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PROBLEMS OF ELECTRICAL POWER PRODUCTION IN THE SOUTHWEST

GOVERNMENT
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CUMENTS

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HEARINGS

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BEFORE THE

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS UNITED STATES SENATE

Pursuant to S. Res. 45
A National Fuels and Energy Policy Study

NINETY-SECOND CONGRESS

FIRST SESSION

ON

ENVIRONMENTAL PROBLEMS ASSOCIATED WITH THE PRO-
DUCTION OF ELECTRICAL POWER BY COAL-FIRED PLANTS
IN THE FOUR CORNERS REGION OF THE SOUTHWEST
UNITED STATES

WASHINGTON, D.C.—NOVEMBER 10, 1971

PART 6

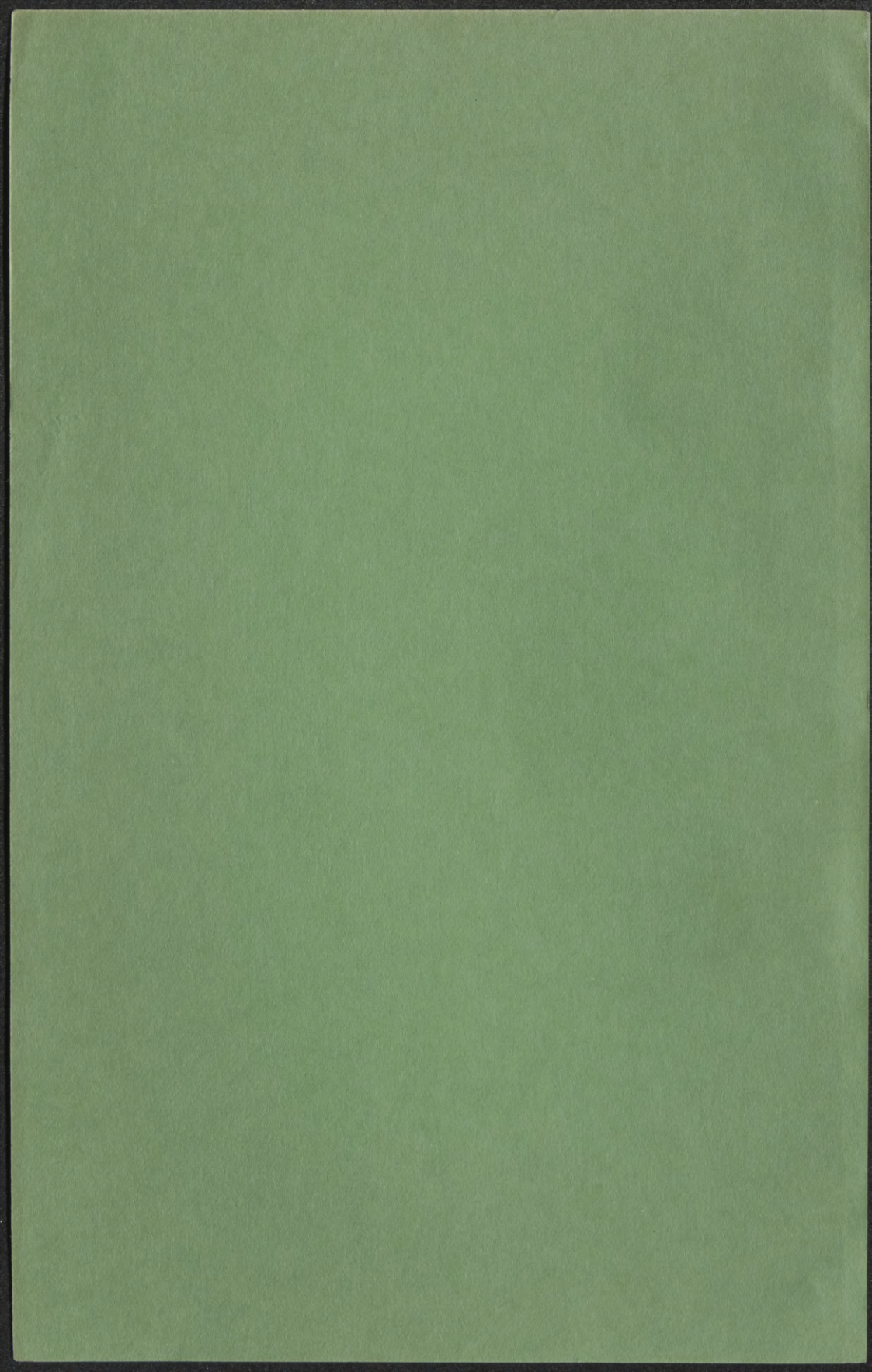
Serial No. 92-16



Printed for the use of the
Committee on Interior and Insular Affairs

AUTHENTICATED
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INFORMATION





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63-876 O

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PROBLEMS OF ELECTRICAL POWER PRODUCTION IN THE SOUTHWEST

WEDNESDAY, NOVEMBER 10, 1971

U.S. SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The committee met at 10 a.m., pursuant to notice, in room 3110, New Senate Office Building, Senator Frank E. Moss, presiding.

Present: Senators Moss, Anderson, Bible, Stevens, Jordan, Hansen, Allott, Montoya, Fannin, and Hatfield.

Also present: Jerry Verkler, staff director; Daniel Dreyfus, professional staff member; and Charles Cook, minority counsel.

Senator Moss. The committee will come to order.

The purpose of this hearing before the Senate Committee on Interior and Insular Affairs is to take testimony on the impact of thermal-electric powerplant development on the desert region of the Southwest. The hearing will be a continuation of the committee's investigation which has included 5 days of field hearings in the Southwestern States last May, and it will be for the purpose of hearing witnesses representing the Federal agencies which have responsibilities regarding the development.

This region includes parts of Colorado, New Mexico, Arizona, Utah, and Nevada. In recent years, large-scale coal-fired powerplants have been planned and are being constructed which will ultimately result in an enormous energy complex.

The major plants which are usually associated with this development are:

- The Four Corners and San Juan plants in New Mexico;
- The Navajo plant in Arizona;
- The Kaiparowits and Huntington Canyon plants in Utah; and
- The Mohave plant in Nevada.

The printed transcript of the field hearings, which is nearly 2,000 pages in length, presents a graphic description of the national interest in the Four Corners development. Aside from the immediate consideration of air pollution control, in which Federal regulation is rapidly evolving, there are unique areas of Federal involvement with these plants which might not exist if they were located elsewhere.

The desert regions of the Southwest include extensive Indian reservations, elements of the national park system, and other lands in Federal ownership. Most of the coal mining and a number of plant-sites involve leases with Indian tribes or with the Secretary of the Interior concerning public lands. The roads, railroads, pipelines, and transmission lines involve similar leases and permits.

As a result of the extensive Federal water resource development of the Colorado River and the unique body of law governing the allocation of the river's water, most of the water used by the plants will involve water supply contracts with the Secretary of the Interior. Furthermore, the Secretary is a direct financial participant in the Navajo plant under the provisions of the Colorado River Basin Project Act of 1968. One-fourth of that plant's capacity will be used as pumping power for the central Arizona project. In view of all of these Federal involvements, many of which come directly under the oversight jurisdiction of the Senate Interior Committee, this committee wishes to compile as complete a record as possible on the development which is taking place.

The Interior Committee has important oversight responsibilities concerning many of these matters. In addition, this hearing will be integrated into the study of national fuels and energy policy which the committee presently has underway pursuant to Senate Resolution 45.

The committee wishes to compile a complete record, therefore, as a basis for evaluating the Federal responsibility concerning the steamplants as they affect the Indian people, the public lands, and other national concerns. The record also will become a case history which can provide valuable insights into many current issues of fuels and energy policy.

We expect the agency witnesses who are here today to assist us in defining the Federal responsibilities in the Four Corners powerplant development so that together we can insure that means are available to carry out those responsibilities effectively.

We are pleased today to have as our first witness Under Secretary of the Department of the Interior, Hon. W. T. Pecora, who, as much as any man alive, I guess, knows about the problems here from the basis of the fuels and energy problems. He has had long experience in the Department, as head of the Geological Survey, prior to his appointment as Under Secretary. So, we are pleased to have you, Secretary Pecora.

Before I call on you I will see if any of my colleagues have any opening comments they would like to make.

Sentor STEVENS. I have none.

Senator JORDAN. I have none.

Senator ANDERSON. I have none.

Senator MOSS. Dr. Pecora, I see you are accompanied by your staff. I would like you to have them identified at the table. We welcome and are glad to have them. This indicates that you came with a full team on the field to pick up any loose balls that might roll out.

STATEMENT OF W. T. PECORA, UNDER SECRETARY, DEPARTMENT OF THE INTERIOR, ACCOMPANIED BY JACK O. HORTON, DEPUTY UNDER SECRETARY; FRANK E. CLARKE, DEPUTY UNDER SECRETARY; JOHN W. NEUBERGER, DEPUTY ASSISTANT SECRETARY FOR WATER AND POWER RESOURCES; LANE MORTHLAND, ASSOCIATE SOLICITOR AND SECRETARY'S LEGAL COUNSEL; JOHN O. CROW, DEPUTY COMMISSIONER, BUREAU OF INDIAN AFFAIRS; GLEN KENDALL, WHITE HOUSE FELLOW; MAURICE N. LANGLEY, BUREAU OF RECLAMATION

Mr. PECORA. Thank you, Mr. Chairman and gentlemen of the committee. You have been very kind in your statement, sir. I would be pleased to present to the committee the battery of specialists.

Seated to my left is Deputy Frank E. Clarke, my deputy in charge of Environmental Sciences, Research, and Engineering Department. On my right, John Neuberger, Deputy Assistant Secretary in Water and Power. Mr. Neuberger is the study manager for the Southwest energy study. Mr. Clarke is head or chairman of the technical advisory board to the task force which I chair. Mr. John Crow is Deputy Commissioner of the Bureau of Indian Affairs, and on his left Mr. Glen Kendall, who is the White House Fellow working on this project. Mr. Lane Morthland is Associate Solicitor in this area and legal counsel to the task force, and Mr. Maurice Langley, of the Bureau of Reclamation. I would be remiss if I did not present to the committee my other deputy, Mr. Jack Horton, who may participate and he is the honcho on my task force in trying to get some coordination in the Federal area.

Mr. Chairman and members of the committee, we appreciate the opportunity to participate in this hearing to discuss this Department's continuing responsibilities with respect to the coal-fired steam-electric generating plants in the Southwest "Four Corners" region of the United States. We also welcome the opportunity to respond to the issues which you have recently addressed to the Department.

On May 7, Secretary Morton launched a comprehensive examination of the possible environmental effects of existing and proposed electric generating plants in the Southwest region together with a study of the full range of alternatives available to meet necessary power requirements with minimal environmental impact.

A Federal interagency task force, under my chairmanship, was promptly established together with a study organization capable of producing an in-depth product within less than 1 year. This Southwest energy study is divided into 12 work groups, each of which will investigate specific economic, social, cultural, and environmental aspects of power production in the Southwest. The environmental impact of the powerplants and related facilities is a primary concern of the study. The Southwest energy study will examine the environmental interactions of existing and future projects. A copy of the program and plan of study for the Southwest energy study is appended to this statement as attachment A, and I request that it be included for the record.

Senator Moss. Without objection, all of those attachments will go into the record at the end of your statement.

Mr. PECORA. Thank you, sir.

It is now estimated that more than 200 professional people from 21 Federal agencies and seven State governments are participating in the study. The Federal participation includes personnel from eight Interior Bureaus, the Environmental Protection Agency, the National Oceanic and Atmospheric Administration, the Atomic Energy Commission, the Soil Conservation Service, the Federal Power Commission, U.S. Forest Service, Rural Electrification Administration, Economic Research Service, Agricultural Extension Service, the National Science Foundation, Department of Transportation, Department of Commerce, and the Office of Science and Technology, and, in addition, we have observers from other Federal agencies. The State governments represented are Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming. In addition, the work groups are utilizing inputs from industries, universities, and private citizens' groups. We have had several meetings with special interest groups to apprise them of the work and of our progress.

In your October 14 letter to the Secretary, Mr. Chairman, you asked for our participation in today's hearing, and requested that Interior address its testimony to questions on several major issues. I have with me today several associates who will assist me in responding to the committee's questions.

In the administration of its responsibilities relating to the natural resources and Indian people of the Southwest, this Department approves or executes many Federal actions. Among these principal actions are eight contracts for water service from Federal water development projects; five mineral leases on public and Indian lands; seven right-of-way easement permits for transmission lines, pipelines, railroads, or highways; two plantsite leases; and 11 power interconnection agreements. These do not include the several amendments to such actions, which have been agreed to since approval.

Some of the above actions are executed directly by this Department; others may be executed by Indian tribes when Indian lands are involved, but these must also be approved by the Secretary or his designated representative. I submit for the record attachment B which includes a chronological listing of Federal actions related to the development of the six major Southwest powerplants and a more detailed response to this issue.

It is our policy to include environmental protection provisions in all our contracts. For example, specific provisions to regulate air and water quality were inserted in several right-of-way easements and lease documents negotiated between the Navajo tribe and owners of units 4 and 5 at the Four Corners plant in 1966. These agreements also were made to apply retroactively to units 1, 2, and 3. This was 3 years prior to enactment of the National Environmental Policy Act of 1969.

The Navajo, Mohave, and San Juan powerplants and the proposed Kaiparowits development have contracted for water from Bureau of Reclamation facilities. These water contracts have air and water pollution control provisions. Examples of these provisions are set out in attachment D. Approval of a contract for water from a Bureau of Reclamation facility to supply a portion of the water for the Huntington Canyon Powerplant is now pending in the Department. This contract would also include air and water pollution control provisions.

Draft environmental impact statements on the Navajo project and the Huntington Canyon project have been prepared and submitted to the Council on Environmental Quality. Those statements are comprehensive and include all aspects of each generating plant. The environmental statement for the San Juan project, which will examine its interaction with the Four Corners project, is now being prepared. These and other projects are included in a list of environmental impact statements in attachment C, which I submit for the record.

A copy of the Department's manual (516 DM 1-3) which contains our policy and guidelines for implementing the National Environmental Policy Act of 1969, is also included in attachment C.

With regard to air and water quality regulations, the departmental policy is to require compliance with all local, State, and Federal regulations. This is reflected in the standards for public land management which require that all land-use and program decisions must be consistent with local, State, and Federal air and water quality standards. Moreover, our field personnel are instructed to work appropriate local, State, and Federal agencies to insure that our programs comply with air and water standards, and that existing unacceptable situations be corrected as soon as possible. I submit for the record examples of the Department's policy on the matter as shown in attachment D to this statement.

Concerning the Department's policies on economic development, I can recall for you that the Four Corners region has been designated by Congress as a depressed area under the provisions of the Public Works and Economic Development Act of 1965. The Four Corners Regional Commission was established in 1969 to meet the following goals:

"Secure early employment in the most seriously affected areas of the region, lay the basis for more stable and higher paying industries, raise the per capita in the lowest income groups, and raise the industrial activity to utilize the wealth of regional resources."

We concur in those goals, especially since many of the residents of that area are Indian people whose welfare is of primary concern in this Department.

Our endorsement of economic development in this area, however, is qualified. That qualification relates to the Department's full intention to preserve the quality of the environment in the area.

Regarding economic benefits to the Indians, we estimate that the current operations of the Four Corners Plant, the Navajo Mine, the Black Mesa Mine, the Black Mesa Pipeline, and the Mohave Plant, plus the construction activities at the Navajo Plant and attendant facilities, are providing about 500 jobs to Indians with an estimated payroll of \$5.3 million annually. Royalty and lease payments to Indians amount to approximately \$1.1 million in 1970 and are projected to be \$4.5 million by 1976. These benefits, plus construction activities at the Navajo project are estimated as providing \$10 million annual benefits to the Indians in the near future. I submit for the record attachment E, which is a more detailed treatment of the economic development issue.

A principal concern of this Department is the impact of electrical power development in the Southwest on the National Park System, tourism, and recreational values. The National Park Service facili-

ties in the States of Utah, Colorado, Arizona, New Mexico, central Wyoming, southern Nevada, southern California consist of 66 administrative units. No major coal-fired powerplants, their attendant mines, or transmission facilities now exist within national parks and monuments of the region. I submit for the record attachment F, which includes a listing of the 20 Park Service units that lie within a radius of 100 miles of the major coal-fired powerplants, and a more detailed response to this issue.

The development of electric generating plants and the attendant facilities near national parks and other recreational lands will have certain impacts. For this reason, we are paying particular attention to this aspect of the development of coal-fired electric generating plants in the Southwest. Whether existing Federal, State, and local air and water quality standards can adequately protect recreational and aesthetic values at projected development levels is not yet known. One of the 12 work groups of the Southwest Energy Study is devoting itself solely to the question of present and potential impacts of coal-fired powerplants on recreational and aesthetic values. Other work groups are studying impacts on water, air, land, flora and fauna.

Another work group is analyzing the cultural, economic, and social impact of electrical power development on the Indians. As you know, the Secretary of the Interior cannot lease Indian lands held in trust or restricted status. Indians cannot lease Indian lands without the approval of the Secretary. The Secretary's approval authority has been delegated to the Commissioner of Indian Affairs and redelegated to field personnel, depending on the type of approval required. Mining and surface leases may be approved only by the Commissioner himself or by his designee, usually an area director.

The council of each tribe consists of representatives elected or appointed from the several constituencies, generally on a proportional or district basis. The council officers are elected by the tribal membership by plurality vote, serving from 1 to 4 years. Decisions of the council and information made available to it from outside sources is available to constituents through their representatives on the council. I submit for the record as attachment G a more detailed response to this issue.

With regard to the long-term effects of electrical power development on the southwest, the Secretary recognizes the necessity to monitor the activities for which he has a responsibility and which have environmental impacts on public and Indian lands. To adequately minimize adverse impact, he has insisted on contract provisions requiring that up-to-date technology and operating techniques be utilized in powerplant developments on Indian and Federal lands. This is followed by requirements for adequate and comprehensive monitoring to determine the changes which occur and to have the interpretive data available to intelligently meet problems having adverse impact. In the Southwest, for example, we are continuing to collect baseline data on prepowerplant conditions for comparison with conditions occurring after operation begins. This includes both air and water monitoring data. We recognize that more detailed monitoring is required and we have set in motion the machinery to establish these monitoring systems. Specifically, study groups working on the Southwest Energy Study are proposing climate and weather moni-

toring systems, air transport and diffusion monitoring systems, and water monitoring systems for both surface and ground water.

To make sure all future actions related to Southwest powerplants are coordinated and environmentally sound, I have reserved for my approval final action on permits, rights-of-way, grants, leases, contracts or memorandums of understanding under the jurisdiction of the Department of the Interior.

Thank you very much, Mr. Chairman, for permitting me to make this statement.

Senator Moss. Thank you, Secretary Pecora, for that statement. The attachments have more complete information on the main facets you have referred to in your overall statement.

(Attachments A-H referred to follow :)

1944

ATTACHMENT A

Hearings

before the

Committee on Interior and Insular Affairs

United States Senate

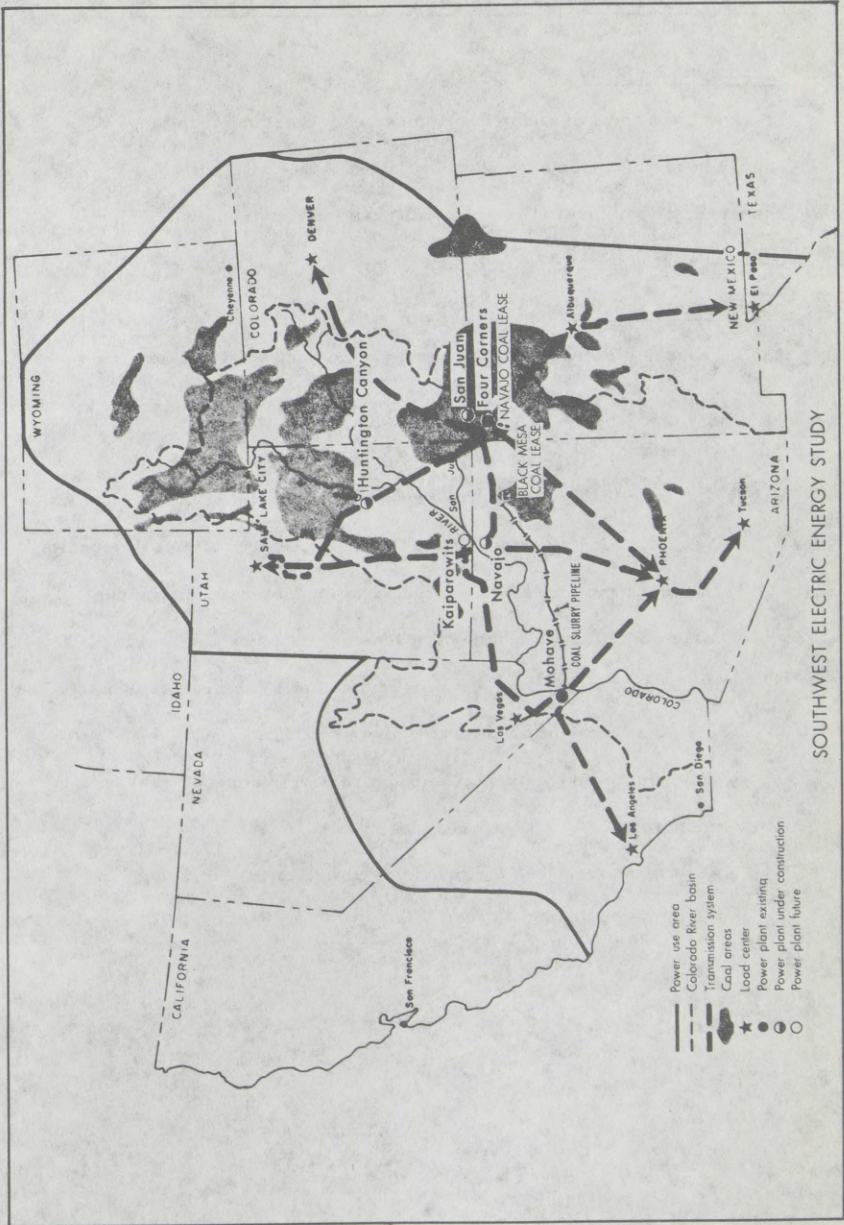
Ninety-Second Congress

November 10, 1971

PROGRAM AND PLAN OF STUDY

FOR THE

SOUTHWEST ENERGY STUDY



SOUTHWEST ELECTRIC ENERGY STUDY

PROGRAM AND PLAN FOR THE SOUTHWEST ENERGY STUDYI. Purpose of the Study

To examine alternatives for developing resources and supplying energy needs of the Southwest and adjacent areas within the constraint of pertinent economic, cultural, and environmental considerations.

II. Objectives of the Study

A. To assess electrical energy needs in the Southwest and adjoining areas east of the Colorado Basin for the next twenty years.

B. To determine -

- 1) the practicability of fulfilling the energy needs of the Southwest and adjoining areas using the Colorado River Basin coal deposits;
- 2) the economic needs and prospects of the Colorado Basin as affected by the development of the coal deposits;
- 3) the impact on cultural, social, and esthetic factors resulting from development of Colorado River Basin coal;
- 4) the overall environmental impacts of development of coal resources.

C. To analyze alternatives for providing power to the Southwest and adjoining areas.

- D. To study the environmental impact of long term coal and power development within the Colorado Basin and adjoining areas.
- E. To determine the environmental tolerances of the Colorado River Basin for the impacts involved in large-scale, long term generation of power.

III. Study Organization

Attachment (A) presents a schematic diagram and a description of the organization structure of the Southwest Energy Study.

IV. Time Frame of Study and Alternative Levels of Development

The time frame considered will begin with present conditions and extend to future power projections through 1990. The study will indicate levels of coal resources development needed to sustain incremental power production at 6, 12, 20 and 30 thousand megawatts. The six thousand megawatt level represents the approximate capacity of five major plants which are either in operation or under construction at the present time. The 12 thousand level represents the approximate capacity of these five plants plus the proposed Kaiparowits plant. The twenty thousand and thirty thousand levels are aimed at studying locations and assessing the impacts of future power requirements which may develop.

V. Definition of Areas for Which Effects Will be Determined

The map (Figure A) shows the major load centers and the general service area for the electric energy produced from the coal resources of the Colorado Basin.

The study of effects of coal-production will be confined to the Upper Colorado River Basin and the Black Mesa areas. Environmental significance of power production will cover the entire area shown on the map.

The study will also make a preliminary assessment of environmental and economic aspects of the production of coal burning electrical energy from adjacent western areas such as the Powder River Basin.

VI. The Work Groups, the Lead Agencies, and Work Assignments*

A. Power Development and Economic Effects - Bureau of Reclamation

1. The work group will:
 - a. Estimate power needs in the designated power service area through 1990.
 - b. Study the practicability of utilizing Colorado Basin coal and water resources on or near site to produce this energy in increments of 6, 12, 20 and 30 thousand megawatt levels over the indicated time span. This will include:

*As a part of each work assignment each group will identify and examine all legal problems inherent in or which may arise from the study.

- (1) Evaluation of economic effects on the power use area for each level of production.
 - (2) Evaluation of economic effects on the coal-producing area for each level of production.
- c. Analyze the practicality of exporting coal from the Colorado River Basin to major power load centers to sustain the 6, 12, 20 and 30 thousand megawatt incremental growth patterns. This will include:
- (1) Evaluation of economic effects on the power use areas for each level of production.
- d. Analyze alternative means of providing power to the load centers without the use of the Colorado Basin coal resources. Alternatives to be considered include:
- (1) Area hydro and nuclear development.
 - (2) Importation of electric energy from outside the power use area.
 - (3) Others.
- The analyses will include in addition to applicable consideration and possible combinations of (a), (b), and (c) above, an evaluation of economic effects of reduced coal development.

- e. Evaluation of power transmission systems for each level of development and each alternative plan.

B. Water Supply - Bureau of Reclamation

- 1. The work group will:
 - a. Determine water (surface and ground) available for mining and thermal power development to meet power production levels covered by the study.
 - b. Propose a water plan for each projected power production level.
 - c. Explore and analyze the opportunities for increasing the efficiency of water use at each incremental level of power development.

C. Water and Air Pollution - Environmental Protection Agency

- 1. The work group will:
 - a. Evaluate disposal methods of waste water resulting from power production.
 - b. Evaluate water pollution problems related to coal mining.
 - c. Identify and evaluate the nature and significance of stack gas components of emissions likely to result from projected power production and determine their local and regional impacts.
 - d. Identify and evaluate trace minerals and radioactive wastes in stack gases.
 - e. Recommend emission control limits that should be instituted with each level of development.

D. Water Resources Monitoring - U. S. Geological Survey

1. The work group will:

- a. Collect necessary data on the Colorado River, its tributaries, and ephemeral washes in the area to provide basic information to evaluate water quality for each level of power projection.
- b. Develop basic data to establish the effects on groundwater quality of each level of projected power generation.
- c. Recommend appropriate water quality monitoring system for surface and groundwater.

E. Atmospheric Studies - National Oceanic and Atmospheric Administration

1. The work group will:

- a. Provide estimates of atmospheric transport and dilution to permit determination of effluent concentrations in the study area.
- b. Estimate the effects of the projected power level on the weather and climate of the region.
- c. Design an adequate monitoring program which can relate the effects of the power complex on weather and climate.

F. Land Use - Bureau of Land Management

1. The work group will:
 - a. Evaluate the impact on land resources with the projected power development levels at 6, 12, 20, and 30 thousand megawatts.
 - b. Evaluate effects of mining and power production on other resource development and local use possibilities.
 - c. Recommend reclamation techniques to minimize adverse impacts of power development.
 - d. Examine opportunities for redeveloping land affected by coal removal.

G. Cultural, Economic and Social Factors - Bureau of Indian Affairs

1. The work group will:
 - a. Study the historical significance of the cultural and religious mores of the indigenous population and assess effects of coal and power production upon them.
 - b. Identify and quantify the economic gains or losses to the Indian people which may result from the projected power development including the impacts on employment, health, education and social customs.

H. Biota - Bureau of Sports Fish and Wildlife

1. The work group will:
 - a. Evaluate the effect on populations of resident and migratory fish and wildlife of construction and operation of all power generating facilities in the study area.

I. Recreation and Aesthetics - National Park Service

1. The work group for each level of projected power development will:
 - a. Evaluate the effects on national parks and monuments of coal and power production and transmission systems.
 - b. Evaluate the effects on historical and archaeological sites and artifacts. .
 - c. Evaluate the effects on recreational use of land and water.
 - d. Examine the aesthetic implications of power systems and related construction on and restoration of the areas involved.

J. Coal Resources - Geological Survey

1. The work group will:
 - a. Establish the location and estimate the quantity and quality of coal resources in the Colorado Basin.
 - b. Evaluate the long term effects on coal resources with projected development of 6, 12, 20 and 30 thousand megawatt levels of power production.

K. Coal Resources (Production Methods and Techniques) - Bureau of Mines

1. The work group will:
 - a. Evaluate relative merits of alternative mining methods.
 - b. Study alternative methods for reclaiming, recycling, and disposing of mine and powerplant wastes.

- d. Consider alternative methods of coal transportation e.g.,
 - railroads
 - slurry pipelines
 - conveyor systems
- e. Delineate mine health and safety factors.

L. Alternative Use of Colorado Basin Coal Supply-- Office of Coal Research

- 1. The work group will:
 - a. Evaluate alternatives to direct combustion for utilizing coal resources of technology for time frame 1980 and 1990.
 - b. Discuss the potential alternative uses of the coal for the Nation's future needs (beyond 1990) with technology presently being perfected.

VII. Southwest Energy Study Schedule

- 1. The Study Management Team will prepare a "Study Management Team Action Plan" -- July 16.
- 2. The Study Manager will send a letter to each lead agency coordinator requesting recommendation of work group leader, participants, and outline of a proposed plan of action for the work group and an outline of the work group's proposed report -- July 23.

3. Each agency coordinator will present a proposed outline of its assignment -- August 8.
4. The Study Management Team will complete review of proposed outlines -- August 19.
5. The Study Management Team will prepare a preliminary draft outline of the Southwest Energy Study Report based on proposals of study groups -- September 10.
6. All work group reports (preliminary drafts) will be completed and submitted to the Study Manager -- November 8.
7. The Study Management Team will complete review and comments on work group reports (preliminary drafts) -- November 22.
8. All work group reports will be completed and submitted to the Study Manager -- December 8.
9. The Southwest Energy Study Report (preliminary draft) will be completed by the Study Management Team and submitted to the participating agencies for review -- January 1.
10. Review of the Southwest Energy Study Report (preliminary draft) by participating agencies completed and comment furnished to the Study Manager -- February 1.
11. Southwest Energy Study Report submitted to Task Force -- March 1.
12. Southwest Energy Study Report submitted to Secretary as supporting information for Task Force position paper and recommendations.

SOUTHWEST ENERGY STUDY
ORGANIZATIONAL STRUCTURE DESCRIPTION

I Study Organization

Attached is a chart showing the organizational structure of the Southwest Energy Study. The study group is composed of a Study Manager, a study management team, agency coordinators, and twelve work groups. Each of the twelve work groups will be the responsibility of a lead agency as shown on the attached chart. The duties and responsibilities of each part of the study group are as follows:

A. Study Manager

Directs the study and prepares the final report of the Southwest Energy Study.

B. Study Management Team

1. Assists the Study Manager in the direction and coordination of the study and assists in disseminating information.
2. Prepares the program and plan for the study.
3. Assigns tasks to work groups.
4. Maintains liaison with the agency coordinators and work groups.
5. Prepares periodic status reports to the task force.
6. Reviews the work group preliminary reports.
7. Prepares the report on the Southwest Energy Study.

C. Agency Coordinators*

1. Serves as a first-level command to insure that work groups are on schedule and are meeting program objectives.
2. Recommends agency participants on work groups.
3. Maintains liaison between agency work group participants and study management team.
4. Coordinates work of agency and insures that no input of any agency is overlooked.

D. Work Groups

1. Develops a study plan to meet the objectives of the study.
2. Implements and executes the technical study and prepares a final report on its particular work assignment.

II Study Organization Concept

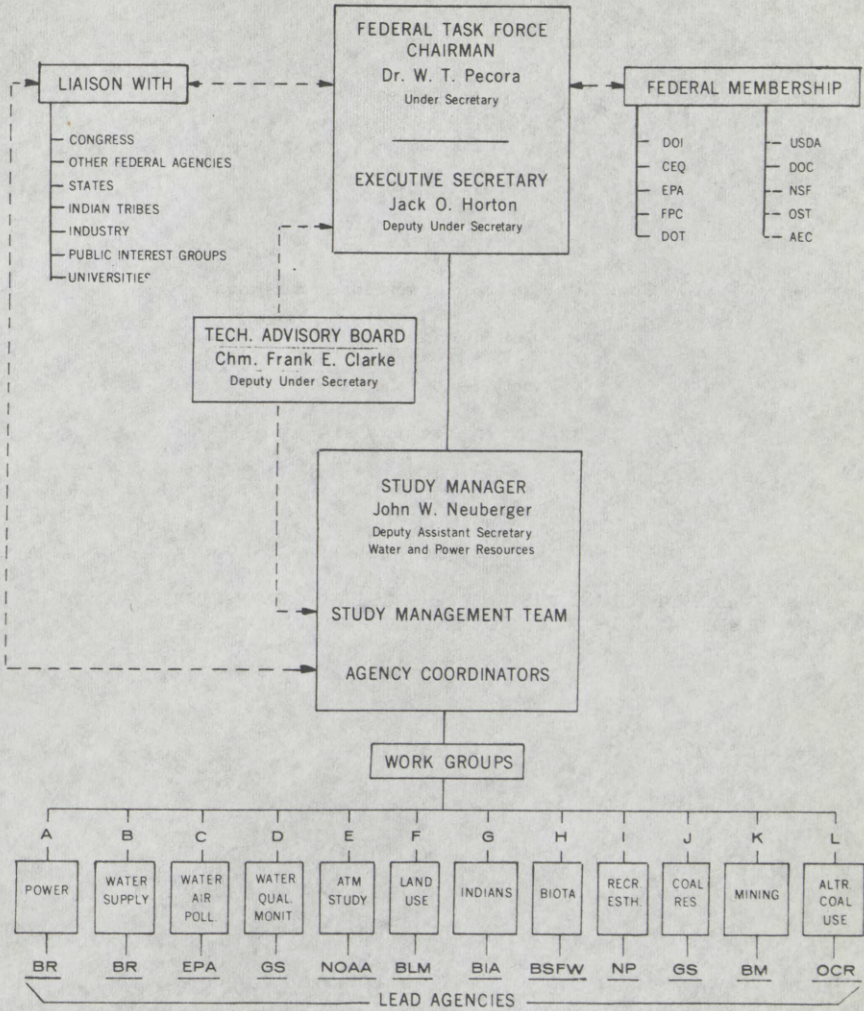
This concept of organization vests in the Study Manager the responsibility for the total effort, including the preparation of a final report. It brings into play twelve professional work groups, each of which is given the responsibility of preparing a thorough professional product as its effort in the Southwest Energy Study. Assurance that the efforts of all agencies are adequately coordinated and that no input of any particular agency is overlooked is vested with the agency study coordinators, who will be responsible to the Study Manager for the thoroughness of the participation of their respective agencies.

* The Study Manager will hold each lead agency responsible for programming, intra-work group coordination, professional adequacy of the work, and completion of the work on schedule.

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The Study Manager's five management assistants, in their overview, coordination, and information roles, will act as special agents of the Team Manager. They will direct their efforts to facilitating and assisting all study efforts at all levels, with responsibility to the Study Manager for positive progress and efficient and harmonious study operations.

ORGANIZATIONAL STRUCTURE SOUTHWEST ENERGY STUDY



1960

ATTACHMENT B

Issue 1

Hearings

before the

Committee on Interior and Insular Affairs

United States Senate

Ninety-Second Congress

November 10, 1971

DEPARTMENTAL POLICY ON CONTRACTS

CHRONOLOGICAL LISTING OF EXISTING OR PENDING
FEDERAL CONTRACTS ON INDIAN AND PUBLIC LANDS

ISSUE 1: Existing or pending Federal contracts relating to water supplies, power purchases, mineral resources, or rights-of-way, whether on Indian or public lands.

RESPONSE: This Department, in the administration of its responsibilities relating to the natural resources and Indian people of the Southwest, approves or executes many Federal actions. Among these actions are such things as:

1. Contracts for water service from Federal water development projects.
2. Mineral leases
3. Transmission line, pipeline, railroad or highway right-of-way or easements.
4. Plantsite or ash disposal area leases.
5. Power coordination or interconnection agreements.
6. Other miscellaneous licenses or permits.

Some of the above actions are executed directly by this Department, others may be executed by Indian tribes when Indian lands are involved but these must be approved by the Secretary or his designated representative. Attached is a chronological listing of the many Federal actions related to the development of the six major Southwest powerplants.

Our forms of leases or easements in the past have always included general provisions related to the housekeeping details of mineral extractions or land restoration. Specific provisions to regulate air and water quality were first inserted in several right-of-way easements and lease documents negotiated between the Navajo Tribe

and the owners of Units 4 and 5 at the Four Corners Powerplant in 1966. These agreements also were made to apply retroactively to Units 1, 2 and 3. Since 1966, we have been increasingly concerned with pollution control and environmental protection for powerplants.

It is our policy to include environmental protection provisions in all our contracts. This policy has been followed in all the contracts executed since that time. The Navajo, Mohave, and San Juan Powerplants and the proposed Kaiparowits development have contracted for water from Bureau of Reclamation facilities. These water contracts have air and water pollution control provisions. Approval of a contract for water from a Bureau of Reclamation facility to supply a portion of the water for the Huntington Canyon Powerplant is now pending in this Department. This contract also includes air and water pollution control provisions.

All provisions in the water service contracts include specific air and water pollution control provisions. We now rely primarily on the State, Federal or county emission standards governing air and water pollution for contract standards of performance.

The following types of provisions are included in our contracts for environmental protection:

1. The Secretary reserves the right either to approve or to review and comment on plans and designs for air and water

pollution control facilities prior to their construction.

This approval is not a waiver of performance requirements of other applicable authorities.

2. The Secretary will periodically meet with powerplant owners to discuss new technological developments and decide upon the desirability of installing additional equipment or modifying existing equipment for air pollution control.
3. A requirement for annual reports to the Secretary on performance and efficiency of air pollution control equipment.
4. That the contract provisions are not be construed as waiving the requirements of State, Federal, or local laws related to the control of air and water quality.

The water service contracts, in general, provide a firm water supply in specified annual amounts at a rate per unit of water for about 40 years.

The contracts usually provide a limited project development period after which the full amount of water must be taken or paid for. A nominal option charge is assessed during the development period. A permanent right to the water does not accrue to the contracting party. Revenues are received by the United States and credited to the water project from which supply is obtained.

11-1-71

CHRONOLOGICAL LISTING OF FEDERAL CONTRACTS AND AGREEMENTS ASSOCIATED WITH DEVELOPMENT
OF COAL-FIRED, THERMAL-ELECTRIC POWERPLANTS ON OR NEAR THE COLORADO PLATEAU

Powerplant and type of action Date of action

Four Corners Powerplant near Farmington, New Mexico

1. Mining lease between Navajo tribe and Utah Construction Company,
Contract #14-20-603-2505
Approved by Commissioner Emmons, BIA, for 24,320 acres
Amendment #1, clarified status of rights-of-way, approved Area Director, Head
Amendment #2, added 549.09 acres and clarified rights-of-way, approved by
Area Director Cannon
Amendment #3, added 6,547.12 acres, increased royalty payment from 15-204
on 6,547.12 acre tract, approved Asst. Area Director Gibben
10-21-57
10-30-57
1-19-62
9-29-65
2. Plant-site lease between Navajo Tribe and Arizona Public Service Co.,
Approved by Acting Secretary Bennett
12-14-60
 - a/ Supplemental and additional indenture of lease including amendments and supplements
to original lease, Four Corners Units 1, 2, and 3 between Navajo Tribe of Indians
and Arizona Public Service Company, et al., approved by Acting Secretary Carver
7-21-66
 - a/ Federal rights-of-way and easements to Arizona Public Service Co.,
approved by Acting Secretary Carver
7-21-66
3. Wholesale Power Supply Agreements between Navajo Tribe and Arizona Public Service Company
approved by Acting Secretary of Interior
Supplements to above agreement which provide for additional purchase of wholesale
power for distribution to consumers on tribal lands (Navajo Tribal Utility Authority)
12-1-60
7-6-66
 1. Approved by Secretary 4-25-68
 2. Approved by Acting Secy. 7-6-66
 3. Approved by Secretary 4-8-67
 4. Approved by Secretary 4-25-68
 5. Approved by Secretary 4-25-68
 6. Approved by Secretary 4-25-68
 7. Approved by Deputy Commr. Taylor 2-23-69
 8. Approved by Acting Commr. Corke 9-5-69
 9. Approved by Acting Commr. Cannon 2-17-70

a/ Document contains environmental provisions

CHRONOLOGICAL LISTING OF FEDERAL CONTRACTS AND AGREEMENTS ASSOCIATED WITH DEVELOPMENT
OF COAL-FIRED, THERMAL-ELECTRIC POWERPLANTS ON OR NEAR THE COLORADO PLATEAU

Four Corners Powerplant (continued)

4. Water service contract with Utah Mining and Construction Company b/ #14-06-400-4831 for 44,000 acre-feet of water from Navajo Reservoir, a Bureau of Reclamation facility approved by Secretary of the Interior	<u>Date of action</u> 4-11-68
Short-term contract #14-06-400-4831 a/ for water service from San Juan River - 2,200 acre-feet with option to divert water in above contract, with Utah Mining and Construction Company, approved by Secretary of the Interior	9-23-69

Powerplant and type of action

Mohave Generating Station, Southern tip of Nevada

1. Water User Contract No. 14-06-300-1877 between Colorado River Commission of Nevada and Southern California Edison Company signed and approved by the Secretary of the Interior.	10-26-66
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b/ Water may be used for potential expansion of Units 6, 7, and 8. Existing units receive water from direct
flow rights granted by New Mexico State Engineer in 1955.

CHRONOLOGICAL LISTING OF FEDERAL CONTRACTS AND AGREEMENTS ASSOCIATED WITH DEVELOPMENT
OF COAL-FIRED, THERMAL-ELECTRIC POWERPLANTS ON OR NEAR THE COLORADO PLATEAU

<u>Powerplant and type of action</u>	<u>Date of action</u>
<u>San Juan Powerplant, near Fruitland, New Mexico</u>	
1. Mining lease issued by Bureau of Land Management NM 045 196 for 2,347 acres	11-1-61
Subsequently modified to add 120 acres	4-1-70
Mining lease NM 045 197 covering 25,065 acres	11-1-61
Mining lease NM 045 217 covering 18,000 acres	12-1-61
The lessee originally was the Public Service Co. of New Mexico but was subsequently assigned to Western Coal Company	8-13-63
Further assignment to utilities	11-23-70
2. <u>a</u> / Exchange of Letters between Secretary of the Interior and President of Southern California Edison--setting forth policy on the coordination of generation and transmission facilities, rights-of-way, Indian agreements, and environmental considerations including air and water pollution control.	4-7-66
	4-11-66
3. <u>a</u> / Water service contract #14-06-400-4821 with Public Service Company of New Mexico for 20,200 acre-feet of water from Navajo Reservoir.	4-11-68
4. San Juan Project Coordination Agreement with Tucson Gas and Electric Co., et al.	10-2-69
5. New Mexico Power Pool Contract with Community Public Service Company, et al.	10-2-69
6. Mutual Assistance Contract for San Juan and Navajo Power Project with El Paso Electric Company, et al.	9-30-69
7. Mutual Assistance Agreement - Alternate Agreements - San Juan and Navajo Power Project with El Paso Electric Company, et al.	9-30-69
<u>Actions Pending</u>	
1. Approval of a transmission line ROW from plant to Tucson, Arizona.	

CHRONOLOGICAL LISTING OF FEDERAL CONTRACTS AND AGREEMENTS ASSOCIATED WITH DEVELOPMENT
OF COAL-FIRED, THERMAL-ELECTRIC POWERPLANTS ON OR NEAR THE COLORADO PLATEAU

<u>Powerplant and type of action</u>	<u>Date of action</u>
<u>Navajo Power Project</u>	
<u>Generating Station near Page, Arizona</u>	
1. <u>a/ Navajo Project Participation Agreement</u> , Contract No. 14-06-300-2131, between United States (24.3%); Arizona Public Service Co. (14.0%); Department of Water and Power, The City of Los Angeles (21.2%); Nevada Power Company (11.3%); Salt River Project Agriculture Improvement and Power District (21.7%); Tucson Gas & Electric Company (7.5%), provided for construction of the powerplant and transmission system	9-30-69
2. <u>a/ Power Coordination Agreement among Navajo Participants</u> , Contract No. 14-06-300-2132	9-30-69
3. Contracts to allow interim sale of United States power entitlement	
a. Contract No. 14-06-300-2133, with Department of Water and Power, The City of Los Angeles	9-30-69
b. Contract No. 14-06-300-2134, with Nevada Power Company	9-30-69
c. Contract No. 14-06-300-2135, with Southern California Edison Company	9-30-69
d. Contract No. 14-06-300-2136, with Salt River Project Agriculture Improvement and Power District	9-30-69
e. Contract No. 14-06-300-2137, with Arizona Public Service Company	9-30-69
f. Contract No. 14-06-300-2138, with Tucson Gas & Electric Company	9-30-69
4. Interim Arrangement for Interconnected Operation Among the Navajo Participants and Southern California Edison Company contract No. 14-06-300-2139	9-30-69
5. Memorandum Transmission Agreement Among the Navajo Participants, Contract No. 14-06-300-2140	9-30-69

CHRONOLOGICAL LISTING OF FEDERAL CONTRACTS AND AGREEMENTS ASSOCIATED WITH DEVELOPMENT
OF COAL-FIRED, THERMAL-ELECTRIC POWERPLANTS ON OR NEAR THE COLORADO PLATEAU

<u>Powerplant and type of action</u>	<u>Date of action</u>
Navajo Power Project (Continued)	
Generating Station (Continued)	
6. a/ Contract for Water Service from Lake Powell with Salt River Project Agricultural Improvement and Power District, to provide cooling water, contract No. 14-06-400-5033. (May not exceed 34,100 acre-feet annually and within Arizona entitlement under compact) Water service contract subsequently assigned proportionate share of the water to each of the participants	1-17-69
	12-22-69
7. a/ Indenture of lease, Navajo Units 1, 2, and 3, with Navajo Indian Tribe	9-29-69
8. Agreement between Peabody Coal Company and the non-Federal Navajo Project Participants (not a federal action)	6-1-70
9. a/ Application for grant of rights-of-way and easements, review of application to provide area for plant site, pumping plant site, rail loading site, ash disposal area, pumping plant access road and water pipeline, pumping plant access road to proposed Indian Service Route N-228, access road from plant site to ash disposal area, power and communication lines, from plant site to pumping plant site, conveyor and communication lines from rail loading site to plant site, and water pipeline from plant site to Lake Powell. Grant approved by Secretary	12-3-67
	12-10-69
10. Grant of Federal rights-of-way and Easements (25 U.S.C. 323) for Railroad Transmission System	1-19-71
11. Arizona-Nevada Power Pool Agreement approved by Secretary	6-1-71
12. b/ Grant of easement for water intake pipeline, Contract No. 14-06-40-543 with Arizona Public Service Company, et al. Approved by Regional Director, Salt Lake City	10-1-70
13. Water service agreement for plant construction, No. 14-06-400-5260, approved by Regional Director	4-17-70

CHRONOLOGICAL LISTING OF FEDERAL CONTRACTS AND AGREEMENTS ASSOCIATED WITH DEVELOPMENT
OF COAL-FIRED, THERMAL-ELECTRIC POWERPLANTS ON OR NEAR THE COLORADO PLATEAU

<u>Powerplant and type of action</u>	<u>Date of action</u>
Navajo Power Project (Continued)	
Generating Station (Continued)	
14. License agreement for pipeline and holding reservoir for water and coal haul railroad construction No. 14-06-40-5554	4-10-70
15. Water service contract for construction of coal haul railroad with Morrison-Knudsen Co., No. 14-06-490-5541	4-22-71
16. Coal mining lease No. 14-20-0603-8580 between Navajo Tribe and Sentry Royalty Company	2-1-64
Assigned to Peabody Coal Company	1-8-68
17. Coal mining lease No. 14-20-0603-9910 between Navajo Tribe and Sentry Royalty Company	6-6-66
Assigned to Peabody Coal Company	1-8-68
18. Application for Federal ROW and Easements for Coal Haul Railway	12-24-70
Actions Pending	

Proposed contracts and agreements currently under review:

Co-Tenancy Agreement drafted 8-5-71
 Southern Transmission System Construction Agreement, latest draft 8-10-71
 Western Transmission System Construction Agreement, latest draft 12-7-70
 Navajo Generating Station Construction Agreement, latest draft 9-7-71
 Edison-Navajo Transmission Agreement, latest draft 3-26-71
 Navajo Generating Station Operating Agreement, 10-28-70 (latest draft)
 Interconnection Agreement, Four Corners-Navajo-Mohave, latest draft 5-28-71
 Approval of ROW and Easements for Navajo-McCullough and Navajo-Phoenix Transmission Lines.
Huntington Canyon Powerplant, Emery County, Utah

1. Grant of right-of-way for Camp Williams--Four Corners 345 kv transmission line to Utah Power and Light Co. by Indians, Forest Service and Bureau of Land Management

Actions Pending

1. a/ Execution of water service contract with Emery Water Conservancy District, subsequent to an amandatory contract between the United States and the District.
2. Approval of ROW and Easements for Highway Relocation and Reservoir Site.

CHRONOLOGICAL LISTING OF FEDERAL CONTRACTS AND AGREEMENTS ASSOCIATED WITH DEVELOPMENT
OF COAL-FIRED, THERMAL-ELECTRIC POWERPLANTS ON OR NEAR THE COLORADO PLATEAU

<u>Powerplant and type of action</u>	<u>Date of action</u>
<u>Kaiparowits Power Project, near Page, Arizona</u>	
1. a/ Water service contract No. 14-06-400-5139, with Resources Company, Associated Southern Investment Company, New Albion Resources Company for 102,000 acre-feet of water annually from Lake Powell.	10-2-69
2. Kaiparowits and Navajo Mutual Assistance agreement No. 14-06-400-5160, with San Diego Gas and Electric Co. and Southern California Edison Company.	10-2-69
3. Kaiparowits power coordination Contract No. 14-06-400-5161, with Arizona Public Service Company, Southern California Edison Co., San Diego Gas and Electric Co.	10-2-69
4. Coal leases with Bureau of Land Management covering 39,355 acres on Kaiparowits Plateau.	11-1-65
<u>Action Pending</u>	
Application for Plant Site Location with BLM and State of Utah.	
<u>Other actions possibly relating to future powerplants on Colorado Plateau</u>	
1. Water service contract with State of Wyoming for capacity in Fontenelle Reservoir	6-14-62
2. The State of Wyoming has contracted with Pacific Power and Light Co. for water supply for "Jim Bridger" powerplant under construction	-----
3. Coal Mining lease for 40,286.75 acres with El Paso Natural Gas and Consolidation Coal, approved by Acting Area Director Kilgore (BIA).	12-2-68
4. Execution of Water Supply Contract with Utah International from Navajo Reservoir	

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ATTACHMENT C

Issue 2

Hearings

before the

Committee on Interior and Insular Affairs

United States Senate

Ninety-Second Congress

November 10, 1971

LISTING OF ENVIRONMENTAL IMPACT STATEMENTS

DEPARTMENTAL GUIDELINES FOR IMPLEMENTING
THE NATIONAL ENVIRONMENTAL POLICY ACT
OF 1969 (516 DM 1-3)

ISSUE 2: Existing or Pending Environmental Impact Statements
of Federal Decisions Regarding the Power Developments

RESPONSE: The following is a comprehensive list of environmental impact statements relating to coal-fired, steam generating plants and related facilities in the Southwest:

<u>Project</u>	<u>Lead Agency</u>	<u>Status</u>
1. Navajo Project (Consolidated) Page, Arizona (includes 2-6 below)	Dept. of Interior	Draft to CEQ 10/5/71
2. Navajo Generating Station Page, Arizona	Dept. of Interior	Draft to CEQ 2/12/71
3. Black Mesa Coal Mine Arizona	Dept. of Interior	Draft to CEQ 7/22/71
4. Black Mesa and Lake Powell Railroad, Page, Arizona	Dept. of Interior	Draft to CEQ 4/20/71
5. Navajo-Phoenix Transmission System	Dept. of Interior Dept. of Agriculture (for U. S. Forest Service lands)	Draft to CEQ 4/9/71
6. Navajo-McCullough Transmission System	Dept. of Interior	Draft to CEQ 6/22/71
7. San Juan Power Plant (Consolidated statement) Fruitland, New Mexico	Dept. of Interior Dept. of Agriculture (for San Juan-Tucson transmission line)	Draft in Preparation
8. Huntington Canyon Power Plant Huntington, Utah	Dept. of Interior	Draft to CEQ 9/30/71
9. Jim Bridger Power Plant ^{1/} (Consolidated Statement) Rock Springs, Wyoming	Dept. of Interior	Draft to CEQ 10/15/71

^{1/} Jim Bridger Power Plant is not considered a part of the Southwest Four Corners area.

1973

<u>Project</u>	<u>Lead Agency</u>	<u>Status</u>
10. Hayden Generating Station - Unit 2 Hayden, Colorado	Dept. of Agriculture	Draft to CEQ 7/3/71
11. Hayden-Wolcott-Vail Transmission Lines Colorado	Dept. of Agriculture	Draft to CEQ 7/28/71

The Departmental Manual (516 DM1-3) to fulfill the policy and directives of the National Environmental Policy Act of 1969 are appended as Attachment C.

1974

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEPARTMENTAL MANUAL

TRANSMITTAL SHEET

Release
Number:

1222

Date: September 17, 1970

Part: 516 DM 1-3

Subject: ENVIRONMENTAL QUALITY

National Environmental Policy Act
of 1969

EXPLANATION OF MATERIAL TRANSMITTED:

This release, 516 DM 1-3, is the first in a new Environmental Quality subseries of the Departmental Manual. It assigns responsibilities and establishes procedures for complying with the National Environmental Policy Act of 1969 (P.L. 91-190), and provides the guidelines noted in the Secretary's memorandum of August 31 to the Assistant Secretaries.

Departmental contact with the Council on Environmental Quality will be through the Office of Policy Planning and Research.

Environmental statements will be prepared by bureaus and offices, approved by Assistant Secretaries, and transmitted to the Council on Environmental Quality by the Office of Policy Planning and Research. The review of environmental statements prepared by other Federal agencies will be directed by the Office of Policy Planning and Research.

Lawrence H. Deussen

Assistant Secretary for Administration

FILING INSTRUCTIONS:

Remove:

None (New Part)

Insert:

516 DM 1
(3 Sheets)

516 DM 2
(6 Sheets)

516 DM 3
(2 Sheets)

**Department of the Interior
DEPARTMENTAL MANUAL**

Environmental Quality	Part 516 National Environmental Policy Act of 1969
Chapter 1 Preservation and Enhancement of Environmental Quality	516.1.1

.1 Purpose. These instructions are to fulfill the policy and directives of the National Environmental Policy Act of 1969 (P.L. 91-190, 83 Stat. 852, January 1, 1970), noted in the following text as the Act; and of Executive Order No. 11514, Protection and Enhancement of Environmental Quality (March 5, 1970).

.2 Policy. The Department shall provide leadership in protecting and enhancing the quality of the Nation's environment and shall initiate measures needed to direct its policies, plans and programs so as to meet national environmental goals.

.3 Responsibilities.

A. The Assistant to the Secretary for Policy Planning and Research:

(1) Shall maintain an overview of the Department's compliance with the Act, E.O. 11514, and this Chapter.

(2) Shall be the Department's contact point with the Council on Environmental Quality.

B. The Solicitor:

(1) Shall review the Department's various statutory authorities, administrative regulations, policies and procedures, including those relating to loans, grants, contracts, leases, licenses, or permits, in order to identify any deficiencies or inconsistencies therein which prohibit or limit full compliance with the purposes and provisions of the Act. A report on this review and the corrective actions taken or planned, including such measures to be proposed to the President as may be necessary to bring these authorities and policies into conformance with the intent, purposes and procedures of the Act shall be provided, after review by appropriate Assistant Secretaries and the Assistant to the Secretary for Policy Planning and Research, to the Secretary for transmittal to the Council on Environmental Quality by September 1, 1970:

Department of the Interior
DEPARTMENTAL MANUAL

<u>Environmental Quality</u>	<u>Part 516 National Environmental</u>
<u>Chapter 1 Preservation and Enhancement</u>	<u>Policy Act of 1969</u>
<u>of Environmental Quality</u>	<u>516.1.3C</u>

C. Assistant Secretaries:

- (1) Shall maintain direct and continuing supervision of the bureaus and offices under their jurisdiction in meeting the requirements of the Act, E. O. 11514, and this Chapter.
- (2) Shall insure that, to the fullest extent possible, the policies, regulations, and public laws of the United States administered under their jurisdiction shall be interpreted and administered in accordance with the policies set forth in the Act.

D. Heads of bureaus and offices:

- (1) Shall monitor, evaluate, and control on a continuing basis their bureaus' or offices' activities so as to protect and enhance the quality of the environment. Such activities shall include those directed to controlling pollution and enhancing the environment and those designed to accomplish other program objectives which may affect the quality of the environment. They shall develop programs and measures to protect and enhance environmental quality and shall assess progress in meeting the specific objectives of such activities. They shall consult with appropriate Federal, State and local agencies in carrying out their activities as they affect the quality of the environment.
- (2) Shall utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment.
- (3) Shall initiate and utilize ecological information in the planning and development of resource-oriented projects.
- (4) Shall study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.
- (5) Shall identify and develop methods and procedures, in consultation with the Water Resources Council and the Council on Environmental Quality, which will insure that presently unquantified

Department of the Interior
DEPARTMENTAL MANUAL

Part 516 National Environmental

Environmental Quality

Policy Act of 1969

Chapter 1 Preservation and Enhancement
of Environmental Quality

516.1.3D(5)
 (Cont.)

environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations.

(6) Shall develop procedures to insure the fullest practicable provision of timely public information and understanding of their plans and programs with environmental impact in order to obtain the views of interested parties. These procedures shall include, whenever appropriate, provision for public hearings, and shall provide the public with relevant information, including information on alternative courses of action. Bureaus and offices shall also encourage State and local agencies to adopt similar procedures for informing the public concerning their activities affecting the quality of the environment.

(7) Shall make available to other Federal agencies, States, counties, municipalities, institutions and individuals, advice, data and information useful in restoring, maintaining, and enhancing the quality of the environment.

(8) Shall insure that information regarding existing or potential environmental problems and control methods developed as part of research, development, demonstration, test, or evaluation activities is made available to other Federal agencies, States, counties, municipalities, institutions, and other entities, as appropriate.

(9) Shall recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment.

(10) Shall proceed, in accordance with Chapters 2 and 3, with actions required by Section 102(2)(C) of the Act and Section 2(f) of E. O. 11514.

(11) Shall cooperate with the Solicitor in carrying out his responsibilities under Section 103 of the Act and Section 2(d) of E. O. 11514.

**Department of the Interior
DEPARTMENTAL MANUAL**

Environmental Quality	Part 516 National Environmental
Chapter 3 Review of Environmental Statements	Policy Act of 1969
Prepared by Other Federal Agencies	516.3.1

.1 Purpose. This chapter prescribes procedures for reviewing draft environmental statements prepared by or for other agencies of the Federal Government under the provisions of Section 102(2)(C) of the National Environmental Policy Act of 1969.

.2 Responsibilities.

A. The Assistant to the Secretary for Policy Planning and Research:

(1) Shall be the Department's contact point with other Federal agencies for the receipt and transmittal of environmental statements;

(2) Shall designate the Assistant Secretary, bureau, office, or task force responsible for preparing Departmental comments on environmental statements prepared by other Federal agencies; and

(3) Shall make assignments and set schedules and suspense dates for responding to other Federal agency requests for reviewing environmental statements.

B. The Legislative Counsel:

(To be prepared when OMB Circular A-19 is revised).

C. Assistant Secretaries and Heads of Bureaus and Offices:

(1) Shall prepare Departmental comments for environmental statements assigned to them by the Assistant to the Secretary for Policy Planning and Research; and

(2) Shall provide review comments based upon their areas of jurisdiction or special expertise to other offices assigned responsibilities for preparing Departmental comments for environmental statements.

Department of the Interior
DEPARTMENTAL MANUAL

Environmental Quality Part 516 National Environmental
Policy Act of 1969

Chapter 3 Review of Environmental Statements

Prepared by Other Federal Agencies

516.3.3

. 3 Content of Department and Bureau Comments.

A. Departmental and Bureau review comments will be based upon the commenting office's jurisdiction or special expertise in regard to the environmental impact of the requesting agency's proposed action.

B. Reviews should not provide a synopsis or description of the environmental statement, but should provide concise comments on the stated or unstated environmental impacts of the proposed action or program and, if appropriate, on alternatives to the action.

C. Except in cases of specific jurisdiction, reviews of environmental statements shall not approve, disapprove, or object to non-Interior projects or programs, but shall critically comment on the project's or program's environmental impact and on the adequacy or inadequacy of the environmental statement.

. 4 Procedures for Legislation.

(To be prepared when OMB Circular A-19 is revised).

. 5 Procedures for Other Major Federal Actions.

A. Thirty calendar days are normally available for responding to other Federal agency requests for review. This represents about twenty working days. Accordingly, environmental statements and review comments will be hand-carried.

B. Offices responsible for preparing Departmental comments shall be responsible for resolving intra-Departmental differences in these comments; in cases where agreement cannot be reached the matter will be resolved by the Office of the Secretary.

C. Existing mechanisms for review will be used wherever possible.

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D. Review comments on environmental statements provided by bureaus and offices directly to other Federal agencies are considered informal and are only for the purpose of providing technical assistance to the requesting agency. Official agency comments from the Department of the Interior as called for in Section 8 of Interim Guidelines of the Council on Environmental Quality will be transmitted by the Office of Policy Planning and Research.

1981

UNITED STATES
DEPARTMENT OF THE INTERIOR

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TRANSMITTAL SHEET

Release
Number:

1341

Date: September 27, 1971

Part: 516 DM 2

Subject: ENVIRONMENTAL QUALITY

National Environmental Policy
Act of 1969

EXPLANATION OF MATERIAL TRANSMITTED:

This release revises 516 DM 2 to reflect the revised Guidelines of the Council on Environmental Quality (April 23, 1971), the revised procedures of the Office of Management and Budget (Circular 72-6, September 14, 1971) in the preparation of statements of environmental impact provided for in Section 102(2)(C) of the National Environmental Policy Act of 1969 (P.L. 91-190).

Environmental statements will be prepared by bureaus and offices; approved by Assistant Secretaries; and reviewed, endorsed, and transmitted to the Council on Environmental Quality by the Assistant Secretary - Program Policy. The release clarifies the responsibilities of Departmental officials; the content of environmental statements; the coordination, public participation, and availability of such statements; and the procedures for preparing and processing statements.

Richard S. Bedner

Assistant Secretary of the Interior

FILING INSTRUCTIONS:

Remove:

516 DM 2
(6 sheets)

Insert:

516 DM 2
(10 sheets)

Appendices A (4 sheets)
B (3 sheets)
C (1 sheet)
D (1 sheet)
E (2 sheets)

Replaces 9/17/70 (part of Release No. 1222)

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516.2.1

.1 Purpose. These procedures are to implement the policy and directives of Section 102(2)(C) of the National Environmental Policy Act of 1969 (P.L. 91-190, 83 Stat. 852, January 1, 1970), hereafter referred to as the Act; Section 2(f) of Executive Order No. 11514 (March 5, 1970); the Guidelines issued by the Council on Environmental Quality (36 F.R. 7724, April 23, 1971), [Appendix A]; Bulletin No. 72-6 of the Office of Management and Budget (September 14, 1971), [Appendix B]; and to provide guidance to bureaus and offices of the Department in the preparation of environmental statements for major Federal actions significantly affecting the quality of the human environment.

.2 Policy. All activities and proposed or recommended actions of the Department will be assessed for their environmental impact. Environmental statements shall be submitted to the Council on Environmental Quality on all legislation or other major actions proposed by the Department, and favorable reports on bills principally concerning the Department, which will have significant impacts on the quality of the environment. All draft and final statements shall be available to the public as provided by the Freedom of Information Act (5 U.S.C. Section 552).

.3 Scope.

.A Actions initiated after January 1, 1970. All activities of the Department initiated after the effective date of the Act (January 1, 1970) which significantly affect the environment are subject to the provisions of this chapter.

.B Actions initiated before January 1, 1970. The provisions of this chapter apply to continuing major Federal actions having a significant effect on the environment even though they arise from projects or programs initiated prior to the effective date of the Act. Where it is not practicable to reassess the basic course of action, continuing major actions should be shaped to minimize adverse environmental consequences. It is also important in continuing actions that account be taken of environmental consequences not fully evaluated at the outset of the project or program. Ongoing or uncompleted programs and projects which were authorized prior to January 1, 1970, shall be reconsidered to determine whether they constitute major Federal actions significantly affecting the quality of the human environment. If the program or project has significant impact, alternatives should be considered and an environmental statement must be prepared. The program

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or project need not be stopped or delayed pending preparation of the statement; except that, if such an ongoing program or project entails individual actions which have significant environmental impact and which are not yet authorized or not yet funded, an environmental statement must be provided before those actions may be carried out.

.4 Responsibilities.

.A The Assistant Secretary - Program Policy:

(1) As he may deem appropriate, shall establish or approve task forces, composed of representatives of other Federal, State, and local agencies; Secretarial offices; and/or appropriate bureaus and offices to prepare environmental statements in special cases;

(2) Shall designate lead bureaus within the Department and shall consult with CEQ and other Federal agencies in the designation of lead agencies, where appropriate;

(3) Shall review and endorse, prior to transmitting to CEQ, all draft and final environmental statements as to their form and content, and conformity with this chapter, in order to determine whether they are formulated in accordance with and represent the full and balanced interests of the Department;

(4) Shall review and approve all bureau and office procedures for the preparation and utilization of environmental statements.

.B The Assistant Secretaries:

(1) Shall maintain general supervision of the bureaus and offices under their jurisdiction in their compliance with this chapter and Section 102(2)(C) of the Act;

(2) Shall review and approve all environmental statements prepared by bureaus and offices under their jurisdictions before they are forwarded to the Assistant Secretary - Program Policy.

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.C The Solicitor:

(1) Shall consult with all bureaus and offices in identifying those actions requiring environmental statements;

(2) Shall assist bureaus and offices with legal questions which arise in the preparation of environmental statements.

.D The Legislative Counsel:

(1) Shall ensure that bureaus and offices prepare environmental statements for legislative proposals of the Department which have significant impact upon the environment;

(2) Shall coordinate or delegate the preparation of environmental statements for favorable reports on bills principally concerning the Department which have significant impact upon the environment.

.E The Director of Communications:

(1) Shall maintain a public file or index of draft and final environmental statements which have been transmitted to CEQ and shall arrange for making such statements available for inspection in accordance with the provisions of the Freedom of Information Act (5 U.S.C. Section 552).

.F Heads of Bureaus and Offices:

(1) Shall identify those actions requiring environmental statements and shall consult with the Assistant Secretary - Program Policy for guidance and direction;

(2) Shall designate those officials responsible for preparing such statements;

(3) Shall transmit the proposed draft and final environmental statements through their Assistant Secretary to the Assistant Secretary - Program Policy;

(4) Shall prepare formal procedures implementing this chapter and identifying the role of the environmental statement in the review and decision-making process in the bureau or office.

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.G Officials Responsible for Preparing Environmental
Statements

- (1) Shall obtain the information needed for the preparation of environmental statements;
- (2) Shall consult with appropriate bureaus and offices; other Federal agencies; and other appropriate sources of special environmental expertise not available within the responsible official's bureau or office;
- (3) Shall prepare proposed draft environmental statements and ensure that they fully consider and reflect the information obtained;
- (4) Shall transmit copies of draft environmental statements, as cleared by the Assistant Secretary - Program Policy, to Federal agencies with jurisdiction by law or special environmental expertise, to State and local agencies authorized to develop or enforce environmental standards, and to private organizations with an expressed or known interest in the proposal;
- (5) Shall give public notice in the manner herein provided of the availability of draft environmental statements and invite comments;
- (6) Shall consult with all bureaus and offices and other Federal agencies submitting comments, where appropriate;
- (7) Shall prepare proposed final environmental statements and ensure that all relevant comments are considered therein;
- (8) Shall transmit copies of final environmental statements, as cleared by the Assistant Secretary - Program Policy, to all bureaus and offices; other Federal, State, and local agencies; and private organizations from whom comments were solicited and received.

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.5 Determination of Major Federal Actions Requiring Environmental Statements. The following criteria are to be used in deciding whether a proposed action requires the preparation of an environmental statement:

.A Types of Federal Actions to be considered include, but are not limited to:

- (1) Recommendations or favorable reports to the Congress relating to legislation, including appropriations.
- (2) Projects, programs, and continuing activities, including research:
 - (a) Directly undertaken by Federal agencies;
 - (b) Supported in whole or in part through Federal contracts, grants, subsidies, loans, or other forms of financial assistance; or
 - (c) Involving a Federal lease, permit, license, certificate, or other entitlement for use.
- (3) Recommendation or adoption of policies, principles, standards, procedures, regulations, and plans which affect the environment.
- (4) Actions relating to natural or cultural resources:
 - (a) Acquisition or disposal;
 - (b) Regulation, permission, prohibition, or other institutional control of their use;
 - (c) Their operational or physical management;
 - (d) Construction or operation of various structures to manage them; and
 - (e) Recommendations of comprehensive, program, or project plans for their management.

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.B The statutory clause "major Federal actions significantly affecting the quality of the human environment" is to be construed with a view to the overall, cumulative impact of the action proposed, and of further actions contemplated. Such actions may be localized in their impact, but if the environment or its uniqueness may be significantly affected, the statement is to be prepared. Any proposed action that has an environmental impact likely to be highly controversial should be considered to require an environmental statement.

(1) In considering what constitutes a major Federal action, bureaus and offices should bear in mind that the effect of many decisions about a project or complex of projects can be individually limited but cumulatively considerable. This can occur when one or more government entities over a period of years put into a project individually minor but collectively major resources, when one decision involving a limited amount of money is a precedent for action in much larger cases or represents a decision in principle about a future major course of action, or when several government entities individually make decisions about partial aspects of a major action. The lead organization (agency with primary authority for committing the Federal Government to a course of action, or bureau or office with primary authority for committing the Department to a course of action) should be designated to prepare an environmental statement if it is reasonable to anticipate a cumulatively significant impact on the environment from such Federal actions.

(2) In considering what constitutes significant effects on the quality of the human environment, bureaus and offices should refer to the principles set forth in Section 101(b) of the Act. Significant effects include those that significantly degrade or enhance the quality of the environment, curtail or extend the range of beneficial uses of the environment, or serve short-term, to the disadvantage of long-term, environmental goals. Significant effects can also include actions which may have both beneficial and detrimental effects even if on balance the bureau or office believes that the effect will be beneficial. Significant effects on the quality of the human environment include both those that directly and indirectly affect human beings.

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.6 Content of Environmental Statements.

.A Cover Sheet

Every environmental statement shall have a cover sheet indicating the type of statement, a brief but descriptive title, the responsible organization, the date, and the signature of the responsible official (draft) or head of the bureau or office (final).

.B Summary Sheet

Each environmental statement shall have a one-page summary sheet prepared in accordance with Section 6(e) and Appendix I of the CEQ Guidelines [Appendix A]. Formats are provided in Appendix D.

.C Body of Statement

The body of the statement shall contain the following eight sections:

(1) Description of the proposal

This section shall describe the proposed or recommended action, its purpose, where it is to be located, when it is proposed to take place, and its interrelationship with other projects or proposals, and shall contain information and technical data sufficient to permit assessment of environmental impact by commenting agencies. Supporting project or program documents shall be referenced and one-page maps included as necessary.

(2) Description of the environment

This section shall include a comprehensive description of the existing environment without the proposal and the probable future environment without the proposal. The description shall focus both on the environmental details most likely to be affected by the proposal and on the broader regional aspects of the environment, including ecological interrelationships. This section shall also include a description of the present and projected level of economic development, land use, and related cultural factors, where appropriate.

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(3) The environmental impact of the proposed action

This section shall describe the environmental impacts of the proposed action. These impacts are defined as direct or indirect changes in the existing environment, whether beneficial or adverse. Wherever possible these impacts shall be quantified. This discussion will include the impact not only upon the natural environment but upon land use and social well-being as well. Separate discussion shall be provided for such potential impacts as man-caused accidents and natural catastrophes and their probabilities and risks. Specific mention should also be made of unknown or partially understood impacts.

(4) Mitigating measures included in the proposed action

A section on mitigating factors may be prepared, where appropriate, and shall include a discussion of measures which are proposed to be taken or which are required to be taken to enhance, protect, or mitigate impacts upon the environment, including any associated research or monitoring.

(a) With respect to water quality aspects of proposed actions which have been previously certified by the appropriate State or interstate organization as being in substantial compliance with applicable water quality standards under the provisions of the Federal Water Pollution Control Act, as amended, discussion shall include reference to that certification and the comments of the Environmental Protection Agency.

(b) With respect to water and air quality aspects of proposed actions which have been found by the Environmental Protection Agency to meet the requirements of Section 4(a)(1) of Executive Order 11507, Prevention, Control, and Abatement of Air and Water Pollution at Federal Facilities, discussion shall include reference to this finding.

(5) Any adverse effects which cannot be avoided should the proposal be implemented

This section shall describe those adverse effects which cannot be eliminated. This section shall include a discussion of the unavoidable adverse impacts described in (3) and (4) above, the relative values placed upon those impacts, and an analysis of who or what is affected and to what degree affected.

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- (6) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity.

This section shall discuss the local short-term use of the environment involved in the proposed action in relation to its cumulative and long-term impacts and give special attention to its relationship to trends of similar actions which would significantly affect ecological inter-relationships or pose long-term risks to health or safety. Short-term and long-term do not refer to any fixed time periods, but should be viewed in terms of the various significant ecological and geophysical consequences of the proposed action.

- (7) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented

This section shall discuss, and quantify where possible, any irrevocable uses of resources, including such things as resource extraction, erosion, destruction of archaeological or historical sites, elimination of endangered species' habitat, and significant changes in land use.

- (8) Alternatives to the proposed action

This section shall describe the environmental impacts, both beneficial and adverse, of the various alternatives considered by and available to the Department, specifically taking into account the alternative of no action. In addition and where appropriate there will be a brief discussion of possible alternatives which are beyond the authority of the Department.

.D Consultation and Coordination with Others

This part will have two sections as follows:

- (1) Consultation and coordination in the development of the proposal and in the preparation of the draft environmental statement

This section shall describe the public participation efforts of the bureau or office concerned and the consultations with Federal, State, local, and individual interests in the development of the proposal and the preparation of the draft environmental statement.

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(2) Coordination in the review of the draft environmental statement

This section shall indicate the procedures used in disseminating the draft environmental statement and will list those organizations and experts from whom comments have been requested. Upon preparation of the final environmental statement this section shall be expanded to indicate those organizations and experts from whom comments were received, their disposition, and any unresolved conflicts; and to summarize any public response.

.E Attachments

(1) Draft statements

Normally draft environmental statements shall not have attachments; however, in some cases it shall be appropriate to attach environmental assessments, evaluations, or reports prepared by applicants or solicited from consultants or other Federal agencies.

(2) Final statements

In addition to appropriate environmental assessments, evaluations, or reports prepared by applicants or consultants, attachments to final environmental statements shall include all written responses from:

(a) Bureaus and offices with delegated jurisdiction or special environmental expertise;

(b) Other Federal agencies with jurisdiction by law or special environmental expertise;

(c) State and local agencies which are authorized to develop and enforce environmental standards;

(d) Responsible private organizations and associations which represent the opinions of wider groups concerning the proposed action or its environmental impact;

(e) Recognized experts.

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.7 Coordination.

In conjunction to the procedures set forth herein, existing mechanisms for obtaining the views of Departmental bureaus and offices and of other Federal, State, and local agencies will be utilized to the maximum extent practicable in the preparation and subsequent review of draft environmental statements.

.A Departmental Bureaus and Offices

(1) Because of the Department's extensive environmental expertise many of the Department's bureaus and offices may have inputs to the preparation of environmental statements. Accordingly working-level consultations should be initiated early in the development of the proposal and in the preparation of draft environmental statements.

(2) Draft statements shall be circulated to all of the Department's bureaus and offices which have delegated jurisdiction or special environmental expertise. Comments received from these bureaus and offices shall be attached to the final environmental statement.

.B Other Federal and Federal-State Agencies

(1) Other Federal and Federal-State agencies shall be consulted in connection with preparation of environmental statements where those agencies have jurisdiction by law or special environmental expertise with respect to any environmental impact involved, and comments shall be obtained from those Federal and Federal-State agencies which are authorized to develop and enforce environmental standards. Section 7 and Appendix II to the CEQ Guidelines [Appendix A] shall be used to determine those agencies from which consultations and comments should be solicited. Draft statements shall be sent to the appropriate offices indicated in Appendix III of the CEQ Guidelines [Appendix A] for official agency review and comment.

(2) The Environmental Protection Agency shall be consulted and comments requested on matters related to air or water quality standards, noise control, solid waste disposal, pesticide regulation, radiation criteria and standards, or other provisions of the authority of EPA.

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(3) A period of not less than forty-five (45) days should be established for reply, after which it may be presumed, unless the agency requests a specific extension of time, that the agency consulted has no comment to make. Where time is a critical factor, time limits of thirty (30) days may be established. A period of forty-five (45) days will always be allowed for EPA review.

.C State and Local Agencies

(1) Where no public hearing has been held on the proposed action at which the appropriate State and local review has been invited, and where review of the proposed action by State and local agencies authorized to develop and enforce environmental standards is relevant, such State and local review shall be provided for as follows:

(a) For Federal water and related land resources plans, projects, and programs, review by State and local governments shall be through procedures set forth by the Water Resources Council (Section III E of Policies, Standards, and Procedures in the Formulation, Evaluation, and Review of Plans for Use and Development of Water and Related Land Resources, approved by the President on May 15, 1962, and printed as Senate Document 97, 87th Congress; Handbook for Coordination of Planning Studies and Reports, June 1969).

(b) For direct Federal development projects, and for projects assisted under programs listed in Attachment D of the Office of Management and Budget Circular No. A-95, review by State and local governments shall be through the State and Regional or Metropolitan Clearinghouses in accordance with the procedures set forth under Part 1 of OMB Circular No. A-95 and 511 DM 5, Intergovernmental Relations.

(c) For actions affecting the cultural or historic environment, review by State and local agencies shall be through procedures set forth by the Advisory Council on Historic Preservation (36 F.R. 3310), and draft environmental statements shall reflect consultations with the State Liaison Officer for Historic Preservation and with the State Archaeologist.

(d) For actions having an impact on Indian lands or communities, review by State and local agencies shall also include review by any Indian tribal governing bodies.

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(2) Where the procedures in (1) above are not appropriate, review and comment by State and local agencies authorized to develop and enforce environmental standards may be obtained by distributing the draft environmental statement to the appropriate State and Regional or Metropolitan Clearinghouses, unless the Governor of the State involved has designated some other point for obtaining this review.

(3) Clearinghouse procedures allow State and local agencies thirty (30) days for initial comment with an extension of thirty (30) days upon request.

.8 Public Participation and Availability of Statements.

.A The public will be provided timely information and material sufficient for an understanding of plans and programs with environmental impact in order to obtain the views of interested parties. The public will also be provided information on alternative courses of action.

.B Public hearings may be held to solicit the views of interested parties. Notice of such hearings shall include publication in the Federal Register no less than thirty (30) days before the hearing date, and such other notice as the bureau or office deems appropriate. If it is decided to prepare a draft environmental statement prior to a relevant hearing, the statement shall be made available to the public at least fifteen (15) days, and preferably thirty (30) days, prior to the hearing date. Procedures for discretionary public hearings are provided in 455 DM 1.

.C Draft and final environmental statements, including required attachments, shall be made available for public inspection at the following locations:

(1) The Office of Communications (for statements considered especially newsworthy by the Director of Communications; otherwise this office will assist the public in locating and inspecting such statements).

(2) The Bureau or Office headquarters.

(3) Any involved Bureau regional offices.

(4) Bureau field offices, where appropriate.

(5) State and Regional or Metropolitan Clearinghouses, where appropriate.

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(6) A local public meeting place, such as a County courthouse or public library, in the immediate vicinity of the proposed action, where appropriate.

.D A complete record of any hearings, draft and final environmental statements, and all comments received related thereto shall be made available for public inspection at the following locations:

(1) The Bureau or Office headquarters.

(2) The Bureau regional and/or field office with primary involvement.

.E Whenever possible copies of draft and final environmental statements, including required attachments, shall be made available to the public at no cost. In those cases where the cost of reproduction of such statements is substantial, the public may be charged a fee no greater than the incremental costs of reproduction (43 CFR 2.3).

.F Notices of availability of draft and final environmental statements will be made in the Federal Register at the time of transmittal of the statement to CEQ. Formats are provided in Appendix E.

.9 Procedures for Preparing and Processing Environmental Statements.

.A General Procedures

(1) Program and project recommendations and decisions are based on various technical, economic, social and environmental factors. These factors are generally incorporated into a program justification or plan formulation document. Environmental statements are separate documents which analyze the salient environmental information in order to provide decision makers with comprehensive and concise, factual information concerning the environmental impacts of the proposed action and related alternatives. Accordingly, environmental statements shall not be used to recommend or justify proposed actions.

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(2) Bureaus and offices shall identify at what stage or stages of a series of actions the environmental statement procedures of this directive will be applied. It may be necessary to use these procedures both in the development of a national program and in the review of proposed projects within the national program. Care should be exercised so as not to duplicate the review process, but when actions being considered differ significantly from those that have already been reviewed pursuant to this chapter, an environmental statement should be provided.

(3) When a proposed grant, leasing, or similar program does not entail approval by other agencies of numerous, but relatively minor, projects within the program, the views of Federal, State, and local agencies in the legislative, and possibly appropriation, process may have to suffice. The principle to be applied is to obtain views of other agencies at the earliest feasible time in the development of program and project proposals.

(4) Statements shall normally be prepared at the organizational level responsible for initiating or implementing the proposed action. A bureau or office may seek information helpful to the preparation of an environmental statement from any appropriate source, but shall itself prepare the statement.

.B Types of Environmental Statements

(1) Draft statement

This document is as complete as possible and is formally circulated to Federal, State, and local agencies and to other interested parties for their review and comment. It may be circulated concurrently with the bureau's or office's review of the proposed action as long as final decisions or recommendations are not made prior to consideration of comments received.

(2) Final statement

This is the completed document which incorporates review comments and discusses unresolved issues. It is the document which must accompany the proposed action through the Department's final decision-making process.

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.C Administrative Actions

(1) Administrative actions are defined as any proposed action subject to Section 102(2)(C) of the Act other than proposals for legislation to the Congress or reports on legislation.

(2) To the maximum extent practicable, no administrative action is to be taken sooner than ninety (90) days after a draft environmental statement has been furnished to CEQ, circulated for comment, and publicly announced in the Federal Register, whichever is later.

(3) To the maximum extent practicable, no administrative action is to be taken sooner than thirty (30) days after a final environmental statement has been made available to CEQ and the public. If the final statement is filed within the ninety (90) day period in (2) above, the two periods may run concurrently to the extent that they overlap.

(4) Where, in the opinion of the responsible bureau or office, emergency circumstances, overriding considerations of expense to the Government, or impaired program effectiveness make it necessary to take an action with significant environmental impact without observing the time limitations in (2) and (3) above, the bureau or office concerned shall consult with the Assistant Secretary - Program Policy, who shall in turn consult with CEQ, about alternative arrangements.

.D Legislative Proposals and Favorable Reports on Legislation

(1) Environmental statements for legislative proposals and reports shall be handled in accordance with Section 3a of OMB Bulletin 72-6 [Appendix B], Section 10(c) of the CEQ Guidelines [Appendix A], and, except as modified herein, Section .9.F of this chapter.

(2) Bureaus and offices shall be responsible for the preparation of environmental statements for their legislative proposals which have significant impact upon the environment, and shall be responsible for any necessary consultations with appropriate Federal, State, and local agencies in the course of preparing and reviewing such statements. State and local agency consultations are not required unless there is a specific impact in the jurisdiction of a State or local agency.

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(a) Information copies of approved draft or final environmental statements shall accompany all such legislative proposals at the time they are submitted by bureaus and offices to the Legislative Counsel for circulation within the Department, and shall be circulated with such proposals.

(b) Information copies of approved draft or final environmental statements shall accompany the Legislative Counsel's submittals of such legislative proposals to OMB for clearance.

(3) In referring introduced legislation to bureaus and offices for comment, the Legislative Counsel, in consultation with the Assistant Secretary - Program Policy, shall indicate whether an environmental statement will be required in the event of a proposed favorable report; and, if such statement will be required, designate the bureau or office responsible for its preparation.

(a) The designated bureau or office shall submit the proposed draft statement to the Legislative Counsel at the same time that they submit comments on the introduced legislation. This proposed draft statement shall accompany the proposed favorable report on its "two-day wait" period within the Department.

(b) The approved draft environmental statement shall be circulated by the designated bureau or office for official review and comment at the same time that the Legislative Counsel submits the Department's proposed favorable report, accompanied by information copies of the statement, to OMB for clearance.

(4) Final environmental statements for legislative proposals and for favorable reports on legislation, and draft statements where appropriate under Section 10(c) of the CEQ Guidelines [Appendix A], shall be sent to the Congress by the Legislative Counsel.

(5) The Legislative Counsel may permit deviation from the procedures set forth herein when undue delay would occur in the presentation of Departmental views to the Congress.

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.E Annual Budget Estimates

(1) Environmental statements and summary lists for annual budget estimates shall be handled in accordance with Section 3b of OMB Bulletin 72-6 [Appendix B], and, except as modified herein, Section .9.F of this chapter.

(2) Draft environmental statements for projects and programs included in annual budget estimates shall be prepared and circulated by September 1 of the fiscal year preceding the fiscal year under consideration.

(3) Final environmental statements for projects and programs included in the budget shall be transmitted to the Congress by the Assistant Secretary - Management and Budget and to CEQ by the Assistant Secretary - Program Policy following the President's budget transmittal to the Congress and prior to any Congressional hearings.

.F Processing of Environmental Statements

(1) Bureaus and offices should consult with and solicit inputs and informal comments from appropriate bureaus and offices; other Federal agencies; and other specific individuals, organizations, and governmental entities with special expertise regarding the environmental impact of the proposed action. The bureau or office may circulate a description of the proposed action at this stage in order to solicit such inputs. These inputs and comments received and sent are intended to provide technical assistance in the preparation of a draft environmental statement and shall be considered informal.

(2) Where appropriate, environmental information may be required of applicants for grants, contracts, loans, leases, licenses, or permits. This material may be circulated for comment pursuant to (1) above as long as it is properly identified. It shall not be circulated as a draft statement; however, it may be circulated as an attachment to a draft statement.

(3) Draft statements may be circulated at any level subject to the following:

9/27/71 (Release No. 1341)

Replaces 9/17/70 (Release No. 1222)

**Department of the Interior
DEPARTMENTAL MANUAL**

Part 516 National Environmental
Environmental Quality Policy Act of 1969

Chapter 2 Statement of Environmental Impact 516.2.9F(3)(a)

(a) Fifteen (15) copies shall be transmitted through the appropriate Assistant Secretary to the Assistant Secretary - Program Policy.

(b) The Assistant Secretary - Program Policy shall clear the statement, assign it a control number, stamp the date on it, and transmit ten (10) copies to CEQ.

(c) A notice of availability shall accompany the statement to the Assistant Secretary - Program Policy, who in turn will send it to the Federal Register at the same time that he transmits the statement to CEQ, except for statements on legislation and budget estimates.

(d) Upon notification of the actions in (b) and (c) above, the bureau or office shall make formal distribution to reviewing entities. The circulation to other Federal agencies will be through the offices designated in Appendix III of the CEQ Guidelines [Appendix A].

(e) The Assistant Secretary - Program Policy shall immediately provide one (1) copy to the Director of Communications at the same time of the transmittal to CEQ, except for statements on legislation and budget estimates. The Director of Communications shall make any necessary arrangements for additional copies with the appropriate bureau or office.

(4) A complete and accurate log shall be kept of all comments received on draft environmental statements and all review comments on draft environmental statements shall be available to the public upon request.

(5) Final environmental statements may be distributed at any level subject to the following:

(a) Fifteen (15) copies shall be transmitted through the appropriate Assistant Secretary to the Assistant Secretary - Program Policy.

(b) The Assistant Secretary - Program Policy shall endorse the statement, assign it a control number, stamp the date on it, and transmit ten (10) copies to CEQ.

9/27/71 (Release No. 1341)

Replaces 9/17/70 (Release No. 1222)

Department of the Interior
DEPARTMENTAL MANUAL

Part 516 National Environmental
Environmental Quality Policy Act of 1969

Chapter 2 Statement of Environmental Impact 516.2.9F(5)(c)

(c) A notice of availability shall accompany the statement to the Assistant Secretary - Program Policy, who in turn will send it to the Federal Register at the same time that he transmits the statement to CEQ.

(d) Upon notification of the actions in (b) and (c) above, the bureau or office shall distribute the statement to all bureaus, offices, agencies, and organizations from whom comments were received.

(e) The Assistant Secretary - Program Policy shall immediately provide one (1) copy to the Director of Communications at the same time of the transmittal to CEQ. The Director of Communications shall make any necessary arrangements for additional copies with the appropriate bureau or office.

.10 Implementing Instructions. This chapter is effective upon release with the following exceptions:

.A Bureau and Office Procedures. The procedures provided for in Section 2.4.F(4) shall be submitted no later than thirty (30) days following the release of this chapter to the Assistant Secretary - Program Policy for approval in accordance with Section 2.4.A(5).

.B Content of Environmental Statements. The body of environmental statements provided for in Section 2.6.C shall contain the prescribed material; however, the body of statements under preparation on the date of this release will not have to conform to the prescribed format if the draft or final statements are forwarded by the head of the appropriate bureau or office to the Assistant Secretary - Program Policy within (60) days or ninety (90) days respectively, of the date of the release of this chapter.

9/27/71 (Release No. 1341)
Replaces 9/17/70 (Release No. 1222)

ATTACHMENT D

Issue 3

Hearings

before the

Committee on Interior and Insular Affairs

United States Senate

Ninety-Second Congress

November 10, 1971

THE RELATIONSHIP OF DEPARTMENTAL POLICIES TO
THE GENERAL STATE AND FEDERAL REGULATIONS ON
AIR AND WATER QUALITY

- 1/ BLM Manual 1602
- 2/ 43 CFR 2850
- 3/ 43 CFR 2800 - 2810
- 4/ 43 CFR 2259
- 5/ Excerpts from Proposed Water
Service Contract, Huntington
Canyon Project
- 6/ Policy letter requiring inclusion
of environmental quality provi-
sions in contracts and other
agreements relating to utilization
of resources under the jurisdic-
tion of the Department of the
Interior

BUREAU OF LAND MANAGEMENT MANUAL

1602 - BASIC GUIDANCE

.34 Environment Protection and Enhancement.

A. Description of Tasks Involved. All Bureau activities are involved in and concerned with environment protection and enhancement, in its largest sense. This includes:

1. The preservation and enhancement of:
 - a. open space
 - b. natural beauty
 - c. rare and endangered ecosystems
 - d. ecological harmony
2. Prevention of:
 - a. air pollution
 - b. water pollution
 - c. pollution by noise
 - d. land pollution by solid wastes
 - e. destruction and damage by wildfire

Open space is a quality or characteristic of our natural environment. It allows us to see, move and appreciate the environment without undue distraction and limitation--either physical, visual or audible.

Natural beauty is the existing and essentially undisturbed beauty of our natural environment.

Rare and endangered ecosystem remnants are those combinations of plant and animal life which are disappearing and which should be preserved for historical and research purposes.

Ecological harmony is the balance of nature, which if observed in the utilization of resources, minimizes unnecessary losses of related resources.

B. Standards Prescribed.

1. All land use and program decisions must be consistent with Federal or State air and water quality standards and public health and safety standards affecting solid waste disposal and noise abatement.

1602 - BASIC GUIDANCE

2. Open space, natural beauty, clean air, clean water, ecological, and ecosystem values and potentials are fully considered in all land use and program decisions.

a. When these values can be preserved or enhanced, at no cost, simply through careful design and execution of Bureau programs, they are preserved or enhanced.

b. When the preservation or enhancement of these values will result in loss of other resource values or increase in program costs, the long range cost is compared to the long range results. Consideration is given to social as well as economic values. Great weight is given to preservation of a wholesome environment for future generations.

C. Application to Program Activities. Each activity applies the standards set forth above. In addition, each activity encourages:

1. public awareness of environmental values,
2. litter abatement,
3. rehabilitation of impaired environments,
4. enhancement of environments by improved technology, and
5. use of adequate stipulations in all licenses, permits and grants to prevent deterioration that may be caused by improper use of land resources.

Title 43—PUBLIC LANDS: INTERIOR

Chapter II—Bureau of Land Management,
Department of the Interior
SUBCHAPTER B—LAND RESOURCE MANAGEMENT
(2000)
[Circular No. 2282]

PART 2850—POWER TRANSMISSION LINES

Environmental Considerations.

On page 18299 of the Federal Register of December 3, 1970, there was published a notice and text of a proposed amendment to Subpart 2850 of Title 43, Code of Federal Regulations. The purpose of the amendment is to require applicants for power transmission line rights-of-way across public lands to submit an environmental impact statement of the project with the application. It also requires that the authorized officer consider the environmental impact in connection with such applications.

Interested persons were given 60 days within which to submit comments, suggestions, or objections to the proposed amendment. Four comments were received. One comment endorsed the regulations and suggested that the impact of

transmission lines on airspace, particularly in the vicinity of airports be considered. Two comments opposed the regulations. One other comment suggested that the regulations be amended to allow for modification of the project where beneficial purposes and effects of the project are outweighed by an adverse environmental impact.

The comments and suggestions received were given due consideration, and the changes have been made to provide that: (1) Required information about the project includes the effect on airspace. (2) "Environmental Criteria for Electric Transmission Lines," a joint publication of the Departments of Agriculture and the Interior shall be used by the applicant in the design and construction of the project. (3) Whenever the application cannot be approved as proposed, the authorized officer will, whenever possible, suggest alternatives or modifications which if adopted by the applicant would make the application acceptable.

The proposed amendment is hereby adopted as set forth below. This amendment shall become effective on publication in the Federal Register (4-9-71).

Section 2851.2-1 (c) is amended by adding a subparagraph (6) to read as follows:

§ 2851.2-1 Applications.

(c) * * *

(6) (i) A detailed description of the environmental impact of the project shall be included with the application. It shall provide, among other things, information about the impact of the project on airspace, air and water quality, scenic and esthetic features, historical and archeological features, and wildlife, fish, and marine life.

(ii) The proposed site, design, and construction of the project shall be consistent with the "Environmental Criteria for Electric Transmission Lines," prescribed jointly by the Secretary of the Interior and the Secretary of Agriculture, as well as such other environmental criteria and guidelines as the Department shall from time to time prescribe. "Environmental Criteria for Electric Transmission Systems" is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20420.

(iii) If all other requirements are met, the application may be approved if it is determined that the beneficial purposes and effects of the project will not be outweighed by an adverse environmental impact. If the authorized officer determines that the application cannot be approved as proposed, he will, whenever possible, suggest alternative routes or methods of construction, or other modifications which if adopted by the applicant would make the application acceptable.

ROBERT C. B. MORRIS,
Secretary of the Interior.

APRIL 5, 1971.

[PR Doc 71-4955 Filed 4-8-71; 8:40 am]

TITLE 43—PUBLIC LANDS: INTERIOR

Chapter II—Bureau of Land Management, Department of the Interior

PART 2000—RIGHTS-OF-WAY, PRINCIPLES AND PROCEDURES

PART 2010—TRAILROADS AND LOGGING ROADS

Miscellaneous Amendments

The purpose of this amendment is to provide for: (1) Protection of the environment; (2) preservation of other resource values in a multiple-use management program; (3) public safety; and (4) equal employment opportunity on rights-of-way across public lands administered by the Bureau of Land Management.

This amendment complies with Executive Order 11514 which directs agency heads to identify any deficiencies or inconsistencies in their agencies' administrative regulations which prohibit or limit full compliance with the purposes and provisions of the National Environmental Policy Act of 1969.

In accordance with the Department's policy on public participation in rule making (36 F.R. 8336) interested parties may submit written comments, suggestions, or objections with respect to the proposed rules to the Director (210), Bureau of Land Management, Washington, D.C. 20240 until October 26, 1971.

Subpart 2000 of Chapter II of Title 43 of the Code of Federal Regulations is amended as follows:

1. Section 2001.1-5 is revised to read as follows:

§ 2001.1-5 Terms and conditions.

An applicant, by accepting a right-of-way, agrees and consents to comply with and be bound by the following terms and conditions:

(a) *State and Federal laws.* To comply with State and Federal laws and regulations applicable to the project for which the right-of-way is approved and to the lands which are included in the right-of-way.

(b) *Equal employment opportunity.* To comply with Executive Order 11246, as amended, 30 F.R. 12319 (1965), and

regulations issued pursuant thereto, 41 CFR Ch. 60 and Part 17 of this title. Each right-of-way permit issued shall contain the equal employment opportunity language set forth in section 202 of E.O. 11246.

(c) *Public access.* (1) To permit free and unrestricted public access to and upon the right-of-way for all lawful and proper purposes except areas designated as restricted by applicant with the consent of the authorized officer in order to protect the public safety or facilities constructed on the right-of-way.

(2) During construction, to regulate public access and vehicular traffic as required to facilitate operations and to protect the public, wildlife, and livestock from hazards associated with the project. For this purpose, applicant shall provide warnings, flagmen, barricades, and other safety measures.

(3) To build and repair such roads, fences, and trails as may be destroyed or injured by construction work and to build and maintain necessary and suitable crossings for all roads and trails that intersect the works constructed, maintained, or operated under the right-of-way.

(d) *Pollution abatement.*—(1) *Pesticides.* To comply with all rules pertaining to the use of pesticides on public lands.

(2) *Water pollution.* To conduct construction work, operation and maintenance in a manner to prevent pollution of, or degradation of the quality of water. Toxic material shall not be released in any lake or water drainage. All construction work and subsequent use of the right-of-way must be consistent with Federal and State water quality standards and public health and safety standards. Unless waived by the authorized officer, dikes or cofferdams shall be installed to separate concrete work areas from lakes or streams during construction. Mobile ground equipment shall be kept within the right-of-way and out of the waters of lakes, streams or rivers except as permitted by the authorized officer.

(3) *Air pollution.* To control emissions from equipment and installations in accordance with Federal and State air quality standards.

(e) *Erosion control.* To conduct all construction, operation, and maintenance activities in a manner to minimize disturbance to vegetation, drainage channels, and streambanks. Construction methods shall be designed to prevent degradation of delicate soil conditions in areas where such degradation would result in detrimental erosion or subsidence. The applicant shall take any other such soil and resource conservation and protection measures on the land covered by the right-of-way as the authorized officer determines are necessary.

(f) *Fire prevention.* To do everything reasonably within his power, both independently and on request of any duly authorized representatives of the United States, to prevent and suppress fires on

RULES AND REGULATIONS

over the lands to be occupied under the right-of-way.

(c) *Sanitation and waste disposal.* To manage or dispose of all waste generated in construction and operation in a manner acceptable to the authorized officer. The term "waste" as used means all discard matter, including, but not limited to, human waste, trash, garbage, oil, drums, petroleum products, and equipment.

(d) *Facilities.* To provide for maintenance and enhancement of esthetic values in planning, construction, and operation. All permanent structures shall be painted a color or colors that harmonize with their natural setting or otherwise appropriate. The authorized officer may require any reasonable measures he deems necessary to protect esthetic values.

(e) *Timber.* To enter into a contract with the United States for the purchase and removal of merchantable timber within the boundaries of the right-of-way prior to cutting operations. Such purchase and removal will be limited to those actually required to facilitate installation of the facilities. The contractor must utilize and dispose of, or otherwise accumulated during construction and maintenance of the facilities in such manner as to minimize the fire hazard and also in accordance with such instructions as the authorized officer may specify.

(f) *Wildlife.* To take such measures as may be necessary to assure unrestricted passage and movement of wildlife including fish. Hunting shall be permitted within 1/4 mile of streams or rivers without prior written authorization from the State fish and game authority. Written notice from the authorized officer, key wildlife areas may be closed to construction activities during periods of wildowl nesting, migration or breeding.

(g) *Antiquities and historical sites.* To conduct construction activities across known or suspected archaeological, paleontological, or historical sites in accordance with instructions issued by the authorized officer; to notify the authorized officer immediately of any archaeological, paleontological, or historical sites during construction operations; to suspend operations on the site pending investigation and instruction by the authorized officer.

(h) *Restoration.* To restore the land in the manner approved by the authorized officer.

(i) *Liability.* To indemnify and save harmless the United States against liability for injury or damage to persons, lands or property arising from occupancy or use of the lands within the right-of-way. Where a right-of-way is granted to a governmental agency which has no legal power to assume a liability with respect to property damages caused by it, such agency in lieu of must agree to repair all such damages.

(j) *Notification of address.* To keep the authorized officer informed of his

address, and, in case of a corporation, of the address of its principal place of business and of the names and addresses of its principal officers at all times.

(k) *Management reservations.* That the allowance of the right-of-way shall be subject to the express condition that the exercise thereof will not unduly interfere with the management, administration or disposal by the United States of the lands affected thereby, and that he agrees and consents to the occupancy and use by the United States, its grantees, permittees, or lessees of any part of the right-of-way not actually occupied or required by the project, or the full and safe utilization thereof, for necessary operations incident to such management, administration, or disposal.

(l) *Subsequent authorized works.* The right-of-way herein granted shall be subject to the express covenant that it will be modified, adopted, or discontinued if found by the Secretary to be necessary, without liability or expense to the United States, so as not to conflict with the use and occupancy of the land for any authorized works which may be hereafter constructed thereon under the authority of the United States.

(m) *Other terms and conditions.* To comply with any additional terms and conditions the authorized officer deems are in the public interest for protecting the environment and natural resources within the scope of the applicable statute and regulations.

2. Section 2802.1-5 is amended by the addition of paragraph (c) to read as follows:

§ 2802.1-5 Documents which must accompany application.

(c) *Plan.* Each application must be accompanied by a plan of development and operation which sets forth the means by which the applicant will comply with the terms and conditions required under § 2801.1-5(e) (2) and (3), (d), (e), (g), (h), (j), (k) and (l).

3. In § 2801.1-7(a) the citation of the Act of March 3, 1921, is corrected to read (16 U.S.C. 757a).

4. A new § 2802.1-8 is added to read as follows:

§ 2802.1-8 Performance Bond.

(a) (1) Prior to initiation of construction activities, the applicant for the right-of-way may be required to file a performance bond with the office issuing the permit. If a bond is required it shall be conditioned upon the faithful compliance by the applicant with applicable regulations and the terms and conditions of the approved right-of-way. The amount of the bond shall be based on the estimated costs of amelioration of damages and restoration of the lands as determined by the authorized officer, in the event that the grantee violates the terms and conditions of the grant.

(2) Where a bond is required any applicant may elect to post a surety bond, promissory note, certified check, cashier's check, or deposit cash or ne-

gotiable bonds of the U.S. Government. The cash deposit or the market value of such securities shall be maintained in an amount at least equal to the amount of a bond as determined by the authorized officer under paragraph (a) (1) of this section.

(b) The authorized officer shall adjust the required amount of a bond or securities when such action would be consistent with the regulations of this section and shall release such bond or securities upon termination of liability.

(c) Performance bonds will not be required of Federal, State, or other governmental agencies. Where the construction is actually performed for such Federal, State, or governmental agencies by a contractor who would have to post a bond under the terms of paragraph (a) of this section if he were the applicant, such agencies shall require such contractor to furnish a bond, payable to the United States, which meets the requirements of paragraph (a) of this section.

5. A new section 2802.1-9 is added to read as follows:

§ 2802.1-9 Public hearings.

The authorized officer will, when he determines it to be in the public interest, hold public hearings after appropriate notice to consider protection of the environment, other uses and public values, and public safety before acting on the right-of-way application.

6. In paragraph (c) and (c) of § 2802.2-1 and in § 2802.2-2, the word "manager", wherever it appears, is changed to read "authorized officer".

7. Subpart 2811 is amended by revising § 2812.9 to read as follows:

§ 2812.9 Appeals.

An appeal may be taken from any final decision of the authorized officer to the Board of Land Appeals. Office of Hearings and Appeals in accordance with the procedures contained in Subpart E of Part 4, Subtitle A of this title.

W. T. PECORA,
Under Secretary of the Interior.

SEPTEMBER 20, 1971.

[FR Doc. 71-14051 Filed 9-23-71; 8:47 am]

Title 43—PUBLIC LANDS: INTERIOR

Subtitle A—Office of the Secretary
of the Interior

[Circular No. 2259]

PART 23—SURFACE EXPLORATION, MINING AND RECLAMATION OF LANDS

A new Part 23 is hereby added to Title 43 Code of Federal Regulations, to become effective upon publication in the FEDERAL REGISTER.

- Sec.
- 23.1 Purpose.
- 23.2 Scope.
- 23.3 Definitions.
- 23.4 Application for permission to conduct exploration operations.
- 23.5 Technical examination of prospective surface exploration and mining operations.
- 23.6 Basis for denial of a permit, lease, or contract.
- 23.7 Approval of exploration plan.
- 23.8 Approval of mining plan.
- 23.9 Performance bond.
- 23.10 Reports: Inspection.
- 23.11 Notice of noncompliance: Revocation.
- 23.12 Appeals.
- 23.13 Consultation.

§ 23.1 Purpose.

It is the policy of this Department to encourage the development of the mineral resources under its jurisdiction where mining is authorized. However, the public interest requires that, with respect to the exploration for, and the surface mining of, such minerals, adequate measures be taken to avoid, minimize, or correct damage to the environment—land, water, and air—and to avoid, minimize, or correct hazards to the public health and safety. The regulations in this part prescribe procedures to that end.

§ 23.2 Scope.

(a) Except as provided in paragraphs (b) and (c) of this section, the regulations in this part provide for the protection and conservation of nonmineral resources during operations for the discovery, development, surface mining, and onsite processing of minerals under permits, leases, or contracts issued pursuant to: The Mineral Leasing Act of February 25, 1920, as amended (30 U.S.C. 181-287); the Mineral Leasing Act for Acquired Lands (30 U.S.C. 351-359); the Materials Act of July 31, 1947, as amended (30 U.S.C. 601-604); and title 23, United States Code, section 317, relating to appropriation for highway purposes of lands owned by the United States.

(b) The regulations in this part do not cover the exploration for oil and gas or the issuance of leases, or operations thereunder, for oil and gas under the mineral leasing acts, which are covered by regulations in Subpart 3107 and Part 3120 of this title and 30 CFR Part 221; neither do they cover minerals underlying Indian tribal or allotted lands, which are subject to regulations in Title 25 CFR, nor minerals subject to the general mining laws (30 U.S.C. 21-54); nor minerals under the Materials Act which are under the jurisdiction of the Secretary of Agriculture (74 Stat. 205); nor minerals underlying lands, the surface of which is not owned by the U.S. Government.

(c) When more than one permit or contract is expected to be issued to dispose of materials in a particular deposit or tract of land, such as community pits or common use areas, no requirement for reclamation will be made in such permits or contracts and the burden of reclamation will be assumed by the Government. Where reclamation is not required because more than one permit or contract is expected to be issued, there shall be added to the sales price under each permit or contract a reasonable charge to defer the cost of reclamation. In computing such added charge, the authorized officer shall establish the estimated cost of reclamation upon completion of extractive operations for the deposit and the estimated total volume of material to be extracted. The added charge shall be a proportionate share of the estimated cost of reclamation in the same ratio as the material sold under the permit or contract bears to the total estimated volume of the deposit which is expected to be extracted.

(d) The regulations in this part shall apply only to permits, leases, or contracts issued subsequent to the date on which the regulations become effective.

§ 23.3 Definitions.

As used in the regulations in this part:

(a) "Mineral leasing acts" means the Mineral Leasing Act of February 25, 1920, as amended and supplemented (30 U.S.C. 181-287) and the Mineral Leasing Act for Acquired Lands (30 U.S.C. 351-359);

Published in 34 F.R. 852, January 18, 1969 - Effective upon publication.

Circular Distribution List

(b) "Materials Act" means the Act of July 31, 1947, as amended (30 U.S.C. 601-604);

(c) "Mining supervisor" means the Regional Mining Supervisor, or his authorized representative, of the Geological Survey authorized as provided in 30 CFR 211.3 and 231.2 to supervise operations on the land covered by a permit or lease;

(d) "District manager" means the manager of the district office or other authorized officer of the Bureau of Land Management having administrative jurisdiction of and responsibility for the land covered by a permit, lease, contract, application, or offer;

(e) "Overburden" means all the earth and other materials which lie above a natural deposit of minerals and such earth and other materials after removal from their natural state in the process of mining;

(f) "Area of land to be affected" or "area of land affected" means the area of land from which overburden is to be or has been removed and upon which the overburden or waste is to be or has been deposited, and includes all lands affected by the construction of new roads or the improvement or use of existing roads to gain access to an operation and for haulage;

(g) "Operation" means all of the premises, facilities, roads, and equipment used in the process of determining the location, composition or quality of a mineral deposit, or in developing, extracting, or onsite processing of a mineral deposit in a designated area;

(h) "Method of operation" means the method or manner by which a cut or open pit is made, the overburden is placed or handled, water is controlled or affected and other acts performed by the operator in the process of exploring or uncovering and removing or onsite processing of a mineral deposit;

(i) "Holder" or "operator" means the permittee, leasee, or contractor designated in a permit, lease, or contract;

(j) "Reclamation" means measures undertaken to bring about the necessary reconditioning or restoration of land or water that has been affected by exploration or mineral development, mining or onsite processing operations, and waste disposal, in ways which will prevent or control onsite and offsite damage to the environment.

§ 23.4 Application for permission to conduct exploration operations.

No person shall, in any manner or by any means which will cause the surface of lands to be disturbed, explore, test, or prospect for minerals (other than oil and gas) subject to disposition under the mineral leasing acts or the Materials Act without first filing an application for, and obtaining, a permit, lease or contract which authorizes such exploring, testing, or prospecting.

§ 23.5 Technical examination of prospective surface exploration and mining operations.

(a) (1) In connection with an application for a permit or lease under the mineral leasing acts or an application for a permit or an offer to make a contract

under the Materials Act, the district manager shall make, or cause to be made, a technical examination of the prospective effects of the proposed exploration or surface mining operations upon the environment. The technical examination shall take into consideration the need for the preservation and protection of other resources, including recreational, scenic, historic, and ecological values; the control of erosion, flooding, and pollution of water; the isolation of toxic materials; the prevention of air pollution; the reclamation by revegetation, replacement of soil, or by other means, of lands affected by the exploration or mining operations; the prevention of slides; the protection of fish and wildlife and their habitat; and the prevention of hazards to public health and safety.

(2) A technical examination of an area should be made with the recognition that actual potential mining sites and mining operations vary widely with respect to topography, climate, surrounding land uses, proximity to densely used areas, and other environmental influences and that mining and reclamation requirements should provide sufficient flexibility to permit adjustment to local conditions.

(b) Based upon the technical examination, the district manager shall formulate the general requirements which the applicant must meet for the protection of nonmineral resources during the conduct of exploration or mining operations and for the reclamation of lands or waters affected by exploration or mining operations. The general requirements shall be made known in writing to the applicant before the issuance of a permit or lease or the making of a contract, and upon acceptance thereof by the applicant, shall be incorporated in the permit, lease, or contract. If an application or offer is made under the Mineral Leasing Act for Acquired Lands and if the lands are under the jurisdiction of an agency other than the Department of the Interior, the requirements must incorporate provisions prescribed by that agency. If the application or offer is made under the Mineral Leasing Act of February 23, 1920, or the Materials Act, and if the lands are under the jurisdiction of an agency other than the Department of the Interior, the district manager shall consult representatives of the agency administering the land and obtain their recommendations for provisions to be incorporated in the general requirements. If the district manager does not concur in the recommendations, the issues shall be referred for resolution to the Under Secretary of the Department of the Interior and the comparable officer of the agency submitting the recommendations. In the case of disagreement on the issues which are so referred, the Secretary of the Interior shall make a determination on the recommendations which shall be final and binding.

(c) In each instance in which an application or offer is made under the mineral leasing acts, the mining supervisor shall participate in the technical examination and in the formulation of the general requirements. If the lands covered by an application or offer are under the jurisdiction of a bureau of the Department of the Interior other than the Bureau of Land Management, the district

manager shall consult representatives of the bureau administering the land. If the lands covered by the application or offer are under the jurisdiction of an agency other than the Department of the Interior and that agency makes a technical examination of the type provided for in paragraph (a) of this section, district managers and mining supervisors are authorized to participate in that examination.

(d) Whenever it is determined that any part of the area described in an application or offer for a permit, lease, or contract is such that previous experience under similar conditions has shown that operations cannot feasibly be conducted by any known methods or measures to avoid—

(1) Rock or landslides which would be a hazard to human lives or endanger or destroy private or public property; or

(2) Substantial deposition of sediment and silt into streams, lakes, reservoirs; or

(3) A lowering of water quality below standards established by the appropriate State water pollution control agency, or by the Secretary of the Interior; or

(4) A lowering of the quality of waters whose quality exceeds that required by the established standards—unless and until it has been affirmatively demonstrated to the State water pollution control agency and to the Department of the Interior that such lowering of quality is necessary to economic and social development and will not preclude any assigned uses made of such waters; or

(5) The destruction of key wildlife habitat or important scenic, historical, or other natural or cultural features; the district manager may prohibit or otherwise restrict operations on such part of an area.

(e) If, on the basis of a technical examination, the district manager determines that there is a likelihood that there will be a lowering of water quality as described in paragraphs (d) (3) and (4) of this section caused by the operation, no lease or permit shall be issued or contract made until after consultation with the Federal Water Pollution Control Administration and a finding by the Administration that the proposed operation would not be in violation of the Federal Water Pollution Control Act, as amended (33 U.S.C. sec. 466 et seq.) or of Executive Order No. 11288 (31 F.R. 9261). Where a permit or lease is involved the district manager's determination shall be made in consultation with the mining supervisor.

(f) Each notice of a proposed appropriation of a materials site filed by the Department of Transportation under 23 U.S.C. 317 shall be transmitted to the proper district manager. The district manager shall cause a technical examination to be made as provided in paragraph (a) of this section and shall formulate the requirements which the State highway department or its nominee must meet. If the land covered by the proposed appropriation is under the jurisdiction of a bureau of the Department other than the Bureau of Land Management, the district manager shall consult representatives of the bureau administering the land. If the district manager determines, or, in an instance in which

the land is administered by another bureau, a representative of that bureau determines that the proposed appropriation is contrary to the public interest or is inconsistent with the purposes for which such land or materials are reserved, the district manager shall promptly submit the matter to the Secretary of the Interior for his decision. In other instances, the district manager shall notify the Department of Transportation of the requirements and conditions which the State highway department or its nominee must meet.

§ 23.6 Basis for denial of a permit, lease, or contract.

An application or offer for a permit, lease, or contract to conduct exploratory or extractive operations may be denied any applicant or offeror who has forfeited a required bond because of failure to comply with an exploration or mining plan. However, a permit, lease, or contract may not be denied an applicant or offeror because of the forfeiture of a bond if the lands disturbed under his previous permit, lease, or contract have subsequently been reclaimed without cost to the Federal Government.

§ 23.7 Approval of exploration plan.

(a) Before commencing any surface disturbing operations to explore, test, or prospect for minerals covered by the mineral leasing acts the operator shall file with the mining supervisor a plan for the proposed exploration operations.

The mining supervisor shall consult with the district manager with respect to the surface protection and reclamation aspects before approving said plan.

(b) Before commencing any surface disturbing operations to explore, test, or prospect for materials covered by the Materials Act the operator shall file with the district manager a plan for the proposed exploration operations.

(c) Depending upon the size and nature of the operation and the requirements established pursuant to § 23.5 the mining supervisor or the district manager may require that the exploration plan submitted by the operator include any or all of the following:

(1) A description of the area within which exploration is to be conducted;

(2) Two copies of a suitable map or aerial photograph showing topographic, cultural and drainage features;

(3) A statement of proposed exploration methods, i.e. drilling, trenching, etc., and the location of primary support roads and facilities;

(4) A description of measures to be taken to prevent or control fire, soil erosion, pollution of surface and ground water, damage to fish and wildlife or other natural resources, and hazards to public health and safety both during and upon abandonment of exploration activities.

(d) The mining supervisor or the district manager shall promptly review the exploration plan submitted to him by the operator and shall indicate to the operator any changes, additions, or amendments necessary to meet the requirements formulated pursuant to

§ 23.5, the provisions of the regulations in this part, and the terms of the permit.

(e) The operator shall comply with the provisions of an approved exploration plan. The mining supervisor and the district manager may, with respect to such a plan, exercise the authority provided by paragraphs (f) and (g) of § 23.8 respecting a mining plan.

§ 23.8 Approval of mining plan.

(a) (1) Before surface mining operations may commence under any permit or lease issued under the mineral leasing acts the operator must file a mining plan with the mining supervisor and obtain his approval of the plan. Paragraphs (b) through (g) of this section confer authority upon mining supervisors with respect to mining plans pertaining to permits or leases issued under the mineral leasing acts. The mining supervisor shall consult with the district manager with respect to the surface protection and reclamation aspects before approving said plan.

(2) Before surface mining operations may commence under any permit issued or contract made under the Materials Act, the operator must file a mining plan with the district manager and obtain his approval of the plan. Paragraphs (b) through (g) of this section confer authority upon district managers with respect to mining plans pertaining to permits issued or contracts made under the Materials Act.

(b) Depending on the size and nature of the operation and the requirements established pursuant to § 23.5, the mining supervisor or the district manager may require that the mining plan submitted by the operator include any or all of the following:

(1) A description of the location and area to be affected by the operations;

(2) Two copies of a suitable map, or aerial photograph showing the topography, the area covered by the permit, lease, or contract, the name and location of major topographic and cultural features, and the drainage plan away from the area to be affected;

(3) A statement of proposed methods of operating, including a description of proposed roads or vehicular trails; the size and location of structures and facilities to be built;

(4) An estimate of the quantity of water to be used and pollutants that are expected to enter any receiving waters;

(5) A design for the necessary impoundment, treatment or control of all runoff water and drainage from workings so as to reduce soil erosion and sedimentation and to prevent the pollution of receiving waters;

(6) A description of measures to be taken to prevent or control fire, soil erosion, pollution of surface and ground water, damage to fish and wildlife, and hazards to public health and safety; and

(7) A statement of the proposed manner and time of performance of work to reclaim areas disturbed by the holder's operation.

(c) In those instances in which the permit, lease, or contract requires the revegetation of an area of land to be affected the mining plan shall show:

(1) Proposed methods of preparation and fertilizing the soil prior to replanting;

(2) Types and mixtures of shrubs, trees, or tree seedlings, grasses or legumes to be planted; and

(3) Types and methods of planting, including the amount of grasses or legumes per acre, or the number and spacing of trees, or tree seedlings, or combinations of grasses and trees.

(d) In those instances in which the permit, lease, or contract requires regrading and backfilling, the mining plan shall show the proposed methods and the timing of grading and backfilling of areas to be affected by the operation.

(e) The mining supervisor or the district manager shall review the mining plan submitted to him by the operator and shall promptly indicate to the operator any changes, additions, or amendments necessary to meet the requirements formulated pursuant to § 23.5, the provisions of the regulations in this part and the terms of the permit, lease, or contract. The operator shall comply with the provisions of an approved mining plan.

(f) A mining plan may be changed by mutual consent of the mining supervisor or the district manager and the operator at any time to adjust to changed conditions or to correct any oversight. To obtain approval of a change or supplemental plan the operator shall submit a written statement of the proposed changes or supplement and the justification for the changes proposed. The mining supervisor or the district manager shall promptly notify the operator that he consents to the proposed changes or supplement or, in the event he does not consent, he shall specify the modifications thereto under which the proposed changes or supplement would be acceptable. After mutual acceptance of a change of a plan the operator shall not depart therefrom without further approval.

(g) If circumstances warrant, or if development of a mining plan for the entire operation is dependent upon unknown factors which cannot or will not be determined except during the progress of the operations, a partial plan may be approved and supplemented from time to time. The operator shall not, however, perform any operation except under an approved plan.

§ 23.9 Performance bond.

(a) (1) Upon approval of an exploration plan or mining plan, the operator shall be required to file a suitable performance bond of not less than \$2,000 with satisfactory surety, payable to the Secretary of the Interior, and the bond shall be conditioned upon the faithful compliance with applicable regulations, the terms and conditions of the permit, lease, or contract, and the exploration or mining plan as approved, amended

or supplemented. The bond shall be in an amount sufficient to satisfy the reclamation requirements of an approved exploration or mining plan, or an approved partial or supplemental plan. In determining the amount of the bond consideration shall be given to the character and nature of the reclamation requirements and the estimated costs of reclamation in the event that the operator forfeits his performance bond.

(2) In lieu of a performance bond an operator may elect to deposit cash or negotiable bonds of the U.S. Government. The cash deposit or the market value of such securities shall be equal at least to the required sum of the bond.

(b) A bond may be a nationwide or statewide bond which the operator has filed with the Department under the provisions of the applicable leasing regulations in Subchapter C of Chapter II of this title, if the terms and conditions thereof are sufficient to comply with the regulations in this part.

(c) The district manager shall set the amount of a bond and take the necessary action for an increase or for a complete or partial release of a bond. He shall take action with respect to bonds for leases or permits only after consultation with the mining supervisor.

§ 23.10 Reports: Inspection.

(a) (1) The holder of a permit or lease under the mineral leasing acts shall file the reports required by this section with the mining supervisor. The holder of a permit or a party to a contract under the Materials Act shall file such reports with the district manager.

(2) The provisions of this section confer authority and impose duties upon mining supervisors with respect to permits or leases issued under the mineral leasing acts and upon district managers with respect to permits issued or contracts made under the Materials Act.

(b) Operations report: Within 30 days after the end of each calendar year, or if operations cease before the end of a calendar year, within 30 days after the cessation of operations, the operator shall submit an operations report containing the following information:

(1) An identification of the permit, lease, or contract and the location of the operation;

(2) A description of the operations performed during the period of time for which the report is filed;

(3) An identification of the area of land affected by the operations and a description of the manner in which the land has been affected;

(4) A statement as to the number of acres disturbed by the operations and the number of acres which were reclaimed during the period of time;

(5) A description of the method utilized for reclamation and the results thereof;

(6) A statement and description of reclamation work remaining to be done;

(c) Grading and backfilling report: Upon completion of such grading and backfilling as may be required by an approved exploration or mining plan, the operator shall make a report thereon and request inspection for approval. Whenever it is determined by such inspection

that backfilling and grading has been carried out in accordance with the established requirements and approved exploration or mining plan, the district manager shall issue a release of an appropriate amount of the performance bond for the area graded and backfilled. Appropriate amounts of the bond shall be retained to assure that satisfactory planting, if required, is carried out.

(d) Planting report: (1) Whenever planting is required by an approved exploration or mining plan, the operator shall file a report with the mining supervisor or district manager whenever such planting is completed. The report shall—

(i) Identify the permit, lease, or contract;

(ii) Show the type of planting or seeding, including mixtures and amounts;

(iii) Show the date of planting or seeding;

(iv) Identify or describe the areas of the lands which have been planted;

(v) Contain such other information as may be relevant.

(2) The mining supervisor or district manager, as soon as possible after the completion of the first full growing season, shall make an inspection and evaluation of the vegetative cover and planting to determine if a satisfactory growth has been established.

(3) If it is determined that a satisfactory vegetative cover has been established and is likely to continue to grow, any remaining portion of the performance bond may be released if all requirements have been met by the operator.

(e) Report of cessation or abandonment of operations: (1) Not less than 30 days prior to cessation or abandonment of operations, the operator shall report his intention to cease or abandon operations, together with a statement of the exact number of acres of land affected by his operations, the extent of reclamation accomplished and other relevant information.

(2) (i) Upon receipt of such report the mining supervisor or the district manager shall make an inspection to determine whether operations have been carried out and completed in accordance with the approved exploration or mining plan.

(ii) Whenever the lands in a permit, lease or contract issued under the mineral leasing acts or the Materials Act are under the jurisdiction of a bureau of the Department of the Interior other than the Bureau of Land Management the mining supervisor or the district manager, as appropriate, shall obtain the concurrence of the authorized officer of such bureau that the operation has been carried out and completed in accordance with the approved exploration or mining plan with respect to the surface protection and reclamation aspects of such plan before releasing the performance bond.

(iii) Whenever the lands in a permit, lease or contract issued under the Mineral Leasing Act of 1920 or the Materials Act are under the jurisdiction of an agency other than the Department of the Interior, the mining supervisor or the district manager, as appropriate, shall consult representatives of the agency administering the lands and obtain their recommendations as to whether the operation has been carried out and completed in accordance with the approved exploration or mining plan, with respect

to the surface protection and reclamation aspects of such plan before releasing the performance bond. If the mining supervisor or district manager, as appropriate, do not concur in the recommendations of the agency regarding compliance with the surface protection and reclamation aspects of the approved exploration or mining plan, the issues shall be referred for resolution to the Under Secretary of the Department of the Interior and the comparable officer of the agency submitting the recommendations. In the case of disagreement on issues which are so referred, the Secretary of the Interior shall make a determination which shall be final and binding. In cases in which the recommendations are not concurred in by the mining supervisor or district manager, the performance bond shall not be released until resolution of the issues or until a final determination by the Secretary of the Interior.

(iv) Whenever the lands in a permit or lease issued under the Mineral Leasing Act for Acquired Lands are under the jurisdiction of an agency other than the Department of the Interior, the mining supervisor or the district manager, as appropriate, shall obtain the concurrence of the authorized officer of such agency that the operation has been carried out and completed in accordance with the approved exploration or mining plan with respect to the surface protection and reclamation aspects of such plan before releasing the performance bond.

§ 23.11 Notice of noncompliance: Revocation.

(a) The provisions of this section confer authority and impose duties upon mining supervisors with respect to permits or leases issued under the mineral leasing acts and upon district managers with respect to permits issued or contracts made under the Materials Act. The mining supervisor shall consult with the district manager before taking any action under this section.

(b) The mining supervisor or district manager shall have the right to enter upon the lands under a permit, lease, or contract, at any reasonable time, for the purpose of inspection or investigation to determine whether the terms and conditions of the permit, lease, or contract, and the requirements of the exploration or mining plan have been complied with.

(c) If the mining supervisor or the district manager determines that an operator has failed to comply with the terms and conditions of a permit, lease, or contract, or with the requirements of an exploration or mining plan, or with the provisions of applicable regulations under this part the supervisor or manager shall serve a notice of noncompliance upon the operator by delivery in person to him or his agent or by certified or registered mail addressed to the operator at his last known address.

(d) A notice of noncompliance shall specify in what respects the operator has failed to comply with the terms and conditions of a permit, lease, or contract, or the requirements of an exploration or mining plan, or the provisions of applicable regulations, and shall specify the action which must be taken to correct the noncompliance and the time limits within which such action must be taken.

(e) Failure of the operator to take action in accordance with the notice of noncompliance shall be grounds for suspension by the mining supervisor or the district manager of operations or for the initiation of action for the cancellation of the permit, lease, or contract and for forfeiture of the performance bond required under § 23.9.

§ 23.12 Appeals.

(a) A person adversely affected by a decision or order of a district manager or of a mining supervisor made pursuant to the provisions of this part shall have a right of appeal to the Director of the Bureau of Land Management whenever the decision appealed from was rendered by a district manager, or to the Director of the Geological Survey if the decision or order appealed from was rendered by a mining supervisor, and the further right to appeal to the Secretary of the Interior from an adverse decision of either Director unless such decision was approved by the Secretary prior to promulgation.

(b) Appeals to Director, Bureau of Land Management, or to Director, Geological Survey, and appeals to the Secretary shall be made pursuant to procedures and requirements of Parts 1840 and 1850 of this title, except that for the purposes of an appeal taken from a decision or order of a mining supervisor made pursuant to this part:

(1) The term "Director" wherever it occurs in Part 1850 or 1850 of this title shall mean the Director of the Geological Survey.

(2) The term "Field Commissioner" shall include a person designated by the Director of the Geological Survey to hold a hearing.

(3) Whenever the provisions of Parts 1840 and 1850 of this title require that a document be filed in the Office of the Director, such documents shall be filed in the Office of the Director, Geological Survey (Address: Director, Geological Survey, Washington, D.C. 20240).

(c) In any case involving a permit, lease or contract for lands under the jurisdiction of an agency other than the Department of the Interior, or a bureau of the Department of the Interior other than the Bureau of Land Management, the officer rendering a decision or order shall, in the event of an appeal from such decision or order, designate the authorized officer of such agency as an adverse party on whom a copy of a notice of appeal and any statement of reasons, written arguments or briefs must be served.

(d) Hearings to present evidence on an issue of fact before a Field Commissioner designated by the appropriate Director shall be conducted pursuant to the requirements and procedures set forth in Part 1850 of this title.

§ 23.13 Consultation.

Whenever the lands included in a permit, lease, or contract are under the jurisdiction of an agency other than the Department of the Interior or under the jurisdiction of a bureau of the Department of the Interior other than the Bureau of Land Management, the mining supervisor or the district manager, as appropriate, shall consult the authorized officer of such agency before taking any final action under §§ 23.7, 23.8, 23.10 (c) and (d) (2) and (3), and 23.11(c).

DAVID S. BLACK,
Under Secretary of the Interior.

JANUARY 15, 1969.

[F.R. Doc. 69-747; Filed, Jan. 17, 1969;
8:51 a.m.]

Excerpts from proposed water service contract related to water pollution and air pollution control setting forth Departmental policy are as follows:

(COPY)

PROPOSED CONTRACT AMONG THE EMERY WATER CONSERVANCY DISTRICT,
THE UNITED STATES OF AMERICA,
AND THE UTAH POWER & LIGHT COMPANY
FOR THE SALE OF THE USE OF WATER
EMERY COUNTY PROJECT

THIS CONTRACT, made this _____ day of _____, 19____, among the EMERY WATER CONSERVANCY DISTRICT, organized under the laws of the State of Utah, with its principal place of business at Castle Dale, Utah, herein styled the District, THE UNITED STATES OF AMERICA, acting pursuant to the Act of June 17, 1902 (32 Stat. 388) and acts amendatory thereof and supplementary thereto, herein styled the United States, and the UTAH POWER & LIGHT COMPANY, a corporation authorized to do business in the State of Utah, with its principal office in Salt Lake City, Utah, herein styled the Company:

WATER POLLUTION CONTROL

18. (a) In the operation of the Huntington Canyon thermal-electric generation plant the Company shall comply fully with all applicable Federal, State, and local laws, orders and regulations, all as administered by appropriate authorities, concerning the pollution of streams, reservoirs, ground water, or water courses with respect to thermal pollution or the discharge of refuse, garbage, sewage effluent, industrial waste, oil, mine tailings, mineral salts, or other pollutants.

(b) The Company shall install and diligently operate as part of the plant facilities, such waste water, waste material, and sewage control and disposal facilities as are necessary to comply with subarticle (a) hereof.

(c) Designs and plans for the water pollution control equipment, and other plant features that may be reached to the control of water pollution, and facilities for the disposal of waste water, waste materials, sewage control and disposal and other plant features installed to control water pollution under subarticles (a) and (b) hereof, shall be submitted to the Secretary of the Interior, hereafter referred to as Secretary, in advance of construction, installation, removal, or major modification thereof. The Secretary shall review and comment in writing on the aforesaid designs, plans, equipment or features, or a major modification or supplementation thereof, within sixty (60) days after

such submissions. Notwithstanding such review by the Secretary, it is the Company's responsibility to install such facilities and to operate them in such a manner as to comply with the standards in subarticle (a) hereof.

(d) During normal working hours, official and regularly employed representatives or professionally employed consultants of the Secretary and other Federal agencies having jurisdiction shall have access to, the right to inspect, and to copy, all records relating to water pollution from plant facilities and such representatives shall have the right to enter upon and inspect any plant facilities affecting water pollution control.

AIR POLLUTION CONTROL

19. To minimize smoke, flyash, and dust in stack emissions from the Huntington Canyon thermal-electric generating plant, the Company shall install as part of the plant's facilities, equipment designed to remove substantially all particulate material in the stack emission and such equipment shall be consistently operated so that the amounts emitted shall not exceed 0.05 pounds per million B.t.u. input. The procedures for testing to insure compliance under this article will be as specified by the American Society of Mechanical Engineers (ASME) Test Procedures for Determining Dust Concentration in a Gas Stream unless some other procedure for making such tests and measurements is mutually agreed upon.

Designs and plans for the air pollution control equipment, stack and other plant features that may be related to the control of air pollution, and facilities for the disposal of waste or residue from burned fuel including waste materials collected by air pollution

control equipment installed or which may be installed to control particulate emission or other noxious emissions shall be submitted to the Secretary in advance of construction, installation, removal, or major modification thereof. The Secretary shall review and comment in writing, on the aforesaid designs, plans, equipment or features, or the major modification or supplementation thereof, within sixty (60) days after such submissions. Notwithstanding such review by the Secretary, it is the Company's responsibility to install such facilities and to operate them in such a manner as to comply with all requirements of this Article 19.

From time to time, but not less often than once in every ten (10) years, the designated representatives of the Secretary and the Company shall, at the request of either, meet to review such technological advances in air pollution control equipment as have taken place and determine the feasibility of installing new or additional equipment or modifying existing equipment in the plant facilities for the purpose of improving performance, taking into account costs and economic feasibility as well as benefits of improved air pollution control. In the event that the Secretary and the Company cannot resolve any disagreement as to whether or when the Company should install new or additional air pollution control equipment or facilities or modify existing equipment or facilities, either party may submit the issue to arbitration in accordance with provision of Article 21 hereof by first giving in writing thirty (30) days' notice of its intention to do so.

In the operation of the plant facilities utilizing the contracted water, the Company will make or cause to make such tests

and measurements, and Company will keep or cause to be kept such records as will enable the Company to make accurate and complete reports to the Secretary relating to the operation and efficiency of the air pollution control equipment. Said reports shall be furnished to the Secretary not less often than once in each calendar year. Tests will be conducted at least two times each year in conformance with the American Society of Mechanical Engineers (ASME) Test Procedures for Determining Dust Concentration in a Gas Stream, unless some other procedure for making such tests and measurements is mutually agreed upon. Any continuous recording equipment will be calibrated against these tests. If requested by the Secretary, the Company shall also furnish monthly reports showing the average monthly assay of the ash and sulfur content of the coal used.

During normal working hours, official and regularly employed representatives or professionally employed consultants of the Secretary and other Federal agencies having jurisdiction shall have access to, the right to inspect, and to copy, all records relating to air pollution from plant facilities and such representatives shall have the right to enter upon and inspect any plant facilities affecting air pollution control.

The Company will furnish quantitative and qualitative data on the content of coal as a part of its designs and plans referred to in subarticle (b) hereof. It is understood and agreed that natural gas and oil, gasoline, diesel fuel, kerosene, or any other fossil-fuel as a source of energy may be used in starting up or in operating the thermal-electric generating plant utilizing water furnished under this contract: Provided, That use of such other sources of energy shall be subject to the requirements of this Article 19.

(h) The Company shall install and operate facilities or equipment to comply with applicable Federal, State, or local laws, regulations or standards for the control of oxides of sulphur and nitrogen and the design of the Huntington Canyon plant, will, to the extent practicable, provide for the future installation of any equipment or facilities required to comply with said Federal, State, or local laws, regulations, or standards.

(i) Nothing herein shall be construed to relieve the Company from complying with all valid applicable air pollution control laws, standards, and regulations under Federal, State, or local jurisdiction now or hereafter in force.

(j) Such air pollution control equipment shall be operated in conformance with provisions of this Article 19 unless uncontrollable forces as hereafter defined in Article 26 hereof prevent or limit such operation.

ENVIRONMENTAL CONSIDERATIONS

20. The Company will take appropriate measures to blend the plant into the environment and give due recognition to the ecology of the area. The Company shall submit plans to the Secretary for his review

and comment in writing regarding noise abatement, dust abatement, and disposal of ash. The Company's plans and programs for implementing this action shall be subject to review at least once every five (5) years by the Secretary to assure that its efforts take advantage of up-to-date techniques and new developments available to minimize the adverse effects of these things. In developing plans for the plant, appurtenant buildings, substations, coal and water handling facilities and transmission facilities, due consideration will be given to minimizing adverse effects on the terrain they cross. Plans for these features will also be submitted to the Secretary for his review and comment in writing prior to construction.

(COPY)



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

June 17, 1971

Memorandum

To: The Under Secretary
Assistant Secretary for Administration
Assistant Secretary--Programs
Assistant Secretary for Fish and Wildlife and Parks
Assistant Secretary--Mineral Resources
Assistant Secretary--Public Land Management
Assistant Secretary--Water and Power Resources
The Solicitor

From: The Secretary

Subject: Inclusion of Environmental Quality Provisions in
Contracts and Other Agreements Relating to Utilization
of Resources Under the Jurisdiction of the Department
of the Interior

Enclosed is a copy of the letter from the Assistant Secretary, Water and Power Resources, regarding the use of environmental quality provisions in all water service contracts, electric energy contracts, rights-of-way, easements, leases, permits, licenses, and other agreements involving directly or indirectly the utilization of lands, minerals, water, and other resources under the jurisdiction of bureaus and offices in this Department.

I approve this suggestion and direct its immediate implementation. Environmental quality control requirements should be incorporated in all agreements permitting the use of resources for residential, industrial, commercial, or agricultural activities which may yield adverse environmental effects.

I am also asking the Assistant Secretary for Administration in cooperation with the other Assistant Secretaries and the Solicitor to prepare and issue manualized instructions regarding this environmental policy as part of the Departmental Manual 516 DM 1-3 issued September 17, 1970.

/S/

Rogers C. B. Morton

Enclosure

ATTACHMENT E

Issue 4

Hearings

before the

Committee on Interior and Insular Affairs

United States Senate

Ninety-Second Congress

November 10, 1971

DEPARTMENTAL POLICY ON ECONOMIC DEVELOPMENT
IN THE SOUTHWEST

EXCERPTS FROM MINING LEASE BETWEEN NAVAJO
TRIBES AND UTAH CONSTRUCTION CO.

ISSUE 4: The Relationship of Department Policies to Economic
Development of the Four Corners Region

RESPONSE: The Four Corners area has been designated as a depressed area under the provisions of the Public Works and Economic Development Act of 1965. Congress established the Four Corners Regional Commission to meet the following goals:

Secure early employment in the most seriously affected areas of the region; lay the basis for more stable and higher paying industries; raise the per capita in the lowest (income) groups; and raise the industrial activity to utilize the wealth of regional resources.

We concur in those goals, especially since many of the residents of that area are Indian people whose welfare are of primary concern to this Department. Our endorsement of economic development in this area is, however, qualified. That qualification relates to the Department's full intention to preserve the quality of the environment in the area.

Water resources of the Four Corners Region are fully committed by compact and international treaty for

beneficial uses. The Department supports programs geared to provide more efficient use of available supplies coupled with augmentation of the flows of the Colorado River, such as water conservation, waste water reclamation, precipitation management, geothermal development, and desalting. These programs are projected to supply future water needs to complement continued economic growth of the Four Corners Region. We have a continuing program for monitoring water quality and quantity of the region. Our grants and technical assistance to State and local government for development of public recreation facilities provides a growth stimulus to this sector of the economy. This is supplemented by the selection and management of the many Federally-operated recreation sites and wilderness areas in the region.

The States of the Four Corners Region (Colorado, Utah, New Mexico, and Arizona) contain vast coal fields and enormous reserves of oil shale. The Department's programs support conservation and efficient development of these fossil fuel reserves of the Four Corners Region

to help meet the Nation's need for energy. Our research programs are seeking new techniques such as coal gasification and oil shale development for improved utilization of these resources.

Department programs for exploration and development of water and mineral resources support the establishment of transportation and industrial investment, which over time contributes to greater employment and tax contributions to the area's economy. This is of special importance to the Indian people of the area who can and are being trained on the job in skills that will allow them to be gainfully employed. The development activities also provide the Indian people with royalty, lease and easement payments for the use of their lands and resources.

As an example, the total cost of the Four Corners Plant located near Farmington, New Mexico, is about \$265,000,000 exclusive of the transmission facilities. Through its participation in contracts with the owners of the Four Corners Plant, the Department has been instrumental in reducing the pollution from the Plant (see Attachment B). Royalty and lease payments and other payments to the Tribe approximates \$1,300,000 annually. State and local government taxes paid for the plant and transmission lines amount to

\$1,063,000 per year. Presently, there are 275 people employed at the powerplant of whom 87 are Indians. The monthly plant operating payroll is \$306,000 of which 29 percent is paid to Indian employees. Another 194 Indians out of a total employment of 332 people are presently employed at the coal mine. The annual payroll of the mine is \$3,100,000 of which \$1,700,000 is paid to Indians. Preference is given to the employment of Indian people at Navajo Mine in positions for which they are qualified (Navajo-Utah Mining lease - attached). Taxes paid by the Navajo mine to State and local governments amounts to \$617,500 per year. Although this is a significant contribution to the economy of the area and the Indian people, there are large economic needs remaining. Greater efforts and economic development must take place before the per capita income of all of the Indian people in the area can be increased.

(Excerpts from Mining Lease Between Navajo Tribes
and Utah Construction Company)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

MINING LEASE - TRIBAL INDIAN LANDS
(For Minerals Other Than Oil and Gas)

Navajo Tribe, State of New Mexico

THIS INDENTURE OF LEASE, made and entered into in
sextuplicate this 26th day of July, 1957, by and between the NAVAJO
TRIBE OF INDIANS, acting through the Navajo Tribal Council and
its Chairman, Paul Jones, of Window Rock, State of Arizona, for
and on behalf of the NAVAJO TRIBE OF INDIANS, designated herein
as lessor, and UTAH CONSTRUCTION COMPANY, a Delaware
corporation having an office at 100 Bush Street, San Francisco, State
of California, herein designated as lessee:

GOVERNMENT EMPLOYEES CANNOT ACQUIRE LEASE. No
lease, assignment thereof, or interest therein will be approved to any
employee or employees of the United States Government whether
connected with the Indian Service or otherwise, and no employee of the
Interior Department shall be permitted to acquire any interest in such
leases by ownership of stock in corporations having leases or in any
other manner.

The Navajo Tribe and Lessee herein recognize the desirability of utilizing the coal produced under this lease in generating electrical power for the development of the area within and adjacent to said Reservation, and agree to cooperate with each other to the fullest extent for the purpose of erecting a powerplant on or adjacent to said Reservation, in which event it is mutually understood, subject to applicable laws and regulations, that electrical power shall be made available by lessee at wholesale bus bar rates to the Tribe or its wholly owned instrumentalities or corporations for use and distribution by the Tribe within the confines of the lands owned by the Navajo Tribe.

Lessee agrees to employ Navajo Indians when available in all positions for which they are qualified in the judgment of the lessee, and to pay prevailing wages to such Navajo employees, and to utilize services of Navajo contractors whenever feasible in the judgment of the lessee. Lessee agrees to make special efforts to work Indians, giving priority to qualified members of the Navajo Tribe, into skilled, technical and other higher jobs in connection with lessee's operations under this lease.

(a) This lease shall be subordinate only to valid rights during their term now existing on the leased premises by virtue of the documents listed in Exhibit "B" attached hereto.

(b) The lessee will hold the Navajo Tribe and the United States harmless from any suit or claim for personal injuries or

property damage arising out of acts or omissions of the lessee or its agents under this lease.

(c) The Navajo Tribe may hereafter grant to other persons, firms, or corporations any oil and gas lease, license, or permit upon land covered by this lease subject to the following limitations, and the provisions of this subsection shall be included in any oil and gas lease, license, or permit granted by the lessor on the leased land:

(i) There is hereby reserved for use of the lessee a corridor 3300 feet in width, running northerly and southerly the full length of the leased premises and the corridor shall be designated and permanently marked by lessee; and there is hereby expressly granted to the lessee the exclusive use of the corridor for mining purposes, provided that the lessee may from time to time for oil and gas lease purposes release from said corridor its rights in such parts or tracts thereof as are in the lessee's judgment no longer suitable for coal mining and related operations

ATTACHMENT F

Issue 5

Hearings

before the

Committee on Interior and Insular Affairs

United States Senate

Ninety-Second Congress

November 10, 1971

DEPARTMENT RESPONSE REGARDING IMPACT
OF POWERPLANTS ON RECREATION

ISSUE 5: Impact of existing or potential powerplants and transmission lines on the National Park System in the Southwest and on the recreational values of the public lands

RESPONSE: The National Park System in the States of Utah, Colorado, Arizona, New Mexico, central Wyoming, southern Nevada, and southern California consists of 66 administrative units. No major coal-fired powerplants, their attendant mines or transmission facilities now exist within national parks and monuments of the region. The development of electric generating plants and attendant facilities near National Park Service lands could have an adverse impact. Smoke from the plants may reduce visibility of vistas and landscapes. Particulates and gaseous emissions may threaten natural ecosystems. Attached is a list of the Park System units that lie within a radius of 100 miles of the major coal-fired powerplants in the Colorado River Basin. For this reason, we are paying particular attention to this aspect of the development of coal-fired electric generating plants in the Southwest. One of the twelve work groups of the Southwest Energy Study is devoting itself solely to the question of present and potential impacts of coal-fired powerplants on recreational and aesthetic values. Other work groups are studying impacts on the land, flora and fauna.

<u>Project</u>	<u>In 1-50 Mile Radius</u>	<u>In 50-100 Mile Radius</u>
Four Corners-San Juan ^{1/}	Mesa Verde N. P. ^{2/} Yucca House N. M. ^{3/} Aztec Ruins N. M.	Hovenweek N. M. Chaco Canyon N. M. Canyon de Chelly N. M.
Navajo-Kaiparowits	Lake Powell N. R. A. ^{4/} Rainbow Bridge N. M. Navajo N. M.	Grand Canyon N. P. Bryce Canyon N. P. Zion N. P. Capitol Reef N. M. Cedar Breaks N. M. Natural Bridge N. M. Pipe Spring, N. M. Wupatki N. M.
Mohave	Lake Mead N. R. A.	-
Huntington Canyon	-	Timpanogos N. M. Capitol Reef N. M. Arches N. M.

1/ Common focus for two projects

2/ N. P. - National Park

3/ N. M. - National Monument

4/ N. R. A. - National Recreation Area

ATTACHMENT G

Issue 6

Hearings

before the

Committee on Interior and Insular Affairs

United States Senate

Ninety-Second Congress

November 10, 1971

DEPARTMENT'S RESPONSE REGARDING PROCEDURES
FOR INFORMING MEMBERS OF INDIAN TRIBES

ISSUE 6: Procedures for Informing Members of Indian Tribes
on Proposed Agreements Involving Indian Lands and
Provisions for Representation of Tribal Members
in Decisions

RESPONSE: The Secretary of the Interior cannot lease Indian lands held in trust or restricted status without Indian approval, nor can the Indians lease Indian lands on reservations without the approval of the Secretary. The Secretary's approval authority is delegated to the Commissioner of Indian Affairs and redelegated to field personnel, depending on the type of approval required. Mining and surface leases may be approved only by the Commissioner himself or by his designee, usually an Area Director. Indian approval is manifested through the Tribal Council.

A proposal involving tribal lands may originate in the Tribal Council or may be referred to the Tribal Council by the Bureau of Indian Affairs. On referrals, the Bureau notifies the tribe and either transmits the proposal or directs the outside principal to present the proposal directly to the Council. The Council acts as the official communication channel between BIA and tribal members on such matters. Decisions agreed to by the tribal council and outside principals are reviewed and acted upon by the Bureau.

The council of each tribe consist of representatives elected or appointed from the several constituencies, generally on a proportional or district basis. The council officers are elected by the tribal membership by plurality vote, serving from one to four years. Decisions of the council and information made available to it from outside sources is available to constituents through their representatives on the council.

Actions on proposals involving lands allotted to individual Indians do not require council review and are handled directly with the affected Indians.

ATTACHMENT H

Issue 7

Hearings

before the

Committee on Interior and Insular Affairs

United States Senate

Ninety-Second Congress

November 10, 1971

DEPARTMENT'S RESPONSE REGARDING PROVISIONS
FOR MONITORING ACTIVITIES

ISSUE 7: Provisions for Monitoring Activities Which Have Environmental Impacts on Public or Indian Lands to Insure Compliance with Contract Provisions, General Laws, and Regulations

RESPONSE: The Secretary has recognized the necessity to monitor the activities for which he has a responsibility and which have environmental impacts on Public and Indian lands. To adequately minimize adverse impact, he has insisted on approving the measures taken at the time of facility-construction to insure that up-to-date technology and operating techniques are used. This is followed by requirement for adequate and comprehensive monitoring to determine the changes which occur and to have the interpretative data available to intelligently meet problems having adverse impact. In the Southwest, for example, we are continuing to collect baseline data on pre-powerplant conditions for comparison with conditions occurring after operation begins. This includes both air and water monitoring data. The Department is also periodically maintaining photographic surveillance on the operating plant and on the several plants now being constructed, as a means of monitoring the construction effort and revealing construction practices which would cause unreasonable or unwarranted adverse effects upon the environment.

We recognize that more detailed monitoring is required and we have set in motion the machinery to establish these monitoring systems. Specifically, study groups working on the Southwest Energy Study are proposing climate and weather monitoring systems, air transport and diffusion monitoring systems, and water monitoring systems for both surface and ground water.

Senator Moss. Basically, you are telling us that the studies are going on and that you are trying to find answers to the various environmental problems before any further permits are granted. But isn't it a fact that one plant is constructed and others are under construction, some partially finished? We have a whole spectrum, don't we, all the way from a completed plant to one that hasn't even begun yet? What is the status on those that are functioning now?

Mr. PECORA. For those that are functioning at the present time, such as Four Corners Units 1 to 5 near Farmington, N. Mex., where, I might add, some of the apprehension has arisen because of the fully evident particulate matter which is being sent into the atmosphere, it is our understanding that within a few months new technology will have been installed on units 1, 2, and 3 which is in the form of wet scrubbers, known as Venturi Wet Scrubber, which will substantially reduce the amount of effluent into the atmosphere. This is part of an action that has been taken since the generating plant has been constructed and operating. It is part of our general game plan that if for any reason the plants are not performing up to their maximum efficiency, or for any reason we can determine that the environmental impact is unacceptable, then there must be changes put into the system, even though they are operating, in order to have these plants meet the quality standards set by each State under the overview of the Environmental Protection Agency. So I would report that within a few months we will see a substantial change in the environmental impact of that one generating plant as opposed to the last 2 years.

Senator Moss. If I recall correctly, when we held our hearings out there in May, we were told that the scrubbers would be in place and functioning by the end of the year. Now, can you tell me whether that is on schedule or not?

Mr. PECORA. It is our understanding from our contract with the company and from our own people in the field that by the end of the year they will be installed and functioning. But we must follow up, Mr. Chairman, to determine whether these scrubbers are operating at full efficiency. Now, as you know, on the drawing board and in the general projection and predictions, one can calculate the effect of certain activity in operations. But one has to watch and monitor to see that in effect the engineering capacity is fully met. So that although the scrubbers will have been installed, according to our most recent information, by the end of the year, we will still monitor to determine whether maximum efficiency is being achieved.

Senator Moss. New Mexico has an air quality law. Do you know what the standards of the New Mexico law requires as far as removal of gases and particulates?

Mr. PECORA. We have information, and it is 0.14—it is on a basis of reference of pounds of particulate removed per million of heat input, B.t.u.'s that is about 0.14 pounds of particulate per million B.t.u.'s, which is being upgraded to another factor; it could be stated as percent of recovery in the stack. And this translation we are trying to make in terms that will be understandable to the general public. But whatever it is, I understand the State of New Mexico will be upgrading its standard to a higher level.

Senator Moss. We are concerned, of course, on the progress being made on those scrubbers and we would like to be advised by the end

of the year, in writing, as to whether they have been fully installed and whether they may be monitored for effectiveness.

Mr. PECORA. We shall do so, Mr. Chairman. As a matter of fact, the Secretary has directed us to take some comparison photographs in the present period and following period and we will also send you photographs if the committee desires a permanent record and we can actually see the change of the before and after scrubbers.

(The information requested follows:)

NOTE.—A fire at the Four Corners powerplant delayed operation of the precipitators as described in the following Department of Interior statement:

FIRE DAMAGE REPORT AT FOUR CORNERS POWERPLANT

On Friday, November 19, 1971, nine days after the hearing, a welding fire occurred in one section of the mist eliminator of the wet scrubber system for Unit 3.

The mist eliminator is a honeycombed section consisting of plastic (polypropylene) and fiberglass material which filters the gas before the stack and emission to the atmosphere. The material is designed to withstand gas temperatures of 140° F. in a gas stream saturated with water and consisting of noncombustibles, such as CO₂ and compounds of nitrogen. The section resembles a series of venetian blind slats canted slightly to let the gas stream move through the chamber. A reheat system is situated above this chamber to heat the effluent and increase its buoyancy.

Molten metal from the welding torch presumably fell into the plastic material and ignited it. One of the two filter sections was destroyed. Also, the fan motor and blades of the scrubber and mist eliminator appear to me damaged and may need to be replaced. The reheating device also may have been warped by the fire. It is likely that some of these components would have to be specially ordered and fabricated. It is tentatively estimated that repairing the fire damage may require two to three months.

The Company plans to bypass the damaged scrubber system and return Unit 3 to operation with the mechanical dust collector. If Unit 3 is to run in this manner beyond the December 31, 1971, compliance schedule established by the State of New Mexico, a new agreement must be made between the State officials and Arizona Public Service Company.

An accelerated schedule has been developed for the wet scrubber hookup on Units 1 and 2. Unit 1 is to be in operation on or before December 10 and Unit 2 as soon as possible thereafter. It is estimated that 10 days to two weeks will be required to complete the assembly of this equipment. Unit 1 and 2, respectively, would not be on line during hookup of the scrubbers. Unit 3 will be operated during this interval.

Senator Moss. The water which is used to convey the coal slurry from Black Mesa in the Mohave plant was originally intended to be used at the plant. The testimony in our earlier hearing indicated the separation of the water from the coal was not effective enough to permit its use. How is the water from the slurry presently being disposed?

Mr. PECORA. At the Mohave site the water separated from the coal is used in part in the cooling tower to cool the plant system, then placed in a large receiving pond and then reused on a cooling basis. This water, the chairman may recall, is derived from the ground water system on the Black Mesa and the slurry is a select transportation medium for the coal to the plant. There is not a complete separation, I should add, of the coal particles from the water. There is some moisture that goes into the system which emits as steam. But essentially the water is being recycled for continual use so that this makes for conservation of the water resources involved in this unit.

Senator Moss. Is there any overflow from the water that goes in to the holding pond and is reused? Does it go back to the river or anything of that sort?

Mr. PECORA. At this stage, the water is being held in the holding pond. There is no reentry into the Colorado River.

Senator MOSS. Between the evaporation in the furnace and solar evaporation, the water really hasn't accumulated beyond those two exits, is that right?

Mr. PECORA. Yes; there is an evaporation loss of the water in the system.

Senator MOSS. In the Albuquerque hearings a slide was shown indicating the possibility that the ash disposal pits of the Mohave powerplant might eventually overflow into the Colorado River. Can you comment on that situation?

Mr. PECORA. Mr. Langley has some more recent information on this.

Senator MOSS. All right. Would you have Mr. Langley comment on that, please?

Mr. LANGLEY. Mr. Chairman, when the plans for those pits were reviewed, there did appear to be that potential. As a result there is a requirement for redesign which has been accomplished and approved, which assures that overflow will not be returned to the river. In fact, the basic water contract for the Mohave plant provides there shall be no pollution of any kind from the plant returned to the river or to the ground water that would include any water mixed with the ash disposal.

Senator MOSS. This would include, you say, water mixed with the ash. What about this overflow of the ash disposal from the pit?

Mr. LANGLEY. The redesign assures that that will not take place.

Senator MOSS. That will not take place?

Mr. LANGLEY. That is correct.

Senator MOSS. Is this something that is monitored more or less continuously so you can be assured of this?

Mr. LANGLEY. That is correct, sir. You know this plant is not too far from our regional office in Boulder City, Nev., and like the other plants, there is periodic monitoring with aerial photographs of this plant as well as on-the-ground inspection.

Senator MOSS. Again, in Albuquerque, N. Mex., officials testified that water from the ash disposal area of the Four Corners Powerplant was discharging into the San Juan River. Does the Secretary's contract for water supplied to the Four Corners Plant include water quality provisions?

Mr. PECORA. The revised plantsite lease does include water quality provisions, but, more than that, the water monitoring teams take samples, as the chairman may know, of the water that is in contact with the fly ash in the holding ponds or storage areas. The composition of that water is continually monitored. For example, I saw some analyses of the water resources people in the Geological Survey down in that area, which showed the composition of these waters that had been in contact with fly ash in the ponds. The leaching analysis shows the parts per million of solid content. They are in the range of 1,000 to 2,000 parts per million, and they are on the alkaline side with a pH of 7 or higher. Our intent is to keep the continual monitoring of the chemical analysis of such waters so that we might be prepared to predict if such water should ever get into the ground water system or ever leach out, what might the effect be. So far, we have a lot of

quantitative information on this kind of water. It would not appear at this stage to be a disastrous or even a hazardous situation. But the water is being contained, as I understand it from my conversations with the technical people.

Senator Moss. Contracts for mining on Indian lands provide for a number of environmental controls on construction procedures and on reclamation of those mined lands. Does the Department have a system for inspecting the mining operations to insure compliance with this agreement?

Mr. PECORA. Yes. The committee, of course, knows that the Mining Branch of the Conservation Division is utilized by the Bureau of Indian Affairs as a technical specialist in this area. So there is joint monitoring and inspection by the Area Director of Indian Affairs and the regional supervisor of the Mining Branch of the Geological Survey, because these are on Indian lands.

On State land or private lands, utilization of the Bureau of Mines' specialty would be brought in to bear with the State authorities. But on Indian and public lands, it is entirely within the Interior Department's purview.

The inspections are made on a periodic basis; the reclamation plan or the restoration of land has a full-scale cycle as part of the plan. It is my understanding in one area this is a 5-year cycle. That is the movement of overburden into waste piles, the extraction of the coal in a given bed for maximum conservation, movement of more waste beds above the next underlying coal seam so that the entire section is then removed for coal or for waste and then followed up with the restoration and reclamation procedures with bulldozers and draglines to smooth out the surface, burying the fly ash and bottom ash collected at the plant.

Here is a very important point, if I may take a moment to present a principle to the committee of the catchment basin. Originally these formations were typical sedimentary layers of sandstone and shale and coal. The water falling upon the land for the most part would run off or evaporate in this highly arid region, or the snowfall in seeping would just go into the soil zone and very little of it seep into the bedrock itself. But the disturbance of the bedrock formation for tens of feet to extract the coal and the restoration of the rubble has now presented a concept of a catchment basin filled with rubble, which will collect that water and hold it so that it will provide greater moisture to the subsurface in this rubble catchment basin in each case. This, we predict, will have a beneficial effect on the long-term restoration of the surface and vegetative recovery.

We are making a special study of this, Mr. Chairman, and I think it is a new aspect that had not been looked into thoroughly before. But part of our technical review of the strip mining and the reclamation-restoration principle carries with it some kind of prediction of what will the vegetation look like where vegetation existed before and what vegetation might occur where vegetation did not exist before, which is the common case. It would be interesting over the next 10 to 20 years to see what effect this moisture catchment basin concept or a perched water table above bedrock might have on the development of these particularly mined areas. It is a very interesting technical point, and I am very interested in this concept.

Senator Moss. I am interested in it, too. What sort of soil goes back on the top when the filling is made?

Mr. PECORA. At the present time, the cycle calls for a simple grading of the surface in uniform contours where possible. Unfortunately, where you break up a rock formation, you end up with greater volume than you started. There has to be some contour grading and intelligent engineering planning for this. It is part of the plan to add some fertilizer of one form or another as well as special plantings in order to get it started. In some places we suspect that the natural arid nature of the region will not permit any luxuriant growth. But if in certain areas the assistance given in the restoration plan, added in fact by what I am speaking of as the moisture relationship in the catchment basin, I suspect in some places there will be a better growth of vegetation than before and some vegetation where none existed before.

Senator Moss. In the desert area where I observed it, if you get any growth at all it is going to be more than is there now. I am quite interested because if indeed the catchment there really works and water is held and percolates and, therefore, retains in some degree, there is a possibility of the growth that just about is nonexistent now.

I wonder if you have received the reports of the Geology Department of Prescott College? Samples of coal have been found in Moen Koni Wash, an important farmland area for the Hopis, due to careless slurry practice at Black Mesa.

Mr. PECORA. I am not aware of that report. I would be happy to look into it. In many of the washes in the Southwest, these coalbeds that crop out at the surface have always provided fine disseminated particles into the the natural drainage system. This is not to find a natural distribution system because coal is a rock and will be pulverized and carried in any direction. I have seen this myself in many areas and have used it as a prospecting principle in finding out where the coalbeds might crop out even though they are covered by talus that comes down from upper slopes. But there are occasions where in the shakedown of the slurry pipe I suppose there may have been some overflow or some dissemination. I shall check into this, Mr. Chairman, and find out whether it was a continual occurrence or whether it was some special event that can be explained away.

Senator Moss. I would appreciate this, and if you can advise us in writing, it will be inserted in the record. Since the question was asked on the record.

(The document to be furnished follows:)

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., December 10, 1971.

Hon. FRANK E. MOSS,
U.S. Senate,
Washington, D.C.

DEAR SENATOR MOSS: At the hearing on November 10, 1971, concerning Southwest power development, a statement was made that the Geology Department of Prescott College had written a report stating that slurry coal had been discovered in Moencopi Wash as a result of the negligent operation of the slurry pipeline from Black Mesa on the Navajo Reservation to Bullhead City.

We have learned that no report was written. Dr. Vernon Taylor, a Geology Professor at Prescott College, made a statement at a geological symposium at Flagstaff, Arizona, on September 3, 1971, that he had discovered some coal in

Moencopi Wash that had apparently washed from the slurry operation at Black Mesa. The coal company informed him that during a torrential rainstorm over the Labor Day weekend, 1970, one of the pits at the slurry operation did break and some of the pulverized coal did go down Moencopi Wash. Dr. Taylor stated on the phone that he did not attach any particular significance to the incident but merely gave it as a statement of fact. Dr. Taylor stated that insofar as he knows only a small amount has been found and there is no damage to cropland. There is some evidence that a small amount of pulverized coal on the farmland in Moencopi Wash would perhaps be beneficial.

The coal company is aware of this situation and at the present time there does not appear to be any real danger to the irrigated lands along Moencopi Wash.

Sincerely,

MITCHELL MELICH,
Acting Secretary of the Interior.

Senator Moss. You were describing earlier the air monitoring going on. Do you have a full-scale monitoring system that is going to be permanent or at least lengthy?

Mr. PECORA. Mr. Chairman, this is related to this interagency task force I mentioned earlier, and it is an excellent example of the fine coordination that existed among Federal agencies with different capabilities and specialties. We are relying on two other agencies primarily for this part of the study, the air analysis group of the National Oceanic and Atmospheric Administration and the Environmental Protection Agency.

We look to them to monitor the air fluid dynamics and the methods of sampling that can take place. As a matter of fact, they are leaders of that part of the study group, calling upon specialties for other Federal agencies as they need it.

This part of the program will be covered in great detail by specialists from other agencies and will be contributed to the major study report.

Senator Moss. Of course, the Department of Interior has the responsibility on the Indian reservations and also the National Parks and Monuments, though it has a special involvement. I was wondering if, for that reason, you assumed any direct responsibility? You are saying you depend on the specialists from the other Federal departments.

Mr. PECORA. Rather than build up our own staff of specialists in an area in which we have not had any specialization before, we would prefer to call upon other Federal specialists. It is my understanding, and I assume Dr. Greenfield of EPA will speak about this during his testimony, that there is in fact a contractual understanding between the States and EPA in the monitoring system that will be set up. But we will, of course, be involved in reviewing what is being done and have representatives on that study so that Interior will be relying, as I said, on the specialists and information that comes out of that part of the program.

Senator Moss. One of the problems that has arisen, is that in the deep wells owned by Peabody Coal on the Black Mesa, they are taking the water from the lower area there for the slurry and this is having an effect on the shallower wells that are used by the Indians on that reservation.

Has the Department made an independent study of this situation?

Mr. PECORA. Yes, indeed, Mr. Chairman, we have had a lot of old information and as a result of the issue having been raised, have had a special study team monitoring this in particular.

The water being used for the slurry process is coming from about 3,500 feet in depth. This is the lower reservoir. During the process of withdrawal, our analyses show there will be a cone of influence spreading out from this point. We do not project any significant influence on the shallow springs or wells.

It is our intent to monitor for two purposes. One, what is happening to the water, and secondly what is happening to the cone of influence. Peabody Co. itself is involved in the study along with the Bureau of Indian Affairs, and the Navajo Tribe, all of which are looking to us to monitor this in detail.

The first is to determine the geometric progression outward of this cone of influence of water withdrawal, and secondly, to also determine through special studies what might be the recharge mechanism and rate. When the water withdrawal procedure ceases, one will be able to predict the rate of time that the water will recharge.

At the present time we have no handle on the second problem but we recognize that it is worth looking into. However, we at this stage do not predict any changes of the withdrawal area on the surface springs or the upper area, aquifers of the region.

Senator Moss. Who would have the responsibility of protecting the Indians so they would not be deprived of water?

Mr. PECORA. The Bureau of Indian Affairs calls upon the Water Resources Division of the U.S. Geological Survey for the technical monitoring, predictions and analyses of the data. This is reported, of course, so that if any unauthorized effects are being observed, they will be known early enough so that corrections can be made, or some other solutions can be reached.

There is, of course, as you know, a royalty paid on the water used by the company, but I agree with the implications of the chairman's remarks, that if this is going to destroy water supply, it isn't worth selling. Let's keep the water intact for the future use of the Indians.

Our studies to date indicate that water can be withdrawn from the lowest aquifers without the significant effect in years on the upper aquifers.

Senator Moss. During our field hearings, we had a number of witnesses who came in contending that the tribal council, the Hopi Tribal Council, does not accurately reflect the views of the effect on the Indians of strip mining and other activities there. Are you satisfied with the procedures that you now have for negotiating these agreements with the Indians?

Of course, the relationship of the Secretary as trustee for the Indians puts him under a considerable obligation to protect any of those contracts.

Mr. PECORA. Mr. Chairman, every administration would face the same problem; one of looking to the benefits of the Indians, and secondly, permitting the Indians to somehow develop their own future. This will inevitably develop conflicts among Indians themselves, one tribe or another, or even within the same tribe.

We must work on the concept that the elected leaders of the Indian group, represented by their council, should speak for the tribe.

In the 1950's when the first discussions took place on these coal leasing contracts, the interest was very great on the part of the Indian groups to enter into such contracts because it brought income to the tribe at the same time it provided employment opportunities to their people. As a matter of fact, I looked into this one aspect myself in a recent trip trying to evaluate the coal resources of the future for this region, and I had found several Indians had been through a training period with one company or another, and some of them had acquired the high technical skill of dragline operator, pit foreman, and things of this kind, which place them in the upper income bracket.

I have found on the part of the Indians, frankly, an enthusiasm for this kind of development which is giving them an opportunity to get a foothold on their economic future.

Now, in dealing with the Indian group, I think the Secretary can only look at the representatives of those people and superimpose the legal restrictions that we may have or other information.

I would like to ask, if I may, Mr. Chairman, John Crow, who is Deputy Commissioner of the Bureau of Indian Affairs, who is an old administrative hand in that agency, and in the Bureau of Land Management, if he would speak, because I think his words are probably a lot more effective than mine on this issue.

Senator Moss. We would be glad to hear from Mr. Crow, responding to that general question.

Mr. Crow. Yes, Mr. Chairman. I think the Secretary has put the thing into very good words. The tribal councils are elected by the people for various terms. For the Hopi, for example, the council is elected every 2 years. Their principal officers are elected for 4-year terms.

Now, they have the same problems I suppose that you have in representing your constituents, or that a Congressman might have. Not always do all of his people agree with what he does, but he has to find some way of finding the consensus that he uses. I can just best describe it as being quite comparable to the Congress in a small way.

With the Navajo, a much larger tribe, the council of 74 members is elected there for a 4-year term, likewise their principal officers, their chairman and vice chairman.

I think these people, by and large, take a real responsive interest in what is best for their people. I have known many of them personally and I have a high regard for their integrity and the way in which they attempt always to represent their people.

Senator Moss. Are you satisfied that the tribal council is elected with at least the opportunity of participation for all the members of the tribe, and therefore has to function much as any other representative body would in government, as we know it in the United States?

Mr. Crow. That is correct, sir, and it would be impossible for us to directly confer with 120,000 people. But a 74-member council living in his district and holding the meetings in his district has the means at his disposal to keep abreast of the thinking on the part of the people he represents.

Senator Moss. Well, we like to feel Congress always exercises ultimate wisdom in deciding things for the Federal Government, so I think your answer is responsive to the question. A number of people

coming in simply say, well, the tribal council doesn't represent the viewpoint of all of the members of the tribe. It seems to me that is automatic. It will never represent the viewpoint of all the members of the tribe, but it must accept the responsibility for protecting the welfare of the vast majority that it represents.

Mr. PECORA. I would say, Mr. Chairman, that is a fairly representative expression of the situation as we see it. I personally sat with the council of several Indian groups and questioned them on this very point. I remember at the meetings with the Oklahoma group consisting of several Pueblo groups, how we questioned them as to how they arrived at decisions, how the council was elected and formed, and how they operated. I came away with a good feeling that we are doing it in the right way, and a better feeling on one point.

I find among white people, frankly, a strong feeling and desire for affluence, development of an estate and almost greed related to it as a consequence. I found in the Indian groups I talked with no relationship of that whatsoever. I found no sense of envy if another Indian group was fortunate enough to have uranium on their reservation, or a different group to have coal, and they were making economic progress.

I think it is characteristic of the culture of those people that they are decent, good people who are looking to the future and are not running down other people who are successful. They are so different from the people that I associate with, it was a shock to me.

Senator Moss. Well, that is a good testimony for our Indian brothers.

I have one or two more questions and I know my colleagues have some.

There was a story presented that the employees at Mesa Verde were restricted from commenting on the Black Mesa strip mining powerplant development. Are you aware of that? Is there any such restriction placed generally on National Park personnel?

Mr. PECORA. I am not aware of the incident to which you refer, and I am sure the Secretary isn't aware of it. Certainly I have not issued any instructions for muzzling people or keeping their mouths shut.

I would say, however, in good management practice and this is an add-on to the statement I already made, if a man is employed in the Federal Government he should shape the nature of his comportment to the institution he is serving, which is the Federal Government.

Now, if he has, on his own time, made comments, that is his affair, but if he is criticizing an administrative action publicly without knowing what the action is, I think he should be called on the carpet and be permitted to make his comments directly to his superior.

I don't know what the incident to which the chairman refers is, but I know of no restrictions put on anybody except to use good commonsense.

Senator Moss. Well, this, as I recall it, was a press story saying that some employee of the Park Service made some comment about the air pollution around Mesa Verde, he couldn't see very well around there now, and on being revisited at a later time he said, I have to keep my mouth shut now, I am not permitted to say such a thing.

This, you know, is a little irritating incident, but the sort of thing that goes on in the comment around there, and I just wanted to have your comment on the record.

Mr. PECORA. I would like very much to look into this matter. I assure you there has never been such a restriction issued. As a matter of fact, it would be very foolish for someone looking at a lot of smog to say the smog isn't there.

(Subsequent to the hearing, the Department of the Interior submitted the following:)

Examination of the record in light of this inquiry revealed that 25 seasonal employees of the National Park Service who identified themselves as members of the Interpretive Ranger Division at Mesa Verde signed a letter protesting "the disastrous Navajo power project and the Black Mesa stripmining operations * * *" The letter appeared in the Durango, Colorado, Herald on August 4. The Department of the Interior considers it appropriate for private citizens to express their personal views in this manner.

At the time of the publication, the National Park Service received numerous complaints that members of the Interpretive Ranger Division at Mesa Verde were using their time with captive audiences to attack the Four Corners program. When reminded that this did not comply with their job requirements, nor adequately serve the public need, five of the seasonal employees resigned.

Senator Moss. In this study that you are now making with these various task forces on this whole Four Corners power generation problem, are there any opportunities for the local people to be called in to make further comment?

Mr. PECORA. Mr. Neuberger can give you more detail on that. He is the chairman of the study group on whom I place this responsibility for participation of everyone in the study affair.

Mr. NEUBERGER. Mr. Chairman, that specific decision is being considered by our management team in the study effort, and we will make a recommendation to the task force on how it disseminates the Southwest Energy Study Report, its contents to the public, and other news media.

I am sure it will be considered and that the public will be kept fully informed. Secretary Morton has directed that and the decision of how it will be done will be with the task force and the recommendation will be made to them.

Senator Moss. In the course of making your study report, though, are you not having any open public forums or hearings of any sort?

Mr. NEUBERGER. We have held briefings to keep the people informed of the study. We have held briefings for conservation and public interest groups, and for the Senate and House committee's staff here on the Hill. We held a briefing on the study and discussed with people in Salt Lake City, inviting local groups from the whole region to be present, and at that time we had an interchange with them on the concerns they have, their comments on the study. In preparing our report we are going to consider the comments and the information that they provided in these briefings.

Mr. PECORA. If I may extend Mr. Neuberger's remarks, we have had several meetings with university and conservation groups and industry groups as indicated by Mr. Neuberger, and we will continue to have these briefings. In July, when the Secretary was in Denver, he had such a meeting with a broad group of conservation representatives. On August 13, here in Washington, I held such a meeting with a number of universities and representatives of other organizations.

Mr. Neuberger referred to the meeting held at Salt Lake City. As a result of these meetings, we have received already a great number of comments and substantive suggestions for consideration by the study group. These materials have been reviewed and are being worked into the study plan by the study team, working through Mr. Neuberger's direction.

Senator Moss. I am glad to have you reply to that. I think that not only might some valuable suggestions and good information come in that way, but it also tends to keep the matter more in perspective. This is a very emotional thing, I guess, all over the country, particularly the area that many on this committee come from, and to keep it in the open with opportunities periodically for people to go and say their piece, or hear others say their piece, is certainly a desirable way to proceed in this matter.

Well, I have taken a long time asking questions. I will give my colleagues a chance.

Senator Anderson?

Senator ANDERSON. No questions.

Senator Moss. Senator Allott?

Senator ALLOTT. I prefer to yield to my other colleagues, since I arrived late.

Senator Moss. Senator Jordan?

Senator JORDAN. Thank you.

Mr. Secretary, in your statement you said whether existing State, Federal, and local air and water quality standards can protect the values at protective levels is not yet known. When do you suspect it will be known?

Mr. PECORA. This is the primary purpose of the study, Mr. Senator. We had hoped by next March or April to have a full study report covering the entire spectrum of the study plan which is in one of the appendices presented to the committee.

We will, of course, in certain aspects know well before then, because in many areas of the study group there is a great volume of information and data already existing, and the work plan of the study group is to accumulate, synthesize, and evaluate and assess that data.

So, I would suggest that certainly by next spring we will have the first handle on the interreaction of plants close together and a general analysis of the overall reaction of the entire region before any new plants will be considered.

Senator JORDAN. Do you have any idea of whether additional Federal legislation might be required in this area?

Mr. PECORA. It may very well be, and the Secretary would like to study this report and its implications in great detail. I would presume that the general concept of the National Environmental Policy Act would be enough for any Federal agency to work with a sense of conscience of what the act intended to imply, that one must not go full scale, pell-mell into these projects but one must consider the side effects and if they are too severe, then modifications must be made in the project.

If they, for example, are acceptable, this does not mean the project must cease or be deferred interminably. I think just good sense must apply here, but we must take into account all of the aspects of the environmental and social implications.

Senator JORDAN. It is my understanding that under the Department contract, you do include in the contract certain environmental protection provisions. Will you enumerate some of those for us?

Mr. PECORA. Yes, indeed.

Some of these are summarized in one of the appendices, and in the contracts in particular dealing with water. There are a number of examples and I will call on my colleagues to give you some specifics. For example, Senator Moss mentioned the possible effect of the ground water to the slurry line. If it shall be found that there are permanent damaging effects to this procedure, that water supply will cease and Peabody will have to find water from some other source. That is a contract requirement.

There are other examples, and Mr. Morthland will give you some specific examples.

Mr. MORTHLAND. Mr. Chairman, Senator Jordan, the contracts which we have executed to date all contain water pollution control provisions and air pollution control provisions. In general substance, the control provisions require that the plant operators or owners prior to installation of pollution control equipment must furnish their plans and technical design data to the Department of Interior technicians or responsible officials for review, and they may not use those devices or that equipment without the written consent of the Secretary.

Now, certain standards of control are set forth in the contracts. Roughly, the air pollution control requirements in most of our contracts require design efficiency and air pollution control equipment to remove 99½ percent of particulate matter; the actual operational requirements are to remove 97 percent particulate matter over a month's period, and not less than 96 percent over a given 24-hour period.

The water pollution control standards have to do with the contamination effects of any effluent discharge, and they must be held within limits that are spelled out in the contract.

Now, the contracts further provide that not less often than every 10 years the plant owners and operators and the Department must review the technological advances that have been made in pollution control equipment with a view toward upgrading or installing any new equipment which affords better promise for both water and air pollution enhancement and control.

We have some monitoring provisions in the contract. The pollution control provisions place a requirement upon the contractors to install and conduct—install equipment for the purpose of, and to conduct measurement tests periodically to make reports to the Department. They also give us the opportunity of free access to the plants for the purpose of making a check on the operation of their pollution control equipment.

In the event we find, I presume, that the equipment is not operating to the standards required by the contract, we then have the obligation—the right and the obligation to take such actions as may be necessary to correct that under our contractual requirements.

Senator JORDAN. All right.

These provisions in the contracts are intended to comply with all Federal, State, and local laws. Who is the enforcer? Who becomes the enforcer of the provisions of the contract?

Mr. MORTHLAND. The enforcer, I believe, so far as compliance with the Federal air pollution control standards, is the Environmental Protection Agency.

Now, the primary enforcer for compliance with the State or any local governmental regulations or requirements, I presume, would be the local agency involved. We can see, however, that we have an obligation to see that enforcement measures are taken if we detect some violation or some deficiency in the design or operation of this equipment. I would say that under the contract, under the proper interpretation, we would have this obligation to call attention to it and bring this enforcement provision into play.

Senator JORDAN. Is there any conflict of jurisdiction between the Department of Interior and EPA with respect to the enforcement of the contract provisions?

Mr. MORTHLAND. I don't feel there is; no, sir.

Mr. PECORA. I don't see any conflict here, Senator. I do think we must rely on the State or local agency whose standards must be upheld for continued observation, which may be done independently of our own observations and measurements.

Senator JORDAN. Who is the monitor of the operations to know whether the provisions are being complied with?

Mr. PECORA. The State and, on the Federal side, the Environmental Protection Agency are those who enforce the standards. We make the contracts and we describe in the contracts that the standards will be adhered. But the enforcement must be the State and the regulatory agency on the Federal side, which is the Environmental Protection Agency.

Senator Moss. Aren't you really saying that the police power is used to enforce it and that would be the local agencies? They would apply the police power to say that you are now violating the law that we have here, but if you depend on the contract, then the parties to the contract, that is the other parties to the contract, would have to enforce that as a contract right, and say this is a breach of the contract because now you have not observed the terms of the contract isn't that right?

Mr. PECORA. That is stating it very succinctly. We could, of course, in the Department of Interior, in observing the operation of the contract, whether it is coal mining with restoration deficiencies or whether it is the air or water, we could call this to the attention not only of the enforcing agency, but also to the contractor. If he doesn't get up and fix this up we have to do something under the obligations of the contract.

I would say, without any question of a doubt, that the Interior Department does have clout in this issue, but we must rely on the standards analysis and regulations by the State entity and the Federal entity responsible for the regulations and that is the Environmental Protection Agency.

Senator JORDAN. In one of your attachments you indicated that draft environmental impact statements have been submitted to CEQ in all but one case. This would indicate they are being circulated to appropriate Federal and State and local agencies and to interested parties for review and comment. The usual review and comment

period is 90 days. However, some of the draft statements have been pending for substantially longer periods. Some statements associated with the Navajo project have been pending for 9 months and the Hayden Unit No. 2 has been pending for over 4 months. What is the significance of this?

Mr. PECORA. First, let me refer to the appendix to which the Senator has brought my attention, which is appendix C, a list of the environmental statements and their status is given on that page. Number one, the Navaho project has the word "consolidated." What we have done, Senator, is to take all of the individual drafts which follow it, and to consolidate several of them into a master statement. Hence that is one explanation for the apparent delay.

The draft to the Council on Environmental Quality, which was made on October 5, 1971, was that consolidated statement, and that is why we brought it into focus in one statement.

Does that answer the question?

Senator JORDAN. Yes, that answers it.

I will yield.

Senator MOSS. We have invited the Public Works Committee to sit with us. They have jurisdiction over a good bit of what we are talking about, and we are pleased that Senator Montoya, who is a member of the Public Works Committee, is joining in this hearing, and I will ask him if he has any questions?

Senator MONTOYA. Thank you, and the other members of the committee, for extending me the privilege of attending this very important session. This allows me the privilege of asking a few questions which I deem very essential in view of the fact that my State is suffering from the environmental consequences of one of the plants about which you have been speaking today.

I would like to ask this question of Mr. Pecora.

Do you understand, Mr. Pecora, that the discharge from the Four Corners Plant, on a per day basis, is 350 tons of particulate matter or fly ash?

Mr. PECORA. It is my reading of the facts and figures available to me that that calculation at the present time with full operation of the plant is a fairly acceptable figure. That is as correct as we can make it.

Senator MONTOYA. And that the additional discharge by this plant in sulfur oxides is 320 tons per day?

Mr. PECORA. I don't have the same confidence in that figure, Senator, because we have yet to determine how much sulfur is being retained in the fly ash within the stack. On chemical analysis, one series of chemical analyses indicated, for example that the coal going into the system averages about 0.7-percent sulfur. There is a recent report that you may know about, just issued about a month ago, by the State Office of Mines in New Mexico which gave that very complete analysis of the nature of the coal itself, and its distribution.

Senator MONTOYA. This testimony was adduced at the Albuquerque hearing and has never been contradicted up to now.

Mr. PECORA. We will be able to give better facts on this. From the analysis I have seen made since the hearings, at least 25 percent of the sulfur is being grabbed in the heavy ash and fly dust that stays within the smokestack and is then transported physically out, at least 25 percent.

Senator MONTROYA. Let me follow up with this question now. It is also known that the city of Los Angeles, which has a high degree of pollution in its air, emits 110 tons per day in comparison with 350 from the Four Corners Plant alone. That was of particulate matter, fly ash, and 225 tons per day in the city of Los Angeles compared to 320 tons of sulfur oxides. The city of New York is less than this, and the city of New York is an industrial city. That is why we are very concerned.

We, in New Mexico, pride ourselves in having very pure air and we don't want to become an economic colony for any of the other States.

Let us go now into the state of the technology and what are we doing with respect to the enforcement provisions or the requirements which would force these companies to update the technology to contain the ash and the oxides.

Now, I understand that these plants are not doing anything about containment of sulfur oxide. There is no technology being installed to take care of this containment. Is that true?

Mr. PECORA. I don't have the detailed information on what is planned, but I can speak of what is being done at the present time and what is being proposed. For example, units 1, 2, and 3, which I made reference to earlier, Senator, that the design is for installation of the venturi scrubbers at units 1, 2, and 3, and this design is intended to grab, by plan, 99.2 percent or more of the particulate matter which is probably a factor of 10 to 20 times better than the present situation.

As I mentioned to Senator Moss, we are going to monitor this carefully. This is just the particulate matter.

Senator MONTROYA. 99.2 percent, all right. Let's go into the time element. When is this expected to be done?

Mr. PECORA. It should be operating, according to the plans made available to us, by the beginning of next year. In other words, through December is the time required for installation and operation.

Senator MONTROYA. Is 99.2 percent satisfactory and is it in line with what is average for containment in those plants which have updated their technology?

Mr. PECORA. I would say that the present upgrading as projected, with installation of these wet scrubbers to these three units, that some figure over 99 percent is a dramatic improvement over the present, which is in the order of 75 percent fly ash particulate matter control. Yes, I would say the design of the venturi scrubbers is certainly well above the State standards.

Senator MONTROYA. It is my understanding that in most instances where this technology has been applied that the containment is 99.4 percent and that the capability under the new technology is 99.8 percent. Now, why aren't we insisting on the utmost?

Mr. PECORA. This depends, of course, on the nature of the coal being used. Western coals have a relatively high ash content—

Senator MONTROYA. And lower sulfur content?

Mr. PECORA. Yes, by far. So that we have an advantage in one case and a disadvantage in another case in dealing with our western coals. But for the most part, the coals of the western region are low-sulfur coals. You are correct, Senator.

The ash content, therefore, is a function of the coals going into the furnace which will be a function of the amount of ash being produced and the percentage control or the grabbing or catching of this is a matter that has to be studied in each individual case.

Now, the figure that I gave you as to the presently contemplated results, after introduction of the venturi scrubbers on units 1, 2, and

3, would reduce that fly ash emanating into the atmosphere down to about 26 tons per day, when it is fully operated. It is a very low number when all of the other elements are put into it. But for units 4 and 5, according to plans I have seen, there are some bag house filters being considered for installation that have not yet been installed, and I think this is an exercise that would cost several millions of dollars—the number escapes me, but I think it is more than \$20 million. It is about \$25 million.

Normally, because it represents an improvement in the operation, we in the Department would not hesitate to grant such a request for an installation of this kind.

However, in view of the National Environmental Policy Act, I have just recently sent a letter to the Council on Environmental Quality and to Mr. Ruckleshaus of the Environmental Protection Agency asking concurrence to put aside a necessity of a 102 statement, because this is a good thing. This would enhance the environment, so let's not waste time going through the procedure of recording and commenting and so forth.

I hope the Senator would agree with me, when you see something that would maximize the good for a change, let's get with it. This would help the units that are to be put on here in the areas of collection of the particulate matter plus the sulfur.

So, I would say in summary, very briefly, that a plant which is designed and constructed some years ago is now under review so that accommodations can be made to increase the collection procedures of the problem.

Senator MONTROYA. Another point I want to make is that I fully appreciate the plants were constructed some years ago before the technology was devised, but are we going to give them grandfather status and sacrifice our environment in the process?

Mr. PECORA. Absolutely not.

Senator MONTROYA. Are we going to insist that they comply with the new requirements for new installations?

Mr. PECORA. We are insisting on that and are presently having no difficulty with the companies to their response.

Senator MONTROYA. Somebody has to move these companies into a timetable and I think it is up to the Department of Interior, which controls some of their leases, and also the Environmental Protection Agency. The two in tandem should oversee that they have a reasonable timetable, but not unreasonable enough to impair the environment.

Now, I want to ask one more question. In view of the fact that your goal now seems to be 99.2 percent containment, if these plants were located in California, would this 99.2 percent satisfy the regulations in the State of California?

Mr. PECORA. I don't know what the air standards are of the State of California.

Senator MONTROYA. I understand they would not, and that a plant with this kind of control could not satisfy those requirements in the State of California. So, why should we in New Mexico be relegated to such a deficiency when the benefiting State is not doing anything about it?

Mr. PECORA. You are quite right in raising the question in the form that you have. The State of New Mexico must have its own standards

to which all industry must comply and in any contracts we issue we will be certain that that compliance does exist.

Now, the figure of 99.2 collection of particulate matter is, of course, the next stage that we have based on our present technology, and it is the intent of the Department and industry to elevate this to 99.5 and 99.8 as soon as technology permits. So that in our case——

Senator MONTROYA. I understand the technology does permit it now.

Mr. PECORA. Well, the installations are being made at the present time on new plants, too. And our contracts are retroactive so that if new standards are developed they must comply. I am in sympathy with the point of view the Senator expresses, and I can assure you that we are likewise sensitive to this issue, that we are not permitting any of the industries or companies that come within our purview in any way to defer or delay because we think it is necessary and I must report, quite frankly, that the companies which whom I have spoken on this issue have indicated a readiness and willingness to do as much as they can, as they possibly can.

Senator MONTROYA. I want you to know that I fully appreciate the vast expenditure these companies must undergo, but they also can ask the beneficiaries of these benefits that they should pay additional rates to take care of the new technology.

Now, another phase which concerns me is the containment of the sulfur oxide. There has been no mention here this morning as to what efforts are being made to contain the sulfur oxide emissions.

There are serious emissions from these plants, from the Four Corners plant, for instance, of 320 tons daily, sulfur oxide. There is a new technology that has evolved and there is no indication of any requirements of these powerplants to install this new technology.

Now, what is being done about that, and what do the contracts provide to create an obligation on the part of these companies to install such technology in the near future?

Mr. PECORA. I will make some comments and ask my technical colleagues to expand.

Further, I think the Senator has categorized particulate matter separate from sulfur oxide and nitrous oxide. This is an appropriate approach. Let me make some comments that recent chemical analyses have revealed.

The chemical analyses of the fly ash emitted from the furnace action have been collected and analyzed. I have seen the analyses as reported in the usual inorganic chemical formula tables, silicon dioxide, SO_2 , Al_2O_3 , down to calcium oxide. As a geologist, I saw this immediately, the chemical analysis of the fly ash is almost identical to the average analysis of the rocks of the earth's crust.

In other words, a windstorm produces a great deal more particulate matter, but of the same composition. So, in the matter of the particulate matter that is being emitted, here is a question of trying to reduce it for the esthetics more than any other reason, frankly, because there is no need to have a lot of black smoke if you can stop it. Wind is bad enough on a windy day. As a matter of fact, when I was visiting the Southwest and saw the Fruitland generating plant one day, the next day there was a terrific windstorm and I calculated the amount of dust being moved around and there was a shocking relationship.

Nature is doing a far greater job in moving the material, but that is no reason why we should permit excess particulate matter to move from these stacks and I agree with the Senator on that.

The other area, which is the oxidized sulfur and the nitrous oxide, I should say I don't accept the figure which has been used in the past because we have evidence now that some of the sulfur is being withheld and grabbed in the chemical reaction within the fly dust particles themselves during the process of combustion.

As a matter of fact, even a particle that goes out through the stack has its sulfur in the form of a sulfite or some other form. But our chemical work will reveal this.

Nevertheless, whatever sulfur is going out as will be revealed as a result of these chemical studies now underway, we should reduce that because sulfur itself is not a desirable element in the effluent.

Senator MONTORA. Don't you have a pilot plant in St. Louis which indicates that it is able to contain 80 percent of sulfur dioxides?

Mr. PECORA. I don't know about this one. We have research pilot plants going on at the Mohave plant and four or five different methods are being utilized.

Because this committee deals with resources as one of its purviews, let me give you some of the inquiries that are now going on in the research pilot stage. For example, it has been found that some of the coproducts of the oil shale in the three Western States are sodium carbonates, hydrated sodium carbonates, and in their raw state one of these is called nahcolite for identification, and is a very good grabber of sulfur and nitrous oxides if used in the raw states.

Experiments are being done by a great number of individual companies in this and other products which can be possibly an effective grabber of sulfur and nitrogen in smokestacks themselves if used in the system.

So, work is going on here. It is very interesting.

Senator MONTORA. What specific contractual arrangement or revision is in sight to require these companies to contain this sulfur dioxide?

Mr. PECORA. The first requirement is that they meet the State standards. That is the first requirement.

Senator MONTORA. What is your agency doing and what is the task force directed to do in this respect, and what authority do you have under mineral leases to exact some kind of performance from these companies?

Mr. PECORA. Insofar as the standards are concerned, if the operating plant meets the State standards, then I think all we can do beyond that is to observe and to make suggestions and get data and use influence, if possible, in order to improve a situation. But if the standards are being met, Senator, I would submit that it is the intent of the entire institutional arrangement.

Senator MONTORA. Let me express some concern now. My concern is this: In trying to exact 99.2 percent performance, I feel that we are doing less than the maximum, which I believe to be 99.8 percent. By exacting performance with respect to fly ash, we are ignoring performance with respect to emissions of sulfur dioxide and we are not trying to require new technology to be installed for the containment

of sulfur dioxide. I think this is becoming an orphan, this aspect of the question.

I would like to find out from you gentlemen whether there is any plan, any definitive plan to try to take care of the escape of sulfur dioxide?

Mr. PECORA. First, I should make reference again to the fact that our contracts are retroactive in review. That the best technical procedures must be applied. Mr. Clarke, my deputy.

Mr. CLARKE. I think the element of retroactivity is a very important one, and it embodies the concept that the best available technology will be used in every instance for emission control, sulfur dioxide, particulate matter, or whatever.

I think it is a fact that pilot plants of small size, essentially laboratory type equipment, have achieved reasonably good sulfur dioxide removal. I think the thing that has not yet been demonstrated is that large-scale operations can be done on an engineering plane of practicality and on an economic level of practicality, and this is what is being sought now.

Our provision is that once this has been established all over the industry, it must be included within the plants within our control. Of course, as the Under Secretary has said, we must conform to the standards if the standards can be conformed to, there is a cooperating Federal agency that will insist this be done. So, there is no escape from this.

I think there is a positive guarantee that whatever technology is available will have to be incorporated in these plants by two authorities, our own contract responsibility and the regulatory control of EPA and their State cooperators.

Senator MONTOYA. Thank you very much, Mr. Chairman, for allowing me this opportunity.

Senator Moss. Thank you.

Senator Anderson?

Senator ANDERSON. I am putting in the Congressional Record a letter from a Pueblo Indian who is not happy with the question of water. I don't expect you to comment on that now, but I would like you to look at it.

Mr. PECORA. I would be happy to read the letter. I am not aware of such an expression of discontent. I have talked with several of the Pueblo groups myself, and this did not come to my attention, Senator, and I will be happy to look into it.

Senator Moss. Would you not only supply the Senator an answer in writing, but we will also put it in the record.

Mr. PECORA. Yes; I would be happy to do it.

Senator ANDERSON. I just want to make sure there is an answer of some kind for it.

Thank you.

(The material referred to follows:)

[From the Congressional Record, Oct. 15, 1971]

DELIVERY OF WATER FROM RIO GRANDE TO PUEBLOS

Mr. ANDERSON. Mr. President, I have just received a letter from Mr. Diego Abeita, chairman of the Irrigation Committee of the Middle Rio Grande Pueblos. Mr. Abeita has attached a copy of a letter he wrote on September 30 to the

governors of the six Middle Rio Grande Pueblos and to the members of the Middle Rio Grande Pueblos Irrigation Committee concerning delivery of water to the pueblos from the Rio Grande.

There has been a great deal of talk about mistreatment of the pueblos in the Middle Rio Grande and statements have been made that they are being short-changed on water and have not been receiving what they need for their operations. I believe the attached report to the governors and committeemen is a very fine and concise report and very plainly points out that the Middle Rio Grande Pueblos have been receiving their share of the water from the Rio Grande.

Mr. President, I ask unanimous consent that the letter from Mr. Abeita and the above-mentioned letter to the Governors and committeemen be printed in the RECORD.

There being no objection, the letters were ordered to be printed in the RECORD, as follows:

"ALBUQUERQUE, N. MEX.,
"October 5, 1971.

"Hon. CLINTON P. ANDERSON,
"Senate Office Building,
"Washington, D.C.

"DEAR SENATOR ANDERSON: I am enclosing herewith a review of our water situation for the season 1971 pertaining to the Six Middle Rio Grande Pueblos, consisting of Cochiti, Santo Domingo, San Felipe, Santa Ana, Sandia, and Isleta.

"We thought you would be interested in the factual review of our water year. We know that you are well informed on the subject of Indian water rights, and have always been interested in Pueblo Indian affairs.

"We are rather disturbed by the distorted press releases which have confused a lot of people on the subject, and have been accelerated a move to create an independent Bureau called the Indian Legal Trust Council which we think is a very dangerous threat in our relations with the United States Government and particularly, the Department of Justice.

"We ask your constant observance on this move.

"Thank you for your attention.

"Yours sincerely,

"DIEGO ABEITA."

"ALBUQUERQUE, N. MEX.,
"September 30, 1971.

"Governors and Committeemen, Six Middle Rio Grande Pueblos, Members, Middle Rio Grande Pueblos, Irrigation Committee.

"GENTLEMEN: At this time we think it well to review our experiences in the irrigation year of 1971 which will be over in October.

"First, you will remember that the Committee was authorized to ask the Secretary of the Interior to make the demand for storage of water for the irrigation season of 1971, in the El Vado Reservoir. This request was made the latter part of 1970, and you were furnished a copy of the letter to the Secretary.

"Upon our request to the Secretary, Assistant Secretary Loesch immediately conveyed our message to the Conservancy District to store a sufficient supply of water for the six Pueblos to meet their needs. The Conservancy District then instructed the Reclamation Bureau to store water for the Pueblos.

"The Reclamation Bureau then stored 23,500 acre feet in El Vado for the exclusive use of the six Pueblos. However, we had an adequate supply from the natural flow of the Rio Grande until June 14, when the stream became low ranging about 250 s.f. at Otowi.

"On June 15, we then made a request through the Superintendent for the release of a supply of water from El Vado to meet our needs; however, the Conservancy District released 5,000 acre feet from Heron Lake—said water coming from the San Juan-Chama diversion. This was the first release that was ever made of this San Juan-Chama water, and it was delivered to the Pueblo lands on a priority basis. It lasted until about July 1, when Reclamation started to divert another 5,000 acre feet from Heron Lake and 5,000 acre feet from El Vado. About one-half of that release was delivered to the lands within the Conservancy District including Indian lands; of course, when the rains in the North supplemented enough to the natural flow, our needs were adequately met. This situation

prevailed until September 14 when the East side of the Isleta lands were in short supply.

"Therefore, on September 14, we requested another supply of water be made available from storage whereupon a flow of 250 s.f. in volume was started from Heron Reservoir, and this supply was intended to continue until there was an adequate amount for lands and to supplement this amount of our water from El Vado if it were needed for the rest of the season.

"The flow continued through the Indian laterals, when on or about September 23, the rains added enough to the stream flow, and as of now, it still continues to suffice to mature our crops.

"Some Observations and Conclusions are:

"Comparatively, we think the six Pueblos have fared very well this season. Thanks for the cooperation we have had from the Office of the Secretary of the Interior—particularly from Assistant Secretary Loesch, the Middle Rio Grande Conservancy District, the Reclamation Bureau, and the Irrigation Department of the Bureau of Indian Affairs.

"The Pueblo of Isleta is the Southernmost of the Rio Grande Pueblos and therefore is more sensitive to the proper administration of the Rio Grande's supply from storage and flow. They are now farming and irrigating approximately 4200 to 4500 acres, and it seems they have been adequately served this season as in other seasons.

"Also, because of this situation, they are at a vantage point to reckon for adequate service. It seems that it has been a good year and a good yield from our river, our land, and our efforts. There is yet to be harvested some corn, partial cutting of alfalfa, chili, and some garden crops. The prospects look favorable.

"We are astounded there has been so much squabble that we are stealing water from Indian Tribes upstream when we are the last on the lower end and we get only what they have left. This turmoil, we believe, is being generated by non-Indians who have no interest in our welfare nor any vested interest of the water of the Rio Grande.

"We note in the papers that these persons are posing as 'experts in water rights', 'Indian experts', etc., and telling the general public what an 'awful shape' we are in. After all, our well being depends upon us, ourselves, how expert we apply the vital substance our Mother, the river, gives us, feeds us, and raises us with, as we have done for a thousand years. We would be pretentious, indeed, if we went about and abroad assuming that we are experts on other people's affairs—yet, there are those who are doing so with us and our destiny—giving out distorted news releases; trying to make the public believe they are the saviours of the downtrodden, abused, and ignorant Indians in order to build their own fortunes and their own bureaucratic empire and to puff up their own egos.

"We make our remark from long and hard observations that: Never has the horizon with the Indian people been brighter nor opportunities between greater and more abundant in all fields and the Government more generous in every area of our lives. Now, let's start our thinking from there, continue this progress that we have thus far made and worked so hard for.

"I take this occasion to wish a big harvest and good health for you and all our people. I am glad to have been of service to you this season as in the past seasons and thank you for your confidence and cooperation.

"Sincerely yours,

"DIEGO ABEITA,

"Chairman, Irrigation Committee, Middle Rio Grande Pueblos."

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., December 10, 1971.

HON. CLINTON P. ANDERSON,
U.S. Senate,
Washington, D.C.

DEAR SENATOR ANDERSON: At the Interior and Insular Affairs Committee hearings on Wednesday, November 10, 1971 concerning the Southwest Powerplant Development you requested that we comment on a letter you had received from a member of the Isleta Pueblo Tribe concerning water rights and the use of water by the Isleta Pueblo people. The particular matter complained about by the

member of the tribe is the creation of an Indian Trust Counsel to represent Indians in water right matters.

The proposal to create an independent Indian Trust Counsel Authority is part of the legislative package that came from President Nixon's message on Indians delivered to the Congress on July 8, 1970. The sole responsibility and duty of the proposed Trust Counsel will be the advocacy of the trust resource rights and interests of the Indian people, untrammelled by other considerations or public policy. It is true that the Department of Justice would no longer be responsible for the legal defense of Indian trust resource rights and interests, but neither would the Trust Counsel be hampered by the conflicts that now weigh in the balance when the Department of Justice must decide what action to take on cases involving Indian trust resource rights and interests. We believe that the strong pro-Indian advocacy that will be exercised by the Trust Counsel Authority will more than compensate for the loss of legal support from the Department of Justice.

At the request of Senator Moss, a copy of this letter is being submitted for the record of the hearings mentioned above.

Sincerely yours,

W. T. PECORA,
Acting Secretary of the Interior.

Senator Moss. Senator Allott?

Senator ALLOTT. No questions.

Senator Moss. Senator Fannin?

Senator FANNIN. Thank you, Mr. Chairman.

I have 24 questions, 23 of them have been capably answered.

Senator Moss. Give him the tough one, then.

Senator FANNIN. I am very pleased with the responses you have made, Mr. Secretary. You have covered very ably the benefits that will accrue to our Indian citizens on the reservations that adjoin the plants. I would like to have your thoughts on the benefits that will accrue to other reservations, particularly some that are isolated from that area, the Papago Tribe specifically. I don't know if you are familiar with the developments they are planning now and the need they have for electricity.

Mr. PECORA. No, I haven't been following that.

Senator FANNIN. The chairman of the Papago Tribe was in my office yesterday discussing what can be done in relationship to having adequate power on their reservation. At the present time they have a limited amount of power, very few homes that do have electrical service.

The problem they have now is that they have an opportunity to develop a new powerline which will be quite extensive, but they do not have the power available at the present time. If these projects do not continue to go forward they will not be able to get that power.

So, I do think this should be a part of the consideration in determining what should be done as far as timing is involved. We realize the serious shortage that can come about and I know you are aware of that. I did want to bring this to your attention because I think it is important.

Mr. PECORA. Thank you, Senator.

Is this related to the Navajo plant?

Senator FANNIN. It would be related to the Navajo plant; yes. The Navajo plant would be the one furnishing additional power. They just naturally have a lack of power there many times in that area where some of the water districts are cut short, and they have been back several times to check with the Department about what should be done so

that they have assured power supplies. This is a very important part of the potential for developing the resources.

We do feel this is absolutely essential. Now, when we are talking about the technology for removal of particulates and sulfur, naturally we are vitally concerned with New Mexico and we have the same problem in our State.

I, of course, realize we cannot have a plant like that in a populated area, but there is a great difference in having a plant in an isolated area than in a populated area. I realize technology is going forward, but haven't we made tremendous advancements just in the past 5 years?

Mr. PECORA. No question about it. I think the R. & D. that has been going on is really substantial and there are so many avenues that appear to open up to follow into a pilot plant that we are at a loss, you see, to select any one at this time for a given problem. Therefore, what we must do is to get several R. & D. avenues opened up at the same time so that we can pick the best course to follow for the future.

I would say that in the past, over several decades, without question of a doubt, I think industry in general had not been thinking too much of the side effects or else the people themselves have accepted it because of the benefits that accrued to them. But over the past 10 years, certainly culminating in the passage of the National Environmental Policy Act, the consciousness of the American people now has risen to a point where we must do something.

Industry is doing it, government is doing it, and consumers are doing it. I think what I see with any form of development over the next 5 years that we will resolve many of these problems.

As the Senator from Utah said earlier, there must be some reasonable period of time in which to have these people toe up. The fact is they are not dragging their feet, and we are confronted with a technological breakthrough in many areas. We don't find a dearth of funds to make these changes in some of these companies even though there is a reluctance to put a high capital cost in some of these areas, nevertheless it is being done.

Senator FANNIN. I know the rate structures will have to be adjusted to take care of this. As I understand, the additional cost for the Navajo plant for the equipment they are installing is about \$90 million; is that correct?

Mr. PECORA. That is the general area I have seen, plus or minus, but even the plus or minus gives you a substantial figure.

Senator FANNIN. It is almost 20 percent of the total cost of the plant. So, this will be a factor and I certainly agree that this should be done, but I think people must realize that it is going to be necessary for them to pay additional charges because those charges can't be passed on to anybody else.

I think there is quite a misunderstanding, too, we hear people talk about they should cut out the lights at Las Vegas along the strip. We had some figures on that and it was something like less than one percent of the total that is involved and it doesn't amount to anything at all. So, it isn't a major factor.

I think the refrigeration which is very necessary in the Southwestern States is many, many times over that factor, but I realize that we must take everything into consideration.

Mr. PECORA. You made comment earlier about the one group, the Papago group, that will receive benefits from this whole project. We made the analysis that some 20 million people are involved with the output of energy and that is no small part of the population of the United States. Therefore, it is a major program and cannot be taken too lightly and put aside too easily.

Senator FANNIN. I realize that. If we do put it aside and have a crisis program with brownouts and blackouts, it is going to be even more costly. I just wanted to bring it to the attention of many people who don't realize we are not talking about bright lights, we are talking about lights for Indian people on these reservations. We have a great number of Indians in our State and they are destitute, they are certainly the most underprivileged people in our country.

We are gradually getting the services to make available to them, and I certainly would not like to see projects delayed. That would mean that they would not have these services.

Of course, as I brought out here, we have the possibility of involvement that at the present time the people on the Papago Reservation have less than a \$700 per capita income. So, they now have a chance of getting into some industries, but to do so they must have electricity. I would hate to see them denied that opportunity.

Well, thank you, Mr. Chairman.

Senator MOSS. The Senator from Nevada?

Senator BIBLE. I don't know about those lights.

Thank you, Mr. Chairman.

I only have a couple of questions directed toward the Mohave plant before us. I am sure you, or part of your battery here, has the answers to it. Have you monitored the discharge from the Fort Mohave plant, both before and after the plant started operations?

Mr. PECORA. Let me ask one of my technical specialists, Mr. Langley.

Mr. LANGLEY. Senator, I can't tell you specifically who did the monitoring, but there has been monitoring done. However, in testing the equipment and we have had people there while the monitoring was being done, but I can't tell you specifically—

Senator BIBLE. I don't care about the person, but it has been monitored before and after the operation?

Mr. LANGLEY. That is correct.

Senator BIBLE. Unit No. 1 is on the line today; is that correct?

Mr. LANGLEY. That is correct.

Senator BIBLE. Can you tell me the results of that monitoring and whether they meet the Federal quality standards?

Mr. LANGLEY. There have been a number of those tests and as I understand, they will meet the contractual requirements, and that is what upgrading is all about.

Senator BIBLE. My understanding is that they do meet, and I want you to correct the record if I am in error, they do meet the Federal standards but they do not meet the higher Clark County standards; is that your understanding?

Mr. LANGLEY. That is my understanding, and that is the reason some modifications were being made.

Senator BIBLE. Has the modification been made insofar as Unit No. 1 is concerned?

Mr. LANGLEY. I am not sure whether all modifications are complete. They ran a series of tests and the last I heard those were still going on.

Senator BIBLE. That is a troublesome problem, Dr. Pecora. It is inherent in this overall environmental problem. There is an investment in Fort Mohave, if I am correctly advised, of something in the range of \$250 million plus, and there have been modifications made and additional criteria imposed that must be met. I am just wondering how far that goal is and what the goal is. I am not clear on that. Can you just clarify for me what goal they must meet? Is it 98.2, 99.2, 99.8?

Mr. LANGLEY. Clark County standards are expressed in pounds of particulate matter per million B.t.u., and that expression is 0.06 pound of particulate matter per million B.t.u., which is an extremely high standard.

Senator BIBLE. Does that relate to the percentages previously being requested by the Senator from New Mexico, 98.2, 99.8?

Mr. LANGLEY. Keep in mind this is a different coal source and a different ash source. With the particular source involved, I believe the figure is about 99.9 in this case.

Senator BIBLE. 99.9?

Mr. LANGLEY. Yes.

Senator BIBLE. How far away are they from meeting that standard? Is that the county standard or Federal standard?

Mr. LANGLEY. That is the county. The contract here was one of those early contracts that had the 97 percent performance requirement in it, and the electrostatic precipitator system they put in there was designed for 98.6, and that was placed on order, as I recall, before the Clark County standards were set, so they are having to do something to supplement that.

Senator BIBLE. May I summarize—you correct me if I am in error. If they met the Federal standard of 98.6, is that what you said?

Mr. LANGLEY. That is the design standard of the equipment they installed. The contract requirement was a 97-percent requirement.

Senator BIBLE. Then they were well over it if they met the design criteria; correct?

Mr. LANGLEY. That is correct, sir. Keep in mind these standards were discussed and arrived at back some 5, 6½, 7 years ago.

Senator BIBLE. I am aware of that and they have been upgraded since then. Are you telling me over and above the Federal standard there has been a Clark County standard requiring them to get to 99.6 percent; do I understand that right?

Mr. LANGLEY. That is approximately correct. It would compute out about that.

Senator BIBLE. Can they in the present technology, the state of the art in this area, can they meet that standard? Is it possible technically to meet that standard, 99.6?

Mr. LANGLEY. Obviously, if they add enough equipment in series, such as wet scrubbers in series or air bags in series with the electrostatic, without limitation to costs, it could be met. But I cannot tell you what the economic effects might be.

Senator BIBLE. This is one of the problems that bothers me a great deal, Mr. Chairman. They do have a tremendous investment here and I am wondering how much of this can be graded up to which they can economically comply?

Mr. PECORA. It is a basic issue and I think you put your finger on one aspect of this entire compliance relationship which bothers us. Standards should be set by reasonable, rational, technical analyses. Then if a plant is designed to meet those standards and does, in fact, meet them, any change in the standards puts a terrible burden on the whole system of trying to reach a balance as to what should be done and what should not be done. In this case, as I understand it, the standard that had been set was somewhat in the order of 98 point something. The new add-on's to the equipment would bring this up, I thought, over 99.5, in that area. But if Clark County has, then, imposed a very high standard, one would either have to shut the plant down, period, or go through, if possible to achieve, an expensive series and time-consuming operations to attempt to meet those standards or the standards ought to be reviewed as to whether or not in fact they are reasonable or unreasonable. It is one of three propositions.

(Subsequent to the hearing the Interior Department submitted the following:)

The particulate removal efficiency required to achieve a particular stack emission standard depends upon both the quality of the coal and the operating load of the steam generator, as shown in the following tables.

	Average grade of black mesa coal	Lowest grade of black mesa coal
Heat content (B.t.u./pound).....	9,250	8,363
Ash content (percent).....	6.6	10.9
Fly ash (percent of total).....	80.0	80.0

Steam generator load (Millions of B.t.u.'s per hour)	Particulate removal required by Clark County standard	
	Average grade coal (percent)	Lowest grade coal (percent)
100.....	93.87	96.64
1,000.....	96.50	98.08
1,000.....	97.55	98.66
40,000.....	98.60	99.20
14,282 (full load at Mohave).....	98.90	-----

Subsequent to this hearing the particulate removal efficiency required to meet the Air Pollution Control Regulations of the Clark County District Board of Health with present generating equipment was calculated. Based upon average quality coal from Black Mesa, an efficiency of 98.9 percent would be required with both units operating at full load. This percentage is slightly greater than the 98.6 percent predicted efficiency of the particulate removal equipment, but the difference probably is within the accuracy of calculations, measuring devices, plant load factors, and other variables.

Senator BIBLE. If I might interrupt there, where does that burden lie? Is that your burden? Who has that responsibility?

Mr. PECORA. That would not be the responsibility of the Department of Interior.

Senator BIBLE. Whose would it be?

Mr. PECORA. I would imagine the State in conjunction with the Environmental Protection Agency.

Senator BIBLE. EPA or the State of Nevada, or Clark County?

Mr. PECORA. Including Clark County. It would seem to me the regulatory entities ought to get together.

Senator BIBLE. I see.

No further questions. Thank you.

Senator FANNIN. Mr. Chairman, just to clarify, I am not sure this is correct, but Senator Bible had a dialog with the representative from the Edison Co. concerning the Mohave plant. He said he was confident that the plant would be ultimately able to meet the requirements for Clark County, Nev., for 99.6 removal of particulates.

Senator BIBLE. I am aware of that dialog. I have it in front of me, Mr. Allen's testimony. But I think I am given to understand that since that time that has been graded even higher. Is that a correct statement?

Mr. PECORA. That is my recollection, Senator Bible.

Senator BIBLE. I think they have been raised above the 98.9-percent removal.

Thank you, Dr. Pecora.

Thank you, Mr. Chairman.

Senator Moss. The Senator from Colorado?

Senator ALLOTT. Thank you, Mr. Chairman.

Many of the questions that I would ordinarily have asked have already been answered. We in Colorado, of course, are in a particularly peculiar position inasmuch as the plants that are affecting us do not lie within the State of Colorado, and none of the electricity which they produce goes to the State of Colorado, either, but we get all of the disadvantages of the Four Corners plants.

It is this, basically, to which I want to address myself here. I have known the southwest corner of Colorado well through several visits a year for in excess of 30 or 35 years. I note that the junior Senator from New Mexico was quite disturbed about the particulates emitted from the stacks. The times I have been over there I was sure all of the wind was blowing from the south and not from the north. He is apparently concerned about the northern and west winds and I am concerned about the south and west winds. This is a matter of very, very grave concern.

Strangely enough, although these plants have been in operation for some time, the public was not aroused there until comparatively recently, I mean in the last 2 years.

My concern is not only with the present situation, but also with the continuing degradation of the climate, of the landscape, perhaps of the soil, plant life, and eventually the animal life, perhaps, in western Colorado, southwestern Colorado, which surely must be one of the most beautiful places on earth, by reason of these plants.

Now, having said that, I am interested in two or three facets of this thing. No. 1, the junior Senator from New Mexico questioned you two or three times relative to your 99.2 figure and your 99.8 and that has been expanded upon. But I want to get the record very clear here that the possibilities under our present technology between these two figures, 99.2 and 99.8 is going to depend upon the kind, the character, the quality of the coal which is used in the plant; is that correct?

Mr. PECORA. Yes, sir; it has a direct relationship.

Senator ALLOTT. Which is the reason for the Senator from Nevada—the Mohave plant has a higher performance than you could expect under the present technology out of the Four Corners plants; is that correct?

Mr. PECORA. That appears to be so, because the coal is coming from a different place in the Black Mesa Basin, whereas the Four Corners plant is coal from the San Juan Basin which extends into Colorado and will be a source of coal for the future.

Senator ALLOTT. I am in receipt of a letter, which I shall ask, Mr. Chairman, be placed in the record.

Senator Moss. Without objection, it will be placed in the record. (The document referred to follows:)

COLORADO DEPARTMENT OF HEALTH,
Denver, Colo., October 20, 1971.

Hon. GORDON ALLOTT,
U.S. Senator, Senate Office Building,
Washington, D.C.

DEAR SENATOR ALLOTT: Thank you for your courteous letter of October 4, 1971. I read it with interest, and I am in concurrence with your plan of a further field trip to investigate the Four Corners Region power plants in operation with the Venturi scrubbers.

My technical staff assures me that extremely high collection efficiencies are possible with this type of collection, if the "throat energy" (which is normally described in inches water column, at around 40 to 60 inches) is adequate. The staff expressed some reservations as to the water usage rates from a 4,000 megawatt unit, but they believe that this solution is within the bounds of modern technology. However, I agree that it remains to be seen.

I would be glad to furnish you with any useful information we may have at any time and we will look forward to your visit in due course.

Sincerely,

ROY L. CLEERE, M.D., M.P.H.,
Executive Director.

Senator ALLOTT. It is from Dr. Roy Cleere and he says in this letter dated October 20 of this year:

My technical staff assures me that extremely high collection efficiencies are possible with this type of collection, referring to the Venturi Scrubbers, if the "throat energy," which is normally described in inches water column, at around 40 to 60 inches, is adequate.

The staff expressed some reservations as to the water usage rates from a 4,000 megawatt unit, but they believe that this solution is within the bounds of modern technology. However, I agree that it remains to be seen.

Now, will you try to tell me in the language that we can understand, what throat energy is?

Mr. CLARKE. A Venturi scrubber depends largely on contact efficiency and the size of the throat and the amount of water injection controls the contact time between the gas passing through and the water being injected to scrub out the particulate matter.

Now, there is an optimum point, depending on what it is you are trying to do. For example, if you are trying to get maximum removal of particulates, the contact efficiency is at one point in a long range of possible points, whereas if you are trying to get the maximum gas pushed through, it is at another point on the scale. If you are trying to achieve sulfur dioxide removal and particulate removal simultaneously, you have some compromise between these two points.

I think it is a fact if you increase the contact efficiency to the maximum you could remove more particulate matter, but the efficiency of plant operation would go down accordingly. So, what is sought where Venturi scrubbers are used is to get that point which achieves the particulate removal hoped for and still maintains plant efficiency at a level economically viable. That is what the letter is about, I think.

You could achieve much greater particulate removal if throat energies were controlled at some particular point.

Whether that is the best way, or whether a combination of electrostatics, wet scrubbers, bag catchment is a better way to achieve plant operation remains to be seen.

Senator ALLOTT. When you speak of Venturi scrubbers in this respect, are you speaking of the same principle involved in the old Venturi scrubbers on airplanes?

Mr. CLARKE. Yes; it is the same sort of thing.

Senator ALLOTT. Is it the acceleration of the air going through?

Mr. CLARKE. Right; it is the same sort of thing.

Senator ALLOTT. Now, I think, Dr. Pecora, you referred—in referring to sulfur dioxide, and nitrous oxide, you referred briefly at one point to nahcolite. Of course, there are extremely large deposits of nahcolite in the oil shale in the Green River formation in Colorado.

Now, nahcolite being a sodium, is it possible that the production of sodium as an extra product from the oil shale areas could actually then in turn enhance the environmental aspects of these huge plants being constructed and already constructed in the Southwest?

Mr. PECORA. Senator, this was the very point I was introducing into the record.

Senator ALLOTT. I know, but it was gone over awfully fast and I think it is very important.

Mr. PECORA. I think it is important and I am happy you reintroduced the point, because it is an exciting relationship that may bear fruit.

The work I referred to is laboratory work where a great number of compounds, natural and chemical, synthetic, were used in tests in part supported through research by the old air analysis laboratory now in EPA, and in part by companies themselves to see whether or not there are some compounds that have a selective and more successful grabbing mechanism with respect to sulfur oxides and nahcolite in the initial tests proved to be successful.

Now, if this be the case that in a powerplant operation where it is tested, then on a larger scale, if this be the case the large reserve of nahcolite that is known to exist in the Piceance Basin of northwest Colorado has a significance in our opinion far greater than the oil in the shale because of the application in this effort of ours throughout the Nation and throughout the world to control not only the particulate matter but also the gaseous emanation.

In addition, Senator, you may be aware that sodium aluminate chemical compound has been very useful in cleaning up municipal water systems. This is created by chemical companies, while the Dawsonite which occurs in the very same oil shale beds and which is sodium aluminate carbonate hydrated can, through a process of heating at high temperatures which is necessary in the production of oil from the shale, yield a product which can be useful in municipal water supply cleanup.

So, we are getting into an area that is exciting in its application but we need a lot more work and time is too short, as you know.

I mentioned it in the earlier questioning from Senator Moss because I think this is an area of research and development which is around the corner and which can play a very important role throughout the world

in making our energy cleaner than it is now. But we don't have enough answers at this time.

I am confident that the work that is going on will give us some answers in the very near future, and if the answers are favorable, then I think your State will be in the enviable position in having such large reserves of this particular kind of carbonate. Utah and Wyoming have yet to find this carbonate in their deposits of oil shale.

Senator ALLOTT. I don't know what research you are referring to. I have heard of research being conducted by one company in which they discussed, I believe, the efficiency of close to 100 percent with the use of nahcolite. Maybe this is optimistic. I am not giving my warranty to this by any means.

The research you are discussing was with the raw nahcolite and not with refined sodium compound?

Mr. PECORA. That is correct. That is the point I meant to emphasize. The raw nahcolite is better than the chemically produced compound according to the tests I have seen so far.

Senator ALLOTT. One final thing. After the hearings which the chairman here and many of us attended in late May, I wrote to the chairman of the committee and suggested that this committee should have a hearing, at least a field trip, out to the Four Corners area after the scrubbers have been installed, perhaps have a field hearing there also to determine what the effect of this and the efficiency of it was going to be. He has set these hearings for the sake of bringing out the government witnesses and, as far as I know, it is still contemplated that those hearings would be held sometime after the scrubbers actually were operational.

I mean, if they are put into operation today, it is obvious that a trip tomorrow doesn't serve any useful purpose. Everything has to have a shakedown. But I would hope that this committee would be able to do that and to observe and obtain testimony on the efficiency of these because it does create a situation for my State, which receives no benefits, that is unacceptable environmentally, as you know.

Now, in that respect we have been talking about who has to take the responsibility for enforcement here. We don't have control of these plants in Colorado and, therefore—we don't have control of the wind yet, and therefore it comes down basically that we have to look to the Department of Interior and to EPA for the enforcement of standards on these stacks which will raise it to the highest possible technological level at the present time and still be consistent with the standards of the State of Colorado. Is that correct?

Mr. PECORA. That is my understanding; yes.

Senator ALLOTT. So that we not only have to depend upon you—reverse that—we not only have to depend upon EPA, we will also have to depend upon the Department of Interior with respect to the contractual controls written into its various contracts on these plants.

Mr. PECORA. Exactly.

Senator ALLOTT. I think that is all I have, Mr. Chairman. Thank you.

Senator Moss. Thank you.

The Senator from Wyoming?

Senator HANSEN. Thank you very much, Mr. Chairman.

Senator ALLOTT. Would the Senator yield?

I have asked the Senator to yield because there is one matter, I have it right in my hand, too. I have received several inquiries from my own State, among them the College of Forestry and Natural Resources of Colorado State University, which is entitled a baseline analysis of the air quality in the Four Corners electric power generation area.

Have you seen this, Dr. Pecora?

Mr. PECORA. I have not myself seen it.

Senator ALLOTT. Well, I would like to have it gotten to you. In it they propose a 2-year study of this area which I would hope the Department of Interior would consider favorably.

In addition to this, I have had inquiries from private sources in Colorado and from the Denver research institute, I recall, and others who are interested really in trying to solve this most difficult problem which is presented to us, and I would hope that we could get a qualified source such as this on a contractual basis to monitor this area so that we have an impartial, as distinguished from a governmental organization.

If anybody is involved in it themselves, they are always suspect. I don't suspect you, but other people will, whether you want them to or not. But I would hope an independent source of this might be used for this monitoring and measuring so that at the end of a period of a year or two we would have some completely independent analysis of data upon which to make judgments.

Mr. PECORA. Thank you, sir. You know there is a program in the National Science Foundation referred to as RANN, research aid for national needs, and we have at the Department of Interior had discussions with our colleagues at NSF with the purpose that research funds be granted to universities and institutional areas with the kind of work that could be coordinated with the work going on within our Federal agency on this program.

I would be very happy to review this for its relationship for that general purpose.

Senator ALLOTT. I would be very happy if you would. I would like, Mr. Chairman, not to include this report in the record.

Senator MOSS. It will be included by reference.

Senator ALLOTT. Yes, included by reference and made a part of the files for this hearing.

Senator MOSS. That will be done.

Senator HANSEN?

Senator HANSEN. Thank you, Mr. Chairman.

Dr. Pecora, at the present time is coal the best energy source for additional power development that you know of?

Dr. PECORA. That is a tough one to answer because all of the energy sources are substituting one for the other. Let me answer it, if I may, in this fashion: Coal is what we have got the most of in this country for the long term, and we have a great variety of coals in different parts of the country. But without question, the total B.t.u. analysis of our variable resources, if they were ranked up, coal far exceeds other sources of energy in the natural state that we have.

Senator HANSEN. We are all aware of the fact that different parts of this country at different times of the year, summer when all of the air conditioners are on and winter when the demands of industry are added to the increased demands for heat, combine together to create power

shortages. I recognize that this may not be specifically in your field of interest, but how near are we to an effected nationwide power grid?

Mr. PECORA. I would imagine that Mr. Nassikas could speak to this much more intelligently than I.

Senator HANSEN. Would you want to venture any opinion on it?

Mr. PECORA. I have no opinion on it.

Senator HANSEN. In your opinion are we keeping up with demand in the supply of electrical energy?

Mr. PECORA. Since electrical energy is the fastest growing source of energy on an annual basis, I believe the figure as reported out is that this is a doubling ratio every 10 years, a 7½-percent increase every year for electrical energy.

I must say that the reports and analyses I have seen indicate to me as a professional that we are in trouble down the pike unless we do something for electrical energy.

Senator HANSEN. Do you know of any plans that the Government might have that would contemplate taking steps to reduce the consumption of electricity?

Mr. PECORA. I know of no plans in particular, although the President in his energy message last June to the Congress urged the consumer group to pay more attention to the better use of energy so that the demand could be reduced on the Government side. I am familiar, of course, as members of the committee are, that the formation of the Department of Natural Resources would assist greatly in zeroing in on energy needs and resources and plans for the future toward the formation of a national energy policy. It would be much easier to achieve through a coordinated group of people now separated in different institutions and placed within a single Department of Natural Resources.

I would urge consideration of this avenue on the other side, consumers on one side and the planning for the future on the other side.

Senator HANSEN. As familiar as I am sure you are with the long-range plans to clean up the environment to abate pollution, to clean the air and the water, will a considerable additional amount of energy be required to get this job done, in your judgment?

Mr. PECORA. Yes; this is one of the inevitable requirements of the effort to improve or enhance the quality of the environment. Part of the very energy that we are producing will be in that direction. I spoke about this last year in considering that energy resources must come from the earth itself in order to tidy up and do housekeeping with the earth. Part of the energy we are developing will be related to the housekeeping effect. What proportion of the new energy will go in this direction is hard to say, but I could answer in the terms of personal attention.

You may have heard the Secretary of Interior say as a result of the National Environmental Policy Act about 1,000 man-years in the Department of Interior are now being expended in reviewing and evaluating and assessing environmental impact for the projects over which we have jurisdiction, and that this is projected to be 2,000 man-years in the very near future if we continue along the path we are now proceeding. I am sure this is going on in every other Federal agency.

So, the real impact of the act is not only in requiring, as I say, attention to enhance and preserve and protect the environment per se,

but it is getting an awfully lot of people thinking on it within the Government service and working at it and coming up with the data for synthesis, analyses and recommendations.

There is no question about it, it is a major event in the history of this country.

Senator HANSEN. I think all of us agree that one of the steps that can be taken and which, in fact, has already been taken by a number of forward-looking companies, and one which we must employ additionally is the recycling of scarce materials or materials that constitute an unwarranted drain on our renewable natural resources.

I refer to paper when I use that term. But metal as well.

Will the recycling efforts that you know about require a substantial additional consumption of energy?

Mr. PECORA. Without question of doubt, if the refuse piles of our major cities are, in fact, used as a source of material from which can be gathered scrap metal, copper, metals in general, organic material for use of other sources, energy will be needed for this purpose alone.

In the past practice of merely mounting big piles of refuse outside of the city called the "city dump" has merely used the truck transportation energy to get it out there. But if we do recycle in full force, and this is called for in our civilization, we will have to assign part of our energy picture to this avenue.

In connection with the earlier statement that you made, Senator, you know several people have been calculating what the costs are, social-economic costs, in moving in the direction that we are certainly moving, and one estimate that I read was that it would cost 2 percent of the gross national product, or \$20 billion, in this country to keep in this direction.

Another estimate I read is that it would cost \$5 billion to catch up in the environmental costs to industry of things that we have let slide over the last century. These are tremendous costs for a nation to consider. It is the kind of cost that will be borne more than just by industry. It has to be borne by the people of this country. But this is the conscience we have reached in our review of this problem, and it is a question of bearing down and chewing up the costs.

Senator HANSEN. I think we are agreed that we just don't have enough land around to continue sanitary landfill programs that have characterized one of the means by which metropolitan areas have disposed of tremendous amounts of waste.

Mr. PECORA. Some regions of the country don't have these places for deposition, other regions are apparently rich in such irregularities. Even at that, you know, once these are filled up, then where do we go?

Senator HANSEN. In this morning's paper one of the local power companies, I think, related to the people that it would no longer be able to supply unlimited amounts of natural gas, that it would be restricted, as I read the story, to individual dwellings.

What about our coal gasification research program? Do you think it is adequately funded to assure adequate amounts of this substitute for natural gas to meet our needs?

Mr. PECORA. I am very happy to speak about this procedure of coal gasification research and development because this was, in the eyes of some people in Interior a few decades ago, a possibility as they viewed the use of coal in the future. Not only in its potential production of gas,

its potential transformation to liquid products, gasoline, but also its potential in production of chemical products. The big competition for use of coal today is really to burn it to release the energy to produce a source of B.t.u.'s.

Now, one of the major values of coal, particularly the western coals, which are low in sulfur relative to the Appalachian coals, is that they are near the surface for the most part, minable in large tonnages and quite amenable to the coal gasification stream system.

We do have in Germany today, as the committee knows, a process by which gas is produced from coal, but it has a low B.t.u. rating, somewhere in the order of 400 or 500 B.t.u.'s per cubic foot.

Our process has been to increase the methanization of this low B.t.u. coal so it becomes equivalent to pipeline gas. I would say there is great potential in resources, reserves, location and what lies before us in R. & D. to see this in the very near future. The work that was done through appropriations of the Congress by elements in Government, essentially the Bureau of Mines, now being carried on jointly with the gas industry, is rewarding because many companies have announced plans under their announcement for looking into this procedure. I have read a number of them in recent months and one of them relates to a big coal reserve in San Juan Basin, N. Mex.

A group of companies are thinking of part of their lease as being dedicated to the development of a coal gasification process. I would say gas without question would be a cleaner source for energy than coal or oil. If other products can be made with the residue after gas is extracted, this is a good thing, too.

I look forward in the next decade for seeing some real progress of natural gas equivalent coming from coal.

Senator HANSEN. Dr. Pecora, calling upon your long experience as head of the U.S. Geological Survey, if we are concerned with minimizing the chances of serious pollution from the development of oil and gas, in your judgement are the chances of minimizing an accident greater or less on land or in the sea?

Mr. PECORA. I would have to say, Senator, the hazards are greater at sea, because of accessibility, the ready state for reaction to an emergency. Just the ability of people to move around better on land by truck, jeep or on foot will minimize accidents.

Without question of doubt, the oil industry, the extraction industry itself is a hazardous occupation, hazardous to people and hazardous to the environment. There is a greater hazard offshore than on land. For this reason, the safety regulations or requirements are constantly upgraded because we get more and more experience as technology proceeds.

In our 20 years experience in this country offshore, I believe American industry has made tremendous progress, not only in marching out of the marshlands of Louisiana and Florida and into the depths of water, but also in the handling of its equipment and the response to an accident that does happen. We have had really relatively few major accidents in the entire petroleum history offshore. Each one has been, of course, visible in the media and headlines.

A good fire on a platform makes a wonderful picture on a color TV screen, as you know, and we are unfortunately subject to accidents no matter what the industry may be. But I insist there are certain

accidents that are apt to occur in any major industry. The record shows there have been fewer fatalities, for example, in this hazardous industry in drilling for oil and gas offshore than any other major industry. But nevertheless, the environmental effects are still there.

If oil does leak upon the water or make a major event of a spill, it is visible because it is black and it floats and it may come upon the shore. It can be cleaned up. It is undesirable, without question of a doubt. The unfortunate characteristic of the entire procedure is this: This country needs petroleum and natural gas. Natural gas immediately. If I were given a choice, gas is a greater value to the people on shore than the oil. You can bring oil by tanker from the greater reserves that exist in other parts of the world, but natural gas can be pipelined to shore from its existing reservoir in nature's geologic structure.

Therefore, any hesitation, deferral, or hindrance in search and discovery of petroleum likewise creates a hesitation and deferral of discovery of natural gas. It seems to me the two go hand in hand, and must go hand in hand. The directives this department has received from the President is that we must provide for increases in clean energy for the future.

One place we must look is not on known and potential provinces for coal and oil and gas, but also on the new provinces yet to be discovered.

So, I have extended my response to your question, Senator, because it is a subject that I am very deeply involved in, as you know. I feel that the task of the Department of the Interior is to study all of the information that we have, assess it and identify targets of opportunity which may be drilled at some future time in order to increase the rate of discovery.

With a great number of discoveries, we have a great number of options as a people. It is the increase in options which makes our economy a viable economy. With very few options, I think we are then facing the kind of problem in our economic future that everyone is talking about.

Senator HANSEN. I am very grateful to you for expanding the response, Dr. Pecora.

Just one final question. As you made your initial response to my query, would you say the same relative assessment of the incidents of an accident would apply in Alaska on land as contrasted with offshore, too?

Mr. PECORA. Senator, in all frankness we have a difficult ballgame in northern Alaska. Are you referring to on land?

Senator HANSEN. Yes.

Mr. PECORA. There we have another element in our equation, which is the permafrost. The knowledge of construction and drilling in the permafrost is a relatively recent acquisition of information in the history of our country.

Now, insofar as construction is concerned, there is no question of doubt that we have learned an awful lot as a result of our observations and studies and experience during and since World War II. So, I think that for normal construction the accident rate will be less than it had been before. In the sense of drilling through permafrost and continuing operations, we have had no experience.

We did do a little work, you remember, as the Federal Government in Naval Petroleum Reserve No. 4 during and following World War II in an attempt north of the Brooks Range to determine what reserves might be there and available in the event of a World War II shortage. We got some experience in drilling at that time which is now being factored in, of course, at a very important time in the Prudhoe Bay exploration development history.

Without that experience, I think they would have been in trouble drilling into the permafrost for the first time. It would seem to me one experience adds technology to the next experience, and I feel, frankly, that we now understand the conditions of the environment in the north, that we in the Federal side have been inserting the requirements of greater safety and it is the first time it has ever been done in the history of any major project.

I can assure you, Senator, in response to your questions, there have been other kinds of hazards in the north country that we have not faced before in the lower 48, but I think we are up to facing them and providing for them.

Senator HANSEN. Thank you very much, Dr. Pecora. I hope there may be some relevance to my questions despite the fact that they don't always pertain to the significance of the southwest powerplant.

Senator MOSS. Thank you, Senator, and thank you, Dr. Pecora. You have provided us with very stimulating and informative information here in this inquiry of ours. We appreciate it. We have kept you a long time but we all had a great interest and many questions we wanted to ask.

Mr. PECORA. If I may close with a few remarks of appreciation on my own, it is great to come back to this committee. As you know, it has been my first appearance since my confirmation, and you haven't changed in the least in your hospitality and graciousness.

Senator MOSS. Thank you very much.

We will stand in recess until 2 o'clock.

(Whereupon, at 12:35 p.m., the hearing was recessed, to reconvene at 2 p.m., this same day.)

AFTERNOON SESSION

Senator MOSS. The hearing will come to order.

We will continue with our hearing on the impact of thermal powerplants in the area of pollution in the Southwest.

Our first witness this afternoon is the chairman of the Federal Power Commission, Mr. John N. Nassikas, and you have a battery of helpers with you. Will you introduce them for us and then proceed, if you will, Mr. Chairman?

STATEMENT OF JOHN N. NASSIKAS, CHAIRMAN, FEDERAL POWER COMMISSION; ACCOMPANIED BY DREXEL D. JOURNEY, DEPUTY GENERAL COUNSEL; GEORGE E. TOMLINSON, CHIEF ENGINEER; THOMAS J. JOYCE, CHIEF, BUREAU OF NATURAL GAS; FREDERICK H. WARREN, ADVISER ON ENVIRONMENTAL QUALITY; DANIEL GOLDSTEIN, ASSISTANT GENERAL COUNSEL; STEWART P. CRUM, DEPUTY CHIEF, BUREAU OF POWER; ROBERT B. BOYD, CHIEF, DIVISION OF ELECTRIC RESOURCES AND REQUIREMENTS; CHARLES W. LINES, HEAD, SECTION OF POWER FAILURE ANALYSIS, DIVISION OF COORDINATION AND RELIABILITY; FRANKLIN P. GOULD, ATTORNEY; SUSAN A. MARSHALL, ATTORNEY; AND EMMETT J. GAVIN, ASSISTANT TO THE CHAIRMAN

Mr. NASSIKAS. I will be very happy to introduce the staff, Chairman Moss. Starting to my left, this is Thomas Joyce, Chief of the Bureau of Natural Gas; next to him is George Tomlinson, Chief Engineer of the Commission; next is Mr. Frederick H. Warren, Adviser on Environmental Quality; to my immediate right, Mr. Robert B. Boyd, Chief, of the Division of Electric Resources and Requirements; to his right, Mr. Drexel D. Journey, Deputy General Counsel in Charge of Power Matters; and to my extreme right, Mr. Stewart P. Crum, Deputy Chief, Bureau of Power. Also, in the next row, Mr. Charles W. Lines, head of the section of power analysis, Division of Electric Resources and Requirements; Susan A. Marshall, attorney; and Daniel Goldstein, who is the assistant general counsel in charge of legislative matters for the Commission.

Senator Moss. Thank you very much. I am delighted to have all of you people here, and you will be valuable, I am sure, if questions arise.

Mr. NASSIKAS. Because my statement is somewhat lengthy, I would like to summarize it and request that the complete statement and all appendixes be made a part of the record.

Senator Moss. Without objection, the statement in full and appendixes will be included in the record.

(The document referred to follows:)

STATEMENT OF JOHN N. NASSIKAS
CHAIRMAN, FEDERAL POWER COMMISSION

MR. CHAIRMAN:

I appreciate this opportunity to respond to your letter of October 14, 1971. My remarks are directed to "* * * forecasted demand for electric power generation in the Southwest and the alternatives which might exist to coal-fired plants at the sites presently proposed."

On July 19, 1971, the Secretary of the Interior established a Federal Task Force for the Southwest Energy Study. The announced purpose of this study is to examine alternatives for developing resources and to supply energy needs of the Four Corners area and adjacent areas with due regard to economic, cultural and environmental factors. The Federal Power Commission staff is participating in this overall Federal analysis of power development and economic effects. The Task Force is scheduled to make its recommendations to the Secretary of the Interior by April, 1972.

Helpful underlying technical data have been assembled by the Commission's staff. They appear in the accompanying staff studies marked "Preliminary Report On Electric Power in the Pacific Southwest", prepared by the Bureau of Power (Appendix A), and "Preliminary Report on Natural Gas Availability for Power Generation in the Southwestern Region", prepared by the Bureau of Natural Gas (Appendix B). I ask that both reports be made part of the hearing record which contains my statement, since I shall refer to conclusionary portions of the studies without reference to the detailed factual support. I have with me today key members of the Commission's staff who have devoted substantial amounts of their professional time, as have Commission members, in the discharge of Commission responsibilities relative to the adequacy and reliability of power supply in the Southwest and other portions of the Nation.

Focusing upon the Federal responsibility in the Four Corners area, I think it well to note, at the outset, what jurisdiction and responsibilities the Commission is charged with by the Congress and the area where it has no jurisdiction. We do not license or certificate thermal electric generating stations. Under Part I of the Federal Power Act,

16 U.S.C. 792-823, we are charged with the responsibility for licensing non-federal hydroelectric developments upon public lands and reservations of the United States, along streams over which the Congress has jurisdiction and at Government dams, 16 U.S.C. 797(e) 1/. In an order issued November 4, 1971 2/, dismissing a complaint by a number of entities seeking to invoke asserted licensing jurisdiction by the Commission, the Commission found that it was without jurisdiction to grant the substantive licensing relief requested by the complainants.

Although the Commission does not certificate steam plants, it does consider them in its Nation-wide administratively established program of adequacy and reliability of bulk power supply. On April 10, 1970, the Commission issued its basic Policy Statement on Adequacy and Reliability

1/ Under Part II of the Federal Power Act, 16 U.S.C. 824-824h, the Commission regulates the interstate aspects of the investor owned segment of the utility industry, particularly wholesale for resale sales, transmissions, services and interconnection arrangements, but not plant certification. This jurisdiction does not extend to publicly owned electric systems or cooperatively owned systems which are borrowers under the Rural Electrification Act of 1936, 7 U.S.C. 901 et seq. Under Part III, 16 U.S.C. 825-825r, the Commission exercises accounting and reporting regulatory jurisdiction over the entities which it regulates under Part I (licensees) and under Part II (public utilities) and factual or data type public reporting jurisdiction over non-jurisdictional systems.

2/ The Chemehuevi Tribe of Indians, et al. v. Arizona Public Service Company, et al., Docket No. E-7664.

of Electric Power Supply, Order No. 383-2, 43 FPC 515. That order establishes, upon a cooperative procedure basis covering all affected utilities -- investor owned, publicly owned and cooperatively owned -- a long-range (10-year) advance planning program for the construction and operation of generation and transmission facilities, public reporting of plans and the correlation of such planning with environmental requirements and regulatory commission procedures. A number of state regulatory agencies do have plant certification authority over steam plants and interconnecting transmission facilities. The Congress is now considering a number of legislative proposals covering plant certification for this type of facility 3/.

The statutory authority for the Commission's Order 383-2 procedure is set forth in Part II of the Federal Power Act, 16 U.S.C. 824a(a). Section 202(a) makes it the duty and responsibility of the Commission to encourage the planning, coordination and operation of electric facilities throughout the United States "For the purpose of assuring an abundant supply of electric energy throughout the United States with

3/ See S. 294, S. 1684, S. 1915, S. 2324; and H.R. 605, H.R. 1079, H.R. 1486, H.R. 3838, H.R. 5277, H.R. 5389, H.R. 5941, H.R. 6526, H.R. 6970, H.R. 6971, H.R. 6972, H.R. 7045, H.R. 9970, and H.R. 11066.

the greatest possible economy and with regard to the proper utilization and conservation of natural resources * * *".

In studying the Southwest region -- and the Four Corners area -- I reference my thoughts in the framework of national policies. Among these, as I see them, are the goals for sustained economic growth, a rising standard of living (particularly for the underprivileged), full employment, maintenance of a quality environment and providing for the common defense, health and safety of the Nation's inhabitants. The National Environmental Policy Act of 1969, 42 U.S.C. 4321, et seq., requires observance of environmental goals in our efforts to achieve all other national goals.

The accomplishment of these objectives requires a continuing use of energy. The Nation must have a systematic expansion of energy in various forms, including electricity. This is where the Commission's Order 383-2 has its basic impact.

The Commission's program includes a full commitment to achieving balanced resource and environmental goals. We recognize that to manage the environment and establish environmental policies, it is essential to anticipate consequences in sound analytical terms and to factor these into the determination of suitable environmental control measures and alternatives consistent with an adequate regional and national power supply.

In summary, the Federal responsibility for bulk power supply in the Southwest is now being discharged, administratively, through the Commission's adequacy and reliability program. Environmental requirements are being applied under applicable laws, including the Federal Water Pollution Control Act, 33 U.S.C. 1151 et seq., the Clean Air Act, 42 U.S.C. 1857 et seq., and the National Environmental Policy Act, 42 U.S.C. 4321 et seq. 4/. Certification of fossil-steam plants is currently under state jurisdiction 5/.

Alternatives and options now available -- The Bureau of Power's Preliminary Report (Appendix A), underscores the urgent need for electric power being produced by the Mohave and Four Corners plants and that to be produced by the Huntington, Navajo, San Juan and Kaiparowits coal-fired steam-electric generating plants in the Four Corners area of Arizona, Colorado, Nevada, New Mexico and Utah. Whatever the basis for past decisions, it is a fact that, as of today,

4/ Since the enactment of the Environmental Policy Act, the Commission, in accordance with requests of the Departments of Agriculture, Interior and the Atomic Energy Commission, has commented upon eight applications by utilities in the Four Corners area to use or cross Government lands in connection with the fossil-fuel stations and related transmission lines. Our comments have been framed in light of the guidelines of the Council on Environmental Quality, electric power needs, environmental factors and regional development.

5/ As I reported to the Subcommittee on Communications and Power, Committee on Interstate and Foreign Commerce, House of Representatives on May 6, 1971, Hearings, H.R. 5277 et al., Appendix E, p. 36 thereto, the states of California, Colorado, Nevada, New Mexico, Utah and Wyoming report plant certification laws. Arizona does not regulate plant certification and Texas has no state regulatory agency for electric utilities.

the options for meeting the Southwest power needs are relatively limited.

The development of fossil-fueled generation in the Four Corners area was accelerated by the decision against development of the Colorado River hydroelectric potential as a result of environmental, recreational and other land or water use problems. See Public Law 88-491, 78 Stat. 607 6/ and Public Law 90-537, Colorado River Basin Project Act, 82 Stat. 885, 901 7/. Moreover, the area hydro potential is not adequate for total long-range demands. The use of thermal generation to meet base-load needs in the Southwest is a necessity if the electric power demands of consumers are to be met.

Plans for use of the Colorado River Basin coal resources as the energy source for major blocks of generation in the

6/ Provides in part "* * * no licenses or permits shall be issued under the Federal Power Act * * * for the reach of the Colorado River between Glen Canyon Dam and Lake Mead during the period ending December 31, 1966 * * *".

7/ Provides in part "Part I of the Federal Power Act * * * shall not be applicable to the reaches of the mainstream of the Colorado River between Hoover Dam and Glen Canyon Dam until and unless otherwise provided by Congress."

southwest stemmed from the five major considerations: (1) environmental problems associated with construction of large thermal electric generating plants in or adjacent to highly developed metropolitan area load centers; (2) physical constraints associated with the location of adequate cooling water supplies, chiefly those outside coastal areas; (3) economies of using coal as a fuel source with site utilization as opposed to transporting fuel supplies to other areas; (4) uncertainties as to continuous long-range availability of oil or gas as a fuel source, irrespective of cost; and (5) lead times for nuclear developments reflecting manufacturing overloads, construction and installation problems and long break-in periods for unit maturation, all of which operated to preclude extensive reliance on nuclear plants for meeting pre-1980 loads.

Nuclear -- At this point in time in reassessing alternatives, we find the following facts. Substitution of nuclear power plants for proposed new fossil-fired facilities scheduled for service before 1980 is not a viable option. Both scheduled fossil-fuel and nuclear capacity are required to meet forecasted demands. Lead times for planning, designing, licensing, manufacturing, constructing and installing nuclear facilities precludes

reliance upon additional nuclear plants as an alternate to fossil-fueled plants for service within the 1971-1980 time-frame. The timely availability of the nuclear option must be evaluated in the light of the recent decision of the United States Court of Appeals for the District of Columbia Circuit, Calvert Cliffs' Coordinating Committee, Inc. v. United States Atomic Energy Commission, Nos. 24839, 24871, Opinion dated July 23, 1971. On November 1, 1971, I transmitted to the Committee our Commission staff assessment of the electrical consequences of delays in the construction and operation of planned nuclear units. The electrical load periods covered in that assessment are near-term, the winter of 1971-72, the summer of 1972 and the winter of 1972-73. Our assessments are continuing. We are working coordinately with all affected departments and agencies of Government.

Long-range, looking to future periods, nuclear plants may be a most promising option in the Southwest and elsewhere. In the data forming a part of the Commission's forthcoming National Power Survey, we are projecting substantial amounts of nuclear capacity installations by 1990, 475,000 megawatts (37.7 percent) out of a total projected capacity requirement of 1,260,000 megawatts. But, here, much depends upon the

successful development of the fast breeder reactor. On September 26, 1971, the President announced his intention to authorize a second liquid metal fast breeder reactor. The President, referring to his special Energy Message to the Congress on June 4, 1971, stated 8/:

At that time I called on the private sector to join government in financing one demonstration liquid metal fast breeder reactor, to begin to move this Nation into an era of plentiful, clean, and safe atomic power.

Today I am happy to be able to say that private industry has, according to our latest information, subscribed over \$200 million for this important project. This assures that our first reactor can go into construction. Further, I have decided to order the authorization of a second liquid metal fast breeder reactor in order that we can move forward as rapidly as possible toward the achievement of our energy goals.

Natural gas -- Due to constrictions in gas supply, we can not, realistically, expect conversion of proposed coal-fired to gas-fired plants. Over the course of the next 10 years, limitations on gas supply will constrain construction of gas-fired base-load electric generating facilities in the area.

8/ Weekly Compilation of Presidential Documents, October 4, 1971.

On November 13, 1969, I presented a comprehensive evaluation of our natural gas deliverable reserves to meet demand, in hearings before the Subcommittee on Minerals, Metals, and Fuels of the Committee on Interior and Insular Affairs, United States Senate, 91st Cong., 1st Sess., pp. 115-183. During the past two years, I have also testified before several other committees of the Congress concerning the natural gas supply-demand gap that developed during the 1960's 9/.

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- 9/ Hearings Before the Subcommittee on Energy, Natural Resources, and the Environment of the Committee on Commerce, United States Senate, 91st Cong., 2nd Sess., January 30, 1970, pp. 11, 44-48, 68-73; Hearings Before the Subcommittee on Communications and Power of the Committee on Interstate and Foreign Commerce, House of Representatives, H.R. 7186 et al., 91st Cong., 2nd Sess., May 7, 1970, pp. 590, 628; Hearings Before the Subcommittee on Special Small Business Problems of the Select Committee on Small Business, House of Representatives, H Res. 66, 91st Cong., 2nd Sess., October 7, 1970, pp. 99, 101-102, 108-110, 113-115, 137; Hearings Before the Subcommittee on Communications and Power of the Committee on Interstate and Foreign Commerce, House of Representatives, H.R. 5277, 92nd Cong., 1st Sess., May 6, 1971, pp. 406, 456-468, 500; Hearings Before the Subcommittee on Special Small Business Problems Select Committee on Small Business, House of Representatives, 92nd Cong., 1st Sess., July 22, 1971, Hearings not yet printed; Hearings Before the Subcommittee on Communications and Power of the Committee on Interstate and Foreign Commerce, House of Representatives, 92nd Cong., 1st Sess., September 21, 1971, Hearings not yet printed; and Hearings Before the Joint Committee on Defense Production, Congress of the United States, 92nd Cong., 1st Sess., September 23, 1971, Hearings not yet printed.

Recently, I testified on the current gas imbalance between supply and demand on a Nation-wide basis in testimony presented in hearings before the Joint Committee on Defense Production, Congress of the United States, September 23, 1971 10/. Particular facts associated with the Southwest region are set forth in a latter portion of this testimony.

10/ Summarizing, I there stated in part (mimeo ed., pp. 13-15):

Our continuous observation and analysis of the oil and gas industry's efforts to discover and produce gas indicates that the adverse trends in the Nation's natural gas supply/demand balance have not yet been reversed. The gas energy gap between demand and supply continues to widen. The annual Form 15 reports, submitted by interstate pipeline companies regarding natural gas reserves and deliverability, indicate that the declining trend of owned or controlled reserves which began in 1968 has worsened.

* * *

In the United States, natural gas comprises approximately one-third of the total energy consumed. More than 50 percent of the 1969 gas consumption went to industrial use, residential usage required 21 percent, 8 percent went to commercial enterprises and 19 percent was consumed in the field and in other uses.10/

10/ Market division estimated by the Future Requirements Committee. The Future Requirements Committee is sponsored by the Future Requirements Agency, Denver Research Institute, University of Denver and is composed of members from the gas producing, pipeline, and distribution industry, observers from State and Federal regulatory bodies, American Gas Association, American Petroleum Institute, Independent Natural Gas Association of America and the National Association of Regulatory Utility Commissioners.

Footnote continued on next page

10/ Footnote continued from preceding page

Based on the most recent estimate of the Future Requirements Committee, the total regional demand for natural gas in the lower 48 states, excluding field use, will grow from approximately 21.4 trillion cubic feet in 1970 to 54.9 trillion cubic feet in 1995. The projected average annual compounded growth rate during the 1970-1995 period is about 3.8 percent. The historical growth rate for the period 1950-1970 was about 6.7 percent.

On September 3, 1971, the Future Requirements Committee announced its latest projection of anticipated natural gas requirements for the United States. In addition to its usual forecast of future gas requirements under conditions of an adequacy of supply, the Committee estimated the requirements that can be met between now and 1975 from presently contracted or assured supplies. These data indicate that by 1975 only 86 percent of the total regional requirements for 28.5 trillion cubic feet of gas, or 24.6 trillion cubic feet, can be met with contracted or assured supplies. * * *

Looking to the time period beyond 1975, with the probable rate of development of natural gas reserves, coupled with reasonable expectations of supplemental supplies, it appears that the problem of balancing supply and demand will be with us for many years.

Synthetic gas (from coal gasification) may be available within the 10-year period, but the gasification of coal at mine-mouth plants requires consideration and balancing of environmental and economic factors. Liquefied natural gas may become an important supplemental source, but its present best projected uses appear to be for peak shaving use by gas distributors, satellite facilities and remote and emergency use points.

Oil -- Most of the oil currently used at power plants in the Pacific Southwest comes from foreign sources. Intensive study is going forward with respect to oil-fired electric generating stations, particularly along the Pacific Coast. However, it must be noted that any long-term use of oil is subject to many variables. Among other factors, I would cite the timing when Alaskan oil reserves may become available in the lower 48 states area and the delivery means by which that will be accomplished, environmental standards governing the use of oil burning stations, and the quantities of oil which may be available to meet those requirements.

Other -- Geothermal energy, solar energy, fuel cells, magnetohydrodynamics and fusion energy have varying degrees of long-range potential. Currently, only geothermal is a potential source that can reasonably be expected to be

available in limited quantities for commercial use within this decade 11/. However, the magnitude of this resource is yet to be determined.

Realistically, therefore, there are no alternatives to coal-fired plants for meeting a major portion of the 1971-1980 base-load needs of the Southwest.

Balancing standards -- The critics of the Four Corners area plants have emphasized their environmental impacts at site and the fact that some of the power to be generated will be consumed in other areas of the western United States 12/. Obviously, both facts are true. One can not build any thermal generating

11/ Testimony of Chairman John N. Nassikas, Hearings Before the Subcommittee on Minerals, Materials and Fuels of the Committee on Interior and Insular Affairs, United States Senate, S. 368, 91st Cong., 2nd Sess., pp. 103-104 (July 28, 1970).

12/ I have received approximately 24,000 communications, some letters, but largely coupons or copies clipped from the solicitation advertisement which appeared in the NEW YORK TIMES, SAN FRANCISCO CHRONICLE, LOS ANGELES TIMES and DENVER POST on May 20, 1971. That full-page advertisement urged the chairmen of the Interior committees of both houses of Congress, the Secretary of the Interior and the Federal Power Commission to stop all construction of fossil-fired plants in the Four Corners area. On June 7, 1971, I forwarded to this Committee a staff report dated May 24, 1971, prepared by Commission's Bureau of Power, "Electric Power and Related Developments in the Black Mesa and Four Corners Areas". My letter and the Report are not included within the Committee's five-volume print of field hearings. I request that the letter and report be included within the Committee Print of today's hearing.

without some impact upon the surrounding environment. The task is one of comprehensive balancing of various uses of air, fuel, land and water for all beneficial purposes, public and private; and of minimizing adverse effects of electric power production upon the environment whether at the production site or points of ultimate consumption.

Clearly, the Four Corners area plants are regionally sized. They are being designed to be operated regionally through the high-voltage interconnected transmission network that rings the Rocky Mountain area, the so-called dough-nut. The western side of this network includes the North-South Interties between the Pacific Northwest and the Pacific Southwest. The eastern side includes lines connecting the Four Corners area through Utah, Idaho, Montana and back to the coastal areas of Washington and Oregon. Factual details are set forth in the attached Preliminary Report of the Bureau of Power. The consumers served from these particular plants will be located in several states, principally Arizona, Colorado, California, Nevada, New Mexico, Utah, Wyoming and Texas. The location and size of these units were developed in the light of regional power needs of the western area of the United States.

As I noted, the Commission is charged with the duty, under the Federal Power Act, of promoting and encouraging regional planning of electric facilities. Section 202(a) of that Act 13/ is unequivocal in this respect, as well as in respect to the conservation orientation which the Congress there gave as a guide for Commission actions. The Commission's Order 383-2 adequacy and reliability program is in direct response to both Congressional directives. There, and elsewhere, we respect the fact that the Power Act is properly interpreted and applied in pari materia with

13/ States in part as follows:

For the purpose of assuring an abundant supply of electric energy throughout the United States with the greatest possible economy and with regard to the proper utilization and conservation of natural resources, the Commission is empowered and directed to divide the country into regional districts for the voluntary interconnection and coordination of facilities for the generation, transmission, and sale of electric energy, and it may at any time thereafter, upon its own motion or upon application, make such modifications thereof as in its judgment will promote the public interest. Each such district shall embrace an area which, in the judgment of the Commission, can economically be served by such interconnected and coordinated electric facilities. It shall be the duty of the Commission to promote and encourage such interconnection and coordination within each such district and between such districts.

other environmental and resource development measures, inter alia, NEPA, the Water Pollution Control Act and the Clean Air Act.

Need for national energy policy -- Recognizing that this hearing is being held under Senate Resolution 45, I am sure the Committee agrees that a foremost obligation of Government, in relation to the Nation's energy resources as recognized and endorsed by the President in his Energy Message, is the formulation and implementation of a National Energy Policy. Programs and goals were set forth by the President. This Committee's energy study, under Senate Resolution 45 with ex-officio participation by members from the Commerce, Public Works and Joint Atomic Energy Committees, will contribute materially to the further delineation of a comprehensive national energy policy. As you know, I have designated members of the Commission staff to work, on a continuing basis, assisting the members and staff of this Committee in this important undertaking. I have stated on numerous occasions, over the last two years, the necessity of formulating national energy planning objectives and of establishing a clearly defined National Energy Policy. I believe such a policy is essential to the growth and preservation of our free enterprise system. Government and industry

have an obligation to protect that system if we are to achieve the realization of our social and economic goals.

The southwest study area power requirements -- The specific projected power development of the Southwest area is discussed in detail in the accompanying Preliminary Report of the Bureau of Power. The staff's analysis shows that power growth trends in the southwestern portion of the United States parallel the national demand for increased power supplies. The need for additional electric generation in this region will double by about 1980 and should represent about four times the current demand by 1990. This projected growth reflects, for the most part, essential power expansion of that region to meet the electric consumer needs of its increasing population, growing environmental improvement programs which require electric power supply as well as industrial and commercial power demands.

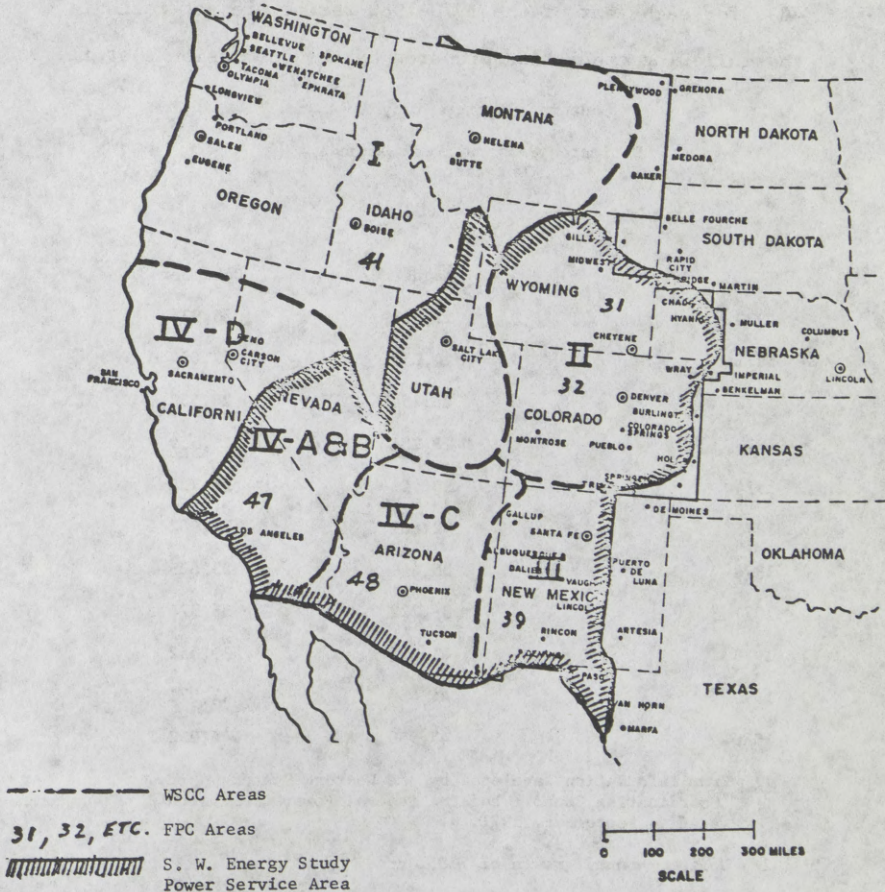
Power systems in the Southwest are interconnected both within the region and with systems adjacent to the region. They function as a part of one of the nine electric reliability councils under the Commission's Order 383-2 adequacy and reliability program, the Western Systems Coordinating Council 14/. The power supply areas most directly

14/ Appendix C hereto sets forth a map showing the location of all councils and members of each.

related to the Four Corners area plants are shown within the bordered area on the following map. They comprise the geographic areas and states which are being studied by the Southwest Energy Study Group. FPC power supply areas are shown by arabic numeral designations, e.g., 41, 31, 32, 47, 48 and 39. The larger land area and additional states shown on the map generally comprise the West Region, one of six regions, which the Federal Power Commission has studied in developing its National Power Survey. The boundaries of this region relate closely to the areas of the Western Systems Coordinating Council, as shown by the map legend.

SOUTHWEST ENERGY STUDY

LOADS & RESOURCES AREAS



Anticipated peak demands in the Southwest Study Group Area (i.e., FPC power supply areas 31, 32, 39, 41, 47 and 48), for each year of the 1970-1980 period are set forth in the following tabulation prepared by the Commission's staff.

Southwest Energy Study Area

Estimated Seasonal Peak Demands 1/
(Megawatts)

	August <u>2/</u>	December <u>3/</u>
1970 <u>4/</u>	22,521	20,978
1971	24,259	22,694
1972	26,195	24,550
1973	28,251	26,559
1974	30,469	28,732
1975	32,861	31,082
1976	35,440	33,625
1977	38,222	36,376
1978	41,222	39,352
1979	44,458	42,571
1980	47,950	46,072

1/ From information developed by the Western Systems Coordinating Council and the Federal Power Commission staff - September, 1971.

2/ Uniform annual growth of 7.85% used

3/ Uniform annual growth of 8.18%

4/ Actual

Viewing these FPC power supply areas (31, 32, 39, 41, 47 and 48) within the total power supply areas constituting the West Region, we find the following growth projections in terms of demand and energy requirements.

West Region by Power Supply Area
Electric Utility Power Requirements

PSA	1970		1980	
	Energy (billion) (KWH)	Peak (million) (KW)	Energy (billion) (KWH)	Peak (million) (KW)
30	9.7	1.4	15.7	2.6
31	4.0	0.6	9.4	1.6
32	12.1	2.1	23.4	4.2
36	8.6	1.6	18.2	3.5
39	5.5	1.0	11.5	2.2
41	15.7	2.9	31.4	5.7
42	13.2	2.2	18.1	3.0
43	33.8	5.9	61.9	11.8
42 & 45	45.0	7.6	96.8	17.4
46	58.6	10.5	136.0	24.1
47	75.5	13.4	151.0	27.7
48	22.1	4.6	50.3	9.6
Total	303.8	49.6 <u>1/</u>	623.7	109.4 <u>1/</u>

1/ Coincident peak for the region not the sum of PSA totals for the West Region.

Generation -- Meeting the demands reflected in the tables as shown above, plus providing necessary reserve capacity and providing for replacements, will require the construction of about 31,000 megawatts of new capacity in the Southwest Energy Study Area by 1980. Estimated required capacity by years and by types is shown in the following staff tabulation. It does not include the existing capacity in the Four Corners Plant, 2,162 megawatts.

Southwest Energy Study Area

1970-80 Additions to Generating Capacity
(From WSCC April 1, 1971 response to FPC Order 383-2)

Year	Total	Fossil		Hydro		Nuclear	
		MW	% of Total	MW	% of Total	MW	% of Total
1971	3,199	3,041 <u>/0</u>	95.1	158	4.9		
1972	1,694	1,086	64.1	278	16.4	330	19.5
1973	2,958	2,500 <u>/1</u>	84.5	458	15.5		
1974	2,681	2,481 <u>/2</u>	92.5	200	7.5		
1975	2,954	2,542 <u>/3</u>	86.1	412	13.9		
1976	3,112	1,712 <u>/4</u>	55.0	260	8.4	1,140	36.6
1977	3,893	1,953 <u>/5</u>	50.2	800	20.5	1,140	29.3
1978	3,493	1,595 <u>/6</u>	45.7	758	21.7	1,140	32.6
1979	4,093	2,230 <u>/7</u>	54.5	523	12.8	1,340	32.7
1980	2,860	1,720 <u>/8</u>	60.1			1,140	39.9
	30,937	20,860	67.5	3,847	12.4	6,230	20.1

0/ Includes Mohave - 1,580 MW.

1/ Includes San Juan #2 - 345 MW.

2/ Includes Huntington Canyon #2 - 430 MW, and Navajo #1 - 770 MW.

3/ Includes Navajo #2 - 770 MW.

4/ Includes Navajo #2 - 770 MW; Cholla #2 - 250 MW; N.W. Colorado - 250 MW.

5/ Includes Cholla #2 - 250 MW; Huntington Canyon #1 - 430 MW; Southern Nevada - 400 MW.

6/ Includes Kaiparowits Plateau - 150 MW; N.W. Colorado - 275 MW; and Southern Nevada - 400 MW.

7/ Includes Kaiparowits Plateau - 1,050 MW; San Juan area - 500 MW; N.W. Colorado - 375 MW; and Southern Nevada - 400 MW.

8/ Includes Kaiparowits Plateau - 1,050 MW; Southern Nevada - 400 MW.

Coal-fired -- The six major base-load coal-fired generating stations in the Four Corners area, which are principal objects of the current hearings, are projected for operation at high plant factors. They are identifiable as follows: Four Corners, Fruitland, New Mexico; San Juan, San Juan, New Mexico; Navajo, Page, Arizona; Mohave, Clark County, Nevada; Huntington, Price, Utah; and Kaiparowits, southern Utah. Collectively, these plants are expected to comprise approximately 10,352 megawatts of installed capability, 22 percent of the total projected load of the Southwest Study Area in 1980, 47,950 megawatts. They will produce over 40 percent of the energy requirements of the area at that time. In addition to these plants, approximately 3,000 megawatts of additional base-load capacity will be needed. Currently, planning studies are underway involving generating sites identifiable as the Cholla site, northwestern Colorado and southern Nevada. Generalized data for existing and projected additional fossil units currently under consideration are shown in the following tabulation, which is a staff composite of coal-fired stations for the Southwest Study Area.

COAL PLANT MW (PLANTS 100 MW AND ABOVE)
IN COLORADO RIVER BASIN

<u>PLANT</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
Four Corners 1-2-3	572	572	572	572	572	572	572	572	572	572	572
Four Corners 4-5	1,590	1,590	1,590	1,590	1,590	1,590	1,590	1,590	1,590	1,590	1,590
Cholla 1	120	120	120	120	120	120	120	120	120	120	120
Reid Gardner	234	234	234	234	234	234	234	234	234	234	234
Hayden	168	168	168	168	168	168	168	168	168	168	168
Mohave	—	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,550
Naughton	380	710	710	710	710	710	710	710	710	710	710
Carbon 1, 2	166	166	166	166	166	166	166	166	166	166	166
San Juan	—	—	—	345	345	345	345	690	690	1,190	1,190
Navajo	—	—	—	—	770	1,540	2,310	2,310	2,310	2,310	2,310
Huntington Canyon No. 1	—	—	—	—	430	430	430	430	430	430	430
Cholla 2, 3	—	—	—	—	—	—	250	500	500	500	500
Northwestern Colo. 1, 2, 3	—	—	—	—	—	—	250	525	525	900	900
Huntington Canyon No. 2	—	—	—	—	—	—	—	430	430	430	430
Southern Nevada	—	—	—	—	—	—	—	400	800	1,200	1,600
Kaiparowits Plateau	—	—	—	—	—	—	—	—	150	1,200	2,250
Total	3,230	5,140	5,140	5,485	6,685	7,455	8,725	10,150	10,975	13,300	14,750

Notes

1. Data are based on April 1971 MSCC Loads & Resources Report.
2. These are coal units planned to be added taking into consideration proper mix of generation to satisfy expected loads and are located inside the Colorado River Basin.
3. Tabulation excludes Jim Bridger plant in S. W. Wyoming inasmuch as essentially all its generation is scheduled for transfer to areas outside the study area.

In the aggregate, these tabulated coal burning plants will supply 31 percent of the 1980 load (14,750 megawatts to meet a load of 47,950 megawatts), and almost half of the 1980 energy requirements of the entire Southwest Study Area, according to staff projections. 7,172 megawatts of coal burning capacity is listed as being now in service or scheduled for initial operation before 1977 15/. The plants making up this capacity are base-load facilities for which definite commitments have been made, and for which

15/ About 87 percent of the new capacity scheduled for service by 1975 will be fossil-fueled. The Four Corners Plant, which is already in service, consists of five generating units having a total capacity of 2,162 megawatts. The first of these was installed in 1963 and the last in 1970. Additional air pollution control devices are being installed on the existing units. The ultimate capacity (sometime after 1980) might include as many as three additional units to compose a total plant capacity of about 5,000 megawatts. The 1,580 megawatt Mohave Plant in Clark County, Nevada, was completed recently. The remaining four power plants involved in the current protests are to be located in New Mexico, Arizona and Utah, and individual generating units are scheduled for service periodically from 1973 through 1977. Tentative schedules have been announced for the Kaiparowits Plant to be located in southern Utah cover 1978-80 period.

there are no planned alternatives. If these plants are not built or permitted to operate, or if installation dates are materially delayed, it would seem inevitable that electrical demands in the area will exceed the available capacity.

Gas turbine alternates -- Considering the limited time available before the output of new plants is vitally needed to carry loads, and considering the lead times required for installation of various types of generating capacity 16/, it presently appears that there are no practical, realistic alternatives to the proposed coal-fired plants in the Four Corners area. Gas turbines have been effectively utilized for peaking and supplementary sources to base-load generation. Currently available types of gas turbines are not capable of sustained base-load operation without incurring the penalty of increased maintenance and probable shortened service life. Because of lower thermal efficiencies, they are less economic than base-load steam-electric capacity (fossil or nuclear) and consume relatively more fuel.

16/ Four to six years for any type of base-load fossil-fired equipment and eight years or more for nuclear plants.

Natural gas alternates -- Viewing the matter in terms of gas-fired units potentially replacing coal-fired, the Commission's Bureau of Natural Gas has reviewed current and projected gas supply conditions through the Southwest Study Area as set forth in Appendix B. That Preliminary Report indicates that the role of natural gas as a power plant fuel will decline over the next 10-year period and supplemental sources of gas, e.g., coal gasification, LNG and nuclear stimulation of tight reservoirs, while they may supplement gas supplies for residential, commercial and industrial consumers, they will not, in all likelihood, increase the supplies of natural gas available for power plants.

With the extension of long-distance natural gas pipelines from the gas producing fields in Texas and New Mexico to the southern California market areas, natural gas became a significant source of energy for fossil fueled steam plants. However, because of limitations on available gas supplies and increasing demands for gas as a residential and industrial fuel, it appears unlikely that natural gas

will continue to meet its historic relative share of fossil-fuels used for electric power generation. The Future Requirements Committee, in its recent report on natural gas demand 17/, indicated that the demand for natural gas for power generation in the Southwest area would reach a peak in 1973 and decline in actual volume, as well as percentage of total fuel consumed.

Other alternates -- The staff analysis set forth in the Bureau of Power Preliminary Report reviews a number of other possible sources, including oil, oil shale, coal gasification, incinerable material, nuclear, geothermal, hydro-electric, new technologies and importations of power. As will be noted, these are not acceptable for the various reasons given until beyond 1980.

Non-fossil fuel capacity -- It is anticipated, based upon the Commission's staff studies, that some 3,800 megawatts of hydro power, constituting about eight percent of

17/ Future Gas Requirements of the United States, Vol. 4, 1971.

the total load of the Southwest Study Area in 1980, will be put into service during the current decade.

The following staff tabulation reflects the expectation that nuclear plants will become a more significant portion of the annual capacity additions in the Southwest Area, with over 6,200 megawatts of nuclear capacity scheduled for service by 1980. The units, about 11 percent of the 1980 load, are as follows.

Southwest Energy Study Area Proposed Nuclear Capacity			
<u>Unit</u>	<u>State</u>	<u>Capacity Mw</u>	<u>Scheduled Date of Operation</u>
Ft. St. Vrain	Colorado	330	March, 1972
San Onofre No. 2	California	1,140	June, 1976
San Onofre No. 3	California	1,140	June, 1977
San Onofre No. 4	California	1,140	June, 1978
San Onofre No. 5	California	1,140	June, 1979
Salt River Project (Unnamed)	Arizona	200	June, 1979
Nuclear A	California	1,140	June, 1980

Between now and the end of 1973, only one nuclear unit, the 330 megawatt Ft. St. Vrain unit, is scheduled for service. Construction of the San Onofre nuclear units, scheduled for service in 1976 and 1977, is presently suspended pending resolution of questions pertaining to radiation and environmental design criteria. Consequently, these units will not come on the line as scheduled. It is not known when work on the units will resume or when they will be placed in operation. Additionally, we believe that the San Onofre units scheduled for service in 1978 and 1979 may also fail to meet the scheduled in-service dates.

Any substantial delay of the installation of nuclear capacity in this region, coupled with any significant slippage in the construction of fossil units, would critically erode power reserves in the study area. At best, if the scheduled capacity additions for both nuclear and fossil plants are placed in service as planned, the power supply for this area would do no more than keep pace with anticipated demands.

Conclusion -- Power supply conditions in the Four Corners study region provide a dramatic example as to why regional and long-range open planning have become essential conditions

precedent to adequacy and reliability of electric bulk power supply in this nation. In the 1960's, electric utility resource planning underestimated in the forecasts of scheduled installation of facilities in relation to increased power demand. Environmental considerations and full compliance with the mandate of the Environmental Policy Act of 1969 must be recognized as part of the organic law of the land. These environmental considerations are part of system planning, engineering and cost-benefit appraisals which are fundamental to the future course of the electric utility industry. In determining national power policy, we must recognize all Congressional mandates and adopt practicable methods of resolving sometimes conflicting objectives.

In my judgment, there must be a resolution of these conflicting considerations through an articulation of what shall be our national energy policies and a provision for a governmental framework within which plant siting and utility operating questions can be solved fairly, timely and upon a rational basis. I have recommended to the Congress the legislative steps which I favor to achieve these goals.

They are set forth in the principles of the Administration's power plant siting bill which I supported in my testimony of May 6, 1971, before the Subcommittee on Communications and Power.

THANK YOU.

APPENDIX A

FEDERAL POWER COMMISSION
Bureau of Power
Preliminary Report On
ELECTRIC POWER IN THE PACIFIC SOUTHWESTThe National Picture

Gross National Product -- the value of all the goods and services produced in the United States -- is a general indicator of growth of national energy requirements, including electric power demands. Since 1950, GNP expressed in constant-value dollars, has increased at a rate of slightly over 3.5 percent per year. It is anticipated that this or a slightly higher growth rate will continue for the next decade.

Electric power demands have consistently grown at a faster rate than GNP, as electric power has become an increasing portion of the national energy picture. Currently, electric power production accounts for about 26 percent of all energy-production in the United States, and this proportion is expected to increase to about 32 percent by 1980. In terms of electrical energy, this growth means an increase in consumption from about 1.5 trillion kilowatt hours in 1970 to over 3.0 trillion in 1980, continuing the historical trend of a doubling of demand every decade.

Recognizing that available energy resources are finite and that ultimate per capita use of electric energy has an upper limit, it is inevitable that the rate of growth in electric energy consumption eventually will decrease. There are no assurances, however, that there will be any slow-down in the rate of demand increases prior to 1980. To the Nation's goals for sustained economic growth, a rising standard of living, and reasonably full employment, has been added a new urgency for maintenance of the quality of the environment. Achievement of these goals, including those for the environment,

will entail continuing and systematic expansion of energy use in its various forms, including power. In fact, indications are that the increased use of electrical energy for environmental controls at power plants and at other installations will more than off-set reductions in growth rate stemming from conservation measures, cost increases, and possible curtailments as a result of potential generation shortages. The environmental bill being presented to this generation and perhaps even to the next, includes the cost of remedying past damage to the environment and the ecology, as well as the cost of future environmental maintenance. This cannot be achieved through any reduced consumption of energy, but only by increased energy outputs that meet more rigorous standards of environmental quality. We must be prepared to pay the high social and economic costs entailed in the remedial process.

Energy conservation takes various forms. On the consumption side, it involves curtailment of wasteful uses of energy and introduction of more efficient forms of production and utilization. On the supply side, conservation seeks to improve the management and technologies of finite resource development, especially those for which proven reserves of natural resources such as fossil fuels are declining. In this respect, conservation of energy is also linked with preservation and maintenance of environmental quality. As a matter of policy, development of wiser and more efficient uses of energy resources through conservation is certainly a desirable national objective.

The mandate of the National Environmental Policy Act of 1969 to meet environmental goals must, however, be observed and implemented compatibly with the mandate of § 202 (a) of the Federal Power Act^{1/} to expand our

^{1/} 16 USC 824a (A)

energy resources base in order to meet the Congressionally expressed intent of "assuring an abundant supply of electric energy throughout the United States with the greatest possible economy and with regard to the proper utilization and conservation of natural resources."

In the above context, conservation is not synonymous with a reduction of energy or power use. The notion that the Nation's environmental problems can be met by physical curtailment of power or other energy forms fails to recognize the intimate relationship of energy to all human endeavor, and to the quality of life itself. Energy plays a decisive role in the Nation's productive processes. It is a key consumer product. It is essential to all economic growth and inextricably linked to progress. A national energy policy which has as its precept the reduction of overall energy use would be counterproductive. Thus, in attempting to forecast power and energy demands to 1980 and beyond, the staff is continually confronted with the realities that point to a consistent rapid growth in the consumption of electrical power in the Nation as a whole, in the western portion of the country in general, and in the areas directly served by the Four Corners area plants in particular.

The West RegionLoad Forecasts

Figure 1 shows the power supply areas and regions used in tabulating historical data and making projections of energy consumption and peak demands in the United States. It also shows the general locations of the major fossil-fueled power plants in the Southwest that are the subject of controversy, and identifies these plants as falling within the West Region of the Commission's National Power Survey.

Studies made in connection with the National Power Survey indicate that the actual 1970 and estimated 1980 electrical energy requirements and peak demands for the West Region are as shown in Table 1.

Table 1

West Region by Power Supply Area
Electric Utility Power Requirements

Power Supply Area	1970		1980	
	Energy (billion) (KWH)	Peak (million) (KW)	Energy (billion) (KWH)	Peak (million) (KW)
30	9.7	1.4	15.7	2.6
31	4.0	0.6	9.4	1.6
32	12.1	2.1	23.4	4.2
36	8.6	1.6	18.2	3.5
39	5.5	1.0	11.5	2.2
41	15.7	2.9	31.4	5.7
42	13.2	2.2	18.1	3.0
43	33.8	5.9	61.9	11.8
42 & 45	45.0	7.6	96.8	17.4
46	58.6	10.5	136.0	24.1
47	75.5	13.4	151.0	27.7
48	22.1	4.6	50.3	9.6
Total	303.8	49.6 <u>1/</u>	623.7	109.4 <u>1/</u>

1/ Coincident peak, not the sum of PSA totals.

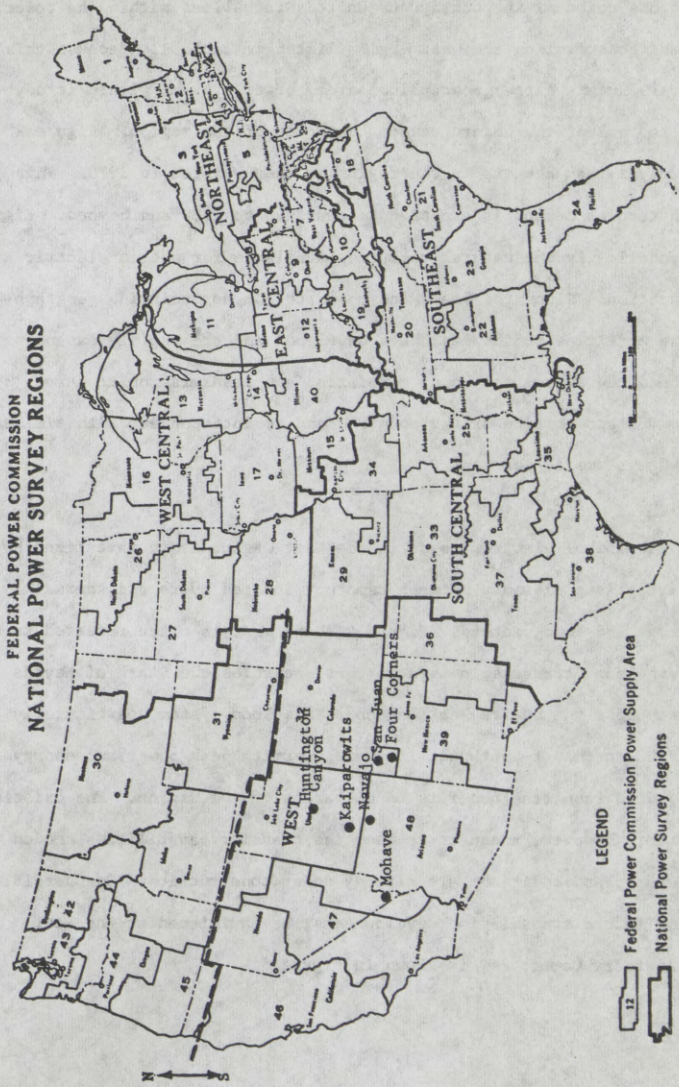


Figure 1

Fully one third of the contiguous United States lies within the power supply areas constituting the West Region listed in Table 1. Because this region covers such a large geographical area, power systems within it have developed to reflect the heterogeneous character of the region. Figure 2 shows the major load centers in the region as they existed in 1970. This general pattern of demand is expected to continue to 1980 and beyond. Figure 3 shows symbolically the natural resources available for use in electric power generation. Since the loads and resources do not coincide geographically, the utilities in the West have developed and are rapidly expanding an interconnected system for power generation and transmission to serve the entire western portion of the country, and to interconnect with similarly coordinated systems to the east.

Transmission

Transmission of electric power in the West Region is characterized by the relatively long distance between remotely located hydro and thermal power sources and load centers. Figure 4 shows what is often referred to as the "western loop" transmission system that encircles the State of Nevada and interconnects the entire West Region. This loop system, particularly the 750 kV DC Northwest-Southwest Intertie, permits peak power and energy transfers, with resulting benefits to all areas of the region. The existing system is not, however, adequate to meet the transfer capabilities needed for the future, and additions are already under construction. One possible pattern for future transmission developments, as envisioned by the West Regional Advisory Committee, is shown in Figure 5.

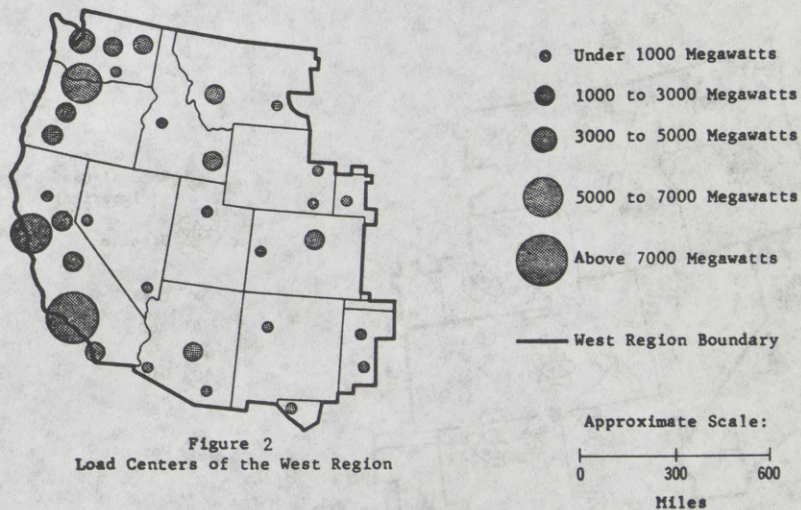




Figure 3

Natural Resources of the West Region for Electric Generation.



Figure 4--1970



Figure 5--1990

Electric Transmission in the West Region

----- 230 kV
 ++++++ 287 and
 345 kV

———— 500 kV and above
 ——— 750 kV D.C.

A major portion of the early additions will integrate the remotely located hydro and fossil generation sources with major load centers. With time, as nuclear facilities located nearer load centers are developed, some of these lines originally built for bulk power transmission will be utilized for reserve capacity, economy exchange, and peaking service. Much of the new transmission capacity will be provided by up-grading the capability of existing lines to permit more intensive use of existing rights-of-way.

The proposed transmission is not, however, a substitute for intra-area generation, primarily because the economics of power system design do not warrant such substitutions. Even if major intra-area bulk power transfers were practical, there are, at least within the 1970-1980 period, no known sources of generation that will not be needed to meet the burgeoning loads in each of the regional or sub-regional areas where major generation plants are being developed. The existing and proposed transmission's basic function will be to provide intra-area source-to-load capacity; permit inter-area improvements in reliability, diversity and economy interchanges; and maximize emergency protection.

Generation

In the past, the West Region, more than any other region of the United States, relied heavily on hydro capacity for its bulk power supply. In 1970, over 45 percent of the area's generating capacity was in conventional hydroelectric installations. The other source of base-load power has been fossil-fueled plants, which provided about 48 percent of the total capacity in 1970. In the future, however, the region will shift rapidly toward nuclear plants as a major source of generation, with nuclear capacity increasing from about two percent of the total in 1970 to about 20 percent in 1980. Most of the new nuclear plants in the region are scheduled for service in 1973 or later, so the immediate effects of the

Calvert Cliffs decision on nuclear plants in the region may not be too severe. If delays in nuclear plant clearances and construction are encountered, however, severe imbalances between loads and supply would probably result. The following table shows present and projected generating capacity in the area represented by the Western System Coordinating Council by types in the years 1970 and 1980.

Table 2
Present and Projected Generating Capacity by Fuel Types
Western Systems Coordinating Council 1/

	<u>Generating Capacity in Megawatts</u>		
	<u>Existing on 12/31/70</u>	<u>Projected Additions 1971 - 80</u>	<u>Projected Total Dec. 1980</u>
Fossil	30,244	27,957 <u>2/</u>	58,201
Nuclear	1,293	17,043	18,336
Hydro	<u>34,217</u>	<u>13,715</u>	<u>47,932</u>
Total	65,754	58,715	124,469

1/ Excludes Canadian member.

2/ Includes 900 MW of unspecified fuel type.

The Pacific Southwest Study Area

The Bureau of Power staff has been participating in the Power Work Group of the Department of the Interior's Southwest Energy Study. The following material is a combination of data prepared by the Work Group and information reported to the Federal Power Commission in periodic reports by electric utilities, Regional Reliability Councils, or others.

Analyses of the Pacific Southwest Study Area show that the national demand for increased power supplies is clearly reflected in the power growth trends in the southwestern portion of the United States. The need for additional electric generation in that region will double by about 1980 and should represent about four times the current demand by 1990. This growth rate reflects, for the most part, essential power expansion of that region to meet the needs of its increasing population and growing environmental and industrial demands.

Power systems in the Southwest are interconnected both within the region and with systems adjacent to the region. The area most directly related to the Four Corners area plants, however, is that shown within the bordered area in Figure 6. The material that follows is related to the designated area, which is also the area currently being studied by Interior's Southwest Energy Task Group as mentioned above.

Anticipated peak demands in the study area, for each year to 1980, are shown in Table 3.

SOUTHWEST ENERGY STUDY

LOADS & RESOURCES AREAS

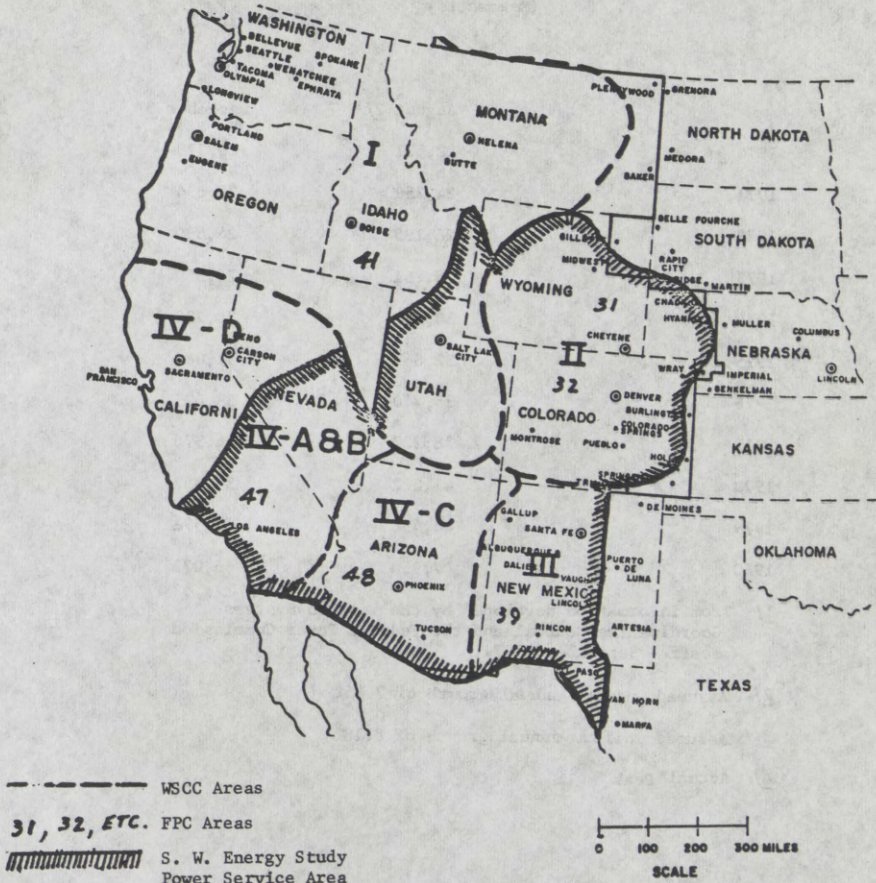


Figure 6

Table 3
 Southwest Energy Study Area
 Estimated Seasonal Peak Demands 1/
 (Megawatts)

	August <u>2/</u>	December <u>3/</u>
1970 <u>4/</u>	22,521	20,978
1971	24,259	22,694
1972	26,195	24,550
1973	28,251	26,559
1974	30,469	28,732
1975	32,861	31,082
1976	35,440	33,625
1977	38,222	36,376
1978	41,222	39,352
1979	44,458	42,571
1980	47,950	46,072

1/ From information developed by the Western Systems Coordinating Council and the Federal Power Commission staff - September, 1971.

2/ Assumed uniform annual growth of 7.85%

3/ Assumed uniform annual growth of 8.18%

4/ Actual Peak

The distribution of the 1970 and 1980 electric power loads by states is shown in Table 4.

Table 4

Southwest Energy Study Area

Estimated August and December Peak Demands, Annual Energy, & Load Factors

<u>State</u>	<u>1970</u>	<u>1980</u>
<u>AUGUST PEAK-MW</u>		
Arizona	3,499	7,383
Colorado	2,108	4,544
New Mexico	977	2,163
Southern California	13,343	28,403
Southern Nevada	666	1,420
Utah	1,204	2,319
Wyoming	<u>724</u>	<u>1,718</u>
Totals	22,521	47,950
<u>DECEMBER PEAK-MW</u>		
Arizona	2,360	5,215
Colorado	2,046	4,685
New Mexico	938	1,932
Southern California	13,251	29,158
Southern Nevada	544	1,260
Utah	1,152	2,083
Wyoming	<u>687</u>	<u>1,739</u>
Totals	20,978	46,072
<u>ANNUAL ENERGY-GWH</u>		
Arizona	16,839	36,664
Colorado	11,893	26,222
New Mexico	5,576	11,384
Southern California	77,978	167,874
Southern Nevada	3,285	7,499
Utah	7,166	13,683
Wyoming	<u>4,398</u>	<u>10,522</u>
Totals	127,135	273,848
<u>ANNUAL LOAD FACTOR-%</u>		
Total Area	64.4	65.2

Generation

Meeting the demands shown in Tables 3 and 4, plus providing necessary reserve capacity and providing for replacements, will require the construction of about 31,000 megawatts of new capacity in the area by 1980. The estimated distributions of the required capacity by years and by types is shown in Table 5.

Table 5

Southwest Energy Study Area

1971-80 Additions to Generating Capacity
(From WSCC April 1, 1971 response to FPC Order 383-2)

Year	Total	Fossil		Hydro		Nuclear	
	MW	MW	% of Total	MW	% of Total	MW	% of Total
1971	3,199	3,041	95.1	158	4.9		
1972	1,694	1,086	64.1	278	16.4	330	19.5
1973	2,958	2,500	84.5	458	15.5		
1974	2,681	2,481	92.5	200	7.5		
1975	2,954	2,542	86.1	412	13.9		
1976	3,112	1,712	55.0	260	8.4	1,140	36.6
1977	3,893	1,953	50.2	800	20.5	1,140	29.3
1978	3,493	1,595	45.7	758	21.7	1,140	32.6
1979	4,093	2,230	54.5	523	12.8	1,340	32.7
1980	2,860	1,720	60.1			1,140	39.9
	30,937	20,860	67.5	3,847	12.4	6,230	20.1

0/ Includes Mohave #1 & 2 - 1,580 MW.

1/ Includes San Juan #2 - 345 MW.

2/ Includes Huntington Canyon #2 - 430 MW, and Navajo #1 - 770 MW.

3/ Includes Navajo #2 - 770 MW.

4/ Includes Navajo #2 - 770 MW; Cholla #2 - 250 MW; N.W. Colorado - 250 MW.

5/ Includes Cholla #2 - 250 MW; Huntington Canyon #1 - 430 MW; Southern Nevada - 400 MW.

6/ Includes Kaiparowits Plateau - 150 MW; N.W. Colorado - 275 MW; and Southern Nevada - 400 MW.

7/ Includes Kaiparowits Plateau - 1,050 MW; San Juan area - 500 MW; N.W. Colorado - 375 MW; and Southern Nevada - 400 MW.

8/ Includes Kaiparowits Plateau - 1,050 MW; Southern Nevada - 400 MW.

All of the coal-fired plants identified in the footnotes to table 5 lie within the Colorado River Basin, where most of the mineable coal in the study area is located. While there are coal deposits in Wyoming, they are outside of the Colorado Basin. In the future they will be used primarily to serve loads outside of the Southwest study area. For these reasons, the only coal-fired plants considered here are those that are projected to serve study area loads within the Colorado River Basin.

To point out the impact of delays in additions of planned generating capacity, Table 6 compares the proposed facilities in the study area with the total generating capacity of the area covered by the Western Systems Coordinating Council.

Table 6

Southwest Energy Study Area

	<u>Existing Capacity</u>		<u>Projected Additions</u>		<u>Projected Capacity</u>	
	12-31-70		1971-1980		12-31-80	
	<u>MW</u>	<u>As % of WSCC total</u>	<u>MW</u>	<u>As % of WSCC total</u>	<u>MW</u>	<u>As % of WSCC total</u>
Fossil	22,292	73.7	20,860	74.6	43,152	74.1
Nuclear	430	33.3	6,230	36.6	6,660	36.6
Hydroelectric	5,131	15.0	3,847	28.0	8,978	18.7
Total	27,853	42.4	30,937	52.7	58,790	47.2

Hydroelectric Capacity

Original plans for serving the electric power needs of the Southwest involved comprehensive development of the water resources of the Colorado River for hydroelectric power production and other purposes. These plans were abandoned, however, because of environmental and land use problems associated with the reservoirs, and thermal plants were adopted as the alternative for meeting electric power demands. There are some hydro potentials in the study area other than those on the Colorado River. It is anticipated that about 3,847 megawatts of hydro power, constituting about 12.4 percent of the total need, will be put into service during the current decade.

Nuclear Capacity

Table 5 reflects the expectation that nuclear plants will become an increasingly significant portion of the annual capacity additions in the Southwest, with over 6,200 megawatts of nuclear capacity scheduled for service by 1980. The units involved in these additions are shown in Table 7.

Table 7

Southwest Energy Study Area

Proposed Nuclear Capacity			Scheduled Date of <u>Operation</u>
<u>Unit</u>	<u>State</u>	<u>Capacity</u> MW	
Ft. St. Vrain	Colorado	330	March, 1972
San Onofre No. 2	California	1,140	June, 1976
San Onofre No. 3	"	1,140	June, 1977
San Onofre No. 4	"	1,140	June, 1978
San Onofre No. 5	"	1,140	June, 1979
Salt River Project (Unnamed)	Arizona	200	June, 1979
Nuclear A	California	1,140	June, 1980

In addition to the 6,230 megawatts of nuclear capacity scheduled for the study area, there are 8,250 megawatts of such capacity planned for the 1971-80 period in other areas of the Southwest. Thus, both the study area and the whole Southwest are expected to become increasingly dependent upon nuclear units as the decade of the 1970's progresses.

The Commission staff has recently analyzed the possible impact of the Calvert Cliffs decision on the electric generating capacity situation through the winter of 1972-73. In this analysis, it was recognized that nuclear plants must receive full environmental appraisals consistent with the National Environmental Policy Act and the Calvert Cliffs decision. The results of the analysis show that if nuclear units now nearing completion are delayed, critical power supply situations will prevail in some areas of the country. In the Southwest study area, however, only one nuclear unit, the 330-megawatt Ft. St. Vrain unit, is scheduled for service in the time

period considered. This unit, scheduled for service in March 1972, is small enough that a delay of a year or so in its operation should not of itself be of critical importance in the ability of the electric utility systems in the region to meet their load requirements.

Construction of the San Onofre nuclear units scheduled for service in 1976 and 1977 is presently suspended pending resolution of certain questions pertaining to radiation and environmental design criteria. Consequently, these units cannot be constructed as scheduled, and it is not known when work on the units will resume or when they will be placed in operation. Undoubtedly, the San Onofre units scheduled for service in 1978 and 1979 will also fail to meet the scheduled in-service dates.

Delay of the installation of nuclear capacity in this region coupled with the possible slippage in the construction of fossil units could cause a critical power supply situation in the region. At best, the scheduled capacity additions for both nuclear and fossil plants will no more than keep pace with anticipated demands. To the extent that nuclear units are delayed because of licensing or other problems, the urgency of completing the fossil units discussed below becomes more pronounced.

Fossil-fueled Capacity

The difficulties, delays, and long lead times associated with hydro and nuclear facilities in the Northwest have led to a heavy reliance on fossil-fueled generation for the 1970's. The significance of fossil-fueled capacity is apparent from Table 5 which shows that about 86 percent of the new capacity scheduled for service by 1975 will be fossil-fueled. Thus, the potential delays in the major plants in the Four Corners area portends extremely serious consequences in terms of the adequacy and reliability for in Pacific Southwest area in particular, and for the entire western portion of the United States in general.

Some of the current publicity about the construction of new fossil-steam power plants in the Black Mesa and Four Corners areas describes the effort as one being undertaken by a consortium of 23 power companies and the Bureau of Reclamation. The 23 power company group is the "Western Energy and Supply Transmission Associates" (WEST) formed in 1964 to cooperate in planning for future power supply in the areas represented by their service territories. The extensive coal reserves in the Black Mesa and Four Corners areas offer an attractive potential for meeting some of the electrical energy requirements of the Pacific Southwest in the years ahead, and the plants which would generate the power from the coal supplies in these areas provide the potential for coordinated operation with the Bureau of Reclamation's hydroelectric generating plants in the same general region.

The Four Corners Plant, which is already in service, consists of five generating units having a total capacity of 2,162 megawatts. The first of these was installed in 1963 and the last in 1970. Additional air pollution control devices are being installed on the existing units. The ultimate capacity (sometime after 1980) might include as many as three additional units to compose a total plant capacity of about 5,000 megawatts..

The 790 megawatt Unit No. 1 at the Mohave Plant in Clark County, Nevada was completed recently, and a second unit of the same size is expected to be ready for initial service later this year.

Four remaining power plants involved in the current protests are to be located in New Mexico, Arizona, and Utah, and individual generating units are scheduled for service periodically from 1973 through 1977. No firm schedules have been announced for the Kaiparowits Plant to be located in southern Utah.

Table 8 lists the six plants and presents a number of details for each with respect to individual plant characteristics, ownership, fuel and other related matters.

The six major plants covered by Table 8 are planned to have, by 1977, a total installed capacity of 6,230 megawatts, representing about 16 percent of the anticipated peak demand for that year, and 13 percent of the 1980 peak. They are base-load generating stations designed to operate at high plant factors, and are expected to produce over 40 percent of the energy requirements. Some additional base-load plants will be needed to serve base-loads to 1980. General locations for the additional fossil units currently under consideration are shown in Table 9, which is a composite tabulation of existing and potential coal-fired stations for the Colorado River Basin portion of the area. These coal-burning plants, in the aggregate, would supply 27 percent of the 1980 capacity and almost half of the 1980 energy requirements of the entire study area. If these plants, or acceptable alternatives, are not built, or if they are seriously delayed, it would seem inevitable that electrical demands in the area will exceed the available capacity.

Alternative Sources of Generation

Table 8 presents a total of 10,352 megawatts of coal-burning capacity as being now in service or projected for initial operation by 1980. Of this total, 7,602 megawatts represent base-load facilities for which definite commitments have been made for operation by 1977, and for which there are no planned alternatives. Considering the limited time available before the output of these new plants will be seriously needed, and considering the lead times required for various types of generating capacity, it appears that gas turbines installed at load centers would be the only

TABLE 8 - COAL BURNING STEAM-ELECTRIC GENERATING PLANTS IN PACIFIC SOUTHWEST

Name of Plant Location	Four Corners Fruitland, N.M.	San Juan San Juan, N.M.	Navajo Page, Arizona	Mohave Clark County, Nev.	Huntington Near Price, Utah	Kaiparowitz, Southern, Utah
Existing Capacity, April 1971	572 (1963 & 1964) 785 (1969) 785 (1970)	None	None	None	None	None
Planned Capacity		#1 unit 345 MW 1974	#1 unit 770 MW 1974	#1 790 MW April 1971	#1 unit 430 MW 1974	Tentatively 3 units 2,250 MW 1978 - 80
Additions	None	#2 unit 345 MW 1977 #3 unit 500 MW 1979	#2 unit 770 MW 1975 #3 unit 770 MW 1976	#2 790 MW Oct. 1971	#2 unit 430 MW 1977	Indefinite
Ownership of Plants	Southern Calif. Edison 48% Arizona Public Service 15% Salt River Project 10% Tuscon Gas & Elec. Co. 7% Public Service of N.M. 13% El Paso Electric Co. 7%	P.S. of New Mexico 50% Tuscon Gas & Electric Co. 50%	Los Angeles D of W & P 21.1% Salt River Project 21.7% U.S.B.R. 24.4% Arizona P.S. 14.0% Nevada Power W & P 20% Tuscon G & E 7.5%	Nevada Power Co. 14% Salt River Project 10% Los Angeles Dept. of W & P 20% Southern Calif. Edison Co. 56%	Utah Power & Light Co. 100%	Resources Corp Arizona P.S. Co. San Diego G & E Co. Southern Calif. Edison Co. (Ownership Division N.A.)
Source of Fuel	Local Strip Mines	Local Strip Mines	Black Mesa Strip Mine via 80- mile railroad	Black Mesa Mines via 275-mile slurry pipe- line	Local Mine via 2-mile conveyor belt	Underground mine 10-15 miles from plant

1/ 1st unit is under test but not yet in commercial operation.
NOTE: N.A. -- Not Available

Name of Plant Location	Four Corners Fruitland, N.M.	San Juan San Juan, N.M.	Navajo Page, Arizona	Mohave Clark County, Nev.	Huntington Near Price, Utah	Kaiparowits Southern Utah
Ownership of Fuel	Navajo Tribal Council	USA Bureau of Land Management	Navajo & Hopi Tribal Council	Navajo & Hopi Tribal Councils	N.A.	N.A.
Area of Service	Service Areas of Owners Pacific S.W.	Central New Mexico & Tucson, Ariz. Area	Pacific S.W.	Pacific S.W.	State of Utah	Pacific S.W.
Consumption of Water	28.1 Cu. Feet/ Sec. 2/	N.A.	N.A.	N.A.	N.A.	N.A.
Source of Water	San Juan River	San Juan River	Lake Powell	Colorado River & water re-covered from slurry coal pipeline	Huntington Creek	Lake Powell
Cooling Towers	No	Yes	Yes	Yes	Yes	Yes
Disposal of Heated To cooling pond Water		None	Lake Powell	None	N.A.	N.A.
Disposal of Ashes	Land Fill	In mine pits cover with spoil	N.A.	Wet Pond	N.A.	N.A.

<u>Name of Plant Location</u>	<u>Four Corners Fruitland, N.M.</u>	<u>San Juan San Juan, N.M.</u>	<u>Navajo Page, Arizona</u>	<u>Mohave Clark County, Nev.</u>	<u>Huntington Near Price, Utah</u>	<u>Kaiparowits Southern, Utah</u>
Temperature of Water Discharges	Units 1,2,3 -- 20°C rise. Units 4 & 5 -- 16.6°C Rise		N.A.		N.A.	N.A.
Installation & Operating Data on Precipitators	Units 4 & 5 have 97% eff. electrostatic precipitators Units 1, 2, & 3 have mechanical collectors	Hot side precipitator 99.5% eff.	--	--	--	--
Other Air Pollution Control Devices	Expect wet scrubbers to be installed on units 4 & 5 by end of 1973 to meet State requirements.	Expect wet scrubbers to install wet scrubber in future, left room in design for SO ₂ desulfurization equip.	--	--	--	--
Planned Control Devices	Scrubbers being installed on #1 Unit.	Design allows for Future Installation of scrubbing, if needed.	--	--	--	--

Table 9
COAL PLANT MW (PLANTS 100 MW AND ABOVE)
IN COLORADO RIVER BASIN

PLANT	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Four Corners 1-2-3	572	572	572	572	572	572	572	572	572	572	572
Four Corners 4-5	1,590	1,590	1,590	1,590	1,590	1,590	1,590	1,590	1,590	1,590	1,590
Cholla 1	120	120	120	120	120	120	120	120	120	120	120
Reid Gardner	234	234	234	234	234	234	234	234	234	234	234
Hayden	168	168	168	168	168	168	168	168	168	168	168
Mohave	—	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580
Naughton	380	710	710	710	710	710	710	710	710	710	710
Carbon 1, 2	166	166	166	166	166	166	166	166	166	166	166
San Juan	—	—	—	345	345	345	345	690	690	1,190	1,190
Navajo	—	—	—	—	770	1,540	2,310	2,310	2,310	2,310	2,310
Huntington Canyon No. 1	—	—	—	—	430	430	430	430	430	430	430
Cholla 2, 3	—	—	—	—	—	—	250	500	500	500	500
Northwestern Colo. 1, 2, 3	—	—	—	—	—	—	250	525	900	900	900
Huntington Canyon No. 2	—	—	—	—	—	—	—	430	430	430	430
Southern Nevada	—	—	—	—	—	—	—	400	800	1,600	1,600
Kaiparowits Plateau	—	—	—	—	—	—	—	—	150	1,200	2,250
Total	3,230	5,140	5,140	5,485	6,685	7,455	8,725	10,150	10,975	13,300	14,750

Notes

1. Data are based on April 1971 WSCC Loads & Resources Report.
2. These are coal units planned to be added taking into consideration proper mix of generation to satisfy expected loads and are located inside the Colorado River Basin.
3. Tabulation excludes Jim Bridger plant in S. W. Wyoming inasmuch as essentially all its generation is scheduled for transfer to areas outside the study area.

practical alternative to the proposed coal-fired plants. However, currently available types of gas turbines are not capable of sustained base-load operation without incurring the penalty of increased maintenance and probable shortened service life; and are less economic than base-load steam-electric capacity (fossil, or nuclear) because of lower thermal efficiencies. Considering the base-load needs, therefore, it appears that there is no practical substitute for the generating plants in this group within the time available to meet projected load requirements.

For service in the years 1976-80, an additional 5,750 megawatts of capacity involving both some of the above locations and others proposing to use the Colorado River Basin coal resources is in various stages of planning by the utilities. These additions would also be base-load plants. Other base-load generation not utilizing the Colorado River Basin coal will be needed to meet the total needs of the area. For planning purposes, the general locations of this additional coal-fired capacity are noted below:

<u>General Location</u>	<u>Capacity-MW</u>
Kaiparowits Plateau	2,250
San Juan	500
Cholla	500
N. W. Colorado	900
Southern Nevada	<u>1,600</u>
	5,750

Time might be available to provide alternatives to some units in this latter group of plants, or to consider alternate fuels. In the consideration of alternate fossil fuels, i.e., natural gas and oil, it has been considered that the chosen fuel must be reasonably guaranteed for a plant life of 35 years at 75 percent plant factor in order to economically justify the plant.

Natural Gas as an Alternate Fuel

The use of natural gas as a fuel for the capacity to be put in service after 1976 could provide some flexibility as to location since the coal burning plants are essentially mine-mouth installations. However, the location of the mine-mouth generating stations necessarily has been coordinated with cooling water supplies which would also govern the location of gas burning plants. More importantly, in the face of rising prices, increasing scarcity, and more beneficial uses for natural gas, it is extremely unlikely that it could be committed to long-term use as a fuel for these base-load plants.^{1/} Problems are currently encountered in the commitment of natural gas for use in gas turbines for peaking application, a higher-worth use than for base-load generation. From both the economic and availability standpoint, natural gas cannot at present compete with Colorado River Basin coal.

Oil as an Alternate Fuel

Proven oil reserves in the United States are not adequate to supply all power plant needs and it appears that dependence upon foreign supply for a major portion of oil used for future generation of electricity will be necessary.

^{1/} See attached report by the Commission's Bureau of Natural Gas

It is estimated that about two-thirds of oil burned in thermal-electric power plants in 1970 in California came from foreign sources.

Air quality control measures favor low sulfur oil which, when coupled with economics, makes such oil from Indonesia, South America, and Africa attractive at the present time but price increases to an assumed value of about \$.70 per million Btu in late 1971, plus transportation to inland locations, places oil in a poor competitive position when compared with mine-mouth prices of \$.20 per million Btu, or less, for Colorado River Basin coal. These factors, coupled with the fact that oil is increasingly more beneficial for other uses, makes it an unattractive substitute at present for coal especially in areas where mine-mouth plants are possible.

Shale Oil as an Alternate Fuel

While the shale oil reserves in the Western United States represent a major fraction of the fuel reserves in the area, the development of this resource has been very slow because other fuel sources were less expensive. Other factors, including governmental policies and environmental considerations, will also have to be faced and problems resolved before full exploitation of this resource can be accomplished. Even though this source of energy could supply an appreciable portion of total requirements, it is not seen as a substitute for the coal resource until after 1980, possibly later than 1990.

Gasification of Coal

At the present time, the gasification of the Colorado River Basin coal for burning in boilers presents only added costs and no substantial environmental gain over the direct burning of the coal in the proposed mine-mouth plants.

Incinerable Material as a Fuel

The use of refuse as a boiler fuel presents the attractive possibility of helping to solve waste disposal problems in urban areas. It is estimated, however, that in the urbanized portions of the study area, refuse available for fuel would provide only 680 megawatts of high-load factor generation now, and about 1,120 megawatts in 1980. Besides, much yet remains to be done in solving the technical and economic problems in the exploitation of this resource. Rather than a substitute for a portion of the capacity proposed for 1977-1980, this resource remains a viable possibility for load center located base-load generation which will be needed in addition.

Nuclear Energy as a Substitute for Coal

Nuclear power plants of the pressurized and boiling water reactor types are commercially available, and present certain advantages as to possible location since fuel transportation costs are not a factor. However, the present plants have greater cooling water requirements than equal output coal-fired plants, hence are also subject to cooling water availability restrictions as to location. The nuclear plant, when coupled with a desalting process to obtain fresh water, becomes particularly attractive for coastal areas. However, nuclear plants planned for the area represent about the maximum amount of this type of capacity that can possibly be built by 1980, considering the lead time required for planning, licensing, and construction. Within the time span to 1980, therefore, the nuclear plant is not seen as an alternate for the proposed coal plants.

Geothermal Energy as a Substitute for Coal

The successful development of the Geysers Steam Field in California and the passage of the Geothermal Steam Act on December 24, 1970 have increased the interest and activity in developing this resource. The power plant generating capacity of the Geysers Field is estimated to be 1,300 megawatts. It is difficult to evaluate the geothermal resources of the area as a substitute for the coal because (1) the magnitude of the resource is not well known at this time, (2) the economic factors relative to development are unknown and (3) the environmental considerations of a producing hot water field will have to be thoroughly evaluated. It is felt that the escalation of interest and funds expended will lead to answers to these unknowns in a few years, but the commercial operation of facilities sufficiently large to supplant coal burning plants is not anticipated until after 1980.

Hydroelectric Generation

Potential conventional hydro-electric projects in the area could provide about 4,000 megawatts of capacity if designed for less than base-load operation. At 85 percent plant factor, this capacity would be reduced to about 2,000 megawatts. In considering the total area energy requirements, it has been and probably will continue to be, a better economic practice to utilize this resource as peaking capacity. Because of this, and the logistics involved in constructing such facilities, this resource is not considered to be a substitute for the coal-fired plants in the 1970-80 time frame.

Pumped storage hydro-electric plants are a net consumer of energy and currently justified only as peaking capacity facilities. Hence, they are

not a reasonable substitute for base-load facilities.

While no known investigations have been made for potential tidal power plants in the study area, the coastal configurations and tide heights of from six to eight feet are probably not adequate for the development of this concept.

Other Forms of Generation

Magnetohydrodynamic (MHD) power plants, when used in "topping unit" applications, present the possibility of improving thermal efficiencies appreciably, possibly to 60%. This represents a 50% increase in thermal efficiency over the best coal burning plants which have efficiencies of approximately 40%. This factor alone is spurring continued research toward solving the still major problems remaining. Because of these technical problems, commercial applications of the MHD principle in significant quantities will probably not obtain until well into the 1980's.

Small fuel cells are being demonstrated, and a modular concept for a type of central station service has been proposed. The use of fuel cells as a substitute for the coal burning plants, aside from the development still necessary for large scale application to electric systems, would require the gasification of coal to fuel the cell. As previously noted, much remains to be accomplished before present pilot stage gasification plants reach optimum development, and the advantages of the double conversion are yet to be demonstrated. For these reasons, fuel cells are not considered as an alternate for the base-load coal burning plants in this period.

Thermionic conversion devices, thermoelectric conversion devices, solar energy devices, and electrogasdynamic (EGD) generators continue to be explored. President Nixon recently emphasized the need to accelerate

interest in solar energy research particularly. At the present stage of research and development in those fields, however, the problems yet to be overcome, including efficiencies, economics, and material, do not promise their application in the electric utility field in the considered time span.

Importation of Energy into the Area

The importation of electric energy into the southwest area from hydro-electric resources in Canada, Alaska, or from the Pacific Northwest area of the United States to supply firm power requirements appears to be only a remote possibility. The considerations of load growth in the generating area, environmental problems, transmission distance, and policy matters lead to this conclusion. It may be desirable to continue to exploit the seasonal and diversity interchange operations now practiced with these areas, but this is not a substitute for base-load needs. The importation of electric energy generated by fossil-fuel burning plants into the area is not a rational proposition under the existing circumstances.

Conclusions

If the forecasted power needs of the study area are to be met on a timely schedule and provide the desired level of reliability and adequacy, it appears that the aggregate of 13,352 megawatts of base-load capacity utilizing Colorado River Basin coal through 1980 must become a reality. Beyond that date, nuclear generation could supply a significant part, if not all, of the area's base-load requirements. The Staff is continuing to work with the Department of the Interior Group in an effort to identify any viable alternatives to the earlier proposed facilities.

APPENDIX B

Preliminary Report on
Natural Gas Availability for Power Generation
in the Southwestern Region
By the Bureau of Natural Gas

Gas Supply

Over the past 3 years natural gas production exceeded additions to the reserve inventory. The declining reserve base and rapidly growing need for natural gas as a clean-burning fuel has led to a nation-wide imbalance between domestic natural gas supplies and the demands placed on them. Inadequate additions to proven reserves by pipelines have limited the availability of additional supply to distributors, so some distributors have been limiting new customers. Form 15 reports, submitted annually by interstate pipeline companies to the FPC, report on natural gas reserves and deliverability. These reports show a continuation of the downward trend of reserves owned or controlled by interstate pipelines which began in 1968. Additional reserve data published by the American Gas Association each year includes information on both interstate and intrastate companies and on a nation-wide basis parallels the trends indicated by Form 15 data as shown on the following table.

TABLE 1
NATURAL GAS RESERVES AND RESERVES
TO PRODUCTION RATIO 1/
(Volumes in Trillions of Cubic Feet)

	End of Year Reserves		Reserve to Production Ratio	
	AGA <u>2/</u>	Form 15 <u>3/</u>	AGA	Form 15
1963	274.5	188.5	18.9	20.2
1964	279.4	189.2	18.3	18.9
1965	284.5	192.1	17.5	18.5
1966	286.4	195.1	16.4	17.5
1967	289.3	198.1	15.7	16.8
1968	282.1	195.0	14.6	15.5
1969	269.9	187.6	13.1	14.0
1970	259.6	173.7	11.9	12.3

1/ Excludes Alaska.

2/ Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States and Canada and United States Productive Capacity as of December 31, 1970, Volume 25, May 1971.

3/ Federal Power Commission Report; "The Gas Supplies of Interstate Natural Gas Pipeline Companies - 1969." Preliminary figures for 1970.

Several oil and gas discoveries resulting from the development of leases acquired in the offshore Louisiana lease sale of December, 1970 have been announced.^{1/} The magnitude of the gas reserves included in these discoveries has not been reported and the total impact of this new gas on the supplies of the interstate pipelines companies will probably not be known for several years. The decline in interstate reserves, if not reversed by the discovery and addition of new supplies, will obviously affect the ability of the interstate companies in meeting their requirements.

The gas supply and requirements in the Southwest through 1980 for boiler fuel, based on the reported proved and potential natural gas supplies of the Four Corners Area states of Arizona, Colorado, Northwest New Mexico, and Utah plus California and the region's future requirements are estimated as follows:

PROVED AND POTENTIAL NATURAL GAS RESERVES AND ELECTRIC
GENERATION GAS REQUIREMENTS
(Trillions of Cubic Feet)
1970-1980
States of Arizona, Colorado,
Northwest New Mexico, Utah, and California

	<u>Actual</u> 1970	1971	<u>Projected</u> 1975	1980
1. Requirements Electric Generation <u>2/</u>	.842	.970	1.169	1.007
2. Reserves-Proved and Potential <u>3/</u>	124.6			

- 1/ Operators Scoring On New Gulf Leases, Oil and Gas Journal, May 3, 1971, page 58.
- 2/ Future Gas Requirements of the United States, Vol. 4, 1971, for Arizona, California, Colorado, New Mexico and Utah.
- 3/ Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States and Canada and United States Productive Capacity as of December 31, 1970, American Gas Association, Volume 25, May 1971, and Potential Supply of Natural Gas in the United States as of December 31, 1971, dated October, 1971.

Gas Requirements in the Southwest

As reported by the Future Requirements Committee, ^{1/} gas requirements for all uses in the Southwest states of Arizona, California, Colorado, New Mexico and Utah grew from 2.57 trillion cubic feet in 1966 to 2.94 trillion cubic feet in 1970, and are estimated to increase to 3.76 trillion cubic feet in 1975 and 5.29 trillion cubic feet in 1990 (Table 2). Electric utility gas requirements increased more slowly than total requirements in 1966 to 1970 and are expected to decrease in the late 1970's. Electric utility requirements for interruptible gas are expected to fall after 1973, whereas firm electric utility requirements will increase during most of the forecast period.

The foregoing estimates were based on the assumption that adequate supplies would be available. However the Future Requirements Committee also prepared another estimate for the 5 year period to 1975 showing the requirements that can be met from presently contracted or reasonably assured supplies. On this basis gas supplies are forecast to meet 85.1 percent of total requirements in 1975. However, only 58.8 percent of 1975 gas requirements for electric generation are expected to be satisfied. Thus, gas utilities expect to sell available gas to Firm Residential, Commercial, and Industrial customers in preference to electric utilities, which are largely interruptible customers with the capability of burning alternative fuels. Gas sales to electric utilities are expected to decline in 1971 and by 1975 such sales are expected to be 82% of the 1970 level.

^{1/} The Future Requirements Committee is sponsored by the Future Requirements Agency, Denver Research Institute, University of Denver and is composed of members from the gas producing, pipeline, and distribution industry, observers from State and Federal regulatory bodies, American Gas Association, American Petroleum Institute, Independent Natural Gas Association of America and the National Association of Railroad and Utility Commissioners.

Table 2
GAS REQUIREMENTS IN THE SOUTHWEST ^{1/}
(All volumes in billions of cubic feet 14.73 Psia and 60° F.)

Year	Firm	For Electric Utility Uses		For All
		Interruptible	Total	Uses ^{2/}
		<u>Actual</u>		
1966	38.0	742.7	780.7	2,567.5
1967	42.0	645.7	687.7	2,634.0
1968	45.0	839.7	884.7	2,838.8
1969	44.7	753.5	798.2	2,875.0
1970	50.4	791.6	842.0	2,937.7
Forecast Based on Unlimited Supply				
1971	78.2	891.7	969.9	3,213.7
1972	78.2	982.9	1,061.1	3,398.4
1973	89.1	1,092.5	1,181.6	3,608.9
1974	86.3	1,074.8	1,161.1	3,668.6
1975	88.0	1,080.8	1,168.7	3,759.6
1980	84.9	921.9	1,006.8	3,961.4
Forecast Based on Limited Supply				
1971	78.2	722.1	800.3	3,020.0
1972	78.2	729.0	807.2	3,106.0
1973	82.6	677.1	759.6	3,118.9
1974	69.6	579.3	648.8	3,070.5
1975	45.6	641.2	686.9	3,197.9
Limited Supply Forecast as a Percent of Unlimited Supply Forecast				
1971	100.0	81.0	82.5	94.0
1972	100.0	74.2	76.1	91.4
1973	92.7	62.0	64.3	86.4
1974	80.7	53.9	55.9	83.7
1975	51.9	59.3	58.8	85.1

^{1/} Future Requirements Committee, Future Gas Requirements of the United States, Vol. 4, 1971.
States: Arizona, California, Colorado, New Mexico, Utah.

^{2/} Excludes field use.

The California Public Utilities Commission in a Summary Report, Ten Year Forecast on Electric Utilities Loads and Resources issued June 2, 1971 reported that natural gas will supply about 62 percent of the fuel requirements of electric utilities in Southern California in 1971, but only 33 percent in 1975.

The Role of Supplemental Sources of Natural Gas

Although the Southwest United States has a variety of prime energy resources e.g., coal, which could supplement conventional gas supply, all of them have limited applicability when compared to prime energy demands for both power generation and other gas users. The new technologies for providing liquefied natural gas (LNG), gas from coal, and nuclear stimulation of the tight gas sands in the southwest are either of limited magnitude or they are not as yet sufficiently technologically advanced to be acceptable means of securing additional needed natural gas supplies.

LNG undoubtedly will find some role as a supplement to the national gas supply base and west coast seaboard imports of LNG could result in increased gas deliveries to other, land-locked, load centers by displacement rather than by direct movement.

To the present time no applications have been made to the FPC for the importation of LNG to the west coast. However, Pacific Lighting Corporation, parent company of Southern California Gas Co. which serves the Los Angeles market, has indicated in the trade press that LNG imports are being considered. While no prices were given by Pacific Lighting, estimated price of imported base-load LNG, delivered as liquid dockside, to East Coast ports pursuant to a project currently pending before the FPC is 63.9¢/MMBtu at Cove Point, Maryland and 68.17¢/MMBtu at Savannah, Georgia. The estimated price regasified and delivered to buyer's pipeline is 79.75¢/MMBtu for the Cove Point deliveries and 78.2¢/MMBtu for the Savannah deliveries. Other current estimates, either published in the trade press or submitted as testimony before the FPC, of the price of future imported LNG delivered and regasified on the East and West Coasts range from 60¢ to \$1.10/Mcf.

Gasification of coal, although producing a relatively pollution-free gas, incorporates the same general mining and transportation systems as used for coal fired boilers. The principal advantage to coal gasification in the Southwest area is to transport, via pipelines already in service, gas produced from coal to existing market areas where it could make significant contributions to pollution abatement.

The Department of the Interior and the American Gas Association have announced a joint program for expanded research and accelerated development work in coal gasification technology. This program would culminate in the construction of a full scale coal gasification demonstration plant. During the first four years of the program total expenditures would be \$30 million dollars per year for development of sufficient information to permit the design of a demonstration plant. Costs for the second four year (demonstration plant) phase are expected to total approximately \$176 million. The purpose of this joint government-industry program is to develop, to commercial status, one or more of the coal gasification processes currently in various phases of pilot plant development. Assuming favorable resolution of anticipated technical problems, work under this joint research and development program can be completed by 1978-1979. Current estimates are that the cost (1971 dollars) of synthetic pipeline gas produced by this programs' technology will lie in the range of 50¢-85¢ per Mcf at the tailgate of a mine month plant.

Two recent announcements indicate major efforts to develop coal gasification facilities in northwestern New Mexico which could begin operation in 1975-1976. The first of these projects was announced on August 19, 1971 by El Paso Natural Gas Company and will involve capital expenditures of approximately \$250 million dollars to build a plant capable of producing 250 million cubic feet of gas per day. El Paso has acquired recoverable coal reserves of about 900 million tons in the area and estimates first deliveries of synthetic gas using the Lurgi gasification process could begin by 1976. The company has not as yet filed an application with the Federal Power Commission relative to this proposal, but it is anticipated that the cost of gas produced in this fashion will be in the 85¢-\$1.00 per Mcf range.

The second proposed northwestern New Mexico coal gasification project was announced on October 27, 1971 by a consortium composed of Pacific Lighting Service Company, Texas Eastern Transmission Corporation and Utah International Inc., a San Francisco based coal producer. These companies have agreed to undertake feasibility studies of a Lurgi coal gasification process project which could produce 250 million cubic feet of gas per day from a plant to be located near 800 million tons of coal reserves. If feasible, the project could be expanded to a total of four gasification plants capable of producing, in total, about one billion cubic feet of gas per day. Synthetic gas production from the first 250 million cubic foot per day plant could begin in 1975.

The Lurgi coal gasification process which both proposals contemplate using is the only fully commercialized coal gasification process currently available. The process produces a 400 to 450 Btu per cubic foot gas which must be subsequently catalytically methanated (hydrogen added) to achieve pipeline quality. No application relative to the Pacific Lighting, Texas Eastern, Utah International proposal has been filed with the Federal Power Commission.

Nuclear stimulation of tight gas-bearing sand formations in the Rocky Mountain Area may eventually add greatly to our domestic gas supplies. 1/ To date, the Atomic Energy Commission through its Plowshare Program has conducted two tests, Project Gasbuggy in New Mexico and Project Rulison in Colorado. While these two projects have demonstrated the ability of this technique to increase gas production from low permeability reservoirs, several problems remain to be solved. Two of the most important of these problems are: (1) commercial feasibility is yet to be established and (2) reluctance to accept this technique because of the radioactivity produced by nuclear stimulation and other potential environmental and ecological hazards that may be associated with this method. These problems must be overcome before this technique of bringing forth additional gas is likely to have any appreciable effect on the future domestic gas supply-demand situation. It does not appear that nuclear stimulation, if proven feasible, will find broad application before the late 1970's.

1/ The United States Bureau of Mines has estimated that 317 trillion cubic feet of gas are contained in low-permeability reservoirs located in the Rocky Mountain Area.

Substitute Natural Gas is produced from a group of processes similar to the Catalytic Rich Gas process developed by the British Gas Council. In this process high heating value gas is produced by the high-pressure, low-temperature reaction of petroleum naphtha or natural gas liquids over a nickel catalyst. The result is a gas completely interchangeable with natural gas. The lead time required for plant construction is usually two years or less.

Several applications for plants of this type have been filed with the FPC and are currently pending. None, however, are located in the Southwestern United States. In general, this source of supplemental gas is not expected to be an important contributor to the gas supply of the southwest area during the next 10 years because of the unavailability of significant feedstock supplies under long-term contracts in the area. This outlook could change, however, particularly in the latter half of this decade if importation of naphtha, for conversion to a substitute gas is exempted from present petroleum import restrictions.

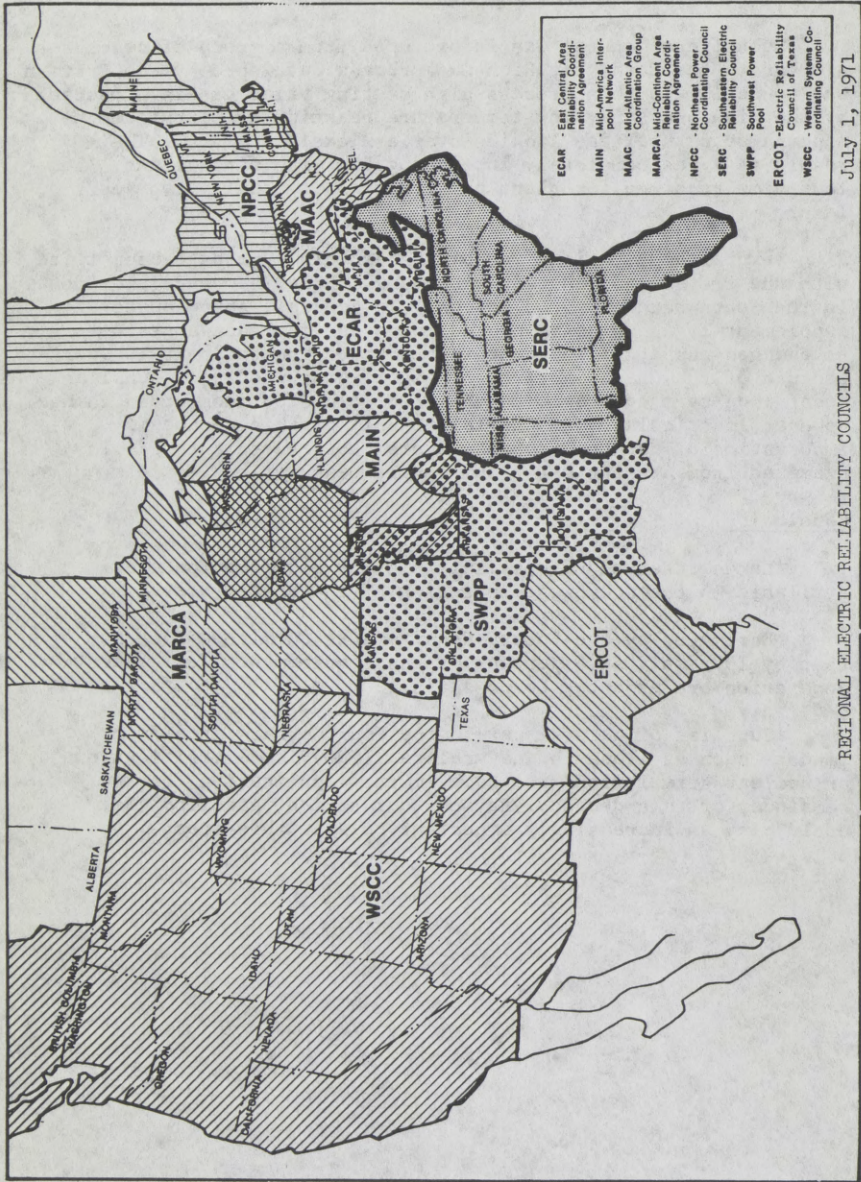
Conclusion

*Large reserves of coal suitable for gasification are available in the southwestern region of the United States.

*Estimates by the Future Requirements Committee forecast that by 1975 only 58.8 percent of gas requirements for electric generation are expected to be satisfied.

*Supplies of natural gas in the Four Corners area-from imports such as liquefied natural gas (LNG), coal gasification or nuclear stimulation-will have limited application for the remainder of this decade. Beyond that period, gas from coal could play an increasingly important role in this area.

APPENDIX C



Part 1

Individual Members of
Regional Reliability Councils a/

Northeast Power Coordinating Council (NPCC)

Boston Edison Co.	New England Electric System
Burlington Electric Light Dept.	New England Gas & Electric Assoc.
Central Hudson Gas & Electric Corp.	New York State Electric & Gas Corp.
Central Maine Power Co.	Niagara Mohawk Power Corp.
Central Vermont Public Service Corp.	Northeast Utilities
Consolidated Edison Co. of N.Y., Inc.	Orange and Rockland Utilities, Inc.
Eastern Utilities Associates	Power Authority of the State of New York
Green Mountain Power Corp.	Public Service Company of New Hampshire
Hydro-Electric Power Comm. of Ontario	Rochester Gas and Electric Corp.
Long Island Lighting Co.	The United Illuminating Company

Mid-Continent Area Reliability Coordination Agreement (MARCA)

Black Hills Power and Light Co.	Lake Superior District Power Co.
Central Iowa Power Coop.	Minnesota Power & Light Co.
Cooperative Power Assoc.	Minnkota Power Coop., Inc.
Corn Belt Power Coop.	Montana-Dakota Utilities Co.
Dairyland Power Coop.	Nebraska Public Power District
Eastern Iowa Light and Power Coop.	Northern Minnesota Power Association
Interstate Power Co.	Northern States Power Co.
Iowa Electric Light & Power Co.	Northwestern Public Service Co.
Iowa-Illinois Gas & Electric Co.	Omaha Public Power District
Iowa Power and Light Co.	Otter Tail Power Co.
Iowa Public Service Co.	Rural Coop. Power Association
Iowa Southern Utilities Co.	U. S. Bureau of Reclamation
Basin Electric Power Cooperative	
Associates: Union Electric Co.	
Manitoba Hydro-Electric Board of Canada	

a/ Membership reported by all electric reliability councils as of April 1, 1971, updated to September 1971.

Southwest Power Pool Agreement (SPP)

Arkansas-Electric Coop. Corp.	Louisiana Power & Lt. Co.
Arkansas-Missouri Power Co.	Mississippi Power & Light Co.
Arkansas Power & Light Co.	Missouri Edison Co. <u>b/</u>
Associated Electric Coop., Inc.	Missouri Power & Light Co. <u>b/</u>
Board of Public Utilities, Kansas City, Kan.	Missouri Public Service Co.
Central Louisiana Electric Co., Inc. (The)	Missouri Utilities Company
City Power & Light Dept., Independence, Mo.	New Orleans Public Service, Inc.
City Utilities of Springfield, Missouri	Oklahoma Gas & Electric Co.
Coffeyville Municipal Water & Light Dept.	Public Service Co. of Oklahoma
Empire District Elec Co. (The)	St. Joseph Light & Power Co.
Grand River Dam Authority	Southwestern Electric Power Co.
Gulf States Utilities Company	Southwestern Power Administration
Kansas City Power & Light Co.	Western Farmers Electric Coop.
Kansas Gas and Electric Co.	Western Power Division - CT & U
Kansas Power & Light Co. (The)	City of Chanute, Kansas
Central Kansas Power Company, Inc.	

Mid-Atlantic Area Coordination Agreement (MAAC)

Atlantic City Electric Co.	Pennsylvania Electric Co.
Baltimore Gas and Electric Co.	Pennsylvania Power & Light Co.
Delmarva Power & Light Co.	Philadelphia Electric Co.
Jersey Central Power & Light Co.	Potomac Electric Power Co.
Metropolitan Edison Co.	Public Service Electric and Gas Co.
New Jersey Power & Light Co.	UGI Corp.

Southeastern Electric Reliability Council (SERC)

Alabama Electric Cooperative	Mississippi Power Co.
Alabama Power Company	Nantahala Power & Light Co.
Big Rivers Rural Electric Coop.	Orlando Utilities Commission
Carolina Power & Light Co.	Savannah Electric & Power Co.
City of Tallahassee	South Carolina Electric & Gas Co.
Crisp County Power Commission	South Carolina Public Service Authority
Duke Power Company	South Mississippi Electric Pwr. Assoc.
Florida Power Corporation	Southeastern Power Administration
Florida Power & Light Co.	Tampa Electric Co.
Georgia Power Co.	Tampoco, Inc.
Gulf Power Co.	Tennessee Valley Authority
Henderson Municipal Power & Lt. Dept.	Virginia Electric & Power Co.
Jacksonville Electric Authority	Yadkin, Inc.
Lakeland Dept. of Elec. & Water	

b/ Also members of MAIN through their parent company, Union Electric Company.

East Central Area Reliability Coordination Agreement (ECAR)

Appalachian Power Co.
 Cincinnati Gas & Electric Co.
 Cleveland Electric Illuminating Co.
 Columbus & Southern Ohio Electric Co.
 Consumers Power Co.
 Dayton Power & Light Company
 Detroit Edison Company
 Duquesne Light Company
 East Kentucky Rural Electric Coop.
 Indiana-Kentucky Electric Corp.
 Indiana & Michigan Elect. Co.
 Indianapolis Power & Light Co.
 Kentucky Power Company

Kentucky Utilities Company
 Louisville Gas & Electric Company
 Monongahela Power Company
 Northern Indiana Public Service Co.
 Ohio Edison Company
 Ohio Power Company
 Ohio Valley Electric Corp.
 Pennsylvania Power Company
 Potomac Edison Company
 Public Service Co. of Indiana
 Southern Indiana Gas & Electric Co.
 Toledo Edison Co.
 West Penn Power Company

Mid-America Interconnected Network (MAIN)

Associated Electric Coop., Inc. c/
 Central Illinois Light Company
 Central Illinois Public Service Co.
 City Water Light & Power, Springfield, Ill.
 Commonwealth Edison
 Illinois Power Company
 Iowa Electric Light & Power Company d/
 Iowa-Illinois Gas & Electric Co. d/
 Iowa Power & Light Company d/

Iowa Southern Utilities Co. d/
 Madison Gas and Electric Co.
 Northern States Power Co. d/
 Union Electric Company
 Upper Peninsula Power Co.
 Wisconsin Electric Power Company
 Wisconsin-Michigan Power Company
 Wisconsin Power and Light Company
 Wisconsin Public Service Corp.

Electric Reliability Council of Texas (ERCOT)

B-K Electric Coop., Inc.
 Baird, City of
 Bartlett Electric Coop., Inc.
 Bluebonnett Elec. Coop., Inc.
 Boerne Utilities
 Bowie, City of
 Brady Water & Light Works
 Brazos Elec. Power Coop., Inc.
 Brenham Municipal Utilities
 Brownsville, City of
 Bryan, City of
 Cap Rock Elec. Coop., Inc.
 Central Power & Light Company
 City of Austin
 City Public Service Board (San Antonio)
 Coleman, City of

Jackson Electric Coop., Inc.
 Jasper-Newton Electric Coop., Inc.
 Johnson County Electric Coop. Assn.
 Kaufman County Electric Coop., Inc.
 Kimble Electric Coop., Inc.
 Lamar County Electric Coop. Assn.
 Limestone County Elec. Coop., Inc.
 Livingston, City of
 Lockhart Utilities
 Lower Colorado River Authority
 Luling Utilities
 Magic Valley Electric Coop., Inc.
 McCulloch Electric Coop., Inc.
 McLennan County Electric Coop., Inc.
 Medina Electric Coop., Inc.
 Mid-South Electric Coop. Assn.

c/ Also member of SPP.

d/ Also member of MARCA.

ERCOT con't.

Comanche County Elec. Coop. Assoc.
 Community Public Service Company
 Crosbyton, City of
 Cuero Electric Dept.
 Dallas Power & Light Company
 Deep East Texas Elec. Coop., Inc.
 Denton Municipal Utilities
 Denton County Elec. Coop., Inc.
 DeWitt County Elec. Coop., Inc.
 Fannin County Elec. Coop., Inc.
 Farmers Electric Coop., Inc.
 Fayette Electric Coop., Inc.
 Garland, City of
 Giddings, City of
 Goldthwaite, City of
 Gonzales Electric District System
 Grayson-Collin Elec. Coop., Inc.
 Greenville Municipal Utilities
 Guadalupe Valley Elec. Coop., Inc.
 Hamilton County Elec. Coop. Association
 Hearne Municipal Plant
 Hemphill Electric Department
 Hill County Electric Coop., Inc.
 Houston Lighting & Power Company
 Hunt-Collin Elec. Coop., Inc.

Midwest Electric Coop., Inc.
 Navarro County Electric Coop., Inc.
 New Braunfels Utilities
 New Era Electric Coop., Inc.
 Nueces Electric Coop., Inc.
 Robertson Electric Coop., Inc.
 Robstown, City of
 Sam Houston Electric Coop., Inc.
 San Bernard Electric Coop., Inc.
 San Patricio Electric Coop., Inc.
 Schulenburg, City of
 Seguin, City of
 Shiner Light & Water Department
 Southwestern Electric Service Co.
 South Texas Elec. Coop., Inc.
 Southwest Texas Elec. Coop., Inc.
 Stamford Electric Coop., Inc.
 Teague, City of
 Texas Electric Service Co.
 Texas Power & Light Co.
 Tri-County Electric Coop., Inc.
 Tulia Light & Power Plant
 Weimar, City of
 West Texas Utilities
 Wise Electric Cooperative, Inc.

Westerns Systems Coordinating Council (WSCC)

Arizona Power Authority
 Arizona Public Service Co.
 Bonneville Power Administration
 British Columbia Hydro & Power Authority
 California Dept. of Water Resources
 Central Telephone & Utilities
 (South Colorado Power Division)
 Chelan County P.U.D. No. 1
 City of Glendale, Public Service Dept.
 City of Tacoma, Dept. Public Utilities
 City of Seattle Dept. of Lighting
 Cowlitz County P.U.D. No. 1
 Colorado-Ute Electric Association, Inc.
 Douglas County P.U.D. No. 1
 El Paso Electric Company
 Eugene Water & Electric Board
 Grant County P.U.D. No. 2
 Idaho Power Company

Nebraska Public Power District e/
 Nevada Power Company
 Pacific Gas & Electric Co.
 Pacific Power & Light Co.
 Portland General Electric Co.
 Public Service Company of Colorado
 Public Service Company of New Mexico
 Puget Sound Power & Light Co.
 Sacramento Municipal Utility District
 Salt River Project
 San Diego Gas & Electric Co.
 Sierra Pacific Power Company
 Southern Calif. Edison Company
 Tri-State G&T Association
 Tucson Gas & Electric Company
 U. S. Bureau of Reclamation
 (Salt Lake City, Utah)
 U. S. Corps of Engineers

e/ Also member of MARCA.

WSCC con't.

Los Angeles Department of Water & Power
Metropolitan Water Dist. of South Calif.
Montana Power Company

Utah Power & Light Company
Washington Water Power Company
West Kootenay Power & Light Company

Affiliate Member Systems

City of Anaheim
Bountiful City Light and Power
Electrical District No.2, Coolidge, Arizona
Garkane Power Association, Inc.
Lamar Utilities Board
City of Lodi
City of Palo Alto

Plumas-Sierra Rural Electric
Cooperative, Inc.
City of Redding
City of Riverside
City of Roseville
City of Santa Clara
City of St. George

Mr. NASSIKAS. Mr. Chairman, I appreciate this opportunity to be here. My remarks are directed to " * * * forecasted demand for electric power generation in the Southwest and the alternatives which might exist to coal-fired plants at the sites presently proposed."

Under Secretary Pecora stated this morning that the Federal Task Force for the Southwest Energy Study was organized on May 7. I would like to correct my statement to that extent. My July 19 reference on the first page of my statement relates to the commencement of FPC staff participation in the task force.

The Federal Power Commission staff is participating in the task force's overall analysis of power development and economic effects. The purpose of the study, as was stated by Under Secretary Pecora this morning, is to examine alternatives for developing resources and supplying energy needs to the Four Corners area and adjacent areas. Appendix A is a report prepared by the Bureau of Power, and appendix B is a report by the Bureau of Natural Gas, dealing respectively with power supply in the Pacific Southwest and the availability of gas for power generation in that area.

Appendix A relates to a detailed analysis and demand situation, scheduled capacity additions to generation over the course of the next decade through 1980. Appendix B concentrates on the availability of gas for power generation because that is basic to the Four Corners problem. Appendix B very briefly summarizes as well, the overall gas supply situation. The power report, I would like to point out, relates not only to power generation in the Southwest area that is to be served directly by the proposed Four Corners and subsequent additional plants in that region, but also relates to the Western Systems Coordinating Council which embraces the broad band of western States, starting roughly with Colorado, Montana, and going west to the Pacific Ocean.

Focusing upon the Federal responsibility in the Four Corners area, I would like to note, at the outset, what jurisdiction and responsibilities the Commission is charged with by the Congress and the area where it has no jurisdiction. We do not license or certificate thermal electric generating stations. In other words, we do not have any jurisdiction to license the kind of plant that is proposed or is in operation in the Four Corners area. Under part I of the Federal Power Act, we are charged with responsibility for licensing non-Federal hydroelectric developments upon public lands and reservations of the United States, along streams over which the Congress has jurisdiction, and at Government dams.

On November 4, the Commission dismissed a complaint which sought to invoke the licensing jurisdiction of the Commission over the projected coal-burning plants in the Four Corners region. The Commission found that we did not have jurisdiction to grant the substantive licensing relief requested by the complaints. My complete statement contains the relevant citations and additional information.

Although the Commission does not certificate steamplants, it does consider them in its nationwide administratively established program of adequacy and reliability of bulk power supply. On April 10, 1970, the Commission issued its basic policy statement on adequacy and reliability of electric power supply, order No. 383-2, 43 FPC 515.

Basically, that order establishes, upon a cooperative basis, a program for reporting to the Commission by all electric utility systems in the United States, publicly owned, cooperatively owned, and investor owned, their long-range (10-year) system plans, including power generation, primary transmission, public reporting of plans, and the correlation of such planning, with environmental requirements and regulatory commission procedures.

Our staff then analyzes the information reported, evaluates it, and submits our summaries to appropriate committees of Congress and State commissions, as well as to such individuals as may request it.

The statutory authority for the Commission's order 383-2 procedure is set forth in part II of the Federal Power Act, 16 U.S.C. 824a (a). Section 202(a) makes it the duty and responsibility of the Commission to encourage the planning, coordination, and operation of electric facilities throughout the United States.

For the purpose of assuring an abundant supply of electric energy throughout the United States with the greatest possible economy and with regard to the proper utilization and conservation of natural resources * * *.

In studying the Southwest region—and the Four Corners area—I reference my thoughts in the framework of national policies. Among these, as I see them, are the goals for sustained economic growth, a rising standard of living, particularly for the underprivileged, full employment, maintenance of a quality environment and providing for the common defense, health, and safety of the Nation's inhabitants. The National Environmental Policy Act of 1969, 42 U.S.C. 4321, et seq., requires observance of environmental goals in our efforts to achieve all other national goals.

The accomplishment of these objectives requires a continuing use of energy. The Nation must have a systematic expansion of energy in various forms, including electricity. This is where the Commission's Order 383-2 has its basic impact.

The Commission's program includes a full commitment to achieving balanced resources and environmental goals. We recognize that to manage the environment and establish environmental policies, it is essential to anticipate consequences in sound analytical terms and to factor these into the determination of suitable environmental control measures and alternatives consistent with an adequate regional and national power supply.

In summary, the Federal responsibility for bulk power supply in the Southwest is now being discharged, administratively, through the Commission's adequacy and reliability program, as assigned to us by Congress.

Environmental requirements are being applied under applicable laws, including the Federal Water Pollution Control Act, 33 U.S.C. 1151 et seq., the Clean Air Act, 42 U.S.C. 1857 et seq., and the National Environmental Policy Act, 42 U.S.C. 4321 et seq. Certification of fossil-steam plants is currently under State jurisdiction. In footnote 5 I have indicated the States in the Southwest that have some kind of powerplant licensing and certification laws. Arizona does not regulate plant siting and Texas has no State regulatory agency for electric utilities.

Now, what are the alternatives and options available in the Southwest with reference to power supply and consistent with meeting the

environmental needs of the area? The Bureau of Power's preliminary report—appendix A—underscores the urgent need for the electric power being produced by the Mohave and Four Corners plants and that to be produced by the Huntington, Navajo, San Juan, and Kaiparowits coal-fired steam-electric generating plants in the Four Corners area of Arizona, Colorado, Nevada, New Mexico, and Utah. Whatever the basis for past decisions, it is a fact that, as of today, the options through 1980 for meeting the Southwest power needs are relatively limited.

The development of fossil-fueled generation in the Four Corners area was accelerated by the decision against development of the Colorado River hydroelectric potential as a result of environmental, recreational, and other land or water use problems. See Public Law 88-491, 78 Stat. 607 and Public Law 90-537, Colorado River Basin Project Act, 82 Stat. 885, 901. Moreover, the area hydro potential is not adequate for total long-range demands. The use of thermal generation to meet base-load needs in the Southwest is a necessity if the electric power demands of consumers are to be met.

Plans for use of the Colorado River Basin coal resources as the energy source for major blocks of generation in the Southwest stemmed from five major considerations:

First, environmental problems associated with construction of large thermal electric generating plants in or adjacent to highly developed metropolitan area load centers;

Second, physical constraints associated with the location of adequate cooling water supplies, chiefly those outside coastal areas;

Third, economies of using coal as a fuel source with site utilization as opposed to transporting fuel supplies to other areas;

Fourth, uncertainties as to continuous long-range availability of oil or gas as a fuel source, irrespective of cost; and

Fifth, leadtimes for nuclear developments reflecting manufacturing overloads, construction and installation problems and long break-in periods for unit maturation, all of which operate to preclude extensive reliance on nuclear plants for meeting pre-1980 loads.

I have devoted a section of my statement to nuclear power because it is one of our chief reliances in the decade beyond 1980 and is an important source of power right now. At this point in time in reassessing alternatives, we find the following facts. Substitution of nuclear powerplants for proposed new fossil-fired facilities scheduled for service before 1980 is not a viable option. Both scheduled fossil-fuel and nuclear capacity are required to meet forecasted demands. In other words, I don't believe under present system planning and availability of generating capability, that we can substitute one for the other. We need both; if we don't have both, I think we are headed for some power shortages.

Leadtimes for planning, designing, licensing, manufacturing, constructing and installing nuclear facilities precludes reliance upon additional nuclear plants as an alternate to fossil-fueled plants for service within the 1971-80 time-frame. The timely availability of the nuclear option must be evaluated in the light of the recent decision of the U.S. Court of Appeals for the District of Columbia Circuit, *Calvert Cliffs Coordinating Committee, Inc. v. United States Atomic Energy Commission*, Nos. 24839, 24871, opinion dated July 23, 1971.

On November 1, 1971, I transmitted to this committee our Commission staff assessment of the electrical consequences of delays in the construction and operation of planned nuclear units. The electrical load periods covered in that assessment are near-term, the winter of 1971-72, the summer of 1972 and the winter of 1972-73. Our assessments are continuing. We are working coordinately with all affected departments and agencies of Government.

Long range, looking to future periods, nuclear plants may be a most promising option in the Southwest and elsewhere. In the data forming a part of the Commission's forthcoming National Power Survey, we are projecting substantial amounts of nuclear capacity installations by 1990, 475,000 megawatts (37.7 percent) out of a total projected capacity requirement of 1,260,000 megawatts.

Currently we are at about 350,000 megawatts nationally so you can see we forecast a quadrupling of generating capacity to meet demands in 1990. But, here, much depends upon the successful development of the fast breeder reactor. On September 26, 1971, the President announced his intention to authorize a second liquid metal fast breeder reactor. The President, referring to his special energy message to the Congress on June 4, 1971, stated:

At the time I called on the private sector to join government in financing one demonstration liquid metal fast breeder reactor, to begin to move this nation into an era of plentiful, clean, and safe atomic power.

Today I am happy to be able to say that private industry has, according to our latest information, subscribed over \$200 million for this important project. This assures that our first reactor can go into construction. Further, I have decided to order the authorization of a second liquid metal fast breeder reactor in order that we can move forward as rapidly as possible toward the achievement of our energy goals.

I will summarize the natural gas data in my statement. You may recall, Mr. Chairman, Senator Jordan, Senator Hansen, that almost 2 years ago to the day I testified before the Senate Interior Committee regarding my assessment and evaluation of natural gas supply along with my colleagues on the Commission. I stated at that time a prediction that I did not wish to make, namely that we would be getting into a very grave situation in gas supply that would deteriorate before it improved. Unfortunately, this prediction has come true and among the top priorities of my Chairmanship of the Federal Power Commission since August 1, 1969, has been to direct our efforts to improving the natural gas supply situation and fill the imbalance or the void between gas supply and demand. The trend for the last 3 years has indicated that we have produced more gas than we have added to reserves, that there are chronic shortages which have developed throughout the United States, particularly with reference to incremental demands.

We have evaluated in the last 2 years all gas producing areas in the lower 48 States, and issued area rate decisions for the first time in all areas, considering the price levels, quality levels and other considerations in gas supply. Remember that the only decision which was finalized as of August 1, 1969, was the *Permian Basin* case which covered only a portion of our total gas supply. By summarizing gas supply data I do not wish to underemphasize in any way the gravity of our gas supply situation and the necessity of taking bold action to

reverse the trends, to assist the environmental quality objectives and to meet some of our national objectives.

I have included in my analysis of gas supply, as has the staff appendix B, some of the detailed gas supply figures. I will not repeat these at this time. I should also point out that the future requirements committee has made certain analyses of gas supply and forecasts, as has the potential gas committee which works with the Colorado School of Mines. We have observers on both of these committees and their conclusions bear out what I am saying to you today.

In my formal statement I also briefly discuss oil as a fuel for power generation. Oil, of course, may be a realistic option for generating units located along the Pacific coast. In this regard, however, it has been extremely difficult for industry to plan fossil-fired generating facilities within the metropolitan limits of Los Angeles County because of properly restrictive air quality standards. This raises the question of the quality of the oil and whether or not it can be obtained in the right sulfur qualities so that it will not add to pollution problems in Los Angeles. Nevertheless, oil is an important source that could supplement the capacity of the coal-fired plants that are planned in the Four Corners area, although not replace them in my opinion.

I also summarize in my formal statement other potential energy alternatives such as geothermal energy, solar energy, fuel cells, magnetohydrodynamics and fusion energy. Perhaps 20, 30 or 40 years from now, closer to 40 than 20, some of these exotic sources will to some degree replace existing energy sources and the problems we are confronted with today will no longer loom as formidable as they may seem at this particular juncture.

The critics of the Four Corners area plants have emphasized their environmental impacts at site and the fact that some of the power to be generated will be consumed in other areas of the Western United States.

At this point, I think it would be of interest to the committee to note that in response to advertisements concerning Four Corners in the New York Times, Los Angeles Times, San Francisco Chronicle, and Denver Post, I have received about 24,000 communications mostly clipped from these newspapers, requesting me as well as the Secretary of the Interior, Senator Jackson as chairman of this committee, and also Chairman Aspinall of the House Interior Committee, to halt power development at Four Corners.

The request made of me, as I read it, was to try to arrest the growth of electric power, and to favor the conservation of power by way of rate regulation.

In response, I sent a letter to this committee, including a report of the Bureau of Power as well as a copy of the advertisement requesting that they be included as part of the record of these hearings. I request, Mr. Chairman, if I may, that that letter and enclosures now be marked as part of the hearing record. They were not marked as part of the five-volume field hearings in the Southwest and I would certainly appreciate that they be included in the record at this time.

Senator Moss. It may be included in the record here.
(The document referred to follows:)

FEDERAL POWER COMMISSION

WASHINGTON

20426

OFFICE OF THE CHAIRMAN

June 7, 1971

Honorable Henry M. Jackson
Chairman
Committee on Interior and Insular Affairs
United States Senate
Washington, D. C. 20510

Dear Mr. Chairman:

The controversy surrounding the development of electric power generating, transmission and associated mining facilities in the Four Corners and Black Mesa area of the Southwest was, as you know, the subject of a full page advertisement in the New York Times, Los Angeles Times, San Francisco Chronicle, Denver Post and other newspapers a few weeks ago. I have personally received thousands of coupons clipped from those advertisements protesting the construction of these facilities and urging me, among other things, "to work towards less use of power not more. . . ." (Emphasis in the original.) I share the interest and concern of those involved in this controversy both with respect to the need for essential bulk power supply facilities and the proper preservation and protection of environmental and cultural values. The hearings you have been holding on these important issues are a valuable contribution to their resolution. I request that this statement of my views and the accompanying materials be included in the record of the hearings.

At the outset, I would like to clarify the jurisdictional status of the Federal Power Commission in this controversy. The Federal Power Commission does not have jurisdiction over the construction or operation of the

power or mining facilities involved in the Four Corners dispute. However, at my request, the Division of Electric Resources and Requirements of the Bureau of Power has analyzed the power aspects of the controversy in conjunction with the Commission's responsibilities and concerns in the areas of adequacy and reliability of bulk power supply. The Division's findings, which include power supply data essential for a proper resolution of the Four Corners dispute, are attached for the use of the Committee.

In addition to my desire to be responsive to all public inquiries directed to me as Chairman of the Federal Power Commission, I am anxious to respond to the portion of the recent advertisement specifically directed to me (and attached for your information) because I believe it reflects a serious misconception of the Congressionally delegated mandate of this Commission under the Federal Power Act.

As the language quoted above from the advertisement indicates, some of the proponents of prohibiting power development in the Four Corners area are urging my support and efforts to curtail the use of electric power. In §202(a) of the Federal Power Act (16 U.S.C. 824a(a)), however, the Congress has charged the Commission with the duty to "promote and encourage" the voluntary interconnection of facilities and systems for the transmission and generation of power for the stated purpose "of assuring an abundant supply of electric energy throughout the United States with the greatest possible economy and with regard to the proper utilization and conservation of natural resources. . . ." The thrust of Congressional intent as expressed in §202(a) does not seem to be compatible with the advertisement's call for less use of power. Moreover, while I join in the view that power should be conserved and appropriate conservation practices should be observed by consumers, I do not believe that a generalized effort to curtail power development and use is necessary to meet our environmental goals.

The mandate of the National Environmental Policy Act of 1969 to meet environmental goals must be observed and implemented compatibly with the mandate of §202(a) to expand our energy resource base. I do not believe our national commitment to environmental preservation requires curtailment of power development since I am confident that our technological society, together with the establishment of the necessary Congressionally directed institutional framework, will resolve this great issue of our time in the public interest.

Energy conservation takes various forms. On the consumption side, it involves curtailment of wasteful uses of energy and introduction of more efficient forms and uses. On the supply side, conservation seeks to improve the management and technologies of finite resource development, especially those for which proven reserves are declining. In this respect, conservation of energy is also linked with preservation and maintenance of environmental quality. As a matter of policy, development of wiser and more efficient uses of energy resources through conservation is certainly a desirable national objective.

But in the above context, conservation is not synonymous with a reduction of energy or power use. This is an entirely different concept. The notion that the Nation's environmental problems can be met by physical curtailment of power or other energy forms fails to recognize the intimate relationship of energy to all human endeavor, and to the quality of life itself. Energy plays a decisive role in the Nation's productive processes. It is a key consumer product. It is essential to all economic growth and inextricably linked to progress. A national energy policy which had as its precept the reduction of overall energy use would be counterproductive.

Forecasts for the performance of the national economy during the balance of the century predict an average growth rate for the Gross National Product in real terms of about 4 percent yearly. Based on the past relationship of energy to economic growth, energy growth requirements can be expected at rates of 3 to 3½ percent yearly. Among the various forms of energy consumption, the most significant area of expansion will continue to be in electricity. By 1990, power is expected to represent over 40 percent of our total energy consumption, with the proportion possibly rising to almost half of total energy use by the end of the century. More specifically, the Nation will require under these assumptions, 5,900 billion kilowatt hours of electricity yearly by 1990, about four times the present level. For the year 2000, some 9,000 billion kilowatt hours of demand

are projected, a sixfold increase over present use. To meet these levels of demand over the next 30 years, the Nation's power production will have to grow at annual rates of 6 to 7 percent.

To the Nation's goals for sustained economic growth, a rising standard of living, and reasonably full employment, has been added maintenance of the quality of the environment. Achievement of these goals, including those for the environment, will entail continuing and systematic expansion of energy use in its various forms, including power. We must bear in mind that the environmental bill being presented to this generation and perhaps even to the next, includes the cost of remedying past damage to the environment and the ecology, as well as the cost of future maintenance. This cannot be achieved through any reduced consumption of energy, but only by increased energy outputs that meet imposed environmental standards. We must be prepared to pay the high social and economic costs entailed in the remedial process.

The specific projected power development of the Pacific Southwest of which the Four Corners area is an integral part, is discussed in some detail in the attached analysis by the Division of Electric Resources and Requirements. I will not attempt to summarize the report here except to point out that it concludes that the national demand for increased power supplies is clearly reflected in the power growth trends in the western portion of the United States. The need for additional electric generation in that region will double by about 1980 and should represent about four times the current demand by 1990. This growth rate reflects, for the most part, essential power expansion of that region to meet the needs of its increasing population and growing environmental as well as industrial demands.

This necessary new capacity is in turn translated into a need for a number of new power plant sites. It is estimated that the West Region in the period 1970 to 1980 will require about 25 more power plant sites with perhaps an

additional 25 sites in the succeeding decade ending 1990. Furthermore, until reasonable alternative sources of power can be developed, particularly nuclear facilities, it is essential to construct and operate fossil fuel plants using coal, oil, and limited quantities of natural gas so that we can maintain the dynamic growth necessary to our high standard of living.

The problem of locating and developing suitable power plant sites with proper concern for environmental considerations is one of our most compelling and challenging national priorities. The answers to power plant siting are complex and controversial. No sweeping immediate solutions are available. However, in my opinion, a solution which will balance all necessary considerations that must be brought to bear in the selection and construction of power facilities is available.

On May 5, 1971, I testified in favor of the Administration's Power Plant Siting Act of 1971 (H.R. 5277) with suggested revisions which I felt would improve the effectiveness of the proposal. Without going into the varied and extensive details of this legislation, I would like to indicate various key provisions that I believe represent the needed solution to our current power plant siting problems and associated environmental concerns. The primary and essential aspect of this legislative proposal, with the revisions I have suggested, is the provision for so-called "one stop" certification of bulk power supply facilities. One stop certification, in conjunction with the bill's provision for the annual disclosure of long-range construction plans by all electric and Federal electric entities, would assure that all power and environmental issues are resolved in a timely fashion in one forum well in advance of the time additional power capacity is needed. I believe that the principles of this legislation should be adopted in order

to establish an institutional framework for a long-term solution to plant siting problems, to assist in minimizing delays in the construction of plants necessary to meet immediate, short-term power needs, and to provide an adequate and reliable power supply over the long term in harmony with essential environmental values.

In addition to advocating less use of power, the recent advertisement in opposition to Four Corners urged me to "work towards . . . lower rates for users who conserve power." (Emphasis in the original.) A close examination of this proposal reveals serious problems with its underlying assumptions.

In the first place, it is difficult to see how a determination could be made of the extent to which individual consumers in fact "conserve power" if by that is meant the extent to which such consumers reduce or eliminate wastage of power. However, various spokesmen have suggested that modification of the present type of rate structure that is prevalent in the electric industry would have the effect of reducing such wastage and thereby would reduce the overall demand for electricity. The type of rate structure that is most common at the present time is "promotional" in the sense that the average rate paid per kilowatt hour decreases as the number of kilowatt hours used increases. The suggested modification is to increase the rates charged in the higher usage blocks while either reducing or leaving unchanged the rates charged in lower usage blocks. If carried far enough, this would so tilt the rate structure as to result in higher average rates per kilowatt hour as the number of kilowatt hours used increases.

One difficulty with this suggestion is that while it would result in lower rates for low users and higher rates for consumers using larger amounts of power, it would not necessarily result in a materially lower demand for electricity. The extent to which it would result in a lower overall demand for electricity depends on the extent of the rate changes in the various blocks and the demand elasticities at the various usage levels.

A second difficulty relates to the possibility that material departures from current rate structures may not be sanctioned on the basis of cost differentials. If in fact the rate structures are closely related to real cost differentials, then significant changes in rate structures may result in discrimination among customer groups as well as misallocation of resources.

Thirdly, it has been argued that "promotional" type rate structures have been designed to improve annual load factors. At high load factors, utilities are able to produce more kilowatt hours with less generation and transmission facilities than at lower load factors. Therefore, other things being equal a higher load factor will enable a utility to supply its customers with their kilowatt hour requirements at lower costs and with bulk power supply facilities having a lesser impact upon the environment than if its load factor were lower.

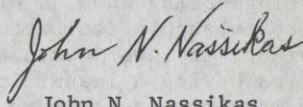
Finally, a high use of electricity does not necessarily imply waste on the part of the user. Rather, it may simply reflect a greater need for energy. Therefore, rate increases to volume users of electricity may result in their switching to other energy forms resulting in lower load factors and higher costs to other electric consumers. More important, the substituted energy forms may be worse pollutants than the facilities and fuels for the supply of electricity.

I have gone into some detail in commenting on the Four Corners dispute and the issues raised in the portion of the recent advertisement directed to me in opposition to the project because of the importance of the power and environmental aspects of the problem. Because of the importance of these problems I was encouraged by Secretary Morton's announcement on May 27, 1971, that the Department of the Interior has established a task force to review all factors involved in meeting the power needs of the Southwest, including, of course, environmental and cultural considerations. The Federal Power Commission will provide whatever assistance we may be called upon to contribute to this review.

In order to effectively reach the thousands of people who contacted me directly on the Four Corners problem, I am transmitting copies of this letter and its attachments to the editors of the newspapers in which the recent advertisement appeared. In addition, I have prepared a news release summarizing the contents of this letter which will be made available to the public and press.

I hope the information I have supplied is useful to you and the Committee. If additional data would be of assistance, please contact me.

Sincerely,



John N. Nassikas
Chairman

Enclosures

1. Staff Report dtd 5/24/71
2. Newspaper Advertisement

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : CHAIRMAN NASSIKAS

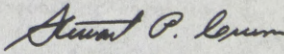
DATE: June 3, 1971

FROM : STEWART P. CRUM

SUBJECT: Staff Report on Black Mesa and Four Corners Areas

In response to your request, the staff of the Division of Electric Resources and Requirements has studied the developing situation with respect to existing thermal electric power plants and proposed new projects in parts of the Pacific Southwest area.

Attached is a staff report entitled "Electric Power and Related Developments in the Black Mesa and Four Corners Areas." The report summarizes the projected power requirements in the Pacific Southwest and presents information on present and proposed thermal electric plants which would utilize coal produced in the general areas of their locations.


Stewart P. Crum

RECEIVED
OFFICE OF CHAIRMAN
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COMMISSION

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STAFF REPORT

ON

ELECTRIC POWER AND RELATED DEVELOPMENTS

IN THE

BLACK MESA AND FOUR CORNERS AREAS

Division of Electric Resources and Requirements
Federal Power Commission

May 24, 1971

INTRODUCTION

Demands for more and more electricity to meet industrial needs for production of goods and services, society's desires for greater comforts and conveniences, and commercial uses associated with the high standard of living in the United States have resulted in an approximate doubling of electric loads in each decade for a number of years. Forecasts indicate that this trend is likely to continue throughout the remainder of the century.

The Federal Power Commission's West Regional Advisory Committee for the National Power Survey has confirmed that the western portion of the United States will likely follow the national trend and that electric generation in that Region will in 1980 be about twice and in 1990 about four times that in 1970. In the past, much of the electricity requirement of the western states has been met by hydroelectric facilities but fewer economically justifiable hydroelectric developments remain for the future, and a greater share of electricity production must come from thermal power plants. The Regional Advisory Committee has projected that electricity production from such sources will increase by a factor of about seven during the next 20 years. Coal and nuclear fueled plants are expected to satisfy most of the increased requirement. Most of the nuclear generation will be installed in California and the Pacific Northwest. Coal burning plants are expected to be built outside the California Subregion and about half of the future increase in coal fired generation in the Rocky Mountain area is planned to serve loads in California.

ELECTRIC LOAD AND GENERATING CAPACITY CONSIDERATIONS
IN THE PACIFIC SOUTHWEST

Electric load growth in the Pacific Southwest is expected to occur at an average rate of about seven percent per year. This rate produces a doubling in use in each ten years.

Because it has felt there are needs for longer range planning and more public collaboration in connection with utility-advance planning activities, the Federal Power Commission issued a Statement of Policy on Reliability and Adequacy of Electric Service on April 10, 1970. This Statement, identified as Commission Order 383-2, calls for submission of utility expansion plans for periods up to ten years in the future.

The following table shows the anticipated generating capacity additions in the Pacific Southwest by years and types of plants from 1972 through 1980. The information is based on the April 1, 1971 report to the Federal Power Commission by the Western Systems Coordinating Council in compliance with Order 383-2.

PACIFIC SOUTHWEST ADDITIONS TO GENERATION
CAPACITY EXPRESSED AS PERCENT OF
TOTAL ADDITIONS - 1972 to 1980

<u>Year</u>	<u>Total Capacity to be Added MW</u>	<u>Fossil %</u>	<u>Hydro %</u>	<u>Nuclear %</u>
1972	1,740	80.9	19.1	0
1973	4,880	52.3	8.7	39.0
1974	3,282	61.6	6.1	32.3
1975	2,598	92.3	7.7	0
1976	2,576	45.7	10.0	44.3
1977	4,869	35.5	18.5	46.0
1978	4,341	29.5	17.3	53.2
1979	6,176	35.4	6.5	58.1
1980	4,035	44.3	0.2	55.5

The Four Corners and Black Mesa areas are part of the Federal Power Commission's West Region and also the Western Systems Coordinating Council. In reference to the discussion which follows, Figure I (a map of the United States) shows the FPC National Power Survey Regions and Power Supply Areas. The analyses of loads and generating capacity additions, as discussed below and presented in the accompanying tables, are based on information from both the report of the West Regional Advisory Committee "The Future of Power in the West Region", prepared as part of the 1970 National Power Survey and the April 1, 1971 report to the Commission by the Western Systems Coordinating Council.

Table I presents a summary of the energy requirements and the peak loads as they are expected to develop during the next decade. These data are presented for the West Region as a whole, for the northern and southern parts of the total Region, and for Power Supply Area (PSA)-39 (western New Mexico), PSA-48 (mostly Arizona), and PSA-47 (mostly southern California). For purposes of this analysis, the West Region was arbitrarily divided into northern and southern sections as shown on the map (Figure 1).

With reference to Table I, it will be noted that the peak demand for electric energy in the southern part of the Region is expected to increase from 35,000 megawatts in 1970 to 73,000 megawatts in 1980, an increase of 38,000 megawatts. The corresponding increases in PSA-39, PSA-49 and PSA-47 are expected to be 1,000, 6,000, and 15,000 megawatts respectively. Thus, these three power supply areas are expected during the next decade to produce an increase in total demand for electricity of about 22,000 megawatts or about 58 percent of the total increase projected for the Southern part of the Region. During the same period, the peak demand in the remaining portion of the southern part of the Region is expected to increase by 16,000 megawatts.

The above percentages are significant with respect to the siting of electric generating plants to meet anticipated loads. Table II lists the generating capacity additions for the southern part of the Region which have been announced in the Western Systems Coordinating Council reports to the Commission through April 1, 1971. The data arrangement is by years and distinction is made between the plants designed to use the Arizona and New Mexico coal deposits and those using other fuels.

By referring to Table II, it will be noted that during the period through 1980, the Council reports the addition of a total of 34,497 megawatts of new capacity. Of this amount, 3,800 megawatts or 11 percent are accounted for by plants which are to use the coal deposits

Table I - Electric Energy Requirements and Peak Demands 1970-1980
 Estimated by the West Region Advisory Committee for
 1970 National Power Survey

Service Areas	1970		1980	
	Energy Requirements (Million Megawatt-hours)	Peak Demand (Thousand Megawatts)	Energy Requirements (Million Megawatt-hours)	Peak Demand (Thousand Megawatts)
FPC West Region (Principally area west of Continental Divide)	276	54	559	109
West Region-North ^{1/}	103	21	196	41
West Region-South ^{2/}	173	35	363	73
PSA-39 (Western New Mexico)	5	1	11	2
PSA-48 (Mostly Arizona)	21	4	45	10
PSA-47 (Mostly Southern California)	65	13	136	28

^{1/} Composed of PSA 42, 43, 44, 45, 31, 30, and one-half of PSA-41.

^{2/} Composed of PSA 46, 47, 48, 39, 36, 32, and one-half of PSA-41.

in Arizona and New Mexico. The remainder of the additions totalling 30,697 megawatts will use other sources of fuel or primary energy in the following proportions: fossil, 37 percent; nuclear, 42 percent; and hydro, 10 percent.

Although they are discussed in connection with some other parts of this report, the generation additions mentioned above do not include the five units of the Four Corners Plant which are already installed or the two units of the Mohave Plant which are to be in service before the end of this year. The Huntington Canyon Plant is not shown because its fuel supply comes from other coal deposits and because its capacity will be used principally in PSA-41. Also, the Kaiparowitz plant, whose ultimate capacity may reach 5,000 megawatts, is not included because construction of the plant is not scheduled until sometime after 1980.

TABLE II

COMPARISON OF NEW CAPACITY BASED ON ARIZONA, NEW MEXICO AND UTAH COAL
DEPOSITS AND OTHER CAPACITY SCHEDULED FOR PACIFIC SOUTH WEST 1972 - 1980

Year	Total Capacity To Be Added MW	Capacity Based on Arizona New Mexico & Utah Coals		Other Capacity to be Added to Serve Loads in Southern Half of FPC West Region			
		Name of Unit	Capacity	Total			Nuclear
				Fossil	Hydro		
1972	1740	-	-	1740	1408	332	0
1973	4880	San Juan	#2	4550	2224	423	1903
1974	3282	Navajo	#1	2512	1252	200	1060
1975	2598	Navajo	#2	1828	1628	200	0
1976	2576	Navajo	#3	1556	156	260	1140
1977	4869	Cholla	#2	4289	1149	900	2240
1978	4341	San Juan	#1	4341	1281	750	2310
1979	6176	Cholla	#3	5846	1856	400	3590
1980	4035	San Juan	#3	4035	1789	6	2240
Total MW	34,497		3,800	30,697	12,743	3,471	14,483
%	100		11.0	89.0	37.0	10.0	42.0

Source: Western Systems Coordinating Council Report - April 1, 1971, Part I (Order No. 383-2)

PERTINENT INFORMATION CONCERNING INDIVIDUAL
POWER PLANTS SCHEDULED THROUGH 1980

Some of the current publicity about the construction of new steam power plants in the Black Mesa and Four Corners areas describes the effort as one being undertaken by a consortium of 23 power companies and the Bureau of Reclamation. The 23 power company group is the "Western Energy and Supply Transmission Associates" (WEST) formed in 1964 to cooperate in planning for future power supply in the areas represented by their service territories. The extensive coal reserves in the Black Mesa and Four Corners areas offer an attractive potential for meeting some of the electrical energy requirements of the Pacific Southwest in the years ahead, and the plants which would generate the power from the coal supplies in these areas provide the potential for coordinated operation with the Bureau of Reclamation's hydroelectric generating plants in the same general area. The only primary alternatives to the coal-fired plants scheduled for this area would appear to be nuclear plants, and scheduling of these within the time available would probably constitute major problems of providing new capacity by the time it will be needed to meet new loads.

The Four Corners Plant, which is already in service, consists of five generating units having a total capacity of 2,085 megawatts. The first of these was installed in 1963 and the last in 1970. Additional air pollution control devices are being installed on the existing units. The ultimate capacity (sometime after 1980) might include as many as three additional units to compose a total plant capacity of about 5,000 megawatts.

Unit No. 1 at the Mohave Plant in Clark County, Nevada was completed recently and a second unit is expected to be ready for initial service later this year.

The remaining four power plants involved in the current protests are to be located in New Mexico, Arizona, and Utah, and individual generating units are scheduled for service periodically from 1973 through 1977. No firm schedules have been announced for the Kaiparowits Plant to be located in southern Utah.

Table III lists the six plants and presents a number of details for each with respect to not only individual plant characteristics but ownership and fuel information and other related data which may be of interest to the reader.

TABLE III - COAL BURNING STEAM ELECTRIC GENERATING PLANTS IN PACIFIC SOUTHWEST

Name of Plant Location	Four Corners Fruitland, N.M.	San Juan San Juan, N.M.	Navajo Page, Arizona	Mohave Clark County, Nev.	Huntington Near Price, Utah	Kaiparowitz Southern Utah
Existing Capacity, April 1971	575 (1963 & 1964) 750 (1969) 750 (1970)	None	None	None ^{1/}	None	None
Planned Capacity		#1 unit 330 MW 1973	#1 unit 770 MW 1974	#1 790 MW April 1971	#1 unit 430 MW 1974	3 units 2400 MW
Additions	None	#2 unit 330 MW 1977	#2 unit 770 MW 1975 #3 unit 770 MW 1976	#2 790 MW Oct. 1971		Indefinite
Ownership of Plants	Southern Calif. Edison 48% Arizona Public Service 15% Salt River Project 10% Tuscon Gas & Elec. Co. 7% Public Service of N.M. 13% El Paso Electric Co. 7%	P. S. of New Mexico 50% Tuscon Gas & Electric Co. 50%	Los Angeles D of W & P 21.1% Salt River Project 21.7% U.S.B.R. 24.3% Arizona P. S. 14.0% Nevada Power 11.3% Tuscon G & E 7.5%	Nevada Power Co. 14% Salt River Project 10% Los Angeles Dept. of W & P 20% Southern Calif. Edison Co. 56%	Utah Power & Light Co. 100%	Resources Corp. Arizona P. S. Co. San Diego G & E Co. Southern Calif. Edison Co. (Ownership Division N.A.)
Source of Fuel	Local Strip Mines	Local Strip Mines	Black Mesa Strip Mine via 80-mile railroad	Black Mesa Mines via 27.5-mile slurry pipe-line	Local Mine via 2-mile conveyor belt	Underground mine 10-15 miles from plant

^{1/} 1st unit is under test but not yet in commercial operation.

NOTE: N.A. -- Not Available

Name of Plant Location	Four Corners Fruitland, N.M.	San Juan San Juan, N.M.	Navajo Page, Arizona	Mohave Clark County, Nev.	Huntington Near Price, Utah	Kaparowitz Southern Utah
Ownership of Fuel	Navajo Tribal Council	USA Bureau of Land Management	Navajo & Hopi Tribal Councils	Navajo & Hopi Tribal Councils	N.A.	N.A.
Area of Service	Service Areas of Owners Pacific S.W.	Central New Mexico & Tuscon, Ariz. Area	Pacific S.W.	Pacific S.W.	State of Utah	Pacific S.W.
Consumption of Water	28.1 Cu, Feet/ Sec. <u>2</u>	N.A.	N.A.	N.A.	N.A.	N.A.
Source of Water	San Juan River	San Juan River	Lake Powell	Colorado River & water re-covered from slurry coal pipeline	Huntington Creek	Lake Powell
Cooling Towers	No	Yes	Yes	Yes	Yes	Yes
Disposal of Heated To cooling pond Water		None	Lake Powell	None	N.A.	N.A.
Disposal of Ashes Land fill		In mine pits cover with spoil	N.A.	Wet Pond	N.A.	N.A.

".....LIKE RIPPING APART ST. PETER'S, IN ORDER TO SELL THE MARBLE."

SO that the world can have still more of Los Angeles, Las Vegas, and Phoenix, six gigantic coal-burning power plants and three huge strip-mines are underway at and around Black Mesa, Arizona. When operative, the complex will spread more deadly smog and soot than currently put out in New York and Los Angeles combined across what is now 100,000 square miles of open country; the last pure air in America.

Affected by the smog will be six national parks, 28 national monuments, the Lake Mead and Lake Powell recreation areas, and Grand Canyon; the places people escape to are being sacrificed to make more of what they escape from. Also being sacrificed on behalf of urban growth: The sacred religious shrines of the Hopi and Navajo Indians, who had thought that it couldn't happen again.

You can stop it, but you must act now. Here are the details:

1) The clearest air in the United States is to be found in the Four Corners region of the Southwest, an enormous area including parts of Utah, Colorado, Arizona, New Mexico and Nevada. It contains the Grand Canyon National Park, Petrified Forest National Park, Zion National Park, Bryce Canyon, Rainbow Bridge, Monument Valley (see photo above) as well as 39 Indian Reservations and the biggest open sky in the world.

The air here is legendary. It is where your doctor sends you when the city air gets you, or you have asthma. But he won't send you here much longer. 2) Not to be outdone by the East, where natural beauty is in the realm of nostalgia, real estate speculators are planning expansion: tract houses across California's open spaces; industrial development of the desert; more slums around Phoenix; and also in Las Vegas, where they say there is a "need" for more neon.

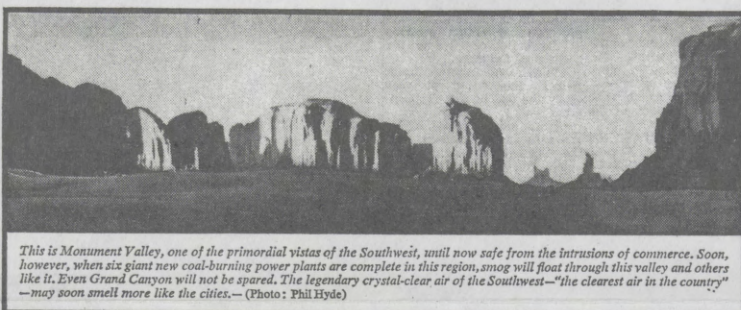
3) All of this takes electricity, a lot of it, and so a consortium of 23 power companies together with the U.S. Bureau of Reclamation is building six coal-burning plants to service the urban sprawl. Growth in those already choking cities will do them nothing but harm, of course, but that's not the point of this ad. What those cities wish to do to themselves is one thing; we are speaking about what they are doing to an area that belongs to you and to us, and to 250,000 Indians.

4) The power plants, you see, are not being put in the cities they service. They produce so much smoke, soot and poison that they are illegal there. The solution: put them elsewhere, where no one will complain. Where there are only parklands and open spaces; where only animals, trees, and farm produce grow; where the population is only hikers, campers, swimmers, climbers, fishermen, boatmen (tourists) and oh yes, some Indians. No "important" opposition.

5) So here is what's planned: at least six power plants and three strip mines, an 80 mile coal-hauling railroad (across Navajo land), a 273 mile slurry pipeline (across Hopi and Navajo lands), hundreds of miles of work roads and thousands of miles of transmission lines crisscrossing the country's last pristine open space, to carry the power to "civilization." 6) Two of the plants are already built. They went up so fast and so quietly no one knew it was happening until it was too late. No pre-construction announcements, no public hearings, no impartial studies on resources, or alternatives, no reports to the Federal Power Commission, no statements under the National Environmental Policy Act.

Only when it was too late, and people began perceiving what was going on out there, were there some pitiful attempts by the companies to cover their public bases, but a lot of the damage is done.

7) To give you an idea of the effect, one of the plants, The Four Corners Plant at Farmington, New Mexico, puts out more fly ash and soot—350 tons per day—than is produced by all sources in Los Angeles



This is Monument Valley, one of the primordial vistas of the Southwest, until now safe from the intrusions of commerce. Soon, however, when six giant new coal-burning power plants are complete in this region, smog will float through this valley and others like it. Even Grand Canyon will not be spared. The legendary crystal-clear air of the Southwest—"the clearest air in the country"—may soon smell more like the cities. (Photo: Phil Hyde)

and New York combined. And the stuff gets carried hundreds of miles downwind.

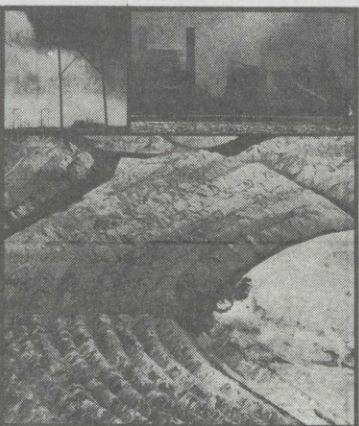
Smoke from this plant was photographed by a Gemini satellite not long ago—the only man-made phenomenon on Earth to be visible out there.

The State of New Mexico has finally ordered some emission controls on that plant, which will improve matters a bit, but this is only one plant in six now planned. If the power companies have their way, one of the new plants, Kapairowitz, will be nearly three times the size of Four Corners; the biggest in the country. And then the total pollution output in this "clearest-air" region will look this way:

	Sulphur Oxides (Per day)	Nitrogen Oxides (Per day)	Ash, Soot, & other particulates (Per day)
Six plants (after controls on Four Corners)	2,166 TONS	845-1,297 TONS	240 TONS
Los Angeles Co. (total all sources incl. cars)	275 TONS	950 TONS	110 TONS

Source: John Muir Institute for Environmental Studies

Even New York City puts out less pollution; 140 tons of ash, and only 1,077 tons of sulphur oxides. And while it is true that this region is larger than New York and Los Angeles together, and concentrations may not be as great all the time, remember, this is the last clean air in the country, and the largest recreational region. Even a little pollution here would be an outrage. But this is not a little.



Three of the ways in which power companies are "improving" the once clear vistas and timeless beauty of the Southwest. These power lines will stretch thousands of miles back and forth across Indian lands and pristine countryside. The power plant (shown on an otherwise clear day) is the non-functioning Four Corners Plant, which puts out more soot and ash than all of N.Y. and L.A. combined. (Note the sailboat on the lake to the right of the plant; one wonders who found that a good place for sailing. Sailing at Lake Mead and Lake Powell will soon be like sailing in this place.) At the bottom is the coal strip-mining operation at the Four Corners Plant, about which more in the body of the ad. (Photos: Terry Moore)

8) To make matters worse, Kapairowitz will be the second of two plants to be built on the shores of Lake Powell, hailed as one of the great recreational lakes of the country—used by swimmers, water-skiers, sailboats, and so on. If Kapairowitz, or the already

begun Navajo Plant, is built, the smog will pour into the sky and the soot will blacken the sails. Tall ugly smokestacks will be visible from almost everywhere on the lake, and it will take on some of the charm of the Hoboken River.

9) To run the power plants, coal is needed and the solution to that need may be still more tragic and brutal: strip mining.

The coal for two of the plants is being provided by Peabody Coal Company, which has already begun its digging at Black Mesa, in the heart of the Hopi and Navajo Nations.

10) Black Mesa is not just another piece of soil with coal in it. It is where the Hopi have lived for a thousand years; the oldest stationary culture in North America.

The religion of both the Navajo and Hopi peoples are intertwined with the soil of Black Mesa.

The Hopi believe that they grew directly up from that soil. It is their Garden of Eden, so to speak, except in their view the soil itself is alive—as alive as they are, and the trees and plants and sheep they herd. They believe the soil itself is sacred, much as you might feel about the Holy Grail, or the Wailing Wall. To the traditional Hopi, ripping apart the soil and removing things from it, as Peabody is doing, is, in the words of one young Hopi, "like ripping apart St. Peter's, in order to sell the marble."

11) Peabody is also removing water from Black Mesa for a coal slurry pipeline, at 3,168,000 gallons per day. No one can be certain what that will do to the farming and grazing in this arid region, but the Hopi fear (and remember, they have lived here, in harmony with the difficult land, for one thousand years) that the water will give out or become poison as it did in Appalachia; that it will destroy their farms and therefore their culture. The Hopi say that if the mining continues, the Hopi Nation will not. All for Las Vegas neon.

12) Peabody counters that it has a "legal" lease, signed by the Hopi Tribal Council and yes, it has a signed piece of paper. "Legal" is another matter.

Last week, all the traditional Hopi leaders filed the first of a series of lawsuits. The suits say, in effect, that the Tribal Council was pushed onto the Hopi by the Bureau of Indian Affairs, and was not legally appointed. They say the Hopi ignore the council almost to a man in favor of their own system of governing, and that it violates the Hopi Constitution, the Hopi religion, and Department of Interior rules. They say the Tribal Council was created by BIA just so such deals could be made. They say that not more than a handful of Hopi ever heard of the strip mining plans until Peabody moved in and started digging things up.

At some point, we are all going to have to come to grips with one irrefutable fact: There is only so much of this country. Only so much land, water, and air to put to the uses of commerce. We cannot behave as though there is always room for expansion. There is not.

There was a time when helping urban growth seemed a good idea, when the country was young and needed to build its base. But now cities are too big and they are turning greyer before our eyes. Yet the dogma remains: More, more, more, more, more.

California begins to look like one gigantic Levittown; one huge trailer camp. Phoenix and Las Vegas likewise. Still there is the notion at large that we must "use" all of the landscape. If they get away with plants at Four Corners, defiling the last pure air

in the country, then more plants will follow those.

In the East, the problem is similar; power plants on mountainsides, in woodlands, on beaches. And now there's a plan to start "using" the oceans; to put enormous plants out at sea. When the parks smell of industry and even the sea offers no escape, then finally, once and for all, we will have become prisoners in a giant world-wide jail.

It is clear that such growth is madness; a cancer feeding on its own living system. And since eventually we will run out of space, hadn't we best plan for that now, rather than later when all is gone?

The conclusions are very clear. We should not be accommodating growth anymore unless and until we can do so without doing-in the world. Instead of promoting more use of power, companies should be promoting less use, and offering special rates to those able to ration. Most important, the United States must arrive at a national energy policy which reflects the facts of life—there is only so much land. A limit on power is needed.

The end of the mass-consumption waste-oriented society is in sight. We may all have to make do with less. But this is not necessarily bad. Fewer lights on



John Lansa, a Hopi elder, speaking about the strip-mining of Black Mesa: "Nature is everything important to the Hopi. It is the land, all living things, the water, the trees, the rocks—it is everything. It is the force or the power that comes from these things that keeps the world together... This is the spiritual center of this land. This is the most sacred place. Right here in this mesa... Before the white men came, all the Hopi were happy and sang all the time. The Hopi didn't have any class structure at all—no bosses, no policemen, no judges—everyone was equal. There weren't any politics then... In those days the air was clear and everyone could see far. We always look to the Earth Mother for food and nourishment. We never take more than we need. Our lives were very rich and humble. We live close to the Earth as laid out by the Great Spirit. When the white men came, everything started to get out of balance. The white brother has no spiritual knowledge, only technical... Now there is a big strip mine where coal comes out of the Earth to send electricity to the big cities. They cut across our sacred shrines and destroy our prayers to the six directions... Peabody is tearing up the land and destroying the sacred mountain... It is very bad that Peabody takes away the water because it upsets the balance of things. You can't do things like that and have Nature in balance."

at once may return us the dusk, and stars. Without electric toothbrushes, we may still brush our teeth. Not all new buildings need be artificially heated and cooled, and those that are could be built with windows that open, so some days fresh air could come in. Las Vegas does not need more neon, going 24 hours per day. We can all get along with less. The Hopi have done it till now. Until strip-mining started at Black Mesa, pollution was impossible there.

If you would like to help stop the outrage we have described above, and work toward some sensible country-wide energy policy, please join us in sending the coupons below. But do it today. Senator Jackson begins hearings in Albuquerque this Monday, the 24th, continuing elsewhere through the 28th, and his office should hear from you before then. There is also a coupon to us. It asks for money to continue this struggle, and offers far more details than we had room for today.

Thank you.
BLACK MESA DEFENSE FUND. Jack Loeffler, Terry Moore, Jim Hopper. 107 Cienega Street, Santa Fe, New Mexico 87501.

CENTRAL CLEARING HOUSE. Harvey Mudd. 338 East de Vargas, Santa Fe, New Mexico 87501.

FRIENDS OF THE EARTH. Mike Williams (Southwest Representative). 8016-G Zuni, Albuquerque, New Mexico 87108.

SIERRA CLUB. Brant Calkin (Chairman, Rio Grande Chapter). 338 East de Vargas, Santa Fe, New Mexico 87501.

ZERO POPULATION GROWTH. Mrs. John Rodgers (New Mexico Chapter). Route 3, Box 131, Santa Fe, New Mexico 87501.

Senator Henry Jackson
Chairman, Senate Interior Committee
Senate Office Building
Washington, D.C. 20510

I oppose power plants and strip mines around 4-Corners region. I also urge shutdown of two present plants until they can be made non-polluting. The government must stop new plant construction until a national energy policy is developed, reflecting that we live in a finite natural system and must establish balance with nature. Per capita growth of power use, and endless proliferation of power plants, cities and industry will destroy what little open space, clean air and water we have left.

Name _____
Address _____
City _____ State, Zip _____

The Hon. Rogers C. B. Morton
Secretary of the Interior
Interior Office Headquarters
Washington, D.C. 20240

I oppose power plants and strip mines around 4-Corners region. I also urge shutdown of two present plants until they can be made non-polluting. The government must stop new plant construction until a national energy policy is developed, reflecting that we live in a finite natural system and must establish balance with nature. Per capita growth of power use, and endless proliferation of power plants, cities and industry will destroy what little open space, clean air and water we have left.

Name _____
Address _____
City _____ State, Zip _____

Mr. John Nicholas Nassikas
Chairman, Federal Power Commission
441 "G" Street, N.W.
Washington, D.C. 20426

I am outraged at power plants being built at the expense of parklands, Indian territories, and the last clear air in the country. I am tired of being told we, the public, "want" more power while power and consumer products industries spend billions in ads to encourage more wasteful power consumption. America's open spaces must not be sacrificed to make more development or electrical gadgetry. I urge you to work towards less use of power not more and lower rates for users who conserve power.

Name _____
Address _____
City _____ State, Zip _____

Rep. Wayne Aspinall
Chairman, House Interior Committee
House Office Building
Washington, D.C. 20515

I support Rep. Kenneth Hechler's bill #HR4456 which would outlaw all coal strip-mining in America. I urge you to expedite its transit through your committee.

Name _____
Address _____
City _____ State, Zip _____

Black Mesa Defense Fund
107 Cienega St.
Santa Fe, New Mexico 87501

☐ I support your position on Black Mesa and the six coal burning power plants. I have sent in the coupons.

☐ Here is a donation to help with your future work: \$ _____

☐ Please forward me further information on: the law suits, the history of the Four Corners battle and the struggle for a rational nationwide energy policy.

Name _____
Address _____
City _____ State, Zip _____

<u>Name of Plant Location</u>	<u>Four Corners Fruitland, N.M.</u>	<u>San Juan San Juan, N.M.</u>	<u>Navaajo Page, Arizona</u>	<u>Mohave Clark County, Nev.</u>	<u>Huntington Near Price, Utah</u>	<u>Kaparowitz Southern Utah</u>
<u>Temperature of</u>	Units 1, 2, 3 -- 20°C					
<u>Water Discharges</u>	rise. Units 4 & 5 -- 16.6°C Rise		N.A.		N.A.	N.A.
<u>Installation & Operating Data on Precipitators</u>	Units 4 & 5 have 97% eff. electrostatic precipitators. Units 1, 2 & 3 have mechanical collectors	Hot side precipitator 99.5% eff.				
<u>Other Air Pollution Control Devices</u>	Expect wet scrubbers to be installed on units 4 & 5 by end of 1973 to meet State requirements.	Expect to install wet scrubber in future, left room in design for SO ₂ desulfurization equip.				
<u>Planned Control Devices</u>	Scrubbers being Installed on #1 Unit.	Design allows for Future Installation of scrubbing, if needed.				

Mr. NASSIKAS. Thank you.

Let me say that there will undoubtedly be an environmental impact at the Four Corners site. Second, some of the power to be generated at the Four Corners complex will be consumed largely in other areas of the Western United States. Both facts are true.

One cannot build any thermal generating plant without some impact on the surrounding environment and certainly not with plants of this size. The task, nevertheless, is one of comprehensive balancing of various uses of air, fuel, land, and water for all beneficial purposes, public and private; and of minimizing adverse effects of electric power production upon the environment, whether at the production site or points of ultimate consumption.

Now, clearly, the Four Corners plants are regionally sized. They are designed to serve the power system needs of the Southwest region. They will deliver power regionally through high voltage interconnected transmission networks that ring the Rocky Mountain-Pacific Coast area, the so-called doughnut. The western side of this network includes the North-South interties between the Pacific Northwest and the Pacific Southwest. The eastern side of the doughnut includes lines connecting the Four Corners area through Utah, Idaho, Montana and back again to the coastal areas of Washington and Oregon. The Bureau of Power has set forth the details in appendix A. The consumers served from these plants will be located in the States they mention there and of course various cities in each of those States.

As I noted earlier, the Commission is charged by the Congress, under the Federal Power Act, with promoting and encouraging regional planning of electric facilities—section 202(a). We are also charged by Congress to recognize conservation standards as a guide for our action. In our order 383-2 we attempt to meet both power planning and conservation objectives.

In my formal statement I again assert my belief that there is a need for a coordinated national energy policy. I will not repeat that material here. Nor, will I repeat the information in my formal statement that compares the growth of power in the Southwest area with national trends and shows parallel growth projections.

The needs for this region will double by 1980, about four times by 1990, and this projected growth reflects, for the most part, essential power expansion of that region to meet the electric consumer needs of increasing population, growing environmental improvement programs, which require electric power supply, as well as industrial and commercial power demands.

Power systems in the Southwest are interconnected both within the region and with systems adjacent to the region. They function as a part of one of the nine electric reliability councils under the Commission's Order 383-2 adequacy and reliability program, the Western Systems Coordinating Council.

The power supply areas most directly related to the Four Corners area plants are shown within the bordered area on the map entitled "Southwest Energy Study Loads and Resources Areas" which is part of my formal statement. Immediately following this map I have provided tables in which I have pinpointed the Southwest study area with respect to estimated seasonal peak demands from 1970 to 1980, which, in round figures, will approach 50,000 megawatts in 1980 from 22,000

to 23,000 at the present time. A second table covers the whole Western region, of which the Southwest region is a part, and projects power requirements for the entire Western region by power supply areas in terms of millions of kilowatts in 1980.

In 1970, you will note that the West region had a peak demand of about 50,000 megawatts, whereas the Southwest region in the preceding table shows between 22,000 and 23,000 megawatts. Then, in 1980 the West region peak demand becomes 109.4 megawatts as compared with our projection for the Southwest study area of 46,072 megawatts as shown in the figure in the preceding table.

I have also outlined in my formal statement proposed generation additions by types of plants in the Southwest energy study area through 1980. Meeting power demands, plus providing necessary reserve capacity and providing for replacements, will require the construction of about 31,000 megawatts of new capacity in the Southwest energy study area by 1980.

Just to see where we are and where we are going, take the year 1971. We find that fossil fuel plants constituted about 95 percent of the total generating capacity additions in the Southwest study area, hydro represented about 4.9 percent of the total, with no nuclear additions. Then you proceed along and find that by 1980 we would project that about 20 percent of total capacity additions during the preceding decade would have been nuclear. Hydro additions would be expected to represent about 12 percent at that stage and fossil about 67.5 percent. The percentage of fossil fueled capacity will have diminished, even though much more fossil fuel will be required to meet the 1980 load, than is used to meet the present load.

Senator Moss Why does your table show some nuclear generation in 1972 and it is blank in 1973, and 1974, and 1975 before it picks up again?

Mr. NASSIKAS. The 1972 figure is the additional capacity scheduled for that year. No additional nuclear capacity is scheduled until 1976.

Senator Moss. I see. Well, really that would continue to represent, though, generation in those subsequent years, wouldn't it?

Mr. NASSIKAS. Yes; it would. It would continue to represent that. In the year 1976, if you take the 3,112 megawatts as the total, do you see that?

Senator Moss. Yes.

Mr. NASSIKAS. 1,712 megawatts is fossil. That is 55 percent of the 3,112 megawatts. Hydro is 260 megawatts scheduled additional capacity; that is 8.4 percent. Nuclear is scheduled at 1,140 megawatts or 36.6 percent of the 3,112 megawatts. Going across horizontally equals 100 percent.

Senator Moss. The other question I had is, I wonder where you got the proposed addition of hydro that would total 3,800 megawatts addition from 1971 through 1979?

Mr. NASSIKAS. I can furnish you further detail on that. Perhaps a member of my staff could see if they could supply it.

Senator Moss. I would appreciate that. I am not aware there was any potential like that for hydro.

Mr. NASSIKAS. All right.

The six major base-load coal-fired generating stations in the Four Corners area, which are principal objects of the current hearings, are projected for operation at high plant factors. They are identifiable

as follows: Four Corners, Fruitland, San Juan, New Mexico; Navajo, Page, Arizona; Mohave, Clark County, Nevada; Huntington, Price, Utah, and Kaiparowits, southern Utah.

Collectively, these plants are expected to comprise approximately 10,352 megawatts of installed capability, 22 percent of the total projected load of the Southwest Study Area in 1980, 47,950 megawatts. They will produce over 40 percent of the energy requirements of the area at that time, all of this on the assumption that these plants go ahead. If they don't go ahead, of course, obviously they are not going to supply this power.

In addition to these plants, approximately 3,000 megawatts of additional base-load capacity will be needed. Currently, planning studies are underway involving generating sites identifiable as the Cholla site, northwestern Colorado and southern Nevada. Generalized data for existing and projected additional fossil units currently under consideration are shown in a tabulation in my formal statement, which is a staff composite of coal-fired stations for the Southwest Study Area. That table shows that a total of 2,162 megawatts are now in operation at Four Corners. It also shows in each year the scheduled additions that our staff has analyzed by the various plants in that region through 1980 for a total of 14,750 megawatts through 1980.

In the aggregate, these tabulated coal burning plants will supply 31 percent of the 1980 load—14,750 megawatts to meet a load of 47,950 megawatts—and almost half of the 1980 energy requirements of the entire Southwest Study Area, according to staff projection; 7,172 megawatts of coal burning capacity is listed as being now in service or scheduled for initial operation before 1977. The plants making up this capacity are base-load facilities for which definite commitments have been made, and for which there are no planned alternatives. If these plants are not built or permitted to operate, or if installation dates are materially delayed, it would seem inevitable that electrical demands in the area will exceed the available capacity, and the corollary to that proposition is that electric demand may have to be curtailed.

Considering the limited time available before the output of new plants is vitally needed to carry loads, and considering the leadtimes required for installation of various types of generating capacity, it presently appears that there are no practical, realistic alternatives to the proposed coal-fired plants in the Four Corners area. Gas turbines have been effectively utilized for peaking and supplementary sources to base-load generation.

Currently, available types of gas turbines are not capable of sustained base-load operation without incurring the penalty of increased maintenance and probable shortened service life. Because of lower thermal efficiencies, they are less economic than base-load steam-electric capacity—fossil or nuclear—and consume relatively more fuel.

Gas turbines are a good alternate for peaking capacity. Some utilities in the East, because they are pressed for base-load generating capacity, have extended the utilization of gas turbines beyond the originally planned peaking service. Such operation is not a desirable alternative either from a standpoint of continued use, useful service lives, or ability to produce power in the required amounts. They are not useful alternatives, as I say, to base-load generation by other fossil fuel fired alternatives, as well as nuclear, of course.

Nevertheless, we have considered the gas turbine alternate here as we try to review all alternatives. They are less economic although today we sometimes tend to discount the economics in supplying power to the consumers and I would not wish myself to discount that factor, because to the extent that we build in required environmental standards, to the extent that we go to more expensive alternatives than might be necessary as a matter of technology, to that extent there will be added cost of power to the consumer, to the extent that economies of scale will not be able to offset increased costs. I can confidently predict that economies of scale will not offset the increased cost according to our present knowledge.

If we had the gas, it would be a viable option to using coal for generation. We don't. In fact, the Commission stated some time ago in order 431, a national proceeding which was designed to have all major pipeline companies present for Commission review their plans for curtailment of deliveries to their customers, what the priorities were with reference to service. We are continuing our evaluation of the various curtailment plans that have been filed with the Commission. Some of these have been accepted and have become a part of pipeline company tariffs, others are now in hearing while some are yet to be heard.

There is some hope, as we get into the latter half of this decade, 1975 to 1980, that we will improve our natural gas supply through additional exploration and development in the lower 48 States and the Outer Continental Shelf, which sources are necessary to meet the needs of the lower 48 States. There is also some hope for the development of our Alaskan and Arctic gas resources which are largely, almost totally, contingent upon whether or not TAPS will become a reality because most of the gas is in solution and can only be produced in conjunction with the oil.

There is also promise for supplementary gas in greater quantities from Canada. The annual rate of delivery of Canadian gas as of 2 years ago, when I testified before this committee, was somewhere in the range of 500 to 6.500 billion cubic feet annually. Last year it was 778 billion cubic feet annually. We are currently at an annual rate of about 900 billion cubic feet annually from Canada.

Another supplementary source in the 1975 to 1980 period that could be a reality is the possibility of baseload gas in liquefied form from foreign countries such as Algeria, Venezuela, Nigeria and others, such as Libya. Proposals for such importation from some of these countries are pending before the Commission. Apart from what action the Commission may take, the pending applications are in the order of magnitude of about 1 billion cubic feet daily, or pretty close to 400 billion cubic feet annually. If authorized, plans are now being formulated for the importation of about 20 billion cubic feet annually by 1980.

Then, of course, as the members of this committee so well know, perhaps a little bit beyond this time frame there is the possibility of extensive oil shale development in the lower 48 States, coal gasification toward 1980, closer to 1980 than 1975, and nuclear stimulation of tight reservoirs of natural gas. There are estimates that have been made by the Bureau of Mines of about 317 trillion cubic feet of gas that could be stimulated in tight formations by the use of nuclear stimulation. Yet we have the same extremely important problem to resolve before

we can rely on this source, and that is what are the environmental hazards to ourselves and to the ecology in comparison to the reward or benefit that might be obtained by additional gas.

I detail near the end of my formal statement the nuclear capacity in the Southwest energy study area. That capacity is indicated on another chart that I showed you earlier. Nuclear capacity does start becoming important here by 1976, although I don't discount the 330 megawatts scheduled for March of 1972.

In conclusion, I would like to state that power supply conditions in the Four Corners study region provide a dramatic example as to why regional and long range open planning have become essential conditions precedent to adequacy and reliability of electric bulk power supply in this Nation.

In the 1960's, electric utility resource planning underestimated in the forecasts of scheduled installation of facilities in relation to increased power demand. Environmental considerations and full compliance with the mandate of the Environmental Policy Act of 1969 must be recognized as part of the organic law of the land. These environmental considerations are part of system planning, engineering, and cost-benefit appraisals which are fundamental to the future course of the electric utility industry. In determining national power policy, we must recognize all congressional mandates and adopt practicable methods of resolving sometimes conflicting objectives, and I would like to add to that, yet meet the law.

In my judgment, there must be a resolution of these conflicting considerations through an articulation of what shall be our national energy policies and a provision for a governmental framework within which plant siting and utility operating questions can be solved fairly, timely, and upon a rational basis. I have recommended to the Congress the legislative steps which I favor to achieve these goals. They are set forth in the principles of the administration's powerplant siting bill which I supported in my testimony on May 6, 1971, before the House Subcommittee on Communications and Power.

Thank you.

I will welcome your questions, Mr. Chairman and members of the committee.

Senator Moss. Thank you very much, Mr. Chairman, for that fine statement that very extensively covered the area that we wanted to hear from you about on sources of power and demands for power.

How are the projections on which your statement is based compiled by the Power Commission? What is the source of your basic data?

Mr. NASSIKAS. Our basic data is submitted by various regional and technical advisory committees, screened by our regional offices that we have in various parts of the United States, referred to our staff in Washington for evaluation, for checking as to accuracy. Of course, we also have our own reporting mechanisms and devices through various reporting forms filed with our Commission. Form 1 is the basic electric utility financial reporting form. It provides us with financial and other accounting data. We also receive form 12 engineering reports. In addition, information is submitted in compliance with order 383-2 where we get our 10-year advanced forecast.

In addition to that, we also receive supplementary data on other reporting forms like form 67, in which electric utilities report to us

the types of fuels that are used in various plants in the United States, what their environmental quality is and what their probable impact is. We share this information on a coordinate basis with the Environmental Protection Agency, and we analyze and computerize this data on a joint basis.

Senator Moss. Does your staff make a critical review of the assumptions made by other reporting agencies?

Mr. NASSIKAS. I would hope so. I think we do. I think it is a critical and constructive review.

Senator Moss. In your appendix on page 2, you say:

In fact, indications are that the increased use of electrical energy for environmental control with powerplants and other installations will more than offset reductions in growth rate extending from conservation measures, cost increases and possible curtailments as a result of potential generation shortages.

Can you provide the underlying conditions for the record?

Mr. NASSIKAS. I would like to give you three or four examples which I believe form the basis of that staff evaluation in appendix A, and then see if we can supplement this by the staff.

It was mentioned earlier this morning when Mr. Pecora was testifying—I believe Senator Hansen asked the question—that you will need additional power for recycling of waste. Also, electric urban transit, which is perhaps more important currently on the east coast and the Midwestern part of the United States, is another area which requires a great deal of power. I don't know whether in Los Angeles they are going to reach the stage someday where there will have to be some type of electric transit for that area instead of the millions of automobiles which go in and out of that particular region.

There are, of course, sewage treatment and water purification programs and similar processes which require significant quantities of power. These are basically the three or four areas that I would mention that I think underlie the staff's observation here.

Now, Mr. Warren, who is the head of our Office of Environmental Quality, perhaps could supplement my comments with your indulgence, Mr. Chairman.

Senator Moss. Yes, I would like to hear from him.

Mr. WARREN. Mr. Chairman, as Chairman Nassikas indicated, there are a host of different kinds of activities all related to environmental requirements and controls which themselves involve the need for additional electrical energy. Sewage treatment plants are just one example which relates to improving water quality. These kinds of facilities of necessity have to be calculated as increasing electrical demand for the future.

The air quality and water quality related to powerplant generation itself is a consumer of electricity for which fuel supply and even plant capacity must be provided along with that needed for the net supply of electricity for outside customers.

The same is true of industrial plants installing air and water quality control and air pollution equipment. There are numerous industrial process conversions going from pollution type processes to those of less pollution which will be consumers of additional electric capacity.

Then, mass transportation in metropolitan areas is another thing. One could enumerate a number of other examples. It is rather difficult to postulate the total quantities of these. We endeavored to see

what it amounts to in terms of future demands. It is certainly in the realm of several percentages of additional electrical capacity that may be added in the coming decade.

Mr. NASSIKAS. I might add to Mr. Warren's comments that the Atomic Energy Commission in its gaseous diffusion plants to develop the uranium 235 requires as much power, I believe, as is required for a city of several million people.

Now, in that context we might suggest that nuclear power may be a better long-range environmental option than fossil fuels. Conventional nuclear capacity is needed for power supply as well as environmental improvement at least until the breeder reactors are perfected and operable.

Senator Moss. On pages 22 and 23 of your statement you indicate the power demand for the Four Corners area will be more than double in the next decade. I wonder if, for the record, you will provide a showing of the demand of energy growth in the area during the 1960 to 1970 decade?

Mr. NASSIKAS. Yes, we certainly will supply that.

Senator Moss. You mention in your statement that the Four Corners power complex is widely interconnected to other systems as far away as the Pacific Northwest.

Have you performed analyses of the total power needs of the interconnected system? In other words, is any consideration being given to managing the power needs of the West on a broader regional basis?

Mr. NASSIKAS. Yes, sir. The Federal Power Commission, as well as the reliability councils and the industry which has the primary responsibility for meeting those needs, is attempting to plan all power needs on a regional basis, interconnected basis, so that you do not have ad hoc building of generating facilities which are not consistent with long range utilization of either our water resources or our land or air or any of these precious resources which are all we have on this planet.

There have been some gains that have been made over the course of the past 2 or 3 years by the Western systems in the interchange of power. In fact, there are interchanges which reach out to British Columbia on a very modest basis, to be sure, but there are significant amounts of power from time to time that can be dispatched from British Columbia due to differences in diversity of load demands in that region.

I think that more and more of this, Senator Moss, should be done. I am not at all satisfied and I don't think that any student of this, including the utility industry, is satisfied with the progress that has been made in effecting essential long range interties between systems as well as an improved distribution network for the dispatch of power.

Senator Moss. Well, the Bureau of Reclamation in 1969 discontinued construction of its proposed transmission line between the Pacific Northwest and the Lake Meade area because there was no willing participants. How does this fact relate to the regional needs for power in the Southwest?

Mr. NASSIKAS. Ostensibly, when you have a discontinuance of an intertie, it would seem as though you may be weakening the integrity of the interconnected system. I would like to have my staff evaluate the reasons as to why that was discontinued. I don't know at this time why it was discontinued and whether or not there is an adequate substitute for it but I will be happy to supply a supplement for the record.

Senator Moss. I would appreciate that. I would like to have that in the record.

Mr. NASSIKAS. Yes, sir.

Senator Moss. In your conclusions you paint a rather grim picture in the event that coal-fired plants in the Southwest are delayed. If the plants are delayed because of public opposition and economics of environmental controls or inability to conform with State or local Federal law, what will be the result?

Mr. NASSIKAS. It depends on the extent of the delay, of course, and I know that is implicit in your question. Any delay which might be caused by the task force's overall review of the proposed projects in that region, in my opinion, are not going to cause a serious impact upon future power problems.

In other words, I think by completing that study as scheduled that this is not going to cause any serious problem in meeting the power needs of the West. We hope that reserves overall will be sufficient to meet the problem of the West in the course of the next 2 to 3 years.

The Pacific Northwest is something else again. We are almost in a marginal reserve situation there. I think the study that has been undertaken that considers all aspects on a comprehensive basis is absolutely essential. Our staff is participating in the study. Mr. Tomlinson, our chief engineer, and two other members of the staff are working on it. We endorse it and feel it is absolutely essential.

If, on the other hand, let's assume at the end of that study for some reason, whatever the reason may be, it is decided that none of these facilities should go forward. Let's assume the worst! They shouldn't go forward because it is not in the national interest for them to go forward. At that stage I cannot now suggest to your committee any viable option to meet the power needs as a substitute for those plants if they do not proceed.

I am hopeful and believe the plants can go forward, that the environmental safeguards, with added cost, will be adequate to meet the long-range plans to preserve the environmental integrity of the States involved as well as to supply the needed power. But I am not going to prejudge the results of that study. I am going to look at it objectively.

Senator Moss. But there is no alternative or contingency plan existing now in the event this is held up for a long period of time?

Mr. NASSIKAS. No, because the alternatives, which are not practical, were examined before the undertaking went forward. This is why I advocate long-range advance power system planning. To plan a power system requires 10 or more years of long-range planning in advance of need.

As an example, take a nuclear facility today, let's say 1,000 megawatts. From the time you plan it until you get that on the line with all tests, assuming you get over the hump of *Calvert Cliffs*, would, I think, take 8 years and it might be closer to a decade.

Senator Moss. Well, I appreciate it.

There is a vote in the Senate and I do know Senator Hansen at least had a question or two.

We will be in recess until 20 minutes after 3.

(Recess.)

Senator Moss. We will resume our hearing.

I appreciate it very much, gentlemen, and we are faced with a very serious problem, as the chairman has pointed out. Unless we can find a way to control the environmental factors here and get on with the additional generation of power, we are going to have a very serious deficiency in the Southwest region and this is widespread on to the coast and elsewhere.

Is that a pretty good summary?

Mr. NASSIKAS. Yes, sir; Mr. Chairman. May I say on behalf of my staff and my colleagues at the Commission that I appreciate the opportunity to testify before this committee and that we will be happy to respond to any questions by members of the committee.

Also, I would like to say in closing that I endorse Senate Resolution 45. I believe this searching inquiry into our energy utilization and allocation of resources should establish a more definitive basis for formulating a more comprehensive national energy policy and goals. I certainly stand willing and ready to assist the committee in any respect. Our staff has been participating and will continue to do so.

Senator Moss. Thank you very much, gentlemen.

(The following letter, received subsequent to the hearing, responds to a number of questions addressed to Mr. Nassikas.)

FEDERAL POWER COMMISSION

WASHINGTON

20425

OFFICE OF THE CHAIRMAN

December 10, 1971

Honorable Henry M. Jackson
Chairman
Committee on Interior and Insular
Affairs
United States Senate
Washington, D. C. 20510

Dear Mr. Chairman:

The accompanying supplemental materials are submitted in response to questions posed by Senator Frank E. Moss at the hearings of the Committee on Interior and Insular Affairs, November 10, 1971. I request their inclusion within the hearing record transcript by the inclusion of this letter. The various topics covered by these materials are identified in subsequent portions of this letter, in each case with an appropriate transcript reference to the hearing record page where the inquiry was posed. These materials, prepared or assembled by the Commission's staff, also include a minor correction to the data set forth in Appendix A to my prepared statement on November 10, 1971. That Appendix is entitled, "Federal Power Commission, Bureau of Power, Preliminary Report on Electric Power in the Pacific Southwest".

Supplemental materials transmitted by this letter are as follows. Transcript pp. 114-115 is a request for data covering projected hydroelectric capacity additions of 3,847 megawatts in the Southwest Energy Study Area

1971-1980. This total amount appears in the tabular presentation at p. 24 of my prepared statement.

The following table (No. 1) lists this projected hydroelectric capacity by unit addition, by state, size of plant, by year of installation, plant name, water sources and geographic location. These data are reported in the report of the Western Systems Coordinating Council to the Commission as a part of the Commission's nationwide program for adequacy and reliability of bulk power supply, Order No. 383-2, issued April 10, 1970, 43 FPC 515.

Also, in respect to p. 24 of my prepared statement, I would note that the reference in footnote 4 to "Cholla #2" should be corrected to read "Cholla #1".

Transcript p. 123 is a reference and inquiry to increased use of electric energy for environmental control and the relationship to rate of growth, cost factors and energy supplies. The inquiry was directed to Appendix A to my prepared statement, p. 2.

It should be observed that the generation, transmission and distribution of electric power supply not only has an impact on the environment, but, in many instances, power is an essential part of programs to preserve, protect and enhance the environment. It not only provides comforts and conveniences in the home, but it is at the heart of numberless techniques for environmental control. Electricity is required to operate the add-on equipment necessary to remove pollutants from the utility and industrial effluents. Additional quantities are usually required where industrial processes are changed to eliminate or reduce undesirable pollution. Electric power is required for processes which are designed to clean fuels prior to combustion. It is also essential in the handling of liquid

Table 1

Southwest Energy Study Area

1971-1980 Hydroelectric Additions to Generating Capacity
(From WSCC April 1, 1971 response to FPC Order No. 383-2)

State	MW	Year	Plant	Water Source	Plant Location
Utah	8	1978	Syar	Diamond Fork	20 miles SE of Provo, Utah
	33	1979	Dyne	Diamond Fork	20 miles SE of Provo, Utah
	90	1979	Sixth Water Creek	Sixth Water Creek	20 miles SE of Provo, Utah
Colorado	32	1975	Crystal	Gunnison River	14 miles east of Montrose, Colorado
	69	1975	Morrow Point	Gunnison River	20 miles east of Montrose, Colorado
	100	1975	Mount Elbert	Twin Lake	12 miles south of Leadville, Colorado
	11	1975	Otero	Clear Creek	18 miles south of Leadville, Colorado
Arizona	97	1971	Mormon Flat	Salt River	40 miles east of Phoenix, Arizona
	206	1972	Horse Mesa	Salt River	45 miles east of Phoenix, Arizona
	36	1973	Horse Mesa	Salt River	45 miles east of Phoenix, Arizona
	22	1973	Roosevelt	Salt River	30 miles NW of Globe, Arizona
California	11	1971	Foothill	2nd Los Angeles Aqueduct	Near San Fernando, California
	50	1971	Castaic	California Aqueduct	40 miles NW of Los Angeles, California
	12	1971	Castaic	California Aqueduct	40 miles NW of Los Angeles, California
	400	1972	Castaic	California Aqueduct	40 miles NW of Los Angeles, California
	200	1973	Castaic	California Aqueduct	40 miles NW of Los Angeles, California
	200	1975	Castaic	California Aqueduct	40 miles NW of Los Angeles, California
	200	1976	Castaic	California Aqueduct	40 miles NW of Los Angeles, California
	200	1977	Castaic	California Aqueduct	40 miles NW of Los Angeles, California
	60	1972	Devil Canyon	California Aqueduct	10 miles SW of Lake Arrowhead, California
	60	1976	Devil Canyon	California Aqueduct	10 miles SW of Lake Arrowhead, California

<u>State</u>	<u>MW</u>	<u>Year</u>	<u>Plant</u>	<u>Water Source</u>	<u>Plant Location</u>
California	50	1977	Terminal	West Branch of California Aqueduct	Near German, California
	550	1977	Black Star	Santiago Creek	10 miles NE of Santa Ana, California
	550	1978	Black Star	Santiago Creek	10 miles NE of Santa Ana, California
	200	1978	Piru Creek	Piru Creek/California Aqueduct	50 miles NW of Los Angeles, California
	400	1979	Piru Creek	Piru Creek/California Aqueduct	50 miles NW of Los Angeles, California

wastes. The thousands of municipal and industrial sewage treatment plants which will be required by law cannot function without considerable supplies of electric power. Electric power is essential to the existing and proposed processes for handling solid wastes.

The Commission staff estimates that the demand for electricity to power environmental control equipment to protect all sectors of the environment to handle major industrial process conversions, hastened by environmental pressures, is expected to reach a capacity of over 40,000 megawatts by 1990. An appropriate distribution of this projected required capacity can be seen in the following table (No. 2). Nationwide, the staff estimates that electrical capacity for environmental protection will be about five percent of the generating capacity to be added in the next two decades.

Transcript p. 125 is an inquiry relative to increased growth for electric power in the Southwest Energy Study Area in the decade of the 1960's. Page 22 of my prepared statement covers the projected growth 1970-1980.

The following tables (Nos. 3 and 4) cover the 20-year period 1960-1980. The first table (No. 3) shows yearly seasonal peaks (summer and winter), on an aggregate basis by year. The second table (No. 4) shows, for three years (1960, 1970 and 1980), and by states, summer and winter peaks and annual energy growth. Annual load factors are shown for each of these three years.

Table 2. Megawatt Capacity Required for Pollution Control 1990

	Air	Water	Solids
Steam Electric	307	14,300	
Industrial Boilers	10,300		
Industrial Processes	17,500		
Fuel Cleaning	30		
Industrial Process Conversion	17.5		
Sewage Treatment Plants		675	
Incinerators	22.5		1,250
Solid Waste Reclamation			
Total	28,177	14,975	1,250

Grand Total = 44,402

Table 3

Southwest Energy Study Area

Estimated August and December Peak Demands, Annual Energy, & Load Factors

<u>State</u>	<u>1960</u>	<u>1970</u>	<u>1980</u>
<u>AUGUST PEAK-MW</u>			
Arizona	1,674	3,499	7,383
Colorado	1,010	2,108	4,544
New Mexico	467	977	2,163
Southern California	5,467	13,343	28,403
Southern Nevada	179	666	1,420
Utah	607	1,204	2,319
Wyoming	275	724	1,718
Totals	9,679	22,521	47,950
<u>DECEMBER PEAK-MW</u>			
Arizona	1,258	2,360	5,215
Colorado	1,086	2,046	4,685
New Mexico	459	938	1,932
Southern California	5,925	13,251	29,158
Southern Nevada	223	544	1,260
Utah	621	1,152	2,083
Wyoming	296	587	1,739
Totals	9,868	20,978	46,072
<u>ANNUAL ENERGY-GWH</u> <u>1/</u>			
Arizona	8,417	16,839	36,664
Colorado	5,453	11,893	26,222
New Mexico	2,596	5,576	11,384
Southern California	33,547	77,978	167,874
Southern Nevada	969	3,285	7,499
Utah	3,808	7,166	13,683
Wyoming	1,884	4,398	10,522
Totals	56,674	127,135	273,848
<u>ANNUAL LOAD FACTOR-%</u>			
Total Area	65.8	64.4	65.2

1/ A GWH (gigawatt-hour) equals one billion kilowatt hours.

Table 4
Southwest Energy Study Area

Year	Seasonal Peak Demands ^{1/} (megawatts)	
	August ^{2/}	December ^{3/}
1960	9,679	9,868
1961	10,534	10,616
1962	11,464	11,450
1963	12,476	12,350
1964	13,578	13,320
1965	14,777	14,367
1966	16,082	15,496
1967	17,502	16,714
1968	19,047	18,027
1969	20,730	19,444
1970	22,521	20,978
1971	24,259	22,694
1972	26,195	24,550
1973	28,251	26,559
1974	30,469	28,732
1975	32,861	31,082
1976	35,440	33,625
1977	38,222	36,376
1978	41,222	39,352
1979	44,458	42,571
1980	47,950	46,072

^{1/} From information developed by the Western Systems Coordinating Council and the Federal Power Commission staff.

^{2/} 1960 and 1970 peaks are actual. 1961-69 are shown at the average annual growth rate of 8.83% which obtained. 1971-80 are shown at an assumed uniform annual growth rate of 7.85%.

^{3/} 1960 and 1970 peaks are actual. 1961-69 are shown at the average annual growth rate of 7.86% which obtained. 1971-80 are shown at an assumed uniform annual growth rate of 8.18%.

Transcript p. 127 is an inquiry directed to the impact upon Southwest area power supply of the failure of the Bureau of Reclamation to complete a direct current extra-high-voltage intertie from the Pacific Northwest to the area of Hoover Dam, the Celilo-Mead 750 kv d.c. line.

It is my understanding, based upon information which our staff recently received from personnel of the Bureau of Reclamation, that the Bureau and the Bonneville Power Administration will undertake a cooperative re-study of this line. This study, scheduled to be completed by March 1, 1972, will consider a number of factors, including costs, availability of resources and load requirements.

The subject high voltage d.c. line from Oregon to Hoover Dam appears as a transmission system addition on the projected transmission facilities map in the Federal Power Commission West Regional Advisory Committee report for the Commission's National Power Survey. The line also is shown with a proposed 1978 construction data on the transmission system map filed April 1, 1971, with the Federal Power Commission by the Western Systems Coordinating Council under the Commission's Order No. 383-2.

In 1969, the initial high voltage direct current line from the Celilo Station in Oregon to the Sylmar Station near Los Angeles had not been completed. This was the first such facility to be installed in the United States and went in service in the spring of 1970; there were many questions surrounding its design and operation; and there was no experience to indicate the degree of success which might be attained in comparison to equivalent alternating current facilities. Furthermore, high voltage d.c. circuits presently are suitable only for point-to-point power transfer, and methods for tap operation to supply wayside loads have not yet been devised.

At that time, alternating current circuit facilities were viewed by the utility engineers as the best means of meeting interconnection needs for at least several years after 1969. This reflects several factors: the then outlook for future power supply requirements, the accompanying need for additional generating capacity in the Southwest, the limitations in d.c. applications, and the lack of actual experience with d.c. operation both alone and in parallel with alternating current circuits.

Currently, projected loads and generating capabilities for the immediate future indicate that little surplus power will be available for export from the Northwest. In fact, the Northwest area may face significant problems in providing adequate capability to meet its own load requirements. Accordingly, our Bureau of Power staff does not believe it practicable to expect that construction of further Northwest to Southwest transmission facilities will be used to transmit excess power south in the near term. As additional generating resources are developed, the feasibility of the Celilo-Mead d.c. line may become more apparent.

The following table entitled, "Table 5 - Coal Burning Steam-Electric Generating Plants in Pacific Southwest" is the revised form of table which appears as Table 8 in Appendix A (pp. 23-25) to my prepared statement. The revisions reflect updated information. Since the earlier staff table was prepared, certain minor corrections have been indicated. Page 1 of the table corrects the unit capacity of the Four Corners plant from 785 to 795 megawatts. Page 2 supplies the ash disposal method of the Navajo plant, a canyon depository. Page 3 corrects the precipitator description data at the Four Corners plant and supplies the data for the Mohave plant.

TABLE 5 - COAL BURNING STEAM-ELECTRIC GENERATING PLANTS IN PACIFIC SOUTHWEST

Name of Plant Location	Four Corners Fruitland, N.M.	San Juan San Juan, N.M.	Navajo Page, Arizona	Mohave Clark County, Nev.	Huntington Near Price, Utah	Kaiparowitz, Southern, Utah
Existing Capacity, April 1971	572 (1963 & 1964) 795 (1969)	None	None	None	None	None
Planned Capacity Additions	795 (1969) None	#1 unit 345 MW None	#1 unit 770 MW 1974	#1 790 MW April 1971	#1 unit 430 MW 1974	Tenatively 3 units 2 250 MW 1978-80
		#2 unit 345 MW 1977	#2 unit 770 MW 1975	#2 790 MW Oct. 1971	#2 unit 430 MW 1977	Indefinite
		#3 unit 500 MW 1979	#3 unit 770 MW 1976			
Ownership of Plants	Southern Calif. Edison 48% Arizona Public Service 15% Salt River Project 10% Tuscon Gas & Elec. Co. 7% Public Service of N.M. 13% El Paso Electric Co. 7%	P.S. of New Mexico 50% Tuscon Gas & Electric Co. 50%	Los Angeles D of W & P 21.1% Salt River Project 21.7% U.S.B.R. 24.4% Arizona P.S. 14.0% Nevada Power 11.3% Tuscon G & E 7.5%	Los Angeles Dept. of W & P 20% Southern Calif. Edison Co. 56%	Utah Power & Light Co. 100%	Resources Corp. Arizona P.S. Co. San Diego G & E Co. Southern Calif. Edison Co. (Ownership Division N.A.)
Source of Fuel	Local Strip Mines	Local Strip Mines	Black Mesa Strip Mine via 80-mile slurry pipeline	Black Mesa Mines via 275-mile pipe-line	Local Mine Underground via 2-mile conveyor belt	Local Mine Underground via 10-15 miles from plant

1/ 1st unit is under test but not yet in commercial operation.

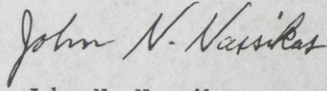
NOTE: N.A. -- Not Available

<u>Name of Plant Location</u>	<u>Four Corners Fruitland, N.M.</u>	<u>San Juan San Juan, N.M.</u>	<u>Navajo Page, Arizona</u>	<u>Mohave Clark County, Nev.</u>	<u>Huntington Near Price, Utah</u>	<u>Kaiparowitz Southern, Utah</u>
<u>Ownership of Fuel</u>	Navajo Tribal Council	USA Bureau of Land Management	Navajo & Hopi Tribal Council	Navajo & Hopi Councils	N.A.	N.A.
<u>Area of Service</u>	Service Areas of Owners Pacific S.W.	Central New Mexico & Tucson, Ariz. Area	Pacific S.W.	Pacific S.W.	State of Utah	Pacific S.W.
<u>Consumption of Water</u>	28.1 Cu. Feet/Sec. <u>2/</u>	N.A.	N.A.	N.A.	N.A.	N.A.
<u>Source of Water</u>	San Juan River	San Juan River	Lake Powell	Colorado River & water re-covered from slurry coal pipeline	Huntington Creek	Lake Powell
<u>Cooling Towers</u>	No	Yes	Yes	Yes	Yes	Yes
<u>Disposal of Heated Water</u>	To cooling pond	None	Lake Powell	None	N.A.	N.A.
<u>Disposal of Ashes</u>	Land Fill	In mine pits cover with spoil	Canyon Depository	Wet Pond	N.A.	N.A.

Name of Plant Location	Four Corners Fruitland, N.M.	San Juan San Juan, N.M.	Navajo Page, Arizona	Mohave Clark County, Nev.	Huntington Near Price, Utah	Kaiparowitz Southern, Utah
Temperature of Water Discharges	Units 1,2,3 -- 20°C rise. Units 4 & 5 -- 16.6°C Rise		N.A.		N.A.	N.A.
Installation & Operating Data on Precipitators	Units 4 & 5 have 97% eff. electrostatic precipitators. 99.5% eff. 99.2% equipment on Units 1,2,&3 by early 1972.	Hot side precipitator	--	-- 97% Eff. Electrostatic precipitators	--	--
Other Air Pollution Control Devices	Expect wet scrubbers to be installed on units 4 & 5 by end of 1973 to meet State requirements.	Expect to install wet scrubber in future, left for SO ₂ desulfurization equip.	--	--	--	--
Planned Control Devices		Design allows for Future installation of scrubbing, if needed.	--	--	--	--

If additional questions arise in connection with my prepared statement or oral testimony before the Committee, I shall be happy to answer them.

Sincerely, -

A handwritten signature in cursive script, reading "John N. Nassikas". The signature is written in dark ink and is positioned above the typed name.

John N. Nassikas
Chairman

Senator Moss. We will now hear from Dr. Stanley M. Greenfield, Assistant Administrator for Research and Monitoring of the Environment Protection Agency.

The question of environment is the most important factor we are dealing with here, so we are very glad to hear from Dr. Greenfield at this time.

STATEMENT OF DR. STANLEY M. GREENFIELD, ASSISTANT ADMINISTRATOR FOR RESEARCH AND MONITORING, ENVIRONMENTAL PROTECTION AGENCY; ACCOMPANIED BY: DONALD F. WALTERS, DIRECTOR, SPECIAL PROJECTS STAFF, OFFICE OF AIR PROGRAMS; S. D. SHEARER, DIRECTOR, DIVISION OF ATMOSPHERIC SURVEILLANCE, NATIONAL ENVIRONMENTAL RESEARCH CENTER; GORDON EVERETT, DIRECTOR, OFFICE OF TECHNICAL ANALYSIS, OFFICE OF ASSISTANT ADMINISTRATOR FOR ENFORCEMENT AND GENERAL COUNSEL; AND GEORGE ALLEN, DEPUTY ASSISTANT ADMINISTRATOR OF GENERAL ENFORCEMENT

Dr. GREENFIELD. Thank you, Mr. Chairman.

Senator Moss. If you would identify your associates and then proceed, please.

Dr. GREENFIELD. I will, indeed.

Starting on my left, I have Mr. Donald Walters, Director of the Special Projects Staff, Stationary Source Pollution Control program in the agency. Next to him is Dr. Shearer, Director of the Division of Atmospheric Surveillance at our National Environmental Research Center. On my right is Mr. George Allen, Deputy Assistant Administrator for General Enforcement, and next to him, Dr. Gordon Everett.

Senator Moss. Thank you very much. We welcome all of you here to the committee.

Dr. GREENFIELD. Mr. Chairman, I am pleased to have the opportunity to appear before you today to discuss the air pollution problems in the Southwest associated with the operation of fossil-fuel-fired generating stations. The committee's letter of invitation requested that our testimony deal with EPA's authorities to regulate emissions of air pollutants from such facilities and the adequacy of monitoring to determine the impact of power development on air quality in the Four Corners region. We will concentrate on these subjects, but we also feel the committee will be interested in the other steps we are taking to protect possibly the greatest scenic and most important recreational area of the Nation.

The Four Corners Interstate Air Quality Control Region which was designated last year includes parts of Arizona, Colorado, New Mexico, and Utah. Located in this 22-county area are six of the Nation's 35 national parks and slightly less than a fourth of our national monuments. Also now operating within its borders are seven fossil-fuel-fired generating plants. Public concern is directed not only toward today's air pollution problem from these facilities, but also toward the problems associated with projected power complex development.

The Air Quality Act of 1967 did not authorize the Federal Government to establish or enforce emission standards for stationary sources of air pollution. The States were charged with this responsibility. Prior to this year, the efforts of our predecessor agencies to achieve emission reduction from existing or planned powerplants were confined to encouraging the Department of the Interior to require the best commercially available control technology for plants built on Federal lands or using water resources under their control, and to encouraging State and local air pollution control agencies throughout support grants and technical assistance programs to adopt and enforce emission regulations.

With enactment of the 1970 amendments to the Clean Air Act, two new ways to deal with emissions from fossil-fuel-fired powerplants become available to us: national ambient air quality standards, including provision for implementation plans to achieve them, and standards of performance for new stationary sources.

Primary and secondary national ambient air quality standards have been promulgated for sulfur oxides, particulate matters, and nitrogen oxides—the three major pollutants from the coal- and oil-fired generating plants.

The States are now in the process of preparing implementation plans designed to achieve these standards. An essential ingredient of any implementation plan is emission control regulations for specific sources, coupled with adequate enforcement procedures. The States are required to submit these implementation plans to EPA for review by the end of January. In the event the States do not submit these plans, EPA is directed to prepare them. We are optimistic, however, that the four States sharing the Four Corners region will submit their plans on or before the deadline.

Because many States lacked the resources to prepare implementation plans in the 9-month period mandated by the act, we have provided them with manpower, and made available on a noncost basis a number of technical services, such as computer time and the gathering of emission inventory data. All four States have received such assistance.

Once the plans have been submitted, we will be in a position to make a judgment on the adequacy of the control strategy adopted to achieve the national primary and secondary standards.

National performance standards, which new fossil-fueled generating plants planned for construction in the Four Corners region will be required to meet, were proposed on August 17. They would apply to emissions of sulfur oxides, particulate matter, and nitrogen oxides for all new plants, and modifications made to existing facilities after the date on which the standards become effective.

With respect to control technology, more operating experience exists with the control of particulates than with sulfur and nitrogen oxides. Particulates are susceptible to control with conventional high efficiency dust collectors, such as electrostatic precipitators, baghouses, and scrubbers. Precipitators have been used almost exclusively to date at large installations. Baghouses offer the promise of more consistent particulate control; however, their application has been limited to a few pilot plant installations. The first baghouses for coal-fired boilers are to be installed on units 4 and 5 in 1972 at the Four Corners, N. Mex., power complex.

Several high efficiency scrubbers are scheduled for installation at coal-fired power stations. Manufacturers of this equipment are guaranteeing 99 percent or greater particulate removal, but none has yet been put into operation and tested. However, they are scheduled for installation on units 1, 2, and 3 at the Four complex.

In addition to the application of baghouses and scrubbers, electrostatic precipitators are being upgraded and refined to provide higher efficiency and more consistent control. Several units with rated collection efficiency greater than 99 percent have been installed in recent years. Our new source performance standards for large steam generators are based on demonstrated collection with electrostatic precipitators.

Stack gas desulfurization schemes and the use of low sulfur fuels are two means of controlling sulfur oxides. To date, the limestone scrubbing process has been demonstrated at various levels of reliability and efficiency in several large scale units with a demonstrated removal of 75 percent. Other sulfur oxides stack gas removal systems are being put into operation which may have advantages over the limestone system in that they produce a smaller quantity of solid and liquid waste and usable sulfur byproducts. These processes include magnesium oxide scrubbing, sodium sulphite scrubbing, and the catalytic oxidation process.

Reductions in emissions of oxides of nitrogen can be accomplished through modifications in combustion techniques. This is accomplished by various schemes which limit oxygen concentrations and reduce maximum temperatures in the fire box.

Neither the ambient air quality standards nor the performance standards can be enforced without adequate provision for monitoring. Our guidelines to the States on attainment of national ambient air quality standards require the establishment of monitoring networks. Each State in an interstate region would share in the cost and operation of the network in proportion to its population in the region. One of the requirements of the new source standards is the installation of continuous in-stack monitors. Information derived from these monitors would be made available to Federal and State officials.

The State of New Mexico currently operates several air monitoring stations in the area of the Four Corners complex. At the present time, EPA does not have any air monitoring network stations located in this general vicinity. The closest National Air Sampling Network Station is located in Rio Arriba County near Dulce, N. Mex.

Such a system must also be integrated with and complementary to the networks established as part of the implementation plans developed by each of the four States.

EPA will be investigating the nature and means of establishment of the most practical air monitoring network to yield continuing air quality data as one of its tasks in the Southwest Energy Study.

The objective of the study, announced by Secretary Morton on May 27, is to determine the economic, social, and environmental effects and the costs of developing the Colorado River Basin coal resources to meet a part of the energy needs of the Western States. The study is being conducted by an interagency task force headed by the Department of Interior. The time period covered will be from the present to 1990, when the maximum generating capacity now proposed would

be operational. The total projected capacity of these plants would be in approximately 7,000, 12,000, 20,000, and 30,000 megawatt stages.

The report of the task force, scheduled for distribution on or around April 1, 1972, will represent the findings of the Interior study team based on inputs from 12 work groups. EPA is responsible for the work groups investigating the current and future air and water pollution problems associated with energy production in the area. The air pollution work group is investigating such topics as characteristics of emissions, control alternatives, dispersion, and public health and welfare effects.

A detailed statement of the activities of both the air and water work group is contained in our outline which I would like to submit for the record.

(The document referred to follows:)

PRELIMINARY OUTLINE—SOUTHWEST ENERGY STUDY—WATER AND AIR POLLUTION
WORK GROUP

STUDY PLAN

I. Objectives

A. Identification of present and potential air and water pollution problems, by geographic area, resulting from southwestern power development.

B. Examination of control strategies to evaluate the effectiveness of abatement alternatives.

C. Evaluation of the adequacy of present air and water quality standards for preserving the environment of the impact area.

II. Air quality study plan

A. Identify existing Federal, State, and local control regulations.

1. Status of New Mexico emission regulations
2. Status of Arizona emission regulations
3. Status of California emission regulations
4. Status of Utah emission regulations
5. Status of Colorado emission regulations
6. Status of Nevada emission regulations

B. Describe current physical conditions of the impact area.

1. Determine existing air quality. Data input from EPA, NOAA, and the States will be analyzed.

2. Determine meteorological conditions. Meteorological data collection and analysis, and diffusion modeling, will be undertaken by NOAA. This will provide the base for determination of pollution concentrations in the impact area.

C. Describe alternative scenarios from the Interior input: 6,000, 12,000, 20,000 and 30,000 megawatt production level

1. Determine expected emissions (particulates, SO₂, NO_x) (Four Corners—present and future quantity of pollutants—all others projected.)

2. Determine trace metals and radioactive wastes. Evaluate. EPA will undertake limited sampling, and support from the USGS solid waste laboratories will be required.

3. Predict ambient air quality for scenarios. NOAA's input is prerequisite (diffusion modeling).

D. Assess local and regional impact for each production level.

1. On human health—Coordination with U.S. Public Health Service indicated. Part C above is a necessary input.

2. On animal life—wildlife and domestic—BSF&W input necessary.

3. On soil and vegetation—Coordination with Department of Agriculture.
 4. On precipitation quality—NOAA input prerequisite.
 5. Other.
- E. Synergistic effects.
- F. Identify and test alternative control strategies.
1. Describe alternative control strategies for each level of production.
 2. Test control strategies via diffusion modeling. This testing is necessary for assessment of control strategies. Within the given time and resources parameters, however, EPA will not be able to undertake more than minimal testing.
 3. Evaluate probable results of alternative control strategies.
 - a. Assuming existing technology
 - b. Projecting future technology
 4. Determine emission limits and compare with existing air quality standards.

III. Water quality study plan

- A. Evaluation of present and planned disposal methods of waste water resulting from power production.
1. Identification and definition of waste water problems associated with each level of power production.
 - a. Processes and/or sources which generate waste water
 - b. Composition of waste water
 - c. Assessment of present or planned technology for waste water disposal
 - (1) Summary of disposal methods planned for each plant site with adequacy evaluated for optimal need.
 - (a) Description
 - (b) Efficiency
 - (2) Environmental problems associated with cooling towers.
 - (a) Wet towers
 - (b) Dry towers
 - (3) Environmental problems associated with other types of cooling.
 - (a) Ponds or private lakes
 - (b) Canals
 - d. Potential impact waste water return on surface groundwater.
 - (1) Impact on quantity of water for other uses.
 - (2) Analysis of return flows and precipitation quality.
 - e. Existing water quality standards
 - (1) Status of Federal-State standards
 - (2) State standards for intrastate waters that may be affected
 - (3) Adequacy of standards vis-a-vis biota and other uses
 - (4) Alternative waste disposal methods necessary to achieve water quality objectives
- B. Evaluate water pollution problems related to coal mining
1. Description of mining plan for each level of power production
 - a. Amount and use of water
 - b. Source of water
 2. Impact of water removal on sources
 - a. Present quality and use of water sources
 - b. Projected changes in water quantity related to optimal mining needs
 - (1) Short-term
 - (2) Long-term
 - c. Projected changes in water quality related to optimal

Mr. GREENFIELD. Specific tasks derived from the preliminary outline are divided into phase I and II. Phase I consists of those elements of the outlined material which can be completed on the basis of available

information as of December 20. Phase II, which we expect to complete about March 1, 1972, consists of the remaining elements and interpretations of material not now on hand and requiring field and laboratory work or modeling and analysis.

In keeping with your request, I have limited my presentation today to the air pollution aspects of current and future fossil fueled electrical power generation in the Southwest. If you wish we would be pleased to outline the water quality aspects of this problem at some future date.

I would be happy to answer any questions that you may have.

Senator Moss. Well, thank you very much. We may indeed wish to have you direct your attention to the water quality problem as well as the air standards.

We were having a discussion earlier about standards that have been issued for sulfur oxides and nitrogen oxides in addition to particulate matter. Are there Federal standards on all three of those now?

Dr. GREENFIELD. There are Federal standards concerning ambient air quality for all three now. The new source standards were proposed and published on August 17, and they are awaiting final promulgation.

Senator Moss. I see. That is, the new source performance standard have not been finally promulgated by EPA yet?

Dr. GREENFIELD. That is correct.

Senator Moss. I see. Now, you pointed out that the scrubbers and the baghouses were to be added to the Four Corners plant. What is the time of installation? What deadline do we have for the scrubbers and the baghouses?

Dr. GREENFIELD. The baghouses on units 4 and 5 are to be installed in 1973. I made a mistake in saying 1972. It is 1973. The schedule for units 1, 2, and 3 calls for December 10 for the first scrubber, December 28 for the second, and January 1 for the third.

Senator Moss. And that is January 1 of 1972?

Dr. GREENFIELD. Yes.

Senator Moss. So by the first of the year those scrubbers should be in?

Dr. GREENFIELD. That is correct.

Senator Moss. I see. The testimony at our field hearings seemed to imply that the rapid evolution of air quality standards introduced unacceptable uncertainties in the planning of powerplants considering the lead times involved. What is your reaction to that general point of view?

Dr. GREENFIELD. The air quality standards which EPA has promulgated place the onus on the States to come up with implementation plans. They are the ones that have to decide what the emission standards should be to meet the air quality standards. The stationary source standards, on the other hand, when they are promulgated will apply primarily to new plants or major modifications in old plants.

From the standpoint of emission standards for new stationary sources, there should be no difficulty, as devices to meet them are folded into the design of the plant. Plants currently in existence may be affected by ambient air quality standards, because in order to meet them, a State implementation plan may have to require modifications in a facility or in its operation.

Now, you are asking whether or not the standards that we promulgate are "final" or "ultimate" standards. As you know, the Clean Air Act of 1970, requires EPA to set primary ambient standards based on health effect, protecting the public health. The standards that we promulgated were based on the information we had at the time they were promulgated.

We essentially set standards based on what we could stand behind in terms of effects on public health. This does not mean that our research on the effects of air pollutants for public health have stopped. We are, indeed, accelerating this work. If we find that the protecting of the public health requires more stringent standards, we are charged by the law to promulgate those in the future.

Senator Moss. Well, we cannot necessarily expect to get to stability then, or there might be still revisions down the road on standards as your research is completed. Is that correct?

Dr. GREENFIELD. There certainly might.

Senator Moss. There was also some discussion about the standards of Clark County, Nev., being more stringent than the national standards. By the way, do you know what the standards are that are required in Clark County?

Dr. GREENFIELD. Yes, I do. The Clark County standards on particulate emissions requires 0.075 pounds per million B.t.u. for large units such as the Mohave plant and the standards for sulfur emissions require 85-percent control for large units. In addition, 0.5-percent sulfur content for fuel is called for.

If you look at the sulfur regulation, they are calling for 0.5-percent sulfur content in the fuel. This would meet our new source standard regulation. Our new source standard regulations, if they hold up through the proposal, are 0.8 pounds of sulfur for 10^6 B.t.u.

The Clark County regulations are calling for 0.5 percent sulfur and 10,000 B.t.u. per pound of coal. The Federal regulations more than adequately meet that standard.

As far as the particulates are concerned, our proposed regulations call for a tenth of a pound per million B.t.u. on particulates, which is somewhat greater than the 0.075 pound per million B.t.u. that Clark County, Nev., calls for.

Senator Moss. You say it is greater. You mean more stringent?

Dr. GREENFIELD. It is less stringent.

Senator Moss. How does this convert into removal of particulates? We were using this measure earlier.

Dr. GREENFIELD. All right. To convert this you have to know, for example, the percentage of fly ash, and the B.t.u. content per pound of coal. The numbers we have for the coal used at the Mohave are 9 percent ash and about 10,000 B.t.u.'s per pound. Converting this into percentage removal, it calls for at least 99.2 percent removal.

Senator Moss. About 99.2 percent on the coal being used at Mohave?

Dr. GREENFIELD. Yes.

Senator Moss. Now, in this situation where both Clark County and the State of Nevada are involved, which jurisdiction has the ultimate responsibility to enforce the standards?

Dr. GREENFIELD. I think I prefer to call on Mr. Allen, who is intimately involved in that subject.

Mr. ALLEN. Yes, sir. The implementation planning process is a joint responsibility of the Federal Government and the States. The Federal Government has the obligation, legally, to approve or disapprove the State's implementation plan from the point of view primarily of whether it realistically and acceptably provides for the attainment of national ambient air quality standards within the time frame specified by the statute.

If the basic plan is disapproved, or if portions are disapproved, the Federal Government is required to promulgate in lieu of the disapproved provisions.

Once that is done, the States are required to be the primary enforcers of the plan as approved. The Federal Government has a continuing responsibility under the law to enforce a plan if a State fails to enforce it.

This will be a continuing process of State and Federal joint responsibility, the State responsibility being the primary responsibility, the Federal responsibility being a secondary responsibility.

The Federal Government is directly responsible for enforcing the new source performance standards that we also talked about. The law specifically provides for a delegation of the enforcement responsibility to a State which meets guidelines that the Federal Government may establish to provide at least broad configurations for the enforcement scheme that the State proposes to use. We have announced that we will favor delegation where States indicate that they want to enforce the new source standards.

So, again, in the area of the new source standards, States will probably in most instances end up as the primary enforcement jurisdiction.

Senator Moss. Then if the State did not enforce, the Federal Government would go into Federal court to enforce the standards?

Mr. ALLEN. The procedure laid down, Mr. Chairman, is that the Federal Government gives the State a 30-day notice that an emitter is not complying with emission standards. If the State doesn't enforce it within that period the Administrator of the Environmental Protection Agency issues an order requiring the emitter to bring his facility into compliance. That order the law provides shall give reasonable consideration to the emitters good faith and other factors that should be considered in deciding how quickly it should be brought into compliance.

Now, if the administrative order is disobeyed, then there is provision for injunctive relief and for a civil penalty against the violator.

Senator Moss. And that would be carried by the Federal Government, if necessary?

Mr. ALLEN. It would be the Federal Government if necessary, and in all events exclusively if a State did not wish to receive a delegation of enforcement of authority under the new source performance standards.

Senator Moss. Thank you.

In the outline in your appendix, Mr. Greenfield, you indicate the plan to determine prospective air pollutant emissions at various levels of production, up to 30,000 megawatts.

Will the southwest energy study also report on predicted ambient levels of air pollutants at production levels up to 30,000 megawatts?

Dr. SHEARER. Mr. Chairman, in the context of that question, as one of the tasks in the air pollution study group of the Southwest energy

study, EPA in connection with NOAA is looking into the meteorological dispersion and diffusion aspect of emissions from the powerplants at the various levels of production. Calculations and estimations will be made of maximum source receptor concentrations which may likely result from the emissions under various meteorological conditions.

Senator Moss. Well, would your study of ambient air pollutant concentrations take into account the combined and cumulative effects of the operation of all five or six plans?

Dr. SHEARER. Yes, a part of the task will be to estimate the combined interaction of the emissions from the various plans.

Senator Moss. Will you be in a position by April, when the report is to be made, to state with certainty whether or not under production levels predicted in 1985 that the Federal ambient air quality standards will be met?

Dr. GREENFIELD. It will be very difficult for me to do that, Mr. Chairman, for the simple reason that the models that are available today are not the best, and we do not have the time between now and March 1st to create and construct a new model. At best, these models give an answer within a factor of two, but even that must be qualified.

So, in answer to your question, I will say we will have some answers but they will be filled with a degree of uncertainty. We are not going to be able to state definitely what the ambient air qualities will be in a particular form.

Senator Moss. We heard in the Albuquerque hearings that 700,000 tons of lead in the fly ash will be buried when the fly ash is buried. Have you evaluated the danger of lead poisoning from the leaching of this material into the waters of the Colorado?

Dr. GREENFIELD. No, we have not.

Senator Moss. Will that be part of the study?

Dr. GREENFIELD. The answer is "No," Mr. Chairman, not as currently planned.

Senator Moss. It is not scheduled to be part of the study?

Dr. GREENFIELD. That is right.

Senator Moss. Are the stated efficiencies of particulate removal devices applicable to particles of all sizes or are certain sized particles not amenable to collection by current devices?

Dr. GREENFIELD. Certain sized particles are not amenable to collection by most of the devices now available. They are the particles below two microns.

Senator Moss. But they make a notable flume, is that correct?

Dr. GREENFIELD. Yes. You can see them in smoke.

Senator Moss. What is the state of research and technology of reducing them and being able to get down to the smaller particles?

Dr. GREENFIELD. There are, in laboratories, very fine filter techniques for removing very small particles. There have not been demonstrated, to my knowledge—I ask my staff to correct me if I am wrong—they have not been demonstrated as efficient ways of removing particles at the plant sizes we are talking about.

Senator Moss. Are these particles more dangerous to human health than larger ones?

Dr. GREENFIELD. They are from the standpoint that the nostril keeps particles above 1 micron from getting down into the lungs. Particles between 1 micron and .01 micron are retained by the lung.

Senator Moss. Is there any technology of combustion that would tend to reduce the number of smaller particles that come into the stack?

Dr. GREENFIELD. Unfortunately, once again, to my knowledge, and I may be wrong, in most of the combustion areas we are talking about, the particles that finally are emitted are the ones that are very small. So, if you are talking about condensation products as opposed to larger particles, you are going to wind up with a greater number of smaller particles.

Now, let me check to make sure I stated this correctly. Does anyone else have any information on this?

Mr. WALTERS. I might make the point that the collection devices do pick up some of the smaller particles but their efficiency falls off rather rapidly as you get to 2 microns.

Senator Moss. It is not totally effective, and the efficiency declines very rapidly, is that correct?

Dr. GREENFIELD. That is correct.

Senator Moss. The point was raised in some of our field hearings that the industry was not expending the amount of money for air pollution control research that could be expected. What is your evaluation of the efforts being made by industry in research?

Dr. GREENFIELD. I can talk primarily to the effort we have in EPA in conjunction with industry. We have a program in air pollution control technology which is approximately \$21 million plus additional money that is carried over from last year. Industry contributes about an additional \$10 million, so, the total program is on the order of \$35 million, with industry contributing about one-third of it. There are joint projects and jointly funded grants to get at, for example, SO₂ technology.

Senator Moss. Well, do you consider that sufficient for industry or should industry be contributing a larger amount?

Dr. GREENFIELD. We would love to see industry contribute a larger amount. I might add here that most of the technology, most of the capability to contribute, probably is contained within the very industries that are the greater polluters. So, the need is to provide some sort of incentive, either through regulatory methods or joint grants and demonstration contracts to enhance their contribution.

Senator Moss. What are the primary areas that need strengthening in this research on the whole question of air pollution?

Dr. GREENFIELD. I think the NOX area is certainly one that needs additional research. The ability to find a more adequate means of removing all sulfur, the ability to get at the small particles of matter, the ability to get mercury out of the vapor coming out of the stack, the ability to get at essentially a lot of the trace elements we see coming out of the stack.

Senator Moss. Are you doing research on coal in that area for these trace elements—mercury, uranium, and others?

Dr. GREENFIELD. Not at the present time. We are doing research in areas such as low-B.t.u. fluidized coal gasification in conjunction with the Department of the Interior, where our interest is particularly in how you clean up the gas during the gasification process.

One of the things that is interesting us now is getting at the higher temperature cleanup as you go toward a more efficient use of the coal gasification technique.

Senator Moss. There were several witnesses who expressed their concern about the emissions of the powerplants in this region on vegetation in the Four Corners region. Does EPA have data on the actual impact of existing powerplants on plants in the region?

Dr. GREENFIELD. Not at this time.

Gordon, would you like to answer that?

Dr. EVERETT. We are working with the biota work group on the Interior study in an analysis of the available data. Working group reports from the initial parts of the Interior study, what we have called phase I, are due in December. They will be largely an analysis of data on hand. In our phase II work, as Dr. Greenfield described, we do have additional laboratory and field studies to supplement the things we do not have in the file at the present time.

In addition, the Interior Department, with the various collaborating agencies, has developed deficiencies in research, basic data that we do not have, which must be made up in a thorough environmental analysis of the problem. As a consequence, through its contact with the National Science Foundation, the RANN program, there is a plan to develop fairly extensive studies over a period of time to further supplement the data that we will not have by the end of our phase II study, and the end of the whole Interior study.

Senator Moss. Is there an overall Federal responsibility to monitor the air in all of this region, the Four Corners region, and to monitor emissions?

Dr. GREENFIELD. As part of the Southwest energy study, we are trying to come up with plans providing this type of monitoring capability in conjunction with the States. We have a limited number of stations in that area. We feel they should be supplemented.

The general rule of thumb that EPA has followed in the whole monitoring area is to work in close conjunction with the States in helping them produce statewide monitoring networks. We are providing funds, personnel, and some analytical capabilities, and we want to continue this and enhance this even more in the Four Corners area.

Senator Moss. Do I understand, then, that in the overall plan that the State might have certain areas of monitoring and others might be filled in directly by EPA?

Dr. GREENFIELD. Possibly some stations would be run directly by EPA, but in addition we will be working with the State in the various plants and the monitoring stations we have also. Particularly in the analytical capability and considering a certain standard.

Senator Moss. You would pool your data, in any event, to get a picture of air and water quality in the overall region, is that correct?

Dr. GREENFIELD. Yes.

Senator Moss. Is the time factor between your beginning of this monitoring and the time when the report must be completed, or is expected to be completed, adequate to get the data you need?

Dr. GREENFIELD. Well, among people who collect data, Mr. Chairman, no time is ever adequate to get all the data that you need. We felt, however, that it was necessary to extend field study beyond the December 20 date to acquire some measure of information on what was happening in the field, over that which we had in the file. We felt that in a lot of the areas concerning air and water pollution, it was not adequate just to go to the files. We had to get additional informa-

tion through sampling of what was going on, particularly in the meteorology area as well as the baseline data. This does not give us full baseline data by any measure, and we visualize long-term monitoring in that area as being absolutely essential to understand what is going on.

Senator Moss. In addition to air and water pollution problems, do you concern yourself with the landscape such as the strip mining that is done to get the coal?

Dr. GREENFIELD. Currently the land reclamation is not part of our responsibility. I might add for the record, Mr. Chairman, that Dr. Everett just pointed out to me that the trace element problems you inquired about before are part of the work being done by the USGS.

Senator Moss. The Senator from Arizona, do you have any questions?

Senator FANNIN. Thank you, Mr. Chairman. Dr. Greenfield, I am sorry I wasn't here to hear your full testimony, but I have been going through your statement. I understand through the association of NSF with your agency that you furnish the guidelines and then expect the States to carry through the programs. Isn't that your goal, to have the States go ahead and adopt standards and work toward the end you have set down for them?

Dr. GREENFIELD. On the ambient air quality standard, which I assume you are referring to—

Senator FANNIN. Yes.

Dr. GREENFIELD. We have the responsibility of promulgating ambient air quality standards. The States then have the responsibility of coming up with an implementation plan.

Senator FANNIN. In other words, the ambient air quality standards must meet your standards, but they can go beyond it?

Mr. ALLEN. The answer is emphatically yes. The law specifically states the State is not preempted in any sense by the Clean Air Act from enforcing a more stringent standard.

Senator FANNIN. You feel if they meet your standards, we will be well on our way toward solving the serious problems we have in that particular area, is that right?

Dr. GREENFIELD. The data we have presently pertaining primarily to the health of human beings lead us to believe that the standard we have promulgated will protect public health. By no means, however, are we saying that, that is the final word on protecting people's health. The research data that were available to us at the time provided the foundation for the current ambient air quality standards.

Senator FANNIN. If technology were perfected whereby you could do more, and if standards are met, it is the best that could be done with present technology, is that right? From a practical standpoint, taking into consideration both economics and environmental considerations, these standards have been reached, is that right?

Dr. GREENFIELD. From the standpoint of ambient air quality, that is correct. If you talk about a new source, the standard is based on proven technology and takes into account economic considerations as well.

Senator FANNIN. You take the consideration that we have a dual obligation; that is, to meet the needs in the power field as well as to do everything that you feel is practical from the standpoint of the environment.

Now we have a particular problem with the shortage of natural gas. That has been brought up several times today. So, as we look forward, this is going to be even a more serious problem, as I watch in my own State the curtailment of use of natural gas—for instance, on water pumping and many other areas of industrial activity—and conversion back to electricity.

Not too many years ago we converted just the other way, going from electricity to natural gas because it was lower cost. Now with the shortage of natural gas, we have the serious problem of converting back to electricity. Looking into the problem that we have in my particular State, I see a very serious problem as they convert back to electricity.

I imagine this is something that you will be concerned with because this certainly aggravates the problem of getting these plants on the line and into productive power.

On page 3, you say with respect to technology, more technology exists. I commend you for going forward as rapidly as you have, but I think you do have the goal of reaching this balance. I think from your testimony that it just can't be done overnight. We must be patient, isn't that true?

Dr. GREENFIELD. We certainly don't expect this to happen overnight. For that reason, there is always a timetable that you hope to develop with the States, with the various industries, so that they go forward toward this at a reasonable pace.

Senator FANNIN. I noticed several times today when we talked about the problems reaching a certain level, it has been mentioned that it goes beyond the 99 percent. I noticed you said the power stations that manufacture this equipment are guaranteeing 99 percent or greater particulate removal, but none have been in operation or tested.

I noticed in some of the plants they are talking about, such as the Navajo plant they are talking about, reaching 99½ percent. But, then if they go beyond that, sometimes it is almost impossible from the standpoint of cost.

Now, this is fly ash removal. You reach that 99½ percent, and if you try to go beyond that, isn't it almost impractical with present technology?

Dr. GREENFIELD. The new source standards that we hope to have out shortly take into account proven technology. In other words, in terms of new source emission standards, the only standards that we point to are ones that can be reached by proven technology. As the technology advances, then the standards will be changed.

Senator FANNIN. I understand that. But with the present technology, and I know naturally it depends upon the fuel and the coal that is available in the Four Corners area, ash content of about less than 8 percent and a sulfur content of about fifty-one one-hundredths, about a half percent, that they will expect with the fly ash to be able to remove about 99½ percent. Do you feel that is adequate?

Dr. GREENFIELD. That meets our standards; that is correct. I have to hasten to add that we are talking just about emission standards, not ambient air quality standards. The actual emission standards that a State might promulgate based on our ambient air quality standards, are part of their implementation plan.

Senator FANNIN. I can see why you would require monitoring networks, and this would be not only throughout the State, but I imagine be regional monitoring too. The air certainly isn't belonging to any one State; the particulates do travel to other States.

How do you handle the situation such as we have where we are bordering on México, for instance? How do we handle a problem of that nature? Are we working with the Mexican Government or with Canada? I am talking really about the State of Arizona; across the line we have operations in Mexico. Are we working with the Mexican Government in that regard?

Dr. GREENFIELD. The consensus at the table, Mr. Fannin, is that we have had some discussions but certainly no agreements.

Senator FANNIN. You are just not that far along?

Dr. GREENFIELD. That is correct.

Senator FANNIN. Well, thank you very much.

Senator Moss. Well, thank you very much, Dr. Greenfield and gentlemen. You have helped us greatly, and we appreciate your testimony; and as I indicated earlier, if we have further questions, we will send them down.

We now stand adjourned, subject to the call of the Chair.

(Whereupon, at 4:15 p.m., the hearing was adjourned, subject to the call of the Chair.)



