and tell us the prinncipal users of the reports.

[The information follows:]

PRINCIPAL USERS OF SELECTED PETROLEUM RESOURCE REPORTS

The 190 reports to be released in fiscal year 1978 include not only petroleum resource reports but also reports on the results of geologic research related to

the origin, migration and accumulation of oil and gas. The users of the reports include Federal and State government scientists and administrators and officials in the petroleum industry.

The following three reports are examples of recently issued research and resource reports concerning petroleum:

"The investigation and development of regional oil and natural gas finding rate methods for the United States," by Betty M. Miller: interim administrative report prepared for the Federal Energy Administration, August 1976.

This report was prepared at the request of the Federal Energy Administration, which is its initial user. However, the report also will be published by the Geological Survey and is then expected to have a broad readership among Government and industry scientists and administrators who are concerned about the finding rates for oil and gas.

"Geologic appraisal of the petroleum potential of offshore southern California: the borderland compared to onshore coastal basins," by J. C. Taylor: U.S. Geological Survey Circular 730, 1976.

The author reviews the geology and petroleum resources of petroliferous onshore basins in southern California and incorporates these data and analyses in an evaluation of the petroleum potential of the southern California borderland. This report has been read by Federal and California State officials concerned with energy resources and the environmental impact of resource development, and it has been well received by the petroleum industry.

"Geologic studies on the COST No. B–2 well, U.S. Mid-Atlantic Outer Continental Shelf area," P. A. Scholle, editor: U.S. Geological Survey Circular 750, 1977.

The COST No. B–2 well was drilled early in 1976 on the eastern flank of the Baltimore Canyon trough. Its total depth is 16,043 feet. This report describes the cores, well cuttings and geophysical logs obtained from the well and uses this information to characterize the possible petroleum source and reservoir rocks in this OCS area. The users of the report include Federal and State government scientists and administrators and officials in the petroleum industry.

A copy of circular 730 and 750 are submitted for the Committee's use.

[NOTE: The report was supplied to the Committee.]

OIL SHALE RESOURCE INVESTIGATIONS

Mr. YATES. You are requesting $1,157,000 for oil shale resource investigations. How long will this program continue?

Mr. MCKELVEY. I expect that these kinds of studies will continue for quite awhile. We are concerned here not only with the oil shale itself but with associated minerals. It is an enormous resource.

Mr. YATES. What is a mineral that is associated?

Mr. MCKELVEY. Dawsonite. That is a sodium aluminum silicate.

Mr. YATES. You are not talking about an oil-bearing rock?

Mr. MCKELVEY. There are oil-bearing rocks that are associated. You may have heard of gilsonite, which is a hard hydrocarbon that actually is in the form of a vein as if it were a rock cutting across sediment. It has been thought that possibly that might represent hydrocarbon material generated from oil shale. There has been speculation also that the heavy oil deposits that have been found have been derived by the metamorphosis of oil shale. But we are referring primarily here to the other kinds of things.

OIL SHALE PROGRAM ACHIEVEMENTS

Mr. YATES. Would you put a statement of your achievements about oil shale into the record?

[The information follows:]

ACHIEVEMENTS OF OIL SHALE RESOURCE INVESTIGATIONS PROGRAM

The accomplishments of the Oil Shale Resource Investigations program during fiscal year 1976 (including Transition Quarter) can be grouped under these activities: Geologic mapping, stratigraphic studies, mineralogic studies, core drilling, and data management.

Geologic mapping.—Geologic mapping at a scale of 1:24,000 has encompassed about 1,400 square miles and has delineated zones of oil shale and barren rock, areas of unstable ground, and fracture patterns, and has determined the thickness and structure of oil-shale beds and associated rocks. A 15-foot thick oil-shale zone just above the base of the Green River formation has been mapped throughout an extensive area in the southwestern part of the Piceance Creek basin. This zone averages more than 15 gallons of oil per ton of rock and may extend the limits of the area to be classified as potentially valuable for oil shale.

Stratigraphic studies.—The collection and analysis of surface and subsurface data have increased our knowledge about the extent and grade of deeply buried oil shales and their associated minerals, and have resulted in a better interpretation of the geologic events that affected the deposition of these potentially valuable minerals. This information has been used in lease-tract selection and in planning experimental mines. The location of the area of maximum oil-shale resources in the eastern part of the Uinta Basin has been inferred from stratigraphic correlations of rich oil-shale zones and analysis of an oil-shale thickness map based on sonic and density logs. The validity of this inferred location is supported by the results of a computer program which derives estimated averages of shale-oil yield from digitized sonic and density logs of exploratory wells drilled for oil and gas.

Mineralogical studies.—Planning for development of any synthetic fuel resource requires knowledge of those minerals that may be deleterious to the environment or may reduce plant efficiency. Mineralogical studies of the Green River oil shales have determined the presence and quantity of those minerals that may cause damage to the environment or may require excessive use of energy in converting the organic matter in the oil shale to liquid petroleum. In fiscal year 1976, major and minor minerals were determined for 378 splits from Fischer-assayed samples obtained from three drill holes in the eastern Uinta Basin, Utah. The samples are from the zones of highest oil yield but show no strong correlation between the percentage of major minerals and oil yield. These data and other mineralogical studies in the Piceance Creek basin suggest that most of the minerals now present in the Green River oil shales formed after deposition of the enclosing rock.

Core drilling.—During 1975–1976, the U.S. Geological Survey drilled three deep core holes to evaluate oil shale in parts of the Piceance Creek and Uinta Basins where reliable data previously had not been collected. Resource estimates for shale oil and alumina (from dawsonite) based on these new data are greater than earlier estimates.

Data management.—Density and sonic logs from the Uinta Basin, Utah have been digitized and converted to oil yield. The calculated results have been plotted to generate average oil yield and thickness values. This information provides control in areas where previously there was little or no information on oil shale resources. These data also lend support to a recently published map which indicates that the thickest and richest sequences of oil shale are farther north in the Uinta Basin than was previously thought. The oil-shale data analysis program also has been used to generate information for contouring isovalue (gallons per ton), isopach (thickness in feet), and isoresource (barrels per acre) maps for 13 stratigraphic oil-shale zones in Colorado. These maps, together with statistical tabulations of the oil shale resources, provide a detailed appraisal of both the distribution and the oil-yield value of these zones for use in studies on the economics of commercial extraction. This information also has been used in land-exchange comparisons and mining-zone selection.

The research results of the Oil Shale Resource Investigations program are made available to Federal and State government officials, industry, and the general public through U.S. Geological Survey publications and reports in scientific journals. In calendar year 1976, the program produced seven geologic maps of areas containing oil-shale resources and ten research and resource reports.

URANIUM/THORIUM RESOURCE ASSESSMENT

Mr. YATES. You are requesting $5,115,000 for uranium/thorium resource assessment. No increase is requested for this program. You say that the objective of this program is to develop and make publicly available information about the occurrence of uranium and thorium that will help the mining industry find new ore deposits. How much is the mining industry itself doing in this field?

Mr. MCKELVEY. A lot.

Mr. YATES. I would think so. I would think the price of uranium would really send them out scurrying.

Mr. MCKELVEY. Yes.

URANIUM POTENTIAL

Mr. YATES. Are you aware of new deposits of uranium that are being found anywhere? We are supposed to be coming to the end of our uranium deposits, aren't we?

Mr. MCKELVEY. It isn't that we don't have to worry about it. As a matter of fact, I think it is likely that interest in resource assessment with respect to uranium is going to increase considerably in the very near future.

Mr. YATES. If that is true why doesn't the price come down?

Mr. MCKELVEY. That is part of the problem. We know that we have substantial resources of uranium already identified but these reactors commit supplies over a very long period. Before you build a reactor you have to know you have enough uranium.

Mr. YATES. It depends on how many reactors we build, too?

Mr. MCKELVEY. Yes.

GEOPHYSICAL EXPLORATION METHODS

Mr. YATES. That seems to be in doubt at the present time.

On page GS–67 you indicate that most of the samples for uranium exploration will be of stream waters and associated sediments, spring waters and associated precipitates, and organic material in streams and lakes. For the edification of the subcommittee, please explain why this technique is utilized. Would you put a statement in the record as to why you utilize this kind of technique.

[The information follows:]

EXPLANATION OF URANIUM EXPLORATION TECHNIQUES

The research is not directed specifically toward uranium exploration, but toward the development of geochemical exploration methods and techniques. One group of methods involves sampling and analyzing materials associated with natural water systems. Because uranium is a very soluble and mobile element, it commonly moves out and away from uranium ores to enter water systems. In those places where uranium enters a stream, there should be anomalously high concentrations of uranium and one or more of its radioactive decay products, which can be detected by analyses. This method of uranium exploration is akin to panning gold up a stream to find a lode deposit. Although the principle involved appears rather simple, such geochemical exploration techniques for uranium actually are quite complex. Research is necessary to develop, refine, and test these methods and to interpret the resulting data. The large number of samples collected and analyzed for the uranium research program reflects the complexity of these geochemical exploration methods.

Mr. YATES. Also put in the record your accomplishments for this program in 1976 and 1977.

You say you are going to support the development of new and improved uranium exploration development. As part of your explanation will you state what they are. How do you know the new techniques will be successful?

Mr. MCKELVEY. Yes; that is true.

[The information follows:]

Accomplishments of Uranium/Thorium Resource Investigations Program

The Geological Survey's program of uranium/thorium resource investigations includes work in geology, geochemistry and geophysics, all of which is intended to improve our understanding of the nature and distribution of uranium and thorium resources in the United States. The program in geology, which produces maps showing areas favorable for uranium exploration, has three elements--mining district studies, sedimentary basin analysis, and studies of frontier areas.

The mining district studies are, in turn, divided into three parts--sandstone, vein, and thorium districts. The sandstone district studies are concentrated in the Colorado Plateau states, Wyoming and Texas. In this work the principal objective is to characterize the detailed geologic setting for uranium deposits through geologic mapping, mine mapping and sampling, rock structure and paleontological studies, and subsurface studies from drill-hole data provided by industry. The geographic areas currently under study are the northern Powder River Basin, Wyoming, where mapping is more than 50 percent completed; the Wind River Basin, Wyoming, for which 10 quadrangle maps are published or in preparation; the northern part of the Great Divide Basin, Wyoming, with three maps published or in preparation; the southwestern Powder River Basin, where special subsurface study is under way; the Green River District, Utah, with four quadrangles mapped under a grant to the Utah Geological and Mineralogical Survey; Duval County, Texas, with two quadrangles mapped; the Chama Basin, New Mexico, two quadrangles being mapped; and the southern and western parts of the San Juan Basin, New Mexico, for which 44 quadrangle maps are in some stage of preparation.

Vein district studies are concentrated in the second most important geologic setting--uranium in fractures, fissures, and structurally deformed igneous and metamorphic rocks. The goal of these studies is to describe the geologic and geochemical setting and known deposits in order to provide guides for further exploration within known districts and in frontier areas. The studies conducted so far are in Colorado and Washington. In addition, studies are under way on igneous and metamorphic rocks in the eastern United States.

Thorium district studies are concentrated in areas known to contain economically producible deposits, even though they are not being exploited at the present time. Most of the current work is concerned with high-grade thorium veins. In the Lemhi Pass district, Idaho and Montana, and the Powderhorn district, Colorado, geologic field studies have been completed and reports are in preparation. These reports contain geologic maps, mineralogical descriptions, sample analyses, and resource estimates. Geologic studies in the Wet Mountains district, Colorado, and Bear Lodge Mountains, Wyoming are nearing completion. Several smaller vein districts, such as Hall Mountain and Diamond Creek in Idaho, Mountain Pass in California, and Bokan Mountain in southeastern Alaska, are also under study. A small amount of work is being done on beach placers in the southeastern United States.

Sedimentary basin analysis is an exploration technique developed by the petroleum industry, but it also can be applied to uranium exploration in sedimentary rocks. About 15 percent of the Geological Survey's uranium/thorium program involves sedimentary basin analysis, which consists of studying the depositional history of the rock formations that fill a sedimentary basin, as related to the distribution of uranium deposits within the basin. Research is being carried on in 14 different areas, including parts of the Colorado Plateau, Wyoming, eastern Colorado, eastern New Mexico, Oklahoma, Kansas, Texas, and Alaska. It is estimated that the analyses are 20 percent completed.

Frontier studies involve examination of potential uranium-bearing areas that have had little or no production. The goal is to establish an improved geologic base for uranium exploration. Frontier areas under study include the Basin and Range province of Nevada and parts of adjacent states, southern New Mexico, the Trans-Pecos area of Texas, the southern High Plains of New Mexico and Texas, the Uinta and Piceance Creek Basins of Utah and Colorado, Precambrian sedimentary rocks in northern U.S., Tertiary sedimentary basins in Alaska, and areas of igneous and metamorphic rocks in western Alaska. Grants have been made to the State Geological Surveys of Wyoming and Texas for frontier area studies.

The geochemistry program consists of studies on the theory of origin of uranium deposits and on exploration techniques. The theory of origin studies are intended to enlarge our knowledge about the time when specific uranium deposits were formed, the geochemical processes that contributed to ore formation, and the physical and chemical changes that affect the host rocks before, during, and after ore deposition. Two current studies examining the geologic sources of uranium ore are in progress. Other ongoing work is directed toward an understanding of the geochemical processes involved in the preparation of host rocks for the emplacement of uranium ore (mineralization) and of the actual emplacement of ore. The research techniques include rock paleomagnetism, a study of sulfur-bearing minerals associated with uranium minerals, and a study of organic materials commonly associated with uranium ore.

Research on geochemical exploration techniques is directed toward improving old methods and developing new methods of detecting anomalous chemical, radiologic, mineralogic, telegeologic, and isotopic "halos" in rocks, soils, ground water, and the atmosphere adjacent to and near known uranium deposits, and to test the application of these methods in areas not known to contain uranium. The work is thus divided into a development stage, which is about 50 percent completed, and a field-testing and application stage, which has only just begun. Studies under way are on soil-gas emanations, stream and other surface waters, stream sediments, surface water and associated decayed plant materials, radium-bearing springs, and geochemical halos of buried deposits.

The work in geophysics is aimed primarily at developing new uranium exploration methods or improving the techniques already in use. For example, tests of drillhole logging techniques not generally used by the uranium mining industry have shown that, in Texas and Wyoming uranium areas, important new information can be obtained that can help define exploration targets. It has been demonstrated that, by making measurements in several adjacent drillholes, geophysical anomalies potentially related to uranium mineralization can be detected between holes.

Surveys based on the magnetic and electromagnetic properties of sedimentary rocks in Texas, Wyoming, and Colorado have shown that there is an apparent correlation between geophysical anomalies and the geochemical alteration associated with subsurface uranium mineralization. The geophysical surveys also can define buried stream channels or changes in ore host rock at depth as guides to exploration. In the igneous and metamorphic terrains of Washington, New York, and Colorado, these methods have proven useful in locating shear zones, fault zones and sulfide-bearing or magnetic rocks, which may be the sites of uranium deposits.

New methods of analyzing remote sensing and radioactivity survey data have been developed to aid in geologic mapping of deposits in Texas and Wyoming. Computer enhancement of Landsat and thermal infrared images has permitted the discrimination of geologic features, such as channel sands, that control uranium mineralization. Image-processing techniques have been used to make color images of radioactivity data showing concentrations of uranium, thorium, and potassium. The interpretation of such data when combined in color composites is significantly improved as compared with the contour-map presentations generally used.

Finally, geophysical work is being conducted to develop a down-hole probe to measure the amount of low-grade uranium mineralization in bore holes. An experimental prototype probe was developed in fiscal 1976 and will be tested and further improved during the current year. The need for this tool arises from the lower grade uranium ores being considered as exploration targets.

Development of Uranium Exploration Techniques

Three different types of uranium methods are being studied--geologic, geochemical, and geophysical. A significant geologic method under investigation is the use of sedimentary basin analyses as a guide to uranium exploration. The geochemical techniques are based on the analysis of samples of naturally occurring gases, liquids, and solids for their content of uranium and certain other chemical elements associated with uranium ores. The geophysical techniques consist chiefly of testing the application of conventional oil-exploration tools and techniques to uranium exploration and of developing new tools, such as remote sensing and radiometric devices. All of these methods are developed and tested in and around areas of known uranium deposits, and additional tests are conducted in areas not known to contain uranium ores. Tests are required to determine the usefulness of these methods in the commercial exploration for uranium, and the test results are published for the information of the uranium mining industry.

NUCLEAR ACTIVATED DRILL HOLE TOOL

Mr. YATES. On page GS–69 you indicate that a nuclear activated drill-hole tool for making inhole uranium analyses has been developed and tested. How does that work? Do you explode some nuclear material?

Mr. MCKELVEY. No. It is a radioactive isotope. I think it is Californium.

Mr. YATES. Is this a promising technique?

Mr. MCKELVEY. Yes, permitting you to assay in the ground, so to speak, and recognize or assess the uranium content of a larger volume of rock than would actually be recorded.

GEOTHERMAL INVESTIGATIONS

Mr. YATES. Then you want $9,611,000 for geothermal investigations. On page GS–70 you say you are involved in current activities. Where would you expect to be involved in fiscal 1978?

Mr. MCKELVEY. We have been working in a number of areas, primarily in the West, in California and Oregon, Alaska, Arizona, also some in Wyoming.

Mr. YATES. Would you put a summary of your achievements to date in this field in the record so we may see how you are doing.

[The information follows:]

Summary of Major Achievements in the Geothermal Investigations Program

(1) The first comprehensive inventory and assessment of geothermal resources of the United States, based upon an integration of data available through early 1975, has been prepared in cooperation with ERDA and published as United States Geological Survey Circular 726.

(2) Based on extremely accurate predictions of Survey scientists derived from geological, geophysical, geochemical, and hydrological investigations, a successful test hole was sited by ERDA in the Raft River area of Idaho, 145°C water.

(3) Studies of seismic P-wave delay times at Long Valley, California, indicate that the Valley's volcanic center may be underlain by about 1,000 km^3 of partially molten hot rock, suggesting that this area should become a geothermal target area of immense potential.

(4) Geological investigations in the Coso Hot Springs area, California, indicate that the magma reservoir beneath the Coso area is much more extensive than previously thought and that the local hot springs and outcrops of young volcanic rock lie near the center of a roughly circular area nearly 45 km in diameter that is ringed by a complex fault zone.

(5) Geochemical "mixing" models which use the fractionation of isotopes to estimate subsurface temperatures have been developed, providing useful geothermometers not previously available.

(6) Discovery of the prospect of hot dry rock east of San Francisco Mountain based on geologic mapping of the San Francisco volcanic field, Arizona.

(7) Use of geothermometers and measured subsurface temperatures to estimate true salinities of formation water samples from geopressured zones in Texas.

(8) Determination based on geologic mapping and hydrologic investigations that a major fault zone south of the Clear Lake geothermal area, California, may be a major control on the undetermined northeastern extent of The Geysers geothermal field.

(9) Updating of the geothermal computer data file (GEOTHERM) to include the U. S. hot springs file and geothermal field data from New Zealand, Mexico, and El Salvador.

(10) Indication by potassium-argon dating that volcanic rocks in southwestern Utah are young, suggesting that the important thermal anomaly at Roosevelt Hot Springs has an extensive magmatic (molten rock) source.

(11) Subsequent determination, based on flow testing, was made that 2 deep geothermal wells at Raft River, Idaho, are producing from a common aquifer in a large and productive geothermal reservoir.

(12) Discovery, using electrical surveying techniques, of zones of high electrical conductivity beneath the Snake River Plain, Idaho, thought to be caused by regions of high temperature.

(13) Determination based on geologic mapping that the volcano at Mt. Shasta, California, consists of 4 separate but overlapping cones, the youngest of which indicates a higher geothermal potential for this volcanic system than previously believed.

(14) Correlation of high micro-earthquake activity in the vicinity of the Healdsburg fault in California with geothermal development at The Geysers.

(15) The utility of a helium survey technique, based on the measurement of an abnormally high concentration of this inert gas in the surface soils of geothermal areas, has been demonstrated as an exploration method for hidden geothermal systems at several geothermal locations in California, Utah, Colorado, and Wyoming, and has prompted testing of this relatively inexpensive technique by several private companies at their own geothermal locations.

(16) Two workshops, each consisting of approximately 40 scientists and engineers from universities, private industry, and government as experts in developing a wide range of geophysical, and particularly electrical, techniques for geothermal exploration, have been convened to encourage an exchange of information among the researchers and to identify the more promising lines of investigation for each technique.

GEOTHERMAL SYSTEMS MODELED

Mr. YATES. On page 71 you have a term called geothermal systems models. You indicate three were done in 1977 and you expect four to be done in 1978. What is the advantage of this?

Mr. MCKELVEY. What we are attempting to do here, Mr. Chairman, is to determine the nature of a geothermal system and what happens when you withdraw steam or hot water from various parts of it. It helps also in the assessment of the resource.

ENERGY RESOURCE DATA SYSTEMS

Mr. YATES. You want $1,483,000 for energy resource data systems. Isn't that what ERDA does? Does FEA have its own system?

Mr. MCKELVEY. Not resource except the reserves that I mentioned.

Mr. YATES. How many requests for data of this kind do you receive?

Mr. MCKELVEY. I don't have a feel for that.

Mr. YATES. Who requests this information?

Mr. SHELDON. As we develop these systems, for example the one on oil and gas, it is made available to the public via the University of Oklahoma, which operates an oil-gas information center and service in this case. They in turn have it on General Electric's computer network. At that stage it is available to anybody. The petroleum data system is the name of the system we have developed for all the oil and gas fields of the United States, all 60,000 of them. This is now available to everybody through General Electric's computer system, at cost, I understand, and this is accessed by all of the major oil companies, and they all have a contract for it. Many universities are interested in the subject. That is an example of the way the information gets out. It is highly used these days.

Mr. YATES. How many people are involved in that effort?

Mr. SHELDON. It is a relatively small one.

Mr. YATES. What does it cost?

Mr. SHELDON. We have five people in an oil and gas resource appraisal group. But much of the release of the information is done on the outside.

Mr. YATES. What is the cost of that system?

Mr. SHELDON. Of the oil and gas system?

Mr. YATES. Yes.

Mr. SHELDON. It was developed at a cost of probably under $7 million, and the operation of it is paid for by the user. There is no Federal cost involved.

OIL AND GAS RESOURCE APPRAISAL GROUP

Mr. MCKELVEY. Mr. Sheldon mentioned the resource appraisal group. They published new estimates of oil and gas resources several years ago offshore and onshore. That was published as circular 725. We kept records of all of the information utilized in the construction of those estimates. They involved separate examination, as I recall, of about 102 different oil and gas provinces. We made all those data available in the open file such that anybody could come and inspect them. I have forgotten the exact number but the last I heard

about a year ago over 70 companies in various organizations had come in and copied those files. Of course, they are extremely voluminous and they had to pay for the reproduction costs.

OFFSHORE GEOLOGIC SURVEYS

Mr. YATES. How many private firms are under contract to the Survey for carrying out this work, that is, the offshore appraisal?

Mr. MCKELVEY. Offshore geological surveys, I would have to supply that.

Mr. YATES. What is the total of this work between Geological Survey and private organizations and other governmental organizations? Who does how much? Would you put that in the record, please?

Mr. MCKELVEY. We would have to speculate about it to an extent but we will do what we can.

Mr. YATES. Everything you do isn't based on exact fact.

Mr. MCKELVEY. As geologists we do a great deal of that.

[The information follows:]

FIRMS DOING OFFSHORE GEOLOGIC SURVEYS

During fiscal year 1976 (including transition quarter), the Geological Survey issued 11 major contracts with as many private firms, totaling $4.8 million, for work related to offshore oil and gas resource appraisal. Three major contracts, totaling $575,000 have been issued so far in fiscal year 1977. In addition, this program provides grant support to 3 State geological surveys and 12 universities for research on specific aspects of the Survey's Outer Continental Shelf assessment investigations.

PROCESS FOR OCS OIL AND GAS APPRAISALS

Mr. YATES. What is the timing on all this; when do you make your study; when do you go to resale and preparation of the environmental impact statement? Do you want to describe what the process is in the record?

Mr. MCKELVEY. For general interest I might mention we have a circular that describes the entire OCS process and we would be happy to submit that for the committee.

[The information follows:]

OCS LEASING AND MANAGEMENT PROCESS

A booklet prepared jointly by the Bureau of Land Management and the Geological Survey, "Leasing and Management of Energy Resources on the Outer Continental Shelf," describes the sequence of procedures that needs to be followed in leasing OSC areas for resource development. A copy of this booklet is submitted for the committee's use.

ENERGY RELATED ENVIRONMENTAL INVESTIGATIONS

Mr. YATES. You are requesting $4,096,000 for energy-related environmental investigations. You indicate that second-round lease sales are scheduled for the Atlantic, Gulf, and Pacific Coasts. In view of the *Weinstein* decision, and the decision by Secretary Andrus to hold off the mid-Pacific sale, where do you expect to assign the resources that had been scheduled for work in those areas?

Mr. MCKELVEY. The *Weinstein* decision unless it would have broader implications than anyone thinks now, would not apply elsewhere on

the Outer Continental Shelf. I believe Secretary Andrus was quoted recently as saying that the sale plan for Georges Bank, the schedule for that would not be disturbed by that decision.

LEASE SALE SCHEDULE

Mr. YATES. Can you speculate again for the committee and let us have the benefit of your views as to where, over the next 5 years, for example, you think that you are going to have the Outer Continental Shelf surveyed and identified?

Mr. MCKELVEY. We included that, I believe, on page GS–106, the sale schedule, which, of course, is the schedule visualized now and may change.

MARINE GEOLOGY INVESTIGATIONS

Mr. YATES. You are requesting $1,247,000 for marine geology investigations, which is no increase over 1977. You indicate that most of this work is related to near shore areas where the principal objectives are to study the nature and occurrence of various marine deposits, investigate the engineering properties of sediments, carry out research on coastal geologic processes, and undertake interdisciplinary geologic and hydrologic studies. What are the results of these studies and investigations?

ACCOMPLISHMENTS OF MARINE GEOLOGY PROGRAM

Mr. MCKELVEY. Those are largely done in-house, Mr. Chairman. We have 25 positions.

Mr. YATES. Will you also put in the record a summary of the accomplishments of this program and what you expect to accomplish during this next fiscal year 1978.

Mr. MCKELVEY. Yes.

[The information follows:]

Accomplishments and Plans of Marine Geology Program

Research by the Geological Survey has shown the effects of storm waves, rip currents and sand transport on modern coastal deposits in California, Oregon and Alaska. Similar features preserved in ancient deposits now can be interpreted in terms of their geometry, areal distribution and potential for containing energy or mineral resources.

During the summer of 1976, the Atlantic Margin Coring Project obtained a total of 3,340 feet of cores from 19 holes drilled on the Atlantic OCS, from the South Georgia Embayment north to Georges Bank. Two significant results of this coring project were the discovery of zones of relatively fresh water that extend beneath the Continental Shelf as much as 60 miles seaward from the New Jersey coast, and the identification of unusually high concentrations of methane in some of the Shelf sediments. Although the methane gas (or marsh gas) is not the kind of gas sought by petroleum companies, it can affect the stability of near-surface Continental Shelf sediments. The initial findings of the Atlantic Margin Coring Project have been published, and detailed studies of the recovered core material are continuing.

A comprehensive study of the geotechnical properties of sea-floor sediments in near-shore waters of the Gulf of Mexico is being undertaken in cooperation with the Bureau of Land Management, the National Oceanic and Atmospheric Administration, and Lehigh, Louisiana State, and Texas A&M Universities. Several reports on the geology and engineering properties of unstable soils in the Mississippi Delta area have been issued. The reports describe how cyclic wave loading, methane gas in sediments and submarine slumping, acting alone or together, can reduce the strength of marine sediments.

In cooperation with the State of Texas, the Geological Survey is gathering sediment samples and geophysical data for maps and reports on shore-line erosion and deposition and geologic hazards (primarily faults) to coastal development in the Gulf of Mexico areas. In cooperation with the State of Massachusetts, the Survey is mapping coastal and shelf deposits of sand and gravel. An ongoing geologic and hydrologic study of San Francisco Bay is producing data that will help distinguish natural fluctuations in sediments and benthic fauna from man-induced effects of water and sewage discharge.

During FY 1978, this scientific program will be continued, with an emphasis given to those OCS areas that are scheduled for early development. The Geological Survey will undertake to obtain additional cores of sea-floor sediments for further studies of the geotechnical properties of these sediments. Basic geological investigations related to the modes of occurrence and geophysical distribution of deep-ocean minerals will be undertaken, provided that a plan for the development of these resources is approved.

FUNDS FOR OCS OIL AND GAS APPRAISALS

Mr. YATES. Have you requested funds for fiscal 1978 that would better enable you to carry out your responsibilities on the Outer Continental Shelf leasing that have been denied or reduced or otherwise not presented to this committee in that table? You remember the table you gave us?

Mr. MCKELVEY. Not to my knowledge.

Mr. YATES. Then we know about all the money you have requested?

Mr. MCKELVEY. Yes.

Mr. YATES. Presumably you think that is the maximum you can use; right?

Mr. MCKELVEY. I mentioned this morning, Mr. Chairman, about additional funds that we may request with respect to the Outer Continental Shelf estimation of MER's. I don't think we will be requesting additional funds for this year in conjunction with that program.

Mr. YATES. Let us adjourn.

WEDNESDAY, MARCH 16, 1977.

Mr. YATES. The hearing will be in order.

OFFSHORE PETROLEUM RESOURCES

You say in the justifications that estimates of the magnitude of the Nation's offshore petroleum resources are needed for Federal policy decisions and for long-range energy planning. I couldn't agree with you more on that:

> Information on the oil and gas resource potential of each OCS area and the undiscovered recoverable quantities of petroleum at various water depths and operating environments are needed for the wise planning of a multiyear OCS leasing program.

What are you going to do about that? You are requesting the same amount of money. That won't permit you to obtain that information, will it?

Mr. MCKELVEY. Well, we will be basing those estimates on available geophysical data primarily.

Mr. YATES. When you say available geophysical data, is this the information you have received from the private companies and from associations?

Mr. MCKELVEY. It will be from those sources as well as data that we collect ourselves.

OFFSHORE DATA COLLECTED BY THE GEOLOGICAL SURVEY

Mr. YATES. How much data can you collect yourselves? I think it is important, and you seem to indicate that it is important, that you obtain the estimates of what our reserves are.

Of course, that need was graphically demonstrated this last winter, when we began to wonder what the extent of our natural gas reserves was, and we don't know that, do we?

Mr. MCKELVEY. We know pretty well the extent of our reserves in the sense that we use that term.

Mr. YATES. Reserves or resources?

Mr. MCKELVEY. Reserves—with respect to the OCS. We have completed a report that was released in January giving updated estimates of about 250 fields, including about 100 on which we have been able thus far to complete reservoir-by-reservoir estimates.

We will probably be expanding that work. I mentioned 250 fields. There are also about 50 in which discoveries have been made, but not enough information is available yet to determine reserves.

EXPLORATORY DRILLING

Mr. YATES. Are you going to do any drilling for the purpose of identifying the reserves?

Mr. MCKELVEY. No drilling is proposed.

Mr. YATES. Wouldn't that be helpful?

Mr. MCKELVEY. No drilling is proposed in our budget. It is a difficult question, Mr. Chairman; certainly drilling is the only way in which it is possible to tell whether or not oil or gas are actually present. But, it is a big world out there, and an enormous amount of drilling would be required to actually determine how much is present.

Actually, we are examining the question in conjunction with legislation that is being proposed and would call for exploratory drilling in some fashion in advance of exploration.

Mr. YATES. I thought that in a previous hearing we had discussed the possibility of such drilling, and you had indicated that it might be helpful. You indicated you were going to do some kind of drilling.

Mr. MCKELVEY. Yes, we have done shallow core drilling.

Mr. YATES. Is core drilling proposed to be done too?

Mr. MCKELVEY. I don't believe any core drilling is planned presently.

Mr. SHELDON. In the conservation division element of the budget there is some core drilling to determine OCS bottom stability.

Mr. MCKELVEY. Yes; in connection with bottom stability studies, But, not exploratory drilling.

We have also discussed the merits of what we call stratigraphic drilling, in which a hole is located on the basis of the best information available, such that there is very little likelihood of finding oil or gas. The purpose of such a well or hole is to learn about the source rocks and the reservoir rocks. It is very valuable, but, again, it is costly. The companies are doing some of that kind of drilling.

GEOPHYSICAL DATA FROM PRIVATE INDUSTRY

Mr. YATES. How much money would you need for that? The private companies are doing it. But, the companies are not giving you all their information, are they?

Mr. MCKELVEY. Oh, yes, they give us all the information that is acquired.

Mr. YATES. Are you telling this committee that the companies give you all the information, accurate information, that they have respecting the size of reserves?

Mr. MCKELVEY. They don't give us interpreted information with respect to reserves, except on specific problems. But, all well data, all geophysical data that are acquired, we receive. With respect to the stratigraphic tests that are authorized—like those drilling now on

the east coast—the regulation specifies that when leasing has been done within 50 miles of the well, all that information is made available to the public.

Mr. YATES. What about the question of having core drilling in areas where the companies are not drilling? What do you do about that? Or, are there no such areas?

Mr. MCKELVEY. Yes, there are many such areas, but there is no drilling——

Mr. YATES. The question is, do you not require information in areas where the companies are doing no drilling?

Mr. MCKELVEY. Yes.

Mr. YATES. Why don't you do it, then?

Mr. MCKELVEY. As I say, Mr. Chairman——

Mr. YATES. It is a question of money?

Mr. MCKELVEY. It is extremely expensive

WATER RESOURCES INVESTIGATIONS

DATA COLLECTION AND ANALYSIS

Mr. YATES. You are requesting $12,713,000 for data collection and analysis. On page 84 you quantify certain elements of data collection.

Is that where we are now, and where we want to be, and where we will be in 1978, assuming the committee approves your request?

Mr. MCKELVEY. What we are asking for is an increase of $1,400,000.

Mr. YATES. That is true. But, it doesn't answer my question.

Mr. MCKELVEY. I believe that we will be requesting additional funds in the future. But, I think what we are doing here is at a reasonable rate of accomplishment and growth.

We are developing a national stream water quality network, and presently we have 345 of the 525 stations that are planned. The extent of this network is shown on this chart.

[The chart follows:]



The national stream quality accounting network (Nasqan) is designed to provide a uniform, continuing measure of the quality of U.S. rivers. Design: 525 stations.

Mr. YATES. Your justification's emphasis is on quality, and at this critical time quantity is just as important. You provide information on that as well.

Mr. MCKELVEY. Indeed we do. Part of the $12.7 million includes both quantity and quality, and information on both surface and underground water.

NATIONAL QUALITY ACCOUNTING NETWORK

Mr. YATES. How much of $1,400,000 is for the national stream quality accounting network?

Mr. MCKELVEY. I believe it is all for that.

Mr. YATES. You want to expand your program from 345 to 445 stations. How much of the amount provided for this program will be for physical installations and how much for interpretation of the data?

Mr. MCKELVEY. I will ask Mr. Cragwall to respond to that, if I may.

Mr. YATES. Mr. Cragwall?

Mr. CRAGWALL. A very small part is for physical installations. Most of our network is being implemented at existing stream flow station sites, and actually there is very little instrumentation involved in establishing a water quality station. So, the money is largely for operational purposes.

Mr. YATES. Will you make available to the committee a copy of one of the reports that you published in 1976 or 1977 relating to this program?

Mr. MCKELVEY. Yes.

[Note: The report was filed with the committee.]

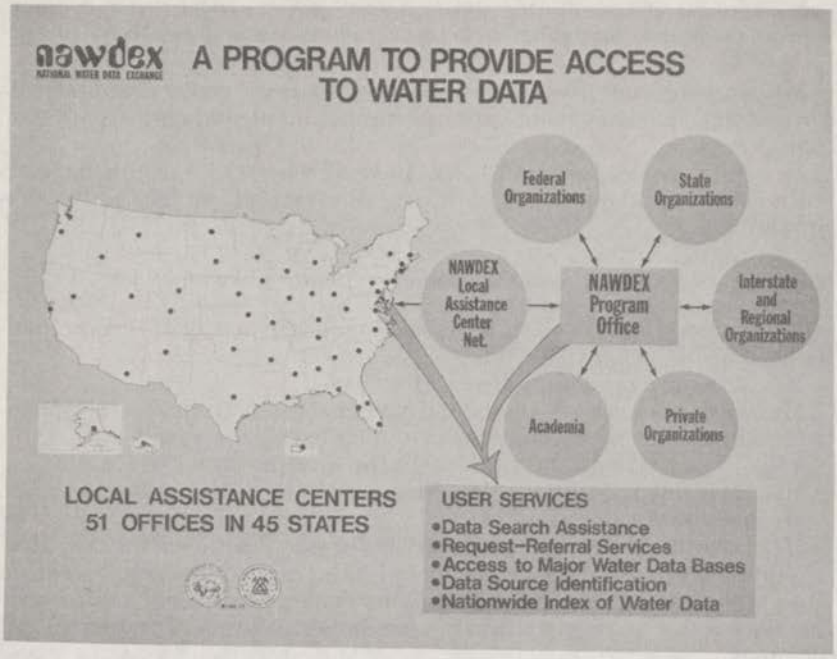
NATIONAL WATER DATA EXCHANGE

Mr. YATES. You want an additional $400,000 for the National Water Data Exchange. You propose to expand your local assistance centers from 45 to 55. How much of the $400,000 is related to that expansion?

Mr. MCKELVEY. Again, may I ask Mr. Cragwall?

Mr. CRAGWALL. We will have to supply that, sir. I don't have it broken down. This chart shows the distribution of the local assistance centers in the States.

[The chart follows:]



The National Water Data Exchange (Nawdex) is a program to provide access to water data. Nawdex is composed of water-oriented organizations voluntarily working together and supported by a nationwide network of local assistance centers to provide users of water data with data-search assistance, request-referral services, access to major water data bases, identification of sources of water data and a nationwide index of water data.

Mr. YATES. Very good.

[The information follows:]

AMOUNT OF NAWDEX INCREASE RELATED TO EXPANDED ASSISTANCE CENTERS

About $35,000 of the requested funding increase is related to the expansion of the local assistance centers. This includes: $5,000 to orientate personnel of the new centers in Nawdex policies and procedures and to train these personnel in the use of Nawdex computerized data systems; $10,000 for technical support by the program office in the use of data systems and the development of computer software in response to specific, localized needs at the new centers; and $20,000 for personnel and other cost reimbursements to the new centers for data input and data processing services provided to the program office in support of its data indexing and data response activities. New local assistance centers are established in existing offices of Nawdex member organizations that voluntarily participate in this segment of the program. There is a sharing of existing personnel, computer hardware, and office facilities. The cost of adding new centers is, therefore, minimal.

INFORMATION FOR NAWDEX

Mr. YATES. You say the objective of the program includes improving the information from the National Water Data Exchange information base by expanding activities to gather background information about organizations collecting water data. What do you mean by background information about these organizations? What is meant by that phrase? What information do you propose to gather?

Mr. McKelvey. Mr. Chairman, in the NAWDEX program we are identifying organizations that are sources of water data, and providing information about the kinds of data that they have and are willing to make available through the National Water Data Exchange.

For more specifics, I will call on Mr. Cragwall again, if I may.

Mr. Cragwall. Basically, we are speaking of what you read in the plan—the water data resources directory. It is learning what agencies collect what kinds of water information.

Then, once we know that, we will be preparing the next step, the master water data index, which actually is an index of those data holdings of each of those other agencies.

Mr. Yates. How many such organizations are there now, Mr. Cragwall?

Mr. Cragwall. As of now, we have 34 member organizations that have signed up in NAWDEX—10 Federal, 18 State, 3 river basin commissions, 1 university and 2 private organizations.

We have listed further in our water data sources directory that is being worked on 320 organizations that are holding some kind of water data.

Mr. Yates. What kind of coordination activities will be expanded?

Mr. McKelvey. The coordination of the national water data activities is not proposed for an increase, Mr. Chairman.

Mr. Yates. Well, that isn't what you said in your justifications.

You say that NAWDEX will be increased to about 300 organizations and coordination activities will be expanded.

Mr. McKelvey. Excuse me, Mr. Chairman, I thought you were referring to the next item, item 3 on the coordination of national water data activities.

As Mr. Cragwall indicated, we are expanding membership in the NAWDEX, hoping to increase it to about 200 organizations. What is referred to there by coordination means the actual operation of the system, and the making available of data to the member organizations.

NATIONAL WATER DATA ACTIVITIES

Mr. Yates. $811,000 is requested for coordination of national water data activities. How does this relate to NAWDEX?

Mr. McKelvey. It has a different focus, Mr. Chairman. Its purpose is the coordination of the organizations that are concerned with the collection of water data, with their operations, whereas NAWDEX is really an information system, the purpose of which is to make available data that has been collected.

But, what is referred to in the coordination of water data activities means coordination of ongoing operations on the part of the various Federal agencies involved.

Mr. Yates. How does this program relate to the Office of Water Research and Technology, with its State Water Resources Council organizations?

Mr. McKelvey. The Office of Water Resources and Technology is an office within Interior that largely grants funds.

Mr. Yates. We provide the funds in this committee. But, we want to know how you relate to it.

Mr. McKelvey. Mostly in an advisory and consultative capacity. We review on their behalf many of the proposals that they receive.

Mr. Yates. Do you get paid for it?

Mr. McKelvey. No, I believe that is done simply——

Mr. Yates. Would you place in the record the relationship that you have with EPA, the Bureau of Reclamation, the Corps of Engineers, NOAA and other agencies involved in water resource management?

Mr. Cragwall told us yesterday about the group that meets and engages in coordinated activities in an effort to try to coordinate your various responsibilities. We would like you to expand on that at this point.

Mr. McKelvey. All right.

[The information follows:]

RELATIONSHIP OF FEDERAL AGENCIES IN WATER RESOURCES MANAGEMENT

The relationships between the Geological Survey and other Federal agencies involved in water resources management are long standing and varied. Over the years the Survey has assisted other agencies by acquiring water data and conducting water-resources investigations to meet their specific needs. This is accomplished primarily through transfer-of-funds arrangements. In 1978 F.Y. it is estimated that about $28 million will be transferred by more than 20 agencies specifically for these purposes.

Following the issuance in 1964 of Office of Management and Budget Circular No. A-67, the water-data acquisition activities of all Federal agencies have been coordinated with the Geological Survey serving as the lead agency. Principal responsibility is focused in the Office of Water Data Coordination. One of the primary mechanisms by which coordination is accomplished is the Interagency Advisory Committee on Water Data (IACWD) which currently has representation by 31 Federal agencies. This Committee, chaired by the Chief Hydrologist of the Geological Survey, is both an "advisory" and a "working" committee, providing advice on needs for data and for coordination of data activities, information about ongoing and planned data programs, and assistance in carrying out the various coordination activities. For example, the Committee, recognizing the need for improving accessibility to water data, established a subcommittee to study the problem and recommend an appropriate course of action. The Committee endorsed the resultant recommendation to create the National Water Data Exchange (NAWDEX). In January 1976, NAWDEX became officially operational as part of the Geological Survey's Water Resources Division. Many of the Federal agencies that acquire data are now participating members of NAWDEX, and others are expected to become members in the near future.

The extensive involvement of Federal agencies in the interagency coordination activities is depicted in table 1. These include (a) the development and maintenance of a Catalog of Information on water-data activities (which serves as the nucleus of the NAWDEX index of data holdings), (b) the continuing data planning and coordination activity being carried out in the field in each of the Nation's 21 major water resources regions, (c) the designation of a set of recommended methods for collecting hydrologic data, (d) the analysis of data deficiencies for water quality in small watersheds and in precipitation, and (e) the continuing development of ways to improve communications between organizations and individuals that collect, disseminate, and use water data. A major achievement in improving communications is just now being completed with the printing of the last of the State maps depicting basic hydrologic unit boundaries and codes developed by the Geological Survey's Office of Water Data Coordination in cooperation with the U.S. Water Resources Council and other Federal and State agencies concerned with water.

To assure that the needs of the non-Federal water-data community are fully considered, a companion advisory committee was established in 1965 with the Director of the Geological Survey as chairman. This Committee (see table 2) has been fully involved in these water-data coordination activities, and it works with the Interagency Committee on matters of mutual interest (NAWDEX, Recommended Methods, Improved Communications, etc.).

The four specific agencies mentioned (EPA, Bureau of Reclamation, Corps of Engineers, and NOAA) are extensively involved in the foregoing coordination activities. In addition, several bilateral coordinating committees have been established to provide continuing operational coordination at headquarters level. At the present time, the Geological Survey has formed such committees with NOAA, SCS, BLM, Bureau of Mines, and Bureau of the Census. Also, the Survey, along with other water-oriented agencies, is represented on various committees (such as the Hydrology Committee and the Sedimentation Committee) of the U.S. Water Resources Council.

FEDERAL AGENCY PARTICIPATION IN THE GEOLOGICAL SURVEY'S
WATER DATA COORDINATION PROGRAM

AGENCY	INTERAGENCY ADVISORY COMMITTEE ON WATER DATA (IACWD)	CATALOG OF INFORMATION ON WATER DATA	FIELD COORDINATION AND REGIONAL PLANNING	Working Groups of IACWD						NAWDEX MEMBERS
				RECOMMENDED METHODS		QUALITY OF WATER IN SMALL WATERSHEDS	WATER DATA HANDLING	QUALITY OF PRECIPITATION	IMPROVED COMMUNICATIONS	
				COORD. COUNCIL	WORK GROUPS					
Department of Agriculture										
Agricultural Research Service	X	-	-	-	X	X	X	X	X	X
Economic Research Service	X	-	-	-	X	X	-	-	-	-
Forest Service	X	X	X	X	X	X	-	X	-	-
Soil Conversation Service	X	X	X	X	X	X	-	-	X	X
Department of Commerce										
Bureau of Census	X	-	-	-	X	-	-	-	-	-
Bureau of Domestic Commerce	X	-	-	-	-	-	-	-	-	-
National Bureau of Standards	X	-	-	X	X	-	X	-	-	-
National Oceanic and Atmospheric Admin.	X	-	-	X	X	-	-	X	X	-
National Marine Fisheries Service	-	X	X	-	-	-	-	-	-	X
National Ocean Survey	-	X	X	-	X	-	-	-	-	X
National Weather Service	-	X	X	X	-	X	X	X	-	X
Environmental Research Labs.	-	X	X	-	-	-	-	-	-	X
Environmental Data Service	-	-	-	-	-	-	-	-	-	X
National Climatic Center	-	-	-	-	-	-	-	-	-	X
National Oceanographic Data Ctr.	-	-	-	-	-	-	-	-	-	X
Environmental Science Info. Ctr.	-	-	-	-	-	-	-	-	-	X
National Geophysical and Solar-Terrestrial Data Center	-	-	-	-	-	-	-	-	-	X
Center for Experiment Design and Data Analysis	-	-	-	-	-	-	-	-	-	X
Department of Defense										
Army Health Service	-	X	-	-	-	-	-	-	-	-
Corps of Engineers	X	X	X	X	X	X	X	-	X	-
Naval Facilities Engineering Command	X	X	-	X	-	-	-	-	-	-
Marine Corps	-	X	-	-	-	-	-	-	-	-
Department of Housing & Urban Development	X	-	X	-	-	-	-	-	X	-
Office of Metropolitan Development	-	-	-	-	-	X	-	-	-	-
Department of the Interior	-	-	-	-	-	-	X	-	X	-
Alaska Power Administration	-	-	X	-	-	-	-	-	-	-
Bonneville Power Administration	-	X	X	X	-	-	-	-	X	-
Bureau of Indian Affairs	X	X	X	-	-	-	-	-	-	-
Bureau of Land Management	X	X	X	-	X	X	-	X	X	-
Bureau of Mines	X	X	X	-	X	-	-	-	X	-
Bureau of Outdoor Recreation	X	-	-	-	X	-	-	-	X	-
Bureau of Reclamation	X	X	X	X	X	X	X	X	X	-
Fish and Wildlife Service	X	X	X	-	X	-	-	-	-	-
*Geological Survey	X	X	X	X	X	X	X	X	X	X
National Park Service	X	-	X	X	X	-	-	-	X	-
Office of Water Research & Technology	X	-	-	-	X	-	-	-	-	-
Southeastern Power Administration	-	-	X	-	-	-	-	-	-	-
Southwestern Power Administration	-	-	X	-	-	-	-	-	-	-
Department of Transportation	X	-	X	-	-	-	X	-	-	-
Independent Agencies										
Council on Environmental Quality	X	-	-	X	-	-	-	-	X	-
Energy Research & Development Admin.	X	X	X	X	X	-	-	X	-	-
Environmental Protection Agency	X	X	X	X	X	-	X	X	X	-
Federal Power Commission	X	-	-	-	-	-	-	-	-	-
International Boundary and Water Comm.	X	X	X	X	-	-	-	-	-	-
International Joint Commission	X	X	-	-	-	-	-	-	-	-
Nuclear Regulatory Commission	X	-	-	X	-	-	-	-	X	-
Tennessee Valley Authority	X	X	X	X	X	-	-	X	-	X
Water Resources Council	X	-	-	-	X	-	-	-	X	X
New England River Basins Comm.	-	-	X	-	-	-	-	-	-	-
Great Lakes Basin Comm.	-	-	X	-	-	-	-	-	-	-
Ohio River Basin Comm.	-	-	X	-	-	-	-	-	-	-
Pacific Northwest River Basin Comm.	-	-	X	-	-	-	-	-	-	-
Upper Mississippi River Basin Comm.	-	-	X	-	-	-	-	-	-	-
Missouri River Basin Comm.	-	-	X	-	-	-	-	-	-	X
Interdepartmental Committee for Meteorological Services (OMB Circular A-62)	-	-	-	X	-	-	-	-	-	-

*Lead Agency for OMB Circular A-67 activities

Table 1.

Advisory Committee on Water Data for Public Use

CHAIRMAN
V. E. McKelvey, Director
U.S. Geological Survey
Reston, Virginia

ALTERNATE CHAIRMAN
J. S. Cragwall, Jr., Chief Hydrologist
U.S. Geological Survey
Reston, Virginia

EXECUTIVE SECRETARY
R. H. Langford, Chief
Office of Water Data Coordination
U.S. Geological Survey
Reston, Virginia

MEMBERS AS OF MARCH 15, 1977

AMERICAN SOCIETY OF CIVIL ENGINEERS
Mr. Charles G. Wolfe, Project Engineer
*Bechtel Incorporated
San Francisco, California

AMERICAN WATER WORKS ASSOCIATION
Mr. John A. Roller, Superintendent
Water Division, Dept. of Public Utilities
Tacoma, Washington

ASSOCIATION OF AMERICAN STATE GEOLOGISTS
Dr. Wallace W. Hagan, Director
Kentucky Geological Survey
Lexington, Kentucky

ASSOCIATION OF WESTERN STATE ENGINEERS
Mr. Chris L. Wheeler, Deputy Director
Oregon Dept. of Water Resources
Salem, Oregon

ASSOC. OF STATE AND INTERSTATE WATER POLLUTION CONTROL ADMINISTRATORS
and
CONFERENCE OF STATE SANITARY ENGINEERS
Mr. Walter A. Lyon, Director
Bureau of Water Quality Management
State Department of Environmental Resources
Harrisburg, Pennsylvania

CHAMBER OF COMMERCE OF THE UNITED STATES
Mr. John E. Kinney, Sanitary Engineer
Ann Arbor, Michigan

COUNCIL OF STATE GOVERNMENTS
Mr. James M. Ridenour
Director of State Services
Council of State Governments
Lexington, Kentucky

MANUFACTURING CHEMISTS ASSOCIATION
Mr. Robert J. Hanson, Manager
ICI United States Inc.
Wilmington, Delaware

NATIONAL ASSOCIATION OF CONSERVATION DISTRICTS
Mr. David L. Firor, Southern Representative
National Association of Conservation Districts
Athens, Georgia

NATIONAL GOVERNORS' CONFERENCE
Mr. David W. Johnson
Special Assistant for Natural Resources
National Governors' Conference
Washington, D.C.

NATIONAL WATER RESOURCES ASSOCIATION
Mr. John W. O'Meara
Executive Director
National Water Resources Association
Washington, D.C.

NATIONAL WATER WELL ASSOCIATION
Mr. Harry E. LeGrand, Consulting Geologist
Raleigh, North Carolina

*UNIVERSITIES COUNCIL ON WATER RESOURCES

WATER POLLUTION CONTROL FEDERATION
Mr. Robert A. Canham, Exec. Secy.
Water Pollution Control Federation
Washington, D.C.

Dr. William C. Ackermann, Chief
Illinois State Water Survey
Urbana, Illinois

Mr. C. R. Baskin, Principal Engineer
Data and Technical Review
Texas Water Development Board
Austin, Texas

Dr. E. J. Cleary, Adjunct Professor
The University of Cincinnati
Westlake Village, California

Mr. James B. Coulter, Secretary
Maryland Department of Natural Resources
Annapolis, Maryland

Mr. Ival V. Goslin, Executive Director
Upper Colorado River Commission
Salt Lake City, Utah

Mr. Herbert W. Greydanus, Chief
Division of Planning
California Department of Water Resources
Sacramento, California

Dr. Laurence R. Jahn, Vice President
Wildlife Management Institute
Washington, D.C.

Mr. C. H. McConnell
Deputy Secretary for Engineering
and Construction
State Department of Environmental Resources
Harrisburg, Pennsylvania

Mr. S. E. Reynolds
State Engineer of New Mexico
Santa Fe, New Mexico

Prof. Robert L. Smith
Dean Ackers Professor of Civil Engineering
The University of Kansas
Lawrence, Kansas

Dr. Clarence J. Velz, Prof. Emeritus
Public Health Engineering
University of Michigan
Longboat Key, Florida

Dr. William C. Walton, Executive Director
Upper Mississippi River Basin Commission
Twin Cities, Minnesota

* Changes since last list (2/10/77)

Table 2.

87-591 O - 77 - 58

Mr. YATES. You want $606,000 for regional water resource appraisal.

WATER CONTAMINATION IN OKLAHOMA

I read in this morning's paper something I found very disturbing. The article talks about the salt contamination of water in Oklahoma linked to the oil producers.

Apparently the oil people are engaged in secondary and tertiary oil recovery, and are pumping salt into their wells, and have contaminated one of the principal aquifers in Oklahoma. I assume you have seen this. It says:

> Hydrologists with the U.S. Geological Survey said that a 3-year study of the Vamoosa aquifer in north-central Oklahoma had turned up numerous examples of contaminated freshwater wells used for homes and for livestock. They believe massive operations by oil producers to inject saltwater are responsible.

The article would seem to indicate that the aquifer is contaminated, it would take years before you could do anything about it.

According to Mr. D'Lugosz, it was said:

> Once this matter is degraded, it is going to take maybe 100 or 1,000 years to naturally flush out the saltwater. An individual land owner's well is destroyed for his lifetime, his son's, and so forth. He can either build a cistern and haul in his drinking water, or get out.

What can we do about that? How much work are you doing to make sure that the efforts by oil companies to engage in secondary and tertiary recovery is not going to damage supplies of fresh water?

Mr. MCKELVEY. Where Federal lands are involved, we do have control over their operations, but where no Federal lands are involved, we do not.

I am not familiar with the details of this, but I assume what has happened, Mr. Chairman, is that the companies have reinjected saltwater produced from their wells for the purpose of disposal.

Mr. YATES. That is what the article says. You haven't had a chance to investigate it yet?

Mr. MCKELVEY. Our people have.

Mr. YATES. But you don't know about it. I wish you would place into the record a complete report on what happened there. I will also insert the article in the record.

[The information follows:]

REINJECTION OF SALT WATER INTO AQUIFERS IN OKLAHOMA

A three-year study "Hydrogeology of the Vamoosa Formation Eastern Oklahoma," was begun in October 1973 by the U.S. Geological Survey in cooperation with the Oklahoma Geological Survey. Joseph J. D'Lugosz was the project chief. The Vamoosa Formation is the principal source of water to wells in several counties in east-central Oklahoma and the U.S. Geological Survey and the Oklahoma Geological Survey recognized that the use of water from the Vamoosa would increase to meet the area's growing need for water. The objectives of the project were to describe the occurrence, availability, and quality of ground water, to determine the present state of development, and to define areas of greatest potential for future ground-water development. In conducting the study, the geology of the aquifer and the hydrologic system were described and current and future water-supply problems were identified.

One of the problems identified by Mr. D'Lugosz was that in some areas the salt content of the ground water was increasing. Some of Mr. D'Lugosz's preliminary findings were presented in a talk on the Vamoosa aquifer at the 1976 Annual Meeting of the Geological Society of America in Denver, Colorado. The abstract of the talk was published by the Geological Society of America in September 1976 and was entitled "Degradation of Water Quality by Salt Water Infiltration in East-Central Oklahoma." The abstract of the talk was reprinted in Oklahoma Geology Notes in February 1977. Oklahoma Geology Notes is a bimonthly publication of the Oklahoma Geological Survey. The abstract follows:

> The specific conductance of surface and ground water in east-central Oklahoma, in most localities, ranges from 200 to 600 micromhos per centimetre. In some areas, however, the conductance ranges from 2,000 to 50,000 micromhos per centimetre because of an increase in salinity of the water. Water use in the area is primarily for domestic and city water supplies and these high-salinity levels could represent a hazard for certain uses. The increase in salinity of surface water and ground water is the result of brine infiltration in areas of salt water injection. Evidence for surface-water contamination is based upon several hundred specific conductance measurements made in all major basins at periods of low flow. Additional evidence is provided by field observations of brine being discharged into streams and of vegetation kills in some oil fields under secondary recovery. Evidence for ground water degradations is based on approximately 150 chemical analyses and analysis of approximately 300 geophysical logs. Because bromide is abundant in Oklahoma brines (from 500 to 6,500 milligrams per litre) and almost nonexistent in fresh ground water, it is used as a tracer and, where present, indicates salt-water infiltration. Cross sections based on geophysical logs show that in some areas the base of fresh water has risen since the onset of brine injection. However, due to the complexity of the stream-aquifer system, the extent of surface and subsurface movement of salt water is not accurately known.

The final report of the three year study of the Vamoosa Formation is now in review in the U.S. Geological Survey Oklahoma District. The manuscript contains about 80 pages of text, 41 figures and 11 tables. District, Colleague, Regional, and Washington office review and approval will be completed before the report is released to the open file this year. The report will be published as a Bulletin by the Oklahoma Geological Survey.

As a result of the three year study which identified the presence of salt water in the Vamoosa Formation, planning for a new study entitled "Effects of salt water infiltration of water resources of central Oklahoma", was begun in October 1976.

[From the New York Times, Mar. 12, 1977]

Salt Contamination of Water in Oklahoma Is Linked to Oil Producers

Oklahoma City, March 11.—Federal water experts have found evidence of widespread saltwater contamination in Oklahoma's third largest underground freshwater basin and they believe massive operations by oil producers to inject saltwater are responsible.

Hydrologists with the U.S. Geological Survey said that a 3-year study of the Vamoosa aquifer in northcentral Oklahoma had turned up numerous examples of contaminated freshwater wells used for homes and for livestock.

More important, they said that they had found major upward intrusions of saltwater into some freshwater zones of the aquifer, making them unusable as a source of irrigation and drinking water for generations to come.

Their findings are preliminary, but the evidence was disturbing enough to warrant a major Federal study of salt degradation in central Oklahoma's fresh ground water supplies to determine the extent of contamination. That study began last October.

Originally, Federal hydrologists planned a simple assessment of water quality and quantity in the Vamoosa aquifer.

"But when we got into it, we began to see such gross quality changes as the result of saltwater infiltration that that became a major part of it," said Joseph J. D'Lugosz, a hydrologist for the Federal agency.

Oil producers pump huge amounts of saltwater along with crude oil out of their wells. In the past, the saltwater was simply dumped into streams, retention pits and evaporation ponds from which it seeped into ground water. These operations have been outlawed in Oklahoma, but enforcement is spotty and Federal scientists have found numerous examples of these practices continuing.

Most of the saltwater, however, is pumped back into the ground, either into deep disposal wells or into reinjection wells used to pressure more oil out of the ground.

The Geological Survey study team has not directly linked freshwater contamination to these operations. Their evidence is circumstantial. However, they can find no other evidence to explain the contamination as a result, say, of natural causes.

SEVERAL COMPLAINTS A MONTH

State officials have been reluctant to investigate changes in ground water quality possibly linked with oil production, which is vital to Oklahoma's economy. Officials with the State corporation commission, which regulates the oil industry, have said repeatedly that ground water contamination is negligible now although some could have occurred decades ago.

"I type four or five complaints a month about saltwater in wells, but most of them are not serious problems," said a woman in the corporation commission offices.

Dr. G. H. Holliday, a senior researcher for the Shell Oil Co., said he had studied all the complaints made in Oklahoma in 1975 and 1976 and found only one case where saltwater contamination could be directly attributed to an oil well reinjection operation. He made his study for the American Petroleum Institute, the oil industry's lobbying arm in Washington.

Other sources in the oil industry and in farmers' groups said that many rural residents were reluctant to file complaints because they received small royalty checks for oil produced from their land. In other cases, oil producers settle on damage payments privately before contamination problems are made public in the courts.

In some cases, oil producers simply buy out the landowner, paying much more per acre than the land is worth, on the condition that he drop his complaint.

In any case, both complaints and court cases are rare. Small farmers and poor landowners have difficulty paying legal fees involved in lawsuits. And lawyers advise them that it is almost impossible to prove that a particular reinjection operation is responsible for contamination of a particular freshwater well. It is much less costly simply to drill another shallower well and find freshwater.

The Vamoosa aquifer rests under eight counties with a population of only 55,000 people, most of them small cattle farmers.

There is practically no grain farming in the region and no irrigation. Residents use only about one-twentieth of the amount of rainfall water available each year in the aquifer.

Freshwater is found near the surface and to a depth, in some areas, of more than 1,000 feet. Below that, the water turns increasingly salty. Oil is found in these deeper layers.

HUGE CONTAMINATION FEARED

The 2,323-square-mile region studied is a pin cushion of oil wells, many of them drilled and abandoned in the 1930's. Since then, some 7.7 billion barrels of saltwater have been reinjected into the deeper layers of the aquifer, according to State records. As oil production declined, reinjection operations increased.

In several areas near these reinjection sites, Federal hydrologists found that the saltwater level rose more than 200 feet into precious freshwater layers, in effect contaminating perhaps millions of acre feet of freshwater. Most of it is well below shallower freshwater wells. Nevertheless, that water has been lost as a potential resource, they said.

In several cases, the saltwater level has risen into areas being tapped for freshwater. Four freshwater wells, 100 feet deep, were drilled in the 1950's in Lincoln County. They became salty 2 years ago. The saltwater could not be traced to any specific reinjection operator. But hydrologists found that the previously deeper saltwater zone had risen from 100 to 300 feet into the freshwater area, contaminating the wells.

Saltwater levels can rise naturally from lack of rainfall. But over a 10-year period in this region, such upwelling would amount to only about 5 feet, certainly not 200 feet, according to Mr. D'Lugosz, who added:

"Once this water is degraded, it's going to take maybe 100 or 1,000 years to naturally flush out the saltwater. An individual landowner's well is destroyed for his lifetime, his son's, and so forth. He has a choice: He can either build a cistern and haul in his drinking water or get out."

The Environmental Protection Agency's ground water quality branch is currently formulating regulations for the reinjection of saltwater by oil producers. An official there said earlier this week that very few cases could be found of contamination caused by such operations. Asked about the Vamoosa aquifer study, an agency official said he had not heard of it.

LACK OF INFORMATION ON NONFEDERAL LANDS

Mr. YATES. I am quite concerned about the fact that you say that you have no jurisdiction over lands that are not Federal public lands. Does this mean that the States are doing nothing about it?

Mr. MCKELVEY. This would be under State jurisdiction. In this case evidently it was not done properly.

Mr. YATES. In this case, that may be true. What are we going to do about it in the future? Every State in the Union has got some kind of a water resource office about which you just spoke. An agency that receives funding in some measure from the Office of Water Resource and Technology.

So, you have a network that could be useful in keeping track of protecting and preserving drinking water in each of the States.

Mr. MCKELVEY. Yes, but that again, as you point out, Mr. Chairman, is after the fact.

Mr. YATES. But, it isn't after the fact with respect to attempts at recovery for the future, is it?

Mr. MCKELVEY. With respect to the injection operation, that would be under the control of the State oil and gas engineer, or whatever his title might be. But, that is where the control is necessary.

Mr. YATES. Suppose he is not doing it? If he is not doing it, sooner or later they are going to call you in and say, look at the condition we are in, what can we do about it, and you are going to say it is too late, I am sorry.

That is what you are saying about Oklahoma at the present time, isn't it?

Mr. McKelvey. In this particular area——

Mr. Yates. I am not charging you with dereliction of duty. What I am trying to do is foresee the future. We appreciate more so today as a result of the drought, the importance of our water resources. It seems to me that we have to be concerned not only with the Federal responsibility on public lands, but trying to help the States protect their own water resources. The question is how we do it.

We have been talking for the last several moments about your water exchange, and about your coordination with 200 organizations and activities, through the Office of Water Resources and Technology.

You also have a nationwide ground water program review in subregional water resource appraisals. Are you telling the committee that all of these activities refer only to your activities on Federal lands?

Mr. McKelvey. No, I meant the control over the injection and the disposal of salt water, and the actual direction of how that is done.

Mr. Yates. The oil producers in the country are being encouraged both by increases in price and by requests by the executive branch to attack their old wells with chemicals, and with salt, to try to bring up secondary and tertiary recoveries.

I had not realized until I read this article the potential dangers of that kind of activity.

This article at least to me sounds an alarm, raises a warning flag, and says this is what may happen to our underground water. So, I raised the question with you this morning, and perhaps rightfully you say, "Mr. Chairman, we don't have jurisdiction over such waters which are not on Federal lands."

COORDINATION WITH STATE WATER AGENCIES

What is your connection indirectly? Don't you have some connection indirectly with State agencies, perhaps through the Office of Water Resources Technology and the coordinating committee. Does Mr. Cragwall's coordinating committee have anything to do with State agencies that would be engaged in protecting State water resources?

Mr. McKelvey. I don't believe the committee itself would. But, through our cooperative programs with the States we——

Mr. Yates. The Geological Survey has the responsibility for advising the country, and I include the States in that, as to what the composition of the geology within the State is, doesn't it?

Mr. McKelvey. Oh, yes.

Mr. Yates. So don't you have some responsibility with respect to the question as to what effect the pumping of salt into some of the wells in Oklahoma, Texas, Louisiana, or other oil-producing States. may have upon the ground water?

Mr. McKelvey. Yes, and that is the kind of thing we are doing. We are also doing research—you called attention to the item on subsurface waste disposal.

Mr. Yates. How do I reconcile this answer with your previous answer saying you have no jurisdiction over this.

Mr. McKelvey. You don't ask about——

Mr. YATES. You remind me of the story of the witness in the railroad case, where the car was struck by the train. They asked the train man on the witness stand as to whether or not he waived his lantern at the approaching motorist. He said, "Yes, I waved the lantern at the approaching motorist, but he paid no attention to it." Later on, they asked him what happened. He said, "They forgot to ask me whether the lamp was lighted."

Now you seem to have some jurisdiction.

Mr. MCKELVEY. Jurisdiction is what we don't have. Providing the information and finding out what is happening we do—as in the study of Oklahoma water problems. Incidentally, with respect to Oklahoma, I would like to ask Mr. Cragwall to speak about that. I think he is informed about that.

Mr. YATES. Mr. Cragwall, we would be glad to hear what you tell us about that case.

Mr. CRAGWELL. The particular study you refer to is one that is conducted, as are many others of similar nature, with the States, to delineate and define the ground water systems and the leakage into and out of those systems.

This finding came as a result of a cooperative study with the State. I am sure as a result of this finding the appropriate State agency will probably take both legislative and management actions to clamp down on this type of thing. I think that is a spinoff result.

GEOLOGICAL SURVEY COORDINATION WITH STATE WATER AGENCIES

Now, to get back to what we are doing in this area, we are working at it in two directions. One is through the cooperative program. We produce the information that hopefully helps the States get on top of this kind of problem, and to devise their regulations. Second, is through the Safe Water Drinking Act of several years ago, which is the responsibility of EPA at the Federal level. It involves the carrot and stick approach with the States to develop better plans for safeguarding the ground waters of the country.

We are working with EPA and the States in improving our ground water level observation networks, so that we can monitor and catch earlier in the stage of contamination, where there is some chance, hopefully early enough to do something about it.

It is true, however, that once a ground water body is contaminated, because it is very slow moving, it takes a long time before it will clean itself.

OKLAHOMA STUDY

Mr. YATES. How did you happen to perform the study—as a result of complaints about the water?

Mr. CRAGWALL. I can't answer how the study began, but we would be pleased to supply that for the record. I suspect it was one of a series of studies to better define the ground water systems of Oklahoma, and this came up—I suspect. But, let me check on that.

[The information follows:]

WHY WAS OKLAHOMA STUDY MADE

The study of the Vamoosa Formation was begun in October 1973 as an appraisal of the water resources. The follow-on study begun in October 1976 was started because of the problem of increasing salinity which was recognized during the appraisal study. Both studies are in cooperation with the Oklahoma Geological Survey.

Mr. YATES. This is a 3-year study. Hydrologists with the U.S. Geological Survey said that a 3-year study of the Vamoosa aquifer in north-central Oklahoma had turned up numerous examples of contaminated fresh water wells.

OIL RECOVERY IMPACT IN OTHER STATES

Are you going to find contaminated aquifers in the other oil-producing States as a result of this activity? Do you know of any of it now?

Mr. MCKELVEY. I don't know of any specifically, but this is the kind of thing that can happen if injection is done carelessly or——

Mr. YATES. You are not telling us anything. What we are trying to do is stop it before it happens. It has happened in Oklahoma City.

Do you have any information indicating that your people in the field are engaged in similar studies, following complaints about possible contamination of aquifers?

Mr. MCKELVEY. I will ask Mr. Cragwall to respond. But let me say generally, we are studying ground water throughout the Nation.

Mr. YATES. What does that mean when you say you are studying ground water?

Mr. MCKELVEY. I mean we are monitoring ground water level and ground water quality.

Mr. YATES. If that is true, why didn't you find this before?

Mr. MCKELVEY. I don't know in this instance when it began.

Mr. YATES. It is a 3-year study.

Mr. MCKELVEY. It is a 3-year study, yes, but I don't know how long ago the contamination might have been found.

I don't want to mislead the committee into thinking that we know the quality of every ground water well in the country on a continuing basis.

Mr. YATES. Let me read another paragraph.

Oil producers pump huge amounts of saltwater along with crude oil out of their wells. In the past, the saltwater was simply dumped into streams, retention pits, and evaporation ponds from which it seeped into ground water. These operations have been outlawed in Oklahoma. But enforcement is spotty, and Federal scientists have found numerous examples of these practices continuing.

You have no jurisdiction to object to this kind of a practice?

Mr. MCKELVEY. Except by way of reporting it to the State agencies involved.

REPORTS TO STATE AGENCIES INVOLVING WATER CONTAMINATION

Mr. YATES. Would you place in the record a list of the reports that you have made to various State agencies for the last year that involve contamination of aquifers by oil producers?

Mr. MCKELVEY. All right.

[The information follows:]

Reports to State Agencies Concerning Contamination of Water by Oil Products

ALABAMA

The U.S. Geological Survey, Water Resources Division District Office, has a continuing program with the State oil and gas board, through the Alabama Geological Survey, to monitor ground and surface waters to detect pollution from oilfield operations including pipeline breaks, spills, and unauthorized disposal of brines. A number of monitoring locations have been set up at which samples are taken and reports made monthly to State oil and gas board. The Geological Survey's program serves as an alert basis. Sampling and reporting are done by State personnel under survey direction for quality control. Program level is $65,000 per year, direct services. Methods and capability of detection were developed by studies and approved by the interstate oil compact commission. The program was initiated about 1960. Since the program was initiated the State has issued regulations prohibiting disposal-seepage pits for oilfield brines. The monitoring program has resulted in a number of pipeline leaks being detected before being recognized by operating companies.

ARKANSAS

The USGS–WRD office has discussed possible contamination of aquifers by oilfield brines with the Arkansas Geological Commission. A study was made by the Arkansas District in Miller County, Ark., in cooperation with the Arkansas Geological Commission in 1967, to define saltwater contamination from brine pots. Results were published in U.S. Geological Survey Water Supply Paper 1998.

COLORADO

The district was recently contacted by the Colorado Department of Health concerning probable contamination of domestic ground water supplies by surface disposal of oilfield wastes.

FLORIDA

No current involvement. Short-term monitoring of surface waters was made in the Big Cypress Swamp a few years ago with Bureau of Geology, Department of National Resources.

KANSAS

Many contacts in the past 5 years with the Kansas Department of Health and Environment requesting data on possible oilfield brine contamination. Also, recently a request from this agency to study contamination from a ruptured oil transmission line. The Kansas District has discussed with the Kansas Geological Survey possible contamination of aquifers through secondary recovery operations and plans for a study of hydrologic aspects of enhanced oil recovery in Kansas.

KENTUCKY

No significant involvement in last last few years. Investigation made of oilfield brine pollution of Green River about 15 years ago.

LOUISIANA

Frequent (up to 24 per year) contacts have been made with the Louisiana Department of Conservation concerning requests for information to guide in granting requests for disposal of oilfield brines.

MISSISSIPPI

The board of water commissioners on a few occasions have asked questions as to whether information showed some oilfield pollution of fresh ground water. Total effort has been relatively small, a few thousand dollars, and involved relatively little field work. Recurring problems are handled on an ad hoc basis.

NEW MEXICO

Discussions have been held with the New Mexico Environmental Improvement Agency concerning general geology and hydrology as pertains to formulating regulations for waste discharge to ground water bodies.

NEW YORK

On several occasions (5–10) over the last 2 years the Geological Survey has reported to the New York Geological Survey Office in western New York that old oil wells were flowing. These wells were observed in the course of fieldwork and their locations were reported.

NORTH DAKOTA

The district was approached by the Williams County Soil Conservation District regarding a study of possible contamination of aquifers from brine pits in northwest North Dakota. Manpower constraints prohibited entering into a study of the problem.

OHIO

On December 6, 1974, the Geological Survey met with the Ohio Department of Natural Resources officials to discuss our recommended study to determine the extent of degradation of shallow ground water in the vicinity of oilfields in the Hocking Valley and to the north. The project would provide information on current conditions and assist in predicting effect on water resources of new oilfield development. The project was not started because of a lack of funds available to the State agency.

OKLAHOMA

The district office as a part of the cooperative program with the Oklahoma Geological Survey made a study of the Vamoosa aquifer in east-central Oklahoma. Near some areas of secondary oil recovery the base of freshwater is at an unnaturally high elevation. In 1969, the U.S. Geological Survey prepared Circular 630, "Hydrogeologic Information on the Glorieta Sandstone and the Ogallala Formation in the Oklahoma Panhandle and Adjoining Areas as Related to Underground Waste Disposal."

WEST VIRGINIA

At the present time the Geological Survey reports to the State geological and economic survey any instances where gas is noted in water wells or it is reported by the owners that there is gas in the wells. USGS is scheduling wells as a part of areal studies and prior instances of explosions in wells prompted this arrangement. Gas may collect in wells from gasfields or from coal mining. In 1970, the USGS in cooperation with the West Virginia Geological and Economic Survey investigated the influence of oil and gas operations on the relation of saltwater to freshwater in the Pocatalico River Basin. A report was published by the West Virginia Geological and Economic Survey as Circular 11 entitled, "Salty Ground Water in the Pocatalico River Basin."

WARNING STATES ABOUT WATER CONTAMINATION

Mr. YATES. I think it is a troublesome thing. The country is faced with an increase of that activity. Am I making too much of this?

Mr. MCKELVEY. No, I don't think—certainly not, Mr. Chairman. It is an important problem and objective, to maintain the quality of ground water, because it is an extremely important resource, and especially in times of drought.

Mr. YATES. Let me read to you again from the article.

The 2,323-square-mile region studied is a pin cushion of oil wells, many of them drilled and abandoned in the 1930's. Since then, some 7.7 billion barrels of saltwater have been reinjected into the deeper layers of the aquifer, according to State records. As oil production declined, reinjection operations increased.

In several areas near these reinjection sites, Federal hydrologists found that the saltwater level rose more than 200 feet into precious freshwater layers, in effect contaminating perhaps millions of acre feet of freshwater. Most of it is well below shallower freshwater wells. Nevertheless, that water has been lost as a potential resource, they said.

In several cases, the saltwater level has risen into areas being tapped for freshwater.

Mr. McKELVEY. There are two ways in which this can come about. One is now beyond control, where it is simply spilled on the surface, as mentioned in that article, and those practices were stopped quite a long time ago.

Mr. YATES. Why don't you have enough jurisdiction to sound a warning to the State agencies, as to what has happened and what can possibly happen?

Mr. McKELVEY. We certainly have that, and are doing that.

Mr. YATES. You are doing that?

Mr. McKELVEY. In this very instance there is an example of that.

Mr. YATES. I wonder how you happened to get involved?

Mr. McKELVEY. We will give that information for the record.

[The information follows:]

HOW THE SURVEY WARNED OKLAHOMA OF SALTWATER CONTAMINATION OF THE VAMOOSA FORMATION

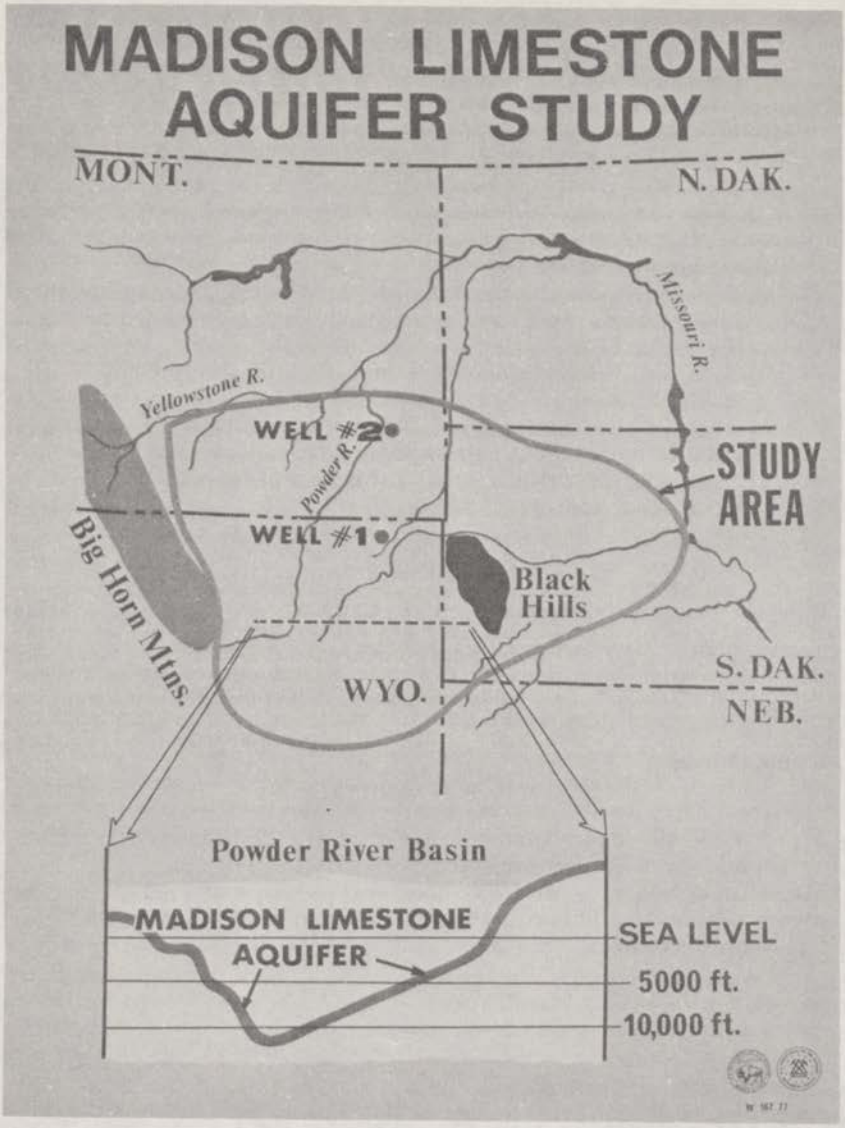
Field observations and reports of water-well owners made during the 3-year study of the availability of water in the Vamoosa formation in east-central Oklahoma indicated increasing degradation of the water quality. The study was made in cooperation with Oklahoma Geological Survey. As a result of findings during the study a follow-on study was begun in October 1976 to determine where and to what extent the area's water resources have been degraded by oilfield brines. The follow-on study is also in cooperation with the Oklahoma Geological Survey.

MADISON AQUIFER

Mr. YATES. We know that you are studying the Madison aquifer. How far advanced is that program?

Mr. McKELVEY. One well has been completed, and another one is nearing completion. This chart shows the location of that study.

[The chart follows:]



The Madison limestone underlying parts of Wyoming, Montana, the Dakotas, and Nebraska may be capable of providing a significant portion of the total water requirement for coal development in the area. The aquifer system is being tested and modeled to permit evaluation of the impacts of water withdrawals and the extent to which such water use is permissible in light of water quality and drawdown restrictions.

Mr. YATES. What did that well show?

Mr. MCKELVEY. It shows a very large aquifer. One well has been completed in northwestern Wyoming.

Mr. YATES. Wells 1 and 2 are shown on that chart. When you say you drilled a well, what does that mean? What is the purpose of it?

Mr. McKelvey. The well that has already been completed, I believe, was to a depth of about 4,500 feet. The well No. 2, in southeastern Montana, has a target depth of about 10,000 feet. What we are trying to do is to get enough information on the Madison limestone aquifer to model the system and see what the effects of large-scale withdrawal would be, to see how much of it, for example, is in a position where it can be recharged from meteoric water at the surface and how much of it may be in structural situations, such that if the water is withdrawn, it is just gone.

Mr. Yates. Will your study indicate how much water there is? Do you have any idea yet as to how much water?

Mr. McKelvey. I don't know whether preliminary estimates have been made or not.

Mr. Cragwall. Preliminary estimates indicate that there is a sizable water supply. We looked at it with particular reference to use with the slurry pipelines being proposed. We are optimistic, but, we cannot put the numbers on it yet. But, our hydrologists are satisfied that there will be significant additions to the available water through pumping from the Madison formation.

Mr. Yates. Do your studies indicate what the quality of the water is?

Mr. Cragwall. The quality range is better than expected. It is not good, clean, pure water, but it is not heavily salted water, either. It is really a little better than expected.

Mr. Yates. Is it drinking water?

Mr. Cragwall. I would not put it in that class, sir. It is a little saltier than drinking water, but perfectly adequate for slurrying, for example, and probably in parts of the system may be adequate for irrigation.

Mr. Yates. When will your study be completed?

Mr. Cragwall. Three more years.

Mr. Yates. Three more years?

Mr. Cragwall. Yes, sir.

OTHER MAJOR AQUIFER SYSTEMS

Mr. Yates. Are there comparably large aquifers anywhere else in the country that ought to be investigated, as this one is being investigated?

Mr. McKelvey. I would again ask Mr. Cragwall.

Mr. Cragwall. I would say yes, there are very few major aquifer systems that we have investigated to the extent that we could digitally model them.

Mr. Yates. Mr. Cragwall, do you have an aquifer map by any chance?

Mr. Cragwall. Yes; we have prepared maps of principal aquifers in the United States.

Mr. McKelvey. And we are publishing reports State-by-State or in some cases involving regions not corresponding to State boundaries.

Mr. Yates. Do you have a copy of your aquifer map with you?

Mr. McKelvey. We do not. I don't know that we have a single map that would show the location of the principal aquifers. But, we have that information on a more detailed basis.

Mr. Yates. Let's discuss that for a minute. How many of your aquifers are major aquifers, like the Madison?

Mr. McKelvey. Well, again I will ask Mr. Cragwall.

Mr. Yates. Where are they located?

Mr. Cragwall. I would like to supply a map and a tabulation, which would summarize this very succinctly for you, sir.

Mr. Yates. I would just as soon you didn't do it succinctly, because I am very much interested.

Mr. Cragwall. We will do it in detail.

[The information follows:]

MAP SHOWING AQUIFERS AND VOLUME OF WATER IN EACH

The locations of principal aquifers in the United States are shown by figure 2 of bulletin 16 of the Water Resources Council and by plate I of Geological Survey Water-Supply Paper 1800 which also provides State summaries of the availability of ground-water resources. The patterned areas on each map identify aquifers that are generally capable of yielding 50 gallons per minute or more of fresh water to a well. Within the unmarked areas there are acquifers locally that have comparable well yields, but the areal extent of these less extensive aquifers cannot be portrayed on a map of the scale shown.

Nearing completion is a program that updates the material of Water-Supply Paper 1800 in a regional appraisal series. Publications to date in this series include the Ohio, Upper Mississippi, Upper Colorado, Rio Grande, California, Texas-Gulf, Great Basin, Arkansas-white-red regions. (Professional Papers 813–A, B, C, D, G, H.) (Copies of the publications cited above were furnished to the committee.)

STUDY OF OTHER MAJOR AQUIFERS

Mr. Yates. The committee is very much interested in the water resources of the country. It happens that we are studying the Madison aquifer. Are there other major aquifers in the country that we ought to be studying in the same way as we are studying the Madison?

Mr. Cragwall. I would certainly say there are others we need to study. The two that we have studied in depth at this scale have been the Mississippi embayment region—that is the lower Mississippi River. We performed a very complete study there. Two years ago we finished one on the Delmarva Peninsula.

Through the cooperative program again, we have within States studied parts of these major regional systems. But, there are a number of major regional systems that have not been put together, as I said before, so that we would be prepared to model them as complete systems.

We have worked at them in parts. The more important parts have been covered in those systems. But, there is good reason for wrapping them together and coming up with digital expressions and definitions of those major systems.

Mr. Yates. How many such aquifers are there in the West?

Mr. Cragwall. I will supply that with the map, sir. I can't answer.

Mr. McKelvey. Mr. Sheldon?

Mr. Sheldon. We have just finished a study of rocks of that age throughout the whole United States and it turns out that the Madison limestone in this area has a relatively unique feature to it. It was exposed shortly after deposition several hundred million years ago to the surface, and a karst topography was developed on the limestone; that is, it was rainfall of the time that forged large caves, so there is a layer within the rocks that is literally honeycombed, and this sub-

sequently was filled with freshwater, which then became salty through time, or somewhat salty.

So, that is a relative unique situation in the West. You are finding brackish and freshwater at very deep levels in the basin out there.

Mr. YATES. When you say very deep levels, what level?

Mr. SHELDON. Well, it is shown on the map.

Mr. YATES. You mean 10,000 feet is considered deep?

Mr. SHELDON. Yes.

Mr. YATES. What you are saying really is that in the same way as the rock formation enclosed oil and gas, they also enclose water.

Mr. SHELDON. But in this case the freshwater drives out any oil or saltwater that is in it. So that the oil exploration in rocks of this same age does not occur in this area. It is further north with the Williston basin, on up in North Dakota and Montana. So, they are mutually exclusive in rocks of this age.

Mr. YATES. Will your study be able to tell how much fresh potable drinking water there is available?

Mr. SHELDON. Sir, that would be the studies of the water resources.

Mr. YATES. Mr. Cragwall, will your studies indicate that?

Mr. CRAGWALL. Yes, sir.

PRODUCTIVE AQUIFERS IN THE UNITED STATES

Mr. MCKELVEY. Mr. Chairman, I had forgotten about this, but we have in our National Atlas, on page 122, a map that shows the productive aquifers in the United States and the location of wells that are exceptionally productive. That doesn't identify the specific aquifers that are involved, but shows the areas in which there are various kinds of aquifers.

Mr. YATES. This map doesn't identify the Madison aquifer very well; does it?

Mr. MCKELVEY. It doesn't identify individual aquifers. I am not sure how the Madison is shown there.

Mr. YATES. Why don't I ask you to interpret that map. What I am interested in is finding whether or not in the drought areas you have any ground water or aquifer water. I know you have it in the East. But, you have enough water in the East to take care of the needs. But, what are you going to do out in the West?

Mr. MCKELVEY. The drought, Mr. Chairman, is not confined to the West.

Mr. YATES. I know. We have it in Illinois, as well. But, are there aquifers out West?

Mr. CRAGWALL. Yes.

Mr. YATES. Can we tap them?

Mr. CRAGWALL. We are tapping them.

GROUND WATER USAGE IN CALIFORNIA

Mr. YATES. You talked about the well being drilled in North Dakota, I think. Are they being drilled in California as well?

Mr. CRAGWALL. Yes. They have been used in California for years. Ground water has been a big resource throughout the San Joaquin Valley of California, for example. In fact, it has been so heavily

pumped in that part of California that we have subsidence up to 20 feet, and it has in itself become a problem.

Mr. YATES. In other words, they are already pumping out their basic reserves?

Mr. CRAGWALL. Yes, that is right.

Mr. YATES. And their basic reserves are not being replaced?

Mr. MCKELVEY. In some places that is very much of a problem.

Mr. YATES. I don't see anything in the justifications as I have gone through it indicating that you want to conduct studies in other areas, like the Madison limestone study. Provide additional details for the record.

[The information follows:]

STUDY OF AQUIFERS AND POSSIBILITY OF TAPPING THEM

Professional paper series 813 (A–H) represents the initial products of the regional appraisals of ground water resources. These reports address ground water development and management opportunities in various regions of the country.

[Copies of the publications cited above were furnished to the committee.]

Mr. CRAGWALL. If you will look at paragraph C, page GS–86 of our justification.

Mr. YATES. Subregional problem appraisals?

Mr. CRAGWALL. Yes, sir. As a result of our regional appraisals, which we are just completing, we intend in 1978 to do a problem assessment study that will give us a blueprint fo. future action for further indepth studies.

Mr. YATES. How much of a study can you perform? All you have asked for is $606,000 for all those activities.

Mr. CRAGWALL. This is to plan, to take a look and rack up priorities for future study on a subregional basis, similar to the Madison study. We will develop from that a blueprint for action which we will have to price out. It will be big money.

GROUND WATER RESERVES

Mr. YATES. Do your studies indicate how much of the ground water resources and reserves of the country is fresh and drinkable and how much is not?

Mr. CRAGWALL. Yes, sir.

Mr. YATES. Will you insert that information in the record as well?

Mr. CRAGWALL. Yes, sir.

[The information follows:]

HOW MUCH GROUND WATER IS FRESH AND DRINKABLE

Reports on the depth of ground water of selected concentrations of dissolved solids include the following:

HA 199—Preliminary map of the coterminous United States showing depth to and quality of shallowest ground water containing more than 1,000 parts per million dissolved solids.

HA 223—Base of fresh ground water in southern California.

HA 310—Saline ground water in Louisiana.

WSP 1601—Saline-water resources of New Mexico.

Detailed evaluations of the quality and quantity of ground water available by county or groups of counties appear in several hundred water supply papers and in many hundreds of reports of Geological Survey works published by State and local cooperators.

[NOTE: Copies of the publications cited above were furnished to the committee.]

RESEARCH IN CONVERSION OF BRACKISH AND SALT WATER

Mr. YATES. I would think this would emphasize very strongly the need for research on the conversion of brackish and salt water to fresh water. Wouldn't you think so?

Mr. MCKELVEY. I am sure it would, Mr. Chairman.

Mr. YATES. That is not your responsibility. That is another office's responsibility. But, we seem to be closing up the Office of Water Research and Technology.

Mr. MCKELVEY. As Mr. Bettenberg indicated the other day, the focus has been shifted to water and methodology that is low energy consuming. We discussed the work that we do in locating brackish water.

Mr. YATES. You have enormous responsibilities, tremendous responsibilities. You are a very important agency. That is why I keep wondering whether you are funded adequately to really take care of these huge responsibilities.

Water, of course, is an enormous responsibility. Of course, minerals and gas are others.

Mr. MCKELVEY. As I indicated yesterday, Mr. Chairman, the trends of the last 10 years, in which our funding has increased several fold, I foresee——

Mr. YATES. Quadrupled.

Mr. MCKELVEY. I foresee that trend continuing because of the gravity of the problems.

Mr. YATES. Should you be split up because of the gravity of the responsibility? Should you have one, and another agency have another?

Mr. MCKELVEY. I don't believe that it would be wise to do that.

Mr. YATES. Not at this moment, anyway?

Mr. MCKELVEY. No.

CORE PROGRAM HYDROLOGIC RESEARCH

Mr. YATES. You want $5,300,000 for core program hydrologic research. Mr. Cragwall is going to tell us what you have achieved in 1976 and 1977 with this kind of approach, and he is going to insert that information in the record.

[The information follows:]

ACHIEVEMENTS, 1976-1977 FOR CORE PROGRAM HYDROLOGIC INVESTIGATIONS

Achievements in our 1976-77 core hydrologic research program, separated into discipline categories include:

Chemistry

Development of procedures for relating ability of chemical extractants used for sediment metal analysis to metal extraction ability of bottom dwelling aquatic deposit feeders. Application could allow relatively quick estimation of bioavailability of sediment-bound metals by chemical extraction as opposed to lengthy bioassay experiments.

Studied chemical reactions at surfaces of manganese oxide and their effects on transport in stream of soluble metal ions. Derived methodology that allowed prediction of cobalt concentrations similar to those observed in ten Colorado streams affected by drainage from metal mines.

Chemistry of oil-shale residues project has developed a sample treatment technique which separates the organic content of water and water-sediment mixtures into six fractions. This segregation procedure will be useful in general monitoring in surface and ground water for organic chemical content.

Geochemistry

A chemical model has been developed for the Fox Hills aquifer in southwestern North Dakota. The model successfully predicts observed water quality changes in pH alkalinity, sulfate, sodium, and calcium down gradient in the aquifer. Extension of this technique to surface conditions is expected to expand the modeling capability to include predictions of water quality in shallow aquifers affected by strip mining operations.

Solute Transport

Developed digital simulation model to analyze regional ground-water flow from the Madison Group Aquifer in the Powder River basin of Wyoming, Montana and adjacent areas. Results indicate the aquifer can probably sustain increased ground-water withdrawals of up to several tens of cubic feet per second; these withdrawals may lower the potentiometric surface in the Madison aquifer in a large part of the basin.

Developed a numerical model to predict the movement of dissolved chemical contaminants in flowing ground water. The model is well suited for application to field problems ranging from less than 1 to more than 100 square kilometres. The model has been successfully applied to problems of agricultural salt build-up in the Arkansas River valley of southeastern Colorado and to a study of the movement of organic contaminants at the Rocky Mountain Arsenal near Denver.

Demonstrated in laboratory experiments, the nature and extent of variation of certain physical and chemical processes in soils with varying soil water content. Understanding these relations will provide valuable tools in predicting the movement of both solutes and water through the unsaturated zone.

Hydrogeology

Research studies of pollen and seed remains in the sediment of Lake Carlson and Kirchner Marsh, Minnesota, suggest that four droughts with a recurrence interval of 300 to 1,000 years occurred in that vicinity between 5,000 and 7,000 years ago.

Ground Water Physics

Summarized USGS developments in the use of models for the analysis of ground-water problems. some general types of problems for which models have been, or are being developed include: (1) ground-water flow in saturated or partially-saturated materials, (2) land subsidence resulting from ground-water extraction, (3) flow in coupled stream-aquifer systems, (4) coupling of rainfall-runoff basin models with soil mositure accounting and aquifer flow models, (5) interaction of economic and hydrologic considerations, (6) predicting the transport of contaminants in an aquifer, and (7) estimating the effects of development alternatives for geothermal systems. The status of modeling activity for various models is reported as being in a developmental, verification, operational, or continued-improvement phase. References that provide useful details on the characteristics of the models are identified.

Equations were derived to describe the flow to water-table wells that obtain their yield or discharge from capture of plant evapotranspiration of streams. These equations can be used to estimate the discharge and the draw-down distribution around such wells. In addition to these single-well equations, equations are also presented for designing well networks spaced for maximum capture.

Research studies indicate that as of 1976, artesian heads in the San Joaquin Valley, California, have recovered toward presubsidence levels (pre 1930's) and subsidence rates have decreased from an earlier maximum 0.5 m/year to near zero in much of the valley. However, increasing irrigation demands, particularly during years of deficient precipitation, pose the threat of increased pumping and another cycle of widespread land subsidence. During a second cycle of pumping overdraft, water levels are expected to be small until pumping levels approach their former lows.

Numerical models of geothermal fields have been developed to describe the flow of heat, steam and water. These models enable researchers to evaluate the potential benefits derived from any particular geothermal field. Moreover they play a decisive part in determining optimal operating strategies for managing our geothermal resources. The numerical models developed are general and are applicable to both hot water and vapor dominated geothermal reservoirs.

Surface Water

Demonstrated the feasibility of using earth satellites for automation of hydrologic data collection thereby providing real-time hydrologic information. We anticipate a real savings in manpower as a result of the application of these technology.

Developed a deterministic model for use in predicting water yields (where snow is the major form of precipitation) under various land-management alternatives. Model is used to predict daily runoff from ungaged basins before, during, and after mining and to compute water-balance estimates for determining revegetation potential. Model is presently being enhanced to predict water-quality and sediment-load changes resulting from surface mining.

The USGS, through contract with the Draper Laboratory in Cambridge, Massachusetts, has completed the general design for building a self-contained airborne (light twin-engine aircraft) instrument system that can continuously measure three-coordinate position locations--such as latitude, longitude, and altitude above mean sea level. This will permit surveying, at the speed of flight, the locations of ground positions to precisions of $\pm$ 1/2 foot vertically and $\pm$ 10 feet horizontally. This promises large savings in manpower, time, and cost.

Developed a scheme that maps the effects of climate on the output of the USGS rainfall-runoff model. This mapping technique also is an integral part of a precedure that has been developed in analyzing the errors in the output of model. The error analysis is the first significant step toward evaluating the amount of information that the model provides.

Surface Water Physics

Two mathematical dam break routing models, a finite-difference model and a multiple-input, linear-system model, were used to analyze the consequences of the rupture of Jackson Lake Dam on the Snake River 38 mi (61 km) above Jackson, Wyoming. Both models were first calibrated using a month of hourly discharge data. The calibration indicates that the linear model was more accurate in a time sense but was not as accurate in terms of damping. Both differences were evident in computed versus observed flood wave. Stage predictions were in general 15 to 25 percent greater for the finite-difference model. Enough uncertainty and assumptions were present in both models to make the choice a matter of economic and risk factors. For this study the finite-difference model cost roughly five times as much to set up and calibrate than the linear model.

Completed a mathematical model for transverse mixing of chemical in solution in an upland river system. The model has been verified over a period of 10 years by observations in a number of natural streams, including the Missouri River and the Potomac River. Two most important applications of the model in pollution problems will be: (1) that the mixing zone downstream from a point source (such as power plant) can now be defined on a sound technical basis, and (2) that the effect of a polluted tributary flow on the main stem flow (such as acid mine effluents) can be assessed with confidence.

A computerized flow-simulation system has been made operational and is being used to provide continuous records of the fresh-water flow of the Sacramento River into the drought-stricken delta of the Central Valley, California. The system, which employs one of the available one-dimensional mathematical/numerical flow models, provides users a continuous record of the tide-affected, upland discharge passing the key monitoring site on the river at Sacramento, California. Records of river flow at this location are provided by the Water Resources Division, USGS, to State, local-government, and other Federal agencies responsible for managing the critically-short water supplies throughout this agriculturely rich region. This system is specifically designed to provide reliable flow information for a broad variety of conditions in regulated rivers and tidal estuaries. Work is already underway to implement the system at other sites. The system provides WRD field offices with a reliable means by which they can--for the first time--effectively cope with the complex dynamic flow conditions encountered in regulated rivers and estuaries. Moreover, it affords local district personnel the ability to process the field data used to actuate the flow simulation, to initiate simulation, to produce graphical results of the simulated output, and to analyze these output results.

Sediment

Satisfactory agreement was achieved between model prediction and independent field data for a stochastic model developed to predict longitudinal sediment dispersion in rivers. Model is based on the assumption that a dispersing particle moves in a series of descrete steps of random duration, separated by random time periods of zero velocity when the particle is trapped in storage zones of backwater or dead-water areas of the stream. Two model parameters are determined from field data.

Snow and Ice

Developed methods using aircraft or satellite imagery that can be used to occasionally predict the approximate timing and magnitude of the next surge by a surging glacier. More than 200 surging glaciers have been recognized in western North America by use of remote sensing imagery.

Evapotranspiration

Field, laboratory and economic analyses concerned with artificial ground-water recharge on the Southern High Plains of Texas and New Mexico, indicate that spreading basins are the most economical method of recharge in most areas of the Southern High Plains.

Ecology

Developed a vegetative cover map of Great Dismal Swamp in Virginia and North Carolina on a 1:100,000 scale. Vegetative cover data are being correlated with climatic and biological data to provide information on successional patterns within the swamp. Vegetation is being classified in order to provide a basis for monitoring future vegetative trends in response to various management practices.

Systems

The oilspill resulting from the December 1976 breakup of the tanker Argo Merchant on Nantucket Shoals provided an opportunity to verify, apply, and extend an oilspill trajectory model previously developed as part of a risk analysis for the proposed Georges Bank outer continental shelf lease area. Simulations of slick movements were made and compared with overflight data provided by NOAA personnel. Model predictions of both the location and general shape of the slick 7 and 12 days following the grounding agreed well with observations. Using historical wind data from two weather towers on Georges Bank (5 years of record), a wind transition probability matrix was prepared and randomly sampled to provide stochastic time series of winds for model simulations. On the basis of repetitive stochastic trials, probability estimates were made of the chances that future releases of oil trapped in the hull would come ashore. Results indicate that while the risk is relatively low for the winter and early spring months, probability of beaching reaches a peak of greater than 90 percent in early summer.

HYDROLOGIC INVESTIGATIONS OF PUBLIC LANDS

Mr. YATES. You want $232,000 for hydrologic investigations on public lands. How many projects are you going to undertake for this money in 1978?

Mr. MCKELVEY. I will ask Mr. Cragwall to respond, sir.

Mr. CRAGWALL. We have been funding three projects in 1977. It would be about the same order of magnitude, sir.

HYDROLOGIC WORK ON PUBLIC LANDS

Mr. YATES. Is that all we should be engaged in, Mr. Cragwall, is three projects?

Mr. CRAGWALL. This is what we might term an old base core program. If you look to the other sectors of our program, particularly in coal hydrology, we are doing a lot of hydrology work on public lands with specific objectives as related to coal and oil shale, which is over in our critical problems page.

Mr. YATES. As I read through this justification, it occurs to me that this is exactly what I was asking you about in Oklahoma, because the objective of this research program is to provide sufficient understanding of hydrologic systems so that quantitative predictions of response of these systems to its natural or manmade stress can be made.

Well, you are undergoing a tremendous lot of manmade stress now, aren't you?

Mr. CRAGWALL. Let me point out, sir, that we annually, on the average, are conducting 1,600 projects. Many of those are of this kind—through the cooperative program, with the States.

Mr. YATES. And you are going to tell us in your summary of the activity as to what progress you are making?

Mr. CRAGWALL. Yes.

Mr. YATES. You are also going to tell us whether or not we are making adequate progress in this kind of activity, or whether it ought to be expanded, in order to assure the Nation that it is going to have adequate water resources.

Mr. CRAGWALL. We will try to do that, sir.

LOCATION OF THREE PROJECTS BEING STUDIED

Mr. YATES. Where are they underway in 1977, Mr. Cragwall? Where are the three?

Mr. CRAGWALL. The three in 1977—the remote sensing project of wetlands which I believe is primarily associated with the Dismal Swamp, which is a new acquisition in the Federal establishment; a study in our central region that has to do with rehabilitation of energy resource lands—I can't give you that State, but it is in the Rocky Mountain Belt—and third, a study that the Department asked us to do on the Osceola National Forest in Florida, that relates to the possible impacts of phosphate mining on the ground water resources of that area. That study is supposed to be finished sometime early in fiscal 1978. Then that money can be transferred to another study.

Mr. YATES. Where are the three studies to be undertaken in 1978?

Mr. CRAGWALL. I will have to furnish that information for the record, sir.

STUDIES ON WATER RECOVERY

Mr. YATES. Do you have any studies on the effect of secondary and tertiary recovery on water? You have one now in Oklahoma, apparently. Any other areas in the country where you are doing this?

Mr. CRAGWALL. I believe we have a little work in Kansas, sir, and possibly in Texas.

[The information follows:]

HYDROLOGIC INVESTIGATIONS ON PUBLIC LANDS

Hydrologic investigations on public lands to be undertaken in fiscal year 1978 include the Great Dismal Swamp in Virginia and North Carolina, and the Osceola National Forest in Florida. Sites for the investigations of rehabilitation potential of coal lease sites on public lands will be selected by the Bureau of Land Management by August 1977.

In addition to the specific hydrologic investigations on public lands and the continuing operation of a network of surface water, quality water, and ground water stations is a program of areal appraisals, interpretive studies, and special problem investigations amounting to about 1,600 projects annually in the Federal-State cooperative program. These projects are, for the most part, completed in 1 to 3 years and result in one or more published reports. Projects include studies and investigations such as water availability, water quality, water for energy development, waste emplacement, urban area runoff, estuarine water quality and circulation patterns, and environmental impact of changes in land and water use.

TRAINING, PUBLICATIONS, AND OTHER SERVICES

Mr. YATES. You are requesting $3,240,000 for training, publications, and other supporting services.

Provide for the record a breakdown of the significant elements involved in this request and how much was provided in 1976, how much you are expecting to spend in 1977 and in 1978 for each of these elements.

Mr. MCKELVEY. Yes.

[The information follows:]

SIGNIFICANT ELEMENTS IN TRAINING, PUBLICATIONS, AND SUPPORTING SERVICES

The significant elements in training, publications, and other supporting services are distributed as follows:

	Fiscal year 1976	Fiscal year 1977 (estimated)	Fiscal year 1978 (estimated)
Training and career development	$264,000	$130,000	$130,000
Publications (data, investigations, studies, reports)	2,550,000	2,770,000	2,770,000
Other supporting services	229,000	340,000	340,000
Total	3,043,000	3,240,000	3,240,000

FEDERAL-STATE COOPERATIVE PROGRAM—COAL HYDROLOGY

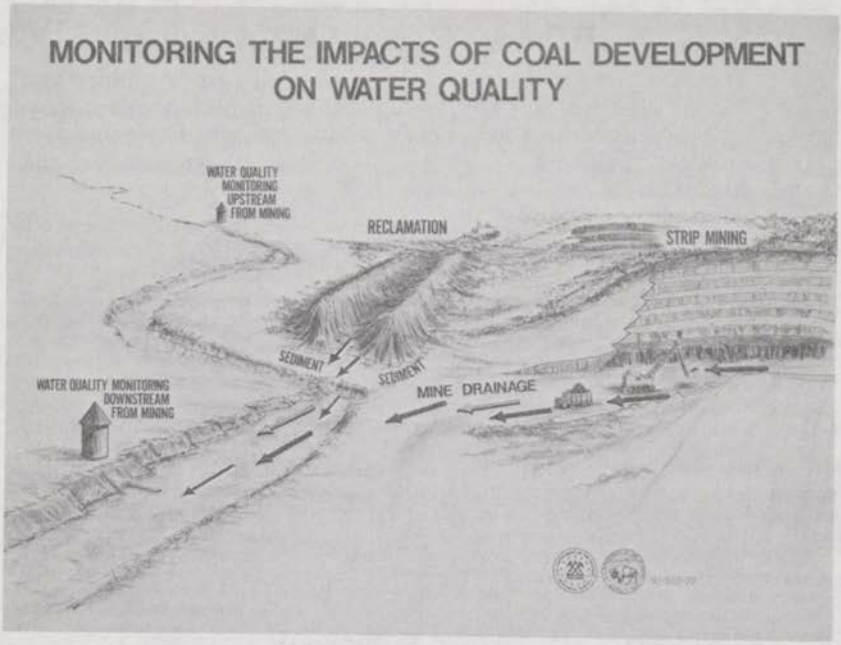
Mr. YATES. For the Federal-State cooperative program in the national water data system, you are requesting $31,144,000, an increase of $2,100,000. Of that, $1,100,000 is for coal hydrology.

You say the program in 1978 will emphasize Federal-State cooperative studies involving all water needs for coal development to include coal conversion and transportation.

That is what you talked about in connection with Madison.

Mr. MCKELVEY. Right. This chart shows the impacts of mining coal.

[The chart follows:]



The impacts of mining coal and the adequacy of concurrent reclamation will be assessed by evaluating changes in water quality in proximity to such developments. This involves the establishment and operation of monitoring stations upstream and downstream of development, before as well as after mining.

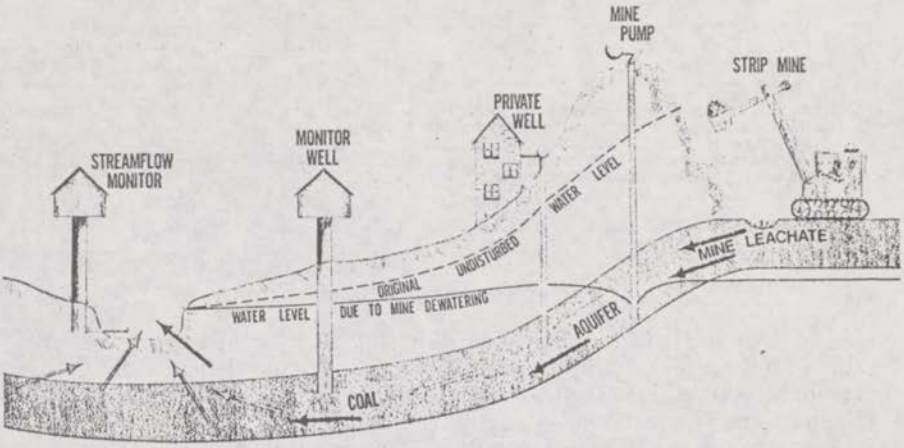
Mr. YATES. Is that the only place there is a possibility of coal slurry pipeline applications?

Mr. MCKELVEY. I believe it's being considered in other States also, but I will ask Mr. Cragwall.

Mr. YATES. What does your study indicate? I suddenly realize that very quietly one of your assistants has put up a chart showing how you propose to monitor the effect of coal development on ground and surface water supplies and we see that and it's a very picturesque chart.

[The chart follows:]

MONITORING THE IMPACTS OF COAL DEVELOPMENT ON GROUND AND SURFACE WATER SUPPLIES



The impacts on hydrologic systems in proximity to coal mining development will be assessed by establishing ground and surface water monitoring stations. These monitoring networks will measure water quality changes and changes in ground water levels.

Mr. YATES. I notice you have the possibility of leaching the aquifers through strip mining; is that correct?

Mr. MCKELVEY. Yes; that is one of the possible effects.

Mr. YATES. And underground coal mining is another possible contaminant too?

Mr. MCKELVEY. Yes; that is true.

Mr. YATES. We are at the threshold of moving into a huge coal mining program. Are you prepared for it?

Mr. MCKELVEY. We are attempting to prepare for it.

Mr. YATES. That doesn't answer my question, does it?

Mr. MCKELVEY. I would say we are not equipped presently with all of the information that will be needed.

Mr. YATES. Are you going to be equipped with it as a result of your request for appropriations for the next fiscal year?

Mr. MCKELVEY. We think the proposal here for $1.1 million increase will be adequate.

Mr. YATES. Page 90 of your justifications you have four areas. Would you identify for the record how much you are going to spend in each of the four areas?

Mr. MCKELVEY. Yes, Mr. Chairman.

[The information follows:]

AMOUNT TO BE SPENT IN EACH OF FOUR COAL HYDROLOGY AREAS

The fund level and the fiscal year 1978 increase in each of the four areas of coal hydrology are listed below:

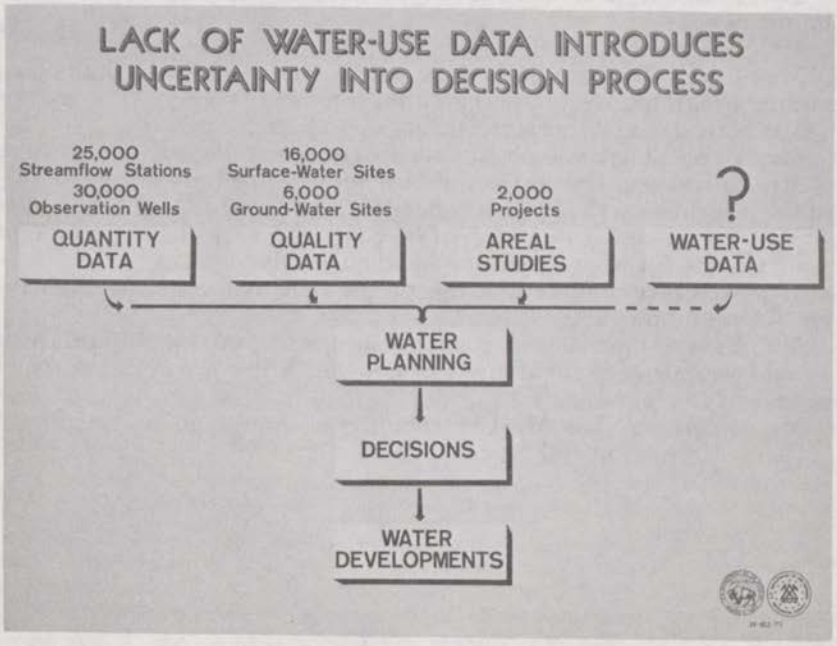
	Fiscal year 1977	Fiscal year 1978	Fiscal year 1978 increase
1. Water supply for mining, conversion and reclamation needs	$760,000	$950,000	$190,000
2. Effectiveness of reclamation and impoundments as evaluated through hydrologic responses	124,000	325,000	201,000
3. Baseline water quantity-quality assessments	370,000	670,000	300,000
4. Impacts on water quality from coal mining, conversion, and transport industries	424,000	833,000	409,000
Total	1,678,000	2,778,000	1,100,000

WATER USE DATA PROGRAM

Mr. YATES. How does the $1 million increase you are requesting for the water use data program, which you say is needed to establish a national water data acquisition and dissemination activity, relate to the national water data exchange program?

Mr. MCKELVEY. Those data will be incorporated in the system as they are collected, but the national water data exchange system, as it presently exists, relates to data on water quantity, water quality and that kind of thing, and what we are proposing here is to begin, in cooperation with the States, acquisition of information on how water is actually used, and as illustrated by this chart, the knowledge that is needed for decisionmaking and planning.

[The chart follows:]



Water-use data, which are lacking, are required to support the decisionmakers in their selection and location of water development projects. The data are needed to determine which areas in the country are potentially water short and which are capable of sustaining additional developments.

DETERMINATION OF STUDIES

Mr. YATES. Who decides which of the studies to undertake? Do you do it or the States?

Mr. MCKELVEY. It will be done in cooperation with the States.

Mr. YATES. Who makes the suggestion?

Mr. MCKELVEY. We operate this program on a cooperative basis in which suggestions from both sides are made.

Mr. YATES. Do you have a committee which decides which to undertake? How do you do it?

Mr. MCKELVEY. Not in the sense of a formal committee, but in the sense of working out cooperatively——

Mr. YATES. But you don't have enough money or time for all of the studies suggested. Who decides which to go ahead with?

Mr. MCKELVEY. That process is one that goes on at several levels.

Mr. YATES. Do you decide?

Mr. MCKELVEY. The details of the special projects are decided at the level of the regional hydrologists generally, but either at the district chief level or at the division chief level.

There may be contributions to that decisionmaking process.

Mr. YATES. Isn't this really something that ought to be established on the basis of national need as to the priority of studies?

Mr. MCKELVEY. I believe ultimately that is the way it's done, including, the final stage, this committee's review.

Mr. YATES. Don't you or somebody in the White House have to decide this is where we ought to go and make that suggestion to the States? Do you just let the decisions be made hit or miss?

Mr. MCKELVEY. No, indeed. They are carefully considered, and I will ask Mr. Cragwall to expand.

Mr. YATES. Please insert in the record, Mr. Cragwall, as to how you proceed.

Mr. CRAGWALL. We have a rather sophisticated system for that and we will be pleased to put that in the record.

Mr. YATES. Let that sophistication come out in your explanation in record.

Mr. CRAGWALL. Thank you, I will do that.

[The information follows:]

Decision Process for Selection of Water-Resources Projects
in the Federal/State Cooperative Program

Most of the activities of the Geological Survey have multiple objectives and serve the needs of a broad range of agencies and individuals at all levels of government and in the private sector for objective and credible earth-science and related information. State, regional, and local agencies are major users of information developed by the Geological Survey and, accordingly, such agencies have played and continue to play a major role in helping define the nature and scope of Geological Survey programs and in providing funding support of selected projects and activities that are deemed to be of mutual benefit to the Federal Government and to State and local governments. For example, the Geological Survey presently is involved in cooperative water-resources programs with some 570 State and local agencies, with most of the work conducted by the Survey, but with about 50 percent of the funds provided by State and local agencies.

Through this network of contacts with the "real" world of water conservation, development, and use, the Survey's Water Resources Division has been able to anticipate and to respond to changing priorities. Thus, the work is diversified, problem oriented, and strongly interdisciplinary. For example, the activities listed in a recent sampling of a few State programs include: collection of long-term multipurpose data (surface water, ground water, and water quality); special interpretive studies of the physical, chemical, and biological characteristics of water resources; and appraisals for environmental impact analysis, energy development, coastal-zone management, subsurface waste storage, waste utilization, land-use planning, flood-plain management, and flood-warning systems.

The strength of the Federal/State Cooperative Program lies in (1) coordinated programming for water information that responds to identified and developing needs of people at all levels, and relates to the environmental aspects of water use; (2) the quality and acceptability of the water data accumulated through a uniform and unified program throughout the 50 States and several of the territories; and (3) the unbiased (non-advocacy) position of the Geological Survey in carrying out its work.

The decision process for selection of projects is truly a mutual effort, with the Survey representing national interests and the cooperator representing State and local interests. The result is a balanced program that recognizes needs, priorities, and resources.

At the beginning of the Survey's annual programming cycle, anticipated water-information needs and priorities are identified by the Water Resources Division with input from all levels of the organization. Field-level views of problems of national significance are developed to a large extent from the continuing dialogue between District offices and their cooperators. District input is reviewed and coordinated at Regional level, and the Region's recommendations are transmitted to Division headquarters. At Division level, national needs and priorities are distilled from field input, coordinated with Bureau, Department, and Administration and Congressional policies. The decision process, from the outset, involves continuing feedback, and to a large extent it is carried out through informal communication.

The essential first step is to identify program priorities within each District that reflect local level circumstances and needs. This information is blended with input at the Regional and National level to establish guidelines for approval of projects and for allocation of cooperative matching funds in future years. As program planning proceeds toward the formalization of annual cooperative agreements, information

regarding national needs and priorities, as well as anticipated budgetary constraints, is passed back to the District Chiefs through the Regional Hydrologists. Guidelines for program negotiation are transmitted from the Division to the Regions and Districts.

New projects proposed as a result of District-level negotiations are reviewed in detail at Regional level. When necessary, they are submitted for review at Division level. Multi-year projects are reviewed annually. Review and discussion often lead to extension, redirection of emphasis, or reduction of effort as the work progresses.

Changing priorities in the face of fixed or limited budget and manpower ceilings usually mean that some projects must be terminated or deferred in order that others of higher priority may be started. The character of the Cooperative Program does not change dramatically from year to year, primarily because more than three-fourths of the projects are of a multi-year or continuing nature. Sudden redirection or early termination of many such projects is technically and administratively infeasible. The investment in a multi-year project can be wholly lost if it is prematurely terminated. Data gaps in a chronological record can never be replaced and may seriously diminish the value of the record. When there are differences of view regarding program priorities, changes proposed by either one of the cooperating parties may conflict with the legitimate interests of the other.

Immediate response to changing needs or priorities also is impeded because program formulation and budgeting are sequential steps which are begun at least a year in advance of project implementation, by both Federal and non-Federal participants. The resulting delay is not without merit. It tends to trim the peak off transient concerns and smooth out the differences in priorities at different levels of government. Despite some difficulty in accommodating differences or rapid changes in priority, the Cooperative Program reflects an overriding degree of unanimity regarding mutual needs of national, State, and local interests.

Mr. YATES. Would you place in the record some of the achievements of your program for the critical national water problems?

Mr. MCKELVEY. Yes.

Mr. YATES. I am sure there are many.

Mr. MCKELVEY. All right.

[The information follows:]

ACHIEVEMENTS OF CRITICAL NATIONAL WATER PROBLEMS PROGRAM

Achievements in the Critical National Water Problems program are as follows:

Energy Program:

The Coal Hydrology program is divided into several major thrusts. The Madison aquifer study is just one facet (admittedly a large one) of investigations concerned with assessing water supplies available for energy development. Other ground water studies in the Rocky Mountain and Northern Great Plains are concentrated in the oil shale areas of Colorado and Utah as well as in the strip minable coal areas of Wyoming, Montana and North Dakota. In the oil shale areas, data has provided the basis for modeling the impacts of dewatering the oil shale and for defining the amounts of water available for the retorting and waste reclamation requirements; reports are in progress describing the models and results; preliminary reports are available now.

The studies of the shallow aquifer systems in the Northern Great Plains are concerned primarily with assessing the impacts on local water supplies of dewatering the shallow coal aquifers to permit strip mining. Basic data is presented in USGS State reports and in Open-File data releases. Much of the water quality data is collected on behalf of EPA and is supplied EPA for publication and use.

Throughout the Rocky Mountain and Northern Great Plains States an extensive hydrologic monitoring system is being established. Existing stations, both surface and ground water are being up-graded and in FY 1977, 61 new surface water monitoring stations established. These hydrologic stations will emphasize water quality and are designed to provide baseline data against which the impacts of mining can be assessed. These data will appear in annual reports as well as special 3-year summary-interpretative type reports.

The nuclear hydrology program is designed to develop hydrogeological criteria for (1) the selection of future low-level solid radioactive waste disposal sites and (2) to be used in the design of an adequate monitoring system for the existing low-level waste burial sites. The program consists of both laboratory and field investigations and is scheduled for completion in 1981. To date the studies appear to be on schedule and objectives should be met on or before the target data.

Laboratory studies being conducted in the Survey's research laboratories in Reston, Virginia, Denver, Colorado, and Menlo Park, California, include geochemical kinetic studies related to the sorption of nuclides, chemical complexing of radionuclides by organic material which were included with the waste at time of disposal, digital solute transport models, migration of transuranium elements in porous media, migration and moisture flow through unsaturated media, and principal and processes of partitioning of trace metals and radioisotopes among the various components of bed sediments which serve as the principal trace elements sinks or reservoirs. All of the laboratory studies are being made with materials and solutions obtained at existing burial sites rather than using the usual theoretical solution and materials, techniques normally encountered in the laboratory.

The field studies include test drilling and instrumentation of hydrologic studies at 5 existing commercial solid low-level radioactive waste burial sites located in New York, South Carolina, Kentucky, Illinois, and Nevada. These studies, all underway, will develop the basic field data needed to verify the laboratory results. By using both field data for existing sites where waste has been subjected to the processes of nature for 18-30 years, and theoretical data from controlled laboratory studies, hydrogeological criteria can be developed to assist in the location of future disposal sites.

Ground-Water Recharge:

A major emphasis of the Survey's program in artificial recharge is the establishment of predictability through study of fundamental properties that control recharge and movement of water in aquifers. Several of the most significant recent accomplishments that lead to this goal are described below:

- A field study at Lubbock, Texas, has shown details of how ion exchange controls water quality and the hydraulic conductivity of aquifers. Desorption and movement of silica from the aquifer framework has been shown to be a second major process.

- Another field study at Lubbock, Texas, has shown how sulfate-reducing bacteria flourish under anaerobic conditions and produce a moving zone of precipitation that changes the water chemistry and clogs the aquifer. The study documents the occurrence of these zones under spreading basins.

- A field study on Long Island, New York, determined the locations and causes of clogging that occurred when waste water from a tertiary-treatment plant was recharged to a granular aquifer. Numerous innovations in instrumentation and approach are employed at the highly instrumented site. The effects of several remedial measures are being studied.

- Laboratory tests demonstrated that a proposed method for measuring unsaturated hydraulic conductivity using a constant-flux technique will probably give satisfactory results in the field and thus provide a direct method of measuring this critical parameter.

- A method has been devised to apply a numerical iterative procedure to the determination of hydraulic parameters in unsaturated flow. This results in a solution of the so-called "inverse problem" of determining critical soil properties from actual measurements of infiltration data. From the solution of this problem, predictions can be made of infiltration rates at recharge sites.

- A computer program has been devised that is capable of predicting chemical reactions in water under recharge conditions. The program uses equilibrium chemical reactions for most ionic species present in ground water, and allows prediction of those reactions that are likely to occur, those that are impossible, and those that will dominate the chemistry of the water.

- A field study of chemical compositional changes in naturally recharged water as it mixes with aquifer water under non-equilibrium conditions has shown that certain ions are conserved through the process and may be used as indicators of the flow system, while others form precipitates that tend to clog the aquifer.

- Laboratory and theoretical approaches have produced cation-exchange models for certain metallic species which show, for example, that the rate of movement of lead through soil may be 1/30 to 1/3000 the rate of water movement, whereas other metals, such as cadmium, may move at rates approaching those of the water. The results are particularly applicable to land-fill studies as well as to recharge projects.

- Analysis of field results from another project showed that a direct index of the capacity of a confined aquifer to accept and store recharge water is the observed vertical expansion of the intergranular structure as fluid pressure increases. Results show, however, that the aquifer system will not, in general, behave in the same way when pressure increases as it does when pressure is reduced by withdrawals from the aquifer. Application of a one-dimensional model to data from six sites showed that, for stresses greater than those previously applied, the coefficient for compression was approximately two orders of magnitude greater than the corresponding coefficient for expansion.

Some of the problems inherent in recharge operations have been solved; many complex problems are still being attacked. More than 70 papers, journal articles, and Geological Survey publications describe the results of projects that have been completed or are now underway in the artificial recharge program.

Subsurface Waste Storage

- Described potential waste storage zones in regional saline aquifers on the middle Atlantic Coastal Plain. Oil test well data were used to delineate three permeable saline zones of Mesozoic Age and show where they are confined by thick extensive shale beds.

- Investigated and described the physical, chemical, and biological reactions of organic waste injected into a saline aquifer in North Carolina. The organic waste reacted with aquifer materials and brine. Biological activity produced methane gas at the waste front. The report underlines the need for relating waste to the injection zone to prevent aquifer plugging and excess pressure buildup.

- Developed a waste transport model through a contract with INTERCOMP that accounts for temperature and density changes and predicts waste movement in three dimensions.

- Developed techniques for measuring the state of tectonic stress in wells, enabling prediction of whether seismic activity might be triggered by high injection pressures.

- Prepared a report mapping the structure and stratigraphy of the Mt. Simon Sandstone in the eight Ohio River Basin states. The report summarizes the work of the state geological surveys and was compiled by ORSANCO under a grant from the USGS. The Mt. Simon is the principal injection zone in the Industrial Ohio Valley.

Flood-Hazard Mapping

During Fiscal Years 75-77 approximately 1,600 maps and 400 pamphlets were prepared identifying areas of potential flood hazards. Since the program started in 1969, over 12,000 maps (including 250 maps prepared by the Soil Conservation Service and printed by the Geological Survey) and 1,000 pamphlets have been provided free as guides for flood-plain management and land-use planning decisions. In addition, the Geological Survey has computed a new flood-frequency curve according to recently issued Water Resources Council guidelines for all of the applicable 11,000 gaging stations in the Nation and made those curves available to all potential users.

Estuarine Studies

Fifteen eastern estuaries have been critically evaluated and ranked prior to selection for interdisciplinary estuarine study. Selection has been reduced to three areas. Final selection to be based on outcome of additional meetings with federal and state officials. Calibration of the two-dimensional digital models of circulation and transport in Port Royal Sound and Tampa Bay has been accomplished. Data collection continued on San Francisco Bay. Development of mathematical models concerned with bay circulation has been started.

87-591 O - 77 - 60

LOCATION OF COAL HYDROLOGIC MONITORING SYSTEMS

Mr. YATES. We already talked about the Madison Aquifer and the conclusions which you can draw. You are going to establish hydrologic monitoring systems in the seven coal subregions?

Mr. MCKELVEY. That is what is proposed.

Mr. YATES. Would you state in the record where you are going to put these?

Mr. MCKELVEY. Yes.

[The information follows:]

LOCATION OF MONITORING SYSTEMS IN SEVEN COAL SUBREGIONS

The seven coal subregions in which hydrologic monitoring is to be initiated are geographically located as follows:

1. West central North Dakota.
2. Southeast Montana.
3. Southwest Wyoming.
4. West central Colorado.
5. Central Utah.
6. Southwest Utah.
7. Northwest New Mexico.

Mr. YATES. Do you know yet?

Mr. MCKELVEY. I don't know offhand, Mr. Chairman, but possibly Mr. Cragwall does.

Mr. YATES. We ought to have an explanation of the program, indicating the number of monitoring systems that will be in effect in the network in order to protect the Nation's water supplies during the buildup on coal mining.

Mr. MCKELVEY. We will supply that, sir.

[The information follows:]

HYDROLOGICAL MONITORING SYSTEMS FOR COAL LEASING ON PUBLIC LANDS

The initial effort will include surface water stations at which the quantity and quality of the stream discharge will be measured, and at selected sites the sediment load; and ground water wells where water levels and water quality data will be collected. The number of new sites now planned includes 55 for surface water and 225 for ground water. In addition to this station activity a reconnaissance will be conducted in southeast Montana to select locations for additional ground water stations; these will be added in fiscal year 1979.

Mr. YATES. You say the network is going to be operated by the private contractor under close surveillance by USGS personnel. What does close surveillance mean?

Mr. MCKELVEY. It means we will be looking over his shoulder to be sure that the work is done according to our standards and specifications.

DISPOSAL OF LOW-LEVEL RADIOACTIVE WASTE

Mr. YATES. You want $2,039,000 for nuclear energy hydrology; a slight increase. You say this will permit the installation and operation of ground water monitoring stations at the Nevada and Washington State low-level waste burial site. That is for low-level waste burial.

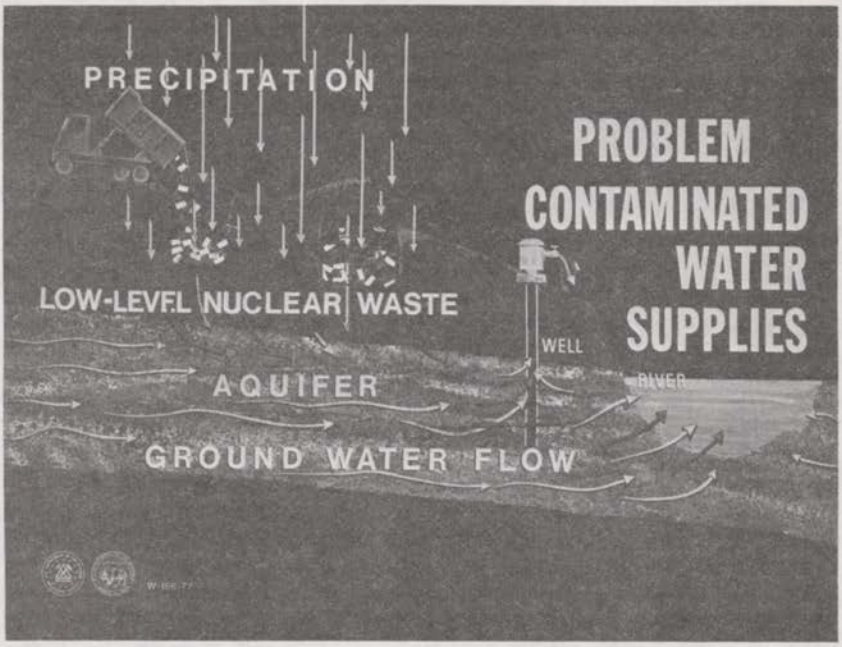
What is being done with low-level waste burial? Where is it being buried?

Mr. MCKELVEY. May I ask Mr. DeBuchananne to speak to that?

Mr. YATES. Sure.

Mr. MCKELVEY. This chart, Mr. Chairman, illustrates how radioactive wastes may contaminate ground water.

[The chart follows:]



Curent low-level radioactive waste disposal practices have the potential for contaminating both ground and surface waters. The natural principals and processes of waste migration must be understood and described to enable the development of hydrogeologic criteria for locating new safe disposal sites and the development of monitoring networks for existing and new sites.

Mr. DEBUCHANANNE. At the present time low-level solid radioactive waste from commercial sites are being deposited at State-owned, NRC licensed burial grounds in the States of New York, South Carolina, Kentucky, Illinois, at Sheffield, Nev., and Hanford, Wash. This is for commercial waste, resulting from the nuclear power generation.

Mr. YATES. You are talking about the use of isotopes that have been extinguished, and so forth?

Mr. DEBUCHANANNE. That is right; hospital and laboratory waste and nuclear power reactor waste.

Mr. YATES. That isn't low level, is it?

Mr. DEBUCHANANNE. There are low-level wastes generated at nuclear power reactor sites.

DEFINITION OF LOW LEVEL RADIOACTIVE WASTE

Mr. YATES. What qualifies it to be included within the term "low-level waste"?

Mr. DEBUCHANANNE. As I stated yesterday, sir, by definition, high-level wastes are only those wastes which come of the primary waste streams of reprocessed nuclear fuel elements.

Mr. YATES. What level is that? No level?
Mr. DEBUCHANANNE. By definition, they do not say.
Mr. YATES. By definition, low level is what?
Mr. DEBUCHANANNE. All other waste that is not high level waste.

RADIO ACTIVE WASTE DISPOSAL STUDIES

At the present time we do have field investigations at five of these sites, where we are studying the results of what has happened in nature over the past 15 to 20 years since they have been burying wastes to see how the waste has migrated, if it has migrated, and if so, how and what we can expect in the future.

Mr. YATES. By migrated you mean leaked from the containers?
Mr. DEBUCHANANNE. It is leached from the waste products, diluted, made into a solution which ground waters can transport to a point of discharge or into the biospheres.
Mr. YATES. Does that happen?
Mr. DEBUCHANANNE. There have been two minor cases and it has not been a health hazard in either case.
Mr. YATES. Is it possible for low level waste leaching to create a health hazard?
Mr. DEBUCHANANNE. Yes.

MONITORING LOW LEVEL WASTE

Mr. YATES. How long has this waste monitoring been going on?
Mr. DEBUCHANANNE. Since the latter part of the fiscal year 1975 when we first had funds authorized to do studies at these commercial sites

Prior to that time there was little or no monitoring done at the sites in the real sense of monitoring.

Mr. YATES. Was there any leaking at the sites where you had no monitoring?
Mr. DEBUCHANANNE. We did not have any monitors any place prior to the latter part of 1975.
Mr. YATES. Did any agency have monitors?
Mr. DEBUCHANANNE. No, sir. This was being done by the State regulatory agencies, and the contractor who was operating the site.
Mr. YATES. Would it not be well to see whether or not there has been leakage at the sites where you had no monitors?
Mr. DEBUCHANANNE. This is what we are doing now with our studies, we have under way today.
Mr. YATES. I see. And you are going to examine each of the sites in the country?
Mr. DEBUCHANANNE. That is right, each of the six sites. We have a problem in the sixth site, which is on the ERDA reservation, formerly AEC reservation at Hanford. ERDA deeded back to the State a parcel of land for a low level waste burial. This happens to be in the middle of an area where ERDA has disposed of a lot of waste before. It's going to be somewhat analogous to looking for a cup of salt water in the Atlantic Ocean to see if the waste we detect there will be coming from the burial ground itself.
Mr. YATES. Will you be able to find it?

Mr. DeBuchananne. We will be able to tell you better when we complete other studies being done in a different area.

CONCERN ABOUT DISPOSAL OF LOW LEVEL WASTE

Mr. Yates. Are you concerned at all about the manner in which low level nuclear waste is being deposited?

Mr. DeBuchananne. Yes, sir.

Mr. Yates. What is the concern?

Mr. DeBuchananne. As to whether or not there has been adequate protection in the planning and monitoring of the sites?

Mr. Yates. Why are you concerned about that, if you say there have been only two minor leaks?

Mr. DeBuchananne. To respond to that, allow me to go back a little bit.

Mr. Yates. Please take as much time as you want, because this is of very great importance.

Mr. DeBuchananne. As you know, the nuclear industry is developing a very new industrial process, we will say. Back during the War, as a matter of expediency when low level waste accumulated at our nuclear facilities, the health physicist said let's get rid of it so it doesn't create a health hazard for employees. So they merely buried it. But after the termination of the War and we came into the nuclear power era and commercial low level wastes were being developed, they said look, 10 years ago we buried waste and nothing has happened. We will bury waste again.

Unfortunately, the decision did not take into account the slow movement of ground waters, the slow dissolution of the nuclides into the waste transport, and so they really did not have an adequate knowledge to make the judgment that this was a safe way to do it.

Our investigations now are aimed at identifying what the capabilities of these different geohydrologic environments are to contain waste. It should be possible to locate areas which will safely contain the waste. If you can identify the waste going to it we know what we are really dealing with.

CONTAMINATION OF GROUND WATER

Mr. Yates. What happened as a result of the program following the war? Has there been contamination of ground water?

Mr. DeBuchananne. At the nuclear reservations or the ERDA reservation as at Oak Ridge, there has been evidence of migration of nuclides from the waste burial disposal into the local streams, again not at a point where it is considered a health hazard.

Mr. Yates. At what point is it considered a health hazard?

Mr. DeBuchananne. When it would be exceeding the maximum permissible concentration as defined by CF–10.

Mr. Yates. Well, if that be true, why are you concerned?

Mr. DeBuchananne. Well, the process of, shall I say, filtering out or ion exchange, as the waste product moves through the underground is a slow process. It is a process which is cumulative. So as waste moves through the ground, for the first few feet it takes out all of the waste for a given period of years; in the next period of years it is going to move on as a front and keep on moving.

The question is, when does the front really move to the point in the biosphere where it is increasing—there is nothing to retain it in forthcoming years after that.

The ion exchange capacity has been used and the waste is more likely to be flushed right straight through with no time delay at all.

POTENTIAL OF LOW LEVEL WASTE BECOMING A HEALTH HAZARD

Mr. YATES. Are you saying there is a possibility that the low level nuclear wastes may become a health hazard?

Mr. DEBUCHANANNE. That is a possibility, yes.

Mr. YATES. Is it a strong possibility, and weigh your words very carefully.

Mr. DEBUCHANANNE. I am trying to, sir. The EPA, which has responsibility of the surveillance of these types of operations, consider it a very good possibility, yes, sir.

Mr. YATES. Very strong possibility.

You would rather not state your own opinion?

Mr. DEBUCHANANNE. I think it is going to be possible to design engineering structures to prevent that which has been put in the ground from doing harm in the future. And I think it is possible to design future solid low level waste burial grounds which will contain the waste, if they are careful as to what types of waste they put into the ground.

Now, there are some types of waste which have an extremely long half life, such as plutonium.

Mr. YATES. Is plutonium a low level waste?

Mr. DEBUCHANANNE. There has been plutonium deposited in low level burial grounds in the past. When it was identified as being a potential migrant contaminant, they have now restricted it from all burial grounds, except the one at Hanford, Wash.

Mr. YATES. Plutonium is a high level waste, isn't it?

Mr. DEBUCHANANNE. By definition, plutonium is high level. There is plutonium in high level waste and there is also plutonium in low level waste.

DEFINITION OF HIGH OR LOW LEVEL RADIOACTIVE WASTE

Mr. DUNCAN. Would you help me in the definition, I apparently missed it. Does it involve half life or concentration?

Mr. DEBUCHANANNE. Not by definition. The difference between high level and low level is the heat generative capabilities of the waste itself.

Mr. DUNCAN. Heat generating?

Mr. DEBUCHANANNE. Heat generating.

Mr. DUNCAN. That involves the concentration of the radioactive material far more than its half-life, does it not?

Mr. DEBUCHANANNE. Yes.

Mr. DUNCAN. Half-life is irrelevant to this?

Mr. DEBUCHANANNE. Half-life is a factor in the concentration in the regenerative process, we will say.

Mr. DUNCAN. Generally low-level nuclear waste would have a comparatively short half-life.

Mr. DeBuchananne. Generally low-level waste has in quantity a short half-life.

Mr. Yates. What is a short half-life?

Mr. DeBuchananne. It is another——

Mr. Duncan. Less than a long half-life.

Mr. Yates. When you talk about the half-life, what do you mean?

Mr. Duncan. Some have a half-life of a very short period of time.

Mr. DeBuchananne. Some have fractions of a second.

Mr. Yates. What is it at the other end? What is a high level? What is the longest half-life?

Mr. DeBuchananne. The longest half-life would probably be a daughter product of plutonium which may be as much as a 5-million-year half-life.

Mr. Balsley. That can be in the low-level waste.

Mr. DeBuchananne. If plutonium is included in the low-level waste, the daughter products of plutonium would be there.

Mr. Yates. You are saying up to recently plutonium was included in low-level waste.

Mr. DeBuchananne. That is right, sir.

Mr. Duncan. Are you also saying it isn't any more?

Mr. DeBuchananne. If it is in greater concentration than 10 nanocuries per gram, it is not supposed to be put in low-level.

Mr. Coulter. It isn't included in the definition. Tranuranic products are excluded from the commercial sites, but not excluded from the definition.

EXAMPLES OF LOW-LEVEL WASTE PRODUCTS

Mr. Yates. I am not sure we know what questions to ask you in order to share your concerns. We see this very picturesque chart that you have presented us, and it shows a truck dumping low-level nuclear wastes into the ground.

What are examples of low-level nuclear waste? You gave us an example of some isotopes, you also gave us an example of some kinds of plutonium.

I am told there is a dumping ground for low-level nuclear waste above an aquifer in Idaho, and the possibility of seepage into that aquifer exists. The chart you have presented to the committee indicates the possibility of nuclear waste leaking into an aquifer and thereby into drinking water supplies.

Does that exist?

Mr. DeBuchananne. That is right.

Mr. Duncan. Do I understand that this digging a hole and dumping this stuff out of a dump truck, like this chart indicates, is still continuing? Aren't they containing this waste in containers of various sorts, stainless steel, concrete, et cetera, at this time?

Mr. DeBuchananne. The low level wastes consists of sweepings from the floors, chem wipes, old cloths, tools which may become contaminated and things like this. This is either put in a plywood box or cardboard box, sometimes into a steel drum, sometimes even put into a plastic bag. They are taken to the burial ground and literally dumped randomly into the pit and buried.

Mr. DUNCAN. So when you talk about proper management being possible to eliminate this threat, you are talking about I assume containerization of it in some fashion.

Mr. DEBUCHANANNE. The container, sir, probably doesn't have too much of an impact. The rusting out of a steel drum in 10 or 15 years time has little impact upon a waste which may have toxicity for 1,000 years.

Mr. DUNCAN. What about concrete?

Mr. DEBUCHANANNE. It will leach from concrete, too.

IMPORTANCE OF PROPER DISPOSAL OF LOW-LEVEL WASTE

Mr. DUNCAN. You are saying then the low level waste ought to be disposed of in the same fashion as is proposed to dispose of the high level waste in the salt domes.

Mr. DEBUCHANANNE. Not necessarily to that extreme. I am saying that the waste should be disposed of in an area and manner which, if it is leached by the ground water, the pathway it will use to get back to the biosphere can be identified so we know how long a time factor is involved.

If it's going to take over 1,000 years for it to get from the trench to the river, and the half-life toxicity is only going to be 800 years, then this should be a safe procedure.

Mr. YATES. What happens during the 800 years?

Mr. DEBUCHANANNE. Then it comes down to the neutral stage and goes on out.

DEFINITIONS OF WASTE PRODUCTS

Mr. YATES. Would you yield for a question at this point?

I am still concerned about definitions. You say plutonium may be included in low level wastes.

Mr. DEBUCHANANNE. That is right.

Mr. YATES. Plutonium we are told is the most dangerous of all of the nuclear wastes in terms of toxicity to a human being. Is this correct?

Mr. DEBUCHANANNE. I have seen this written; yes, sir.

Mr. YATES. You have seen this written.

Mr. DEBUCHANANNE. I am not a nuclear chemist or physicist.

Mr. YATES. You are concerned with the manner in which it is being disposed of, aren't you?

Mr. DEBUCHANANNE. That is right.

Mr. YATES. Have you made that concern known to the Nuclear Regulatory Commission?

Mr. DEBUCHANANNE. We are working closely with them and ERDA.

ADEQUACY OF DISPOSAL CRITERIA

Mr. YATES. Are these wastes being disposed of in accordance with the requirements of ERDA and the Nuclear Regulatory Commission?

Mr. DEBUCHANANNE. These wastes which were disposed of in the past and present are in accordance with the criteria set up by ERDA.

Mr. YATES. Well, then, the criteria are inadequate, in your judgment, aren't they?

Mr. DEBUCHANANNE. That is right. They have not been adequately identified.

Mr. DUNCAN. Are or were?

Mr. DEBUCHANANNE. The criteria, hydrological criteria, for disposal of radioactive wastes are inadequate, in my judgment.

Mr. YATES. What does ERDA say about this picture?

Mr. DEBUCHANANNE. They are working with us and trying to reach——

Mr. YATES. Do they say there is no concern?

Mr. DEBUCHANANNE. I think it depends on which part of ERDA you talk to, sir. Some are quite concerned.

Mr. YATES. Why wasn't this waste contained in the ceramics? They say they are containing high level waste in ceramics.

Mr. DEBUCHANANNE. They are working with containment of waste in ceramics for ultimate disposal, but low level is such a large volume they cannot contain it this way.

DISPOSAL OF HIGH LEVEL WASTES

Mr. YATES. How are they disposing of high level wastes?

Mr. DEBUCHANANNE. They are not; they are storing it.

Mr. YATES. Is the high level waste being contained in some kind of pools near the reactors?

Mr. DEBUCHANANNE. The spent fuel rods are being contained in the so-called emergency swimming pools for fuel rods.

Mr. YATES. Shouldn't we be told the kinds of nuclear wastes that exist and how they are being disposed of and what the dangers are?

BURIAL SITES

Mr. YATES. There are five locations in the country.

Mr. DEBUCHANANNE. There are six locations in the country.

Mr. YATES. Where this practice is going on?

Mr. DEBUCHANANNE. Where this practice is going on for commercial waste. ERDA then has their own burial grounds within their own reservations in which they are disposing of ERDA generated waste. These are just commercial generated wastes we are referring to here.

Mr. YATES. Is it possible that nuclear waste is being disposed of at places other than the six depositories?

Mr. DEBUCHANANNE. I do not believe it's likely. The possibility, you never know who is going to flush what down a drain someplace.

Mr. YATES. Isotopes are being used all over the country, in hospitals. They are being used I think even in doctors' offices, aren't they?

Mr. DEBUCHANANNE. That is right, and the licensing of these different facilities is supposed to funnel these wastes into these types of disposals.

Mr. YATES. I think we will pass this temporarily.

You have raised a warning flag, and I think rightfully so. Are leaks taking place at any of the sites? You said there have been two leaks so far.

Mr. DeBuchananne. At the commercial sites.

Mr. Yates. Without health consequences.

Have other leaks taken place?

Mr. DeBuchananne. At the national laboratories there have been some leaks, but these are well within the reservation, they have not gotten outside of the boundaries.

DEVELOPMENT OF CRITERIA FOR SAFE DISPOSAL OF WASTE

Mr. McKelvey. I believe Mr. Coulter wanted to say something.

Mr. Coulter. To get back to where we started from, something we sort of lost sight of, the intent of this particular program we are talking about is to use these six sites as a laboratory to develop criteria which will permit one to identify sites where there will be no possibility of leakage or off-sites contamination.

Mr. Yates. But you don't have that now, do you?

Mr. Coulter. No. But here we have a situation where you have radio nuclides that you can trace through the system, and get appreciation of their travel times, and the bypassing effect on the filter.

You have a filter that will collect all of this material until it gets full and clogged, and then it will bypass and progressively bypass, and you must learn the rates and capabilities of these materials, these sites are the optimum situation in order to determine that.

From such a determination you can then develop criteria and say if a site fulfills these various criteria, then you needn't worry about the problem of disposing of low level waste.

Mr. Yates. Is it a process my friends at National Cancer Institute tell me exists with respect to carcinogens? You may take a little bit of some carcinogenic agent or possible carcinogenic agent in your coffee. Some have been identified as having developed cancers in animals like a cyclamate, or saccharin. If you take a little bit of it it won't hurt you. But, if you take a little bit of it cumulatively, at some point, and they don't know at what point that is reached, it may develop carcinogenic action.

Now, your picture indicates the dumping of a certain amount of nuclear waste and then the truck comes back and dumps some more, and then the truck comes back and dumps some more, so you have an increasing accumulation of these wastes.

Then over a period of time there is seepage of the waste so the same amount of waste that may have been in one of these containers is massed with other wastes, and in the possible filtering process you have an accumulation of the nuclear material, and is the accumulation of that nuclear material a dangerous amount?

Mr. Coulter. It's not the accumulation you are worried about. It's the fact that you can accumulate only so much and then the next increment will bypass, because your filter is clogged and you catch a bunch on the filter, and the next increment is clogged.

FILTER FOR PRESENT BURIAL SITES

Mr. YATES. What is the filter, the ground?

Mr. COULTER. Ground is the filter, the clay minerals in the ground actually have an ion exchange capacity and trap individual radio nuclides, but they have an ultimate capacity and when that capacity is exceeded, then the next one that comes by will bypass, so ultimately you might get a direct pipeline from your trench out to the stream with no filter in the middle to catch it.

Mr. YATES. You are depending on the filter.

Mr. COULTER. You are depending on the filter now.

Mr. YATES. To stop it from getting into the water, no matter how much an accumulation you have, as of now, say, the filter protects that contaminant; is that correct?

Mr. COULTER. Yes.

Mr. YATES. That is the theory.

Mr. COULTER. This was the old philosophy that Mr. DeBuchananne talked about. They dumped some of this material and none of it ever turned up, so it was all caught and they assumed it would stay there. Now with some more experience, it appears that you can, indeed, exceed the capacity of your filter and start the bypass.

Mr. YATES. Or the safe level.

Mr. COULTER. Or the safe level.

Mr. YATES. But he says that safe level hasn't been exceeded yet, didn't you say that, Mr. DeBuchananne?

Mr. COULTER. It hasn't appeared in the streams at concentrations high enough to exceed it.

Mr. YATES. What about the Idaho aquifer, has it appeared there?

Mr. DEBUCHANANNE. We have not detected any radio nuclides in the aquifer itself; we have detected nuclides that have migrated away from the ponds and from the injection well.

Mr. YATES. Does it make sense for NRC to stop disposing of low level nuclear waste as they are doing in this chart until you know where it ought to be disposed of?

Mr. COULTER. They have taken the first step. They have banned transuranic elements which includes plutonium and many of the long half-lived elements have been banned from these disposal sites.

PLUTONIUM

Mr. YATES. How does it happen that plutonium is included in this disposal?

Mr. COULTER. It was originally in small quantities, because it was a contaminant.

Mr. YATES. Where does plutonium come from? Plutonium can only come from a Government plant, can't it?

Mr. COULTER. Or reactors.

Mr. YATES. Or a reactor. And how does it get into the low-level nuclear waste, because of the definition?

Mr. COULTER. In small quantities.

Mr. YATES. Who is in charge of disposing of the waste, ERDA?

Mr. DEBUCHANANNE. Which waste?

Mr. YATES. Low level.

Mr. DEBUCHANANNE. For low level commercial nuclear waste, ERDA, or the old AEC, is originally the one who licensed these sites. This has been now passed on to NRC as the regulating agency, and they set up the specifications as to what should or could be disposed of in this manner.

TRANSPORTATION OF LOW LEVEL WASTES TO BURIAL SITES

Mr. YATES. I am not sure how it gets to your dumping ground. How does it get to your dumping ground from commercial plants that are authorized to use it? Do they transport it to the dumping ground themselves or does it go to an ERDA collecting station and ERDA then moves it to the dumping grounds?

How is it done?

Mr. DEBUCHANANNE. Let's take an example of a lab with carcasses of animals in which they have been using radio isotopes for studies. These are accumulated at one point at the laboratory facilities. When they have containerized it for shipment——

Mr. YATES. Are you saying that for this study purpose all elements of that study are located in one spot, or may this be done at various places in the country?

Mr. DEBUCHANANNE. This could be done at numerous places throughout say the State of Massachusetts, and each of these will have a collecting point where a truck will come and load it on board the truck, and go around for the collection, then drive to Barnsville, S.C. for disposal, for example, and they will go in and say this is our inventory of what the shippers say they had in their different containers.

Mr. YATES. What happens to the carcasses in the first instance? Does the laboratory encase them in something?

Mr. DEBUCHANANNE. They place them in some sort of container.

Mr. YATES. It may be plastic containers?

Mr. DEBUCHANANNE. A plastic bag, put in a barrel or something like this, something which would make it safe for transportation purposes.

Mr. YATES. Doesn't sound very safe.

Mr. DEBUCHANANNE. The Department of Transportation has certain regulations as to how this stuff should be packaged for transport.

Mr. YATES. And then what happens?

Mr. DEBUCHANANNE. It is taken to the burial ground. The commercial operator at the burial ground will review the bill of lading as to what they have and he will say OK, we will put it in this particular location.

They take it to the edge of the trench, dump it or use cranes or some sort of shovel or something to move it into the trench itself, and then it is buried.

DETERMINATION OF SUITABILITY OF MATERIAL FOR BURIAL

Mr. YATES. Who determines whether it should be buried?

Mr. DEBUCHANANNE. The NRC or AEC originally issued licenses to the State to do this.

Mr. YATES. The State has somebody at that actual dumping ground who decides whether it ought to be dumped in the ground or shipped somewhere else because it's high-level waste?

Mr. DEBUCHANANNE. Sir, again, they do not ship high-level waste.

Mr. YATES. Then what is there to be determined? All he does is say you dump it?

Mr. DEBUCHANANNE. They have a health physicist who runs his counter over the containers and if it has radiation which is dangerous he says, OK, this has to be handled by remote controlled equipment of a crane or something like this.

Mr. YATES. Rather than human hands?

Mr. DEBUCHANANNE. Right.

Mr. YATES. That is the only distinction?

Mr. DEBUCHANANNE. Yes, sir.

Mr. YATES. Even though it's very highly active?

Mr. DEBUCHANANNE. If it's highly active, they use a dry well, which would be more isolated than the trench is itself, and be concrete lined, and they put the material in it and put concrete on top of it.

Mr. YATES. But it still can leach from that?

Mr. DEBUCHANANNE. Yes, sir.

Mr. YATES. I suppose you are still studying how long you would have to have such monitoring before you are confident that a site is safe from leakage from radioactive waste?

Mr. DEBUCHANANNE. Well, it would depend upon the waste which was put in the trench, sir.

Mr. YATES. You should live so long, 250,000 years.

NUCLEAR WASTE DISPOSAL

Mr. DeBuchananne, would you insert in the record some expressions of your concern as to what we ought to be doing here?

Mr. DEBUCHANANNE. Yes, sir.

[The information follows:]

STATEMENT OF GEORGE D. DEBUCHANANNE, CHIEF, OFFICE OF RADIOHYDROLOGY, WATER RESOURCES DIVISION, U.S. GEOLOGICAL SURVEY, ON RADIOACTIVE WASTE STORAGE AND DISPOSAL, BEFORE THE SUBCOMMITTEE ON CONSERVATION, ENERGY, AND NATURAL RESOURCES, HOUSE COMMITTEE ON GOVERNMENT OPERATIONS, FEBRUARY 23, 1976.

Mr. Chairman:

INTRODUCTION

I am pleased to have the opportunity to appear before this Committee today to discuss the Geological Survey's recommendations for improving site-selection criteria for solid-radioactive waste burial grounds and the management and regulation of such disposal sites, so as to minimize waste migration problems at existing burial sites.

The Geological Survey has had a long history of working with the Atomic Energy Commission (AEC), now the U.S. Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission (NRC), on site selection for nuclear generating plants, laboratories, and processing plants, related water-supply problems, and evaluating the effects of underground weapons tests on rocks and water, but generally the Survey has worked only on part of the radioactive waste disposal problem. Although the Geological Survey participated in the preliminary evaluation of some disposal sites selected by ERDA or others, and has studied specific disposal sites after the site has been in use, prior to the 1975 Fiscal Year, the Survey's role in radioactive waste burial grounds has been primarily one of investigating problems as they were recognized by those agencies which had primary regulatory and development responsibility for nuclear energy. Most waste-disposal sites were selected and administered by contractors under the supervision of the AEC or ERDA, and the Survey became involved after problems arose.

Starting with the 1975 Fiscal Year program, however, operating under new appropriations authority, the Survey initiated a program intended to lead to more comprehensive hydrogeologic criteria for the evaluation of existing and proposed waste disposal sites. The program consists of two elements: (1) theoretical laboratory research to investigate hydrogeologic, geophysical, and geochemical factors affecting the movement of waste solutes through porous earth materials, and (2) field investigations of existing burial grounds in different hydrogeologic environments. The field investigations will determine what has happened in the years since the waste was first buried at a site.

HISTORY OF PROBLEM

To put this discussion in its proper perspective allow me to briefly recapitulate the history of shallow land burial of solid radioactive waste. In the 1940's during the all-out war effort, it became necessary to dispose of material that had become radioactive through use in Federal nuclear laboratories and production facilities. Since it was felt that it was too expensive if not impossible to decontaminate these materials, a decision was made that the best way to resolve the problem was to bury the material at a depth that would allow for sufficient earth cover to eliminate hazardous radiation at the land surface of the burial site. Under the circumstances of our defense effort, and in view of the state of knowledge at the time, this was probably a tenable decision. After the war with the beginning of our effort to develop nuclear energy to its full potential for peaceful purposes, the waste-disposal problems began to grow. These problems were developing and growing in a new and expanding industry, and much of the technology, instrumentation, and understanding we possess today did not then exist.

Waste disposal was originally viewed from both the economic and radiological safety viewpoints. Unfortunately, economic pressures may have colored the need for safety precautions. Later, based on evaluation of experiences with the early burial sites and on preliminary laboratory experiments, it was concluded that land burial was a satisfactory method of handling waste. If any problems should develop the solution would be to engineer a remedial technique at that time. Even though it was acknowledged that more precise information from the earth sciences was needed, initial studies using less expensive techniques on the several existing burial grounds had not indicated any major problems. As a result, land burial operations continued and the sites became larger and more numerous.

Criteria for selecting the new sites were few and generalized. They included factors such as isolation of the site from population centers and water supplies, depth of burial sufficient to minimize the radiation hazard at the land surface, limits on the forms and type of waste (to some extent) that could be buried, and prescribed operational procedures at the site prior to burial. The latter, except for specifying the depth to the ground-water table, contained no geologic or hydrologic considerations. It now seems apparent that on hindsight, even considering the state of technology at the time, more attention was given to the economics of handling the material, and to the cost, location, and ready availability of a site for burial use, than was given to the ultimate fate of the waste. This philosophy of land disposal prevailed through the 1950's and into the 60's.

A 1966 review by the National Academy of Sciences concluded that site practices were not beyond question, but hard evidence of leakage was scant at that time. Now in the mid-Seventies, it is apparent that some of the existing and closed burial sites are not retaining the waste intact. Some of the problems are reported in the Comptroller General's report on "Improvements Needed in Land Disposal of Radioactive Waste--A Problem of Centuries."

LAND DISPOSAL OPERATIONS TODAY

Six licensed commercial and five principal Federal land disposal sites are in use today in the United States. The 11 sites contain a total of more than 50 million cubic feet of solid radioactive waste that has been generated during the past 30 years. Rowe (1974) estimates that the total volume of low-level waste that will have been generated from both commercial and government programs by the year 2000 will total 400 million cubic feet. With the predicted 8-fold increase in total waste volume in the next 25 years, it is mandatory that we address the problem of re-evaluating existing criteria for selecting future waste burial sites.

FATE OF LOW-LEVEL WASTE

After solid low-level radioactive waste is buried, the principal method for its exposure, release, or movement from the burial site would be by a by a combination of erosional processes and transport in ground water and surface water.

In the event that buried waste were to be exposed at the surface, the radioactive nuclides could then be transported by surface water, or by the wind as particulate matter. Present knowledge of the rate of geomorphic processes and man's understanding of earthquake probabilities would be able to minimize this type of radioactive release by selecting sites where such events are least likely.

When solid radioactive wastes are placed beneath the land surface, they are subject to dissolution and transport by percolating ground water. Radioactive nuclides leached from the waste materials could then be transported downward and laterally as waste solutes to areas away from the burial site, or be transported upward by capillary flow to the overlying soil zone to be concentrated in plants growing at the land surface or concentrated in salts on the surface. In nature these transport processes are usually extremely slow yet deliberate and the subsurface flow paths of such solutes may be exceedingly tortuous.

It is probable that the slow movement of ground water contributed to the erroneous belief, in the 1950's and 60's, that the original burial ground would retain the radioactive waste. In both reconnaissance and detailed evaluation of a given site, the length of time required for the waste to be retained must be a major consideration. As stated before, ground-water flow (and solute transport) can be extremely slow, being measured in many cases in centimeters per year, yet it must be remembered that the longevity of the toxicity of many of the radionuclides is measured in terms of years to hundreds of thousands of years. Unfortunately extremely long-lived waste materials have been buried along with waste materials of short-lived activities so that most, if not all of the existing burial grounds must be evaluated for extremely long-term retention capabilities. In the future, it is essential that radioactive wastes be separated by types and length of time the wastes will remain radio-active, so that every site will not have to be designed for hundreds of thousands of years retention.

RECOMMENDATIONS FOR SITE CRITERIA

The Geological Survey's recommendations for hydrogeologic criteria for intermediate-term and long-term burial sites, and for types of data needed for for determining if the criteria are met were set forth by Stavros Papadopulos and Isaac Winograd in a 1974 study they made for the Environmental Protection Agency. Among the criteria are:

Land surface should be devoid of surface water;
Site should be stable geomorphically;
Water table should always be below the disposal trenches by several meters;
Burial zone should be separated from fractured bedrock by an interval of geologic deposits sufficient to prevent migration of radionuclides into the fractured zone;
Site should be well suited for effective monitoring and for containment by flow-system manipulation;
Hydrogeologic conditions must be simple enough for reliable residence-time prediction to be made;
Predicted residence time of radionuclides must be long enough to provide many years or perhaps centuries of delay time before radionuclides reach areas which might be considered hazardous in the biosphere.

The report also listed 17 types of data needed for evaluating whether proposed or existing burial sites meet criteria for containment of radioactivity at the burial sites. Their report points out that it may not be necessary to collect all 17 types of data to evaluate all sites, but they also indicate that some proposed sites may be located in such complex hydrogeologic environments that it may be economically or even technically impossible to adequately evaluate the site. For those sites that lend themselves to evaluation, solute transport models may be used to predict the time it would take a radioactive nuclide to move from the burial ground to the biosphere, the direction of movement, and the concentration level. With these predictions available, the waste managers could then specify which radionuclides can safely be buried at the site and design a monitoring system for checking waste movement. Such monitoring is crucial to check the predictions obtained from the model.

GEOLOGICAL SURVEY'S INVESTIGATIONS

The Geological Survey's investigations are both theoretical and applied. Theoretical mathematical simulation and laboratory studies related to radioactive waste disposal are under way at its research centers in Reston, Va., Lakewood, Colo., and Menlo Park,,California. Experiments in the laboratory use actual materials and solutions collected at the different burial sites. The Survey has initiated comprehensive field investigations at the burial sites, with the cooperation of the different responsible State agencies in New York, South Carolina, and Kentucky. Earlier studies at the Maxey Flats burial ground in Kentucky were begun with funds transferred from EPA's Office of Radiation Protection. Before the end of the current Fiscal Year, we also expect to begin a field investigation at a burial ground in Illinois. Next year studies at the two remaining commercial burial grounds in Nevada and Washington will be initiated. These field investigations will provide field data from six different hydrogeological environments. It should be noted that, in initiating these studies, the Survey has received both policy and resource support from the Federal regulatory agencies, such as the Nuclear Regulatory Commission, and the Environmental Protection Agency.

The commercial-burial-ground data are being augmented with data obtained from the joint programs of the Energy Resources Development Agency and the Geological Survey centered at several of ERDA's National laboratories. These joint studies provide information on additional hydrogeologic environments that can be related to our theoretical laboratory studies and models.

In addition to providing data needed for improving existing and developing new site selection criteria, the ongoing and planned investigations at existing burial grounds will provide the information needed for designing a subsurface monitoring system at each of the existing sites. At those sites where it is possible to construct viable solute transport models, the site manager will have a description of hydrogeology that will assist him in evaluating the ability of the burial site to retain its waste products or, if the site is not as efficient as hoped, it will allow the manager to monitor the migration and thereby assist him in designing remedial measures.

REMEDIAL ACTION NEEDED

Of the 11 solid waste burial grounds in use today, waste managers have reported migration in excess of predictions of radioactive nuclides at Maxey Flats, Kentucky, (1974) West Valley, New York, (1975) and Oak Ridge, Tennessee (1975). It is probable that some of the other burial grounds also release radioactive nuclides to some extent. The releases to date are not known to constitute a major health problem but they do indicate that something has not worked as planned. The burial sites were intended to contain radionuclides for hundreds or even thousands of years, yet in the first 12 years of operations, migration beyond expectations of radionuclides have been detected at several sites. In addition to demonstrating that waste can leave the trenches, it also suggests that the ion exchange capacity along at least one pathway of migration has either been exceeded or that it has been neutralized by some complexing agency, such as organic material, or cleanup fluids, that were buried with the waste. If this indeed is the case, it would not be unreasonable to expect an increase in the concentration of the migration of radionuclides in the future.

The problem of designing remedial action for the waste migration problem at existing burial sites is complicated by a lack of information on the detailed hydrogeology of the area. Information on at least 12 of the 17 factors listed by Papadopulos and Winograd are lacking at most sites. For example:

Contour maps of the water table;

Depth to water table, including the position of perched water tables;

Chemistry and radioactivity of the leachates from the waste trenches;

Laboratory and field measurements of hydraulic conductivity and effective porosity;

Mineralogy of core from wells or samples from trenches and of each lithology in both the saturated and unsaturated zones beneath the burial ground;

Soil moisture profile of the numerous formations beneath the burial ground;

Three-dimensional distribution of hydraulic head in all hydrostratigraphic units to the base of the shallowest confined aquifer;

Transmissivity and storage coefficients;

Areas of recharge and discharge for the unconfined and shallowest confined aquifers;

Field measurements of the dispersivity coefficients; and

Laboratory and field determinations of the movement of critical radionuclides through all hydrostratigraphic units.

It is apparent, therefore, that only limited generalized data are available for use in designing a remedial program that will allow the waste managers to control and possibly manipulate the flow of waste radionuclides from the burial trenches. Until the principles and processes of waste migration from the trenches are well understood, no permanent control system can be designed.

One obvious immediate remedial step that can and has already been taken is to control infiltration of precipitation into the existing trenches. Another step in controlling the waste migration is to keep the trenches dewatered. The water from the trenches, however, will have to be passed through ion exchange filters and/or evaporated to remove waste radionuclides in solution before it can be released to the environment. These remedial or stopgap type of operations will probably have to be maintained on a continuing basis for as long as the lifetime of the toxicity of the waste materials. Older sites that are not suited for burial should be phased out of operation as quickly as suitable sites meeting modern criteria become operational.

SUMMARY

In summary, the U.S. Geological Survey recommends continuing extensive studies of micro geohydrologic conditions at existing waste disposal sites to serve as the basis for design of monitoring systems that properly assess degree of containment and risk, and indicate possible mitigating measures. It also recommends expansion of laboratory studies of geochemical kinetics and site studies of geochemical and geohydrologic processes as they occur in nature to enable prediction of behavior of wastes in future disposal locations. Improved management of waste disposal practices through these actions presumes that there will be early proper attention to inventory of existing wastes and classification of wastes for future disposal.

- - - -

87-511 O - 77 - 61

REFERENCES CITED

Committee on Geologic Aspects of Radioactive Waste Disposal, Division of Earth Science, National Academy of Sciences, 1966, Report to the U.S. Atomic Energy Commission.

Duguid, J. O., 1975, Status Report on Radioactivity Movement from Burial Grounds in Melton and Bethal Valleys: Oak Ridge National Laboratory, ORNL-5017.

Kentucky Department for Human Resources, 1974, Six Month Study of Radiation Concentrations and Transport Mechanisms at the Maxey Flats Area of Fleming County, Kentucky: State of Kentucky Open File Report.

New York Department of Environmental Conservation, 1975, Radioactivity in air, milk and water, Jan-March, 1975: State of New York, Environmental Radiation Bulletin No. 1.

Papadopulos, S. S., and Winograd, I. J., 1974, Storage of Low-Level Radioactive Wastes in the Ground--Hydrogeologic and Hydrogeochemical Factors: U.S. Geol. Survey Open file report 74-344. Prepared for U.S. Environmental Protection Agency.

Rowe, William D., and Holcomb, William F., 1974, The Hidden Commitment of Nuclear Waste: Nuclear Technology, Vol. 24.

TESTIMONY OF MR. DE BUCHANANNE

Mr. YATES. Have you made reports on this?

Mr. DEBUCHANANNE. Yes, sir. I testified before the House Committee last spring on this.

Mr. YATES. Would you update your testimony for the record?

Mr. DEBUCHANANNE. Yes, sir.

[The information follows:]

UPDATE OF TESTIMONY, MARCH 1977

During the 1976 calendar year, the Geological Survey has completed the first phase of test well drilling, and has continued the data collection activities at the New York, South Carolina, and Kentucky State-owned commercial low-level waste disposal sites. Field investigations were initiated at the Illinois and Nevada State-owned commercial low-level burial sites. Laboratory research and hydrological modeling studies related to the field studies are continuing. These studies are designed to work with rock types and waste solutes that occur at the different disposal sites instead of using theoretical nonrelated rock materials and synthetic solutions that are often used in theoretical laboratory experiments.

In addition to the effort described above, the Geological Survey has a cooperative program funded by ERDA addressing hydrogeological problems related to the establishment of a high-level waste repository. The basic problem to be addressed in consideration of geologic disposal of high-level waste can be stated as follows: Material which is not in mechanical, thermal or chemical equilibrium with its natural environment is placed in a complex geologic host with the objectives of not allowing physical and (or) chemical migration of radionuclides away from the disposal site into the biosphere in hazardous concentrations. The multi-component physical-chemical system that will develop in and around the respository as a result of waste-rock interactions must be completely understood in order to avoid any unforeseen effects. The effects of natural disturbance on local equilibrium must be considered as well.

ADEQUACY OF CURRENT FUNDING FOR NUCLEAR WASTE DISPOSAL

Mr. YATES. Are you satisfied with the amount of money being allocated to this program?

Mr. DEBUCHANANNE. At this stage of our investigations, I think we have asked for what we could do, and I say that because it is not possible to speed up Mother Nature's reactions. It takes time, and you have to do this sequentially, not parallel.

Mr. YATES. Could you model it?

Mr. DEBUCHANANNE. We are working through modeling, yes, sir.

USE OF SALT CAVES FOR WASTE DISPOSAL

Mr. YATES. I remember Mr. Coulter's testimony about using salt caves for high-level waste. Why shouldn't you be using it for low-level waste too?

Mr. DEBUCHANANNE. The Germans are.

Mr. YATES. Why aren't we?

Mr. DEBUCHANANNE. Because, as I said in my testimony before, it's a matter of economics and expediency where during the War we disposed——

Mr. YATES. I know, but that was 30 years ago.

Mr. DEBUCHANANNE. That is right.

Mr. YATES. Why are the Germans doing it?

Mr. DeBuchananne. I doubt they have the same flexibility in land space that we do, sir.

Mr. Sheldon. They have a large number of salt mines too, natural places to put these.

SELECTION OF BURIAL SITES

Mr. Yates. Why are these places selected? Did they consult with you for the selection of these dumping places?

Mr. DeBuchananne. The selection was made and after——

Mr. Yates. Selection was made by whom?

Mr. DeBuchananne. AEC and the States.

Mr. Yates. Originally, 30 years ago? And they haven't changed since then?

Mr. DeBuchananne. No, sir.

Mr. Yates. Did they make the selection after an analysis of what the possible consequences would be if the nuclear products leaked?

Mr. DeBuchananne. In my opinion they made a selection without adequate hydrogeological criteria.

Mr. Yates. What are they doing now to find alternate sites that might be better?

Mr. DeBuchananne. This is what we are hoping to do with our investigations.

Mr. Yates. How long are you going to take?

Mr. DeBuchananne. We said in 5 years time we would come up with geohydrologic criteria for future grounds and monitoring criteria for existing sites.

Mr. Yates. So in the ensuing 5 years they are still going ahead and dumping the products into the six sites?

Mr. DeBuchananne. Yes, sir.

Mr. Yates. Shouldn't that be stopped temporarily until we find out about it?

Mr. DeBuchananne. What do we do with the waste?

Mr. Yates. How much waste is there?

Mr. DeBuchananne. They estimate by the year 2000 there is enough low-level waste to make a four-lane highway from New York to San Francisco.

Mr. Yates. How thick is the highway? Four lanes wide, but how thick?

Mr. DeBuchananne. I can get the figure. It was in the testimony.

Mr. Yates. If that is as much waste as they are going to have by the year 2000, how can they dispose of it in the six sites they have selected?

Mr. DeBuchananne. I think they had planned to locate additional sites, and I hope they will have adequate criteria when they make the selection.

Mr. Yates. And that is what you are engaged in?

Mr. DeBuchananne. Yes, sir.

HIGH LEVEL WASTE DISPOSAL SITES

Mr. Yates. What is Mr. Coulter doing about the high level sites? What are you doing about the salt caverns?

Mr. Coulter. We have a series of programs with ERDA, various facets of their overall waste disposal program that we are working on.

Mr. YATES. What are they doing with the high level sites, just keeping it near the reactor now in pools?

Mr. COULTER. Yes.

Mr. YATES. How long can they do that?

Mr. COULTER. They are running out of pool space.

Mr. YATES. When will they run out of pool space?

Mr. COULTER. The decisions on whether or not to reprocess fuel has not been made yet. If fuel is not reprocessed, then those spent fuel rods will be buried in the form they are in. They will be disposed of in the form they are in. If they reprocess fuel, then you will take some of the materials out of those fuel rods for recycling, and only have to dispose of the residue.

Mr. YATES. How long are you going to take to find them sites?

Mr. COULTER. It's not our responsibility to find the sites. It's our responsibility to do the background studies to make sure that the sites which ERDA selects will fulfill all of the necessary requirements for high level containment.

Mr. YATES. Is it your responsibility to find the salt caverns?

Mr. COULTER. We help them identify areas where prospective salt caverns exist.

Mr. YATES. These seem to be the best possible sites, don't they, at the moment?

Mr. COULTER. They are the chosen medium at the present time. They are the first runner. They are looking at shales, crystalline rocks and other media also.

PROBLEMS OF HIGH LEVEL WASTE DISPOSAL

Mr. YATES. The nuclear scientists I have talked to say that the problem of high-level waste disposal is that it is not a problem—they say we are going to resolve that very quickly.

They haven't found it yet, though, have they?

Mr. COULTER. No.

Mr. YATES. What about the business of enclosing it in ceramics and putting it in steel containers?

Mr. COULTER. That is only one facet to the problem. That is a necessary preamble, but you must indeed have integrity of the site, in addition to the encapsulating mechanism, and there are several different mechanisms they are looking at, different media for encapsulating.

Mr. YATES. I gathered when told about this that encapsulation in ceramics was pretty much of a positive and safe disposal means.

Mr. DeBuchananne shakes his head. Has it leaked from ceramics, Mr. DeBuchananne?

Mr. DEBUCHANANNE. They do not have a commercial operation for encapsulating it in ceramics. They had a pilot test.

Mr. YATES. Yes, and has the pilot test worked?

Mr. DEBUCHANANNE. On the pilot scale, yes.

Mr. YATES. On a pilot scale. Well, that would be encouraging, wouldn't it?

Mr. DEBUCHANANNE. Yes.

Mr. YATES. You are walking on eggs.

Are there any questions that I ought to be asking you that I haven't asked you?

Mr. DeBUCHANANNE. No.

Mr. YATES. Suppose you were sitting in my seat, and I was sitting in yours, would you be asking me questions I haven't asked you on this, because it is important, and we want to know about it.

Mr. DeBUCHANANNE. May I suggest at a later date, sir——

NUCLEAR WASTE DISPOSAL—ENEWETAK

Mr. YATES. How much later? I should like to point out that the Department of the Interior is coming before us tomorrow for an appropriation to permit the people of Enewetak to go back to Enewetak. They say they are going to be able to take care of all of the low level wastes by putting it in a concrete saucer on Rennel Island and cover it with a concrete saucer and then they won't have to worry about it any more after that.

So, you see, what you are telling us has some bearing on whether or not the people of Enewetak who go back to their Islands are going to be radiated or not. The gentleman from ERDA says, they will pick up the contaminated material, put it in the concrete saucer and the people from Enewetak can come back.

We say it's not that easy. In our testimony with the Geological Survey we are told they haven't yet found an adequate container for, apparently, low level wastes as well as high level wastes.

Now, that is why I ask this question. It would be easy to accept the recommendations of ERDA, and I think ERDA has been involved so long they tend to become somewhat immunized to it. They have certain goals they want to accomplish, and they tend to overlook the safety problems.

So that is why I want you to let us know whether there are questions we ought to be asking and concerns we ought to have which we haven't asked because we aren't as familiar with the problem as you are.

If there is something you ought to be doing, that you are not doing because you don't have enough money, and you think ERDA is going to be doing it, we want to know about it.

We want to be able to clear up this problem by having your cooperation and that of the other agencies as well. We don't want you to keep from us information that we ought to have. We are in accord on this arrangement between us?

Mr. DeBUCHANANNE. Yes; I am in accord on this.

Mr. YATES. So what should I be asking? What haven't I asked you about? I should have light in the lantern is what I am saying.

Mr. DeBUCHANANNE. In the low level wastes, sir, I think what we are doing with the funds which were funded at this time, I think we are approaching the problem as expediently as we can. And the questions we are addressing I think we are going to come up with answers. The high level waste, I think there are several questions that have not been addressed yet by the industry.

Some of the questions related to the interaction of the waste and the host material.

Mr. DUNCAN. You mean the ceramics?

Mr. DeBUCHANANNE. Whether ceramic or steel or whatever it is as this breaks down, the thermal and geochemical stresses placed on the

host rock, the salt, shale or crystal rock. There are many in the Geological Survey who think these questions have not been adequately addressed to date. They are making investigations now, but they have not been made in the past.

ERDA is looking at this through their laboratories in some cases, and we are assisting on this too. We are looking at some of these things.

Mr. YATES. You have research on the host material too?

Mr. DEBUCHANANNE. Yes, sir, on the high level waste.

Mr. YATES. Not on the low level?

Mr. DEBUCHANANNE. This is part of what we have. We have geochemical studies in our laboratories, and so-called KD functions, which are this bumping, filtering effect of natural soils which Dr. Coulter referred to.

We have investigations along these lines too.

NUCLEAR WASTE DISPOSAL BY GERMANY

Mr. YATES. The case of the Germans comes to my mind. Are they willing to take risks that we are not willing to take because they are required to do it, because of the extent of their territory, and the availability of salt mines?

Mr. DEBUCHANANNE. I didn't mean to imply they were taking risks, sir.

Mr. YATES. But you say they are disposing of it.

Mr. DEBUCHANANNE. They are disposing of it in salt mines.

Mr. YATES. From what we know, at the moment, it may be risky.

Mr. DEBUCHANANNE. So far as low level waste I do not believe it is the same risk as would be involved in the high level.

Mr. DUNCAN. Is that because those areas are below the aquifers that are in normal use?

Mr. DEBUCHANANNE. Well, the ASSA Mine does have aquifers above it which are used by local farmers and so forth. It is not a high productive aquifer. Whether or not the waste will get to the salt mine, or get from the salt mine into these aquifers has not been completely addressed. The Germans are working on this at the present time.

LOW LEVEL WASTE DISPOSAL BY THE FRENCH AND BRITISH

Mr. YATES. What about the French and British?

Mr. DEBUCHANANNE. The French and the British. I have visited the French low level burial grounds. They handle it differently. They encapsulate it in cement; it's in shale, and they are building natural barriers around the waste to retard the movement of the waste, and the isolation of the waste from the infiltrating waters.

They are taking more engineering precautions than we are taking. I guess I would say.

Mr. YATES. Of what kind?

Mr. DEBUCHANANNE. Structural.

Mr. YATES. Give us an example.

Mr. DEBUCHANANNE. The picture showed we are putting it into the ground, and we are burying it and that is essentially what we are doing.

We are sloping the earth over the trench so the water will run off. But in time we have noted that the ground settles, and then cracks dvelop and the rainwater can easily get into the trenches themselves. This is what has happened in the two places where waste has migrated from the burial grounds, and in Kentucky and New York, the trenches became bathtubs, they filled up with water and eventually the water has moved out.

The French, on the other hand, will make a large swimming pool structure in which they will then compartmentize and build individual concrete blocks that the waste is put in and the ground is all encased around this.

Mr. YATES. Well, it's going to leak out, isn't it?

Mr. DEBUCHANANNE. It will in time. When we look at the geological half-life times involved, yes. They will not have the ease of waste migration as we are experiencing.

Mr. YATES. Why do you say that? Those trenches are concrete lined.

Mr. DEBUCHANANNE. No, sir. They scoop it out like a sanitary landfill, like they use for waste from Washington, D.C.

Mr. YATES. And the bottom of it deteriorates too. Do they just scoop it out and there is just dirt there?

Mr. DEBUCHANANNE. There is just dirt there. If it is a shale or clay which is impermeable, then the water accumulates and builds up. If it's a sand, it percolates on through.

Mr. YATES. They should have encased it in concrete, like the French are doing. And the British are doing the same thing.

Mr. DEBUCHANANNE. I don't believe the British are. I have not visited one of their burial grounds, sir.

Mr. YATES. You don't know what the British are doing?

Mr. DEBUCHANANNE. I know from the literature that they are doing somewhat similar to what we are, but I have not actually seen pictures or been to the site.

NUCLEAR WASTE DISPOSAL BY THE SOVIET UNION

Mr. YATES. What about the Soviets, do you know anything about them?

Mr. DEBUCHANANNE. The Soviets are encasing theirs in bitumen or asphalt, as we could call it. They are putting it in asphalt blocks and storing it underground.

Mr. YATES. Who else has this problem?

Mr. DEBUCHANANNE. Every nation which has a nuclear activity has this problem. I think in general it is being done the same as we are.

GERMAN NUCLEAR WASTE DISPOSAL SITES

Mr. YATES. Have you seen the German disposal units?

Mr. DEBUCHANANNE. Yes.

Mr. YATES. They are just about the best so far, aren't they?

Mr. DEBUCHANANNE. They certainly appear to be the dryest so far. There is no water for the waste to move in. This is the one factor we have in our favor. If we could get a handle on the hydrology, how fast the water is moving, we know that the waste is not going to move any faster than the water. We do have ways for identifying how fast the water will move through the soil.

Anything else, filters and so forth, are redundant safety factors. I think we can come up with a figure for locating further burial grounds, to say the wastes will be contained for "x" number of years.

Mr. DUNCAN. How do you measure the rate at which the water moves—by putting a radioactive isotope in it?

Mr. DEBUCHANANNE. This is one way it has been done. There are other techniques, too.

Mr. MCKELVEY. That has been done for all ground water now, surface water, with tritium, as a result of the tests, nuclear explosions conducted at the surface.

Mr. YATES. Dr. McKelvey, I think it is a tribute to you and to your agency that we have gotten nowhere in reviewing your justification.

WATER RESOURCES WITH LOW LEVEL RADIOACTIVITY

Mr. DUNCAN. Can I ask a couple of questions real quick?

We have natural water sources that have low levels of radioactivity in them, don't we?

And those levels presumably have been consumed by people for a long period of time, without adverse health effects?

Mr. DEBUCHANANNE. Yes.

Mr. DUNCAN. Have you observed in the water supplies, the rivers and so on, in proximity to these disposal sites, increases in radioactivity in excess of those found naturally in other areas?

Mr. DEBUCHANANNE. No, sir.

Mr. DUNCAN. And I think you already said that you have not—I wasn't here all the time, so I don't know—but I thought I heard you say that thus far at least there have not been health hazards in the water as a result of this; is that correct?

Mr. DEBUCHANANNE. That is right.

Mr. DUNCAN. And your apprehension is that they have been buried in those sites for too short a period of time and your knowledge of the hydrology is at this point still in a rather primitive state, so that you cannot prognosticate the future with the degree of confidence that you would like to; is that correct?

Mr. DEBUCHANANNE. That is right.

Mr. YATES. We are worried about the clogging aspect of the soil, and the elimination of the ground as a filter, in which case the nuclear danger might build up.

Where else do you have nuclear materials in the Northwest area?

Mr. DUNCAN. They occur as a natural phenomenon, and have for many, many years. I think the danger is not the existence of radioactivity in those quantities, but our activities in adding substantially to them. Isn't that a fair statement?

Mr. DEBUCHANANNE. Yes.

Mr. YATES. Thank you very much, gentlemen.

Mr. MCKELVEY. Thank you, Mr. Chairman.

THURSDAY, MARCH 31, 1977.

RESUMPTION OF HEARINGS

Mr. YATES. The hearing will come to order.

This is a continuation of the hearing on the budget for Geological Survey for fiscal year 1978.

CONTROVERSY OVER PAPAGO INDIANS AND MEXICAN GROUND WATER USAGE

We have a letter here, dated March 18, addressed to Congressman Udall regarding the ground water controversy between the Papago Indians on our side of the border and the Mexican farmers on the other side of the border. Apparently the Mexican people are taking more advantage of the ground water than we are and the water is being drained out.

Commissioner Friedkin of the International Boundary and Water Commission says he is in touch with the Geological Survey, and he says:

> * * * We now have a preliminary letter report prepared by Mr. L. A. Heindl of the Geological Survey, at the request of this section. He reports that if the Papago farms are developed using ground waters, they would lower ground water levels along the boundary between the United States and Mexico, and conversely if farms are expanded from ground waters on the Mexican side they would lower ground water levels along the boundary. The seriousness of the lowering of ground waters would of course depend upon the extent of irrigation developments and pumping in each country. Mr. Heindl recommends a complete data collection program to monitor and evaluate the changes in event of extensive new developments on either side of the boundary.

Is that enough of an effort by Geological Survey, the development of a data collection system?

Mr. MCKELVEY. Mr. Chairman, I am not familiar with the individual case here but that would certainly be the point of departure.

Mr. YATES. Why would that be the step to take?

Mr. MCKELVEY. To find out what is happening and the nature of the system.

Mr. YATES. You mean you don't know yet?

Mr. MCKELVEY. I am not sure the extent to which it has been studied thus far. I can certainly supply that for the record, and I can ask Mr. Hackett.

Mr. HACKETT. We have not had an active study on the matter.

Mr. YATES. Have you been called in to consult on it at all?

Mr. HACKETT. Yes.

Mr. YATES. Just recently?

Mr. HACKETT. Just recently. The man involved is Mr. Heindl, who did a study there about 10 years ago. There have been changes since then and there would have to be data collection.

Mr. YATES. What good did it do to do a study if we don't do anything? Suppose we do the study; what happens after that?

Mr. MCKELVEY. It is up to the water management agencies. In this case it would be the Boundary Commission and the Bureau of Indian Affairs that take the controlling steps.

Mr. YATES. I think we ought to find out from the Boundary Commission what they did after the last study. What did Mr. Heindl's 10-year-old study do? Would you let the committee know what it did?

Mr. MCKELVEY. We will provide that for the record.

[The information follows:]

PAPAGO INDIAN LANDS—MR. L. A. HEINDL'S STUDY OF 1954–59

Three reports relevant to the Molenitus area of the Papago Indian Reservation were made by L. A. Heindl and his coworkers on the basis of the field study conducted during the period 1954–59:

L. A. Heindl, 1958, "Availability of Ground Water in the Molenitus Area, Papago Indian Reservation, Arizona," 1958; U.S. Geological Survey open-file report 76–716, 8 pages and 1 map.

L. A. Heindl and O. J. Cosner, 1961, "Hydrologic Data and Drillers' Logs, Papago Indian Reservation, Arizona," with a section on chemical quality of the water by L. R. Kister, Arizona State and Land Department Water Resources Report No. 9, 116 pages, and 1 map.

L. A. Heindl, O. J. Cosner, H. G. Page, C. A. Armstrong, and L. R. Kister, 1962, "Summary of Ground Water on the Papago Indian Reservation, Arizona"; U.S. Geological Survey Hydrologic Investigations Atlas HA–55.

[Copies of the publications cited were furnished to the committee:]

The study showed that ground water is considered to be sufficient for irrigation purposes in five areas on the Papago Indian Reservation, one of which was the Molenitus (or Papago farms) area. The ground water in the Molenitus area was considered to be suitable for most irrigation purposes but leaching may be required to prevent the accumulation of sodium carbonate. High fluoride content in the Molenitus area may require treatment to meet public health standards for domestic use.

Rates of water-table decline in the Molenitus area can only be approximated with available data. If development in the Molenitus area is limited to about 3,000 acres, the total drop in water-level in the vicinity of development will be approximately 90 feet. Thus the depth to water will be increased to about 300 feet below the surface at the end of 30 years of pumping. If the developed area is increased to 12,000 acres the lowering in water level will be in the order of 360 feet, dropping the water table to depths of about 570 feet. Irrigation on the Mexican side will act to lower the water levels in the Papago farms area by another 10 to 50 feet, depending on the extent of the Mexican development.

COST TO UNDERTAKE STUDY

Mr. YATES. Mr. Friedkin says:

As I wrote to Mr. Cecil Williams, chairman of the Papago Indian Tribe, on November 2, 1976, copy enclosed for your ready reference, the U.S. section of this international commission proposes, after definition of ground water problems along the boundary, to consider in consultation with authorities of the four border States in the United States, the need and desirability of seeking a ground water agreement with Mexico, and if so, on what terms.

I suspect this happened after Mr. Heindl's survey. They must have gone into some discussions and dropped it. I am afraid it is likely to happen again but I don't know we have any alternative except to do as he suggests.

How much would it cost to make the study that has to be made?

Mr. MCKELVEY. I can't answer that.

Mr. YATES. Furnish it for the record.

It is important to the Papago people and it really is a rather impoverished tribe.

[The information follows:]

PAPAGO INDIAN LANDS--SUGGESTED GROUND WATER STUDY

Data regarding the availability of ground water on the Papago Indian Reservation are fragmentary and mostly twenty years old. A study should be begun now to up-date the information and provide a sound basis for the management of the Papago water resources. The Arizona District of the U.S. Geological Survey is prepared to begin necessary operations on a limited scale as soon as a program is approved.

Two alternate studies are proposed. The first is for three years and will cost $225,000; the second is for four years and will cost $322,400. The first option is for the work required to evaluate the water available in the Papago Farms area and the adjacent area in Mexico. The second option includes all the work envisioned in the Papago Farms area (first option) plus additional work required to update and revise the prior work done by Mr. Heindl throughout the entire Reservation. Some parts of the work should be started now, but it is not desirable or practical to attempt a crash or one-year program.

Option 1:

a. Drill, case, log, and pump-test two wells near Mexican border and equip for water-level monitoring.
b. Collect and analyze water-level and water-quality information in the Papago Farms and adjacent areas.
c. Install and operate station(s) on San Simon Wash for measuring flow, sediment load, and water quality.
d. Run seismic profile(s) across Papago Farms area.
e. Make digital ground-water model of Papago Farms area to be used as a management tool.
f. Prepare annual (or interim) and final reports of hydrologic conditions in Papago Farms area.

Estimated cost:		
	1st year ----	$140,000
	2nd year ----	60,000
	3rd year ----	25,000
	Total	$225,000

Option 2:

a. Drill, case, log, and pump-test two wells near Mexican border for water-level monitoring.
b. Collect and analyze water-level and water-quality information in the Papago Farms and adjacent areas.
c. Install and operate station(s) on San Simon Wash for measuring flow, sediment load, and water quality.
d. Run seismic profile(s) across Papago Farms area.
e. Make digital ground-water model of Papago Farms area to be used as a management tool.
f. Inventory all wells on the Papago Reservation, collect and analyze available water-level and water-quality information.
g. Prepare annual (or interim) reports of hydrologic conditions in Papago Farms area.
h. Prepare map(s) showing changes in water levels resulting from ground-water development.
i. Revise and update map (HA 55) showing productivity of ground-water aquifers and general chemical quality of water on the Papago Reservation.

Estimated cost:		
	1st year ----	$140,000
	2nd year ----	62,400
	3rd year ----	60,000
	4th year ----	60,000
	Total	$322,400

Both options will provide for cooperation with the Papago Tribal Utility Authority to the extent that at the end of either study the Authority will have the basis for continuing a data collection program for management purposes as a Tribal operation.

OIL SHALE HYDROLOGY

Mr. YATES. You have reduced the oil shale hydrology program since last year. Is it your reduction or OMB's?

Mr. MCKELVEY. I believe that reduction was made by OMB, Mr. Chairman, but it will not have much effect on the program except that we will perhaps not be able to expand it as rapidly as we might have otherwise.

Mr. YATES. How can you have an oil shale program without the hydrology?

Mr. MCKELVEY. We still have a program.

Mr. YATES. Is it adequate?

Mr. MCKELVEY. Yes; I believe it is adequate.

OCCIDENTAL OIL SHALE PROGRAM

Mr. YATES. When Occidental's representative came before us some weeks ago, he indicated they were confident they could carry out a program of oil recovery with no degradation of the environment. Are you familiar with Occidental's activities?

Mr. MCKELVEY. In a very general way.

Mr. YATES. Are you sufficiently familiar to indicate whether you agree with what Occidental said?

Mr. MCKELVEY. I think that their process certainly would have minimal effect on the environment. As I understand it, it would involve some mining but of rocks——

Mr. YATES. Who is looking at it? I think you have to go further than saying in a general way.

Mr. MCKELVEY. When they submit a development plan, our shale oil supervisor——

Mr. YATES. Suppose they don't submit it?

Mr. MCKELVEY. Then there will be no mining or development.

Mr. YATES. You mean they need your approval before they can go ahead?

Mr. MCKELVEY. That is right.

Mr. YATES. And they haven't submitted a plan to you yet?

Mr. MCKELVEY. Not that I am aware of. They have submitted a preliminary plan.

Mr. MURTHA. Is that because it is on Government land?

Mr. MCKELVEY. It is a Federal lease, yes, sir.

SURVEY ACTION ON OCCIDENTAL MINING PLAN

Mr. YATES. They have submitted a preliminary plan. What does that mean in terms of activating the Geological Survey? You said you wouldn't be activated unless they submitted a plan. Are you activated now?

Mr. MCKELVEY. I will ask Mr. Wayland.

Mr. WAYLAND. Sir, this is an amendment to a previously submitted plan for the same lease—the Colorado-B lease which was granted a few years ago. The amendment is necessary because they have proposed an entirely different method of production. The preliminary plan will be followed by a detailed development plan. Both of these

will be reviewed by us and by all other Federal agencies involved and by the Oil Shale Environmental Advisory Panel. The detailed development plan will be the one which ultimately will be approved for action.

Mr. YATES. When does that ultimately come into being? When do you contemplate you will have reached the "ultimately" that you used? What is the date?

Mr. WAYLAND. It is a matter of several months or a year before the detailed development plan can be expected, but things are on schedule.

Mr. YATES. What I am asking for is the scheduled time. Presumably we want to move ahead with oil shale development.

NEED FOR ENVIRONMENTAL IMPACT STATEMENT

Mr. MCKELVEY. We are in the process of preparing a new environmental impact statement covering in situ development. I am not sure of the target date.

Mr. YATES. Is the old one not adequate?

Mr. MCKELVEY. The old one did not cover that method of extraction.

Mr. YATES. Why is that so? We have had the in situ process for several years.

Mr. MCKELVEY. It has been discussed from time to time. There have been some investigations of it but it was not proposed as a method of extraction at the time the leases were issued and the prototype program developed. It has not yet been used commercially.

FEA AND ERDA INVOLVEMENT

Mr. YATES. Are you working with FEA and ERDA on this?

Mr. MCKELVEY. I am not aware that we are. With respect to FEA, I don't think so except perhaps in supplying them information about resources.

I am not sure that we are working with them directly on this, but I believe that ERDA is investigating the in situ technology.

Mr. YATES. Should one of these agencies be working on this in order to expedite it?

Mr. MCKELVEY. I think it is appropriate for ERDA to be supporting investigations of the extractive methodology.

Mr. YATES. But as of now ERDA still hasn't come in for its appropriation. Should we ask their witnesses about this?

Mr. MCKELVEY. I am sure we are supplying information to them, but I don't think we have actually a cooperative project.

Mr. YATES. We will check into it. You may expect a call.

UNDERGROUND HEAT STORAGE

You have $105,000 for an underground heat storage program. Would you explain that program, please.

Mr. MCKELVEY. This program, Mr. Chairman, is designed to explore the possibility of storing excess heat from power production.

Mr. YATES. What does that mean? How do you do that?

Mr. MCKELVEY. The underground——

Mr. YATES. Like a geothermal container?

Mr. McKelvey. In reverse; right.

Mr. Yates. What do you mean?

Mr. McKelvey. We are putting heat in the ground and storing it temporarily.

Mr. Yates. Do you have enough excess heat to do that?

Mr. McKelvey. In some cases it appears——

Mr. Yates. Is any other country doing this?

Mr. McKelvey. I am not aware of any other country doing it yet, but let me ask Mr. Hackett.

Mr. Hackett. Mr. Davis.

Mr. Davis. No, sir, we are not aware of any other country doing it.

Mr. Yates. Is this a promising initiative?

Mr. Davis. It was one of several ideas that were examined. This probably has some long-range promise rather than immediate short-term promise.

Mr. Yates. Who suggested it? Did a company suggest it? Who will you be working with on this? Why don't you put an explanation in the record?

Mr. McKelvey. Yes.

[The information follows:]

EXPLANATION OF THE UNDERGROUND HEAT STORAGE PROGRAM

The Earth, because of the insulating properties of natural Earth materials, is the ideal site for the long-term storage of heat. Aquifers are ideally suited for this storage. Immense storage volumes are available in shallow to moderately deep aquifers.

As a part of its research activities, the Geological Survey has developed a computer program to describe the long-term storage of heat in an aquifer. As a second phase of this activity, an experiment was initiated in 1975 at the site of a conventional powerplant on the Mobile River, north of Mobile, Ala., with the express purpose of providing data to verify the computer model. The experiment is being conducted by Professors Warman and Moltz of Auburn University with joint funding from both the Geological Survey and ERDA; to date approximately 60 percent of the funding has come from the Geological Survey. Four million gallons of moderately hot water was stored and recovered during the first phase of the experiment. Unfortunately, fine silt and clay, which passed through the filter system, clogged the injection well.

A second phase of the experiment is planned in which water from a deeper aquifer will be heated utilzing heat extracted from the cooling water of the powerplant and injected in the experimental aquifer. This information will provide a controlled set of data to verify the computer model. Once the model is verified it will be utilized to investigate the feasibility of particular aquifers for the useful seasonal storage of heat.

The French are currently conducting a similar set of experiments with approximately the same objectives. We are exchanging information with the French with the express objective of broadening our experimental base.

At the present time ERDA is proceeding with a solicitation for demonstration heat storage proposals in which aquifer storage projects are to be a part of the program.

GROUND WATER RECHARGE

Mr. Yates. You have a ground water recharge program for which you want $1,250,000, the 1977 level. Have there been any accomplishments to date on this study?

Mr. McKelvey. Yes, Mr. Chairman. The work that has been underway in the vicinity of Lubbock, Tex.—the Texas high plains—has indicated some promise with respect to recharge of aquifers——

Mr. Yates. What does the recharge of the aquifers mean? How do you recharge them?

Mr. McKELVEY. There it would be proposed to recharge them through wells.

Mr YATES. What is the advantage to that rather than taking the water directly from the wells?

Mr. McKELVEY. Water would be pumped out eventually but in that region there is rainfall accumulating in the winter season in Playa lakes, and then it evaporates in the summer.

Mr. YATES. You want to store it?

Mr. McKELVEY. Right.

Mr. YATES. Has the program been carried on previously?

Mr. McKELVEY. It has been for several years. I am not sure when it began in that area, but I think perhaps 8 or 10 years ago.

Mr. YATES. How do you know where you are going with this? You have already spent an amount of money, approximately $10 million.

Mr. McKELVEY. No; all of that money has not been spent in the Lubbock area. Mr. Hackett perhaps can tell us what the budget has been in the Lubbock area. It has been going on in other parts of the country as well.

Mr. YATES. Describe the program in the record. I would think there would be more progress over a period of 10 years, wouldn't you?

Mr. McKELVEY. I think we have made good progress.

Mr. YATES. Will you describe that for the record along with the other facts we have asked you about.

[The information follows:]

EXPLANATION OF THE GROUND WATER RECHARGE PROGRAM AND PROGRESS TO DATE

DESCRIPTION OF THE PROGRAM

With the progressive decline of water levels in areas of intensive development of ground-water resources, as in arid or semiarid regions of the West and Southwest, and with saltwater encroachment into aquifers utilized for water supply by coastal communities, water management agencies become increasingly concerned with definition of the governing controls on artificial recharge. In 1969 field and laboratory research aimed specifically at problems of artificial recharge was initiated by the Geological Survey at Lubbock, Tex. The immediate objective was to evaluate recharge alternatives for alleviating the approaching critical water shortage in the high plains of Texas and New Mexico, but the long-range goal was to establish the predictability of recharge operations and to provide a basis for transfer of knowledge to other areas.

Since 1969, two additional field projects in differing terrains have been completed, one on Long Island, N.Y., and one at St. Paul, Minn. In addition, at various times during this period, some 15 field, laboratory, and theoretical studies in the U.S. Geological Survey core-research program have been initiated or redirected toward aspects of research needed for predicting and managing the behavior of fluids introduced by various means into aquifers. Much of the information gained through this basic research is fundamental to an understanding of waste disposal problems also.

The results of the U.S. Geologcal Survey research efforts are described in about 40 U.S. Geological Survey publications and in more than 90 papers published in journals of research. The following list of accomplishments describes, for the most part, only the most significant results obtained during the 2 most recent years of activity for the several projects through fiscal year 1976.

SIGNIFICANT ACCOMPLISHMENTS

A technique that enables prediction of clogging of spreading basins by the action of anaerobic material.

A field method that shows great promise as a quick, inexpensive, and reliable technique for measuring in situ permeability by utilizing air pressure change at depth in response to barometric fluctuation.

Demonstrated that polyelectrolyte flocculating agents will reduce sediment content of playa lake water enabling recharge through spreading basins.

An unique development of coring technique that enables nearly 100 percent recovery of alternately hard and soft layers of soil or rock.

Special geophysical logging techniques that identify highly permeable zones in aquifers.

Geophysical logging methods that identify the location and thickness of clogged material in an injection well.

A device that permits continuous sampling from small-diameter test wells at any depth in the unsaturated zone.

Solute transport models that enables prediction of water quality changes during recharge infiltration.

The feasibility of injection well recharge in limestone-sandstone aquifers.

A thermal flow meter that measures borehole velocities as small as 0.1 foot per minute.

A gamma-gamma spectral system for monitoring contaminants.

An acoustic televiewer technique for down-hole traversing that identifies fracture zones and secondary porosity features.

The development of small-diameter inflatable packers for hydraulic testing of selected zones.

The use of nonequilibrium anion-cation relations to define the flow-system characteristcs.

Instrumentation for measuring elastic and plastic properties of aquifer systems.

A new laboratory method for measuring unsaturated hydraulic conductivity.

Design and development of a constant-rate syringe pump for use in hydraulic models of unsaturated flow.

Design and development of a self-contained mobile core laboratory for complete range of hydraulic tests on drill cores.

A back-pressure permeameter-consolidometer for maintenance of chemical equilibrium during hydraulic testing.

Established a basis for modeling of adsorption of metals on sediments.

A numerical model for simulating unsaturated flow in layered media.

A numerical method that solves the inverse problem of determining flow properties from unsaturated flow measurements.

Computer programs for simulation of equilibrium chemical reactions for most ionic species encountered in ground water recharge.

A numerical model of alluvial deposition that related permeability fabric to recharge characteristics.

SUMMARY

Although the accomplishments to date resolve many operational problems of artificial recharge, it is clear that a unified body of knowledge that would enable confident prediction of recharge behavior under a wide range of field conditions has not yet been achieved. The pace of progress is dependent upon the rate of acquiring field experience, the rate at which technological breakthroughs occur in methods of observation and measurement, and to advances in modeling techniques. This pace could be accelerated significantly only by rechanneling already scarce manpower resources.

ACCELERATION OF GROUND WATER RECHARGE PROGRAM

Mr. YATES. Is there no way of accelerating the program?

Mr. MCKELVEY. It could be accelerated if given additional funds and manpower, I am sure.

Mr. YATES. How would you accelerate it?

Mr. MCKELVEY. For example, it would be accelerated by extending it to other areas, and that is being considered. You mean accelerated in the Lubbock area?

Mr. YATES. Yes. Isn't this an experimental program?

Mr. McKelvey. It has been, yes.

Mr. Yates. How do you know whether it is a desirable one until you reach its conclusion? You haven't reached a conclusion on it yet; have you?

Mr. McKelvey. We haven't concluded the study.

Mr. Yates. You better start moving after April 20. We understand the sermon is going to come down from the mountain. Are you participating in the April 20 message?

Mr. McKelvey. Not directly. I don't believe we have been involved directly thus far.

Mr. Yates. But you will be listening to it with a great deal of anticipation.

Mr. McKelvey. Indeed we will.

SUBSURFACE WASTE STORAGE

Mr. Yates. You want $1.3 million for subsurface waste storage program. There have been 70 reports on this program as a result of completed projects. Still we go on with the program. Is there still a need for it?

Mr. McKelvey. Yes; I think there is a considerable frontier here and I guess I can use that term in both the literal and the figurative sense, in that the rocks beneath the surface in many areas contain pore space that is not occupied by any liquid or natural gas so that it is available for the storage of other materials. This kind of use of underground space has been developing in recent years for several purposes, storage of water for one. Other uses include the storage of heat, natural gas.——

Mr. Yates. That is what we have been talking about this morning.

Mr. McKelvey. And also for the storage of waste products.

Mr. Yates. What do you mean by waste products?

Mr. McKelvey. Fluids that have been contaminated in an industrial process, possibly sewage materials in some areas.

Mr. Yates. Would you list for the record your reports on this program.

[The information follows:]

Reports Issued on Subsurface Waste Storage Program

Listed are some of the reports that have been issued on the subsurface waste program:

"Geological Survey Professional Paper 987," dated 1976, physical, chemical, and biological apsects of subsurface organtic waste injection near Wilmington, N.C.

"Registry of Wells for Use in Underground Injection of Wastewater," 1972–75, dated July 1976.

"Evaluation of The Ohio Valley Region Basal Sandstone as a Wastewater Injection Interval," dated July 1976.

"Registry of Wells for Use in Underground Injection of Wastewater in the Ohio Valley Region," dated March 1974.

"Subsurface Waste Disposal by Means of Wells—A Selective Annotated Bibliography," "Geological Survey Water-Supply Paper 2020," dated 1971.

"Underground Waste Management and Environmental Implications, Memoir 18," edited by T. D. Cook, published by American Association of Petroleum Geologists, 1972.

[Copies of the publications cited were furnished to the Committee.]

FLOOD HAZARD MAPPING

Mr. YATES. You want $387,000 for a flood hazard mapping program. When do you expect to complete this program?

Mr. MCKELVEY. I will ask Mr. Hackett.

Mr. YATES. Mr. Hackett, when do you expect to complete this program?

Mr. HACKETT. It will be several more years depending on the rate of funding. We have completed the high priority areas and we are now extending the mapping to some of the upstream areas that are less of an immediate problem and to some of the recreational areas.

Mr. YATES. When do you expect to complete it?

Mr. HACKETT. I don't have a date.

Mr. YATES. Would you look at it and put it in the record, please.

[The information follows:]

COMPLETION DATE FOR FLOOD HAZARD MAPPING PROGRAM

Most of the work to delineate flood areas on the 12,000 maps of developed and developing areas has been completed.

The ongoing program is providing coverage on quadrangles for the following types of areas: First, those having potential for future development; second, those within the public domain, where management or planning decisions are or may be required; and third, those undeveloped areas where there is or there is likely to be recreational use.

The preparation of maps should be spread over a period of years to allow identification of critical areas as land-use plans are prepared or development patterns change. Current level of funding will allow preparation of about 200 maps annually, and this appears to be responding adequately to the identified needs.

Mr. YATES. You say you may have to have as many as 5,000 maps to cover areas of potential future development. That seems like an awful lot, doesn't it?

Mr. MCKELVEY. Yes; but a large area is involved.

ESTUARINE STUDIES

Mr. YATES. You want $155,000 for estuarine studies. What can you do with that $155,000 that NOAA can't do with its larger appropriation? Do you want the committee to believe you can do as well with your small appropriation?

Mr. MCKELVEY. Mr. Chairman, we hope to work cooperatively with NOAA on this problem but I don't believe as yet NOAA has an active program on estuarine circulation. That is the program that we want to do.

Mr. YATES. What is the purpose of this?

Mr. MCKELVEY. We want to know what the circulation pattern is in estuaries as it relates to pollution and the general health of the estuarine water.

CONSERVATION OF LAND AND MINERALS

Mr. YATES. Let's turn to the area of conservation.

REGULATION OF OCS OIL AND GAS OPERATIONS

Mr. YATES. You want an increase of $2 million for regulation of OCS oil and gas operations. What effect will the Weinstein decision have on this activity?

Mr. McKelvey. I don't think it will have any effect on it, Mr. Chairman. Of course, it will cause some delay in the beginning of exploration but the $2 million that we are requesting really relates to actions that are being completed elsewhere. With respect to the Atlantic, there is some activity in the form of drilling a stratigraphic test well, but mostly these funds will be used in support of regulatory operations resulting from the expanded lease sales of recent years. There is the southern California sale that has been completed, the Gulf of Alaska sale that has been completed, and the expansion in the Gulf of Mexico has led to the opening of new offices.

Mr. Yates. How much of your activity is going to result in actual production and consumption?

Mr. McKelvey. Actual production comes as a result of industry's efforts, so I suppose I would be hard pressed to say this will actually lead to new production. But I could put it in another way, and that is to say if we did not have the capacity to handle the requests for approval of work plans and development plans and so on, development of new production in these various areas would be delayed.

INCIDENTAL RESERVE STUDIES

Mr. Yates. On page 105 of the justifications you indicate incidental reserve studies will be increased from 177 in 1977 to 200 in 1978.

Mr. McKelvey. These represent the number of studies planned.

Mr. Yates. Yes. Do you have enough studies charted?

Mr. McKelvey. We may be expanding that general activity, Mr. Chairman——

Mr. Yates. That is why I asked you if you had enough money for it.

Mr. McKelvey. The reserve studies that are described here are in the regulatory part of the program and relate to individual problems that may be encountered in unitization or other problems related to operations.

In a later item on page 107 we describe the work that is in progress with respect to reserve inventory.

Mr. Yates. Is the answer to my question yes?

Mr. McKelvey. Mr. Chairman, I think that the funds that we have for reserve studies are not adequate to perform the inventory.

Mr. Yates. How much money do you need?

Mr. McKelvey. We have not yet completed our proposal on this, Mr. Chairman, but we are in the process of developing a proposed——

Mr. Yates. Revision for OMB?

Mr. McKelvey. Right; for the Department and OMB.

Mr. Yates. Would you place in the record a copy of what you propose.

[The information follows:]

PROPOSED AMENDMENT FOR RESERVE INVENTORY STUDIES

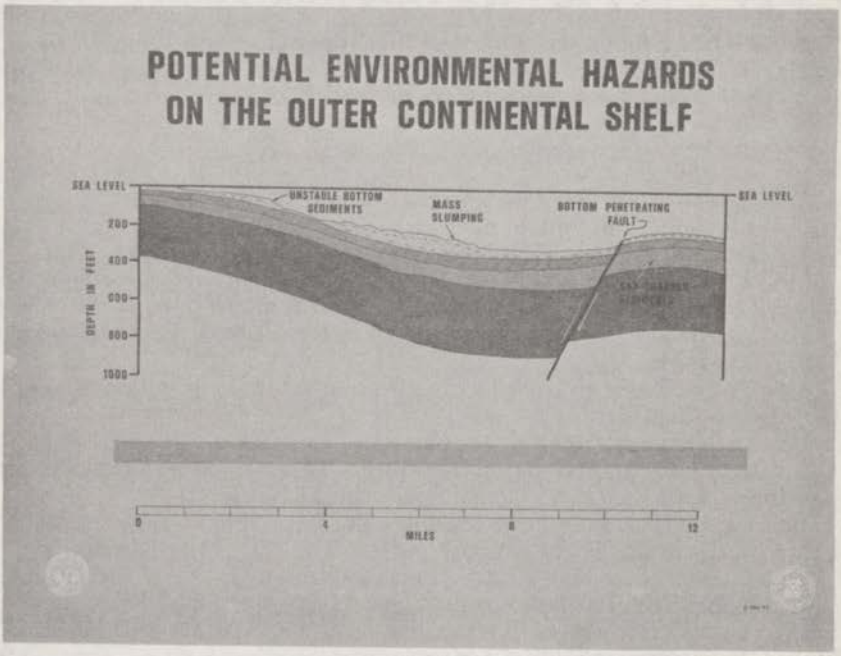
The Geological Survey will propose that an additional $2.5 and 90 full-time positions be added to the fiscal year 1978 budget. This will provide a total of $3.6 million and 144 new positions in fiscal year 1978 to determine the oil and gas reserves in developed fields in the OCS and those under development. It will provide the resources to complete the initial reserve inventory of all fields in the Gulf of Mexico and off California by the end of fiscal year 1978.

OCS SEISMIC RISK AND OCEAN BOTTOM STABILITY

Mr. YATES. You want $1.4 million for a new program in OCS seismic risk and ocean bottom stability. What do you hope to achieve by that?

Mr. MCKELVEY. Mr. Chairman, $1 million of this $1.4 million total is to be devoted to the study of bottom stability as it relates to the installation of platforms and other facilities which are attached to the bottom; $400,000 of it is to be devoted to the development of maps showing seismic risk. This chart, Mr. Chairman, shows some of the potential risks found on the OCS.

[The chart follows:]



The diagram shows some of the potential geologic hazards commonly identified on the OCS using echo sounders and high resolution seismic systems.

Mr. YATES. How will this operate? Will you be making the studies preparatory to placing a rig there? Is that the purpose?

Mr. MCKELVEY. That is part of the purpose. First, of all, there will be studies, research on the kinds of processes, the kinds of situations in which bottom instability exists that could affect platform installation.

Mr. YATES. How fast will you be going with your study?

Mr. MCKELVEY. From the standpoint of coverage of the frontier areas—let me ask Mr. Edgar if he can respond to that.

Mr. EDGAR. This is just starting out—our program to collect some samples and determine the strength of sediment in various parts of the OCS, particularly in the Gulf of Alaska. We anticipate setting up standards for the measurement of sediment strengths and then to anticipate what effect earthquake or seismic loading would have from waves.

STUDIES IN GULF OF MEXICO

Mr. YATES. Had you performed these studies prior to the installation of facilities that are in the Gulf of Mexico now?

Mr. MCKELVEY. We have some preliminary studies——

Mr. YATES. My question is whether your studies were preliminary to the installation of those rigs or whether they were put in there without your studies.

Mr. EDGAR. They were put in without the studies.

Mr. YATES. Has anything happened to them as a result of your not having studied it?

Mr. EDGAR. There have been some incidences of instability, yes.

Mr. MCKELVEY. There have been some platforms lost and one or two——

Mr. YATES. From hurricanes and tidal waves?

Mr. MCKELVEY. Some in connection with hurricanes but some apparently related to conditions of instability in the bottom.

TIME NEEDED TO COMPLETE STUDIES

Mr. YATES. How are you going to cover all this area within anybody's lifetime? Can you do it?

Mr. MCKELVEY. Yes, Mr. Chairman.

Mr. YATES. Look at that whole Gulf of Mexico and the whole Atlantic Ocean along the seaboard where you hope to have some leases.

Mr. MCKELVEY. The entire area will not be leased. The entire area is not favorable.

Mr. YATES. Let's go back to the question. How long will it take you to perform these studies?

Mr. MCKELVEY. I would imagine studies of this kind will expand and continue for a good many years, Mr. Chairman, as exploration and development of the Outer Continental Shelf expand.

Mr. YATES. How many rigs are there in the Gulf?

Mr. MCKELVEY. There are presently about 2,000 platforms.

Mr. YATES. How many have been upset as a result of instability?

Mr. MCKELVEY. Perhaps as many as a half dozen.

Mr. YATES. Is there a likelihood all the OCS lands will be leased before we have the results of your program?

Mr. MCKELVEY. No; I am sure not.

Mr. YATES. But you are going to move forward with all deliberate speed?

Mr. MCKELVEY. Yes, Mr. Chairman.

OCS OIL AND GAS TRACT SELECTION AND EVALUATION

Mr. YATES. You are requesting $21,736,000 for OCS oil and gas tract selection and evaluation. Will you place in the record a description of this activity and the activities that occur as you go through developing the necessary information prior to a tract being put up for lease?

[The information follows:]

DESCRIPTION OF PROGRAM FOR OCS OIL AND GAS TRACT SELECTION AND EVALUATION

In the OCS tract selection and evaluation program activity the conservation division is responsible for the acquisition and analysis of geological, geophysical, engineering, and economic data, and using these analyses, acts in either an advisory or primary role depending on the function involved.

Specific functions include:

1. Advises BLM and the Department of the Interior on the 5-year leasing schedule.
2. Determines jointly with BLM, the call for nominations outline.
3. Recommends jointly with BLM, the tracts to be tentatively selected for sale.
4. Identifies drainage tracts that will be offered for sale barring environmental or joint use problems that would warrant their deletion.
5. Provides technical input to BLM for preparation of the EIS.
6. Jointly with BLM conducts briefings for appropriate State officials.
7. Is responsible for detailed tract evaluation. This involves the tract specific identification of geologic hazards to drilling, recommendations as to tract withdrawal, the writing of special lease stipulations to mitigate any identified hazards, and the determination of a dollar value for each tract. The determination of dollar value is based on the widely accepted "Monte Carlo" or range of values computer system in which reasonable ranges are established for all pertinent geologic, engineering, and economic parameters. Hundreds of determinations of value are made with each determination based on a value for each parameter selected randomly from within that parameter's range. These values are discounted to net present worth and a risk factor is applied to arrive at a mean net present worth and a discounted mean net present worth.
8. Furnishes tract values to BLM and advises BLM on acceptance or rejection of high bids.

In order to meet its responsibilities the conservation division collects massive amounts of data on the OCS. Well data on leases has been submitted by industry since the inception of the OCS leasing program in 1954. This includes well logs, test, and production records of more than 13,000 wells submitted under regulatory requirements. Since 1967 the conservation division has been acquiring additional marine geological and geophysical data to be used in the OCS tract selection and evaluation program activity. The data are needed to identify OCS areas that are believed to have a high mineral resource potential and are used in the selection of tentative tracts for proposed OCS lease sales and for the detailed evaluation of each tract. The data are also utilized in the geologic hazards analysis of the sale area on a tract-by-tract basis and are the basis for tract withdrawals or special lease stipulations to mitigate hazards.

These data have been acquired through two methods: competitive procurement and submittal of data by permittees as a condition of the OCS exploration permit. Acquiring geological and geophysical data through competitive procurement enables the Government to obtain high quality data at the lowest possible cost. The data are procured mostly from specialized geophysical data collection firms. Most of the data acquired in the past have been through competitive procurement with these geophysical contractors,

The second important method used by the Conservation Division in acquiring data is through regulations governing the geological and geophysical exploration of the OCS (30 CFR 251) which were signed by the Secretary of the Interior on June 11, 1976. Before a company can collect data on the continental margins under Federal jurisdiction, it must obtain an OCS Exploration Permit from the Geological Survey. The regulations stipulate that the permittee must submit as a condition of permit and upon the request of the supervisor, all or part of the geophysical data, processed and/or reprocessed geophysical information, geological data, and analyzed geological information acquired under the permit. These regulations also stipulate that the Government will reimburse the permittee for a portion of the processing and reprocessing costs of data submitted as well as the reproduction costs of these data. A special case is stratigraphic drilling in which all data are submitted under terms of the permit at no cost to the Government.

Since fiscal year 1968 through fiscal year 1976 and transition quarter, the Conservation Division has obligated $24.6 million for marine geological and geophysical data. The data include 350,000 miles of common depth point (CDP) seismic data, 200,000 miles of high resolution data 90,000 miles of gravity data, and 150,000 miles of magnetic data as well as the results of all deep stratigraphic test wells. Of these data, the following were obtained under the G & C Regula-

tions during fiscal year 1976 and transition quarter: 83,000 miles of CDP data, 16,700 miles of high resolution data, 500 miles gravity data, 25,000 miles of magnetic data, 4,600 miles of geochemical data, and 160 miles of refraction data. Reimbursement for the Government's share of the processing and reprocessing costs totaled $1.6 million; reimbursement for reproduction cost totaled $50,000. In addition, since the inception of deep stratigraphic drilling in 1975, industry has drilled under permit from conservation division two tests in the Gulf of Mexico and one each in the OCS of southern California, Gulf of Alaska, Mid-Atlantic, North Atlantic, and the Bering Sea. Tests are currently drilling in the North Atlantic and the South Atlantic and are proposed for Lower Cook Inlet. Data from all these tests are used in tract evaluation and data from six of the tests have been made available to the public as specified by regulation.

Information development for OCS sales takes place continuously from before the formulation of the 5-year leasing schedule until the lease sale takes place. First, broad reconnaissance data is on hand for almost all areas of the OCS. These data are used to make general assessments of the relative resources potential and, along with assessments of technological capabilities for exploration and development are used to make recommendations concerning the 5-year leasing schedule. Once an area appears on the leasing schedule accelerated data collection takes place and broad geological and geophysical shape maps are made. These maps identify the prospective structures of the area and are used to outline the call for nominations area and are the basis for the conservation division's tentative tract selection recommendations. Once tracts are tentatively selected, infill data is collected which is sufficient in detail and amount to conduct a specific tract-by-tract evaluation of resource potential and geologic hazards to drilling.

RESERVE INVENTORY OF OCS OIL AND GAS FIELDS

Mr. YATES. You want $1,332,000 for a reserve inventory of OCS oil and gasfields. With that we return to the question of the credibility of those making up the estimates of oil and gas reserves.

Are you more credible than the American Petroleum Institute or the Federal Power Commission?

Mr. MCKELVEY. I am sure we would be, Mr. Chairman, and not because they necessarily lack any integrity, competence or anything of that sort with their studies, but simply because we have more information. We have all the information that is developed in the Gulf of Mexico.

Mr. YATES. So you should be able to hit the nail on the head?

Mr. MCKELVEY. Estimation of reserves always involves many subjective judgments and it is something that cannot be done with great accuracy even under the best of circumstances.

ADEQUACY OF RESOURCES TO CONDUCT THE PROGRAM

Mr. YATES. Over the years we have asked you whether you had enough resources and people to conduct the program. We ask you that again. Do you?

Mr. MCKELVEY. In this area as I mentioned, Mr. Chairman, we are developing a proposed amendment because we don't think that we are adequately staffed and funded to accomplish the objectives that are being set out for us.

Mr. YATES. Would you place your amendment in the record and would you also place in the record what you think is absolutely necessary. This is for the committee. There are no constraints by OMB and no constraints by the Department. We have no other advisors than

you as to how this program should be undertaken and how you should do it and how much it will cost. It is a vital program, isn't it?

Mr. McKelvey. Yes, it is.

DIFFICULTY IN ESTABLISHING OBJECTIVES

Mr. Yates. Will you let your hair down when you answer this question.

Mr. McKelvey. Mr. Chairman, let me let my hair down just a little bit right now.

Mr. Yates. All right.

Mr. McKelvey. Just enough to discuss the difficulty.

Mr. Yates. I know how difficult it is. There is a lot of land under the water there.

Mr. McKelvey. Yes; it is not only that but it is a question of what we establish our objectives to be.

As you know, in this program over the years there has been substantial modification. This has come as the result of the wishes of the public and the Congress.

Mr. Yates. What do you mean by that?

Mr. McKelvey. Ten years ago the budget for the entire activity that we undertook on the Outer Continental Shelf was less than $900,000 total.

Mr. Yates. You didn't have much activity.

Mr. McKelvey. There was substantial activity.

Mr. Yates. You are talking not about the number of platforms but an estimate of the reserves, aren't you?

Mr. McKelvey. An estimate of the reserves but also other things that are related to it.

At that time there was no interest in reserves on the part of the general public or the Congress.

Mr. Yates. We will agree with you on this. Take it for granted. We have a new day. We are post-embargo now and we know where we are and where we are going.

Mr. McKelvey. We have a new day now, Mr. Chairman, but times are still changing so we will be giving you an estimate of what we think our needs are in the context of objectives as we presently see and understand them.

Mr. Yates. Secretary Andrus has given you certain objectives, hasn't he?

Mr. McKelvey. Not in detail, but he has indicated that he wants greater attention paid to diligence in production and development.

Mr. Yates. Isn't it simply that he wants to know what our oil and gas reserves are? What do you have to know beyond that?

Mr. McKelvey. Many things.

Mr. Yates. That is your primary objective?

Mr. McKelvey. Reserve estimation is fundamental to virtually all other kinds of regulatory actions.

Mr. Yates. So you have to get reserve information. What I am saying too, is that it is a vital task. We finally agree on that. We want to know how much money you need for it and how many people you need.

Mr. McKelvey. We will do our best to respond.

RESOURCES NEEDED TO CONDUCT PROGRAM

Mr. YATES. Is the estimate that is in this justification adequate for it?

Mr. MCKELVEY. Not for the rate of completion or——

Mr. YATES. Or the speed?

Mr. MCKELVEY. Speed is desirable, yes.

Mr. YATES. Will you put that in the record.

Are there any constraints upon you with respect to what you put in the record?

Mr. MCKELVEY. Not that I am aware of.

Mr. YATES. Mr. Wiles is glaring at you from the back.

Mr. YATES. Have we an agreement and understanding? Can you say yes or no?

Mr. MCKELVEY. You have asked us to put the amendment in the record.

Mr. YATES. No, I haven't asked you that at all. I have asked you to give us your best estimate of how much money you need to do the job, not what the amendment is going to be, because that may be something else again. That may have a constraint on it.

Mr. MCKELVEY. We will do that, sir.

[The information follows:]

ESTIMATE OF FUNDING AND PERSONNEL NEEDED FOR RESERVE INVENTORY

The Geological Survey's present estimate of an adequate OCS reserve program is $3.6 million with a staff of 144 permanent, fulltime employees. Of this total $1.1 million and 54 positions are in the present budget and $2.5 million and 90 positions are in the proposed amendment.

OCS OPERATIONAL SAFETY DEVICES

Mr. YATES. What is the first phase of the Harry Diamond Laboratories study on OCS operational safety devices?

Mr. RADLINSKI. They made investigations into certain specific OCS operational areas and have identified some projects which they think would require additional research and development. We have taken their report and made it available through the Federal Register for the general public reaction to the proposed research.

Mr. YATES. Will you expand on that in the record.

[The information follows:]

STATUS OF HARRY DIAMOND LABORATORY STUDY ON OCS OPERATIONAL SAFETY DEVICES

Harry Diamond Laboratory, a research and development laboratory of the U.S. Army Material Development and Readiness Command, has completed a technology study with regard to safety and pollution control of Outer Continental Shelf (OCS) oil and gas operations. The study specifically addressed the application of advanced technology to structures, drilling operations, subsurface production, transportation, and data collection and distribution. In December 1976 the four-man study team released its final report entitled Research and Development Assessment on Safety and Pollution Control for Outer Continental Shelf Operations. The report recommended that the U.S. Geological Survey sponsor research and development in technology areas of which the following are representative:

1. A reliable computer operated structural alarm system for use on structures used for OCS operations.

2. Surface-to-bit telemetry system.
3. Down hole blowout preventer.
4. Fluidic sensors for gas detection on platforms.
5. Computerized system to display safety-related information in the driller's console.
6. Breathable inert gases for fire suppression.
7. Mass flow measurement and leakage detection techniques.

On February 9, 1977, the report was outlined in the Federal Register and instructions for obtaining copies and submitting comments were given. Several replies have been received to date.

Presently, the Harry Diamond Laboratory is continuing its investigations into specific technology applications as follows:

1. Fluidic sensing systems for down hole telemetry and for hydrocarbon gases in the atmosphere.
2. Portable microprocessor data-recording systems for use on production platforms.
3. Inspection procedures for subsea production systems.
4. Flowmeter study for offshore oil, gas, and mud.
5. Fire suppression study for use on offshore platforms.
6. Development of a hardhat-contained radio communication system.

REGULATION OF FEDERAL AND INDIAN ENERGY MINERAL LEASES

Mr. YATES. You want $428,000 to regulate Federal and Indian energy minerals leases. What is your relationship with BIA on this? Do they hire you to do it? Do the tribes hire you?

Mr. MCKELVEY. It is done at the request of the tribes. Ordinarily there is no reimbursement.

Mr. YATES. That is a $428,000 increase. Do you have enough money for this project?

Mr. MCKELVEY. The increase that we are requesting, Mr. Chairman, relates to the increased activity in the coal program and implementation of new regulations. I believe what we are requesting is adequate with respect to the existing needs. There is, as you know, continuing development of legislation that could affect the work involved, but I guess a short answer would be yes.

Mr. YATES. Good.

DILIGENT DEVELOPMENT

Part of the money is for 572 diligent development analyses. The justifications indicate that you are going to do things you have never done before. What are you going to do with the balance of the $3,381,000 in this program? List the things you are going to do, for the record.

[The information follows:]

WORKLOAD FUNDED IN FISCAL YEAR 1978 BY BASE PROGRAM AND INCREASE FOR REGULATION OF OPERATIONS ON FEDERAL AND INDIAN ENERGY MINERAL LEASES

Workload item	From base funds	From increase	Total program
Review and process new and modified exploration and mining plans	375	65	440
Inspections	1,250	906	2,156
Environmental analyses	175	377	552
Process lease continuances and preference right lease applications	259		259
Preparation of Federal Register notices	50	450	500
Public hearings	40		40
Diligent development analyses	240	332	572

PROGRAM ACCOMPLISHMENTS

Mr. YATES. What are the accomplishments that have been made? Did you achieve anything with all this expenditure in the last fiscal year?

Mr. MCKELVEY. I didn't understand the question.

Mr. YATES. I am trying to find out whether you did anything that you think is of note or whether it was just pedestrian, prosaic, ordinary, or customary.

Mr. MCKELVEY. I will ask Mr. Wayland to respond to that. But I have to say, Mr. Chairman, that this is rather routine, systematic inspection and monitoring of operations for the most part.

Mr. YATES. Mr. Wayland, will you put in the record what you found as a result of this operation?

Mr. WAYLAND. Yes, sir.

[The information follows:]

RESULTS FROM ENERGY MINERAL LEASING PROGRAM

During fiscal year 1976 new coal mining operating regulations (30 CFR 211) were promulgated replacing the old regulations in order to strengthen environmental protection, and insure proper and timely reclamation. Promulgation of the new regulations was preceded by an EIS, public hearings, and coordination with various other agencies, both in and out of the Department, and was a major accomplishment requiring many man-hours in preparation time and implementation time involving changes of operating and reclamation procedures on all existing coal exploration and mining operations, some of which had been in operation for many years. The above work increased the frequency of inspections, and provided for additional contacts with operators, the public, and other agencies in the process of upgrading old mining plans, which were approved under the old regulations, to conform with the requirements of the new regulations. At the same time proposals for new exploration and mining projects began increasing at a substantial rate over the rate in previous years.

REGULATION OF OPERATIONS ON FEDERAL AND INDIAN OIL AND GAS LEASES

Mr. YATES. You are requesting $12,964,000 to regulate the operations on Federal and Indian oil and gas leases. That is the 1977 program level. You indicate you are going to be collecting data, you are going to perform reservoir analyses relating to reservoir performance to determine the justification for shut-in wells and the pursuit of diligent development. Three hundred analyses will be completed in fiscal year 1978?

Mr. MCKELVEY. Yes.

Mr. YATES. How many were performed in 1977?

Mr. MCKELVEY. I will have to supply that for the record.

Mr. YATES. Put in 1976 as well.

[The information follows:]

NUMBER OF RESERVOIR ANALYSIS PERFORMED IN FISCAL YEAR 1976 AND FISCAL YEAR 1977 IN THE REGULATION OF OPERATIONS ON FEDERAL AND INDIAN OIL AND GAS LEASING PROGRAM

The present estimate is that 75 reservoir analyses will be performed in fiscal year 1977; 15 such analyses were performed in fiscal year 1976.

NUMBER OF RESERVOIRS

Mr. YATES. How many reservoirs are there where this kind of analysis needs to be performed, and when will you expect to complete them?

Mr. McKELVEY. I am not sure how many reservoirs there are, Mr. Chairman. There are some 13,000 leases that are producible and we will put that in the record if it is available.

Mr. YATES. Fine.

[The information follows:]

NUMBER OF RESERVOIRS ON THE OCS AND COMPLETION DATES OF ANALYSES

There are estimated to be some 3,000 reservoirs where this type of analysis needs to be performed. It is estimated that it will take 10 years, at the current rate, before they will be completed.

REGULATION OF OPERATIONS ON FEDERAL OIL SHALE LEASES

Mr. YATES. You want $589,000 to regulate the operations on Federal oil shale leases. You haven't had any activity in 1977, have you?

Mr. McKELVEY. I am not sure how much activity there was actually on the leases.

Mr. YATES. Mr. Wayland?

Mr. McKELVEY. Our activity has been very much involved with the EIS I mentioned earlier.

Mr. YATES. Are there any leasing activities going on now, Mr. Wayland? These are the six leases, aren't they?

Mr. WAYLAND. The leasing has been completed but the problems with the development plans have led certain of the original lessees to drop out of the program.

Mr. YATES. How many dropped out? Four, weren't there?

Mr. WAYLAND. Yes.

Mr. YATES. So you only have two leases that are active at the present time?

Mr. WAYLAND. There are no leases active on the ground. All leases are active in planning for engineering works and in planning for proper environmental protection.

Mr. YATES. How long ago were the leases signed?

Mr. WAYLAND. About 3 years ago.

Mr. YATES. Why does it take so long?

Mr. WAYLAND. Sir, these are prototype leases. It was not really certain that the companies could make a profit, and they paid their funds in a steep schedule for up to about the third payment to retain their rights. But some companies decided they won't make it and have dropped out. Another company you mentioned a moment ago, Occidental, has come into the program. Oil shale is a big question mark. I think this is one reason ERDA is coming in to help develop some more technology.

Mr. YATES. How will they do that; by granting other leases?

Mr. WAYLAND. I think ERDA is going to work with the companies that have existing rights.

Mr. YATES. To give them guarantees or subsidies?

Mr. WAYLAND. They may also fund some experimental mining and experimental processing.

Mr. YATES. Have the base line studies been completed?

Mr. WAYLAND. The leasing program was preceded by an environmental impact statement, of course, and then on the four leases that were granted by the Secretary of the Interior there were extensive

studies, both of the preliminary plans and in some cases the detailed development plans. However, with some companies dropping out, some of those detailed development plans are in limbo at the moment.

NUMBER OF OIL SHALE LEASES

Mr. YATES. Are we talking about six leases?

Mr. WAYLAND. There were six offered, but two in Wyoming were not bid on. Only four were bid upon.

Mr. YATES. None of the four leases is active beyond the preparation of plans? What is the activity on the four leases? Do you monitor these?

Mr. WAYLAND. Yes, indeed, we do.

Mr. YATES What is the present state of the four leases?

Mr. WAYLAND. It is primarily a paper exercise but there is also a monitoring to establish base line facts with respect to the existing environment of all types, biological, water, air quality. Monitoring is going on continuously. The companies are funding that. The results of this continuous monitoring are being reviewed by the Oil Shale Environmental Advisory Panel.

SUSPENSION OF OIL SHALE LEASES

The Secretary has granted some suspensions.

Mr. YATES. You have had suspensions on oil leases at the request of the companies themselves?

Mr. WAYLAND. That is right.

Mr. YATES. If they are suspended, why are they engaging in activities?

Mr. WAYLAND. It is part of the understanding of the suspension to continue further monitoring and to increase the base line data.

Mr. YATES. Was that at the request of the Secretary?

Mr. WAYLAND. It was agreed to by the companies.

Mr. YATES. Do the companies have any more lease rights there?

Mr. WAYLAND. Their lease rights continue in a suspended state.

Mr. YATES. What does that mean? What is the purpose of the suspension? What was the effect of the suspension?

Mr. WAYLAND. To relieve them of meeting the original timetables for payments and for development and production established at the time the leases were granted. It was to recognize they simply could not meet that schedule because the stated technology was such that these protoype leases wouldn't go. This having been recognized, the leases have been suspended.

Mr. YATES. When were they suspended?

Mr. WAYLAND. A few months ago.

Mr. YATES. Secretary Andrus suspended them?

Mr. WAYLAND. Secretary Kleppe. This was last fall, in September and November.

Mr. YATES. I must say I don't know what the legal position is right now. The testimony you have given us is they still have lease rights there but they have no obligation?

Mr. WAYLAND. Their obligations have been suspended, and in particular the planning is going ahead on a new basis with respect to one of the leases, to use a different process.

Mr. YATES. Will you give us for the record or the files all the documents relating to the leases, the suspensions, and whatever the new understandings are for the four leases?

Mr. WAYLAND. It will be rather voluminous.

Mr. YATES. Hold that request in abeyance.

RIO BLANCO OIL SHALE PROJECT

We have in the record for January 25 four overview hearings, pursuant to the request we made, a letter dated January 24, 1977, signed by Mr. W. T. Hergett, president of the Rio Blanco oil shale project, explaining what that company's understanding is with the Federal Government respecting its lease.

We also have a notice of suspension of operations of that lease signed on behalf of the United States by Peter A. Rutledge, the area oil shale supervisor for the U.S. Geological Survey, dated August 19, signed also by the representatives of the Gulf Oil Corp. and the Standard Oil Co.

We also have an application for suspension of operations by the Gulf Oil Co. and the Standard Oil Co.

May the committee take it that this is representative, not only representative, but exactly like the documents that were signed with respect to the other leases, or is this only Rio Blanco?

Mr. WAYLAND. I think the committee can take it this is quite representative of the action with respect to all the others.

SOLICITOR OPINION ON OIL SHALE LEASE RIGHTS

Mr. YATES. Do you have your solicitor here today?

Mr. MCKELVEY. I don't think so.

Mr. YATES. Will you ask your solicitor to give us an explanation in the record of what the current status is of the relationship between the lessees and the Federal Government, who has what rights and what rights the Government has, or what rights the companies have, because it is an unusual relationship, isn't it? Have you ever done this before?

Mr. WAYLAND. Sir, we have other types of suspensions and extensions. While they are about the same, this is uncommon in that these were quite unusual leases, with very specific terms and extension stipulations as compared to the ordinary oil and gas lease.

[The information follows:]

OIL SHALE INFORMATION

Because the four prototype oil shale leases have been suspended for 1 year the lessees will not have to pay any rentals during the suspension period. Also, payment of the fourth year bonus installment by the lessees is deferred until the suspensions are terminated. However, when that occurs the lessees will be under a legal obligation to resume payments of the last two bonus installments.

Although actual development of the leases cannot go forward during the suspension of the leases, under the terms of the lease suspensions the lessees are obligated to perform many functions:

1. Complete the 2-year baseline data collection program and submit the data collected to the mining supervisor pursuant to the existing approved program;

2. Submit a final report on the 2-year baseline program analyzing the data collected which will include appropriate sections on ecological interrelations as required by lease stipulation 1(c)(2)(d) within 6 months following completion of the 2-year baseline data collection period;

3. Implement an interim environmental monitoring program to commence immediately upon the completion of the 2-year baseline data program. The program shall include continued air quality and meteorology at selected stations, hydrologic monitoring at selected surface and ground water stations, and biological monitoring of important parameters in accord with ecological survey methodology;

4. Maintain facilities and conduct any work on the leased lands authorized by the terms of the suspension in accord with the terms of the lease during the period of suspension;

5. Continue existing revegetation program during the period of suspension.

During the suspension period the lessees are to attempt to resolve the problem of increasing resource recovery by improvement of their technology and the Federal Government will deal with the problem of air quality.

Geological Survey during the suspension period is to continue the management, supervision and inspection of the leased tracts.

PAYMENT OF FEES

Mr. YATES. The companies agree to pay the Government a certain fee, do they not? Have they paid the Government that fee?

Mr. WAYLAND. Up through step 3, I think it is.

Mr. MCKELVEY. The fee was to be paid in stages.

Mr. YATES. How many stages were there to be for payment?

Mr. WAYLAND. There were to be five but these have been deferred by the action of the extension.

Mr. YATES. "These" refers to what?

Mr. WAYLAND. The remaining two.

Mr. YATES. Three have been paid?

Mr. WAYLAND. Three have been paid and two have been deferred.

Mr. YATES. How much money is involved in the two that were delayed?

Mr. ZIMMERMAN. A total of $477 million was the bonus, so it would be two-fifths of that amount.

Mr. YATES. By all the lessees?

Mr. ZIMMERMAN. By all four of the lessees. Under the lease terms, they could be excused from making the last two payments provided they made developmental expenditures equal to or exceeding the last two bonus installments.

Mr. YATES. Are you continuing to monitor those investments by the companies, those expenditures?

Mr. ZIMMERMAN. The Geological Survey is.

REVIEW AND MODIFICATION OF SUSPENDED LEASES

Mr. YATES. Are those suspensions subject to review or change? I assume they are subject to change by mutual consent?

Mr. MCKELVEY. I would assume by mutual consent, but they have a term of 1 year.

Mr. YATES. What has happened to the lawsuit filed by Environmental Defense Fund against Rio Blanco?

Mr. MCKELVEY. I believe it is still in progress. I am not sure of its present status but I don't believe it has been settled or is likely to be in the near future.

REGULATION OF OPERATIONS ON FEDERAL AND INDIAN GEOTHERMAL LEASES

Mr. YATES. You are requesting $1,059,000 for regulation of operations on Federal and Indian geothermal leases. Are commercial quantities of hot water and steam being taken from the wells at this point?

Mr. MCKELVEY. I will ask Mr. Wayland to respond to that. As it is indicated in the statement here, several geothermal wells have been successfully completed on Federal leases, but I am not sure that any are yet in production.

NUMBER OF COMMERCIAL GEOTHERMAL WELLS IN OPERATION

Mr. YATES. Mr. Wayland, how many commercial wells are in operation?

Mr. WAYLAND. We have one Federal lease that is actually in operation. We got that because the court decided that this was indeed a Federal lease and not a private lease. That was the result of litigation with Union Oil Co.

We have producible leases, about eight of them, but, of course, you don't produce steam into the atmosphere. You have to hook it up to a powerplant, so that will take time.

SCHEDULE FOR PRODUCING GEOTHERMAL POWER

Mr. YATES. How much time will it take?

Mr. WAYLAND. Several years. The problem is siting the powerplants. There are a number of authorizations that are required, both Federal, State and local.

Mr. YATES Are these under lease now?

Mr. WAYLAND. Yes; the leases are good. They simply can't be produced until they can bring the steam into turbines.

Mr. YATES. I would think that would be true. But what is the state of bringing the leases into production and payment?

Mr. WAYLAND. They are operating within the terms of the lease.

Mr. YATES. I suspect that, yes; but that doesn't answer my question. You have just said you have to bring the steam into the turbine. There have to be some connections. What is the state of those connections?

Mr. WAYLAND. The bulk of the new discoveries on Federal leases have been in Utah by a consortium headed by Phillips. Phillips is continuing to drill to develop more steam capability before they know how large a powerplant unit to plan for. This is one characteristic of geothermal development, that they take a much longer time to develop. They develop in small increments typically. The powerplants are small. They have a regional market. The public utility has to agree to accept the power or there has to be an industrial use for it, so that there are many complications of this nature with respect to geothermal steam.

It means that you won't be into production until long after you have made a discovery.

87-591 O - 77 - 63

Mr. McKelvey. Mr. Chairman, an indication of the length of time that is involved I think could be had from the history of the Geysers project in California. I can't give this in detail although I could supply it for the record, but I believe production began there in the midsixties or possibly earlier than that with a power production capacity of 100 megawatts. It has been expanding since then but in increments of about that same order of magnitude. I believe it is expected that eventually it will reach at least 1,000 megawatt capacity, but I don't believe it is at that level yet. That has been going on over a period of 10 or 15 years. Part of that is due to the time it takes to develop the field and to understand what capacity it will support, and part of it relates to the installation and construction of the facilities, and so on.

ROYALTIES FROM GEOTHERMAL PRODUCTION

Mr. Yates. You have a lease with Phillips for a certain steam area? What do we call it?

Mr. McKelvey. The Roosevelt Hot Springs area in Utah.

Mr. Yates. Under your lease, Phillips is supposed to pay you a certain amount of money?

Mr. McKelvey. It will pay a royalty on production.

Mr. Yates. But it doesn't have to pay you anything until steam goes into production?

Mr. McKelvey. I believe it pays rental.

Mr. Yates. Of what?

Mr. McKelvey. I will ask Mr. Wayland.

Mr. Wayland. $2 an acre.

Mr. Yates. It doesn't cost very much to sit back and do nothing.

Mr. McKelvey. They are not sitting back and doing nothing. They are developing it.

LENGTH OF TIME FOR DEVELOPMENT

Mr. Yates. How long does it take for the development? Is there any requirement on them to move forward with the development?

Mr. McKelvey. We could give you an estimate of that for the record based on their current plans and outlook. But as we have indicated, it is a process that will take several years to bring to an advanced stage. First there is the question of, as I mentioned with respect to the Geysers, what sort of production——

Mr. Yates. When did you make your leases with Phillips?

Mr. McKelvey. Mr. Wayland.

Mr. Wayland. Sir, the bulk of the leases were issued in 1974 and 1975, I believe. They are 10-year leases.

Mr. Yates. Signed when?

Mr. Wayland. In 1975.

Mr. Yates. They are not going to be brought in until about 1985?

Mr. Wayland. Right. They can be extended if they are producible and there is proof of activity.

REGULATION OF OPERATIONS ON NONENERGY MINERAL LEASES

Mr. Yates. You are requesting $1.5 million for regulation of operations on nonenergy mineral leases. Will you place in the record the

revenues you received during 1976 from these leases and the revenues you expect to receive on them for 1977 and 1978.

[The information follows:]

ESTIMATED REVENUES FROM NONENERGY MINERAL LEASES FOR FISCAL YEARS 1976–78

[In millions]

	1976	[1] 1977	[1] 1978
Federal lands	$20.1	24.3	29.0
Indian lands	2.2	2.5	3.0
Total	22.3	26.8	32.0

[1] Estimated.

OIL AND GAS LEASE TRACT SELECTION AND EVALUATION

Mr. YATES. You are requesting $334,000 for oil and gas lease tract selection and evaluation for classifying the lands. Will you place in the record an explanation as to how this program is to be carried out?

[The information follows:]

EXPLANATION OF PROGRAM FOR OIL AND GAS LEASE TRACT SELECTION AND EVALUATION

The oil and gas lease tract selection and evaulation program serves two distinct functions, classification and evaluation. The oldest duties, dating from the founding of the survey, involve classifiying lands as to their value for oil and gas so that minerals are not inadvertently disposed of when property is disposed of or exchanged.

The standard procedures for classifying Federal lands as prospectively valuable for oil and gas is based on geologic data acquired through field mapping, geoscientific evidence and geologic inference. Sedimentary basins and other favorable areas having significant thickness of both potential source rock and potential reservoir rock are classified as prospectively valuable regardless of whether or not such areas include productive wells. These areas are classified in order to retain the oil and gas mineral rights in Federal ownership and to maintain an inventory of mineral lands which would most likely become subject to oil and gas leasing. Presently there are approximately 377 million acres of land classified as prospectively valuable for oil and gas on Federal lands. Reports are written on all land disposal, exchange, or multiple use actions on a case-by-case basis.

By the provisions of the Mineral Leasing Act of 1920, the Secretary of the Interior is authorized to grant to any qualified applicant a noncompetitive lease to prospect for oil and gas. The lease may be granted on any part of the mineral estate of the United States open to oil and gas leasing and not within a known geologic structure (KGS) of a producing oil or gas field; lands within a KGS are competitively leased to the highest bidder.

The Geological Survey provides to the Bureau of Land Management (BLM) data as to whether proposed leases are subject to the competitive provisions or noncompetitive provisions of the 1920 Mineral Leasing Act and recommends tracts to be offered for competitive sale. It is the Department's policy that Fair Market Value (FMV) is to be received in the leasing of mineral resources in competitive lease sales. The survey provides detailed tract evaluation including the determination of a minimum pre-sale acceptable bonus in terms of dollar value for each tract. The estimated tract values prepared by the survey are presented to BLM as a recommendation and may consist of a single value or a range of values. While BLM accords great weight to the survey's estimates of mineral values, in view of the survey's expertise in this area, BLM is not bound by the estimates.

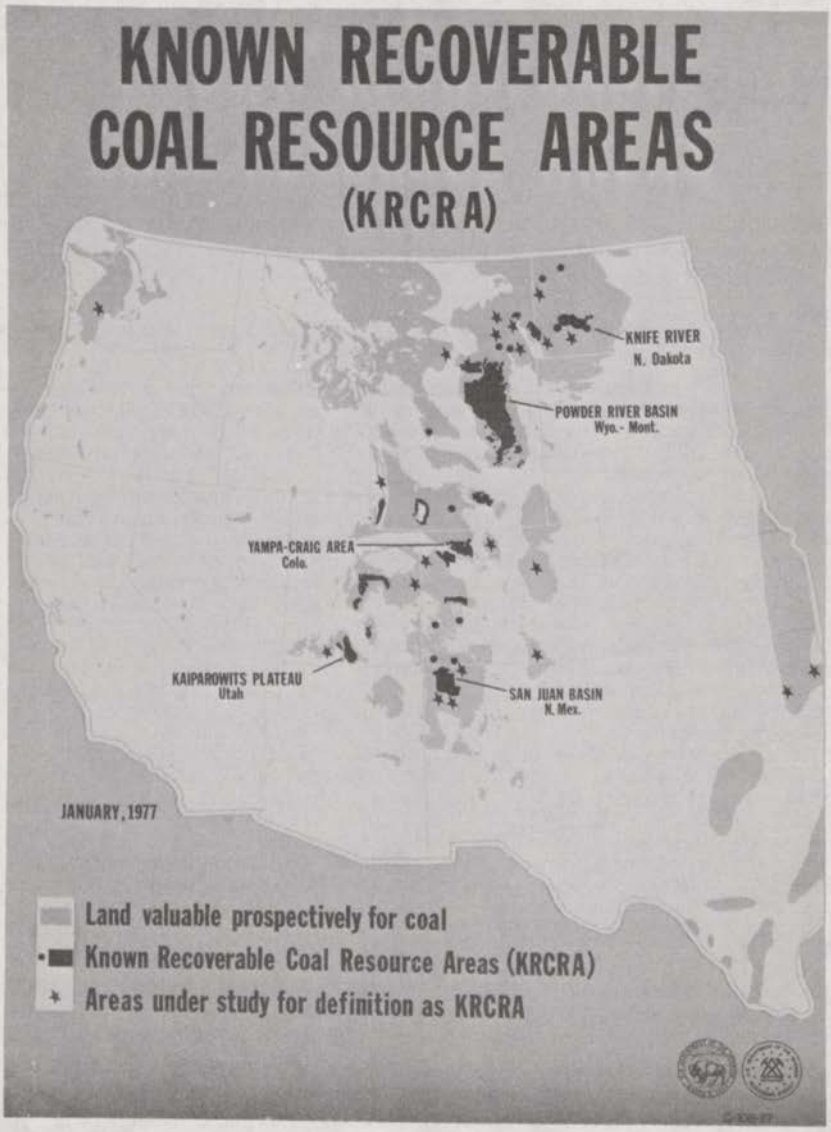
Recently, a task force was established by conservation division which will be charged with reviewing procedures currently used for tract selection and evaluation of Federal KGS tracts in competitive lease sales.

COAL LAND CLASSIFICATION

Mr. YATES. You want $7,803,000 for coal land classification. Do you have the same process for classifying coal lands as you do for the other mineral lands?

Mr. MCKELVEY. It is developing, Mr. Chairman, as shown on this chart.

[The chart follows:]



Known recoverable coal resource areas (KRCRA's) are areas which include Federal lands where data is sufficient to determine:

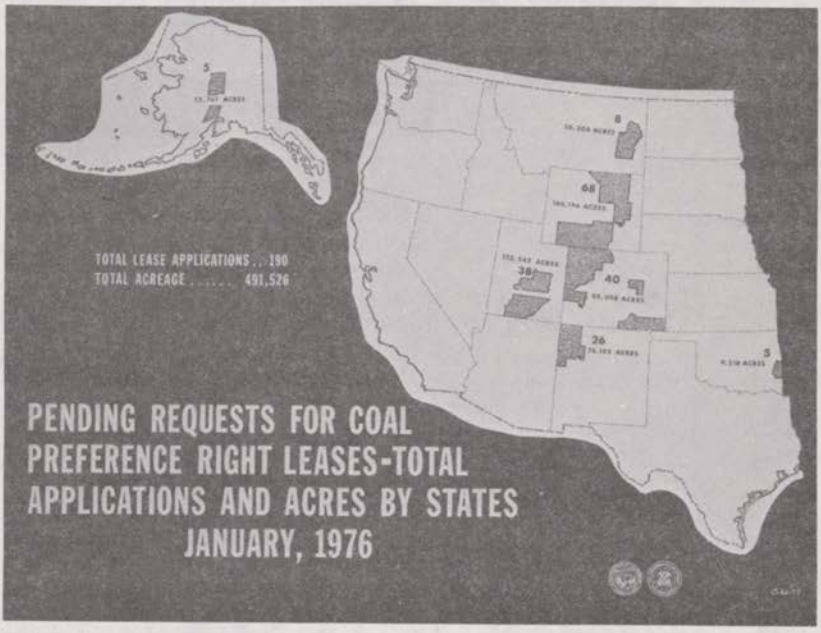
(1) Coal is physically recoverable.

(2) The extent of areas with a potential for coal development.

KRCRA's are target areas for leasing. However, additional data is required for tract selection and evaluation.

Mr. McKELVEY. The objective here is to not only identify areas that might be suitable for leasing on a regional basis but to be prepared to evaluate individual tracts, much as we do with respect to oil and gas on the OCS in advance of leasing, and in determining whether or not preference-right lease applications are valid. This chart shows areas of pending applications.

[The chart follows:]



The number and general location, by State, of pending coal preference right lease applications in the Central and Western Regions are shown on this chart.

COAL LEASING PROGRAM

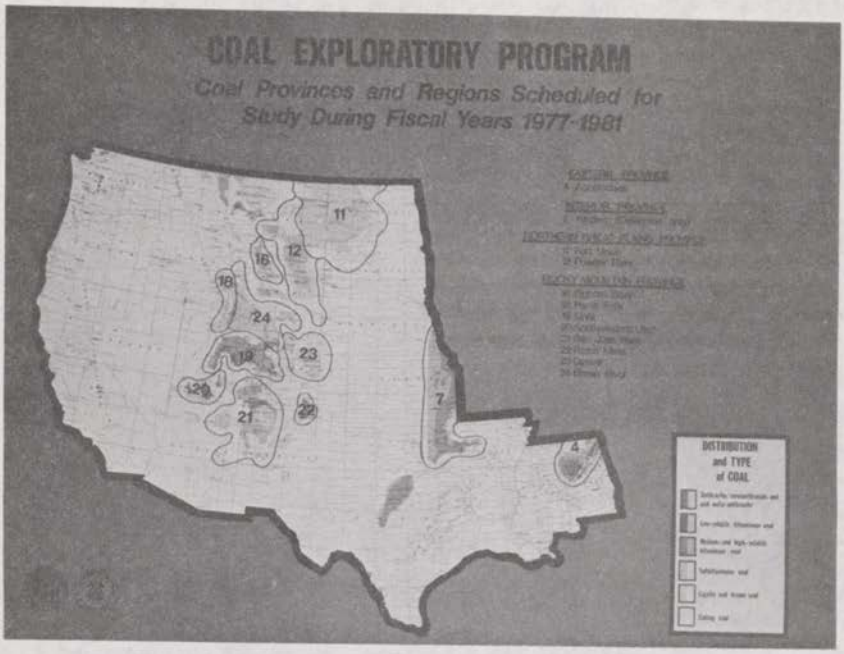
Mr. YATES. What is the situation with respect to the coal leasing program? The committee was impressed several years ago with the fact that leases had been granted and they weren't being developed. What is the situation with respect to the development of the coal program? Is it going forward?

Mr. McKELVEY. Yes; it is, and production from Federal lands is increasing rather steadily.

Mr. YATES. Is production increasing under the leases that were inactive a couple years ago, or are we talking about the leases that were active?

Mr. McKELVEY. I was speaking with respect to the total. I can't tell you whether any new leases have come into production—I am sure Mr. Wayland can—during the last year. But the program is moving forward. This chart, Mr. Chairman, shows areas of federally owned coal.

[The chart follows:]



This map shows areas containing federally owned coal deposits where the coal exploratory program will focus during the first 5 years. This acceleration of ongoing activities is in response to the "Federal Coal Leasing Amendments Act of 1975." (PL 94-377)

Mr. McKELVEY. There are several environmental impact statements under preparation that will be the basis for additional leasing and in part, also, for the opening up of leases or for the development of leases that already exist.

NEW MINES ON PUBLIC LANDS

Mr. YATES. Mr. Wayland, have there been any coal mines brought into production on the public lands since the committee expressed its surprise that there were so many leases that weren't producing? What has come about in the last 2 years, any new leases?

Mr. WAYLAND. Sir, I think it would be better if we provide the actual count for you, but what happens is that, of course, a lease is not a mine. A mine encompasses usually several leases and as a mine operation progresses, it will enter into a different lease occassionally. So a lease not in production comes on production because the mining catches up with it. We have had an increase in production.

Mr. YATES. But that doesn't answer the question. You may have had an increase in production from mines that were producing.

Mr. WAYLAND. Right.

Mr. YATES. I am trying to find out whether any new mines have come in.

Mr. WAYLAND. That is what I think I had better check on.

[The information follows:]

NUMBER OF NEW COAL MINES ON PUBLIC LANDS DURING THE PAST 2 YEARS

During calendar year 1975 five mines began production operations. Five additional mines began production in calendar year 1976. All 10 are currently in production at this time. Also during calendar years 1975 and 1976, construction of surface facilities was started by 16 lessee/operators in preparation for opening up 16 more mines. These have not been completed and are not in production.

CLASSIFICATION AND EVALUATION OF OIL SHALE, GEOTHERMAL, AND NONENERGY MINERAL LEASES

Mr. YATES. You are requesting $306,000 for oil shale classification and evaluation, $1,002,000 for geothermal lands and resources, and $299,000 for classification and evaluation of nonenergy mineral lands.

These are essential expenditures, aren't they?

Mr. MCKELVEY. Yes.

Mr. YATES. How do they relate to other programs in similar areas that you administer?

Mr. MCKELVEY. I would have to be specific in terms of individual areas.

Mr. YATES. Insert that in the record.

[The information follows:]

Relationship of Oil Shale Classification and Evaluation, Classification and Evaluation of Geothermal Land and Resources, and Classification and Evaluation of Non-Energy Mineral Land and Resources Programs to Other Programs in Similar Areas

Geothermal Lands and Resources

The geothermal program in Conservation Division is directed at classifying and evaluating Federal lands as to their geothermal potential. The geothermal research programs of other components of Geological Survey are aimed at assessing the geothermal potential of all lands in the U.S. regardless of ownership. Data generated by research programs may be utilized by Conservation Division personnel in the geothermal classification program. The other components may additionally support the Division's classification program by responding to specific requests for information. Support by other Geological Survey component groups is more widespread during evaluation of lands prior to competitive lease sales.

Geothermal Leasing

1. Basic Data Gathering
   The geothermal leasing program is a two tiered program as there is legislative authority for both competitive and noncompetitive leasing. Competitive leasing takes place on lands classified as Known Geothermal Resource Areas (KGRA's) by the Area Geologists and/or Eastern Area Supervisor for Resource Evaluation. Formation of a KGRA may be based on geologic indications of the presence of a geothermal resource and on competitive interest. While most of the data used in classification are from existing sources or are generated within the Conservation Division, the Geologic Division may support the Conservation Division in response to specific requests for additional information.

2. Preparation of Maps for the Bureau of Land Management
   Two types of maps are prepared for BLM's EMARS Program. Mineral and Waterpower Land Classification Maps provide complete map coverage at a 1:250,000 scale showing the classification status of all U.S. lands. Geothermal Land Classification Maps provide information on the location of not only KGRA's but also land that is prospectively valuable for geothermal resources on a State-by-State basis. The State maps are at a scale of 1:500,000.

3. Input to Environmental Impact Statement (EIS)
   A programmatic EIS was completed in 1973 prior to the issuance of the first geothermal leases. Since that time, environmental documents have been prepared by the appropriate surface managing agency for each area coming up for geothermal leasing. In only a few cases have EIS's been required and in all of these cases the U.S. Forest Service was the responsible Agency. Conservation Division usually is given the opportunity to supply baseline information on such subjects as geology and hydrology of the proposed leasing area for the environmental documents.

4. Tract Selection and Evaluation
   Lands to be competitively leased are selected by BLM on the basis of environmental considerations and in accordance with multiple use planning principles. Conservation Division parcels the selections and performs the evaluation of the leases prior to the sale. The Geologic Division and the Water Resources Division may acquire and supply data to the Conservation Division in support of specific lease sales.

Geothermal Leasing Statistics as of March 1, 1977

Number of KGRA's	105
Acreage in KGRA	3,202,825
Acreage Valuable Prospectively	98,256,710
Number of Competitive Leases	193
Acreage in Competitive Leases	360,419.44
Number of Non-Competitive Leases	750
Acreage in Non-Competitive Leases	1,236,918.44

Number Lease sales - 75
Total high bonus bid - $15,679,784.69
High bonus bids have ranged from $3200/ac to $1.04 ac.

Non-Energy Minerals

The classification and evaluation program for non-energy minerals is related specifically to the administration of Federal lands where other programs on these minerals within the Geological Survey involve study of the mineral commodities without regard for mineral ownership or regard to specific administrative actions or responsibilities. Specifically the classification and evaluation program involves preparation of engineering and geologic reports for (1) classification actions for retention or disposal of mineral ownership in the event of surface disposal or exchange, (2) definition of known leasing areas for competitive leasing,(3) tract selection and evaluation for competitive lease sales, (4) land and mineral resource reports to other Federal Agencies for their use in determining land use or disposal, (5) review of and technical report on prospecting permit and preference right lease applications, and (6) geologic input into environmental impact statements and analysis. Geologic Division assistance has been requested for support in the Cadiz Lake, and Searles Lake, California, legal cases; and for mineral classification guidelines. Published and unpublished Geologic Division reports have also been utilized in these determinations, as is all other data available from publications, lessees or data developed by the classification and evaluation program.

Oil Shale

The classification and evaluation program for oil shale is related specifically to the administration of Federal lands. Other programs on oil shale within the Geological Survey involve study of the geology of oil shale without regard for mineral ownership or regard to specific administrative responsibilities. Specifically the classification and evaluation program at this time involves preparation of engineering and geologic reports for (1) verification of lessees reserves; (2) land exchanges; (3) reserves on about 10 tracts of approximately 5,000 acres each for the in situ development program. The program will also include selection and evaluation of lease sale tracts if competitive sales are scheduled. Cooperation is needed with the Water Resources Division for hydrology and Geologic Division's computer program designed to compute oil shale thickness and average value in gallons per ton and reserves in barrels per acre.

LAND CLASSIFICATION AND EVALUATION FOR WATER RESOURCE DEVELOPMENT

Mr. YATES. You want $494,000 for land classification and evaluation for water resource development. You have indicated that in excess of 1,785,685 acres have been studied, and you are going to study an additional 5,572,000.

Mr. MCKELVEY. Yes.

Mr. YATES. We gather from your justification you have been surveying land for the last 12 years at the rate of 148,800 acres per year.

Mr. MCKELVEY. That is approximately correct.

Mr. YATES. You have another 37 years to finish the program. How valuable is the program.

Mr. MCKELVEY. I think it is important, Mr. Chairman. As you may know——

Mr. YATES. Will you be here to finish the program?

Mr. MCKELVEY. I don't think I will be, sir.

IMPORTANCE OF PROGRAM

Mr. YATES. Don't we want you here to finish the program? How important is it?

Mr. MCKELVEY. I think it is important to keep up to date with respect to classification and reservation of public lands for the development of water resources.

Mr. YATES. What does that mean specifically? What do you mean by the development of water resources on public lands in this activity?

Mr. MCKELVEY. Use of public lands for the construction of a reservoir for water power generation.

WORK OF BUREAU OF RECLAMATION

Mr. YATES. Is that what you do for the Bureau of Reclamation?

Mr. MCKELVEY. It is possible the Bureau of Reclamation may have a project or the Corps of Engineers that involves Federal lands, but our work is not done only for those agencies.

Mr. YATES. What is it done for, then?

Mr. MCKELVEY. It is done to establish the classification of Federal lands for protective purposes, and what is being done is to review acreage that has previously been classified as valuable for reservoir or water power development but may no longer be.

WATER RESERVOIR DEVELOPMENT

Mr. YATES. What makes an acre valuable for water reservoir development?

Mr. MCKELVEY. It would be the nature of the topography. It would not just be on acreage.

Mr. YATES. You mean something like a Grand Canyon makes it——

Mr. MCKELVEY. Yes; a site suitable for a dam containing a reservoir.

STUDY OF GRAND CANYON

Mr. YATES. Was it your study of the Grand Canyon that decided the dam should be built alongside the porous rock?

Mr. McKELVEY. No; it would not have been our study that decided that. That particular site might have been one classed as a site and reserved for that purpose years ago.

PRIORITY OF PROGRAM

Mr. YATES. You don't consider this to be a priority program, then, do you?

Mr. McKELVEY. I can't say it has a high priority, Mr. Chairman, compared to many of our other activities, but it is important.

Mr. YATES. Let's turn to Land Information and Analysis.

EROS PROGRAM

Earth resources observation systems, EROS. How valuable is EROS?

Mr. McKELVEY. I think it is an extremely valuable program, Mr. Chairman. We have developed, with the committee's help over the years, this program, and the EROS data center at Sioux Falls that receives and distributes LANDSAT imagery to the public. This chart shows the superior images received from digital processing of the data.

[The chart follows:]



This chart illustrates the superior image received from digital processing with that of standard processing. With the higher quality image, land resource decisionmakers can detect better detail for: irrigated lands, saline deposits, water depths, topography, and roadways.

Mr. YATES. You are going to launch a satellite in November of this year?

Mr. McKELVEY. The plan is that NASA will launch that.

ADEQUACY OF STAFF TO HANDLE NEW IMAGERY

Mr. YATES. Do you have enough staff to operate the system and handle the output from the satellite?

Mr. MCKELVEY. We have enough to operate the system as it currently exists, but as the program develops, it may not be sufficient.

Mr. YATES. NASA is going to put up a satellite in November. That will be in the next fiscal year.

Mr. MCKELVEY. Yes.

Mr. YATES. The results from that satellite will have to be interpreted and analyzed by the Geological Survey, won't they? Do you have enough people on hand and in this budget to take care of that?

Mr. MCKELVEY. Mr. Chairman, we don't have the responsibility that you indicated with respect to all LANDSAT imagery. What we are doing is distributing LANDSAT imagery and making it available to the public, and we also have a research effort——

Mr. YATES. Let's stop there for a minute, then. The imagery and the material that you make available to the public will be increased by the satellite, won't it? Otherwise, why are you putting the satellite up? It is being put up to produce additional material, isn't it?

Mr. RADLINSKI. Yes, sir.

Mr. YATES. You are going to disseminate that material?

Mr. RADLINSKI. Yes, sir.

Mr. YATES. Do you have enough people on hand to do that?

Mr. RADLINSKI. Yes, sir, we do.

Mr. YATES. It is indicated by the chart that half of your costs are to be met through the sale of products from the Data Center; is that correct?

Mr. MCKELVEY. Yes.

APPLICATIONS DEMONSTRATION AND RESEARCH

Mr. YATES. How much of the request is for applications demonstration and research?

Mr. MCKELVEY. About $3 million, Mr. Chairman.

Mr. YATES. Who benefits from the program?

Mr. MCKELVEY. I think that the beneficiaries of the program are numerous, Mr. Chairman, as indicated in the material supplied with the budget statement.

Mr. YATES. Where?

Mr. MCKELVEY. Page GS–123.

[The chart follows:]

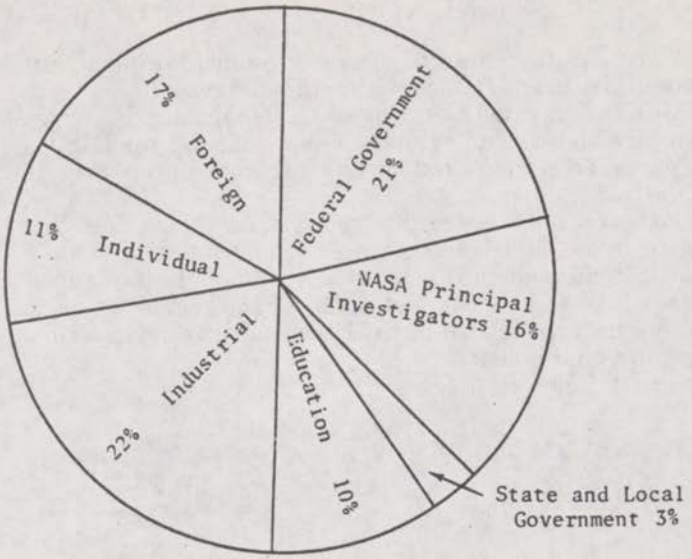


Figure L-2.--Customer profile of orders for data from the EROS Data Center - $2.5 million, FY 1976.

Mr. McKelvey. We show the broad categories of the purchasers of the data.

COST RECOVERY

Mr. Yates. Do they pay enough to cover the cost?

Mr. McKelvey. We are increasing the fees, Mr. Chairman, to work toward full coverage, but they cover a substantial part of it now.

I think it is interesting, as the chart shows here, the industrial sector is the largest of the user groups, with the Federal Government being second, but with individual users and the educational community each making up roughly about 10 percent. That chart tells a great deal about the breadth of interest in the data and the extent to which they are being used.

The industrial sector includes both oil and mining companies, and I am sure some in other fields, such as agriculture and silva culture, and so on.

RESOURCE INVENTORY OF IDAHO, OREGON, AND WASHINGTON

Mr. Yates. How much of the money will go into the resource inventory of Idaho, Oregon, and Washington to cooperate with NASA?

Mr. McKelvey. I am not sure of the magnitude of that program. Perhaps Mr. Balsley knows.

Mr. Balsley. That has been a demonstration project, and the funding now will be developed by the individual States. Our function was to show them how to use the data and now it is going forward under the individual State leadership, so that survey funds will not be expended in fiscal year 1978.

ENVIRONMENTAL IMPACT ANALYSIS

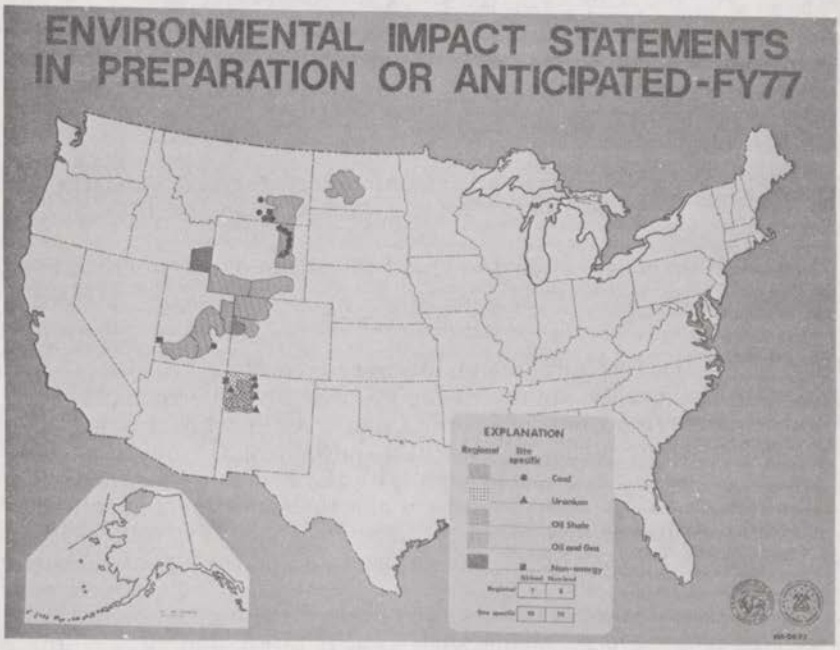
Mr. YATES. With respect to your environmental impact analysis, is all EIS activity in GS funded within this program?

Mr. MCKELVEY. I don't believe so, Mr. Chairman. Perhaps Mr. Balsley can give an estimate of the total expenditure for EIS.

Mr. YATES. How many statements will you be preparing during the next fiscal year?

Mr. BALSLEY. This is complicated. It is a joint effort between the Bureau of Land Management and the Geological Survey. We take the lead in some and in others we contribute. It is planned that in 1977 we will be jointly completing 15 of the regional type and 20 of the site specific type EIS. The distribution between GS lead and BLM lead is shown on this chart.

[The chart follows:]



This map shows the general location of the 15 regional and 20 site specific environmental impact studies underway or anticipated during fiscal year 1977. The heavy workload associated with these studies require study tasks be shared among various agencies within the Department.

Mr. BALSLEY. We work closely together.

Mr. YATES. What about offshore activity? Will you have no environmental impact statements to prepare in the next fiscal year?

Mr. BALSEY. Those are prepared by the Bureau of Land Management. We contribute support to them, but they have the lead.

NUMBER OF PEOPLE IN EIS ACTIVITY

Mr. YATES. Your justification talks about 68 people for this activity. Do you contract a lot of your work out?

Mr. BALSLEY. Some of it is contracted, but most of the work is done in-house. We get support from other Federal agencies—Fish and Wildlife, Forest Service—these people are our in-house experts.

POWDER RIVER REGIONAL EIS

Mr. MCDADE. Could I interject a question?

Would you describe a little, Doctor, what you are doing on the North Powder River regional EIS in Montana? What are you doing there?

Mr. MCKELVEY. We are preparing an environmental impact statement there, Mr. McDade, in which we have the lead responsibility, and that statement will cover all aspects of the environment that bear on possible production and on elements of the environment that can be impacted by production of coal in that area. The northern Powder River region has extremely large resources, including coal resources that can be mined at the surface, and there can be, of course, extensive and undesirable effects from mining and attendant development.

Mr. MCDADE. Is it all federally owned land?

Mr. MCKELVEY. I believe there is much federally owned land in that area, but I don't think it is all Federal land.

Mr. MCDADE. How close are we to actually offering for lease some of this land?

Mr. MCKELVEY. There are no specific plans for a lease sale in that area that I am aware of. Perhaps Mr. Zimmerman, of the Bureau of Land Management, can answer that.

Mr. ZIMMERMAN. We are hopeful of being able to hold a first lease sale within the next 9 to 12 months, in either northwest Colorado, EIS area, or in the Powder River.

AREA OF LEASE

Mr. MCDADE. How large an area are you contemplating putting out to lease?

Mr. ZIMMERMAN. It would depend on the size that Geological Survey suggests as a leasing block.

Mr. MCDADE. And you don't have that information yet?

Mr. ZIMMERMAN. No, I don't.

Mr. MCDADE. Thank you, Mr. Chairman.

GEOGRAPHY PROGRAM

Mr. YATES. You are requesting $2,527,000 for your geography program. How does this relate to all of the other mapping programs that GS conducts?

Mr. MCKELVEY. Mr. Chairman, in this effort we are mapping the use that is being made of the land or the nature of the land cover where the land has not been developed for other purposes. And we, in the preparation of our topographic maps, do map certain kinds of cultural features, but not in a comprehensive way.

Mr. YATES. What do you mean by cultural features?

Mr. MCKELVEY. That term applies to features that have been developed by man.

Mr. YATES. I am still not sure I understand that.

Mr. MCKELVEY. Cultural features in the sense used on a map would refer to roads and town sites——

Mr. YATES. What man has put in there.

Mr. BALSLEY. Not only what man has put there, but whether it is range land, agriculture land, how it is being used.

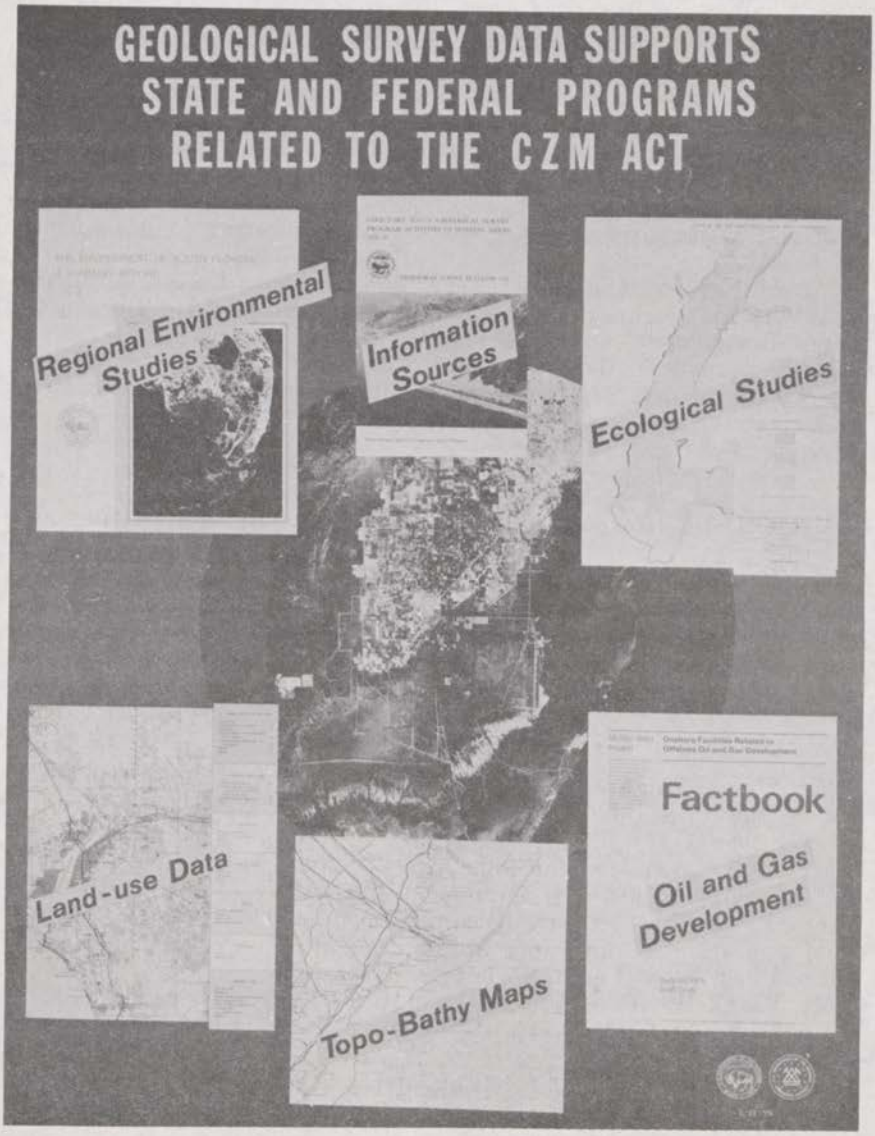
Mr. YATES. OK. In today's culture.

Mr. MCKELVEY. Right.

Mr. YATES. That shows you the result of having endowments for the arts and humanities before us, too.

Mr. MCKELVEY. The actual map compilation of land use maps is done in our topographic division. The geographers do the basic work on the land use classification. Some uses of the data are shown on this chart.

[The chart follows:]



This graphic shows examples of Geological Survey publications which support State and Federal programs related to the Coastal Zone Management (CZM) Act.

FUNDS FOR PRODUCTION OF EXPERIMENTAL AND DEMONSTRATION LAND USE

Mr. YATES. How much of the funds are used for the production of experimental and demonstration land use?

Mr. MCKELVEY. I am not sure I have that figure, Mr. Chairman.

Mr. YATES. Would you insert it in the record?

Mr. MCKELVEY. Yes.

[The information follows:]

FUNDS FOR PRODUCTION OF EXPERIMENTAL AND DEMONSTRATION LAND USE MAPS

Funding for the production of experimental and demonstration land use maps was about $170,000 in fiscal year 1976. It is anticipated that funding for such maps will be approximately equal to this amount in fiscal year 1977 and fiscal year 1978.

COST OF PROFESSIONAL PAPER NUMBER 964

Mr. YATES. How much is involved in the publication of your professional paper 964?

Mr. MCKELVEY. It would have been——

Mr. YATES. Incidentally, your annual report for fiscal year 1976 is a beautiful one.

Mr. MCKELVEY. Thank you, sir.

Mr. YATES. A lot of time and effort went into it.

Mr. MCKELVEY. Yes.

I don't have the cost of professional paper 964, but I will expect it would have been several thousand, perhaps $20,000.

Mr. YATES. Insert it in the record.

[The information follows:]

COST OF PROFESSIONAL PAPER NUMBER 964

The publication cost of professional paper No. 964 was approximately $35,000.

LAND RESOURCE DATA APPLICATIONS

Mr. YATES. You are requesting $2,704,000 for land resource data applications, to enable you to meet the demand by other Federal, State, and local agencies, as well as outside groups. What indication have you gotten that the outside groups are willing to pay to acquire the information you would provide, any at all?

Mr. MCKELVEY. Information that is being developed here is attracting considerable interest. I will provide for the record a list of organizations which have supported the program. As indicated in the budget statement, we have already completed, through the help of the New England River Basin Commission, a rather extensive study showing the onshore impact of offshore development, and that study has come to be a source book, I think, for many others interested in that same kind of problem.

Mr. YATES. You are going out drumming up business for the information?

[The information follows:]

Selected examples of other Federal, State, and local agency support of Land Resources Data Applications activities

Agency	Activity	FY	Amount
Federal:			
HUD	San Francisco Bay regional urban environmental study (SFBRS)	70-76	$2,125,000
ARC	Greater Pittsburgh regional urban environmental study (GPRS)	72-75	289,000
NSF	Environmental impact assessment study	75	75,000
EPA	Onshore impact of OCS	75-77	381,000
DOT	Los Angeles and Minneapolis-St. Paul tunneling feasibility studies	76-77	215,000
DOI			
BLM, FWS, NPS	Phoenix, Powder River, Dade Co., Puget Sound demonstration projects	73-74	1,200,000
BLM	Utility corridor guidebook	75	50,000
LUWP	Council of State Governments study	75	100,000
	Critical areas guidebook	76	50,000
	State information systems guidebook	76	50,000
NPS	South Florida case study	76	50,000
BIA	Colville Reservation case study	76	40,000
FWS	South Florida case study	76	50,000
Library	Departmental directory of information sources	77	10,000
State and Local:			
Arizona	Phoenix-Tucson urban environmental study	75	$ 15,000
California-San Mateo Co.	SFBRS	75	16,000
Colorado	Front Range urban corridor environmental study	75	15,000
Maryland	Baltimore-Washington urban area study	75	20,000
Pennsylvania	GPRS	75	30,000
Washington	Puget Sound regional urban environmental study	75	10,000
Virginia-Fairfax Co.	Fairfax County urban environmental study	77	3,000
		TOTAL	$4,794,000

FUNDING BY EPA

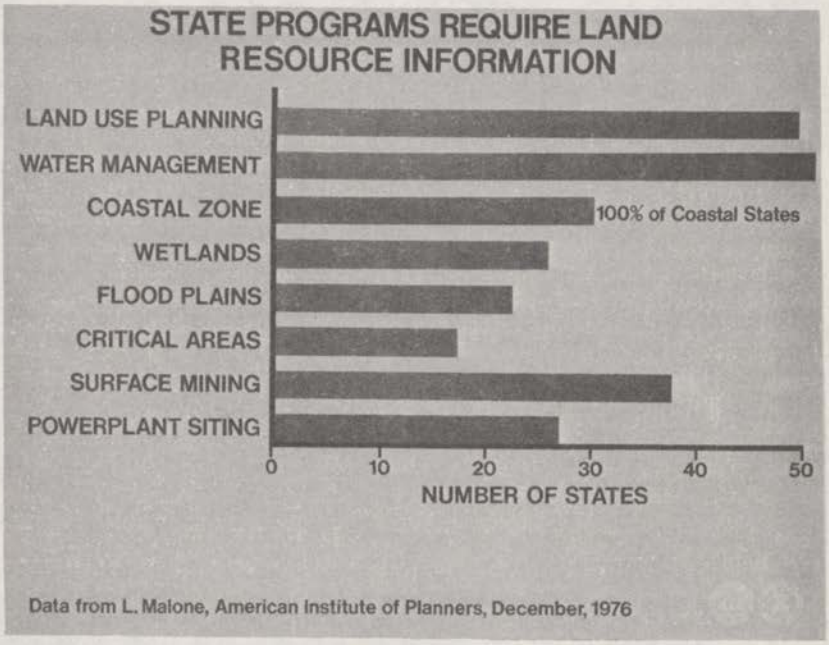
Mr. BALSLEY. If I may interject, sir; the use of this activity is now being funded by EPA.

Mr. YATES. The use of what activity?

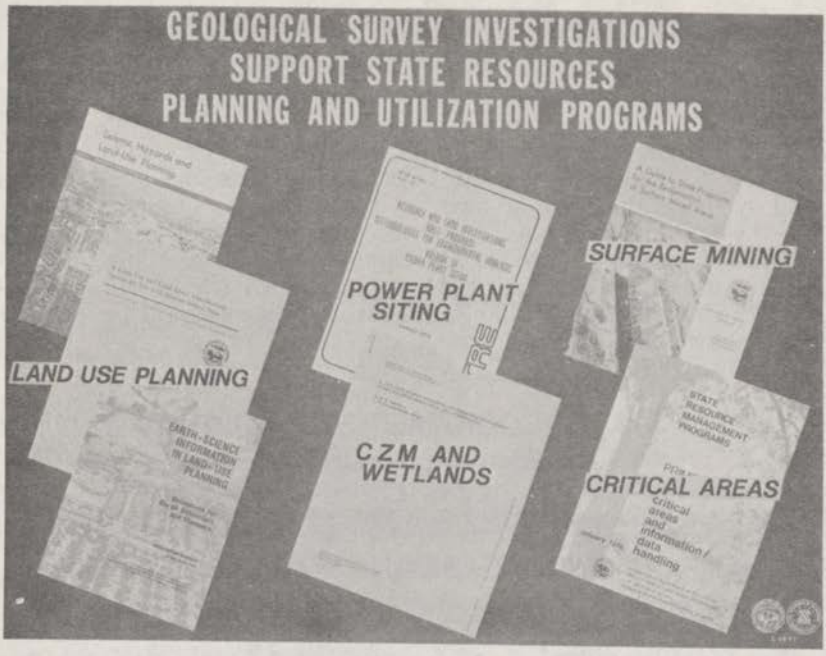
Mr. BALSLEY. This onshore facility study which we contracted with the New England River Basin Commission. This fact book is being used by the States, and we have established a series of workshops to take the data to the States.

Another product of this is a computer program to allow the users to make use of the data and EPA is funding a series of workshops to make the information available and usable. Some uses of this information is shown on those two charts.

[The charts follow:]



Recent State initiatives and State and Federal legislative actions have increased State involvement in land use decisions requiring land resource information.



Geological Survey investigations support State resources planning and utilization programs with reports on land-use planning, power plant siting, CZM and wetlands, surface mining and critical areas.

General Administration

Mr. Yates. Let's turn to general administration. You want $3,587,000, which is a decrease of $178,000.

Mr. McKelvey. Net, yes.

Mr. Yates. You have $400,000 program reduction in general administration, an increase of $216,000 for employee compensation payments and $6,000 for annualization of increased pay costs.

Where did the program reduction occur?

Mr. McKelvey. That is a reduction in direct funding, Mr. Chairman, and represents, I guess, a decision on the part of the administration that more of the cost of our general administration be funded through assessment on other programs.

Mr. Yates. There is no indication where you are paid here. Are you paid under this? Do you receive payments? Are you paid by the Government?

Mr. McKelvey. Yes. I am paid under this item. Not that much.

Mr. Yates. I am glad you said that instead of not enough. Where does that appear?

Mr. McKelvey. Under executive direction.

Mr. Yates. Along with Mr. Radlinski?

Mr. McKelvey. Yes.

Mr. Yates. Would you prepare for the record a table that identifies personnel and dollars for the seven categories that are identified for the years 1976, 1977, and 1978?

[The information follows:]

GEOLOGICAL SURVEY GENERAL ADMINISTRATIVE EXPENSES, FUNDING AND POSITIONS, FISCAL YEARS 1976–78

[Dollar amounts in thousands]

	Fiscal year 1976		Fiscal year 1977		Fiscal year 1978	
	Funding	Positions	Funding	Positions	Funding	Positions
Executive direction	$2,441	65	$2,627	66	$2,713	66
Personnel management	1,128	47	1,526	47	1,646	47
Administrative management improvement	778	15	1,193	14	1,287	14
Safety program	37	1	128	1	139	1
General services	1,608	79	1,752	75	1,891	74
Budget and financial management	1,286	80	1,531	80	1,652	80
Contract management	625	26	876	27	945	28
Regional administration and management	3,051	188	3,868	168	4,174	163
Employment compensation payments	497	----	497	----	713	----
Total	11,451	501	13,998	478	15,160	473

EMPLOYEE CAREER DEVELOPMENT

Mr. YATES. You are going to give increased attention to the development of Bureau employees. How much did you spend in 1976, and how much are you spending in 1977, and how much will you spend in 1978 for the career development of Bureau employees, which I recognize and appreciate as a good program?

Mr. MCKELVEY. I will ask Mr. Grant to respond, sir. Or we will supply it for the record.

Mr. YATES. Would you insert that information in the record?

Mr. GRANT. Yes, sir; I will.

[The information follows:]

COST OF PROGRAM FOR CAREER DEVELOPMENT

The costs of the Geological Survey's career development program funded by the General Administration line item for fiscal years 1976, 1977, and 1978 are as follows:

Fiscal year:	*Cost*
1976	$159,408
1977 (Estimate)	215,674
1978 (Estimate)	259,229

Mr. YATES. For facilities you want $11,720,000. Are there duplications of items that are explained in other portions of the budget justification here?

Mr. MCKELVEY. No, Mr. Chairman.

FUNDING OF GENERAL ADMINISTRATIVE EXPENSES

Mr. YATES. Will you put an explanation of the table on page 139; that table lays out the funding of your general administrative expenses.

[The information follows:]

GEOLOGICAL SURVEY
Funding of General Administrative Expenses

General administrative expenses (GAE) of the Geological Survey are financed in part by assessments on direct program funds, and on funds from other Federal agencies and sundry non-Federal sources. No assessment is levied on cooperative funds from State and local governments.

For many years GAE of the Survey has been financed by direct appropriation (line item) and assessment against reimbursable programs. The intent has been that (1) the direct appropriation fund the administrative expense of the direct program including the Federal-State cooperative program, and (2) that the administrative expenses allocable to program financed by other agencies (except State and local governments) be funded by assessment on those programs.

Experience over the years demonstrated the impracticality of maintaining, under the existing budgetary procedures, the necessary balance between (1) executive and administrative staff capability, and (2) substantive Survey programs. For example, during the 10-year period from 1958 to 1968, the ratio of directly funded GAE to total direct appropriation decreased from 3.3 percent to 2.6 percent. This was because program funds increased at a higher rate than the appropriation for GAE.

In 1969, the Survey increased the rate of assessment against funds from other Federal agencies and foreign governments from 3.75 percent to 4.5 percent and, at the same time, proposed to assess direct program funds initially at a rate of approximately one-half of one percent, with the expectation that the assessment would be increased in subsequent years in order to provide an over-all ratio of GAE to total funds of between 3.0 and 3.5 percent, a ratio believed necessary to achieve progressive and effective management. An over-all level of 3.3 percent was achieved in fiscal year 1977. Details of funding for fiscal years 1970 through 1978 are shown on the following table.

Prior to 1951 - Appropriation for "Salaries and expenses", augmented by selected assessment against transferred funds.

1951 - G.A. established as budget activity - 2% of total SIR program. Supplemented by 3.5% assessment against other Federal agencies (OFA), with many exceptions resulting in overall rate of 2%.

1954 - 3.8% assessment on funds from OFA, and SIR Line item for G.A. 2.8% of total SIR.

1957 - 3.75% rate on funds from OFA remained in effect until 1969.

1958 - Line item 3.3% of total SIR, declined gradually to 1.8% in 1974.

1969 - Rate of 4.5% set on OFA funds - remains in effect in 1978 budget.

1970 - Policy established of supplementing SIR line item by assessment against program funds, with stated intent of raising the ratio ultimately to between 3.0% and 3.5%. Line item has had no substantive change since then - only general pay raises and specific reductions have affected its level.

Rate of SIR assessment has been set as follows:

1970 Budget -	Ratio of line item to total SIR	2.5%
	Program funds assessed at	0.5%
	Ratio, direct GAE (line item + SIR Assessment), to total SIR	3.0%
1971 Budget -	Line item ratio to total SIR	2.5%
	Program funds assessed at	0.87%*
	Ratio, direct GAE to total SIR	3.3%
1972 Budget -	Line item ratio to total SIR	2.3%
	Program funds assessed at	1.25%**
	Ratio, direct GAE to total SIR	3.5%

1973 Budget -	Line item ratio to total SIR	1.9%
	Program funds assessed at	1.6%**
	Ratio, direct GAE to total SIR	3.5%
1974 Budget -	Line item ratio to total SIR	1.8%
	Program funds assessed at	1.6%**
	Ratio, direct GAE to total SIR	3.4%
1975 Budget -	Line item ratio to total SIR	1.3%
	Program funds assessed at	2.0%**
	Ratio, direct GAE to total SIR	3.3%
1976 Budget -	Line item ratio to total SIR	1.2%
	Program funds assessed at	2.3%**
	Ratio, direct GAE to total SIR	3.4%
1977 Budget -	Line item ratio to total SIR	1.2%
	Program funds assessed at	2.4%**
	Ratio, direct GAE to total SIR	3.4%
1978 Budget -	Line item ratio to total SIR	1.0%
	Program funds assessed at	2.5%**
	Ratio, direct GAE to total SIR	3.4%

* Composed of 0.7% of Base (i.e., 1970 program level), plus 3.3% of 1971 program increase.

** Composed of 0.882% of base (i.e., 1970 program level), plus 3.5% of program increases cumulative from 1971.

RATE OF FUNDING NEW POSITIONS

Mr. YATES. And will you also place in the record the rate at which your new positions were funded in fiscal year 1978?

Mr. MCKELVEY. Yes.

[The information follows:]

GEOLOGICAL SURVEY
Funding Rate for New Positions in FY 1978

Activity/Program	Number of New Positions	Average Annual Rate	Total Annual Cost
Topographic Surveys and Mapping:			
Modernization of mapping technology	+5	$20,750	$103,750
Intermediate scale mapping	+3	16,750	50,250
Geologic and Mineral Resource Surveys and Mapping:			
Earthquake hazards reduction	+40	22,100	884,000
Volcano hazards	+1	24,300	24,300
Reactor hazards research	+2	25,175	50,350
Geologic, geophysical, and geochemical surveys	-7	--	--
Wilderness mineral surveys	+11	22,850	251,350
Conterminous State mineral surveys	+7	24,825	173,775
Federal coal leasing exploration	+2	25,175	50,350
Water Resources Investigations:			
Data collection and analysis	+10	25,000	250,000
National water data exchange	+2	25,000	50,000
Nuclear energy hydrology	+2	25,000	50,000
Conservation of Lands and Minerals:			
Regulation of OCS oil and gas operations	+20	15,000	300,000
OCS seismic risk and ocean bottom stability	+3	21,500	64,500
Regulation of operations on Federal and Indian energy mineral leases	+7	18,600	130,200
Land Information and Analysis:			
Land resource data applications	+2	24,500	49,000
General Administration	-10	--	--
National Petroleum Reserve in Alaska	-27	--	--
Subtotal	73	--	--
Less: Reduction of in-house publication services	-25	--	--
GRAND TOTAL	48	--	--

Mr. YATES. Will there be any program annualization charge in fiscal year 1979 for these new positions?

Mr. MCKELVEY. No.

Mr. YATES. Your permanent employment increases by 48, but your permanent average employment decreases by 51. Put an explanation of that in the record.

Mr. MCKELVEY. Yes, sir.

[The information follows:]

EXPLANATION OF INCREASE IN PERMANENT EMPLOYMENT VERSUS A DECREASE IN AVERAGE PERMANENT EMPLOYMENT

In the budget estimates submitted prior to the fiscal year 1978 budget, average paid employment was equivalent to man-years of effort. This is no longer true. Average paid employment is now defined as the average end-of-month employment for the year. This means that an other-than-permanent employee will be counted the same as a permanent full-time employee in the average paid employment figures even though he works fewer than 40 hours a week. The following table showing positions, estimated man-years of effort, and average paid employment might help explain the apparent discrepancy.

	Fiscal year 1977 estimate	Fiscal year 1978 estimate	Change
Direct positions:			
Permanent	7,570	7,618	+48
Other than permanent	1,955	1,963	+8
Total positions	9,525	9,581	+56
Direct man-years:			
Permanent	7,426	7,436	+10
Other than permanent	1,614	1,683	+69
Total direct man-years	9,040	9,119	+79
Direct average paid employment:			
Permanent	7,426	7,436	+10
Other than permanent	1,955	1,963	+8
Total average paid employment	9,381	9,399	+18

Mr. YATES. Mr. McDade?

Mr. MCDADE. No questions.

Mr. YATES. You may go, with our blessings.

Thank you very much.

WITNESSES

	Page
Bajema, D. D	608
Baker, R. L	1
Balsley, J. R	608
Barrett, R. E	1
Bettenberg, William	1, 608
Christie, J. D	188
Cook, J. O	1
Coulter, H. W	608
Cragwall, J. C	608
Davis, Robert	588
Debuchananne, G. D	608, 954
Edgar, Terence	608
Fygi, E. J	188
Gilmore, Comdr. G. R	588
Grant, E. J	608
Hackett, Milton	608
Hamilton, R. H	608
Hanfling, R. I	188
Henrie, Dr. T. A	55
Houtman, F. L	588
Howell, M. D	188
Jones, Capt. H. R	588
Kirby, R. C	55
Klepper, M. R	608
Lockwood, G. O	1
Lyddan, R. H	608
Mckelvey, V. E	608
Morgan, Dr. J. D., Jr	55
Nelson, A. P	1
Nelson, Capt. R. H	588
Noel, T. E	188
O'Leary, J. F	188
Oyler, W. D	55
Radlinski, W. A	608
Reuling, Lt. Comdr. T. J	588
Schilk, D. P	1
Seneca, Martin, Jr	188
Sheldon, R. P	608
Shepich, T. J	1
Smith, G. C	188
Stassi, J. J	608
Vogel, Comdr. L. W	588
Waller, L. W	1
Wayland, R. C	608
Weiss, Alfred	55
Wiles, F. M	1, 55, 608
Yancik, Dr. J. J	55
Zabetakis, M. G	1
Zimmerman, Dale	608

INDEX

	Page
Bureau of Mines	55
Abandoned lands, reclamation of	179
Aluminum pilot plant	153
Anthracite conversion demonstration plant	180
Anthracite mined land demonstrations	162
Asbestos fiber problems	115
Budget changes, fiscal year 1978	109
Budget requests:	
Coal mining research	111
Fiscal year 1978	96
Fiscal year 1978 coal mining	110
OMB reductions in	143
Bureau field locations	81
Bureau minerals role	81
Canadian imports and trade relations	87
Cartels, other possible areas for	142
Catalog of minerals problems	89
Chances for (citrate process) project success are good	156
Chrome imports and usage	90
Chrome imports, source of	94
Chrome mining, history of domestic	93
Chromium research programs	91, 92
Chromium stockpile and imports	94
Citrate process for the gas desulfurization	156
Clean air act standards	103
Coal extraction research, projected funding for	108
Coal mine development	117
Coal mining technology, advancing—results to date	172
Coal mining technology research	116
Coal preparation:	
Adequacy of funding for	105
Economics of	104
Improvements from	103
Research	96
Coal producion, effect of mining research budget reduction on	144
Coal research funding priorities	105
Coal slurry pipeline	97
Columbium deposits, United States and foreign	85
Columbium importation and domestic resources	84
Congressional action on Rhodesian chrome imports	94
Congressional funding responsibility	107
Conventional continuing mining	119
Critical minerals, impact of proposed programs	153
Critical minerals, metallurgy research on	152
Critical minerals, situation reports on	87
Data collection activities, coordination of	151
Department of Energy, transfer proposed:	
Effective programs, transfer and retention	152
Functions	150
No facilities	150
Personnel, effect on bureau program	150
Program	122, 150

Bureau of Mines—Continued

	Page
Department of State attaches	81
Diamond stones, industrial	90
Dust, fume, and small particulate control	157
Dust problems, respirable	168
Energy balance in steel processing	160
Energy loss in cooling steel ingots	161
Energy data collection and analysis	181
Energy funding priorities	106
Fine coal characteristics and use	101
Fine coal combustion efficiency	102
Flow of information into bureau	81
Funding and personnel requirements, additional	144
Haulage and equipment accidents	169
Health	162
Helium fund	187
Import dependence for certain minerals	138
Imported minerals, sources	95
International Bauxite Association	142
Lateritic ores, beneficiations of	138
Locatable minerals	139
Locatable versus leasable minerals	140
Longwall and shortwall mining	118
Magnetohydrodynamic research	97
Methane:	
Cryogenic processing	1125
Location in the coal seam	124
Recovery in advance of mining	123
Recovery research	123
Methane-coal dust explosions	169
Mica imports and substitutes	85
Mica processors	86
Mica substitution technology development	86
Mine fire control programs	125
Mined imports and exports	83
Mined land demonstrations	110
Mineral and meal needs, minimizing	159
Mineral and resource attaches and country assessments	82
Mineral embargoes, vulnerability to	141
Mineral import dependence date	84
Mineral land assessments	111, 184
Mineral land assessment, budget increase for	184
Mineral leasing laws, origins of	141
Minerals availability system	116
Minerals in the economy, role of	82
Minerals patent laws, origin of	140
Miners, training of	113
Mining, environmental consequences of	180
Mining health and safety research	112
Mining research, coordination of	151
Oil shale, recovery of minerals from	154
Organization	64
Overall organization of bureau	81
Personnel and funding relationship	122
Personnel requirements, additional	122
Petroleum imports, refined	83
Pipeline versus rail, costs of	99
Positions, need for new	153
Priority areas for added funding	111
Reports of bureau	82
Research, development, and demonstration cycle	109
Roof fall accidents	168
Safety	163
Slurry pipeline water requirements	98
Stockpile legislation and planning	88
Strategic stockpile, bureau relationship to	82

Bureau of Mines—Continued Page

Strip-mining legislation, programs for implementing 112
Strontium imports 86
Sulfur, use in paving and construction 157
Sulfur, uses of byproduct 156
Surface coal mining 121
Trace elements in mineral processing 115, 155
University research, bureau support for 114
Unobligated balances and carryover—year funding 187
Uranium situation 89
Urban refuse processing research, status of 158
Wilderness areas:
Adequacy of mineral surveys 129
Availability of minerals 141
Discovery of specific minerals 137
Known mineral resources 136
Mineral discoveries in 128
Mineral survey workload 130
Mineral surveys 126
Presence of minerals 138
Recurring mineral surveys 136
Wilderness bills, pending instant 129
Wilderness legislation 139
Wilderness mineral surveys, status of 127
Wilderness study areas, addition of new 128

Federal Energy Administration 188–587
Appliance program 527
Biographies 194–198
Budget, FEA 394
Budget request, fiscal year 1978 396
Coal:
Anthracite as an important resource 533
Coal mine expansion relationship to Bureau of Mines 532
Conversion 431, 434, 543
Conversion in South Africa 443
Distribution study 534
Efficiency compared to oil and gas 453
Energy Resource Development 529
Environmental standards for coal 408
Financial status of coal transportation 535
Gasification 439
Indian Lands Coal Development program 532
International Energy Agency 419
Loan Guarantee program for low sulfer mines 533
Movement 408
New construction, use in 431
Pennsylvania Anthracite program 532
Production 454, 549
Programs 530, 531
Rail transportation 534, 535
Relationship to nuclear field 544
Siting 549
Use of water for coal slurries 474
Conservation:
As an answer to the energy problem 412
Automobile mileage 400
Awareness 400
Economic impact of 404
Education 509
Efforts 398
Energy audits 508
Energy extension service 508
Gasoline shortage 403
Importance of 399
Innovative programs 503, 505, 506
Life cycle costing 399

Federal Energy Administration—Continued
Conservation—Continued Page
Mandatory programs 456
Man-years and positions 528, 529
Marketing office 502
National programs 511
Program evaluation duplication 502
Public response 401, 505
Purchases, Federal 399
Small cars versus large cars 402
Speed limit 402
State building performance standards 510
Technology transfer 508
U.S. policy 405
Voluntary programs, response to 455
Employment:
Consultants 396
Employee transfer from Congressional offices 395
Employee turnover 394
Retired military personnel 395
Energy:
April 20 message 422
April policy paper 444
Future action 421
Harris poll results 428
Increased use 396
Industrial use 432
Relationship to the economy 412
Relationship to water 474
Relationship, United States with other countries 419
Reorganization 393
U.S. world position 417
Energy Finance Advisory Committee 546–548
Energy independence authority 542
Energy information and analysis:
Aggregation of confidential data 466
Confidential financial information 466
Data Services:
Availability 462
Collection reforms 463
Duplication 461, 464, 465
Evaluation 470
Gathering modeling and forecasting 467
On coal reserves 463
Services and data analysis distinction 471
Services, programs supported by 471
Systems, importance of 471
Validation effort 469
Economic impact office 458
EIA and new Department of Energy 462
EIA reporting requirements 462
EIA studies 460
Employees 459
Energy related forecasts 464
Enhanced oil recovery estimates 468
Evaluation of other agency data systems 461
Federal Power Commission data collection 468
Horizontal and vertical divestiture 458
Independent data verification 456
Information to the public 465
Internal energy supply analysis 469
National Energy Information System 461
National household survey 459
Oil and gas reserves assessment 467
Oil and gas reserves survey 469
Staff resources 459
State income and employment analysis 458

Federal Energy Administration—Continued	Page
Environmental functions	550
Financial planning incentive activities	545
Gas:	
Alaskan gas	445
Cash-flow argument	482
Design basis for the gas system	435
Electric generation in industry	433
Gas Act economic philosophy	481
Interstate versus intrastate market	434
Legislation needed	435
Natural gas:	
Essential uses of	438
High priority of burning	437
New homebuilders, options of	436
New households, attachment to	436
Overview of the present gas sytsem	434
Peak demand, problem of	436
Propane:	
Additional transportation of	495
Allocation, study of	493
No authority to require production of	493
Storage of	494
Supply problems	455
Rate increases by FPC	475
Reward of economic activity	481
Taxes, impact of	475
International energy affairs	550
Introductory statement	189, 193
Justifications	199–392
Light bulbs, fluorescent and spherical	443
Magnetohydrodynamics	442
Nuclear energy:	
Development	413
Effect of resultant price on oil and gas supplies	455
Fissionable material	417
Investment	414
Policy with regard to other countries	415
Power growth by 1985	455
Problems	417
Safeguards	416
Waste disposal	414
Obligation guarantee program	511
Description of positions	512, 513
Estimated energy savings	515
Obligation guarantees	511
Obligation guarantees $500 million	514
Public awareness of	514
Targets for	514
Technical assistance	515
Oil:	
Alaskan oil	444, 446
Arms sales	406
Audit coverage	490
Capped wells	423, 428
Capture of economic rents	480
Central purchasing agency	478
Chemical recovery efforts	438
Conservation:	
Costs	452
Demand	452
Decontrol:	
Impact	476
Spur to exploration	478

87-591 O - 77 - 65

Federal Energy Administration—Continued
Oil—Continued
Page

Deregulation:
Categories of 425
Effect of 426
Texas 484
Direction of energy policy 476
Discoveries, future prospects of 421
Drilling:
Offshore 420
Outer Continental Shelf 484
Reinvestment 483
Embargo 477
Entitlements program 478
Exception procedures 480
Field development 427
Forced deliveries 486
Forecasts 420
Foreign relationship of oil producing companies 551
FPC preliminary decision 447
Heating oil trigger formula 474
Illinois petroleum marketers 472
Imports:
Increase of 397
Mandatory program 491
Indian claims 446
Inflation, aspects of 407
Lease agreements of oil companies 552–553
Middle distillate trigger 474
Occidental process 442
Oil and gas, short-term manageability 433
Pet 4 429
Phillips decision 487
Prices 397
Ideal structure of 479
Measurement of 426
Three-tier and one-price system 479
Production:
Encouragement of 485
Signals to producers 481
Texas 422
Refiners:
Computer programs, testing of 491
Inspection of 493
Major 488
Northern tier, thinking on line to 446
Shortage of 452
Small 488–489
Regulation development and standby resources 492
Requirements and production 405
Resellers 490
Reserves for producers 427
Savings from Coal Conversion program 453
Shale 439
Contribution of 441
Investment as a constraint 439
Processes to be studied 441
Prototypes, Government construction of 440
Shoe manufacture argument 482
State set-aside program 472
Supplies 407, 455
Holding off market 424
New 419
Philadelphia problem 487
Slowdown of decreasing rate 426
Tertiary oil recovery 438, 473
Theory of Hubbard's pimple 413

Federal Energy Administration—Continued

Oil—Continued

Page

Use of, in public buildings 431
Withholds, Interior investigation of 486
Zapp hypothesis 421
Poston letter 507
Progress, FEA 393
Questions and answers 572–587
Regulatory data coordination activities 502
Resistance heating 440
Rosenberg proposal 527, 528
Sea-Aside program expiration 473
Short-term:
Other options 430
Priorities 429
Relationship to energy 428
Solar:
Lake Michigan Federation 542
New solar technologies ready for commercialization 539–541
Solar energy time frame 413
Solar, geothermal and synthetic fuel programs 537
Stanton letter 517, 518
Formula for distribution of State grants 507
Guidelines for State energy conservation plans 508
State Department energy staff 551
State energy conservation plans 507
State grants 507
Strategic Petroleum Reserve 554
Alternative financing methods 560
Appropriation authorization 561
Authorization of Strategic Petroleum Reserve 560
Breakdown of storage preparation costs 566–567
Brine disposals 563
Canada, additional oil supply from 499
Changes in obsolete regulations 495
Contingency planning 499–501
Criteria for selection of tankers 568
Defense supply center to purchase oil 570
Employees, function of 565
Entitlements 558
Foreign inspection of tankers 569
Foreign storage sites 555
GAO, disagreement with 570
GAO study 569
Helium, waste of 571
Hydrocarbon emissions 563
Industrial reserves, viability of 562
Industry storage capacity, increases to 560
Long-lead procurement 564
Management of program 562
Methane, waste of 571
Northern tier study 497–498
Operating expenses 568
Procurement of oil 556
Profitability of storage 557
Safety of tanker transportation 563
Saudis, direct oil purchase from 559
Source of oil for storage 556
State contingency plans 502
Storage facilities, availability of 554
Storage facilities, description of 555
Storage facilities, security of 556
Storage site costs, estimate of 557
Strategic transportation supply 495
Tanker transportation, safety of 563
Update of northern tier study 496

Federal Energy Administration—Continued

Page

Synthetic Fuels:
- Plants ---- 542
- Purification of air ---- 543

Uranium:
- Cost ---- 418
- Enrichment ---- 415
- Location of U.S. uranium ---- 419
- Supplies ---- 418

Utilities:
- Cogeneration, involvement of ---- 544
- Cooperation ---- 521
- Demonstrations ---- 516, 521–524
- Energy initiatives ---- 411
- Federal bureaucracy, bias of ---- 519
- Greenes, Robert, statement of ---- 525–527
- Intervention consideration ---- 519, 520
- Investment ---- 411
- National utility picture ---- 409
- Northwest picture ---- 409
- Plant construction ---- 457
- Power generation, centralized ---- 457
- Power generation, decentralized ---- 457
- Power reliability and productivity ---- 544
- Rate reform ---- 516
- Regulatory institutions programs ---- 515
- State Regulatory Commissions ---- 518
- State Utility Commissions ---- 517

Weatherization program ---- 397, 509
- Commitment of weatherization funds for fiscal year 1977 ---- 398
- Regional weatherization personnel ---- 509

Geological Survey ---- 608
- Alaska, mineral potential of ---- 872
- Alaska mineral resource assessment program ---- 875
- Aquifer systems, other major ---- 921
- Aquifers in the United States, productive ---- 923
- Aquifers in west and survey jurisdiction ---- 730
- Aquifers, maps and volume of water in each ---- 922
- Arctic environmental studies ---- 868
- Arctic gas pipeline, EIS (Environmental Impact Statement) for ---- 686
- Areas to be addressed with supplemental funds ---- 793
- Atlantic seaboard, fault movement on ---- 863
- BLM (Bureau of Land Management) Organic Act ---- 692
- Budget increase, fiscal year 1978 ---- 803
- Budget request, adequacy of ---- 804
- Budget request to Department ---- 805
- Budgets, past 10 years' ---- 804
- Bureau of Reclamation ---- 998
- Capability to administer growing program ---- 813
- China visit by Mr. Edward Chao ---- 754
- Travel expenses, payment of ---- 755, 756

Coal:
- Exploration, interpretation of requirements for ---- 684
- Federal-State agreements ---- 692
- Hydrology ---- 883
- Land classification ---- 992
- Leasing program ---- 993
- Mining technique ---- 882
- Preference right leases ---- 683
- Resource assessments ---- 880
- Resource studies ---- 880
- Royalties ---- 684
- Strip mining ---- 882

Conservation of land and minerals ---- 975

Geological Survey—Continued	Page
Conterminous State mineral assessments, objectives of	876
Conterminous States mineral surveys	874
Contracting, need for	812
Contracting, other examples	812
Contracts and grants workload	811
Core program hydrologic research	925
Critical mineral commodities	876
DORIS and CRIB mineral information systems, explanation of	877
Dams near seismic activity	869
Data, availability of	872
Data collection and analysis	902
Denver fire	833
Department action on order 1 through 14	809
Drilling, exploratory	901
Drought	792
Advisers to the President	797
Cooperative efforts toward dealing with	795
Data gathering automation	798
Existing conditions	726
Ground water:	
Location of	725
Maps	726
Sources of supply	725, 798
Monitoring of conditions	725
NOAA (National Atmospheric and Oceanic Administration), cooperation with	796
Need for additional funds	730
Problems	795
Program to reduce problems	724
Reason for additional funds	798
Steam gaging stations	796
Supplemental request for funds	792
Water:	
Evaluation of potential for alternative supplies	799
Monitoring, increased	799
Storage projects	795, 800
Due diligence	687
EROS (Earth Resources Observation System) multispectral scanning	723
EROS program	990
Earth materials, accurate dating of	870
Earthquakes:	
Adequacy of funds for program	704
Animal behavior research for prediction	845
Budget relationship to prediction results	853
Budget request	834
Calculation of severity	712
California uplift	848, 855
China	854
Chinese expenditures for programs	840
Chinese prediction capability	701
Communications with other agencies	848
Dam siting	709
Data and information services	860
Data, capability for processing	852
Data exchange with Chinese and Russians	858
Earth plates, explanation of	700
Eastern magnitudes	837
Eurasian plates	701
Expenditures by Federal agencies	707
Extent USGS (U.S. Geological Survey) funding would reduce other Federal funding	706
Facilities built on faults	698
Fault lines in California, other	697

Geological Survey—Continued
Earthquakes—Continued
Page
Federal agencies involved in studies 697
Funds for studies 694
Future technology 716
Geologic processes that present hazards 837
Good control of program problems 708
Hazard delineation and evaluation, funds for 859
Hazards mitigation 692
Identification of areas 857
Impact of program on achievement by other agencies 840
Intensity 712
Laboratory and modeling, cost of 852
Local authorities, concern of 857
Losses 697, 705, 796
Magnitudes exceeding predictions 760
Mobilization efforts by Chinese 703
National Science Foundation program 707
Nuclear reactors:
Adequacy of design 710
Advisory Committee on Reactor Safety 716
Committee concern about siting 719
Consultation with survey regarding siting 760
Design standard 715
Diablo Canyon 709
Geologic and seismologic analysis 710
Ground motion needed to breach housing 719
Location in relation to faults 761
Maximum ground movement at Diablo Canyon 714
Melt-down, impact resulting from 714
Melt-down, potential 710
North Anna Power Station, Louisa County, Va 762, 781
Retrofitting, cost of 710
Role of Geological Survey in determining sites 709
Seismic activity, subject to 762
Site applications participated in by USGS 767
Sites in Eastern United States 718
Sites in seismic areas 759
Sites in Washington State 720
Siting 717, 756
Virginia 769
Washington Post articles 781–792
Origin of Dr. Simon's research studies 846
Other agencies involved in program 840
People's Republic of China program 754
Personnel requirements for program, additional 812
Population of potential areas 856
Prediction—Stever Report 701
Programs in other Federal agencies 706
Project VELA 852
Recent activity 855
Recurrence pattern 855
Regional scale evaluation 835, 846
Research by Dr. Ruth Simon 845
Rio Grande rift—New Mexico 714
Romania 755, 757, 854
Severity prediction 711
Stever committee comments on other Federal agencies programs 707
Tectonic plates 756
Basis for existence 838
Boundaries 837
Continental drift on weather, impact of 839
Map showing movement of 843
Movement 838
Origin of concept 839

Geological Survey—Continued
Earthquakes—Continued
Page
Total funding for program 840
Tsunami warning program 706
United States, in the 758
Uplift in other parts of the world 858
Worldwide standardized seismograph network 852, 859
Eddy and Lea Counties, N. Mex 687
Emergency procedures for collection and assessing gas royalties 651
Employees in Federal-State cooperative program 812
Energy lands research 864
Energy Policy and Conservation Act 660
Energy production, minerals for 876
Energy related environmental investigations 897
Energy resource data systems 896
Engineering geology 868
Estuarine studies 975
Federal and Indian energy mineral leases:
Diligent development 983
Program accomplishment 984
Regulation of 984
Results from 984
Federal and Indian gethermal leases, operations on 989
Commercial geothermal wells in operation, number of 989
Development, length of time for 990
Geothermal power, schedule for producing 989
Regulation 989
Royalties from geothermal production 990
Federal and Indian oil and gas leases 984
Regulation of operations 984
Reservoirs, number of 984
Federal coal leasing exploration 883
Federal leases, production of gas under 653
Federal OCS (Outer Continental Shelf) and onshore petroleum production 651
Federal oil shale leases, operations 985
Information 987
Number of 986
Payment of fees 988
Regulation 985
Rio Blanco project 987
Solicitor opinion on rights 987
Suspended lease, review of modification 988
Suspension of 986
Flood hazard mapping 975
Gas:
Availability under contract 658
Gulf of Mexico, from the 659
Pipeline facilities for transportation of 661
Price of 657
Reserve estimates on completed fields 654
General administration 1008
Employee career development 1009
Funding of expenses 1009
Increase in permanent employment versus a decrease in average permanent employment, explanation of 1014
Rate of funding new positions 1012
Geochemistry, and geophysics, funds for resource techniques in 880
Geochemistry and geophysics, resource techniques 879
Geological Survey capability for reserve estimates 884
Geophysical data from private industry 901
Geophysical exploration methods 888
Geothermal investigations 893
Geothermal systems modeled 896
Government's authority to require additional production 666
Grand Canyon, study of 998
Ground water recharge 971

Geological Survey—Continued	Page
Ground water recharge program, acceleration of	973
Ground water recharge program and progress to date	972
Horizons, number of	657
Identification of nonproducing reservoirs	655
Igneous rock	879
Imagery:	
Adequacy of staff to handle new	1000
Areas of lease	1003
Applications demonstration and research	1000
Cost recovery	1001
Environmental impact analysis	1002
Funding by EPA (Environmental Protection Agency)	1007
Funds for production of experimental and demonstration land use	1005
Geography program	1003
Land resource data applications	1005
People in EIS activity, number of	1002
Powder River regional EIS	1003
Professional Paper 964, cost of	1005
Resource inventory of Idaho, Oregon and Washington	1001
In-house publication services, reduction of	834
Interstate shipment of gas	657
Known reservoirs, number of	656
Landslides	869
Leases covering production, provisions of	667
Letter from Gilbert F. White	695
Madison limestone aquifer	729, 919
Marine geology investigations	898
Marine geology program, accomplishments of	898
Maximum efficient rate of production	661, 667
Mineral information systems and resource analysis	877
Mineral resource processes research program	878
Mineral resource recovery	687
Mineral survey reports	874
Mines on public lands	994
NAWDEX (National Water Data Exchange), information for	904
National coal data system	882
National mineral policy decisions	877
National Petroleum Reserve in Alaska (NPRA)	631
Civilian holdings	633
Contractor for work	811
Contribution to Nation's energy needs	639
Depth of wells	644
Discoveries	637
Distance to Prudhoe Bay	641
Drilling of wells	637
Drilling schedule	648
Employees, need for more	659
Environmental restoration	650
Exploration wells, number of	635, 639, 642
FEA (Federal Energy Administration) study	648
Flexibility to change drilling program	645
Gas exploration	639
Husky Oil Co	648
Mapping	632
Minimum reserve size for economic recovery	643
Naval Arctic research laboratory	635
Naval personnel, transfer of	635
Naval Petroleum Reserve No. 4	643
Navy 5-year exploration plan	635
Navy, future role	635
Offshore drilling	634
Personnel	631, 635
Petroleum potential	641

Geological Survey—Continued
National Petroleum Reserve in Alaska—Continued
Prudhoe Bay:
Page
Drilling in 640
Gas reservoir 643
Proven reserve 640
Request for new positions 635, 648
Seismic areas 642
Size 631
South Barrow gas field 637
Gas production 638
Operations 650
Production 635, 650
Reserves 638
Umiat, oil field at 642
Year-round drilling operations 643
Zone A 632, 640
National quality accounting network 903
National water data activities 905
National water data exchange 903
Nonenergy mineral leases, regulation of operations on 990
Nuclear activated drill hole tool 893
Nuclear power reactors (*see* also Earthquakes) 862
Nuclear power reactors, other agency funding 862
Nuclear power reactors, relationship with other agencies 864
OCS (Outer Continental Shelf) oil and gas operation 669
Adequacy of present staff 675
Distribution of new positions 675
Data, disposition of 808
Funds for appraisals 900
Gulf of Mexico, number of producing reservoirs 657
Harry Diamond Laboratory study on OCS operational safety devices 982
Leases:
Diligence provisions 807
Duration and extension 670
Involuntary terminations, number of 809
Leasing and management process 897
New order for 808
Outstanding 809
Pipeline facilities, not producing due to lack of 662
Produce or lose lease 806
Sale schedule 898
Secretarial order, intent of 806
Statistics 807
Terminated number appealed 808
Washington Post article on production 805
Operational safety devices 982
Personnel, request for additional 674
Pipeline jurisdiction 662
Pipeline safety 676
Pipelines, capacity and utilization of 665
Process for appraisals 897
Production from existing wells, increased 665
Regulations governing 669, 975
Reserve inventory 670
Reserve studies:
Adequacy of resources to conduct program 980
Difficulty in establishing objectives 981
Funding and personnel needed, estimate of 982
Gulf of Mexico 978
Incidental studies 976
Inventory of oil and gas fields 980
Proposed amendment for reserve inventory studies 976
Resources needed to complete program 982
Seismic risk and ocean bottom stability 977
Time needed to complete 978
Tract selection and evaluation 978

Geological Survey—Continued

OCS—Continued — Page

- Safety regulations, recommendations for improvement — 672
- Safety violations, validating — 672
- Secretary's position on additional drilling — 664
- Shut-in wells — 663
- Third party inspections — 671, 676

Offshore data collected by the Geological Survey — 900
Offshore geologic surveys — 897
Offshore petroleum resources — 900
Oil and gas:

- Lease tract selection and evaluation — 991
- Onshore resource investigation — 883, 885
- Reserves on Federal lands — 654
- Resource appraisal group — 896

Oil, gas, and potash leasing and development within potash area — 687
Oil royalties — 651

- Cost per barrel — 652

Oil shale:

- Environmental impact statement, need for — 970
- FEA (Federal Energy Administration) and ERDA (Energy Research and Development Administration)
- Geothermal and nonenergy mineral leases — 995
- Hydrology program — 969
- Occidental mining plan, survey action on — 969
- Occidental program — 969
- Program achievements — 886
- Resource investigations — 886

Oil spills — 809
Papago Indian lands—Mr. L. A. Heindl's study of 1954–59 — 967
Papago Indians and Mexican ground water usage — 966
Pay cost annualization — 834
Personnel, adequacy of number of — 810
Personnel, interchange among programs — 870
Petroleum resource reports — 885
Pipeline facilities for transportation of gas — 661
Private industry, value of services to — 879
Problem areas — 631
Producing fields with nonproducing reservoirs — 655
Program benefits, achievement of — 696
Radioactive waste:

- Burial:
  - Filter for present sites — 941
  - Selection of sites — 960, 969
  - Suitability of material, determination of — 953
  - Transportation of low level wastes to sites — 952
- Disposal — 753
  - Adequacy of criteria — 948
  - Nuclear waste — 953
    - Adequacy of current funding — 959
    - Enewetak — 962
    - German sites — 963, 964
    - Soviet Union — 964
  - Safe disposal, development of criteria — 950
  - Salt caves, use for — 959
- Ground water, contamination of — 945
- High level wastes — 949, 960, 961
- High or low level, definition of — 948
- Low level:
  - Concern about — 945
  - Definition of — 963
  - Examples of products — 948
  - French and British, disposal by the — 963
  - Health hazard, potential of — 946
  - Importance of proper disposal — 948
  - Monitoring — 944

Page

Geological Survey—Continued
Radioactive waste—Continued
Plutonium 951
Products, definition of 948
Studies 944
Testimony of Mr. Debuchananne 959
Water resources with low level radioactivity 965
Reserve estimating capability, resources needed to develop 884
Resources and reserves 883
Resources processes research 878
Royalties collected in kind, 1976 652
Royalties, Government's share in 653
Royalties in kind 651
Royalty payments, coming 686
Seismic areas, high risks 698
Seismic measurement of fault lines 863
Shut-in wells, funds for monitoring 705
Statement of McKelvey 608
Stripmining areas, studies in 864
Subsurface waste storage 974
Supplemental funds, requests for 803
Surveys, methods of conducting 872
Tar sands deposits 683
Teton Dam 869
Topographic mapping:
Backlog 721
Cartographic data in digital form 722
Contracting for
Comparison of economics and efficiencies 720
Contracts 720
Cost studies to evaluate 721
Opinion regarding 722
Quality of maps 721
Reasons for 721
Duration of program 829
Federal agencies, coordinating requirements of 722
Glossary of mapping terms 819
Importance of maps 818
Map modernization, advisors for 830
Mapping:
Contracts, research and development 830
Fiscal year budget 1977, reduction for 827
Intermediate scale 833
Modernization 829, 832
New and revised 826
OMB (Office of Management and Budget) task force study 832
Other agency 829
Regional, and analysis 869
Standard, covering of United States by 825
Surveys, and 813
Technology, modernization of 828
Types needed for country 814
Maps prepared for United States only 818
Metric mapping series 832
Rate of 825
Series, scales, and principal users 814
Tribe mineral resource exploration and production 691
Underground heat storage 970
Underground heat storage program, explanation of the 971
Underground mining in west, problems with 883
Uranium exploration techniques, explanation of 888
Uranium potential 888
Uranium/thorium resource assessment 888

Geological Survey—Continued

Page

Volcanoes:
- Eruptions — 860
- Funds, need for additional — 862
- Hazards — 860
- Krakatoa — 862
- Mauna Loa, size of — 861
- Monitoring stations — 861

Waste treatment:
- EPA and Oregon, concurrence in survey findings — 750
- EPA (Environmental Protection Agency), coordination with — 750
- EPA, review of procedures — 751
- Enewetak, clean up of — 754
- Expansion of study to other rivers — 751
- Facilities — 749
- Radioactive waste disposal — 753
- River-quality assessments, methods and results of — 752
- Sewage, alternative to rigid treatment standards — 750
- Williamette study — 751

Water:
- Adequacy of programs — 742
- Adequacy of research programs — 742
- Adequacy of supply, responsibility for — 740
- Authority for studies — 747
- Brackish and saline:
  - Conversion — 741
  - Geological Survey investigations — 747
  - Research on conversion of — 747, 925
- Bureau of Reclamation — 742
- Committee concern about problems — 741
- Geological Survey responsibilities for — 727
- Institutional problems regarding ownership and control — 735
- Interior programs, coordination of — 740
- Other Federal agencies, work with — 735
- Projects in Washington and Oregon — 731
- Research — 740
- Responsibility for programs and problems — 743
- River quality assessment research — 744
- Use information — 739
- Wells in North Dakota — 744
- Willamette River basin study — 745
- Yampa and Chattachoochee River basin studies, selection of — 746

Water reservior development — 998

Water resource development, land classification and evaluation — 998

Water resources:
- Bureau of Reclamation water programs — 801
- Coal hydrologic monitoring systems, location of — 942
- Colorado River Dam — 801
- Contamination in Oklahoma — 910
- Determination of studies — 935
- Employees in Federal-State cooperative program — 813
- Federal-State cooperative program—coal hydrology — 931
- Geological Survey coordination with State water agencies — 915
- Ground water:
  - Contamination of — 945
  - Reserves — 924
  - Usage in California — 923
- Hydrologic investigation of public lands — 930
- Hydrologic work on public lands — 930
- Lease operations and evaluation of budget needs — 802
- Location of three projects being studied — 930
- Maximum efficient rate of production — 802
- National water problems, critical — 938
- Non-Federal lands, lack of information — 913

Geological Survey—Continued
Water resources—Continued
Page
Oil recovery impact in other States 916
Oklahoma study 915
Radioactive waste, low-level 942, 965
Shut-in wells, verification of 802
State agencies involving contamination, reports to 916
State water agencies, coordination with 914
Training, publications, and other services 931
Vamoosa formation, saltwater contamination of the 919
Warning State about contamination 918
Water recovery, studies on 931
Water use data program 934
Wilderness mineral surveys 871
Wilderness program increase in subsequent years 871
Wilderness program surveys, completion of 873
Work under contract, adequacy of 811

Mining Enforcement and Safety Administration 1
Absorption through improved efficiency 34
Accident prevention in metal/nonmetal mines 22
Accident prevention program, selection process for 40
Annualization costs 33, 53
Appropriations, growth in 11
Areas of possible reductions 22
Assessment conference procedures 29
Assessment system 25
Attrition rates for metal/nonmetal 42
Automobiles and replacement standards, number of 43
Black lung 12
Blitz inspections 13
Cabs and canopies 27
Causes of increased safety 12
Closure orders 26
Coal inspection requirements 23
Coal mine inspectors 29
Coal mining equipment, certification of 50
Comprehensive health program 21, 41
Comprehensive training plans 46
Cost of operating versus market price 26
Disaster, prevention of 14
Dust control program 20, 31
Dust standards 12
Educational and training changes 45
Electrical systems laboratory 51
Employment, actual 9
Explosions, causes of 16
Explosive storage facilities, inspection of 44
Fee collections 51
GSA (General Services Administration) motor pools 43
GSA space costs 39
Health program, computerization of the 29
Health programs 20
Industry frequency rate 41
Impact inspections 37
Impact on the industry, increased 26
Inspection/facilities 44
Inspector attrition 35
Inspectors, average salary of 36
MESA (Mining Enforcement and Safety Administration)/OSHA (Occupational Safety and Health Administration) training relationship 42
Management information 31
Manual information system 31
Matrix management program 43
Metal and nonmetal mine health and safety 39
Metal/nonmetal programs, accomplishments in 44

Mining Enforcement and Safety Administration—Continued	Page
Methane and the mining process	17
Methane gas, capturing	37
Methane monitors	15
Mine closure orders	24
Mine emergency operations equipment	53
Mine profile rating system	35
Mine profile system	23
Mine profile system, expansion of criteria	36
Mines, growth in	11
Mining in presence of methane	15, 18
Motor vehicles, purchase of	9
NIOSH (National Institute of Occupational Safety and Health study	45
National Mine Health and Safety Academy	47
Contracts	47
Operation of	49
Operations at	50
Outside attendance	48
Private industry traniing	
Student enrollment	48
Non-coal-mining hazards	19
OMB (Office of Management and Budget), request to	54
Other support costs	51
Pay increases, 1977	42
Penalties, pass-on of	25
Personal sampler	13
Piecework mining	19
Position lapse	9
Program administration	42
Program expansion	20
Research funding, additional	22
Roof and ground control	52
Roof bolting system	27
Roof fall fatalities	27
Roof falls, efforts to control	28
Safety, increased	11
Samples, manipulation of	32
Special inspection programs	24, 33
State grant applications, new	39
State grant program	38
State officials, coordination with	23
State safety laws	23
Technical support	50
Television and radio messages	47
Terminals, use of	30
Training models	47
Underground and surface regulation, review of	47
User fees	51
Vehicles, additional	33
Ventilation	52
Violations, assessment of	29
Vp-gech schools	10
Winter alert programs	36
Naval Petroleum Reserves	588
Budget:	
Adequacy of fiscal year 1978	599
Initial submission	601–606
Costs:	
Development	600
Production	592
Production at NPR–3	598
Elk Hills:	
Personnel increases at	598
Pipeline	592

Naval Petroleum Reserves—Continued	Page
Extraction process	595
Natural gas:	
In Alaska	598
Oil shale exploration	607
Reserves	596–597
Interior, transfer to Department of	593
Nelson, Robert H., Captain, CEC, USN:	
Biography	588
Statement	589–591
Summary	588–590
Oil:	
Production/reserves	591
Utilization	591
Oil Shale:	
Extent of reserves	595
Market price of	594
Natural gas and	607
Reserves	593
Personnel:	
Increases	596
Increases at Elk Hill	598
Predevelopment:	
Content of plans for	600
Plans for	594
Status of:	
NPR–2	596
NPR–4	593
Water needs	607
Wells, differences in	596

○