CALVERT CLIFFS COURT DECISION

HEARING

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 CONSTRAINTS AND THE GENERATION OF NUCLEAR ELECTRIC POWER: THE AFTERMATH OF THE COURT DECISION ON CALVERT CLIFFS

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CALVERT CLIFFS COURT DECISION

WEDNESDAY, NOVEMBER 3, 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, Gravel, Allott, Jordan, Hansen, Hatfield, Stevens, Bellmon, and Baker.

Also present: Jerry T. Verkler, staff director; William Van Ness, chief counsel and study director; Charles Cook, minority counsel; and Thomas Nelson, assistant minority counsel.

Senator Moss. The committee will come to order.

OPENING STATEMENT

Today's hearing is being conducted pursuant to Senate Resolution 45, which authorizes a study of national fuels and energy policy.

The purpose of the hearing is to explore the short- and long-term implications of the decision of the U.S. Court of Appeals in *Calvert Cliffs Coordinating Committee et al.* v. *Atomic Energy Commission.*

This decision represents a major interpretation of congressional intent regarding the National Environmental Policy Act of 1969. The procedures and ground rules for the licensing of nuclear powerplants have been significantly affected, and the implications for other Federal licensing programs are yet to be determined.

The Environmental Policy Act is a very broad statute which has introduced new responsibilities into the basic mandates of almost every Federal agency. Each agency has programs and activities with peculiar problems and circumstances. The way in which the general provisions of the act are implemented by a particular agency must be elaborated in rules, procedures, and practices. As in any significant new Federal function, the process of implementation will require some difficult determinations. The court decision we are discussing today involves one such determination.

The committee is concerned with understanding the reasons for the decision and the probable impact which it will have. We will be concerned with the way the ultimate results relate to the original objectives of the act.

Improving environmental decisionmaking is a desirable and necessary common goal which challenges our political and legal institution. This challenge is perhaps greatest when it comes to the balancing of social benefits and social costs of energy—especially the generation, distribution, and use of electrical energy.

Some of the important questions which the committee wishes to explore are:

What is the status of efforts to comply with the court decision?

What is the magnitude of the impact of the decision?

What delays are anticipated and how many plants are affected?

What will be the practical effect of the decision upon short-term reliability of the Nations power systems?

What are the long-term implications of the decision for the atomic energy program and for other licensing programs of the Federal Government?

The committee looks forward to hearing the views of the witnesses on this and other questions.

We have an outstanding list of witnesses to be heard today and we are anxious to get testimony from all of them. Before beginning I would like to insert the text of the National Environmental Policy Act in the record at this point.

Public Law 91-190
91st Congress, S. 1075
January 1, 1970

An Act

83 STAT. 852

To establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Environmental Policy Act of 1969".

National Environmental Policy Act of 1969.

PURPOSE

SEC. 2. The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

TITLE I

DECLARATION OF NATIONAL ENVIRONMENTAL POLICY

Policies and goals.

SEC. 101. (a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may—

(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

(3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

(5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

(6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

Administration.

SEC. 102. The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall—

(A) 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;

(B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on—

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

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

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5. United States Code, and shall accompany the proposal through the existing agency review processes;

Copies of statements, etc.; availability.

81 Stat. 54.

(D) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(E) 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;

(F) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(G) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

(H) assist the Council on Environmental Quality established by title II of this Act.

Review.

SEC. 103. All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this Act and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this Act.

SEC. 104. Nothing in Section 102 or 103 shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

SEC. 105. The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies.

TITLE II

COUNCIL ON ENVIRONMENTAL QUALITY

Report to Congress.

SEC. 201. The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, manmade, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban, and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the Nation in the light of expected population pressures; (4) a review of the programs and activities (including regulatory activities) of the Federal Government, the State and local governments, and nongovernmental entities or individuals, with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; and (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation.

Council on Environmental Quality.

SEC. 202. There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve at his pleasure, by and with the advice and consent of the Senate. The President shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainments, is exceptionally well qualified to analyze and interpret environmental trends and information of all kinds; to appraise programs and activities of the Federal Government in the light of the policy set forth in title I of this Act; to be conscious of and responsive to the scientific, economic, social, esthetic, and cultural needs and interests of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment.

SEC. 203. The Council may employ such officers and employees as may be necessary to carry out its functions under this Act. In addition, the Council may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this Act, in accordance with section 3109 of title 5, United States Code (but without regard to the last sentence thereof).

80 Stat. 416.

Duties and functions.

SEC. 204. It shall be the duty and function of the Council—

(1) to assist and advise the President in the preparation of the Environmental Quality Report required by section 201;

(2) to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information for the purpose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in title I of this Act, and to compile and submit to the President studies relating to such conditions and trends;

(3) to review and appraise the various programs and activities of the Federal Government in the light of the policy set forth in title I of this Act for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the President with respect thereto;

(4) to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation;

(5) to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality;

(6) to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes;

(7) to report at least once each year to the President on the state and condition of the environment; and

(8) to make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the President may request.

SEC. 205. In exercising its powers, functions, and duties under this Act, the Council shall—

(1) consult with the Citizens' Advisory Committee on Environmental Quality established by Executive Order numbered 11472, dated May 29, 1969, and with such representatives of science, industry, agriculture, labor, conservation organizations, State and local governments and other groups, as it deems advisable; and

34 F. R. 8693.

(2) utilize, to the fullest extent possible, the services, facilities, and information (including statistical information) of public and private agencies and organizations, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the Council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

SEC. 206. Members of the Council shall serve full time and the Chairman of the Council shall be compensated at the rate provided for Level II of the Executive Schedule Pay Rates (5 U.S.C. 5313). The other members of the Council shall be compensated at the rate provided for Level IV or the Executive Schedule Pay Rates (5 U.S.C. 5315). Tenure and compensation. 80 Stat. 460, 461. 81 Stat. 638.

SEC. 207. There are authorized to be appropriated to carry out the provisions of this Act not to exceed $600,000 for fiscal year 1970, $700,000 for fiscal year 1971, and $1,000,000 for each fiscal year thereafter. Appropriations.

Approved January 1, 1970.

LEGISLATIVE HISTORY:

HOUSE REPORTS: No. 91-378, 91-378, pt. 2, accompanying H. R. 12549 (Comm. on Merchant Marine & Fisheries) and 91-765 (Comm. of Conference).
SENATE REPORT No. 91-296 (Comm. on Interior & Insular Affairs).
CONGRESSIONAL RECORD, Vol. 115 (1969):
July 10: Considered and passed Senate.
Sept. 23: Considered and passed House, amended, in lieu of H. R. 12549.
Oct. 8: Senate disagreed to House amendments; agreed to conference.
Dec. 20: Senate agreed to conference report.
Dec. 22: House agreed to conference report.

Senator Moss. Our first witness is our colleague and member of this committee and one who has certainly been involved in environmental problems, especially in the National Environmental Policy Act that is the basis for the inquiry today and we are glad to have him appear as the first witness, the Honorable Mike Gravel, U.S. Senator from the State of Alaska.

STATEMENT OF HON. MIKE GRAVEL, A U.S. SENATOR FROM THE STATE OF ALASKA

Senator GRAVEL. Thank you very much.

Mr. Chairman, I am pleased to speak on some of the ideas I had in mind in supporting Senate Resolution 45.

This hearing is to inquire into the short-term and long-term implications of the *Calvert Cliffs* decision.

Unless that decision is circumvented by AEC acceptance of unexamined power emergency claims, the short-term implication is clearly a temporary moratorium on the construction and operation of nuclear powerplants. The court said in part 5 of its decision:

> In order that the preoperating license review be as effective as possible, the Commission should consider very seriously the requirement of a temporary halt in construction pending its review . . ."

This should come as no surprise to the utilities. A year and a half ago, the AEC explicitly warned that, "Many safety issues remain to be resolved or to be better understood before a substantial number of these plants [having construction permits] will be able to be licensed for operation." That is from testimony, to the Joint Committee, March 11, 1970, by the AEC's Director of Reactor Technology and Development, Milton Shaw.

The long-term implication of the court decision may be a permanent halt to the nuclear electricity program. The court said in part one of its opinion, "This requirement, section 102(2)(D) of the National Environmental Policy Act . . . seeks to insure that each agency decisionmaker has before him and takes into proper account all possible approaches to a particular project including total abandonment of the project . . ." The "total abandonment" phrase is the court's, not mine.

HOW TO EVADE THE CLEAR MANDATE

The October 4, 1971, memo from the Edison Electric Institute which was provided to the committee makes it clear that the utilities do not yet intend to give serious consideration to the short- and long-term moratorium implications of the decision. I quote from the EEI paper entitled, "Preliminary Study of Effect on Nation's Electric Power Supply of AEC Regulations to Implement National Environmental Policy Act".

It reads:

> Finally, a large reduction in the amount of scheduled nuclear capacity will play havoc with maintenance schedules . . . its effect on system reliability will be felt long after the nuclear capacity is eventually placed in operation.

The EEI assumption seems obvious enough: the nuclear capacity will eventually be placed in operation.

In other words, the EEI seems to take the position that there are no serious nuclear problems which need public discussion in the additional studies required by the law.

If the additional analyses required by the court are considered by industry to be a procedural obstacle and mere paper clutter signifying nothing, then it is no wonder that AEC Chairman Schlesinger reported October 20 that he has received "a fair amount of advice on how to evade the clear mandate of the Federal courts." I hope we won't be hearing any of it today.

THE PROBLEM FOR CIVILIZED MEN

No one has any business behaving as if the problem were getting these nuclear plants into operation in spite of the court decision. In fact the problem is to solve the undeniable complications created by keeping such dangerous machines out of operation until a reliable emergency cooling system is proven, until a safe place is demonstrated for storing their indestructible radioactive wastes for the next several thousand years, and until there is assurance that permanent radioactive poisoning of the planet will be prevented.

I am not alone in pointing to the unsolved safety problems of nuclear electricity. On October 20, AEC Chairman Schlesinger pointed to quite a few in the following order—these are taken from his speech to the Atomic Industrial Forum American Nuclear Society conference:

One, "The shortage of experienced personnel" and lack of "adequate technical knowledge" in the utilities.

Two, "The large engineering extrapolations" in reactor designs.

Three, The failure of many nuclear engineering firms to assemble "the needed resources of qualified personnel."

Four, Industry's "Reason to blush regarding some aspects of quality assurance" in piping, pumping, welding—which are central in disaster-prevention from nuclear electricity.

Five, "The lack of a comprehensive set of regulatory safety criteria and industry standards relating to the safety of nuclear powerplants."

Six, in one devastating sentence, Chairman Schlesinger acknowledged that "Good answers still have to be provided regarding safety, transportation, and waste management."

As far as I can determine, there still is no report to back up the AEC's June "Interim Criteria" which allegedly compensate for emergency cooling deficiencies.

As far as I can determine, there is no AEC refutation or even public response to the two independent studies—July and October—by the Union of Concerned Scientists on emergency core cooling problems. The second report is a 28-page heavily documented technical analysis of what is wrong with the AEC's interim criteria for safety. The report concludes with the following statement:

> Reactor safety with respect to major accidents and consequent widespread damage and loss of life is in a very unsatisfactory state. The interim criteria make no adequate remedial contribution and can serve only to prolong public exposure to extreme risks. The situation should not be allowed to persist. We wish to emphasize the continuing importance of the recommendation of our earlier paper: A total halt to the issuance of operating licenses for nuclear power reactors until safeguards of assured performance can be provided.

The authors of that report include a nuclear engineer and two nuclear physicists. I am submitting both their reports for this hearing record.

IGNORING THE PROBLEM

In the face of several serious and undeniable nuclear safety problems, it is breathtaking to watch utilities advertise nuclear powerplants as proven safe, and to see the industry bend its efforts to expedite licensing of 61 additional nuclear plants by 1975.

Have the utilities ever refuted M. A. Schultz, professor of nuclear engineering at Penn State, who has said:

> Better gear notwithstanding, when we talk about 50 reactors, the statistical probability of something going wrong and an accident occurring is an absolute certainty . . . Mathematically, this is a certainty, and in a short finite period of time . . . I'm saying that there will be accidents. My feeling is that they will be minor accidents.

The Union of Concerned Scientists argues that they may be truly major accidents, has anyone refuted the rest of Professor Schultz' warning? I hope it will not be ignored by any of today's witnesses. I would like to submit the full statement of the Union of Concerned Scientists for this hearing record.

Senator Moss. That may be printed.

Senator GRAVEL. Thank you.

(The reports referred to by Senator Gravel are in the appendix 1.)

The reliability of components is what concerns Professor Schultz. The reliability of human operators is what concerns Dr. Edward Teller. Perhaps some of today's witnesses, and the utilities, and the AEC licensing boards will try to counter the warning of Dr. Teller about supposedly foolproof systems? Dr. Teller said:

> With the greater number of Simians monkeying around with things that they do not completely understand, sooner or later a fool will prove greater than the proof even in a foolproof system.

There have been a number of accidents at experimental reactor facilities, writes Dr. Walter Jordan, professor of nuclear engineering and former Assistant Director of Oak Ridge Laboratory, in the October 1971 issue of Nuclear News:

> All of the previous accidents can be laid to human error, which is surely the most likely cause of accidents in the future. However, the critics rightly point out that other causes must be considered, such as mechanical failure, natural disaster, sabotage, and nuclear attack . . . There has not been a serious accident at a commercial plant in the U.S., but the accumulated experience is only 100 reactor-years—not a very consoling number when the target is at least 10,000 reactor-years.

Surely such facts must be fully discussed under the mandate of the *Calvert Cliffs* decision.

Where has anyone in industry or government paid necessary attention to the opinion of the 1970 Nobel laureate in physics, Dr. Hannes Olof Alfvén, who says:

> In my opinion, the dangers associated with the fission energy have not received necessary attention . . . if a reactor goes out of control, the consequences may be terrible. Even if extreme safety precautions are taken, the large quantities of radioactive material in them constitute a permanent danger. . . . In a full-scale fission programme, the radioactive waste will soon become so enormous that a total poisoning of our planet is possible. Under such conditions, safety margins which are acceptable in other fields are inadequate.

Dr. Alfvén's opinion has been widely read—most recently it was published in the September 1971 issue of the Bulletin of Atomic Scientists, from which I submit it for the record of this hearing. It certainly pertains to the National Environmental Policy Act and the *Calvert Cliffs* decision far more fundamentally than mere, unsupported claims of "power crisis."

Today's witnesses know what I know: that the 61 nuclear plants—53,000 megawatts—listed by the Edison Electric Institute will produce enough radioactive plutonium in 1 year to give 22 trillion people the maximum lifetime body burden of that poison, and that the same 61 plants will also produce in 1 year 150 times more long-lived radioactive fission-products than this country's entire load of fallout from the atmospheric bomb tests. The arithmetic is in my July 8 statement about the President's energy message. This comes to the equivalent of fissioning 50,000 Hiroshima bombs in a single year.

These 61 plants represent a commitment which will affect men for all time, and responsible men should err on the side of utmost caution, and not be stampeded by cries of power emergency.

A SPECIAL DUTY

For one reason or another, today's other witnesses occupy positions of great power in this country. They are lucky enough to have good jobs, and good minds, and probably superior educations. They represent a group of human beings gifted in special ways. Because they are bright and informed about the dangers which the public does not necessarily see, and which are definitely not appreciated by half of the population, these men have a special obligation to speak out loudly and clearly, to rock the boat if necessary, to take some personal risks on behalf of the human race. The ultimate decadence of civilized men is to perceive a danger to mankind, and then fail to act.

THE REAL ENGINE OF CONCERN

Informed leaders certainly know about the nuclear hazards. They cannot claim innocence, at least not after the past year. What consideration could possibly carry greater weight with such men than the utmost caution when considering a commitment to the annual production of 22 trillion lifetime body burdens of plutonium? What considerations could possibly argue against implementation of the temporary moratorium recommended for consideration in the *Calvert Cliffs* decision?

I submit that the answer is money.

If Congress passed a relief bill this afternoon guaranteeing to refund money and profits lost on the nuclear investment, and to hold utilities blameless for possible power rationing, I bet the pressure to license those 61 nuclear plants would vanish.

In other words, I believe the real engine of concern over the *Calvert Cliffs* decision is the desire to recover a large investment.

Furthermore, I consider this quite a natural phenomenon in a private enterprise system, and not something which needs covering up in an elaborate charade about duty to meet the public's demand for air-conditioners and antipollution equipment.

On the contrary, the financial and job losses resulting from a moratorium, or a "halt in construction" as the court calls it, very badly need to be talked about openly, honestly, and sympathetically right here in this committee today and in additional hearings, so that Congress may know how to provide relief for both investors and employees. The monetary implications of the *Calvert Cliffs* decision must be considered with fairness and candor.

It would be both intellectually dishonest and a waste of precious time to pretend that money is not important in a hearing on the *Calvert Cliffs* decision.

A THREE-POINT ACTION PROPOSAL

In a private enterprise system, the basic question is obviously who needs to get paid what, in order to make certain publicly desirable things happen?

If civilized men agree that it is desirable not to rush into a technology which might ruin the planet, and if we also agree that it is desirable to obey the laws and the courts, then I suggest the following three-point action proposal for discussion here and elsewhere:

One, acceptance of delays in nuclear operating permits and a halt to construction, plus congressional provision of appropriate financial relief to affected investors and employees.

Two, full and fair examination of the alleged power emergencies.

Three, an all-out popular campaign to make the disruption of electrical service minimal, to make the conservation of electricity maximal, and to lead a successful crash program to deliver on the immediate and future alternatives to nuclear electricity.

I don't believe the first point needs any further elaboration.

With regard to the second point, AEC Chairman Schlesinger has the power to demand a very careful examination of the alleged regional power "emergencies" which might result from nuclear licensing delays and a halt in construction. He does not have to cave in to claims as superficial and inscrutable as the Edison Electric Institute "preliminary study" dated October 4, 1971, just because predecessors did so.

In its decision, part V, the court refers to the AEC's argument that the "national power crisis" militates against delay in the construction of nuclear power facilities. The court was not especially persuaded by this argument. It stated explicitly in part III of its ruling, "Whether or not the specter of a national power crisis is as real as the Commission apparently believes, it must not be used to create a blackout of environmental consideration in the agency review process."

Can a construction or operating permit possibly be justified before each utility applicant provides a detailed supply-and-demand accounting with regard to the following questions?

One, what kind of customers are presently buying their power, and what are they using it for? The standard "household/commercial," "industrial," and "transportation" categories are lamentably inadequate to predict the effects of regional rationing, for instance.

Senator Moss. Could I interrupt just a minute? Some of the members of the committee would like to follow this.

Do you have any additional copies of your statement?

Senator GRAVEL. Unfortunately, you have the only additional one. We are Xeroxing them now and I only have one small Xeroxing machine and we finished this very late last night.

So I apologize to my colleagues in this regard.

Senator Moss. They will be down shortly, I take it?

Senator GRAVEL. Yes, Mr. Chairman.

Senator Moss. You may proceed. But it is hard to follow a lengthy statement and an intricate one such as you are giving, and it would be helpful if we had copies.

Senator GRAVEL. I appreciate that and I will provide copies.

Senator ANDERSON. What material do you have that we can look at?

Senator GRAVEL. Copies are being prepared now, and I apologize for not having them before you at this moment.

Senator ANDERSON. Well, aren't you familiar with the rules of the Senate?

Senator GRAVEL. Yes.

Senator ANDERSON. Why don't we have the presentation?

Senator GRAVEL. Because mechanically it was impossible for me to get it done with the amount of staff I have in this area.

Senator Moss. All right. You may proceed, Senator, and complete your statement.

Senator GRAVEL. Thank you.

The second question, what customers were expected to use the delayed nuclear capacity, and for what purposes? It should not be assumed that, in the case of regional rationing, that air conditioners, and antipollution equipment, and other real contributors to the quality of life should be the first to go.

Three, what effect would a reduction of peak-load demand have on the need for additional generating capacity?

Four, what effect would a redesign of presently promotional rate-structures be likely to have on regional demand?

Five, is the utility still advertising or otherwise promoting increased use of electricity? If not, when did it desist?

Six, what effect would the installation in new buildings of gas heating and cooling, instead of electrical heating and cooling, have upon regional demand?

Senator Moss. Thank you.

We have the copies now.

Senator GRAVEL. Thank you.

I am on item 6 near the bottom.

Seven, what effect would the use of solar collectors for homes have on regional demand?

Eight, what effect would better insulation for new buildings have on regional demand?

Nine, what effect would the recycling of metals and other materials have on net industrial demand for electricity?

Ten, what effect would higher electrical efficiency in better designed industrial machinery and home appliances have on demand?

Eleven, what effect would the use of highly efficient fuel cells have on power supply per unit of fuel?

Twelve, what effect would a national power grid have on power supply?

If Dr. Schlesinger already possesses such information, he should make it public certainly before ruling whether or not to suspend present permits and licenses.

I might add that it is obvious that some of the measures implied in the above questions could and would come into effect in 4 years or less,

if people understand that the 53,000 additional megawatts of nuclear electricity planned for 1975 are not going to be on hand.

The third part of my action-proposal means a redirection of corporate ingenuity—away from trying to circumvent the court decision and forcing nuclear power into premature operation.

In view of the inherent hazard of nuclear fission, such an industry attitude might lead rapidly to a Government takeover.

Instead of pushing nuclear power, corporate ingenuity is needed in a crusade to minimize the disruption of electrical service as a result of a nuclear moratorium, to maximize the conservation of electricity, and to pursue actively the immediate and future alternatives to nuclear power.

ENLIGHTENED SELF-INTEREST

In closing, I would like to say that the *Calvert Cliffs* decision should not be regarded with hostility by business. It is likely to protect every business in this country. One big nuclear accident killing thousands of people, creating millions of radiation refugees, and contaminating up to 15 States the size of Maryland, would almost certainly result in the immediate shutdown of every single nuclear powerplant in the Nation.

What would that do to business, to the stock market, and to the gross national product if meanwhile nuclear power had become a significant source of the country's energy?

Enlightened self-interest should line up every business and chamber of commerce behind the *Calvert Cliffs* decision, behind the utmost caution with regard to nuclear electricity, and behind an immediate moratorium on further nuclear operations—coupled with government financial relief for the affected investors and employees.

Thank you, Mr. Chairman.

Again, I want to apologize to my colleagues for the delay in getting you copies of my statement.

Senator Moss. Well, thank you for your statement and we are glad to have the copies now.

I notice you have a bibliography of articles that you refer to and they will be included by reference in the record; and if you will supply copies, we will have them in the committee file to go with the transcript that you made here today.

Senator GRAVEL. Thank you.

Senator Moss. Your statement indicates that you have done a great deal of research and a lot of thinking about this matter. It consists primarily of a warning against possible nuclear contamination.

You, I think, sort of assumed that this committee or others, at least, were opposing the court decision of *Calvert Cliffs* which may not necessarily be valid. We are trying to find out what its effect will be and what, if any, policies we ought to adopt in view of that.

I think your statement is helpful in calling to our attention many of the matters that must be considered by us and of course by industry, by everyone involved with this power problem in our country, especially with the generation of power by nuclear means.

I am sure that it will be helpful to have your position stated clearly in our record.

Now, some of my colleagues may have some questions.

Senator Anderson?

Senator ANDERSON. It has been a long time since the statement began and I have been studying this. Why is this matter here before this committee?

Senator MOSS. It is here because Resolution 45 charged this committee, along with ex officio members from some of the other Senate committees with studying this whole question of power and so-called policy that we need in generating power and distributing power in our country.

The energy study, now, as a facet of that, we are confronted with the decision that was made by the Federal court in the *Calvert Cliffs* case extending the building of a nuclear powerplant as part of bringing energy to a section of our country and that is how the jurisdiction happens to be here.

We are not examining the nuclear part as such, but it is the whole energy generation and distribution problem that we are considering under the Senate resolution.

Senator ANDERSON. Are you familiar with the Senate rule about 24 hours in advance on the statements?

Senator GRAVEL. Yes, I am.

Senator ANDERSON. And why wasn't it carried out?

Senator GRAVEL. I stated earlier, because I did not have the technical capacity. Because I am a younger Senator, I can't get anybody specifically working on this under Senate rules.

We just worked overtime, and we got it as best as we could to this committee. I apologized once, and I will apologize again for the delay.

Senator ANDERSON. What other witnesses do you have who are going to testify?

Senator GRAVEL. The witnesses this committee brought forward. I am merely giving my views, what I feel on this subject.

Senator MOSS. Senator Allott?

Senator ALLOTT. I have no questions at this time.

Senator MOSS. Senator Bible?

Senator BIBLE. I regret I didn't hear the Senator's testimony and I haven't read it as yet; I have no questions at this time.

Senator MOSS. Senator Jordan?

Senator JORDAN. I think I heard the Senator say there was 25 percent surplus of power in the United States now, did you say that?

Senator GRAVEL. Yes.

Senator JORDAN. Where is it, we would all like to know.

Senator GRAVEL. Distributed in various areas that have overcapacity, while we have deficiencies in areas that have undercapacity. With the establishment of a power-grid around the country, then areas that have a low peak-demand could transfer their power to areas that have high peak demands. In the overall country, we have an oversupply of 25 percent.

Senator JORDAN. Would you supply that for the record.

Senator GRAVEL. I would be happy to.

Senator JORDAN. I would like to see it.

Senator GRAVEL. I will not only supply it for the record, but I will see that it is delivered to your office personally, Senator.

(The information referred to follows:)

In winter 1970, Federal Power Commission Chairman John N. Nassikas testified to Congress that electric generating "reserves of 15 to 20 percent are generally considered normal to guard against unexpected equipment failures and

higher peak loads than predicted * * *. The net dependable capacity of the 48 contiguous States is 326,667 megawatts, with an estimated peak demand of 257,419 megawatts." That leaves a surplus capacity of 27%. A national power grid would reduce the need for big cushions in every locality.

Senator Moss. Senator Hatfield?

Senator HATFIELD. No questions.

Senator GRAVEL. One further point. The President of the United States, in establishing priorities, raised the amount of money going to the fast-breeder reactor. I would like to quote one paragraph in the statement he made September 26, 1971 at Hanford, Wash.:

> That is why, as far as the particular matter is concerned, in terms of nuclear power, we must not be afraid, we must explore it. We can't be sure what it is going to produce, but, on the other hand, we know that by exploring the unknown, we are going to grow and progress in a way that will be good for all Americans and for all people in the world.

I would submit that the *Calvert Cliffs* decision is a more circumspect view of the problem in question. Thank you.

Senator Moss. Thank you, Senator Gravel, we are glad to have your statement, and you are a member of this committee, and you may come up and join us and sit here.

Our next witness will be the Honorable Russell Train from the Council on Environmental Quality, Executive Office of the President. We are pleased to have you with us today, Mr. Train, and we look forward to your comments. We will have some questions, perhaps, that we would like to put to you.

STATEMENT OF HON. RUSSELL E. TRAIN, CHAIRMAN, COUNCIL ON ENVIRONMENTAL QUALITY, EXECUTIVE OFFICE OF THE PRESIDENT, ACCOMPANIED BY DR. GORDON MacDONALD AND TIMOTHY ATKENSON

Mr. TRAIN. Thank you. I am accompanied by Dr. Gordon MacDonald, member of the Environmental Quality Council, on my right; and the General Counsel of the Council, Mr. Timothy Atkenson, on my left.

Senator Moss. We welcome you, gentlemen, too, to the committee.

Mr. TRAIN. Mr. Chairman, members of the committee, it is particularly appropriate that your committee, which authored the National Environmental Policy Act in the Senate and is conducting an important study on national fuels and energy policy, should review the implications of the recent *Calvert Cliffs* decision of the U.S. Court of Appeals for the District of Columbia Circuit.

As you have already noted, this decision has direct bearing on the relation between public policies on energy and the environment. As a result of this decision that its procedures did not measure up to the requirements of the National Environmental Policy Act, the AEC has promptly and responsively revised these procedures and before the end of this month will make available for expert agency and public comment revised draft environmental impact statements on 19 priority cases where facilities are close to startup or already in partial operation.

I will be followed this morning by Commissioner Doub of the Atomic Energy Commission, who can give you a much more detailed description of the over 100 licensing actions AEC has on its agenda

to handle under the new procedures and of these new procedures themselves. I propose to focus my remarks on four more general questions that can be asked about the *Calvert Cliffs* decision and its implications:

1. What role is being played by the courts with respect to the National Environmental Policy Act?

2. Can we afford the *Calvert Cliffs* type of environmental review of nuclear plant licensing, with all its potential for delays, in view of our energy problems and requirements?

3. What implications does the *Calvert Cliffs* decision hold for the environmental impact analysis procedure of NEPA?

4. How does the *Calvert Cliffs* decision fit into the general problem of powerplant siting and energy policy?

Turning to my first question, "What role is being played by the courts with respect to the National Environmental Policy Act?" I will note briefly some of the points developed more fully in our chapter on "The Law and the Environment" in our Second Annual Environmental Quality Report transmitted by the President to the Congress last August.

With your permission, I am submitting the full text of this chapter for inclusion in the record.

(The report referred to by Mr. Train is in appendix 1.)

Mr. TRAIN. One clear conclusion is that court decisions have given very effective teeth to NEPA. Almost without exception courts have concluded that the NEPA section 102 environmental statement procedure is court enforceable at the suit of interested parties. If this conclusion had not been reached we would have lost a very potent means for enforcing your intent in the enactment of NEPA.

I might also comment that the position taken by the courts in this respect is in line with their treatment of other environmental protection provisions as in the scenic Hudson decision of the second circuit in 1965—which construed the Federal Power Act—and the *Overton Park* decision of the Supreme Court this year—which construed section 4(f) of the Transportation Act.

A second conclusion is that these decisions have strengthened the prospect that government will take citizen concern and participation into account before important decisions are reached and, if necessary, justify the reasonableness of the handling of environmental issues. Summarizing the developments that have given our citizens new power to test the actions of Government affecting the environment, I have commented:

> I submit that we now have an "Environmental Ombudsman" system in being. It will take citizen initiative, more than superficial concern about environmental values, and a sense of responsibility in using these potentially powerful new tools to achieve results we can be proud of. But our message to citizens concerned about the environment is that we are willing to take the risks of being open to delay and the requirement of justifying major government actions affecting the environment to the public, and to a court if need be, because we put high values on both environmental quality and on the contribution on informed and active public can make.

There is a great deal more that can be said about the court decisions constituting NEPA. For the most part we think they have been sound and good evidence of the capacity of our institutions—in

this case the law and the courts—to apply the national environmental policies you have set to specific problems. But it is also true that we are still in an early state of court application of NEPA.

The *Calvert Cliffs* decision was one of the first Federal appellate court constructions of the environmental impact statement requirement and there have been no Supreme Court decisions yet. Taking all the results, and including many in which no opinion was written, we find no evidence that the courts are not continuing to make a careful, case by case, application of this new law.

I turn to my second question, "Can we afford the *Calvert Cliffs* type of environmental review of nuclear plant licensing—with all its potential for delays—in view of our energy problems and requirements?"

Given the dimensions of our future power needs and the reliance we expect to place on nuclear power to help supply these needs, I am tempted to reverse this question and ask "How can we afford not to subject our Government decisions about nuclear power to the NEPA type of environmental analysis and testing?"

In the next two decades we must make wise decisions about over 300 giant new powerplants. As the President's energy message of June 4 indicates, we will be putting heavy reliance on nuclear power as a source of economical clean energy. Today nuclear power involves analysis of significant environmental impacts—including a large scale need for cooling water with attendant thermal pollution and other environmental problems, the proper control of cumulative radiation into the environment, reactor safety, and satisfactory arrangements for disposing of spent fuel. We cannot expect to have public confidence in the decisions we make on handling these impacts without the sort of analysis and comment process required by NEPA.

At the same time we must do everything in our power to see that the analysis and comment process is performed in a responsible and timely way. Since the *Calvert Cliffs* decisions, AEC under its new procedures has brought extensive environmental capabilities from its laboratories into the NEPA environmental analysis process. It is mobilizing its staff for expeditious action and has established procedures in emergency power need situations for permitting partial operation of newly constructed facilities which the NEPA analysis goes on.

We on our part are working with AEC and the other Federal agencies involved to achieve prompt expert comment on the new environmental statements and coordination with other Federal decisions involved such as the Refuse Act water quality permits and dredge and fill permits of the Corps of Engineers.

In one respect—in the treatment AEC should give water quality certifications by State and regional water quality agencies made under section 21(b) of the Water Quality Improvement Act of 1970—we advocate legislation now to modify the result reached in *Calvert Cliffs*.

As I have informed the Senate and House Public Works Committee and your staff, we think the level of water quality treatment approved in a properly qualified state or regional water quality agency certification under section 21(b) of the Federal Water Pollution Control Act or a Refuse Act water quality permit approved by

EPA should dispose of the water quality issue so far as AEC is concerned and that NEPA should not compel AEC to "second guess" the agencies responsible for water quality. We have proposed an amendment to the Federal Water Pollution Control Act to achieve this result.

Mr. Chairman, I should note that since the preparation of this statement, yesterday on the floor the Senate adopted an amendment to the water quality legislation proposed by Senator Baker to achieve just this objective. That was approved, as I noted, by the Senate.

Senator Moss. That is true, I am glad you noted that.

(Text of floor debate on November 2, 1971, and amendment follows:)

[From the Congressional Record, Nov. 2, 1971]

Mr. BAKER. Mr. President, I send to the desk an amendment and ask that it be read.

The PRESIDING OFFICER (Mr. NELSON). The amendment will be read.

The legislative clerk proceeded to read the amendment.

Mr. BAKER. Mr. President, I ask unanimous consent that further reading of the amendment be dispensed with.

The PRESIDING OFFICER. Without objection, it is so ordered.

The amendment is as follows:

On page 183, line 2, insert the following new subsection:

"(d) The requirements of the National Environmental Policy Act of 1969 (83 Stat. 852) as to water quality considerations shall be deemed to be satisfied—

"(1) by certification pursuant to section 401 of this Act with respect to any federal license or permit for the construction of any activity which may result in any discharge into the navigable waters of the United States; and

"(2) by certification pursuant to section 401 of this Act and the issuance of a permit pursuant to section 13 of the Act of March 10, 1899, or section 402 of this Act with respect to any federal license or permit for the operations of any activity which may result in any discharge into the navigable waters of the United States.

Mr. PASTORE. Mr. President, may we have order?

The PRESIDING OFFICER (Mr. NELSON). The Senate will be in order. Will those Senators who wish to carry on conversations retire to the cloakroom? The Senate will be in order. We will not proceed until the Senate is in order.

The Senate is not in order.

The Senate is still not in order.

The Senator from Tennessee will proceed.

Mr. BAKER. Mr. President, I must say that is the most "in order" I have ever heard in the Senate.

Mr. President, the purpose of this amendment is to clarify the relationship between the Federal Water Pollution Control Act, as this bill would amend it, and the National Environmental Policy Act of 1969.

Section 21(b) of the existing Federal Water Pollution Control Act provides that any Federal agency charged with the responsibility of issuing a Federal license or permit for the conduct of any activity which may result in any discharge into the navigable waters of the United States must, prior to the issuance of such license or permit, receive certification from the State in which such activity will be conducted that the activity will be conducted in a manner that will not violate water quality requirements. Section 21(b), with minor changes, appears as section 401 of the pending bill, S. 2770.

The National Environmental Policy Act of 1969—Public Law 91–190—vests in any Federal agency having jurisdiction over any action significantly affecting the quality of the human environment as affirmative duty to weigh environmental impact in determining whether a given action should proceed and, if so, how such an action can minimize its impact on the environment. The issuance of a license or permit by any Federal agency, when the activity licensed or permitted results in a discharge into the Nation's waters, is clearly one of the kinds of actions embraced by the National Environmental Policy Act—NEPA.

In July of this year the U.S. Court of Appeals for the District of Columbia handed down a far-reaching, and as yet unreported, decision in what has become known as the "Calvert Cliffs" case (U.S.C.A., D.C., — F. 2d. —, July 23, 1971). In its opinion the Court said, in part:

"NEPA mandates a case-by-case balancing judgment on the part of federal agencies. In each individual case, the particular economic and technical benefits of planned action must be assisted and then weighed against the environmental costs; alternatives must be considered which would affect the balance of values."

I wholly concur with the Court's view of the affirmative mandate imposed by NEPA.

It seems to me most desirable, however, that each Federal permitting and licensing agency not be required by the operation of NEPA to develop special expertise vested by the Congress in other agencies. It was, in fact, to avoid this kind of duplication that the Congress enacted section 21(b) of the Federal Water Pollution Control Act in 1970. As I said earlier, section 21(b), with some modification, appears as section 401 of the pending bill.

My amendment would make it clear that, for the purposes of making the kind of "balancing judgment" required by NEPA, each individual Federal permitting and licensing agency would not be required to develop its own special expertise with respect to water quality considerations. My amendment should not in any way be construed to mean that water quality considerations do not play a role in such a "balancing judgment." On the contrary, where pertinent, water quality considerations must be considered by any agency when it decides, under the NEPA mandate, whether it is in the public interest to grant a license or permit and, if so, under what conditions and stipulations.

However, my amendment would relieve any such permitting or licensing agency of the responsibility for determining on its own the standard of performance or effluent limitation that must be applied to the activity under consideration for a license or permit. That determination would be made by a State or by EPA pursuant to sections 401 and 402 of the pending bill. Certification pursuant to section 402 would discharge a licensing or permitting agency from any further consideration as to what specific degree of effluent control was required with respect to water quality considerations for the activity under consideration.

Mr. President, if I may have the attention of the distinguished manager of the bill, I believe this is a matter that it is felt has its proper place in clarifying the decision in the Calvert Cliffs case. I believe it does no violence to the laudable purpose of the Calvert Cliffs case. I believe it is necessary if we are to avoid duplication which would inevitably occur. I would genuinely hope that the manager of the bill might consider accepting the amendment.

Mr. MUSKIE. Mr. President, as I understand it, the thrust of the amendment, which has been changed pursuant to my letter of October 27, 1971, is to preserve equally the authority to balance out the environmental protection. I believe we have an understanding as to the thrust of the amendment, and I have no objection to accepting it.

The PRESIDING OFFICER. Do Senators yield back the balance of their time?

Mr. BAKER. Mr. President, I yield back the balance of my time.

Mr. MUSKIE. Mr. President, I yield back the balance of my time.

The PRESIDING OFFICER. All time on the amendment having been yielded back, the question is on agreeing to the amendment of the Senator from Tennessee.

The amendment was agreed to.

Mr. TRAIN. On the specifics of the impact of the *Calvert Cliffs* type procedures on energy supplies and reserves I am asking AEC to give you their detailed information. It seems quite clear that the energy reliability problem we have had in the last year was the result of other factors than environmental litigation or NEPA. I have reason to believe that the NEPA type review is also not a significant factor in the availability of power this coming winter. Whether it has an impact next year will depend to a considerable extent on many other factors. I would recommend that we take a careful look at the types of environmental problems the new AEC environmental statements available this month identify, the pace of the initial round of AEC hearings on these issues and the working of the AEC emergency procedure for partial plant operation during the NEPA review before making any judgment as to what the impact of the AEC's new NEPA procedures is going to be on the supply of energy even in the short run. In the

longer run I am convinced, as I shall say in answer to my fourth question, that we need powerplant siting legislation along the lines proposed by the administration to handle the issues involved.

My third question was "What implications does the *Calvert Cliffs* decision hold for the environmental impact analysis procedure of NEPA?"

Within a week after the *Calvert Cliffs* decision was handed down we alerted all the relevant Government agencies as to its broad implications for their NEPA procedures and circulated the opinion together with a memorandum of July 30, which I offer at this point, Mr. Chairman, for the record.

Senator BIBLE (presiding). Without objection that will be included.

(The documents referred to follow:)

EXECUTIVE OFFICE OF THE PRESIDENT,
COUNCIL ON ENVIRONMENTAL QUALITY,
Washington, D.C., July 30, 1971.

MEMORANDUM

To: Agency Liaison on National Environmental Policy Act (NEPA) Matters.
From: Timothy Atkeson, General Counsel.
Re Decision of D.C. Circuit in *Calvert Cliffs* case construing requirements of Section 102(2)(C) of NEPA.

On Friday, July 23, the Court of Appeals for the District of Columbia Circuit handed down a far reaching decision on the requirements of Sec. 102(2)(C) of NEPA. Although this opinion is addressed to AEC's environmental impact statement procedures, it has implications for all agencies. This is the first time a Court of Appeals has construed this provision of NEPA (a copy of the opinion is attached). It is recommended that you consult your legal advisor * to determine the impact of this opinion on your programs.

The opinion makes a number of points which are relevant to agency procedures to implement Sec. 102(2)(C):

1. A balancing of economic and environmental costs and benefits is a required part of the 102 process.

> In each individual case, the particular economic and technical benefits of planned action must be assessed and then weighed against the environmental costs. . . . (p. 27, see also pp. 7–9).

2. The Section 102 duties are not inherently flexible. They must be complied with to the fullest extent, unless there is a clear conflict of *statutory* authority. (p. 10).

3. If a decision as to a proposed action subject to NEPA is reached procedurally without individualized consideration and balancing of environmental factors—conducted fully and in good faith—it is the responsibility of the courts to reverse. (p. 11)

4. The environmental impact analysis must be considered in all agency review processes.

> Compliance to the *fullest* possible extent would seem to demand that environmental issues be considered at every important stage in the decision-making process concerning a particular action—at every stage where an overall balancing of environmental and nonenvironmental factors is appropriate and where alterations might be made in the proposed action to minimize environmental costs. (pp. 16–17)
>
> [An agency's] responsibility is not simply to sit back, like an umpire, and resolve adversary contentions at the hearing stage. Rather, it must itself take the initiative of considering environmental values at every distinctive and comprehensive stage of the process beyond the staffs evaluation and recommendation. (p. 18)

5. The effective date of NEPA is January 1, 1970 and its implementation cannot be unreasonably delayed. (The AEC procedures applied NEPA to cases whose initial notice appeared in the *Federal Register* after March 4, 1971).

*To whom I am sending copies of this memorandum and the opinion.

> Congress cannot have expected that federal agencies would immediately begin considering environmental issues on January 1, 1970. But the effective date of the Act does set a time for agencies to being adopting rules and it demands that they strive to the fullest extent possible to be prompt in the process. . . . Although the Act's effective date may not require instant compliance, it must at least require that NEPA procedures, once established, be applied to consider prompt alterations in the plans or operations of facilities approved without compliance. (p. 22)

6. Where some environmental aspect of a project (e.g. water quality) has been certified by an agency with relevant regulatory authority, the agency proposing the project still has responsibility to evaluate this aspect in the overall assessment required by NEPA.

> It may be that the environmental costs though passing prescribed standards, are nonetheless great enough to outweigh the particular economic and technical benefits involved in the planned action. The only agency in a position to make such a judgment is the agency with overall responsibility for the proposed federal action—the agency to which NEPA is specifically directed. (p. 27)

[Note that Sec. 6(b) of CEQ's guidelines require agencies to seek and consider EPA comments on state agency water quality certifications given under Section 21(b) of the Federal Water Pollution Control Act.]

Summary Analysis of Calvert Cliffs Decision

On July 23, 1971, the U.S. Court of Appeals for the District of Columbia Circuit rendered a consolidated decision in two suits jointly filed against the AEC by the Calvert Cliffs' Coordinating Committee, Inc., the National Wildlife Federation and the Sierra Club. The suits sought review of: (a) regulations adopted by the Commission for implementation of the National Environmental Policy Act of 1969 (NEPA) in AEC licensing proceedings; and (b) the application of those regulations to the Calvert Cliffs Nuclear Power Plant, a facility licensed for construction prior to NEPA's enactment. The Commission regulations in question (Appendix D to 10 CFR Part 50) were published in the Federal Register on December 4, 1970, and became effective 30 days thereafter.

Petitioners challenged four aspects of the Commission's NEPA regulations as improperly limiting consideration of environmental values in the Commission's decisionmaking process. They asserted that:

1. The Commission's regulations wrongfully excluded licensing broad consideration of NEPA matters in construction permit hearings where such matters were not affirmatively raised by the license applicant, an intervenor or the regulatory staff.
2. The regulations invalidly prohibited independent licensing consideration of those non-radiological environmental effects (including thermal effects of facility discharges) which were acceptable under standards or requirements established by other governmental agencies.
3. The regulation improperly prohibited any party from raising non-radiological environmental issues at a licensing hearing if the notice for that hearing appeared in the Federal Register before March 4, 1971.
4. The regulations improperly provided that when a construction permit for a facility had been issued prior to NEPA's enactment (January 1, 1970) the AEC would not conduct a full NEPA review (including a hearing on the basis of that review) until the time of issuance of the operating license.

The Court's decision of July 23, 1971, upheld the petitioners' contentions in each of the above respects. The Court ruled that:

1. The AEC was wrong in providing that in uncontested licensing proceedings consideration need not be given to non-radiological environmental issues. The Court held that environmental issues must be considered at every important decisionmaking stage; and that at each stage of the process there must be a case-by-case balancing (through a cost-benefit assessment) of environmental and non-environmental factors with alterations made in the facility which would minimize environmental costs. In uncontested cases the licensing board must examine the staff's environmental statement to determine whether the latter's review was adequately and the board must independently consider the final balance among conflicting factors that is struck in the ultimate staff recommendation.
2. In its implementation of NEPA, AEC must make an independent assessment of water quality and other non-radiological environmental factors. The Com-

mission cannot rely on certification by Federal or State agencies of compliance with water quality standards established under the Federal Water Pollution Control Act or on Federal or State standards in other environmental areas. The Commission must be prepared to set more stringent requirements of its own in light of the overall balance of project benefits and environmental costs resulting from the NEPA cost-benefit assessment.

3. The AEC was tardy in its implementation of NEPA following the statute's enactment. Even if a delay in implementing the statute was necessary for administrative reasons, the AEC was not relieved of responsibility to consider, and hold public hearings on, the environmental consequences of licensing actions taken between January 1, 1970, and the final adoption of the Commission's NEPA regulations. AEC must thus give prompt NEPA consideration to faciilties for which permits and licenses were issued after January 1, 1970, where NEPA matters were not substantively considered in the original licensing determination.

4. With respect to construction permits issued before January 1, 1970 (e.g., the Calvert Cliffs Nuclear Power Plant), AEC must promptly consider, on its own initiative, any significant non-radiological environmental impact and order such facility alterations as may be indicated thereby. This NEPA consideration, includng a hearing thereon, may not be deferred until the operating license review.

The Court did not direct suspension of any permits or licenses already issued by the Commission. Suspension was left to AEC's discretion, the Court stating that the agency "should consider very seriously the requirement of a temporary halt in construction pending review and 'backfitting' of technological innovations."

The *Calvert Cliffs* decision remanded the proceedings to the Commission for further rulemaking consistent with the Court's opinion.

Mr. TRAIN. As Senator Jackson noted in his remarks announcing this hearing, one of the most significant aspects of the Court decision is its conclusion that the balancing of economic and environmental costs and benefits is a required part of the section 102 process. In its own words the Court concluded that "NEPA mandates a rather finely tuned and systematic balancing analysis in each instance" and that "In each individual case, the particular economic and technical benefits of planned action must be assessed and then weighed against environmental costs."

You will recall that section 102(2)(B) of NEPA directs our Council to assist agencies in identifying and developing methods and procedures—

* * * which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking, along with economic and technical considerations.

We have taken the approach that this assignment was best handled in the context of specific programs.

We have circulated such studies as that prepared by the Department of the Interior entitled "A Procedure for Evaluating Environmental Impact"—Geological Survey Circular 645.

We have requested that where an agency now prepares a cost-benefit analysis of a proposed action—as is the case for most water resource projects—this cost-benefit analysis should be attached to, and circulated with, the environmental impact statement required by section 102(2)(C) of NEPA.

We have provided in our guidelines with respect to the analysis of alternative actions—section 6(A)(iv) that "Sufficient analysis of such alternatives and their costs and impact on the environment should accompany the proposed action through the agency review process in order not to foreclose prematurely options which might have less detrimental effects."

As you perhaps also are aware, the House Appropriations Committee Conference Report on environmental appropriations this year,

even prior to the *Calvert Cliffs* decision, indicated a desire that environmental impact statements include "full information available not only as to the impact upon the environment but also the significant economic impact on the public and the affected areas and industries . . . including employment, unemployment, and other economic impacts."

We view the provision for a cost-benefit type analysis in the new AEC NEPA procedures as being responsive not only to the court's decision but also relevant to the provision in section 102(2)(B) I referred to and to the interest of the House Appropriations Committee in more extensive treatment of the economic benefits of a proposed action. At the same time, we do not propose now that these AEC procedures be applied across the board to all proposed Federal programs and actions. We see NEPA as permitting flexibility as to how the assessment of the economic and technical benefits of proposed action takes place and is evidenced. We will want evidence that such benefits have been weighed against the environmental costs and that a reasonable range of alternatives that would affect this balance has been considered. But as to just how this is done and which parts are shown in the section 102(2)(C) environmental impact statement is a matter still under study. In the meantime we are working closely with AEC on the implementation of its procedures.

My fourth and final question was "How does the *Calvert Cliffs* decision fit into the general problem of powerplant siting and energy policy?" As I have indicated, we think the decision underlines the logic and urgency of powerplants siting legislation along the lines of the administration's proposal.

Although we have some important differences of approach, I am glad to see that the House Commerce subcommittee concerned has recommended general legislation in this area. I submit for the record Director Shultz' letter on this subject:

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF MANAGEMENT AND BUDGET,
Washington, D.C., November 1, 1971.

Hon. TORBERT H. MACDONALD,
U.S. House of Representatives,
Rayburn House Office Building,
Washington, D.C.

DEAR MR. MACDONALD: This is in response to your letter of October 7, requesting this Administration's views on H.R. 11066, the "Electric Power Supply and Environmental Protection Act." On behalf of the Executive branch agencies which, like your Subcommitee, have labored to devise a sound legislative formula for resolving power plant siting problems, I would like to acknowledge at the outset the hard work done on this legislation by you and your colleagues.

In his environmental message of February 8, 1971 to the Congress, the President recognized the urgent need for legislation to assist in the resolution of the growing number of disputes relating to the siting of bulk electric power facilities. The President outlined the major features of the legislation he recommended and stated his belief that the "two goals of adequacy of power supply and environmental protection are compatible if the proper framework is available." To carry out the President's recommendations, the Administration submitted proposed legislation, H.R. 5277, key elements of which would:

Assure a responsible forum where siting issues can be conclusively resolved;

Require disclosure and approval of proposed sites well before construction begins, with meaningful public involvement in the approval process; and

Establish a process providing for the continuing applicability of Federal regulatory and environmental protection laws.

I am compelled to state that H.R. 11066 fails to make adequate provision for these key elements. In this letter I would like to indicate the most significant differences between the Administration's thinking and H.R. 11066.

1. To handle the problems associated with siting 300 large new power plants and routing the related high voltage transmission lines required in the coming two decades, this Administration is convinced of the need to develop a sound, continuing institutional structure in the States and Federal Government. The Administration's power plant siting bill calls for the establishment in all the States of balanced State or regional authorities empowered to rule conclusively on all siting related questions, but provides for Federal assumption of this responsibility on a continuing basis if a State fails to establish a properly constituted siting agency. It provides for the adequate financing of such agencies through charges to applicants for permits, or through other revenue raising mechanisms. It also provides for a continuing, professionally staffed Federal certifying agency, and for issuance by the President of much needed substantive and procedural guidelines for the operation of the State, regional and Federal siting agencies.

Your Subcommittee's bill, on the other hand, makes no provision for a systematic Federal role in the planning, siting, and certification process if a State elects not to establish a siting agency. It makes only limited provision for the adequate financing of State siting agencies (one of the great shortcomings of present utility regulation in many States), uses *ad hoc*, temporary Federal panels as a substitute for a publicly accountable and properly staffed Federal plant siting authority, and provides for no uniform guidelines to make the system really effective.

2. If the public is to avoid continuing dilemmas of "build or brownout," and if the Nation's energy requirements are to be met without undue delays, the resolution of power plant siting problems must be put before a siting agency in an orderly and timely way. This means, quite simply, that there must be a comprehensive requirement for site approval and certification of large-scale power facilities in every case. The Administration's bill provides a straight-forward, unambiguous mechanism for early identification of issues and conflicts surrounding proposed power facilities, through ten-year advance planning, five-year advance approval of site alternatives, and two-year advance certification of specific facilities. Our bill further provides for meaningful public participation in the timely resolution of these issues, conclusive decisions on siting by a responsible administrative agency, and time for court review of these decisions, if required, before the construction of needed facilities should commence.

Under your Subcommittee's bill, on the other hand, if a State fails to set up a plant siting authority, the resolution of siting questions would be left to Federal panels invoked on an emergency basis only a few months before scheduled construction is to commence. This same *ad hoc* mechanism also apparently would be invoked if a Federal agency fails to take action necessary to permit construction of a power facility, or acts adversely in such a case. This procedure leaves no time to develop and consider alternatives or to carry out the careful analysis necessary to properly evaluate the power supply and environmental implications of facility siting and design, nor would there be an opportunity for meaningful public participation in the process of resolving these issues.

3. With the 10, 5, and 2-year review stages provided by the Administration's bill, we are convinced that there is simply no justification for a blanket authorization, such as H.R. 11066 contemplates, for a Federal siting panel to override Federally-established or approved standards or permit requirements. The Administration's bill provides that the siting agency's judgment shall be "conclusive on all questions of siting, land use, State air and water quality standards, public convenience and necessity, aesthetics, and any other State or local requirements" but requires that it determine that "all applicable Federal standards, permits or licenses have been satisfied or obtained." As Acting Secretary of the Interior Pecora indicated to you in his letter of July 6, we believe this approach will preserve the integrity of Federal laws while providing, through coordinated Federal agency actions, a procedural one-stop process.

Your Subcommittee bill would create, in our judgment, an unwieldy Federal approval mechanism that could generate confusion and uncertainty in the application of other Federal laws. Under H.R. 11066, if there is an alleged conflict between Federal environmental laws (e.g., air quality requirements versus water quality requirements) the proposed *ad hoc* siting panel could modify "Standards or regulations which relate to environmental factors and which are prescribed

under any Federal law." While we are far from convinced that such a conflict is likely ever to occur, in the event it does we believe that the cognizant Federal agency having expert knowledge of the environmental laws concerned, not a panel convened on an emergency basis, should have the responsibility for dealing with it.

Of greater importance, H.R. 11066 would authorize the panel generally to exempt particular power facilities from all electric energy regulatory and environmental protection laws. We are strongly opposed to the granting of such sweeping authority to an *ad hoc* panel whose members are not accountable public officials. Under this authority the members of such a panel would appear to have the power to set aside, in whole or in part, comprehensive and balanced Federal statutory formulas for both the regulation of electric energy and the protection of the environment. For example, the bill could be interpreted to allow the panel, in effect, to license a hydroelectric power facility without reference to relevant provisions of the Federal Power Act, or to disregard emission standards deemed necessary to provide for clean air. In this latter connection it may be noted that, to the extent the power industry is relieved if complying with air quality standards, other emitters, including industrial sources, would bear the burden of reducing their emissions to assure acceptable ambient air quality. The Administration does not believe that such drastic measures are either necessary or desirable to meet our imperative power needs, within the context of balanced industrial growth and environmental protection.

In a similar vein, H.R. 11066 would provide the *ad hoc* Federal siting panel the ultimate authority to compel the use or taking of most categories of Federal lands for bulk power supply purposes, apparently without regard to the adverse effects such use or taking may have upon other programs and objectives. Such sweeping authority is rendered especially objectionable by the limited time frame and necessarily narrow range of alternatives which, as noted above, would be available to the panel for making siting decisions.

For the foregoing reasons we do not think that H.R. 11066 provides a viable or effective process for the timely resolution of the difficult problems associated with the siting of bulk power supply facilities. We believe that H.R. 5277, the Administration's bill, does provide for such a process, and we strongly urge the Subcommittee to reconsider its bill in the light of the comments set out in this letter.

The Administration believes that there is an urgent need for early enactment of this legislation, and I urge your Subcommittee's reconsideration be undertaken as soon as possible.

Sincerely,

GEORGE P. SHULTZ, *Director.*

I also note the important statement issued October 19, by the Joint Committee on Atomic Energy in connection with its decision not to consider amendments to the Atomic Energy Act at this session.

It would appear more prudent for legislative action to wait further developments on overall power plant siting legislation currently pending before other committees. An objective of overall power plant siting legislation should be to recognize the AEC's responsibility for all radiological considerations associated with nuclear plants, and to place in state and regional authorities the general responsibility for deciding other environmental matters. It is hoped that such legislation, which is vitally needed to provide our nation with a coherent and rational power plant siting policy, will soon be enacted.

We will continue to press for this long-term solution. In the meantime the Calvert Cliffs NEPA rules applied by the AEC will give us very thorough experience in the handling of the environmental issues involved in nuclear plant siting. The NEPA process applied to AEC's own developmental operations such as the liquid metal breeder reactor should also give us very useful "technology assessment" on future technology to be applied in this field.

In summary, while we believe the implementation of AEC's new procedures evolved in response to the Calvert Cliffs decision requires very close monitoring, we think the process will improve the balance we are able to strike between our energy and our environmental needs.

We and AEC welcome the interest of your committee and will be glad to keep you informed as the situation progresses.

Senator BIBLE. Thank you, Mr. Train. That appears to be a very well reasoned, well worked out statement. You have given us your thoughts on the entire matter and I appreciate it. I have no questions of you.

Senator Anderson?

Senator ANDERSON. I have no questions, Mr. Chairman, it was a very fine statement.

Senator BIBLE. Senator Allott?

Senator ALLOTT. I have no questions. I think it was a very well reasoned statement. I recall very well in the conference committee, as others do here, when we were adopting section 102, I raised repeatedly the questions that have opened the door to a lot of mischief. I never did disagree to the basic purpose that we were trying to accomplish with section 102. But I still believe that that section might be reviewed by the committee as a legislative oversight to avoid what has become, in some instances, merely a means of promoting mischief rather than a means for which the act was originally passed. That is all I have to say.

Senator BIBLE. Thank you. Senator Hatfield?

Senator HATFIELD. No questions.

Senator BIBLE. Senator Gravel?

Senator GRAVEL. Yes, I have some questions.

Mr. Train, can you explain to me and the committee how we got into a situation where it took a court to find out an error of this magnitude, particularly when we have an agency such as yours which is funded to monitor the National Environmental Policy Act and, of course, we have a Joint Atomic Energy Committee of Congress? How did we get into a situation where plants were being built helter-skelter, particularly Calvert Cliffs, and receiving 102 statements which were mere "mockeries of the law"? Had your office agreed with the environmental statements, examined them, had they gone into any investigation as to what the statements said, and their validity?

Mr. TRAIN. We have had, from the inception of the Council, which, as you recall, was only in early 1970, continuing discussions with the Atomic Energy Commission as to its responsibilities under the National Environmental Policy Act, as we saw them. Throughout that period it was our belief that we were making constant progress in our discussions with the Commission on this overall problem.

If you recall, prior to the enactment of the National Environmental Policy Act, it was essentially the position of the Commission that it was not required to consider overall environmental considerations in its licensing determinations. There was the first turnaround on the part of the Commission in 1970 and it developed revised rules and procedures. These rules and procedures were to give effect to its responsibilities to consider the board range of environmental factors under the National Environmental Policy Act.

Subsequently, I think it was perhaps in October of 1970, the Commission revised its procedures—not its procedures but its standard with respect to permissible radiation levels to substantially lower the levels. That was following continuous discussions that we had with the Commission.

I think that the Commission has been moving, particularly recently, very effectively to give full implementation to the requirements of the act. It is true that in the case before us the court decided, in July,

July 23 of this year, that AEC had not met its full responsibilities under the act. I personally would not want to prejudge that AEC would not have reached this same general view itself. But that, of course, is a matter of hindsight and it is very difficult to state categorically.

I do believe, and I mean this very seriously, that the Commission was moving along, dealing with a brandnew national policy insofar as the environment is concerned, calling for a rather substantial turnaround in its accustomed procedures.

These things are not accomplished overnight, as you know. I know from talking with Commissioner Doub or the new Chairman of the Commission, Mr. Schlesinger, that they have strong views of the responsibilities of the Commission toward the public interest, involving both safety and environmental protection.

I think this has been an evolving matter and I think the Commission's situation at this time on this is very commendable and shows a very strong response to the requirements of the act.

Senator GRAVEL. But, Mr. Train, the point I am making is this—here you have Government which has the money, the expertise, the scientists, everything with respect to ability to act, and yet we don't discover or realize the problem until some private citizens choose to bring a lawsuit against the Government. So if it hadn't been for these private citizens, who weren't funded by Congress, who don't have a joint committee to oversee them, where would we be today? Is there any case where the AEC, after granting the initial license, stopped a project?

Senator BIBLE. I think the AEC would be the more apt body to answer that question. We can ask them that question.

Senator GRAVEL. Thank you.

Mr. TRAIN. May I comment with respect to your previous statement, Senator? I do not mean, by my answer, in any way to downgrade the importance of the citizens' role in this entire matter of environmental protection or, for that matter, any other field of public policy. It is absolutely vital. I think in appropriate circumstances the citizen suits in the courts provide a very effective and appropriate method of moving government along.

Senator GRAVEL. You spoke of the possibility of an ombudsman, which I think is an interesting concept. Would you be in favor of congressional funding for hiring scientists to take an adversary position, so that we have a check and balance and not just a situation where experts are operating in the context of a vested interest or vested goal?

Mr. TRAIN. I don't think in general I would favor this because I don't think it would be a very effective process. We are talking about, or I imagine you are talking about, more than simply radiation standards. You are talking presumably about the whole field of environmental protection, which involves such a broad range of public and private interest that it would take a rather extraordinarily diverse group of specialties and disciplines to provide any kind of competence in an across the board way.

It is for this reason that I think we in particular welcome the very active and effective role of the public in this entire field of environment. It was the thrust of my statement, to which you just referred, that the public is in fact providing, very effectively, this role of ombudsman and I doubt very much whether a publicly financed body of some sort could do it as well and certainly not better.

Senator GRAVEL. Well, if that is the position, then, maybe we are stuck with interminable delays. Because what you are saying is that it would take too much time for the Government to fund this and get the scientists to address themselves to all of these issues, but it is okay for members of the public, in a pell-mell fashion, as best they can, picking up volunteer contributions, to come in and act as an ombudsman. Wouldn't it be more effective if we had an arm of government that took an ombudsman's position?

How can we shorten this controversy, if the AEC just makes a mockery of the Environmental Policy Act, and you say to the National Wildlife Federation, go ahead and raise some money and bring forth the case if you can. And without access to Government documentation.

What do you speak of when you talk of ombudsman? What is he going to do, and where is he going to get his scientific data? How can you evaluate the AEC's "102" statements if you don't have scientists of equal competence to say what's wrong with the statements? That takes time, and that takes money.

Mr. TRAIN. Well, we do have a process, Senator, that is established within the Government that operates under the National Environmental Policy Act. This includes comment by all Federal agencies, either with expertise or jurisdiction in the subject matter, so that for example, AEC draft environmental statements must be circulated to all governmental agencies, including EPA. EPA has broad competence and research capabilities in the field of air pollution, water pollution, radiation, thermal pollution, and other areas involved in these licensing activities. The statements are also required to be made available to the public which gives the public a full opportunity to bring private scientific capabilities to bear.

There is a hearing process, at which time all of these issues are required to be developed and gone into de novo with the final environmental statement developed by the Commission available at the time of the hearing. I don't think that it is really feasible for our Council to try to duplicate, within the Executive Office, all of these scientific capabilities, nor do I think it would be desirable or very useful.

Senator GRAVEL. The Wilderness Society and others seem to do it. What would your ombudsman do, then?

Mr. TRAIN. I am afraid you misunderstood me, Senator Gravel. The comment I made was that the public is in fact providing the role or filling, in effect, the role of the ombudsman.

Senator GRAVEL. Let us look at the record, with respect to the public's ability to function. Here we have a situation with Cannikin. We had hearings on Cannikin, and environmental statements, but 33 Congressmen tried to get the environmental studies. The Government would not give them to them. So, if the public or Congress can't get the data to evaluate, you have no check. We find that the "102" statements fail to reveal the serious flaws relative to the storage of nuclear material in Kansas. Then we get the Garvin anti——

Mr. TRAIN. Senator, that came out and became a matter of public information because of the environmental impact statement process. The matter has not been put under very extensive long-range study. It seems to me the obvious example would be the effective operation of the act.

Senator GRAVEL. But the loss of water, the 175,000 gallons of water came out as a result of the 102 statement, is that what you are telling

me? That was in the Lyons statement, when they lost the water?

Senator BIBLE. Is the question clear, Mr. Train?

Mr. TRAIN. Yes.

I don't believe that specific aspect of the Lyons situation was reflected in the impact statement but I believe the impact statement referred to and raised the general issue of water movement and subsequent examinations indicated this problem.

Senator GRAVEL. Yes. I will get that statement for the record, Mr. Chairman, and insert it in the record because I think it demonstrates very clearly that the objections do not come from Government but private citizens.

Senator BIBLE. Very well, when it is offered it will be made a part of the record.

(The documents referred to follow:)

U.S. SENATE,
Washington, D.C.

The AEC's final Environmental 102 Statement on the "Radioactive Waste Repository" in Kansas, June 1971, is 101 pages long and cannot be included in this hearing Record.

It does not include consideration of the 175,000 gallons of water which "disappeared" in the adjacent salt mine of the American Salt Company. That water was hopelessly lost in a tiny area where the Atomic Energy Commission allegedly understood the geology thoroughly, and the movement of water in particular.

The "AEC Staff Report on American Salt Company Operations" was officially transmitted to the Joint Committee on Atomic Energy on September 30, 1971. All dates were missing on and in the staff report.

The AEC's letter to the Joint Committee and the AEC Staff Report are as follows:

SEPTEMBER 30, 1971.

Mr. EDWARD J. BAUSER,
Executive Director,
Joint Committee on Atomic Energy,
Congress of the United States.

DEAR Mr. BAUSER: This letter is to confirm discussions held on September 24, 1971, with you and Mr. Shwiller by Dr. Pittman and Mr. Donoghue of the Atomic Energy Comission's Division of Waste Management and Transportation regarding a literature study which we plan to make on possible alternative sites in Kansas for the National Radioactive Waste Repository.

The Commission decision to make this study arose as a result of certain additional information, given in more detail in the enclosure hereto, which has recently come to light concerning: (1) operations of the American Salt Company mine near the Lyons site; and (2) problems of plugging of the numerous deep oil and gas wells located on or immediately adjacent to the Lyons site.

In each instance, the new information raises questions concerning our ability to assure that water will not be introduced into the bedded salt formation at the repository site. Since absenee of water is a key factor in the long range safety of the use of the bedded salt as a storage repository for radioactive waste, the Commission feels that its only prudent course of action, pending a more detailed and extensive evaluation of the new information, is to make a literature search to identify other potential repository sites in the Kansas salt bed formation. We would stress that the Commission has not made a finding that the Lyons site is unacceptable or that any other more acceptable site can be found. Our objective is to assure that, should our future evaluation indicate that Lyons is not safe and acceptable by reason of unresolvable problems raised by American Salt Company operation or by the existence of oil and gas well penetrations which cannot be satisfactorily sealed, continuity of this very important effort will not be compromised.

We have, therefore, instructed the Oak Ridge National Laboratory to enter into a contract with the Kansas Geological Survey, as the group having the most knowledge and greatest degree of expertise on the situation in the State of Kansas, in cooperation with Dr. Robert Walters, an ORNL consultant from the Kansas area, to undertake a *literature survey of various potential locations in*

Kansas where salt bed thickness and depth, the overlying and underlying formations, and other geologic and hydrologic factors are similar to those at Lyons. As a part of this overall study, the KGS will work with the AEC and ORNL in the development of detailed criteria which could be used for specific site selection should this be necessary. The study will be *complete by November 1, 1971*, and the final report will be available by December 1, 1971.

Pending further evaluation of the "hole plugging" problem and further discussions with the American Salt Company management to lead to a better understanding and evaluation of potential problems raised by their activities, and awaiting the results of the KGS study, we *are holding in abeyance any further site oriented work at Lyons, including leasing of land and plugging of holes.*

During the course of the meeting on September 24, 1971, you raised questions concerning the Advisory Council called for by the FY 1972 Authorization Act. We have no information on the status of appointment or potential membership of the Council, nor are we informed on how the administrative aspect of the Council's operation will be handled.

We hope that this letter and its enclosures furnish you the information you need, however, should you require additional information, please let us know.

Sincerely,

JOHN A. ERLEWINE,
General Manager,
U.S. Atomic Energy Commission.

AEC STAFF REPORT ON AMERICAN SALT COMPANY OPERATIONS

The American Salt Company operates a salt mine at Lyons, Kansas, which at its nearest point is estimated to be between 1500–1800 feet from the existing Carey salt mine. This Company engages in both mechanical mining operations (depicted in black on the enclosed map) and solution mining operations (depicted in green on the enclosed map).

The actual extent of the area mined by solution techniques is not fully or clearly understood since it is difficult to accurately map out the size and shape of caverns formed by this method. The Company President indicates that the Company has mined out an area one-half by three-quarters of a mile (shown in green on the enclosed map) which lies approximately two miles from the Carey mine, but it is evident that he is not sure of the extent or shape of the solution-filled cavity.

The solution mining technique removes all the salt from the bed, leaving no supporting pillars to prevent subsequent collapse of the mined-out area. One problem which is introduced by the nearby solution mined area is, therefore, the potential for sudden and dramatic collapse of a fairly large area not too far from the Repository site, with the formation of a surface lake which could be several hundred feet deep. While it is likely that such a lake would have no real technical significance to Repository safety, its formation and presence could certainly engender unfavorable emotional and public relation problems should it form during the construction or early demonstrational phases of the Repository.

Another question which American Salt Company activities raises, deals with an attempt made at one point in their solution mining operations to use a hydraulic fracturing technique to dissolve and remove salt from the formation. In this technique, two holes are drilled into the salt formation at different locations (as opposed to the single hole concentric pipe technique used by the Company for its normal solution mining). Water under pressure is forced down one hole; it fractures the salt bed and works its way to the second hole where it returns to the surface as saturated brine. In the one attempt made, after only a few hours of operations, water pressure was lost and some 175,000 gallons of water disappeared. The experiment was terminated and no further work was done on this method. American Salt people could not determine what had happened, and the expert concensus is that we will never know whether the water broke through to the Arbuckle formation below the salt or to the aquifers above the salt bed, or whether it moved through the salt bed in more or less horizontal directions.

The uncertainty of the fate of this water raises the questions of whether it, and possibly over water in the solution mining cavern could be selectively migrating toward the Carey salt mine. Further evaluation of this possibility is required.

A third problem raised by the American Salt Company's operations, this one in the mechanical mining section of the mine, came to light last March and was discussed with the PCAE at that time. At that time, in the course of drilling small holes in the mine face for emplacement of explosive charges for further mining operations, water started leaking into the mine. Similar drillings at different elevations indicated that one of the many gas or oil bore holes in the area had been intercepted and that water, either from the Arbuckle below, or an aquifer above the salt bed had leaked into the mine. The hole was satisfactorily grouted and sealed as far as continued salt mine operation is concerned, but the incident raises the question as to knowledge of the location of oil and gas holes. The conclusion of the American Salt Company people is that this hole, which was thought from its surface position to be at less than 100 feet from where the drilling was taking place, probably had penetrated the subsurface structures at an angle after hitting some drilling impediment. There is also the possibility that inaccuracy of underground surveying resulted in the mine operator not knowing exactly where he was working.

In any event, the potential impact on Repository operation should such events occur in the American mine in the future, needs careful evaluation, as does the potential of intercepting gas and oil wells in Repository operation itself.

GAS AND OIL WELL SEALING

The initial survey of the Lyons site and the one-mile buffer zone surrounding it has shown that there are twenty-nine known abandoned gas and oil well penetrations that extend into or below the salt formation and there may be others that will be found by more extensive surveys.

An ORNL consultant in Kansas has made a study of the characteristics of these 29 holes and has concluded that for 26 there is a very high probability that the work necessary to reenter, cleanup and safety plug the holes can be successfully accomplished. With respect to the other three holes, however, it is the opinion of the expert consultant that the probability of successfully plugging the holes is very low.

While this fact, in itself, does not make the site unacceptable or unsafe, since there are ways which can be used to assure that the unplugged holes, when adequately mapped, will not be a vehicle for introduction of water into the mine, more evaluation and study of the problem is required to assess its true impact on safety.

(Enclosed: copy of the final 102 statement for the file.)

Senator GRAVEL. I have one last question, Mr. Chairman.

In the Council's first report, August 1970, you stated, "Radiation is potentially a more dangerous pollutant to man than pesticides." In the 14 months since that statement appeared, our 9,000 megawatts of nuclear electricity have also produced approximately enough radioactive plutonium with a half-life of 24,000 years to give 3 trillion people a maximum permissible lifetime body burden of plutonium.

AEC Commissioner Larson said a loss rate of 1 or 2 percent of the plutonium inventory is unavoidable. Even if Commissioner Larson is only half right, let us say it is an annual loss of only one-half of 1 percent, that is about 15 billion lifetime doses unaccounted for since you published your warning.

Now, NEPA charges you in sections 202 and 203 to appraise the programs of the Federal Government for the purpose of determining whether any trends are interfering or likely to interfere with the assurance of safe and healthful surroundings, with fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations, and so forth.

When are you going to appraise the nuclear electric program in total? When do you think it is time to appraise it?

Senator BIBLE. Let's just get one question at a time. It will make it easier for the record. Do you have the first question in mind?

Mr. TRAIN. I think I do.

Senator BIBLE. Very well, let's answer the first question.

Mr. TRAIN. I think there are several comments to make on that.

One, as I indicated in response to an earlier question, the AEC 2 or 3 months subsequent to that report of ours to which you referred—and I am not trying to claim credit for the AEC action, but I wish to point out the coincidence of time—AEC reviewed these regulations in October of 1970 to reduce permissible levels of radioactivity, as I recall, by a factor of almost 100. So that there is action being taken in this area. I am not saying that everything has been done that needs to be done. I don't think the Atomic Energy Commission would say this is not a continuing process.

We put forward or supported very vigorously the President's proposal for a reorganization which established, under Reorganization Plan No. 3 of 1970, the Environmental Protection Agency, to which was transferred the responsibility for the general community radiation levels in connection with nuclear power plants.

This is still a developing area. We believe that this, too, is providing a substantial amount of new protection for the public in connection with radiation levels.

Senator GRAVEL. Then you have no answer to the question I posed. Apparently there is no intention of having an overall study as to what the impact of moving into a plutonium economy will be for this Nation, much less for the planet. They want 61 reactors now and 1,000 by the year 2000. Shouldn't somebody in Government ask the question what all this means to the total planet? Shouldn't someone take an inventory of how much radiation is going into the atmosphere?

Mr. TRAIN. This is a continuing responsibility of the Atomic Energy Commission overviewed by the Joint Committee on Atomic Energy.

This is a matter which the AEC has under continuing review. They do have a study which I believe Commissioner Doub can describe more completely to this committee that goes into these questions that involves the entire industry picture of the United States. It is my understanding that his statement is directed in part to the kind of questions you raise. It will be our intention on the part of the Council to keep informed of that study.

Senator GRAVEL. But AEC is not charged with protection of the total environment. You are charged with it as nearly as anybody is. So to say AEC is monitoring it does not answer my question. I have no further questions.

Senator BIBLE. Senator Anderson.

Senator ANDERSON. Are you fairly sure these overriding standards are established well enough? I believe they are very unsatisfied in the matter of plants now operating.

Do you have a feeling for this along the same line?

Mr. TRAIN. Senator, I think this is an area where we can never feel satisfied. We should always be concerned in the sense that continuing monitoring and research should be done and standards should be raised just as rapidly as is practicable.

Senator ANDERSON. Didn't we have for several months a while ago a study of standards?

Mr. TRAIN. Yes.

Senator ANDERSON. I think the Atomic Energy Commission made a very fine statement a few months ago, as you very well know.

Senator BIBLE. Are there any further questions?

Senator Stevens.

Senator STEVENS. Mr. Train, do you see any implications in the *Calvert Cliffs* decision that present impediments to the future construction of our pipeline?

Mr. TRAIN. I don't think the *Calvert Cliffs* decision raises any substantial new problems or substantial new considerations that haven't been present for some time.

I think, as you know, the Secretary of the Interior has been in the process of developing full information on all the relevant factors involved and then weighing them in trying to reach a decision. This is basically what *Calvert Cliffs* calls for. No license has been granted, no permit has been granted in connection with the pipeline.

Now, I believe we had all of this and it always has been indicated that an economic analysis would be included as part of an overall analysis of the pipeline proposal. However, the *Calvert Cliffs* decision refers rather specifically to that kind of factor so that if there is ever any doubt about whether it would be included, I think the decision would dispel that doubt. I am sure it would be included in this study.

Senator STEVENS. I am glad to hear you say that. I read the decision several times and that was my conclusion. It indicates the caution the Secretary decided to use in approaching this matter. My reading of the *Calvert Cliffs* decision was if they continue on the course they are on now they should satisfy the requirements of the decision.

Senator BIBLE. Can you give us any indication, Mr. Train, as to when we might receive the pipeline decision from the Secretary of Interior?

Mr. TRAIN. No, sir.

Senator BIBLE. You are not the Secretary of the Interior, and he is the right witness. He indicated we would have it in August, then September, then October, possibly now in November. Might it be expected this year?

Mr. TRAIN. I think you had better ask the Secretary that.

Senator BIBLE. All right, I thought you might give me a little lead on that. Thank you.

(The following letter and questions were transmitted to Chairman Train. Answers appear in app. 2.)

United States Senate
COMMITTEE ON
INTERIOR AND INSULAR AFFAIRS
WASHINGTON, D.C. 20510

November 30, 1971

Honorable Russell E. Train
Chairman
Council on Environmental Quality
Executive Office of the President
Washington, D. C.

Attention: Mr. Timothy Atkinson

Dear Chairman Train:

May I take this opportunity to express my appreciation for your excellent statement on November 3 on the implications of the Calvert Cliffs court decision. Your statement was very informative.

In reviewing the transcript of the hearings, additional questions have arisen from the members and the staff which are enclosed for your response. While some of the questions were touched upon in your prepared statement, you may wish to expand upon your testimony.

Receipt of your response by December 15, 1971, would assist the Committee in our evaluation of the hearings.

Thank you for your assistance and cooperation in this regard.

Sincerely,

Henry M. Jackson
Chairman

COUNCIL ON ENVIRONMENTAL QUALITY

QUESTIONS FOR THE RECORD

SENATE INTERIOR AND INSULAR AFFAIRS COMMITTEE

November 3, 1971

(1) The court in its decision on Calvert Cliffs said that the AEC's action in implementing NEPA made a mockery of that Act.

(a) Would you supply for the record the Council on Environmental Quality's views on the adequacy of AEC initial actions to implement the NEPA subsequent to January 1, 1970, and a comparison of those actions to the actions taken by other agencies.

(b) Did the Council on Environmental Quality or its staff review the subject proposed AEC regulations? Did they object to the proposed AEC regulations? Did they provide any guidance to the AEC with regard to deficiencies in the AEC regulations?

(c) Please supply for the record CEQ's position on the steps which licensing agencies such as AEC should take to implement NEPA and the guidance which CEQ has issued in that regard.

(2) Please supply for the record CEQ's analysis of the Calvert Cliffs decision and its impact on the implementation of NEPA in the environmental decision making process of all agencies and departments.

(3) In your letter or Representative Holifield on September 16, Chairman Train noted "that the AEC consulted our Council fully in developing its revised NEPA procedures and that we stand ready."

(a) Did you provide any written comments to the AEC on their revised NEPA procedures. If so, would you provide your comments for the record?

(b) Under the revised regulations an applicant for a nuclear power plant construction permit or an operating license is required to perform a cost-benefit analysis. Did you provide the AEC any guidance in this regard? If so, in what form?

(4) In a letter to Congressman Holifield on September 16, Chairman Train noted that "in some cases simultaneous hearings may be possible on various environmental aspects" of a nuclear power plant where both a Refuse Act Permit and an AEC permit are required.

(a) In your view would this serve to accelerate treatment of pending AEC license and permit applications?

(b) Do you plan to initiate any actions in this regard? If so, when?

(5) The Calvert Cliffs decision holds that the AEC has the responsibility under NEPA to undertake a comprehensive balancing of the environmental factors affecting nuclear power plant construction and operation against other consideration. The mechanism for balancing, according to the Court, is a cost-benefit analysis which the court interpreted to be required by Sections 102 (A) and (D) of NEPA which refers to the need for "a systematic interdisciplinary approach..."which will insure that presently unquantified environmental amenities and values may be given appropriate consideration..." The result is to require the Commission, its staff, and Atomic Safety

and Licensing Boards to make an ultimate value judgment based on a very broad set of factors. Would you comment and supply for the record the views of the Council on Environmental Quality on the following:

(a) Do you interpret that the National Environmental Policy Act requires such a cost-benefit analysis, and if so, what do you consider should be its scope?

(b) What is your opinion on the desirability of placing such balancing process for nuclear power plants within the AEC and its Atomic Safety and Licensing Boards?

(c) Do you feel that such balancing process must become a factor in Administrative Procedure Act evidentiary hearings simply because of the fortuitous circumstance that a hearing may be called for under the AEC licensing procedures? If yes, would you comment and provide an analysis of NEPA and its legislative history to support your position?

(6) Under the 1899 Refuse Act permit program the Corps of Engineers and the Environmental Protection Agency have comprehensive water quality regulatory responsibility.

(a) Does the NEPA contain anything which relieves the Corps and the EPA from simultaneously performing precisely the same cost-benefit analyses which the AEC says it must perform?

(b) Do you see the EPA and the Corps of Engineers confining themselves simply to standards setting or can they be expected to consider the total environmental impact of individual plants?

(c) What guidance have you given or do you plan to give AEC, the Corps, or the EPA to avoid counterproductive delay or redundancy which, of course, is in addition to review approvals required under applicable State and local law?

(d) In view of the foregoing, do you plan to recommend that applicable Executive Orders be revised so that the NEPA responsibilities of the EPA, the Corps, and the AEC in the licensing of nuclear power plants will be more clearly defined?

(7) In a letter to Congressman Holifield on September 16, Chairman Train "endorsed the legislative clarification on the relation of State certifications under Section 21(b) of the Federal Water Pollution Control Act and NEPA proposed by the Senate Public Works Subcommittee which is now considering amendments to the Federal Water Pollution Control Act."

The legislation passed by the Senate on November 8, 1971, contained an amendment in this regard.

(a) Do you feel further clarification is necessary?

(b) Do you anticipate proposing additional legislation?

(8) Would you supply for the record -

(a) An explanation of the impact of the Calvert Cliffs decision on licensing and similar approval procedures followed by other Federal agencies such as the Federal Power Commission, the Department of Transportation, and the Federal Aviation Agency?

(b) Has the Council supplied, or does it intend to supply other Federal agencies than the Atomic Energy Commission revised guidelines, reflecting the Calvert Cliffs decision, for their preparation of environmental impact statements? If not, why not?

(c) Your evaluation of the desirability for clarification of NEPA responsibilities for Federal licensing agencies, such as the AEC?

(d) Your evaluation of the desirability for legislative clarification between NEPA responsibilities for Federal licensing and non-licensing activities? If yes, does the Administration plan to submit such legislation?

(9) (a) The AEC's revised regulations (in Appendix D to Part 50) restrict the operation of a nuclear plant which has not yet received a full-term operating license until supplemental cost-benefit analysis information has been received. Does the CEQ believe that the AEC's requirements are mandated by the Calvert Cliffs decision which dealt primarily with the need to avoid irretrievable commitments of resources during construction?

(b) Should the same cost-benefit analysis requirements apply to (i) a plant which has already been constructed and is ready to operate, or (ii) a plant which has been substantially constructed, or (iii) a plant which has not commenced construction?

(10) The AEC's revised regulations (in Appendix D to Part 50) appear to require the AEC to duplicate the expertise of other Federal and State agencies in wide ranging disciplines such as esthetics and water quality matters; the revised regulations also require low probability accidents to be treated in environmental statements. This suggests that agencies other than the AEC should acquire expertise in the radiological field. Do you agree with the AEC's approach in this regard?

If yes, please explain; if no, please indicate for the record what actions you have initiated or plan to initiate to help alleviate the situation.

(11) In a letter to Chairman Train on October 8, Congressman Holifield wrote:

> "It seems to me that the wording of the National Environmental Policy Act (NEPA) and its legislative history make it quite clear that the Act is concerned with the assesment of operations that it is known will occur and not with events that have very low probabilities. The Act is clearly concerned with the consequences of deliberately planned operations, some of which could involve consideration of consequences of great subtlety and uncertainty (such as, for example, the long term effects of the deliberate release to the

environment of low levels of pollutants). However, there appears to be some body of thought that interprets this to include events that are not deliberate and are of low probability (i.e., accidents). It seems to me that neither the Calvert Cliffs decision nor any other judicial interpretation would appear to conflict with my understanding of the situation."

(a) Do you agree with this interpretation of the NEPA? If not, would you comment?

(b) The Atomic Energy Commission in its revised regulations requires that environmental statements include consideration for low-probability accidents? Do you consider this as desirable?

(12) As a general proposition, would the CEQ support interim licensing authority which would allow fossil and nuclear plants to be operated pending the receipt of supplemental environmental information provided that available data indicates that there will be no irretrievable impact on the environment from the operation of the plant?

If the CEQ agrees that such authority is desirable, does the Administration plan to propose such authority?

(13) What programs has the CEQ initiated with States such as Maryland and Connecticut which have recently passed power plant siting legislation to help assure that the various State and Federal approvals necessary for a power generation plant are coordinated?

(14) One early reaction to the procedural implications of Calvert Cliffs was that hearings will become so cumbersome that they will collapse under their own weight and intervenors and utilities will come to private agreements outside the hearing room.

To what extent does this raise the possibility that special interests by the threat of intervention could extract from public utilities consessions and special treatment?

Senator BIBLE. Our next witness is Mr. William O. Doub of the AEC, accompanied by Commissioner Ramey.

STATEMENT OF COMMISSIONER WILLIAM O. DOUB, U.S. ATOMIC ENERGY COMMISSION, ACCOMPANIED BY COMMISSIONER JAMES RAMEY; P. A. MORRIS, DIRECTOR, DIVISION OF REACTOR LICENSING; L. ROGERS, DIRECTOR, DIVISION OF RADIOLOGICAL AND ENVIRONMENTAL PROTECTION; L. M. MUNTZING, DIRECTOR OF REGULATION; AND M. HOFFMANN, GENERAL COUNSEL

Mr. DOUB. I am very pleased to have the opportunity to appear today, and I have with me on my right, Commissioner James Ramey; on my left, Mr. Hoffmann, our general counsel; to his left, Mr. Muntzing, director of regulations.

Because of the complexity of the subject we are discussing we have people here who I think will be able to answer any questions, or at least we are prepared to answer any questions that the committee may put forth.

Senator BIBLE. Very well, you may proceed.

Mr. DOUB. Commissioner Ramey has a statement of his own and perhaps at the conclusion of my statement he may be permitted to present his.

Senator BIBLE. Certainly.

Mr. DOUB. I am pleased to have the opportunity to discuss with you certain recent developments in nuclear powerplant licensing in connection with your ongoing national fuels and energy policy study hearings.

Your letter of invitation to appear states the committee's particular interest in the recent *Calvert Cliffs* decision of the U.S. Court of Appeals for the District of Columbia Circuit, and the immediate and long-term implications of that decision regarding the scheduling and reliability of electric generating capacity.

Before turning to the specific matters raised in your letter, I believe it will be useful to recapitulate, very briefly, the holdings of the court of appeals' decision of July 23, 1971, with respect to the AEC's implementation of the National Environmental Policy Act of 1969. The court directed, in summary, that the Commission's rules make provision for the following:

One, independent evaluation and balancing of certain environmental factors, such as thermal effects, notwithstanding the fact that other Federal or State agencies have certified that their own environmental standards are satisfied. In each individual case, the benefits of the licensing action must be assessed and weighed against environmental costs; and alternatives must be considered which would affect the balancing of values.

Two, independent substantive review of environmental matters in uncontested as well as contested proceedings and issues by presiding atomic safety and licensing boards.

Three, consideration of NEPA environmental issues in connection with all nuclear power reactor licensing actions which took place after January 1, 1970, the effective date of NEPA.

Four, NEPA review, and appropriate action after such review, for construction permits issued prior to January 1, 1970, in cases where an

operating license has not yet been issued.

Five, the court's opinion also states that the Commission should consider the temporary suspension of those licensed activities for which a supplemental environmental review is required pending the completion of that review.

Regardless of individual personal opinions as to its merits, the Calvert Cliffs mandate left no doubt as to its "holdings" and the course that the Commission should take in operating within the framework of existing law and of court decisions applying that law. The basic result was underscored by Chairman Schlesinger in announcing the Commission's determination not to appeal the decision, but rather to accept the judicial mandate and get on with the job at hand by drafting implementing regulations.

He then made clear that:

> The effect of our revised regulations will be to make the Atomic Energy Commission directly responsible for evaluating the total environmental impact, including thermal effects, of nuclear power plants, and for assessing this impact in terms of the available alternatives and the need for electric power.

As you are aware, the impact of the *Calvert Cliffs* decision on the licensing and regulatory functions of the AEC was both immediate and far reaching.

To give statistical perspective to the immediate task of implementing this new licensing responsibility, the court's decision affects as of this time 65 construction and operating license applications involving 97 nuclear power units with a total electrical generating capacity of about 87 million kilowatts. Approximately half of these applications are either in the hearing stage or nearing completion of AEC processing with the balance in various stages of review.

In addition to these 65 applications, five nuclear power reactors for which operating licenses were issued after January 1, 1970, are affected, as well as three fuel reprocessing facilities. Also affected are 10 power reactors operating under provisional licenses which must undergo full NEPA reviews when applications are filed for conversion to full-term licenses. And, of course, future nuclear plant applications also will be subject to these new licensing requirements.

Mr. Chairman, I would like to submit for the record a list of the nuclear facilities presently affected by the court's decision, and now covered by our revised regulations.

Senator BIBLE. Without objection, that will be incorporated in the record.

(The information referred to is in app. 1.)

Mr. DOUB. At this point, Mr. Chairman, I think it appropriate to turn to the revised rules implementing NEPA which were published in the Federal Register on September 9, 1971, as appendix D to part 50 of the AEC's facility licensing regulations.

Practical considerations dictated that these regulations be made immediately effective to achieve early compliance with the court's decision and to minimize potential delays in licensing actions. The Commission received views on a preliminary draft from representatives of Federal and State agencies, the affected industry, and environmental groups. In addition, a 60-day period was provided to allow for further comments.

Mr. Chairman, I would like to submit a copy of these regulations for the record and, rather than attempt to describe them in detail, I

would like to provide the following summary.

Senator BIBLE. The regulations in full will be incorporated in the record. You may summarize them.

(The regulations referred to are in app. 1.)

Mr. DOUB. Thank you.

The revised regulations define the procedures whereby the AEC will implement its responsibility for evaluating and assessing the total environmental impact, including thermal effects, of nuclear powerplants.

Key changes in our basic procedures broaden the environmental impact information required from applicants for NEPA review purposes and factor a cost-benefit analysis into the licensing process. The role of the AEC's atomic safety and licensing boards in the licensing review process is broadened to include these considerations, and the opportunity for hearing participation by the public on such matters is correspondingly expanded.

A significant near-term concomitant of the regulations is the expansion of the environmental review process to many nuclear powerplants for which licensing actions had already been taken before, as well as after, the enactment of NEPA, and to applications which were in various stages of the licensing process.

This includes requirements for supplemental environmental reports from the affected applicants, licensees or construction permit holders by November 9, 1971; reevaluation by the AEC of the environmental impact of each power reactor in light of broadened licensing criteria; and the preparation and recirculation of revised AEC environmental statements for comment by other agencies and interested persons.

The regulations either prescribe mandatory public hearings where construction permits are involved or provide the opportunity for hearings on NEPA issues.

The court's opinion also stated that the Commission should "seriously consider" a temporary halt in the construction of plants hitherto licensed pending their review and the possible backfitting of technological innovations.

Under the revised regulations, holders of construction permits and operating licenses affected by the court's decision were given until October 19, 1971, to submit information to the AEC as to why the permit or license should not be suspended pending completion of the NEPA review.

Statements from all of the affected licenses, involving 53 power reactors, have been received and the AEC is reviewing this information to determine whether to continue or suspend in whole or in part, these permits or licenses during the ongoing NEPA reviews.

Following the AEC's decision on whether to continue or suspend a permit or license pending the NEPA environmental review, an opportunity for a hearing is given to the licensee or an affected member of the public.

The main thrust of the *Calvert Cliffs* decision dealt with interpretation of section 102(2)(C) of NEPA which requires preparation of detailed environmental statements on major Federal actions having environmental consequences. Before the *Calvert Cliffs* decision, Mr. Chairman, we had furnished preliminary guidance on this matter to nuclear plant license applicants.

I would like, in this regard, to submit for the record our "Draft Guide to the Preparation of Environmental Reports," which was issued in February of 1971. I would also like to submit for the record a document entitled "Scope of Applicants' Environmental Reports with Respect to Transportation, Transmission Lines, and Accidents," dated September 1, 1971, which was sent to those affected by our revised NEPA regulations.

Senator BIBLE. Each of the documents referred to will be made a part of the record.

Mr. DOUB. Thank you.

(The documents referred to are in app. 6.)

Mr. DOUB. This document gave guidance to applicants on information required regarding three new areas, as indicated by the title, to be included in the consideration of potential environmental effects of nuclear plants.

With respect to transportation, it covers the shipment of fuel elements from the fabrication plant to the reactor, the transportation of irradiated—spent—elements from the reactor to the fuel reprocessing plant, and the transportation of packaged radioactive material from the reactor to low-level waste burial grounds. A general description of the environmental impact of transmission lines whose construction is necessitated by the production of electric power from the reactor is also called for.

Finally, the guidance indicates that the probabilities of occurrence and the consequences of postulated accidents must be taken into account, and lists classes to be considered. For those classes found to have significant adverse environmental effects, the applicant is to evaluate them as to probability or frequency of occurrence, to enable estimates to be made of environmental risk or cost involved.

The most important and most complex new feature to be contained in the applicant's environmental reports and in AEC's final environmental statements under our revised regulations is the cost-benefit analysis. The regulations provide that this analysis should consider and balance "the environmental effects of the facility and alternatives available for reducing or avoiding adverse environmental effects, as well as the environmental, economic, technical, and other benefits of the facility."

The regulations also provide that, to the fullest extent practicable, the various factors should be considered in quantitative terms.

The preparation of an adequate cost-benefit analysis in an applicant's environmental report is a difficult item with which the applicant must deal. In addition to the cost-benefit analysis which will be received from the applicant, we will also have the benefit of a model for cost-benefit analyses and evaluations, as applied to nuclear powerplants, which is being prepared by the Commission's staff.

The AEC has recently entered into contracts with outside organizations having experience in operations analysis and related fields to assist in this endeavor. We will be pleased to furnish a copy of this to the committee when completed.

I would like to emphasize that while the Commission is lending guidance, and will make every effort to carry out its regulatory responsibilities fully and expeditiously, the burden of providing the information required by the AEC to properly assess the environmental

impact of each project rests on the applicant. The effectiveness of the regulatory process depends to a great extent on the adequacy and timeliness of the information submitted by the applicant.

Let me turn for a moment to the matter of potential conflict between the *Calvert Cliffs* decision and existing Federal water quality legislation.

In the Commission's view, the basic problems involved in this area are those associated with potential multiple licensing requirements. Briefly, the Water Quality Improvement Act of 1970, which is an amendment of the Federal Water Pollution Control Act, precludes Federal agencies from issuing licenses for activities involving discharges into navigable waters without a certification from the appropriate Federal, State, or interstate ageny that there is reasonable assurance of compliance with applicable water quality standards.

In addition to certifications required by the Water Quality Improvement Act of 1970, applicants for nuclear powerplants normally must obtain a discharge permit under the program established by the President pursuant to the Refuse Act of 1899. The Corps of Engineers, in conjunction with EPA, issues permits for industrial facilities whose operation involves discharges into navigable waters, and EPA provides guidance on water quality matters involved in determining whether a permit should be issued.

Under the *Calvert Cliffs* decision, the AEC must independently consider actual water quality impact in its NEPA determinations and be prepared to impose consequent water impact restrictions. The AEC must therefore undertake a water quality assessment for a facility even though the facility's discharges have been reviewed and approved by a State or regional agency, or EPA, under the FWPCA, and by the Corps of Engineers and EPA under the Refuse Act. This cost-benefit balance may lead to the imposition of water quality requirements stricter than those imposed under the FWPCA and the Refuse Act.

To answer the specific question raised in your letter, Mr. Chairman, we do see an overlap of requirements stemming from the *Calvert Cliffs* decision and those which are already extant under the WQIA and the Refuse Act Program.

In our view, rather than three separate and independent agency reviews of water quality matters as I have outlined, it would make more sense if a mechanism could be provided for one consolidated review by the agencies concerned. An effective way to preclude duplicate review of water quality matters would be through an amendment to the present Federal Water Pollution Control Act providing that once water quality approval is given by cognizant governmental authorities, water quality matters need not separately be considered under NEPA by a licensing agency such as the AEC. Pending the enactment of this or similar legislation, and in order to expedite agency review with respect to the priority cases, the AEC has been working with EPA and the Corps of Engineers to coordinate our schedules with respect to water quality matters under NEPA and the Refuse Act. Of course, we are aware of the Senate action yesterday with regard to Senator Baker's amendment.

Mr. Chairman, you also requested that we discuss anticipated delays in nuclear plant licensing resulting from the additional NEPA re-

quirements, as well as those areas expected to experience problems in meeting anticipated 1971 or 1972 electric energy requirements. Any impact occasioned by the licensing process on areas where power shortages are anticipated is of immediate importance. I would like to discuss these subjects together.

Senator BIBLE. Before you get into the next section, just a clarifying question. Does the Baker amendment yesterday adopted take care of the duplication that you mentioned just a minute ago? Does it or does it not? Is that the type of amendment you would be proposing?

Mr. DOUB. Yes. To answer your question, we think it does take care of part of it, the duplication of the water quality reviews by Federal agencies, but even with the amendment we would still, in our weighing and balancing and in the cost-benefit analysis that we would have to make, we would have to consider the water quality standards.

Senator BIBLE. That being true, are you considering other amendments which you will in due time submit to the Congress? You seem to indicate here some necessity for amendments.

Mr. DOUB. We are exploring that.

Senator BIBLE. You haven't reached a permanent determination that you will or will not?

Mr. DOUB. We haven't reached a determination that we will not. It will resolve part of the problem, but even then we would have to consider the standard in our weighing and balancing.

Senator BIBLE. I understand it doesn't answer the whole problem. You may want to consider additional amendatory language to take care of the questions that you raise there, is that right?

Mr. DOUB. Yes, sir.

Senator BIBLE. All right, you may proceed.

Mr. DOUB. The Federal Power Commission is, of course, the primary agency concerned with power supply and reliability, and Chairman Nassikas of the FPC will, I understand, cover this question in detail in a statement which will be furnished for the record.

We are obtaining the FPC's comments and independent assessment of power supply needs in affected areas in connection with each environmental statement prepared for a nuclear power plant. The FPC has recently provided us with a report regarding possible near-term power shortages. The agency has identified several regions of the country that could experience such difficulties during the next 18 months. From these regions, the FPC has pinpointed five "critical subregions" considered to face the most severe problems of adequate power reserve margins if nuclear plants are not available at critical times. There are 14 nuclear powerplants under consideration for operating licenses in these areas.

The AEC regulatory staff has projected schedules for the plants in question which reflect its best judgment as to the earliest possible dates for the various licensing steps that must be taken. The staff analysis, a copy of which is submitted for the record, indicates that the NEPA review should not be the determining factor in the areas identified by the FPC as having critical power needs.

If, however, unforeseen circumstances arise due to the NEPA review, they can be mitigated in cases where construction has been completed by use of the low power and emergency provisions of the Com-

mission's revised regulations. These regulations provide that the AEC may authorize upon the applicant's request fuel loading and operation at levels up to 20 percent of full power consistent with appropriate regard for environmental values during the period of the supplemental NEPA review. In emergency situations, or other circumstances where the public interest so requires, the Commission may authorize operation beyond 20 percent of full power.

Senator HATFIELD. Mr. Chairman?

Senator BIBLE. The Senator from Oregon.

Senator HATFIELD. I have a couple of questions that relate into this particular emergency situation that you are covering now.

As I understand the regulations, you have the authority to take into consideration this particular emergency situation, that you can permit a licensee up to 20 percent of full power.

Now, in uncontested cases, if I am in error tell me, in uncontested cases no public hearing is required, is this correct?

Mr. DOUB. Senator, the Atomic Safety and Licensing Board has the authority under the regulations to permit fuel loading and power up to 20 percent. Criteria under which they must make such a judgment is spelled out in the regulations. Any relief beyond the 20 percent must be a Commission action itself.

Senator HATFIELD. All right. But in uncontested cases, up to the 20 percent level, no public hearing is required, but in contested cases, such as Indian Point No. 2, I understand then public hearing is required. Is this a correct understanding?

Mr. DOUB. Yes, that is correct.

Senator HATFIELD. What guidance has been provided for the issuance of such an interim license?

Mr. DOUB. Beyond 20 percent?

Senator HATFIELD. Up to 20 percent.

Mr. DOUB. The guidance has been the criteria spelled out in the regulations, the matters which must be considered by the Board in making such a judgment to allow power up to 20 percent. They have to consider the nature and extent of the resulting environmental impact, should it call for license modification, suspension determination, whether limited operation would foreclose later adoption of alternatives or facility design operation and the public interest factors mitigating for immediate facility operation.

There would have to be an affirmative finding of fact of these matters before the Board could permit operation.

Senator HATFIELD. That is up to 20 percent. I believe the regulations also state that operations beyond 20 percent of full power will not be authorized except in a stated case of an emergency situation, or other situations where the public interest prevails?

Mr. DOUB. That is correct.

Senator HATFIELD. Will you define for the committee or me what constitutes an emergency situation?

Mr. DOUB. This is a subjective matter which would call for an input of other State and Federal agencies such as the State public service commissions, Federal Power Commission and other Federal agencies. We have not defined at this time the basic requirements that will have to be satisfied before there could be a finding.

In effect, it is what might be determined to mean a NEPA review where the full environmental effects are weighed against the need for the power and the immediate impact, if the power is not available to regional economy or the local area.

Senator HATFIELD. Are you in the process of defining a certain broad based criteria for what is an emergency situation that you could submit maybe later to the committee?

Mr. DOUB. Yes, indeed.

(The information referred to follows:)

At present the Commission has not established criteria or guidelines for making a determination of what constitutes an "emergency situation" or "other situations where the public interest so requires," rather, the Commission plans to deal with each request on the basis of its particular facts as developed in the record. Absent actual experience with this category of cases, and in view of the character of the situations these licensing categories are designed to embrace, it would presently be difficult to spell out with confidence any specific criteria or guidelines. At this juncture the paramount need is for a broad standard which would permit a flexible and individualized approach in dealing with this special licensing authorization.

Among the items which might be considered in making such a determination, however, are:

(a) Whether all issues related to plant safety at the proposed power levels have been resolved;

(b) Whether operation of the plant at the proposed power level would result in irretrievable consequences which could not be ameliorated through subsequent plant modifications that may be found necessary as a result of the full NEPA review;

(c) The urgency of the need for power in the region affected and available reserve margins. The AEC would, of course, rely heavily upon the advice and expertise of the FPC in this area; and

(d) Public health and safety considerations of not having necessary reserves versus the extent of any adverse environmental effects that may be anticipated from operation of the plant at the proposed power level during the NEPA review.

Senator HATFIELD. What do you consider to be other situations where the public interest so requires it? What are other situations?

Mr. DOUB. I think you get into health, safety, a broad spectrum of areas which might not, in the accumulative approach, amount to an emergency, but they may be very demanding in terms of the need for the power.

Senator HATFIELD. Again, is this in an evolving situation that you are considering that perhaps at a later time you can submit to the committee a more specific description?

Mr. DOUB. Yes, sir. I want to emphasize, however, that any determination in this area has to be weighed and will be weighed against the environmental consequences and the redressability.

Senator HATFIELD. In such an emergency situation, if such a situation arises that justifies exceeding the 20-percent level, what is to prevent the licensing board from granting such an interim operating license on the same grounds in both contested and noncontested grounds, on the same ground in both contested and noncontested cases? Could they grant such a license?

Mr. DOUB. Yes, I believe they could. They could not go beyond the 20 percent, however.

Senator HATFIELD. I would be very interested in following through with you to see what you are going to define as other situations in more specific terms, and the emergency type situations, because here again I think it is very important to have this understood by the gen-

eral public as well as by the committee, what kind of exceptions can be made of these general situations.

Senator GRAVEL. Will my colleague yield on that point?

Senator HATFIELD. Yes.

Senator GRAVEL. The AEC certainly is not only talking about what happens at plant sites when you grant these licenses, but about the transportation of radioactive material and the storage of radioactive waste, and all of those environmental consequences. That is obviously tied to the license. If you have one site that does something, then you have all of these other inevitable problems. Is that considered?

Mr. DOUB. The permit will not be granted while the radiological issues are open. The statutory radiological issues would have to be concluded.

Senator BIBLE. Would you repeat that, please?

Mr. DOUB. Radiological issues would have to be concluded and if they are not, interim operation would not be permitted.

Senator GRAVEL. You wouldn't license the plant if you didn't have all of the waste problems solved?

Mr. DOUB. The areas in radiological problems would have to be resolved at the hearing before the operation up to 20 percent would be permitted.

Now, the other areas such as transportation would be a point that would have to be considered in the balancing of the need for the power against the impact to the environment and any other factors. It would be a mini-NEPA review, in effect.

Senator GRAVEL. This is the point that I think my colleague wants to make. There are broader considerations that must be taken into effect when you go ahead and grant these licenses.

Mr. DOUB. Well, the whole spectrum has to be considered.

Senator GRAVEL. If you create plutonium and you have no storage, what do you do with it? If you approve a plant, which will inevitably produce radioactive waste, and you haven't anything to do with the waste, what do you do with it?

Mr. DOUB. There is a procedure for waste disposal.

Senator GRAVEL. Apparently the Kansas site was going to be used for somebody's radioactive waste, and now that the Kansans say they don't want it, where is that waste going to go?

Mr. DOUB. Into temporary storage.

Senator GRAVEL. Well, how long are you going to keep it on a temporary basis—well, I will withdraw that. I was imposing on my good colleague.

Senator BIBLE. Yes; we will get back to Senator Hatfield.

Senator HATFIELD. I just have one closing question involving this matter. Let's take a hypothetical situation. Let's say there has been determined that there is an emergency and you are going to authorize up to the 20-percent level.

Mr. DOUB. It wouldn't require an emergency for up to 20 percent.

Senator HATFIELD. All right. Let's assume you are going to do it on whatever basis you are going to do it, and it is subject to public hearing, such as Indian Point No. 2, and that hearing will have review or will be challenged and carried on beyond some appeal form or fashion, is it reasonable to assume that, in effect, really interim operating procedures have little value?

Mr. DOUB. No; I don't think so.

Senator HATFIELD. Why?

Mr. DOUB. The operation up to 20 percent serves a variety of purposes beyond just meeting the public need for power.

Senator HATFIELD. Well, what is the difference? In the process of getting it implemented you have these hearings subject to appeal and so forth, is that right?

Mr. DOUB. Yes.

Senator HATFIELD. Well, you can't implement until that is a final decision, can you?

Mr. DOUB. No; not if we are prevented.

Senator HATFIELD. Aren't we dealing a little bit in mythology here, talking about interim permits, emergency situations, and so forth. that can be delayed and delayed and delayed in these procedures?

Mr. DOUB. I don't think so. The issues are easily identifiable, whether there would be appeals is problematical.

Senator HATFIELD. The only way this interim procedure has meaning, really, is in a case where it is not contestable?

Mr. DOUB. I wouldn't think so, Senator. It is my impression that environmentalists and parties in cases who have demonstrated need for power up to 20 percent, where it can be shown, they would accept such a judgment if the case is critical. I wouldn't want to make a generalization in a contested case that the parties would not accept such a judgment by this licensing board with a basis having been made for the need for power.

Senator HATFIELD. Conceivably, the so-called interim operating license, though, could be prolonged in proceedings to the point where the final decision has been made on the original question, couldn't it?

Mr. DOUB. Yes, I don't think——

Senator HATFIELD. Hypothetically speaking.

Mr. DOUB. In permitting an operation up to 20 percent, the items that would be looked at would be the incremental environmental effect of a plant operating during the shortened period at 20 percent. So, it is a very narrow issue.

Senator HATFIELD. But subject to review, subject to appeal and delay. This is not a reality, you could say, a reality to talk in terms of interim licenses up to 20 percent if they are contested, is it? Are we really getting the interim relief here? Are we actually getting emergency action here or are we just providing us here with some limericks?

Mr. DOUB. No; I don't think so. The incremental environmental effect is the matter which we look at very closely. Assuming that a case can be made weighing the environmental impact against the need for the capacity, then permission to operate up to 20 percent may or may not be granted by the board. The case would continue, the NEPA review would continue while the plant operates at that 20 percent level.

Senator HATFIELD. Well, I would hate to ask any of these parties to any controversy to delay their reaching their reconciliation or conclusion or solution based upon the assumption that somehow if an emergency arose or if there was some other necessity, that there was an interim procedure that would relieve that automatically, or could be brought to bear on that situation. I may be in error. That is why I am asking these questions.

I have no preconceived ideas or conclusions on this, but I just feel to talk about these interim procedures to relieve emergency situations

that are automatically going to take place, or somehow relieve the pressure on those parties or agencies to reconcile their differences, could not be looked upon as such an automatic operation or such an immediate relief to be interpreted as an interim operating license.

Mr. DOUB. I think to answer your question, in a contested case, if an appeal were taken, that the plant would be operating at 20 percent during the course of the appeal, unless there was an injunction or something else that prevented it.

Senator HATFIELD. It would be operating?

Mr. DOUB. Yes; it could very well be operating while the appeal is in process.

Senator HATFIELD. Don't you have to grant a special type of license for this interim period to operate up to 20 percent?

Mr. DOUB. Yes.

Senator HATFIELD. And isn't the granting action subject to a public hearing and therefore subject to contest?

Mr. DOUB. Yes.

Senator HATFIELD. Are you going to put it in operation while there is an unresolved question?

Mr. DOUB. No; the issue would be resolved, but the appeal would be taken to an appeal board, and it would be decided very quickly by the appeal board.

Senator HATFIELD. No operation is taking place at this particular moment, during the appeal, is there?

Mr. DOUB. Yes, it would be operating at 20 percent. The decision having been made by the Atomic Safety and Licensing Board to permit operation at 20 percent, and then presuming that a party wishes to appeal, under the procedures of the Commission, an appeal can be taken at that point to the appeal board.

Senator HATFIELD. So, you are actually going to put them into operation, under the licensing board, to put them in operation up to 20 percent, even though it is going to be a contested decision.

Mr. DOUB. A party could ask the appeal board for a stay in the operation.

Senator BIBLE. Can you take it from there to the courts? Because, if a court enjoins it going up to 20 percent, you can't violate that, can you?

Mr. DOUB. No; you can appeal it from the court.

Senator BIBLE. I think it might look like you are taking things into your own hands up to 20 percent and you are inviolate during that time and in an emergency, is that right?

Mr. DOUB. I don't think so. I tried to say a court may very well enjoin the operation.

Senator BIBLE. Even up to 20 percent?

Mr. DOUB. Yes. But in-house, in the regulatory process, the hearing board can grant authority to operate up to 20 percent. A party can then appeal it to the appeal board. The company would be operating at 20 percent while the appeal is being processed.

If a stay were asked, then the appeal board would have to make a determination.

Senator HATFIELD. If I understand it, if I can put it down to my level of understanding, the licensing board under certain criteria can grant a right to operate up to 20 percent to a particular plant?

Mr. DOUB. Yes.

Senator HATFIELD. It is known beforehand that it is going to be contested, somebody is going to come in and contest it. But as I understand it, by the very simple action of this licensing board, they can put that into an actual operating procedure for that plant up to 20 percent while the contesting parties meet to have their procedures fulfilled?

Mr. DOUB. No. Maybe counsel can explain it a little better.

Senator BIBLE. Yes, let's clarify it.

Mr. HOFFMANN. The proceeding contemplated would be based on an application by the applicant in which he would provide the basis on which he would rely. This would be the same general sort of showing required beyond 20 percent.

Now, the rule provides for expedited consideration of those particular matters and, as has been explained, the scope of the matters in the 20-percent proceeding does not run to the entire operation of the plant for a number of years, such as recurrent loading and transportation of wastes. The matters for hearing apply only to that incremental portion of the operation of the plant during the time for which the interim operating authority is sought.

The benefits of that period of operation are balanced against the environmental impact of that short-term operation. The hearing board makes a decision on that basis.

Up to the time that the hearing board makes a decision, having heard the parties under the limited procedures authorized by the regulation, there is no authority to operate at 20 percent. Once the hearing board says that they approve the 20 percent, then the same sorts of procedures that obtain in a litigated case in court take over. The applicant can then proceed to go to 20 percent.

He, of course, is aware that the appeals board to which this matter may be taken may stay the hearing board's allowance to go to 20 percent. That would be litigated in the appeals board which again is an appeals board within the AEC regulatory process.

Now, if the appeals board decides they will not stay, then they may review the determinations made by the hearing board, and at that point they may either reverse the hearing board, in which case the 20-percent authority will be withdrawn and the plant would have to shut down, or the appeals board might approve what the hearing board had done, and after an opportunity for a Commission review, which is limited under our rules, the administrative procedures would have been exhausted and the matter would be ripe for review by the courts.

So that this——

Senator HATFIELD. So, the plant can be operating up to 20 percent during these proceedings of appeal?

Mr. HOFFMAN. Yes, sir.

(The following questions were submitted to Commissioner Doub by Senator Hatfield on November 30, 1971; the answers appear in app. 2.)

AEC QUESTIONS SUBMITTED BY SENATOR MARK O. HATFIELD IN HIS LETTER OF NOVEMBER 30, 1971

Question 1. It has been alleged that one of the major reasons for the overly long AEC licensing processes, even prior to the Calvert Cliffs decision, was the shortage of qualified personnel. In addition, your testimony before the Interior Committee on November 3, 1971, states, "the manpower requirements necessary to insure conformance with the Court's decision are formidable." Does such a shortage exist, and if so, is it due to (a) unavailability of qualified personnel, (b) a deficiency in funds appropriated to the Commission, or (c) a "position freeze" imposed upon the Licensing Division by the Commission and/or the Office of Management and Budget?

Question 2. As approved by the Senate on November 2, 1971, the Federal Water Pollution Contract Act Amendment of 1971 (S. 2770) contains an amendment by Senator Baker to eliminate duplicative review of water quality matters by clarifying the relationship between the Federal Water Pollution Control Act and the National Environmental Policy Act of 1969. In reply to questions by members of the Committee concerning the effect of this amendment, you stated that it would take care of part of the problem, but that AEC would still have to consider water quality standards. What is the basis for your statement, which appears to be contrary to both the language and the intent of this amendment? Would you please provide the Committee with specific language which you feel is needed to eliminate the requirement for duplicative review of water quality matters?

Question 3. In your testimony you state that, "The most important and most complex new feature to be contained in the applicant's environmental reports and in AEC's final environmental statements under our revised regulations is the 'cost-benefit analyses . . .' " In view of the importance which you attach to this requirement, will you please provide the Committee with an explanation of why the Commission did not issue any definite guidelines to be followed by applicants in preparing cost-benefit analyses? More specifically, would you explain why such guidelines were not provided for applicants who, under Sections B and C of your revised Appendix D, had to submit environmental reports by November 9, 1971?

Question 4. The staff analyses of "Key Dates for Critical Nuclear Plans" which your submitted for the record raises a number of questions. Is the estimated time required from completion of construction to the earliest projected date of license issuance predicated primarily on the power situation in the area or on other factors? For example, why is there a lag of eight months in the case of Maine-Yankee and no lag at all for Turkey Point 4 when construction of both plants is expected to be completed in April 1972? Could you please furnish the Committee with an explanation of why there is such a wide variation in the anticipated license schedule for these plants?

Question 5. Several utility witnesses expressed concern that regulatory delays could adversely affect the adequacy and reliability of electric service. This seems to be a valid concern, since AEC's new regulations require an elaborate and lengthy procedure involving the preparation of environmental reports by the applicant, submission of draft and final environmental statements by AEC staff, extensive governmental and public review, at least one mandatory hearing, and additional agency or judicial reviews. Can you provide to the Committee an anticipated time schedule for the procedures outlined above and a statement of why in your opinion this will not cause delay in licensing and operation of nuclear plants presently under construction or operation?

Question 6. In your testimony you stated, "In emergency situations, or other circumstances where the public interest so requires, the Commission may authorize operation beyond 20% of full power." Would you please provide the Committee with a statement of how this testimony relates to Section A. 12 of the new regulations? It appears that Section A. 12 says that authorization beyond 20% of full power cannot be implemented if any interested person objects. This would appear to mean that final action on an interim or emergency operating permit could be delayed for an indeterminate period. Is this a correct assessment of the effect of Section A. 12?

Question 7. In your testimony you said, "The effectiveness of the regulatory process depends to a great extent on the adequacy and timeliness of the information submitted by the applicant." I understand that substantially all of the applicants' environmental reports have been submitted. Presumably this answers the timeliness question. Regarding adequacy of information, can you explain how an applicant can submit adequate information when there are no AEC guidelines to determine what is adequate?

Question 8. Considering the import you place on cost-benefit analyses, can you provide the Committee with a specific detailed compilation of factors you consider to be costs, factors you consider to be benefits and the extent of detail the applicant must provide regarding alternatives considered prior to the application for a construction permit?

Question 9. In your testimony you said, "The Commission received views on a preliminary draft from representatives of federal and state agencies, the affected industry and environmental groups." What was the procedure and format used in obtaining these comments? How much time did non-governmental interests have to study the preliminary draft? Did the Commission make any substantive changes in the preliminary draft as a result of the comments received?

Senator BIBLE. Now, we will resume on page 12.

It is my intention to finish the testimony in main and when we recess we will stand in recess until 2 o'clock. I don't know if there will be extended questioning between now and the time of the recess, but we will be back at 2.

So, we will let you finish, now, the balance of your testimony in chief.

Mr. DOUB. Thank you, Mr. Chairman.

Senator BIBLE. Would you pardon me for a minute?

The Senator from Wyoming.

Senator HANSEN. Thank you, Mr. Chairman.

Inasmuch as the Finance Committee, of which I am a member, will be in executive session at 2 this afternoon, if I may I would like to ask the Commissioner if he would be willing to submit for the record the costs, the relative costs as compared to other fossil fuels, or whatever other sources of power you may make a comparison with, in order to cooperate, as I suspect you will be doing, with NEPA.

I understand section 2(b) of NEPA has been directed to assist agencies in identifying and developing methods and procedures which will assure that presently unquantified environmental amenities and values may be given appropriate decisionmaking along with economic and technical considerations.

I presume you will be cooperating with them. I recall there was a surplus of some 50,000 tons, is that right? I would just like to have use of it for the record, the relative costs that have gone into the factoring of the equation from which may be drawn some conclusions with respect to costs and benefit ratios.

Mr. DOUB. We will be delighted to do so.

Commissioner Ramey has a few comments.

Mr. RAMEY. In his NEPA statement the applicant would indicate the alternate sources of power and the alternate costs, including the cost of fuel that led to his determination on the source of power to be used.

In that case, the costs that you allocate would certainly be a part of the costs of nuclear fuels.

Senator HANSEN. It would be helpful for my purposes if you could make some projections, not just for the next 2 or 3 years but I would imagine over the next 25 years, which I think is a relevant point to be made as we try to compare the relative desirability or feasibility of plants. I take it we need to know what we are anticipating in the way of availability of other sources of fuel and costs as well.

Mr. RAMEY. We can give you some general figure on that.

(The information referred to follows:)

Projection of Availability, Sources and Relative Costs for the Next 25 Years of Fuels for Electric Power Production

The availability of fuels is dependent not only on their abundance in nature but also on the prices that can be obtained in a competitive market in relation to the costs of production, the ability to produce sufficient quantities to meet demands, and the effects of regulations or allocations.

The following comments and projections with respect to coal, oil, and gas are based primarily on information and statements originating with organizations, agencies, or individuals other than the Atomic Energy Commission. The sources, which include the Department of the Interior, national associations, and leading industry spokesmen, have direct responsibilities, authority and knowledge in matters relating to the fossil fuels.

Additional discussion of factors affecting the availability and costs of fossil fuels is reported in the Record of Hearings Before the Joint Committee on Atomic Energy on the Atomic Energy Commission Authorizing Legislation, Fiscal Year 1972, beginning on Page 636 of Part 2.

COAL

Resources of coal in the United States, as determined by mapping and exploration, exceed 1,500 billion tons. An additional 1,300 billion tons are estimated to be in the ground at less than 3,000 feet. Thus, it is apparent that if no other factors were brought to bear, there would be ample resources to meet all of this Nation's power needs well beyond the next twenty-five years. However, the future availability of coal is expected to be limited by rising costs of production and transportation, scarcity of labor, and the imposition of controls on mining and consumption. The current trend of urban governments to limit the sulfur content of fuels burned has forced many utilities to pay premium prices for low-sulfur coal. Since most of the low-sulfur coal is located in the western part of the country whereas the principal demand is in the East, the added cost factor of long distance transportation results. This condition may be relieved through the successful commercial development of devices to remove sulfur in coal or sulfur dioxide in stack gases and combustion beds, but such devices are still in the development or demonstration stages, and mass application cannot be achieved for many years.

The coal industry is finding difficulty in attracting sufficient numbers of miners and supporting technicians to meet its needs. The increasing future requirements for coal to fuel added power plants and for gasification are apt to further aggravate the manpower crisis. Some relief could be achieved through more intense mechanization and through higher wages, but the latter would have the adverse effect of increasing production costs.

Continuing enforcement of the Mine Health and Safety Act and the trend to stricter controls on strip mining will not only impose further limitation on coal production but also increase costs.

In 1969 the mine price of steam coal averaged a little over $4 per ton. (The corresponding average cost, as burned, to utilities was $6.26 per ton). This increased by 75¢ in 1970 and a further increase of 75¢ is indicated in 1971. The sharp rise, 1969–1971, is largely attributable to added expenses stemming from compliance with new Federal regulations. Beyond 1971 the cost of mining coal is expected to continue to rise steadily in view not only of further costs of compliance with Federal or State controls but also of escalating labor and materials costs without significant increase in productivity. By 1985 the mine price is estimated to be about $11 per ton and by the mid-1990's, $15 to $18 per ton, equivalent to about 62¢ to 75¢ per million Btu.

GAS

Proven U.S. reserves of natural gas total about 275 trillion cubic feet (TCF). Estimated additional undiscovered resources increase this number to about 1500 TCF. Current annual demand is about 22 TCF and is increasing at 5% to 6% per year. If this rate continues, the cumulative demand during the remainder of this century will total just about 1500 TCF. It is to be noted, however, that because there is a growing demand by utilities for natural gas as a prime fuel in the abatement of air pollution, the total resources would be exhausted at an earlier date in the absence of alternative gas sources.

Dwindling proven reserves of natural gas together with rapidly-increasing demands and production have generated a tight supply situation. In contrast to the price of coal, which is principally influenced by production costs, the price of

natural gas is controlled by regulation and allocation. In order to encourage exploration and production, the Federal Power Commission has recently been allowing modest price increases. Even if these and any future increases do bring about accelerated industry effort, the lead time required to discover new wells and bring them into production is such that the effect would not be significant for a number of years.

There is a strong possibility that interim near-term measures such as the import of gas in natural and liquid forms will not suffice to fill the gap. As a result, even though utilities would prefer to use gas as fuel, many of them may not be able to negotiate contracts to purchase gas for new plants or, in some cases, even for existing plants.

A long-term significant relief measure would be the successful commercial development of the production of pipeline-quality gas from coal. Greatly accelerated activity is underway, both by industry and Government. It is not unlikely that one or more practical processes will have been fully demonstrated in 5 to 10 years. Rapid expansion of a gasification industry would follow, with a substantial output by about the mid-1980's. It is currently estimated that the price of gas produced from coal will be from 50% to 100% more than natural gas.

Each of the corrective or alternate measures applied to relieving the tight supply of natural gas will result in substantial cost increases. It is estimated that by 1985 gas prices will be double today's level, or about 55¢ per million Btu. (in 1970 dollars). It is not expected that natural gas will be available in sufficient quantities to be used for electric power generation beyond 1985.

OIL

Proved crude oil reserves in the United States total about 30 billion barrels. The U.S. Geological Survey has estimated that 430 billion barrels of additional undiscovered domestic crude oil are recoverable under current technological and economic conditions—260 billion on-shore and 170 billion off-shore. In 1970, U.S. consumption was about 5.4 billion barrels, of which 23% was imported. Consumption to 1985 is projected to increase at an annual 2½% to 4% rate. If this rate continues beyond 1985, the total cumulative consumption from 1971 through 1995 would be 190 to 233 billion barrels. Thus, it appears that domestic resources would have to be developed on a very intensive basis if they are to take care of needs over the next twenty-five years. However, in recent years productive capacity has actually declined, exploratory effort has fallen off, and the returns per unit of exploratory effort have also declined sharply. As a result, oil imports have risen rapidly and will continue to do so until our natural domestic sources are sufficiently developed to assure a security of supply. By 1985 oil from the Alaskan North Slope may amount to about one billion barrels per year but foreign imports may rise to as much as 45–50% of total supply.

Future imports will be sought from Venezuela, Canada, North Africa, and the Middle East. Venezuelan and Canadian potential quantities are also limited. Thus, we would need to look to North Africa and the Middle East for most of our imports.

Other possible future sources of oil are the liquefaction of coal and recovery from oil shale. Both have been demonstrated to be technically feasible. The cost, however, is considerably higher than that of either domestic or imported crude oil. Resources of oil shale are very great—perhaps as great in energy content as our resources of coal.

The average price of oil burned for power production rose from $2.08 per barrel in 1966 to $2.45 in 1970. The varied and numerous coming influences on the cost of oil make projections uncertain, particularly as far as twenty-five years in the future. However, it is estimated that by 1985 and beyond the price of oil to the power industry is likely to be somewhat higher than the present $3.00 to $3.50 per barrel (50¢ to 60¢ per million Btu.).

It is to be noted that the oil refinery industry has the flexibility to reduce or increase emphasis on the production of any of several products from petroleum. Thus, the production of residual oil for power plants and the prices charged can be adjusted to the market and to the cost of competing fuels.

NUCLEAR FUELS

As of January 1, 1971 reasonably assured reserves of U_3O_8 at no more than $15 per pound totalled 580,000 tons, and estimated additional resources 1,040,000 tons. This amount of nuclear fuel material is expected to be sufficient to sustain the projected U.S. operation of light-water reactor nuclear power plants for

most of the remainder of this century at an economic level. By that time it is expected that breeder reactors will be firmly established and will generate the fissile material needed.

Experience has shown that increase in demand for uranium fuel motivates industry exploration and development with resultant increases in reserves. There is every reason to believe that this condition will continue to prevail as the needs arise.

Overall nuclear fuel costs include the costs of raw material (U_3O_8), enrichment in the isotope U^{235}, fuel element fabrication inventory carrying charges, fuel recovery, and plutonium credit. U_3O_8 is presently being sold at an average price of about $7 per pound. It is projected that this price will gradually increase to about $9 in 1985 and about $11 in 1995. Fabrication and fuel recovery costs are expected to achieve substantial reductions because of increased volume, automation and learning curve type of improvement. It is projected that these savings will largely offset future escalation of labor and materials costs such that by 1985 the overall fuel cycle cost will be close (perhaps about 10% higher) today's level (16¢ to 17¢ per million Btu.) and by 1995 not more than 60% higher.

An additional potential nuclear fuel is thorium. Several types of reactors, one of which is now planned for commercial power production, are designed to use thorium as a fertile material for the breeding of the fissle U^{233}. Proven U.S. reserves of about 100,000 tons and additional resources of 500,000 tons are estimated to be available at a recovery cost of no more than $10 per pound. The present price of about $7 per pound may actually decline over the next twenty-five years because of increasing availability of by-product thorium from domestic and foreign sources and the economic gains through large-scale production.

Senator BIBLE. That would be very fine, Mr. Ramey.

Any further questions of these gentlemen?

[No response.]

Senator BIBLE. All right, we will go back to you now.

Mr. DOUB. Thank you, Mr. Chairman.

Our regulatory staff review of the schedules in these cases in relation to the power reserve margin requirements set forth in the FPC staff report for the five critical subregions indicates that for seven of the 14 nuclear plants in question, the licensing process could be completed in time to assist in meeting these needs, provided favorable decisions to issue the operating licenses are reached. The AEC staff estimates that construction by the utilities will not be completed on five of the remaining seven units in time for full licensing action to help alleviate the anticipated near-term peak power loads.

Our staff identifies only two units of the 14 nuclear plants in question which may not be able to help alleviate the anticipated near-term power supply problems due to the time requirements of the licensing process. These are Point Beach Unit 2 in Wisconsin and Surry Unit 1 in Virginia.

In the case of Surry Unit 1, there is a possibility that this plant could be available to help meet next summer's critical power supply period.

Point Beach Unit 2 presents a different situation. The operating license application for this plant is now in the hearing process, and it is not possible at this time to predict when the Atomic Safety and Licensing Board will complete its review. The staff anticipates, however, that the proceeding for the Palisades plant, in Michigan should be completed in early 1972. The FPC has indicated that if the Palisades plant is placed in operation, the reliability of the electric power supply in the Chicago metropolitan area will be improved during the summer of 1972.

Mr. Chairman, I would point out that the plants just mentioned are among 30 units scheduled for near-term operation to which the AEC

is giving priority attention in the licensing process. Several construction permit applications which are in hearing or nearly that stage also are on priority schedules. Apart from these priority cases, the AEC staff is developing schedules for all other affected plants. We believe that the NEPA review should not be a determining factor in the availability of these plants to provide power for critical areas. To reinforce our efforts, the Commission is improving its procedures in the licensing process.

You will recognize, of course, Mr. Chairman, that the staff estimates I have referred to are not intended to reflect on the merits of the proceedings in question, nor to be a prediction of how the cases will be decided. The schedules we have discussed are predicated on the issuance of a permit or license.

We do not mean to imply that the Commission will act to approve each application. In many of the cases there are controverted issues which must be resolved by atomic safety and licensing boards, and we do not intend to anticipate that their conclusions may be either favorable or unfavorable to the applicants. As is well known, the burden of proof before the Atomic Safety and Licensing Board rests with the applicant.

The manpower requirements necessary to insure conformance with the court's decision are formidable. To implement the court's decision on a timely basis, the AEC has turned to its National Laboratories for technical assistance and has marshaled its in-house staff for the conduct of NEPA reviews. At the present time approximately 200 AEC and laboratory staff are involved in implementing NEPA.

Oak Ridge National Laboratory, Argonne National Laboratory and Pacific-Northwest Laboratories are assisting the AEC regulatory staff in environmental analysis and evaluation of environmental reports submitted by applicants for nuclear power facilities. Each of these laboratories has had considerable experience in environmental matters, and has specialists in such fields as ecology, health, physics, aquatic biology, and meteorology.

With respect to the AEC staff, we have supplemented the staff of the Division of Radiological and Environmental Protection, which has the primary responsibility for NEPA implementation, and have reassigned staff from the other divisions to assist in the NEPA reviews. We also have placed additional responsibilities on certain of our other divisions, such as the Division of Reactor Licensing and the Division of Materials Licensing, which are now responsible for evaluating the applicants' submission on whether to suspend construction pending the NEPA review, and for preparing the accident section for the NEPA statements. We are at all times reviewing our manpower situation to determine what additional assistance may be needed.

To fund the increased level of effort at the National Laboratories and by other Commission contractors, the Commission has reprogramed $2.9 million to the regulatory program for fiscal year 1972, and this is equal to about 72 contractual technical man-years of effort.

I believe it would be in order at this point to note for the committee's information some steps the Commission is considering in the area of procedural improvements to our licensing process. The Commission is focusing attention on revisions to hearing procedures which would

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take more specific account of AEC's enlarged licensing responsibilities and also of the fact that the bulk of our licensing cases now fall into the contested category. We are hopeful that the procedural changes can contribute to the timely conduct of the supplemental hearings resulting from the *Calvert Cliffs* decision. I spoke of this matter of procedural reform in somewhat more detail in recent remarks delivered to the annual conference of the Atomic Industrial Forum, and I would like to furnish a copy of those remarks for inclusion in the hearing record.

Senator BIBLE. Without objection, they will be incorporated as part of the record at this point.

(The document referred to follows:)

REMARKS BY WILLIAM O. DOUB, COMMISSIONER, U.S. ATOMIC ENERGY COMMISSION, AT THE 1971 ANNUAL CONFERENCE OF THE ATOMIC INDUSTRIAL FORUM, BAL HARBOUR, FLA., OCTOBER 18, 1971

"THE RIGHT TO BE HEARD"—LAYING IT ON THE LINE

It is a distinct honor and pleasure for me to be here today. The Forum brings together an unusually stimulating and perceptive segment of the nuclear community, and I look forward to meeting many of you personally.

The topic for your symposium session is "The Crisis in the Licensing and Regulation of Nuclear Power Plants." While there may be divergent viewpoints as to the aptness of the word "crisis" for describing the present situation, there is an undeniable and widely shared concern as to the ability of the nuclear licensing process to cope with the demands which are being placed upon it—a problem to which I am devoting a substantial amount of my time together with my fellow Commissioners.

At a time when the Nation is demanding more electrical power and when nuclear facilities are being called upon to meet a constantly mounting share of that energy demand, we have been encountering vexing—and frankly untenable—delays in completing the licensing consideration of nuclear power plants.

There is, to be sure, a complex mix of factors which enter into the overall "delay" picture. A full survey of these matters is plainly not feasible within the scope of my brief remarks this afternoon. Instead, following the enjoinder to "particularize," which I hope will soon become the hallmark of our licensing hearings, I am going to focus on one element in this mix, that of public participation in decision-making on nuclear plant siting, construction, and operation. This is not to imply that other important parts of the regulatory program are not receiving vigorous review, and I intend to comment briefly on some of these aspects also.

So that there will be no mistaking the guiding premise in my approach to this subject, let me state my basic and fundamental belief at the outset. In my judgment there are sound practcial and social reasons why the public properly claims and is afforded the right to be heard in our licensing proceedings. Public participation is a cornerstone of administrative law and is an inherent and necessary factor in the regulatory processes of a public agency such as the Atomic Energy Commission. As far as I am concerned, this right of the public to be heard is nonnegotiable and should not be the subject of time-consuming debate. For in the final analysis, it is the public which derives the very real benefits from the safe operation of well designed and constructed nuclear power plants and which must as a corollary of that benefit shoulder the associated environmental costs.

I recognize that many thoughtful observers are disquieted by the fact that the systematic environmental inquiry, which is an integral part of the nuclear licensing process, is singularly absent (at least at the Federal level) when it comes to the construction of fossil-fueled plants which concededly have appreciable environmental consequences of their own. Some environmentalist and other concerned groups are seeking to fill this "gap," using legislation such as the National Environmental Policy Act (NEPA) to require broad-gauged environmental reviews in individual cases, like that of the Four Corners project of the Southwest. More broadly, power plant siting legislation now pending in the Congress would provide a national structure for thermal plant environmental reviews on an across-the-board basis.

But whatever the future may hold in the non-nuclear sphere, in the nuclear area we are presently operating within the demanding framework of existing law, and of court decisions applying that law. The *Calvert Cliffs* decision,[1] regardless of individual personal opinions as to its merits, leaves no doubt as to its "holding" and I believe that the AEC is being responsive to its clear definition of the agency's responsibilities under NEPA. Nuclear plants are now subject to a plenary environmental review prior to the issuance of a construction permit—and then again before operation—and at each stage affected segments of the public have the legal right to be heard in a quasi-judicial proceeding.

Of course, as I am continually discovering, stating these obvious requirements is one thing; translating them into a viable regulatory process—one which keeps step with a dynamic technology and equally dynamic social patterns—is quite another matter. And nowhere is this more evident than with the hearing phase of the process. We are confronted today with formidable problems in restructuring our hearing procedures so as to meet not only our obligation to the participating public but also our responsibility to the general public—a responsibility to arrive at sound decisions in a timely fashion. This present broad-gauged AEC responsibility demands a total in-depth review of the AEC licensing program with equal attention to the past approach of industry intervenors, and the utilities in the process. My initial reaction—which is more than just an impression—is that there is need for considerable improvement across the board.

The dimensions of problems are reflected in the increasingly lengthy proceedings which we are seeing in plant licensing. In some instances, hearing times are beginning to be measured in years—not simply weeks or even months. Parenthetically, as we all know, the time factor between the filing of an application and the granting of a construction permit or operating license has been increasing in recent years on the average of something in excess of 20% annually. And a look to the future with the additional review responsibilities stemming from the *Calvert Cliffs* decision, serves only to underline the potential scope and the seriousness of these matters.

What are some ways that the hearing procedures and the actual conduct of the hearings can be improved? This is the focus of our attention this afternoon.

In approaching the matter, I should like to put to one side the legislative proposals affecting plant siting—nuclear and otherwise—now before the Congress. We have, whatever their outcome, an independent administrative obligation to act now with the means we presently possess.

Moreover, I am not disposed to be pessimistic about the possibilities for substantial progress through changes which are within our present capabilities: changes which build on concepts which have been subjected to intensive reexamination in recent months by the Commission. I would like to share with you some of these possibilities this afternoon. While the majority of my suggestions—particularly the ones for procedural change—are within the domain of the AEC, before I conclude these remarks I should like to discuss several suggestions for changes which the industry itself might undertake and also some observations for those environmental groups which have taken an active interest in our licensing proceedings.

Let me turn first to the licensing hearing itself, the ground rules under which it is conducted, and the role—and responsibilities—of the respective parties in a contested proceeding.

I see no inconsistency between active public participation in the decision-making process and the legal prerequisite that this participation take place in a reasonably ordered manner. Indeed, if it cannot, the concept of public participation will be on a collision course with another concept—that of the necessity for the administrative process to permit decision-making on a basis timely enough to serve vital public needs.

I am not willing to concede that there is any inherent incompatibility between these two concepts. Hearings, of course, take time; but agencies, like courts, are not without means to so structure a proceeding as to accomplish its purpose with the maximum possible dispatch. The Commission recently issued proposed amendments to its procedural guidelines (Appendix A to Part 2) which were designed to take account of the fact that reactor licensing had passed from an era of essentially uncontested hearings, where public education was a primary function of the licensing proceeding, to one of contested hearings, where the settlement of disputed matters was the central purpose of our adjudicatory process.

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[1] *Calvert Cliffs' Coordinating Committee Inc., et al.* v. *United States Atomic Energy Commission, et al.* (Nos. 24,839 and 24,871, D.C. Cir., July 23, 1971).

The recent *Calvert Cliffs* decision clearly called for a reexamination of the matters dealt with in those proposed guidelines; and we are now in the process of recasting them—as well as some of the basic procedural rules in Part 2 itself—to take account of *Calvert Cliffs* and also of suggestions received from industry, environmental groups, and some further thoughts of our own. I might add that we expect shortly to complete a new draft issuance of Part 2 and its appendix and that we plan to discuss our proposals with representatives of industry and environmental organizations and to assess their further comments prior to adoption of new procedures.

As to our present thinking, let me outline briefly some of the procedural changes we are considering. Functionally, these changes are built around two objectives, which I view as being mutually complementary: First, to provide for earlier public participation in licensing proceedings, within a context of maximum and convenient public access to facility licensing information; and, second, to demand a sharper focus on matters which are actually in controversy, and a greater discipline in dealing with those matters, during the hearing phase of the licensing process.

To be more specific about the direction the thoughts of some of us are taking:

In the sphere of earlier public participation, consideration is being given to allowing intervention in licensing proceedings at a much earlier point in time than is now permitted—even under our early notice procedure. This is a step which some environmentalists have been urging the AEC to take to facilitate public participation and to expedite the conduct of the later hearing—and I believe it makes sense.

As a correlative step, we would plan to assure that the application and all of its amendments, the staff-applicant correspondence, the safety review and NEPA documents, and the like, would be conveniently accessible to the public as they become available from the date of the filing of the application onward. We have just recently moved in this area by establishing a public document room at each site locality.

As an additional measure in pursuit of this objective, we are considering liberalizing further our rules dealing with availability of AEC records by eliminating certain of the present privilege exemptions for internal documents. This would not only broaden information access to the public—desirable in and of itself—but could also appreciably lessen the time loss involved in licensing proceedings through protracted arguments over document production.

Early, readily available access to all of the foregoing information, and a forthright approach in the matter and attitude of applicants with regard to the production of information—about which I'll say more in a moment—could make early intervention a highly useful step. It is painfully apparent to me that a considerable, and to a large degree unnecessary, amount of time is expended by concerned parties in simply trying to acquire what I believe should be readily available information regarding the proposed plant.

Let me add one further thought on the matter of early public participation. I can well understand the concern—if not the sense of frustrations—of local citizens and civic and environmentally minded groups who observe site preparation and construction to grade of a proposed plant prior to an opportunity to be heard. I believe constructive steps are needed to come to grips with this problem, and we will be giving this additional attention.

Turning to the matter of providing a sharper focus and a more orderly process for the contested hearing, we are looking at the following steps:

Early identification of the issues to be considered in operating license hearings and restriction of testimony to those matters which are actually in controversy;

Greater utilization of the prehearing mechanism for the purpose of showing substantiality of issues both in construction permit and operating license proceedings, as a prerequisite to the raising of radiological safety or NEPA contensions;

Greater utilization of prehearing conferences and procedures to better define and narrow controverted issues and to deal with related discovery matters; and

Recognition of the authority of the licensing boards to impose limitations, where appropriate, on the time within which a hearing or any part of it may be completed. This last point, as some of you will recall, is in line with the provisions of our revised NEPA regulations in Appendix D to Part 50.

I believe, moreover, that our procedures should contain some express recognition of the role which can properly be played by party settlements of disputed matters in contested licensing proceedings. Settlement by mutual agreement of all parties is an accepted aspect of judicial proceedings and, as a practical matter, it is an essential ingredient in day-to-day business and personal affairs. There are sound public interest considerations for encouraging this kind of settlement of disputed matters in our licensing proceedings and our procedures should not only reflect this but also provide mechanisms which take account of productive party settlement efforts.

Beyond these and other measures which might be adopted, a cardinal objective on our part will be to set the tone for the conduct of hearings by our presiding officers—a tone which while demanding recognition of legitimate party rights would also require the shouldering of corresponding responsibilities. The boards would be urged in this regard to use the tools given them by our rules and in principal accepted by the courts as precepts of effective administrative law—for control of prehearing and hearing schedules, for preventing abuse of discovery mechanisms and for maintaining rein over hearing examination and cross-examination—to move the parties to completion of the decisional record as expeditiously as possible consistent with the right of all parties to be heard.

Having said all this, I want to emphasize that a licensing hearing is obviously not an opportunity for a free-for-all nor is it a Hyde Park where unlimited oratory can be practiced. Such a hearing functions—or should function—within reasonably defined sensible and logical rules. Intervenors, equally with the staff and applicant, must be required to respect the rights of all participants. Hearing boards are obliged to consider all timely presented, relevant evidence, but should not unduly accord special privileges to any one participant. In practical terms and putting it bluntly, this means that no one has the right nor should be permitted to use a hearing simply as a device to delay a decision on construction or operation of a plant.

In advancing these suggestions, I would not want to appear the pollyanna or to profess to believe that licensing miracles can be wrought with these or any other rules changes. But I do believe that earlier, informed, public participation can only help the licensing process; and, further, that such participation provides the most viable framework for subsequent adherence to firm procedural groundrules.

As to the efficacy of those groundrules, we must, of course, recognize their practical, and proper, limits. We do know, however, that our country's judicial system has been able to achieve similar goals within the framework of procedural rules roughly parallel to our own; and I know from my own experience as People's Counsel before, and then as Chairman of the Maryland Public Service Commission, that fair and well-defined rules administered by tough, impartial and fair-minded hearing officers can do a great deal to move a proceeding forward to its conclusion.

I promised earlier that I would have a few thoughts regarding changes in approach on the part of the industry which could help in the amelioration of hearing delays.

At the outset, let me remind you that the hearing is only the capstone of an overall process which begins with utility planning and ends with governmental licensing. The public's disposition to raise contentions for governmental consideration at the relatively late adjudicatory stage is, more often than you may care to acknowledge, a byproduct of a utility-applicant's failure to do its "homework" with its constituency in the earlier phases of the process. In all too many cases a frustrated, confused, and often alarmed citizenry has no other recourse than to contest an application—if initially only to acquire information.

I am speaking now of early, open and full communication of utility plans for facility siting and construction. I recognize that some utilities have established a fairly impressive track record in this regard of late, and that others are improving on past performance. But we still see instances of plant construction plans that are disclosed relatively close to, if not contemporaneous with, the filing of governmental licensing requests. And we also know that public information programs, when they have been mounted—as they increasingly are these days—have ofttimes been found to be superficial by responsible environmental groups; and that some utilities may not be prepared to give these groups the hard information they are seeking. This old-line, close to the vest approach is a residual byproduct of a philosophy of managerial prerogatives that is not viable in an economy such as this where electricity plays such a significant role.

Moreover, the impact of delays that occur at the hearing stage cannot be divorced from events within a utility's control that occurred much earlier: less than adequate plans for load growth; indecisiveness in making basic determinations, such as whether to go fossil fuel or nuclear; woefully incomplete initial construction permit applications; failure to develop in-house quality assurance expertise; not pressing for licensing hearings as early as one might because of what may be termed "local resistance" factors. These are only the examples that most readily come to mind.

In another vein, the industry has quite rightly urged the Commission to utilize rulemaking for the establishment of generally applicable design and other standards, rather than leaving matters to *ad hoc* facility review and adjudication. The Commission has, in fact, been moving in this direction but our pace is in no small measure influenced by the degree of standardization which obtains among the equipment vendors and particularly the architect-engineers. Reading some of Craig Hosmer's comments in this year's Joint Committee hearings on the regulatory program, I am convinced that there is considerable room for improvement on this score. Whereas there appears to be a gradual and encouraging trend toward limiting the types of nuclear steam supply systems being offered by the vendors, the non-nuclear portions of the plants (by far the largest fraction of the investment made by the utilities) change from one plant to the next. In my own mind, this seems to be an unnecessarily expensive approach and there is no question that it complicates the regulatory process when the interaction between the nuclear and non-nuclear portion of each plant must be exhaustively studied in a safety context.

In terms of the hearing itself, the most useful step I could urge upon the utility-applicant is maximum openness with information in its possession. Proprietary information may present special problems but, with limited exceptions such as that, I frankly believe that a license applicant is best advised to make available to a requesting intervenor the greatest amount of information possible. And I include within the "availability" category information which may only be arguably relevant. The hearing boards, after all, will ultimately determine the evidentiary admissibility of any information furnished. The dividends realized in enhanced communication—and in simple savings in hearing time—make this, to my thinking, the eminently sensible course.

Since I am being liberal with my advice today, it is only appropriate that I save a few words for the representatives of environmental organizations. I hope you will be frank and recognize that these organizations have been instrumental in rightfully bringing to light a national lack of concern about the environment. As a result, a striking and irreversible change in the outlook of policy makers has occurred and "concern for the environment" is no longer a catch phrase but a mandate that we must follow and enforce. As in most matters involving radical change, adaptation has been accompanied by the need to resolve practical as well as legal and administrative problems. For example, in the past, a primary complaint of a number of the environmentalists was the jurisdictional refusal of the AEC to consider the full environmental impact of proposed nuclear plant licensing actions. The grounds for that complaint went by the boards, so to speak, with the enactment of NEPA, the subsequent *Calvert Cliffs* decision and our recent procedures implementing that decision. We now have a system, and scope of review, which is truly unique insofar as environmental examination of industrial undertakings is concerned.

The basic question confronting us now is whether this system can be made to work in a fashion timely enough to serve essential public needs—or whether it will be overwhelmed, as some are fearful. I can only assume that it is in the best interest of environmentalists to help us make the new system work, as they have repeatedly stated in the past that it could be made to work. *Responsible* participation in our proceedings and a recognition of the practical limits of the new system—particularly at this early stage—will be key elements in this regard.

I would hope also that the emotionalism which has marked the approach of some to the question of nuclear plant environmental impact will be tempered in the cold light of the NEPA review process. The Commission fully intends, as Chairman Schlesinger has stated, to be responsive to the conservation and environmental concerns of the public. But we would be serving no sound public purpose, and defeating NEPA's ends, if we were to deal with these matters other than through the process of dispassionate and balanced assessment.

CONCLUSION

Let me add a concluding observation on the licensing "crisis" we are examining this afternoon.

I harbor no illusions as to the magnitude of the task facing the Commission as we move forward into what, in a very real sense, is a new era of licensing responsibility. We are called upon to match the capabilities of a dynamic and complex technology to the urgent energy and environmental needs of the country, and to accomplish this within a legal and social framework which calls for the most sophisticated type of decision-making.

But meeting the challenge which change poses is hardly a novel experience for either the Commission or you members of the nuclear community. The Commission's licensing program and the industry it covers never have been static. They are today the end-product of evolvement and of adaptation to the constantly changing circumstances of the past 15 or so years.

Without pretending to special insights—only a willingness to tackle the problems—I am cautiously optimistic for the future. We have available the talents of an unusually gifted group of people, both in the public and the private sectors, and the pressing needs of our country provide an unremitting reminder that we have no choice but to succeed.

Senator BIBLE. I am going to ask the Senators who are here and who cannot return at 2 o'clock if they might have questions of the AEC at this time. I would like to accommodate those who cannot come back at 2.

First, Senator Anderson, any questions?

Senator ANDERSON. Yes; just one question.

Have you had experience in atomic energy—are you worried about this capability from the standpoint of safety?

Mr. DOUB. I think we have a very challenging task. We have moved immediately in a wide range of areas to implement the NEPA decision reflected in the *Calvert Cliffs* case. I think we can do it effectively and in the public interest.

Senator ANDERSON. Has your experience with the Shippingport reactor been satisfactory? It has been expensive, I know. Is it safe?

Mr. RAMEY. Shippingport was the prototype powerplant for the current generation of commercial reactors. It went into operation in 1957 and it has been running as a prototype and experimental reactor ever since. It was built under Admiral Rickover's direction. It has operated very safely. The safety procedures that were established for its operation have, in effect, served as a model for our regulatory process. For example, the quality assurance requirements that Admiral Rickover established for Shippingport have served in part as a basis for our regulatory requirements on quality control in the building of private atomic powerplants.

So, we have learned a great deal from Shippingport. For example, some of the uranium oxide blanket that was in the original fuel charge in Shippingport is still there and being irradiated when the plant is operating, so we are getting a great deal of information on the life of fuel elements, for example.

Senator ANDERSON. And the reactor that was set up near Chicago now, I think that has the same experience? Is that thing safe?

Mr. RAMEY. Yes, sir; that is the Dresden Plant located near Morris, Ill., about 50 miles south of Chicago. The original Dresden No. 1 reactor, which was around 180,000 to 200,000 electrical kilowatts, went into operation, I believe, in 1959 or 1960. It has been running now for about 11 years, and has operated very safely.

On the basis of that experience, the Commonwealth-Edison Co. of Chicago, which built the original plant, has built two more plants at that site, Dresden No. 2 and Dresden No. 3, and is also building additional plants in other parts of its service area. But it has been these early demonstration plants that have demonstrated the safety and the economy of nuclear plants that have, in part, provided the confidence for the power industry to make the decisions to go ahead into commercial nuclear power.

Senator ANDERSON. Mr. Chairman, I spent a long time with this. I do think Commissioner Ramey and Commissioner Doub are very capable.

Senator BIBLE. We are very happy to have your point, Senator Anderson. I don't know any of us who have a greater background in atomic energy than you do, sir. If you think up further questions that you wish to reduce to writing, you may do so, or ask them in the afternoon.

The Senator from Oregon?

Senator HATFIELD. No questions.

Senator BIBLE. The Senator from Oklahoma?

Senator BELLMON. Do I understand the panel will be back this afternoon?

Senator BIBLE. Yes; the panel will be back at 2 o'clock.

Senator BELLMON. I will withhold my questions.

Senator BIBLE. The Senator from Utah?

Senator MOSS. No questions.

Senator BIBLE. The Senator from Alaska?

Senator GRAVEL. I will withhold my questions.

Senator BIBLE. All right, everybody is hungry. [Laughter.]

With that, we will stand in recess until 2 o'clock.

(Whereupon, at 12:29 p.m., the hearing was recessed, to reconvene at 2 p.m., this same day.)

AFTERNOON SESSION

Senator GRAVEL (presiding). The hearing will come to order.

Before resuming the questioning, I understand Commissioner Ramey has a brief statement he would like to make. So, Mr. Ramey, the floor is yours.

Mr. RAMEY. Mr. Chairman, members of the committee, I am pleased to be given the opportunity to briefly present my views regarding the immediate and long-term public policy implications of the decision by the U.S. Court of Appeals for the District of Columbia in the *Calvert Cliffs* case, decided on July 23, 1971.

As you may be aware, I have expressed some reservations regarding, and have partially dissented from, the Commission's September 3, 1971, revisions of its regulations, implementing the National Environmental Policy Act of 1969, to comply with the court's decision. My views in this regard were stated for the record in my memorandum of October 4, 1971, to the Secretary of the Commission. I have included a copy of this memorandum as an enclosure to my prepared statement.

Before discussing my specific concerns in this regard, I would like to provide the committee with a bit of background as to how things stood at the time of the decision. I would first like to make a few personal observations regarding public understanding of the decision

itself. I do not want to take issue with the holding of the court; however, I do believe the record needs to be set straight in several respects:

One, the impression was left by the decision and in the press that the Commission had not embraced the National Environmental Policy Act. In fact, AEC had. For example, AEC was commended by Russell Train, Chairman, Council of Environmental Quality for issuing its regulations implementing EPA. This fact was further evidenced by the statement of Dr. Gordon J. MacDonald of the Council on Environmental Quality at the November 1970 conference of the Atomic Industrial Forum and the American Nuclear Society. He said:

> AEC has by far the best record of any federal agency in submitting environmental reports under NEPA. The AEC reports are the most complete, the best thought-out, and the most sophisticated of any agency.

He reiterated this commendation in the spring of this year, 1971.

Two, a second erroneous impression arising out of the decision was that AEC in its acceptance of State certifications regarding thermal effects under the Federal Water Quality Improvement Act of 1970, was deliberately going against the intent of Congress and interest of NEPA. On the contrary, we believed that our interpretation and implementation of the two acts was correct and in keeping with the traditional role played by the State and local governments in the protection of the environment.

We also believed that it would avoid unnecessary duplication in this regard as established by the legislative history of the Muskie act—that is to say, Water Quality Act. Where there was no appropriate State or Federal certification, the AEC regulations provided that the Commission would decide the matter in question through its own licensing process.

I might add that I don't believe we have seen the end of this particular issue, as evidenced by the direction being taken in proposed amendments to the Federal Water Pollution Control Act and the siting legislation now under consideration in the Congress. And, Mr. Chairman, you will remember this morning it was pointed out that the Baker amendment to the 1971 Water Quality Act would, in effect, require AEC to go back to the position that the AEC took prior to the *Calvert Cliffs* decision in regard to accepting State water quality certifications on nuclear powerplants.

It would indeed be ironic if the AEC should now get all geared up to handle these NEPA environmental arrangements only to find Congress deciding to follow the established patterns of Federal-State-local relationships in these areas.

Three, closely related to its requirement that AEC must go behind established State and Federal determinations on thermal effects, the Court in its decision also "federalized" the risk-benefit equation for each nuclear plant, by requiring AEC to make an independent overall determination on each licensed plant in uncontested as well as contested hearings.

As the AEC's guidance to utilities issued on September 1, 1971, indicates, this broadens the environmental aspects of AEC's determination to cover aspects of such matters as power transmission lines and transportation of fuel.

Traditionally, the "land use" and basic site selection part of this equation has been a State and local matter.

Whether adequate methods can be developed for measuring and trading off the quantified and unquantified risks and benefits of specific plants remains to be seen. It is interesting that thoughtful commentators in the field of energy and the environment, such as Ralph Lapp and Bruce Netschert have their doubts as to the desirability and efficacy of such an approach in relation to specific plant site selections.

Four, finally, the Court also held that the environmental statements under NEPA were to be made essentially a central part of the record of the licensing case. I believe there is considerable room for doubt that Congress and its committees intended this, in light of their changes in the language of the act during its consideration.

It is also important that we keep in mind the status of nuclear powerplant licensing prior to the time the decision was rendered. For some months prior to the July 23, 1971, decision, the Commission, as well as the Congress and the nuclear industry, had been concerned with the delays being encountered in the licensing of nuclear reactor powerplants and the cost of such delays—both to the utilities and to the consumers.

On June 22, 1971, in my testimony on behalf of the Commission in the Joint Committee on Atomic Energy on AEC Licensing Procedures and Related Legislation, I suggested that some new directions were needed in order to counteract the resultant trend toward ever increasing delays in licensing. For example, I called for effecting improvements in the hearing process to keep delays within acceptable bounds. I also called for establishment of a national siting policy, early review of site suitability, and elimination of hearings at the operating license stage as a part of a restructuring of the AEC licensing process.

In this connection, I spelled out in some detail the Commission's proposal for early site authorization legislation. I might note in this regard that our proposed legislation was introduced as H.R. 9286 and its companion bill S. 2152. Recently the Joint Committee, in the absence of an urgent request for action, announced it will not be reporting out a bill during this session of Congress.

While the Commission has initiated a number of other steps to improve its licensing process in the first part of 1971, the emergence of such problems as our emergency core cooling problem made any progress on our "delay" situation more difficult. Now, I am concerned that the *Calvert Cliffs* decision as implemented by the Commission may cause additional delays in the licensing process, particularly in regard to the facilities which are or will be about ready to go into operation in the next 6 or 8 months.

I would have preferred that the Commission and its staff have devoted their attention to a greater extent to providing a summary procedure in section D of the appendix—relating to plants which have been completed or substantially completed—which would permit power plants which have been reviewed and approved from the radiological standpoint to go into operation pending the development of additional environmental information.

Such a summary procedure could include a brief show-cause hearing to determine the urgency of the need of the public for electric power from the plant and the question of whether irreversible damage would

result from interim operation of the plant. Subsequently, a full hearing could be held to consider any additional environmental considerations.

Under the revised appendix D as issued in September, where there is no intervenor or where an intervenor has so agreed, it should be possible for a plant to be brought up to, say, 50 percent of power without too much difficulty. However, where there is one or more determined intervenors there could be substantial delay resulting from the breadth of issues that are potentially subject to being raised, considered, and resolved.

I do not believe that in such cases we should have no hearing as recommended by some or that we should have a full hearing as recommended by others. Instead, as I have stated, I believe we should have a summary procedure which, if no irreversible adverse effect on the environment were shown, would permit a plant to go up to full power in reasonable steps over the period of time during which environmental issues would be gone into in a hearing of greater detail.

Should this not be thought legally possible, then I believe we need legislation early in the next session to authorize such summary or interim procedures.

If we have an unusually cold winter this year or an unusually hot summer next year, we will have lost a good bit of essential protection of our environment. After all, our environment requires not only optimum conditions for our lakes and streams and air, it also includes heat in our homes in the winter and the cool of essential air conditioning in the summer.

Further, it involves essential electric services in our hospitals and places where electricity is a necessity for public health and safety.

In the intermediate and long run, we will, of course, need general across-the-board siting legislation and specific provisions such as the AEC siting legislation I referred to previously.

(The memorandum referred to follows:)

MEMORANDUM OF JAMES T. RAMEY, COMMISSIONER, ATOMIC ENERGY COMMISSION, TO W. B. MCCOOL, SECRETARY, OCTOBER 4, 1971

At Commission Regulatory Meeting 304 on Friday morning, September 3, 1971, the Commission approved, with revisions, Appendix D to Part 50, implementing the National Environmental Policy Act of 1969, to comply with the decision of the U.S. Court of Appeals for the District of Columbia Circuit on July 23, 1971.

The purpose of this memorandum is to state for the record my reservations and partial dissent which I expressed orally from the action taken by the Commission in this regard. Since I left for an extended trip abroad on the afternoon of Friday, September 3, this is the first opportunity I have had upon my return to set forth my position in writing.

While I agree with most of the revisions made in Appendix D on September 3, I am concerned that several aspects of the revised regulation may reflect an over-reaction to the Court's decision.

Specifically I have the following comments:

1. I would have preferred that the Commission and its staff have devoted their attention to a greater extent to providing a summary procedure in Section D of the Appendix (relating to plants which have been completed or substantially completed) which would permit power plants which have been reviewed and approved from the radiological standpoint to go into operation pending the development of additional environmental information. Such a summary procedure could include a brief show-cause hearing to determine the urgency of the need of the public for electric power from the plant and the ques-

tion of whether irreversible damage would result from interim operation of the plant. Subsequently, a full hearing could be held to consider any additional environmental considerations.

2. I believe that one sentence from subsection 2 of Section D of the Appendix should have been placed in the Statement of Considerations. The sentence (italicized for emphasis) reads in context as follows:

"In addition, the Commission recognizes that there may be other circumstances where, consistent with appropriate regard for environmental values, limited operation may be warranted during the period of the ongoing NEPA environmental review. *Such circumstances include testing and verification of plant performance and other limited activities where operation can be justified without prejudice to the ends of environmental protection.*"

Since it is understood that the sentence was intended to be essentially illustrative, it should have been included in the Statement of Considerations; otherwise it may be thought to be substantive and hence become overly restrictive. I hope this will not be the case.

3. The Statement of Considerations in the amended regulation states in part:

"Sections B, C and D provide that the Commission or the presiding Atomic Safety and Licensing Board, as appropriate, may prescribe the times within which the proceedings subject to those sections will be completed. These provisions are in keeping with the Commission's continuing objective of minimizing undue delay in the conduct of its licensing proceedings. They would not impinge upon the basic requirements for a fair and orderly hearing on the NEPA issues."

In my opinion, the following quotation of the Commission's continuing policy regarding delays in licensing should also have been included, either in the Statement of Considerations or as a footnote to the Statement:

"The Commission expressly recognizes the positive necessity for expediting the decision-making process and avoiding undue delays in order to provide adequate electric power on reasonable schedules while at the same time protecting the quality of the environment. It expects that its responsibilities under the Atomic Energy Act of 1954, the National Environmental Policy Act of 1969, and other applicable statutes, as set out below, will be carried out in a manner consistent with this policy in the overall public interest."

In my opinion, had the above changes been included, the regulation would have given better balance to the means of implementing NEPA considerations during an extremely critical period. I particularly believe that the lack of summary procedures to take care of review of virtually completed plants or plants already complete and ready for operation may result in serious delays in the availability of nuclear power. Therefore, it may be necessary for the Congress, in connection with its consideration of the Commission's early site hearing proposals or otherwise, to consider and enact legislation to cover these serious interim problems.

I would hope that the Commission together with the Council on Environmental Quality and the Federal Power Commission will provide leadership with the Congress in solving these very serious problems.

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

Senator GRAVEL. Thank you, Commissioner.

Senator Bellmon?

Senator BELLMON. Mr. Chairman, I will withhold questions at this time.

Senator GRAVEL. Fine.

The President, when he made his statement earlier this year about the nuclear breeder reactor, made a statement and I quote, "I have requested the early preparation and review by all appropriate agencies of a draft environmental impact statement for the breeder demonstration plant in accordance with section 102 of the National Environmental Policy Act."

Can you give me any kind of report as to where we are on that statement, the President's request?

Mr. RAMEY. A draft statement was prepared in accordance with the established NEPA procedure and has been issued and made available publicly for review. I believe the Commission is still in the process

of taking into account comments on this draft statement and, as we do in regard to statements under the NEPA procedure, of putting our revisions into a final statement.

Senator GRAVEL. So, one is in process right now?

Mr. RAMEY. Yes, sir.

Senator GRAVEL. As I read the language of the President, the 102 statement covers only the demonstration reactor in question. Is there any consideration being given to the drafting of a 102 statement with respect to the whole breeder reactor program? Since we are going to have a lot of them all over the country, wouldn't it be important to assess the environmental consequences of the whole program?

Mr. RAMEY. Well, the draft statement and the statement as revised when it comes out have a great deal of background information on the broader overall breeder program as background in relation to the demonstration plant. But it is believed that the intent of the NEPA requirements was to go to individual plant projects rather than overall long-range programs.

For example, the Commission has a program on the development of water cooled reactors, which are the ones that are now coming into commercial operation. There is a controlled thermonuclear program and so on. It is true, however, that the broader range implications of various aspects of the Commission's power program have been examined in great depth over a period of years.

The Commission's breeder reactor program has been in existence, of course, for more than 20 years. The experimental breeder reactor No. 1 which produced the first electricity went into operation in 1951.

In 1962, in response to a request by President Kennedy, the Commission prepared a report to the President on its atomic power program in which it identified the breeder reactors as the most important of the advanced reactor programs looking to the future.

In 1967, the Commission put out a supplement to that report to the President and more specifically gave priority to the liquid metal fast breeder program. Similarly, each year before the appropriate committees of the Congress, particularly the Joint Committee on Atomic Energy, in authorization legislation and other hearings they hold, various aspects of the breeder program have been gone into in great detail.

Senator GRAVEL. We heard testimony earlier in which Russell Train deferred to the Atomic Energy Commission with respect to any assessment of this. Now, what you are telling me, and it is something that I already know, is that of course the breeder reactor is the No. 1 project of the AEC, and you have report after report stating it should be the No. 1 project.

What I am asking is this: Is there anything that is going to be initiated to assess the breeder-program impact in its totality on this country?

Mr. DOUB. I understand your question. I asked the same question myself. Understand, it is so closely identified with the characteristics of the plant area that if you are looking for an environmental impact, it is very hard to do that in the abstract without tieing it into where the breeder project will be located.

Senator GRAVEL. I am not talking about one plant. I am saying that, if we are going to have 500 breeder reactors in this country, we

should ask the reasonable question, what does that mean? Has anybody calculated how much waste and how much storage capacity is going to be needed? We are told we have temporary storage capacity, but perpetual storage of lethal radioactivity is a very deep environmental question.

If we only have a narrow look, one plant at a time, before you know it, we could have the countryside scattered with 500 plants before somebody asks, what is the total impact of it?

Mr. RAMEY. We have, in the sense that was mentioned this morning, in our year 2000 study, been looking at the projected effects of the nuclear powerplants that will be built and in operation by the year 2000 in terms of their radiation effects and in relation to the radiation from radioactive waste and other various sources. This would include the breeder reactors. It would also include the water reactors.

We also have a study underway comparing the quantitative effects from an environmental standpoint in the year 2000 as to various alternate sources of power, nuclear powerplants, coal-fired plants, oil-fired plants, gas and the like.

Senator GRAVEL. So, you will be able to tell us what the environmental impact will be of nuclear energy in the year 2000 as you perceive it?

Mr. RAMEY. Yes.

Senator GRAVEL. When will this be available?

Mr. RAMEY. The first reports on it should be available next July, on these comparative sources.

Senator GRAVEL. Then wouldn't it have been wise for the administration to hold off any gigantic appropriations until you see the results of these reports?

Mr. RAMEY. We believe that the preliminary results we have been getting from both the radiation study that I mentioned as well as this comparative study and other data we have had, of course, over the years, indicate that the levels of radiation from nuclear powerplants, even assuming very optimistic numbers of plants constructed, will be extremely small.

Senator GRAVEL. Who is performing these studies?

Mr. RAMEY. They are being conducted as a joint effort between our reactor development staff, our regulatory staff and our national laboratories.

Senator GRAVEL. How much money do you think you are spending on it?

Mr. RAMEY. It would be several hundred thousand dollars, I would say.

Senator GRAVEL. So, we are going to have the study next June or the first draft of it?

Mr. RAMEY. On the year 2000 study, we can give you some preliminary results. Mr. Lester Rogers is here and could give you some comments on it.

Senator GRAVEL. Before you answer on the preliminary results, is there any estimation as to the increase of cancer as a result of the pollution? Is there any estimate as to the number of lives involved?

Mr. ROGERS. We can make such estimates based on the data that has been provided by the International Commission on Radiological Protection and the National Council on Radiation Protection Measurements.

We have made some projections as to what the population dose would be in the year 2000, assuming that we have approximately a thousand, 1,000 megawatt electrical, power reactors in the country.

Actually, the increase in average population exposure for radioactivity in effluents from nuclear power reactors will be less than 1 percent of natural background radiation. Something less than 1 millirem per year averaged over the total population.

Now, one can translate those figures into upper estimates on the increased incidence of disease. As you are well aware, the estimates of increased incidence of disease down at these extremely low levels of exposure is very uncertain because if there are effects down in these regions, the increased incidence is so low that we can't measure it.

We do have reasonably good data on increased incidence of leukemia and some cancers at dose rates which are hundreds and thousands of times higher than the levels that are set forth in radiation protection standards. Now, on the basis of this data we can make some upper estimates based on the total man rem exposure to the total population in the year 2000.

Senator GRAVEL. Are these estimates realistic? You say the contamination level will be based on total containment, or 99.99-percent containment of all radioactive pollutants in production, in use, in shipment, in storage, in operation.

Now, that is a pretty strong order of infallibility that you are predicting between now and the year 2000, isn't it?

Mr. ROGERS. Our projections are based on normal operations and based on experience to date on the capability of designing power reactors to limit the release of levels of radioactivity to the environment.

Senator GRAVEL. Suppose you had a meltdown, what would that do to your projection?

Mr. RAMEY. In terms of the average projections, it wouldn't have a significant aspect.

Senator GRAVEL. Well, how about with the one 40 miles from Detroit, suppose you had a meltdown there?

Mr. RAMEY. There was a minor meltdown there and it was quite difficult to detect any radiation outside of the facility.

Senator GRAVEL. Suppose you had a steam explosion that went along with it and put a bunch of that radioactive stuff into the atmosphere?

Mr. RAMEY. That type of reactor, which is a breeder reactor, runs at a very low pressure, and it is not very likely that you would get the kind of pressure that would cause that.

Senator GRAVEL. Well, suppose you had a water cooler that melts down?

Mr. RAMEY. Well, they have for safety purposes made calculations on what the leak rate of the various types of containment would be if there were an explosion.

Senator GRAVEL. Do you consider those in your licensing procedures?

Mr. RAMEY. Certainly, very much so.

Senator GRAVEL. What about the test you conducted in Idaho relative to the emergency cooling systems, were they satisfactory?

Mr. RAMEY. We had some tests that we could go into and could provide you with a statement relating to the blowdown aspects of water cooled reactors. Unfortunately, the results of these tests have been sort of exaggerated in the sense of their relationship to the whole safety

process on water cooled reactors. What they had was a very small scale test of about a 9-inch vessel that was part of a whole series of other tests.

It was designed to test what would happen if the fuel element overheated and the water would boil and come out. Then they had an add-on experiment to determine what would happen when you bring in your emergency cooling water.

Well, unfortunately, this was a small scale test. In the judgment of a number of experts from the Commission and the industry, this second test was not designed adequately to take into account how a large-scale reactor would handle this amount of heat, and what would happen after a blowdown when you would be injecting your cooling water.

It did show——

Senator GRAVEL. But these tests failed, is that right?

Mr. RAMEY. I wouldn't say they failed, I wouldn't say they didn't work. I would say we obtained some data and some information that made our regulatory staff believe that they ought to look at the codes being used in measuring the effects of an emergency core cooling system.

Senator HATFIELD. Commissioner, am I not correct in the statement that the British have more electricity generated by atomic powerplants than all the rest of the world combined?

Mr. RAMEY. I don't believe that is the case now. For a number of years that was the case. In the last couple of years the United States has been getting quite a bit of nuclear power.

Senator HATFIELD. Why I predicate my question with that, let's assume it was so, what if they had a long record, a rather remarkable record in Britain today. We are not having to deal with projections entirely. We are not having to deal with hypothetical situations. Do we not have some kind of data or information showing some of the specific experiences out of the British program? Because, as I understand it, they don't pollute in Britain, they use gas cooled systems there. They don't dump anything in the rivers, the lakes, the streams, the bays. Consequently, they have an excellent safety record.

Can't we get some of this hard, fast data before this committee? I think it is very interesting to study about projections and estimations and hypothetical situations. I would like to see some hard data.

Mr. RAMEY. Yes, sir; we have the British experience and we have our own experience.

Senator BELLMON. If I may interrupt, I just want to say Chairman Jackson intends to schedule a whole series of hearings on this whole question of safety and perhaps you could come in and give us this information.

Senator GRAVEL. I think it is germane.

Mr. RAMEY. One of the interesting things about the British and their safety program, is that they have done a great deal on statistical analysis and statistical predictions. For example, at the Geneva Conferences in September, they had a paper by Dr. Farmer on their experience and methods.

In this country, of course, we have a lot of operating experience and we never have had an accident affecting the public on any of our power reactors. We had one accident on a little experimental plant

in Idaho. This was an Army plant in which three people were killed, but that is the only fatal accident of any type relating to any reactor in this country.

As I say, it was not a licensed plant, but was purely an experimental type of reactor.

Senator GRAVEL. How many reactor-years of experience do the British have?

Mr. RAMEY. Their plants started in operation in the mid-1950's.

Senator GRAVEL. Close to 400 reactor-years, would that be right?

Mr. RAMEY. That may be the ball park.

Senator GRAVEL. In the United States how many reactor-years of experience do we have?

Mr. ROGERS. On licensed plants, it is about 100.

Mr. MORRIS. If I might—my name is Peter Morris, Director of the Division of Reactor Licensing. If we are talking about light water reactor experience, I think we ought to include the rest of the experience, not just the licensed plants. For example, the nuclear navy, the production reactors, the test reactors, that is up around 1,000 reactor years.

Senator GRAVEL. How do you feel about the statement of Dr. Jordan, who says 10,000 reactor-years of experience would be a minimal number of years to give any kind of safety record upon which to stand? Is that out of line, is that unreasonable?

Mr. MORRIS. In the context of Dr. Jordan's paper where he is taking a statistical approach, he of course is considering the whole spectrum of accidents.

Of course, the ones that are serious and affect the public have a low probability of occurrence. In order to get some handle on that, you do need a large number of years of experience to be quantitative.

Senator GRAVEL. You are telling Congress that we are really novices, yourselves included, in this whole field of nuclear accidents.

Mr. DOUB. I don't think the safety standards will ever reach a point where we can stand on them. It is a continuing process.

Senator GRAVEL. That is the point I want to make. This is new and we can't sit here smugly and say the safety record, though good, is all that good, because we don't have that many years experience.

Mr. DOUB. It is not only that, the Federal nuclear power generated in the country today is about one-half percent of the total, in a decade it will be up to 25 percent. There are a large number of reactors to be operated. There are a lot of things that relate to safety that don't just pertain to the construction of the units.

One area that we are looking at is rulemaking, legislative-type rulemaking with public participation in the whole safety area, and then maybe moving from that to as low as practicable, pressurized vessels, containment, all of these things.

Senator GRAVEL. You are talking about rulemaking and letting the public in; who released the information about your failure of the Idaho experiment?

Mr. RAMEY. It was made available initially through seminars conducted by our Idaho people with various experts at Oak Ridge, from the Commission, and other agencies.

Senator GRAVEL. Since those Idaho experiments last year, has the AEC done any other experiments on the emergency core cooling system to determine its effectiveness?

Mr. RAMEY. In the past AEC and industry have conducted many, many hundreds of experiments and AEC is designing and will be conducting many additional experiments that will hopefully be more representative of how a large reactor would operate.

Senator GRAVEL. I don't want to misunderstand your statement. I was of the impression, and I am prepared to admit I am wrong, but I was under the impression that the Idaho experiments were essentially the last word in the emergency core cooling. What you are saying is that there are many other experiments and this one doesn't disturb anybody because the other experiments turned out to be OK.

Mr. RAMEY. As I indicated, this experiment that you refer to, plus some other data that we had had earlier, did raise some questions as to the adequacy of what they call codes. These are some of the computer based mathematical calculations with which they figure out how the water and steam go around a reactor in the cooling sequence, in the unlikely event of such an accident.

As a result of that data coming from several differing experiments and calculations, the Commission decided that it would require the equipment companies and utilities to go back and, with us, recalculate these codes as applied to the various nuclear powerplants to see whether they were adequately taking into account the whole sequence.

So, last spring, we issued the regulatory requirement on this review of emergency core cooling systems and certain interim requirements as to the operation of the plants while we are examining these codes.

For example, we established temperature limits and various types of things like that.

Could I have Dr. Morris go further into that?

Mr. MORRIS. If I might, Mr. Chairman, I would like to supplement what Commissioner Ramey said. First, with respect to the so-called semiscaled experiments in Idaho, these were a series of tests of which those that were run about a year ago in December and January were the tests of interest. They were part of a continuing series of tests that have been going on for years in the study of the whole question of heat transfer and blowdown in pressurized systems. These tests were designed not to mock up the behavior of an actual power reactor, but to serve as a basis for better understanding in the orderly and efficient design of an actual test reactor, the so-called LOFT, or loss of flow test reactor, a pressurized water reactor of 55 megawatts now under construction.

So, the tests didn't fail in any sense of the word. The tests, and I am an experimental physicist by trade, gave results useful to the designers in carrying out the program. Since the results were not predicted accurately in the way in which the cooling water behaved in going into the core after blowdown, it raised the question in the minds of the regulatory staff as to whether we shouldn't look harder at the analysis of coolant accidents for the power reactors.

Those tests happened to coincide in time with some better understanding on our part and on the part of industry of the reactor behavior during this loss of coolant accident which was shown by more sophisticated computer codes developed in the last 2 years. This led us, as Commissioner Ramey said, to an intense effort on the part of the regulatory staff to better understand the calculational models as well as the physical effects in blowdown and the subsequent emergency cooling of the core.

This led to the development by a task force of some interim criteria by which we would evaluate existing reactors and existing reactor designs to be sure they were equipped to handle even the most severe loss of coolant accidents, including the instantaneous guillotine break of the largest pipe connected to the reactor pressure vessel.

In developing these criteria, we worked very closely with the national laboratories and the industrial groups, the designers, to be sure we had a very good understanding of each phase of the reactor accident, how the pipe might break, the waterflow, the streamflow, the entrainment of water in the steam, the temperature rises, the heat transfer. It is quite a complicated subject and we can't do it justice today.

I think the Commission would be willing to submit for the record a description of where we stand on this and certainly if there are hearings on safety we would be prepared to talk about it more. But where there was hard, factual knowledge, we used it in a conservative way. Where there was lack of knowledge, we imposed upper bounds on the limit of what would happen physically.

(The information referred to follows:)

Since publication of the Interim Acceptance Criteria for Emergency Core Cooling Systems for Light-Water-Cooled Nuclear Power Reactors (36 F.R. 12247) on June 29, 1971, the AEC has continued to review the developments by industry and others of information relevant to the analysis and understanding of loss-of-coolant accidents. This has included principally the review of additional computer code and model developments by Combustion Engineering Inc., and Babcock and Wilcox Co. The staff has also reviewed in considerable detail the results of the recent semiscale tests (test series 845 thru 851).

The AEC has used the interim criteria and evaluation models published in June 1971 to evaluate the adequacy of emergency core cooling systems for the following plants at the listed power levels:

Plant	Type	Type review	Percent full power
Palisades	PWR	Operation	60
Indian Point-2	PWR	do	100
Point Beach-2	PWR	do	100
Vermont Yankee	BWR	do	100
Quad Cities 1 & 2	BWR	do	100
Pilgrim	BWR	do	100
Shoreham	BWR	Construction	100
Fermi-2	BWR	do	100

Additional computational methods submitted by Combustion Engineering, Inc., and Babcock and Wilcox are under review. If they are found suitable, additional evaluation models based on them will be developed by the AEC. We hope to do this within the next month or so. Using these models, we will evaluate the acceptability of the emergency core cooling systems for the reactor designs to which they are applicable.

Additional experimental work is presently being performed by the Westinghouse Electric Corporation to study further the effects of low flooding rates which are predicted to occur in containment buildings having systems specifically designed to keep the post-accident pressure low. The progress of this work is being monitored by the Commission.

The Aerojet Nuclear Corporation is presently constructing, as part of the semiscale series of tests, a more elaborate reactor and loop configuration to provide additional data on thermal-hydraulic responses representative of LOCA for developing and assessing analytical techniques required for PWR safety evaluations and for support of the LOFT design and test program. The experiments to be performed with the LOFT reactor are now planned to start in mid-1974.

The Oak Ridge National Laboratory in cooperation with the light-water reactor manufacturers has performed in-pile experiments to provide additional information on fuel performance characteristics for the sequence of events postulated to occur in a LOCA. This information was obtained to provide failure mode and distortion characteristics of fuel rods typical of present manufacturing processes.

The AEC will hold a public rule making hearing on the interim policy statement on January 27, 1972, for the purpose of aiding the Commission in determining whether or not the subject interim policy statement should be retained in its present form or adopted in some other form. Before the hearing is held the Commission will make available a discussion paper on the interim acceptance criteria. After the conclusion of the hearing, the presiding officer, without rendering any decision or making any recommendation, will forward the transcript of the hearing to the Commission. The Commission will carefully consider the transcript of the hearing and any comments and suggestions submitted in accordance with the notice of hearing, as well as other relevant considerations and factors, and, after reaching its determination in the rule making proceeding, will cause an appropriate notice to be published in the *Federal Register*.

With these two approaches and with some general criteria based on the understanding of the technology, we came up with what we considered to be very conservative criteria and models for evaluation of the existing and proposed emergency core cooling systems. It is on this basis that we let reactors continue to operate and on which we will license them in the interim future.

Senator GRAVEL. Just to close out this one point, because we will have extensive hearings on it, I would like your comment to the statement of the Union of Concerned Scientists, made up of Daniel Ford, Henry W. Kendall, James MacKenzie, and others, who make this statement:

This is a very unsatisfactory state. The AEC's emergency core cooling interim criteria make no adequate remedial contribution and can serve only to prolong public exposure to extreme risks over which there is inadequate control, and which criteria gloss over with only the appearance and illusion of safety.

Mr. RAMEY. May I comment on that?

Senator GRAVEL. Yes.

Mr. RAMEY. I think, so far as we know, there hasn't been much consultation by that group with the Commission or the various safety and technical organizations that have looked into the safety of reactors. But one of the things that would permit groups like this to be heard, at least, and to at least get their technical questions discussed would be when we hold hearings on such matters as this in which public groups can participate. Of course, obviously if they wanted to we would talk to them right now and go over these matters with them.

Senator GRAVEL. You would make yourselves available to these scientists if they asked you?

Mr. RAMEY. Certainly.

Mr. MORRIS. Might I make a further remark?

I don't want to sound derogatory in commenting on these people, but they are not experienced in this field. None of them have any experience with power reactor design or operation. They have not talked to us, they have not talked to manufacturers, they have not had access to calculational codes.

Senator GRAVEL. Have they tried to talk with you?

Mr. MORRIS. They are trying now. They have not tried with us. I know they have tried with the industry and the industry is considering the proprietary problem of the calculational codes. We are going to be dealing with them in the context of the contested cases, this week, in fact.

Senator GRAVEL. In other words, they have to come to the hearing and fight you in an adversary proceeding?

Mr. MORRIS. They choose to come to the hearing and submit interrogatories to us which we have just received in the last week, and we will go over it in detail. It is on this basis that I make the statement that these people are not experienced. Some of the questions reveal this.

Mr. DOUB. I don't think these matters should be considered in contested cases when we are down to basic principles. It seems to me to be one of the advantages for rulemaking, where you do something like this in writing. That is to say, participation by groups such as this be given an opportunity to come in and state their views on the record together with anybody else who has similar or divergent views, with proper cross-examination, is a proper way to handle these matters as to the emergency cooling, the effluent levels, containment, the pressurized vessels, whatever it happens to be and take it out of the contested case.

Except as issues arise in the contested case, I think it would be a savings in time in the regulatory process if we could get on with the legislative type hearings.

Senator HATFIELD. Mr. Chairman, before we close out this part of the hearing, I would like to let the record be clear that this committee is so very well aware of the need for development of nuclear power. This committee being aware of this will have hearings on the safety factors relating to nuclear energy either later this winter or the first of the year.

We certainly, I am sure, along with the Chair's questions today, want to invite you people back and also have others, especially general citizens before us testifying and expressing their interest.

I think also that we now have a new Chairman of the Atomic Energy Commission and it should be pointed out that where the Commission has been charged with both promotional as well as regulatory responsibilities that there is a new emphasis that appears to be in the making. That is putting the Commission in a more regulatory role and less in a promotional role.

Again, I would like to refer back to the experience and say to my knowledge there has never been major public loss of confidence, never major confrontation between environmentalists and the agency, and primarily because, I think they have worked with the public and the public has established a basis for confidence.

I am not saying the public in this country doesn't have a lot of confidence, but I think there have been basic questions raised with scientists trying to communicate with laymen. I am hopeful that while these hearings that we are scheduled to have with this committee, that we can help provide better communication and create more edification and less emotion as it revolves around this very important issue.

Senator BELLMON. Commissioner, you say in your statement if you have an unusually cold winter this year or an unusually hot summer next year we will have lost a good deal of protection to our environment. I take it by that that we will have a loss of energy. Is that your meaning?

Mr. RAMEY. Yes; and one has to take into account when one is looking at the environment in a broad sense, that we have to protect essential human needs and concerns as well as the general aspects of air and water and fish and wildlife effects.

Senator BELLMON. So, there are environmental issues on both sides of this?

Mr. RAMEY. Yes, sir.

Senator BELLMON. What will be the effect of the *Calvert Cliffs* decision on this side of the environmental question?

Mr. RAMEY. As I indicated in my statement, I am a little concerned that for some plants that are completed or which will be completed in the next 6 or 8 months or a year, if a situation is encountered where there is a determined intervener, he could, just by deliberately taking his time within his legal rights, hold up the granting of an operating license wherein power would be rather urgently needed.

Senator BELLMON. Are you suggesting, then, that perhaps the Congress needs to review these appeal procedures to shorten the length of time that the appeals are taken?

Mr. RAMEY. If it is determined that the Commission, under the law and under NEPA as it stands, is not legally in a position to establish what I call these summary procedures, then I do believe that the Congress ought to look at some type of interim licensing legislation; yes, sir.

Senator BELLMON. Let me ask also—AEC has announced it will not seek reconsideration of the *Calvert Cliffs* decision. Can you tell me why you have come to this decision, not to appeal?

Mr. RAMEY. Perhaps Mr. Doub can answer that. [Laughter.]

Mr. DOUB. There are a variety of reasons. It was taken in concert with the Justice Department. The first reason, I think, was because we didn't think it was reversible.

Second, it would be time consuming. Third, we had a major job to do in restructuring the agency to handle the consideration of NEPA as interpreted by Calvert Cliffs, and we felt in view of the first two matters we should get on with the job.

As a matter of clarification, I thought we would have a better chance of clarification in one area and I think that will be resolved by Senator Baker's amendment to the water bill which just came out yesterday, and that will take care of that problem, in which we could have spent 6 to 9 months going through the appeal process.

With your permission, I would like to respond to a question of Mr. Ramey. FPC has indicated five critical regions in the country with 14 nuclear plants that are needed to meet the power for next summer and next winter. In my statement I stated that our regulatory staff has identified all of these nuclear powerplants. We projected that only two of them may miss; that is, miss in terms of being on the line because of the time requirements of the regulatory process resulting from the *Calvert Cliffs* case.

Therefore, I think a great deal of attention has to be given to not overreacting to the power crunch and simplifying it on the basis of the impact of Calvert Cliffs. It is not that simple, and the *Calvert Cliffs* case really comes down to a delay, to use that term, in only two cases of the 14 in the five critical areas identified by FPC.

That doesn't mean the legislation won't help and it doesn't mean we don't support the early site legislation that we sponsored last year.

Senator GRAVEL. We have a vote to make, can we push on?

Senator BELLMON. One further question.

Today, what harmful effects have come to human beings or to the environment as a result of the atomic power generation in this country?

Mr. RAMEY. We believe there have been no discernible amount of effects from the program. As mentioned by Mr. Rogers, the levels of radiation from nuclear powerplants are extremely low to the average individual, less than what we call a millirem, that is one-thousandth of a rem; to get an idea how much that is, in a flight from Oklahoma to Washington and back, you would probably get three-plus additional millirems from cosmic radiation. We get 100 millirems to 200 millirems from natural radiation.

So, with regard to the levels of radiation from a normal operation of powerplants, we believe there has been no discernable harm or damage and there have been no accidents that have affected the public.

So, here you have a new energy resource coming in as a large energy resource that seems to get quite a bit of attention and worry, yet has a safety record that far surpasses any other alternate source of power or any other industrial aspect of our society.

Senator BELLMON. This would seem to say that perhaps the *Calvert Cliffs* decision is a little stern. Would you say, with the record such as you have, that perhaps the Congress has made it possible for us to overreact a little to danger?

Mr. RAMEY. I think Calvert Cliffs essentially related not to the radiological aspects so much as the general environmental aspects. In the general environmental sphere, the amount of cooling water required for nuclear plants is somewhat greater than for a coal or oil fired plant. Then you get into this tradeoff business where with a nuclear plant you have a somewhat greater thermal effect; but with a coal or oil fired plant you have more air pollution and problems in that area.

So, certainly it is probably desirable in a general sense, that one should look at these matters. As was discussed this morning, the question is sort of how much and how fast should one implement this overall policy statement established by the National Environmental Policy Act.

As you may know, NEPA doesn't mention licensing at all in the actual statute and relatively little in the committee considerations.

Senator BELLMON (presiding). As you probably noticed, we have a vote underway and I believe it will be necessary to recess the hearing for perhaps 10 minutes while we go to make the vote.

Mr. NEDRY. Mr. Chairman, my name is Alan Nedry. May I ask leave on behalf of Mr. William Gould to file our statement for the record. Mr. Gould has to return to Los Angeles this afternoon and the time frame is such that he cannot catch his airplane.

Senator BELLMON. Without objection, Mr. Gould's statement will appear as part of the record.

(The statement referred to appears following Mr. Allen's testimony on page 253.)

Senator BELLMON. We will take a 10-minute recess.

(Recess.)

Senator GRAVEL (presiding). Unfortunately Mr. Gould had to leave and we have accepted his statement, and I understand it will be included in the record as if he were present.

Earlier today, I made a statement relative to the excess power capacity which could be apportioned throughout the Nation on a grid, and I was wrong. I said 25 percent. The amount is 27 percent, and the source is the Federal Power Commission, Mr. Nassikas.

We will try not to hold you people too much longer. I will go over some questions that I have.

Under your revised appendix D, part E(2)(c), concerning suspension of licenses pending the court ordered review, the AEC describes what you mean by "public interest" considerations as follows: "Of primary importance are the power needs to be served by the facility; the availability of alternative sources, if any, to meet those needs on a timely basis; and delay costs to the licenses and consumers."

Isn't there anything in the public interest about the possibility of death, the possibility of deformity; isn't it broader than just the power question?

When you talk about public interest, in deciding whether or not to suspend a permit or to grant a license, you seem to rest upon this definition of public interest which is really an electric problem, and not broader than that.

Could you elaborate on that?

Mr. DOUB. Well, I think it is much broader than that. I think we are trying to look at it from our responsibility, our point of view, our mandate. The public—the FPC, of course, looks at it in a different point of view in assuring the reliable capacity to meet those power needs. Our responsibility is different from that of the FPC.

Maybe I don't understand your question.

Senator GRAVEL. Well, the question is, is your definition of "public interest" restricted to the power needs, or is there other consideration of the public interest when you are holding licensing hearings that go beyond power needs?

Mr. DOUB. Yes; all of the conditions in a contested case, plus an uncontested case, all of the input that is made by the staff, the utility, the ACRS, the whole regulatory process, all of it.

Senator GRAVEL. OK, I will accept that.

What studies do you have relative to the power emergencies that exist in the area that supposedly will be met by Calvert Cliffs? Was there any study on the power needs—emergency situtation made?

Mr. DOUB. Yes, there are detailed studies that have been developed in the Federal Power Commission and we are working with them. In my prepared remarks I addressed myself to the critical areas for the coming summer and winter peaks, as identified by the Federal Power Commission, and then related that to the 14 plants that are at one stage or another in the licensing process, and attempted to show that there would be seven of these plants where construction could not be completed, regardless of the licensing problems, and that there would only be a possibility of two plants that would not be on the line because of the time requirements for licensing resulting from the *Calvert Cliffs* decision.

Senator GRAVEL. I am not talking about that. I am talking about the need for electricity with the emergency that exists. You apparently have some studies that say we need *x* amount of electricity that is going to be for what, where and how.

Mr. DOUB. My estimation is that it would be with the Federal Power Commission rather than us. We have a good working relationship with them.

Senator GRAVEL. I am interested in specific studies. I would like to see the studies and have them placed in the record.

Mr. DOUB. Well, we have attached to my statement an exchange of letters between Chairman Nassikas and Chairman Schlesinger of the AEC.

Senator GRAVEL. Well, if your estimation is the power need, I would think you would have more than an exchange of letters.

Mr. RAMEY. I think that quotation as to the public interest is from section D of the Commission's regulations. It is from subsection (*c*) in a group of factors that the Commission would take into account in making a judgment about permitting low power operation up to 20 percent.

Subsection (*a*) goes into environmental factors, such as whether it is likely that limited operation during the prospective review period will give rise to a significant adverse effect on the environment, the nature and extent of such impact, whether redress of such adverse environmental impact can reasonably be effected should modification and termination of the limited license result from the ongoing environmental review.

Then (*b*) goes into whether limited operation would foreclose subsequent adoption of alternatives in design or operations that could result from the ongoing NEPA environmental review.

Then it is (*c*) that is talking about the other side of the equation in the sense of the effect of the delay in facility operation upon the public interest in terms as you say, of power needs. But it would be in the context of balancing these environmental factors and design factors, whether those would be significantly affected.

That section refers to "the effect of delay in facility operation upon the public interest," and says, "of primary importance of this criterion are the power needs to be served by the facility, the availability of alternate sources, if any, to meet those needs on a timely basis; and delay costs to the licensee and to consumers."

So, this is a part of the balancing process, and it was this kind of power information that the commission was getting from the Federal Power Commission in looking at that one factor.

Senator GRAVEL. You did get data then from the Federal Power Commission on the emergency needs, the power demands, the distribution of power and all of that?

Mr. RAMEY. Yes.

Senator GRAVEL. Can we have that for the record?

Mr. DOUB. We will give you everything we have. We will get you additional information in addition to what we put in the record.

Senator GRAVEL. Very good.

All of your data comes from the FPC; is that correct?

Mr. DOUB. Yes, sir.

Mr. MORRIS. Excuse me. Each applicant is required to submit the data himself, and we verify that through the Federal Power Commission.

Senator GRAVEL. Pardon me?

Mr. MORRIS. Each applicant for a license or construction permit is required to furnish information.

Senator GRAVEL. So, the utilities furnish the information?

Mr. MORRIS. Yes, sir, and we check on that independently with the Federal Power Commission.

Senator GRAVEL. And does the Federal Power Commission supply you with data?

Mr. MORRIS. In commenting on each NEPA statement they furnish us with an evaluation of what the applicant submits to us.

Senator GRAVEL. Would you provide for the record an evaluation of the Calvert Cliffs power needs?

Mr. MORRIS. Yes, sir, we will.

(The documents to be furnished follow:)

The following comments were submitted by the Federal Power Commission on April 30, 1971, concerning the power needs to be served by the Calvert Cliffs Nuclear Power Plant, Units 1 and 2. The comments are in response to a draft detailed statement for the Calvert Cliffs plant which the AEC forwarded to the FPC on March 12, 1971. In accordance with the Commission's revised regulations, 10 CFR Part 50, Appendix D, implementing NEPA, a supplemental statement is being prepared for the Calvert Cliffs plant which also will be submitted to the FPC and to other appropriate Federal, State, and local agencies for comment.

FEDERAL POWER COMMISSION,
Washington, D.C., April 30, 1971.

Mr. HAROLD L. PRICE,
Director of Regulation,
U.S. Atomic Energy Commission,
Washington, D.C.

DEAR MR. PRICE: This is in reference to your letter of March 12, 1971, requesting the comments of the Federal Power Commission on the Draft Detailed Statement on Environmental Considerations, U.S. Atomic Energy Commission, related to the proposed operation of Calvert Cliffs Nuclear Power Plant, Units 1 and 2 by the Baltimore Gas & Electric Company, Docket Nos. 50–317 and 50–318, dated March 10, 1971.

These comments are in accordance with the National Environmental Policy Act of 1969 and the role of expertise assigned to the Federal Power Commission by the Council on Environmental Quality in its memorandum of July 29, 1970. Our comments take into account the fact that this project is in an advanced stage of construction and that the applicant is currenly expecting the first unit to go into commercial service in January 1973 and the second unit about a year later.

THE NEED FOR POWER

According to the applicant's environmental report of November 16, 1970, the capacity of the two 845-megawatt units will be critically needed in 1973 and 1974 to fulfill three purposes. These are:

(1) To help in meeting the electric demand of the applicant's customers

(2) To enable the applicant to fulfill an obligation to the Pennsylvania-New Jersey-Maryland Interconnection of which the applicant is a member

(3) To make possible a planned short term sale of capacity to the Potomac Electric Power Company, which is also deficient in reserve capacity for the peak load period of 1973 and 1974.

The applicant states that unless project capacity is available as scheduled, the applicant would enter the 1973 summer peaking season with zero reserves and that this situation would be repeated in 1974 and later as system demands continue to grow.

A review of information available in this office, based on the applicant's 1969 Power System Statement, FPC Form 12 and the report of the Mid-Atlantic Area Coordinating Group dated September 1, 1970, tends to confirm the importance of the Calvert Cliffs Nuclear Power Station as a factor in helping to prevent a supply-demand crisis on the applicant's system and an undesirably low reserve margin in the total PJM Interconnection during the summer peaking seasons of 1973 and 1974.

The following table summarizes data available from the reports filed with FPC as noted:

	Baltimore Gas & Electric Co.,[1] summer		PJM interconnection,[2] summer	
	1973	1974	1973	1974
Summer peaks, megawatts	3,570	3,982	33,061	35,888
Net dependable capacity, megawatts, excluding Calvert Cliffs project	3,343	3,343	38,840	42,559
Reserves, megawatts	−227	−639	5,779	6,671
Percent	−6.4	−16.0	17.5	18.6
Including Calvert Cliffs project	4,188	5,053	39,685	44,249
Reserves, megawatts	618	1,071	6,624	8,361
Percent	17.3	12.7	20.0	23.3

[1] Based on 1969 power system statement, FPC form 12.
[2] Based on mid-Atlantic area group report, September 1970.

It will be observed that without the capacity of the Calvert Cliffs Nuclear Units the applicant's available generating capacity during the summer peaking seasons of 1973 and 1974 is expected to be less than the peak loads anticipated for those periods. Under these circumstances, the applicant would have no reserve margins as claimed. If on the other hand, the units come on the line as scheduled, the reserve margins for the summer of 1973 and 1974 would be 17.3 and 12.7 respectively.

The effect of the unavailability of the Calvert Cliffs units on the reserve margins of the PJM Interconnection during the summers of 1973 and 1974 would be to diminish anticipated reserve margins from 20.0 to 17.5 percent in 1973 and from 23.3 to 18.6 percent in 1974.

For a system of the size and characteristics as that of the applicant's system, we feel that a reserve of about 20 percent would be essential. During the past several years, there have been many delays in availability of new power system facilities in the PJM area and a number of serious problems with large new generating units. Because of such problems, it is not assured that even when the Calvert Cliffs nuclear units become available the reserve margins of the PJM Interconnection during 1973 and 1974 will be as large as the theoretical figures indicate or high enough to dispel anxiety over the summer supply-demand situations. Circumstances such as these have prevailed at least since the summer of 1967, when an area-wide power failure was experienced, and they support the applicant's claim of need for the capacity of the Calvert Cliffs units.

ALTERNATES TO PROPOSED ACTION

At this late date with the Calvert Cliffs nuclear plant well along in the construction phase, there are no practical alternatives to the project which could provide the equivalent capacity for service in 1973 and 1974. The applicant is unable to rely on capacity elsewhere on the PJM Interconnection because of the expected demands for electric power throughout the system during the 1973 and 1974 summer season. Importation from beyond the PJM Interconnection service area is impractical because of the tight supply situation along the entire Eastern Seaboard, and because of a lack of sufficient transmission capacity from the west to carry an added block of power of the amount represented by the Calvert Cliffs units. The engineering work alone involved in consideration of an alternate fossil fuel generation station would exhaust the time remaining before the 1973 summer peaking season. For the same reason, a hydro alternative is also eliminated.

Sincerely,

JOHN N. NASSIKAS,
Chairman.

FEDERAL POWER COMMISSION,
Washington, D.C., November 15, 1971.

Hon. JAMES R. SCHLESINGER,
Chairman, U.S. Atomic Energy Commission,
Washington, D.C.

DEAR CHAIRMAN SCHLESINGER: This refers to your letter of October 29, 1971, transmitting the AEC staff analysis of the projected licensing schedules for critical nuclear power stations, which responds to my communication on this subject dated October 15, 1971. I appreciate the thoughtful analysis given to this matter by you and the AEC staff. I have also noted the discussion of this same matter in the testimony of Commissioner William O. Doub before the Senate Committee on Interior and Insular Affairs on November 3, 1971.

The impact of AEC's NEPA review upon scheduled nuclear capacity in relation to a total power system cannot be predicted with certainty at this juncture.

The FPC staff fully recognizes that the AEC staff has projected schedules which reflect "its best judgment as to the earliest possible dates for the various licensing steps that must be taken". We are, of course, hopeful that these are the schedules which can and will be maintained for these plants. The question still remains as to whether the capacity involved, even if these schedules are met, will realistically meet the power needs of the Nation. We trust that continual surveillance of scheduled generation and transmission additions in relation to regional and national power supply will determine the necessity for modification in present schedules as circumstances develop.

We must concern ourselves with the potential effects on adequate and reliable supply of power of a variety of contributing factors and adverse contingencies which experience tells us may well arise. It was this approach which prompted the FPC staff to present its analysis on the basis of the assumptions stated in the report accompanying my letter of October 15, 1971. It is clear, of course, that the different assumptions used in the analyses of our two staff reports could lead to differing conclusions. Some of the factors which underlie the more conservative estimates of probable power availability dates used in the FPC staff analysis are:

A 20 percent power license permits no significant delivery of power to the system and is only sufficient for general testing of the auxiliary equipment and overall plant operation.

Some minimum period of time is required to raise the power output in steps from the 20 percent level or less up to 100 percent output. Thus 100 percent output cannot be available at the time a license for this level is issued.

There are potentials for delay in the issuance of licenses for 20 percent or higher levels of operation on environmental or other grounds because of both questions which may have already been raised or others which may be raised in hearings still to be held.

Even after allowance of a sufficient period of time to raise power levels up to 100 percent and perform operational tests along the way, it is not realistic to count on firm power supply from such a unit in the first few weeks after it has reached full power level.

On the basis of experience, our staff judged that an average of one year potential delay in the availability for dependable full power service of many of these nuclear plants is a reasonable general assumption for an analysis of power emergency possibilities.

While the factors previously cited all relate to the potential completion of individual plants, we cannot overlook the fact that an added condition which may affect the supply of power and the relative importance of an individual plant is the possibility of concurrent delays in a number of plants, both fossil and nuclear, which are important to new capacity in a single region. It is, of course, difficult to predict the coincident impact of variable contingencies bearing on future power supply. Nevertheless, realistic concern for needed power supply emphasizes the importance of the cumulative effects within a region of a number of new plants coming into operation concurrently. The recent damage to the Indian Point No. 2 unit highlights the need for broader consideration than just a unit-by-unit effect on area or regional power supplies. Our FPC staff evaluation concludes that Indian Point No. 2 is an essential source for the summer of 1972 of base load generation for the New York Metropolitan area forecasted power demands in conjunction with all other generating and transmission sources comprising the system. However, its availability in the summer of 1972 is questionable. At the same time, it appears that the Vermont Yankee and Pilgrim units might be capable of operation in time to supply power which may be needed to prevent a critical situation in New York City next summer, provided action is taken sufficiently soon to enable dependable operation to become a reality within the time available. The NEPA review schedule enclosed in your letter of October 29 indicated June 1972 for Vermont Yankee and July 1972 for Pilgrim as the "earliest projected date of license issuance if decision favorable". Assuming a favorable decision and further assuming that AEC does not authorize limited operation above the 20 percent level in steps so as to assure substantially full capacity operation in advance of the AEC scheduled dates, the capacity provided by these units will not fill the power void created by delay in operation of Indian Point No. 2. Similar situations may prevail in the Midwest and other potential problem areas.

We are continuing our review of individual applications for operational licenses referred to us by your agency.

Sincerely,

JOHN N. NASSIKAS,
Chairman.

AN ANALYSIS OF THE CURRENT ENERGY PROBLEM

Remarks of

John N. Nassikas, Chairman
Federal Power Commission

Electrical World Conference
for Utility Executives

Shoreham Hotel
Washington, D. C.

January 14, 1971

AN ANALYSIS OF THE CURRENT ENERGY PROBLEM

Our resources are finite. Man's wants are infinite.

The fundamental problem, therefore, is to develop and allocate our finite resources to meet the priority requirements of an economically productive society through a competitive economy with such regulatory restraints as may be necessary to assure the conservation and efficient allocation of these limited resources.

Energy is the lifeblood of our economy and the catalyst enabling us to convert raw resources into the products and services that constitute our high standard of living. The growth of our national economy supporting our technologically advanced civilization is dependent on continued expansion of our energy resource base. A Background Study entitled, "The Economy, Energy, and the Environment," dated September 1, 1970, published by the Joint Economic Committee of the Congress of the United States, states the proposition as follows:

> "The economy of the United States and the technologically advanced nations is based on energy. Energy is the ultimate raw material which permits the continued recycle of resources into most of man's requirements for food, clothing, and shelter. The productivity (and consumption) of society is directly related to the per capita energy available." (At page 5 of the Joint Committee Print.)

As shown in Table 1, 21 percent of our energy requirements was supplied by coal in 1969; 43 percent by crude oil, its products and natural gas liquids; 32 percent by natural gas; and 4 percent by hydro and nuclear electricity. Relative to the pattern of energy consumption in 1950, coal's share has been reduced by 17 percentage points, most of which was made up by an increase of 14 percentage points in the relative share of natural gas. Petroleum's share increased moderately between 1950 and 1969.

Our energized society is reliant on oil and gas for 75% of its energy requirements. Over the next twenty years oil and gas requirements will almost double and will account for over 60% of projected energy use. If nuclear technology does not fulfill its promise on schedule, we may continue to be significantly more dependent on oil, gas and coal resources than anticipated into the twenty-first century and beyond.

Largely due to the impact of nuclear power, over the next twenty years we can anticipate even more dramatic changes in the contribution of each energy source to total energy consumption. The projections in Table 2, which are derived in large part from an "energy model" prepared by the Bureau of Mines, show significant declines in the relative shares of coal, gas and oil by 1990. The declines will be offset, according to these projections, by the rise in nuclear's share from less than 0.2 percent in 1969 to about 10 percent in 1980 and 23 percent in 1990. Since the absolute volume of all fossil fuel energy sources in the next two decades will increase, even though there will be a relative decline in their shares of the total, the energy industries must now evolve their long-range plans to assure the capital commitment required to produce a balanced energy supply.

Relation of Energy Industries to National Commitment to Economic Growth and a Rising Standard of Living

During the past year the question of national priorities for energy consumption and production has been attracting increasing attention. It has been suggested that energy consumption is growing at too fast a rate, so that it is causing an excessive drain on our resource base, and that energy production is associated with large social costs which threaten to outweigh its benefits. This is a viewpoint which certainly deserves thoughtful study, but it should be analyzed in conjunction with a basic study of energy's contribution to our national goals for economic growth and improved living standards.

The availability of an adequate supply of low-cost energy is important to man because of energy's unique capacity to do man's work. Energy not only displaces manpower and animal power, but it also multiplies society's productive potential to improve our standard of living and combat inflation. In the future, as in the past, man's economic and social progress will be closely dependent on the provision of increasing amounts of energy for his use.

Table 3 summarizes productivity, energy consumed per capita, and gross national product per capita over the past fifty years.

In the 50 years from 1920 to 1970, energy consumption per capita in the United States increased from 185 million Btu to about 335 million Btu. During the same period the United States gross national product (GNP), measured in dollars of 1958 purchasing power, increased from $1,315 per capita to about $3,500 per capita. Comparing the two increases, we find that energy consumption per capita rose at a compound rate of 1.2 percent per year, 1920 to 1970, while the GNP per capita advanced 2.0 percent per year. The explanation of the historically slower growth of energy consumption than of GNP is that the actual useful work done by energy has been rising because of the better design and increased efficiency of energy-using equipment.

Fuel Use Compared with Economic Indicators

The attached Table 4 shows the trends in U. S. energy consumption, gross national product (1958 dollars) and energy use per dollar of GNP since 1955.

In 1969, when we consumed 65,900 trillion Btu (or 65.9 quadrillion Btu) in producing a GNP of $931 billion, each dollar of GNP was associated with 70,750 Btu of energy. Stated differently, each dollar of GNP required, on the average, the energy equivalent of about one-half gallon of oil, about 70 cubic feet of natural gas, or a little more than 5 pounds of coal. This energy input per dollar of GNP cost between 1.6 and 2.5 cents, based on average prices paid by industrial consumers in 1969.

Tables 5 through 7 provide basic data on energy consumption, total and per capita, and energy consumption per dollar of disposable income and per person employed. It is apparent that disposable income per capita, which is a measure of the standard of living, has increased only slightly more rapidly

than the use of primary energy since 1955. During this period the amount of energy consumed per person in the labor force increased by almost one-third.

In the most recent years energy has been growing at a faster rate than GNP. Based on early estimates for 1970, it appears that the percentage increase in energy consumption since 1966 has been almost double the increase in GNP. A modest acceleration in the annual rate of energy growth has coincided with a slowdown in economic growth, especially since the latter half of 1969. It is too early to say whether this reversal of the long-run relationship is simply a cyclical phenomenon or signals a basic change.

The share of energy consumption represented by the consumption of electricity has, of course, been rising rather steadily for many years. In 1970 an estimated 24 percent of energy consumption was accounted for by electricity, compared with 18.7 percent in 1960. The historical trend of electricity demand doubling every ten years is about twice as fast as the long-term growth in GNP measured in real terms. According to the Commission's growth projections, this relationship is unlikely to be altered significantly during the decade of the 1970's. By 1980, electricity should be supplying about 34 percent of the Nation's total energy requirements.

As we enter the second year of the decade of the 1970's, it is evident that the past patterns of energy utilization have caused the following significant problems:

(1) We are continuing to develop imbalances between the demand and the supply of fuel resources reducing our capacity to meet unexpected changes in the availability of particular fuels.

(2) Our use and consumption of fuel resources under current technologies has produced greater environmental effects than the Nation is willing to tolerate.

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(3) Beyond this we have been pursuing patterns of use of our mineral fuels which may be sustainable to the end of the century at the rate at which we expect energy to be needed only if:

(a) we increase the trend rate of exploration and development of assured reserves of oil and gas, create new technologies for developing existing as well as supplementary energy resources;

(b) there is adequate technical effort to make our longest term fossil fuel (coal) adequately usable with minimum acceptable environmental effects, or to gasify coal or synthesize coal to other commercially feasible energy forms; and

(c) our nuclear power needs of the future, which are critically dependent on successful development of a fast breeder reactor program, are vigorously pursued on a time schedule which assures bringing this vital technology to a state of commercial readiness in the early 1980's.

(4) Meanwhile, there are advocates of the doctrine that the solution to environmental concerns compels:

(a) indefinite deferral of any type of nuclear power plant, new hydroelectric installations including pumped storage, or new steam electric plants using fossil fuels;

(b) halting development of our prolific offshore oil and gas reserves; and

(c) curtailing the use of energy and particularly electricity to diminish adverse environmental effects.

The responsible formulation of national energy policy cannot be grounded on extremism, but rather on comprehensive balancing of energy and environmental goals to serve the total public interest.

Given the necessity of additional energy production to support a rising GNP, together with the prospect of relatively greater proportionate reliance on electrical energy, what is my response to those who favor curtailing the growth of energy demand? First, it is clear that a more vigorous effort, supported by substantially larger R&D funding, is needed to increase the efficiency of energy production and consumption. We still have a long way to go in improving the relationship between the input of Btu's and the output of useful energy. Second, we should move faster in establishing realistic environmental standards based on an efficient balancing of the need to protect the environment and the need for more energy. Here, again, there are opportunities for technological advances to reduce the cost of meeting our environmental goals, both through the development of more efficient equipment or the expansion of our supplies of "clean" fuels. Third, the extra costs of R&D, environmental protection, and increased fuel supplies should be paid in part by all energy consumers and in part by taxpayers in general. A cost-sharing arrangement is both practical and appropriate in view of the large benefits to society as a whole from a program of expanding our use of energy while at the same time preventing environmental damage.

National Energy Policy

Both the Congress and the President of the United States are assigning high priority to the development of a national energy policy. Various committees of Congress have conducted hearings and are continuing to investigate and review procedures designed to establish a more effective national energy policy. Since August 1, 1969, when I became Chairman of the Federal Power Commission, I have made thirteen appearances

before Congressional committees concerning energy matters. The President, on August 6, 1970, appointed a Committee of the Domestic Council headed by Chairman Paul W. McCracken, of the Council of Economic Advisers, to undertake a study of the national energy situation and to develop for his consideration new or revised energy policies, and to recommend Federal actions which may be taken to alleviate shortages of clean fuel this coming winter and to assure adequate fuel supply over the next five years. 1/

On September 29, 1970, a Joint Board to identify emergency problems in fuel supply and fuel transport and coordinate prompt and appropriate remedial action by the responsible Federal agencies was established by the President. The Joint Board is composed of the Director of the Office of Emergency Preparedness (Chairman), the Secretaries of Interior and Commerce, and the Chairmen of the Council of Economic Advisers, the Council on Environmental Quality, the Interstate Commerce Commission, and the Federal Power Commission.

1/ Members of the Committee conducting the study include Secretary of State William P. Rogers; Interior Secretary Walter J. Hickel (succeeded by Fred J. Russell, Acting Secretary of Interior); Secretary of Commerce Maurice H. Stans; Health, Education & Welfare Secretary Elliot L. Richardson; Dr. Lee A. DuBridge (succeeded by Dr. Edward E. David, Jr.), Director of the Office of Science and Technology; Russell E. Train, Chairman, Council on Environmental Quality; George A. Lincoln, Director, Office of Emergency Preparedness; John N. Nassikas, Chairman of the Federal Power Commission; Dr. Glenn T. Seaborg, Chairman, Atomic Energy Commission; Mrs. Virginia H. Knauer, Special Assistant to the President for Consumer Affairs; George P. Shultz, Director, Office of Management and Budget; and Dr. Paul W. McCracken, Chairman of the Council of Economic Advisers.

Among the actions taken by the Administration 1a/ to cope with the winter problem are the following:

(1) Expansion of imports of Canadian oil and gas;

(2) Reduction in the turnaround time of coal hopper cars enabling a more efficient utilization of the fleet;

(3) Development of a program through the Special Assistant to the President for Consumer Affairs to urge the consuming public to practice conservation in the use of energy and economize in the use of fuel;

(4) Major foreign users of domestic coal (largely metallurgical) have fully cooperated in these efforts and the rate of exports has declined; and

(5) The domestic refining industry has shifted refining capacity to a greater output of residual oils.

A Working Group to assist the Joint Board in carrying out its assigned function has been established, consisting of representatives designated by the Secretaries of the Departments of the Interior and Commerce, the Chairmen of the Interstate Commerce Commission and the Federal Power Commission, and the Director of the Office of Emergency Preparedness. In addition, Field Boards on Fuel and Energy Problems have been established by the Office of Emergency Preparedness in the eight OEP regions throughout the United States. These Field Boards are the counterpart of the Joint Board at the national level established by the President.

The Federal Power Commission and other Federal agencies have taken several significant actions to assist in averting any shortage of electric power consistent with its assigned responsibility to assure an adequate and reliable power supply throughout the United States:

1a/ On December 22, 1970 Presidential Proclamation 4025 modifying the oil import control program was issued by President Nixon. The major impact of this modification will be to increase licensed oil imports into Districts I-IV, including the Canadian components of those imports, by approximately 100,000 barrels per day during 1971.

(1) Since the Fall of 1969, the FPC has monitored the fuel situation for power generation;

(2) FPC staff met with representatives of the coal and oil industries and electric utilities to define the problem and course of action;

(3) A procedure for regularly monthly reporting on the fuel situation of all major generating entities was instituted by FPC in mid-1970 in collaboration with the American Public Power Association, the Edison Electric Institute, the National Rural Electric Cooperative Association, and the Tennessee Valley Authority;

(4) Joint procedures have been worked out with the Office of Emergency Preparedness for coordinated action by all Federal agencies which could contribute to resolution of fuel supply problems including continued surveillance of availability and supply of coal, residual fuel oil and natural gas for the generation of electric power;

(5) Administrative procedures and conferences with state public utility commissions and staff throughout the United States have coordinated the joint efforts of the Federal Power Commission and state regulatory agencies to meet common problems;

(6) Reports by affected utilities of critical fuel situations are referred to the Department of the Interior, Office of Oil and Gas if residual oil is involved or the Office of Minerals and Solid Fuels if coal is the problem. The Interior Department has been instrumental through direct contacts with fuel industries in obtaining relief in specific emergency situations;

(7) The Federal Power Commission has instituted a national investigation of the reliability of electric power and natural gas supply which should produce significant reports and data to aid:

(a) the Commission in carrying out its jurisdictional responsibilities to assure adequate interstate gas and electric service;

(b) the Joint Board in formulating an effective course of action to meet any exigency;

(c) the Committee of the Domestic Council in developing new and revised energy policies for the President's consideration.

Electric Utility Industry Forecast

The Commission staff with the assistance of regional advisory committees representing all segments of the power industry, has projected estimates of needed electric generating capacity for the next two decades. A summary of these projections follows:

PROJECTION OF GENERATING CAPACITY

	1970		1980		1990	
	Megawatts	Percent	Megawatts	Percent	Megawatts	Perce
Conventional hydro	51,700	15.2	68,000	10.4	82,000	6.
Pumped storage hydro	3,600	1.1	27,000	4.0	71,000	5.
Fossil steam	260,300	76.5	393,000	59.0	557,000	44.
Internal combustion and gas turbine	18,300	5.4	30,000	4.5	50,000	3.
Nuclear	6,100	1.8	147,000	22.1	500,000	39.
TOTAL	340,000	100.0	665,000	100.0	1,260,000	100.

In my judgment, these figures represent reliable estimates made on the basis of operating experience and historical trends. Some shifts of capacity may be made between different types of power sources due to availability of fossil fuels or the deliverability and timely installation of scheduled generating technologies, but the total needs should remain approximately as stated. It may be expected that particular siting considerations will also cause some of these shifts. Nevertheless, the fundamental point is that approximately these projected amounts of future capacity must become firm goals for needed power generation facilities to be added for the decade 1970-1980 and the decade 1980-1990, if the necessary planning, manufacture, delivery and construction to serve electric power demands is to be accomplished on time.

It should be noted that an essential part of the construction of the required generating facilities is the selection and certification of new sites for power generation. Currently, the Federal Power Commission estimates the number of new sites

needed for new thermal generating plants of 500 MW or more, over and above substantial additions to be made at existing plants, as follows:

1971-1980	170 sites	
1981-1990	130 sites	
TOTAL	300 sites	(135 for fossil fuel plants, 165 for nuclear plants)

At present, there are approximately 1,000 steam-electric plants out of a total of 3,400 electric power generating plants. The remaining 2,400 plants consist of hydro and internal combustion (diesel and gas turbine). Seventy-nine percent of generating capacity is steam electric, producing 82 percent of the kilowatt-hours generated. Over the next 20 years, we project an increase in steam-electric generating capacity (fossil fueled and nuclear) to 84 percent of total capacity and 93 percent of kilowatt hours used. While some existing sites are capable of redevelopment to accommodate new and larger units, most new plants will require new sites and more land under regional rather than parochial planning concepts.

Concurrent with the new generation that will be needed between 1970 and 1990, we estimate that operable circuit miles of major high-voltage transmission will increase dramatically: 230 kv from 40,500 to 67,000; 345 kv from 16,600 to 50,500; 500 kv from 7,500 to 34,700 and 765 kv from 560 to 10,200. It is estimated that new transmission construction in the next 20 years will utilize about 7,000,000 acres of land for rights-of-way compared with 4,000,000 acres now used for existing transmission.

The most significant change anticipated in thermal generation for electric power indicated by the 1970 National Power Survey data is the extraordinary growth expected in nuclear generation during the next two decades. In 1990, nuclear generation is expected to account for 40 percent of generating capacity and about 55 percent of thermal electric

energy requirements (kilowatt hours), an increase of more than 80 times the generation of kilowatt hours by nuclear plants estimated for 1970.

A Commission staff analysis of the anticipated relative use of the various fuels to be converted to energy by the electric utilities during the period 1970-1990 projects the following requirements for fuel expressed in tons of coal having a heating equivalent of 25 million Btu:

Projected Fuel Use by Electric Utilities 1/
(Tons in Millions)

	1970		1980		1990	
	Tons	Percent	Tons	Percent	Tons	Percent
Coal	300.2	55.0	472.0	41.9	613.6	28.7
Gas	150.1	27.6	162.3	14.4	200.2	9.4
Oil	79.3	14.6	136.4	12.1	145.1	6.8
Nuclear	15.2	2.8	356.5	31.6	1,176.1	55.1
Total	544.8	100.0	1,127.2	100.0	2,135.0	100.0

1/ All forecasts of the relative energy mix for power generation are based on the assumption that fuel resources will be available at the requisite quality level of prescribed environmental standards at an economically feasible price.

Even though the relative importance of coal as fuel for this purpose is expected to decrease from 55 percent in 1970 to 28.7 percent in 1990, the actual amount of coal to be used for electric power generation will double in the two decades.

Electric utility consumption of natural gas during this same period is expected to increase by 33 percent and the consumption of residual fuel oil by 83 percent. Here again, the relative importance of these fuels for electric power generation will diminish, but quantitative requirements will increase. In 1990, gas is expected to account for 9.4 percent of the total utility fuel requirements, and oil 6.8 percent, compared to 27.6 percent and 14.6 percent, respectively, in 1970.

How do we translate these power plant transmission and fuel resource requirements for the electric utility industry into an effective national action plan? Certain basic principles must be recognized:

(1) Utility managements have the primary responsibility for an adequate and reliable bulk power supply to meet expanding demands for electric power;

(2) The Federal Power Commission has the regulatory responsibility to assure a reliable bulk power supply in interstate commerce nationally;

(3) State regulatory agencies have the responsibility for power service requirements under their jurisdiction;

(4) The selection of sites and new generating and transmission systems must be planned and constructed so as to meet environmental quality standards for air, water and land use which will recognize an optimum balance between energy growth and environmental concerns;

(5) Implementing administrative action, legislation is required:

(a) to expedite the installation of required facilities consistent with due process; and

(b) to compel public disclosure for systematic review of all economic, social and environmental factors in advance of scheduled construction and installation so that a final certificate to install the facility can be granted without jeopardizing the project in mid-stream;

(6) A regulatory system must be established to reduce licensing and construction delays from proliferating Federal, state and local regulation and standards;

(7) We must develop methods of efficient and optimum utilization of our finite fossil fuel resources, develop technology for new energy resources and increase our scientific technology related to energy production and environmental quality control; and

(8) Federal and state regulation must recognize that rates of the regulated energy industries must be at a level adequate to attract capital at reasonable costs in competition with competing demands for capital by other industries in a growing economy.

To coordinate industry, Federal and state responsibilities to meet common objectives of supplying electric power needs in harmony with the environment within the framework of existing law, the Federal Power Commission issued its Statement of Policy on Reliability and Adequacy of Electric Service, Docket No. R-362, Order No. 383-2, on April 10, 1970. Administratively, through the National Electric Reliability Council, nine regional electric reliability councils, the Federal Power Commission and state commissions are receiving 10-year advance system plans of all electric utilities in the contiguous 48 states.

The reliability councils are coordinating projected system plans with 22 power pools on a regional basis throughout the United States to attain the declared national objective of Section 202(a) of the Federal Power Act of "* * * an abundant supply of energy throughout the United States with the greatest possible economy and with regard to the proper utilization and conservation of natural resources." System plans will be analyzed to determine feasibility and adequacy to meet comprehensive economic and environmental standards. 2/

2/ Order No. 420, adopted January 7, 1971, pursuant to Notice of Proposed Rulemaking issued in Docket No. R-379 on January 22, 1970, revised FPC's accounting procedures to encourage utility management to acquire land for long-range utility needs by amending the Uniform System of Accounts to permit a return on investment in plant sites. Order No. 412, issued October 22, 1970, amended Commission rules to require electric utilities to annually submit air and water quality control data to help develop and evaluate effective environmental quality programs.

Capital Requirements of the Electric Utility and Natural Gas Industries, 1971-1980

Electric Utility Industry

The prospects in the electric power industry are for capital expenditures of about $180 billion over the next 10 years. This estimate does not include any allowance for general price inflation beyond 1970. If we assume average price inflation of 3 percent per year, the industry's capital requirements will be in the neighborhood of $210 billion for the decade.

It is estimated that the industry's capital expenditures were approximately $13.0 billion in 1970. The prospect is for a generally rising trend of capital outlays to about a $20 billion annual level before the end of the current decade and a $40 billion level by 1990. (These projections also are in 1970 dollars. A 3 percent annual rate of inflation would raise the $40 billion annual level estimated for 1990 to $72 billion.) The current investment in electric utility plant is about $110 billion.

Based on recent experience, we would expect that about 40 percent of the needed capital funds will come from internal financing and 60 percent (over $100 billion during the next ten years) will need to be obtained in the capital market by selling securities in competition with other business borrowers. The industry's requirements for refunding maturing securities will be an additional source of demand for capital funds. During the decade of the 1970's this refunding will amount to approximately $7 billion; during the decade of the 1980's it will be more than $11.5 billion.

Natural Gas Industry

According to AGA estimates, the transmission and distribution segments of the natural gas industry will require new capital investments of about $33 billion during the next decade. This will include about $17 billion for transmission and $11 billion for distribution facilities, plus about $5 billion for storage facilities, general plant, and some production investment.

In addition to the investments reported by AGA, staff has computed that the gas producers may require about $34 billion for drilling gas wells 3/ plus about $18 billion for lease acquisition, geological and geophysical expense and lease rentals. 4/ This exploration and drilling outlay plus the transmission and distribution investment totals $85 billion for the 10-year period. (Allowing for 3% per year inflation this total would amount to about $100 billion.)

3/ This estimate is based on a drilling program calculated to keep natural gas reserves at a level high enough to provide the expected requirements. This level of additions to reserves (which is about equal to the decade's optimum reserve addition program as shown in A Staff Report on Natural Gas Supply and Demand (FPC, Sept. 1969) page 40) enables the calculation of the necessary number of wells to be drilled (based on the 1960-69 level of findings per well); the number of wells enables the calculation of the drilling footage (based on an estimated annual increase in the average depth of the wells drilled for gas); the footage enables the calculation of a total cost (based on the assumption that drilling expenses will increase in accordance with past trends).

4/ According to data published by the Chase Manhattan Bank in Capital Investments of the World Petroleum Industry, 1965-1969, lease acquisitions, geological and geophysical expenses and lease rentals have been about 53 percent of drilling costs.

Electric Power Supply - Winter 1970-1971

Generating Capacity

Electric power capacity for the 1970-1971 winter should be adequate to meet peak demands nationally but in some regions of the United States there may be some interruptions as the result of outages of required plant to meet load. Staff analyses indicate that about one-fifth of the Nation's principal electric utility systems will have less than a 20 percent reserve margin in relation to peak load demand, which is generally considered as a necessary reserve to compensate for forced outages, required maintenance, uncertainties in load forecasting, and other reasonable contingencies.

On a nationwide basis, utilities are expected to have 322,274 megawatts of dependable capacity this winter with an estimated peak of 257,173 megawatts. The capacity available for reserves thus totals 65,101 megawatts, or 25.3 percent of peak.

In the Northeast region reserves are 26.0 percent. 5/ While the region as a whole appears to have adequate margins, 6 of the 15 systems have less than 15 percent reserves. New England reserves are 11.1 percent and its two largest systems have less than ten percent each. New England utilities had to reduce voltage twice in November because of capacity deficiencies; however, the 652 megawatt Millstone unit is now on test and the continued availability of this unit should improve the power supply situation in the area.

The East Central region is expected to have a reserve margin of 21.0 percent, with only 4 of 26 systems having less than 15 percent.

5/ Composition of each of the six National Power Survey Regions by states is shown in Appendix A.

In the Southeast region 5 out of 17 systems have less than 15 percent reserves. The reserve margin for the region as a whole is 16.4 percent.

The West Central region as a whole has 26.9 percent reserve. Fifteen of the 32 systems in this region have less than 15 percent.

Reserve margin in the summer peaking South Central region is 61.2 percent, by far the highest in the Nation.

The West region has a reserve margin of 18.7 percent, with 13 of 48 systems having less than 15 percent. The Pacific Northwest alone is expected to have reserves of 1.7 percent. This area has large amounts of interruptible industrial loads which may be dropped during emergencies.

Load Forecasting

Reliable load forecasting is fundamental to planning capacity additions and other elements of system expansion required to adequately meet future power requirements. Electric energy production over the last 50 years grew at an average annual rate of approximately 7.5 percent, and only in the decade of the 1930's did it fall below 7 percent. In the past five years, growth in electric energy requirements has averaged more than eight percent per year.

Planning must take cognizance not only of the average rate of growth, but must make provision for those periods of greater than average growth including the effects of temperature sensitive loads during unusual conditions such as extremely hot summers. To the extent that such demands cannot be predicted, reserves to meet such contingencies must be provided. Examination of past performance indicates that while utilities' short range estimates (5 years and less) showed an average error of 5.2 percent from experienced loads individual differences ranged to 15 percent on peaks and up

to 12 percent on annual energy increments. These are some of the reasons why load forecasts must be improved or greater margins of reserve provided.

The Federal Power Commission's 1964 National Power Survey load projections by region and nationally are compared in Table 8 with the estimated peak loads in 1970 by the various regional councils. While the national projection of the 1964 Survey was within 1.8 percent of the 1970 estimated peak loads, there were differences in regions ranging from an overestimate of 8.4 percent of the anticipated peak in the Western Systems Coordinating Council region to an underestimate of 17.4 percent in the Mid-Atlantic Area Coordination Group.

Even where estimated load forecasting by various utility systems was accurate, there were, nevertheless, in some instances inadequate plant capacity and associated transmission to provide a completely reliable power supply to meet public demand.

When demand is underestimated and generating and transmission facilities are not constructed in time to meet demand, the inevitable result is chronic regional shortages of electric energy as we have experienced over the course of the decade of the sixties and this past year.

Coal

Based on our continuing monthly survey and analysis of the fuel problems currently confronting the electric utility industry, as of December 1, 1970 we estimated that there was less than a 60-day supply of coal on hand for 66,100 megawatts or about one-half of coal-fired megawatt capacity totaling 129,300 megawatts. The situation has improved since September 1, 1970, when electric utility generating stations with a total installed capacity of 86,500 megawatts had less than a 60-day supply of coal on hand. Action by the Congress and the President to avert a rail strike in December, improved

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utilization of rail cars, increased coal production, reduced level of exports, milder than normal weather conditions in the late fall, conversions to oil, and the purchase by utilities of coal in the "spot" market at higher prices -- all of these factors contributed significantly to an improving level of coal inventories. We may predict with caution that continuance of the present favorable trends should meet generating load demands by coal-fired power plants this winter.

What are the underlying reasons for the shortage of coal?

In sum:

1. Increased demand over the past six years by electric utilities over and above industry and FPC growth estimates.

2. Change from planned nuclear systems to fossil fuel with its double-barreled effect of accelerating demand for coal and creating deficiencies in timely installation of generating equipment.

3. Transportation problems -- rail car shortages and wildcat strikes.

4. Air quality requirements in some major urban areas.

5. Technological lag in production of pollution abatement equipment to utilize available supply of high sulfur coal in the East.

6. The reliance by utilities on spot purchases rather than long-term contracts to fund the investment in required equipment and improved productivity to meet demands.

7. Increased exports of coal contributing to both coal and rail car shortages.

Oil

The demand for heavy fuel oil increased 8 percent in 1969 and over 15 percent in the first half of 1970, compared with an average gain of about 2 percent per year between 1960-1968. In New England, the demand for residual fuel oil by electric utilities increased by 70 percent in 1970 over 1968. Imports to the East Coast -- a quota-free market -- account for 93 percent of the supply of heavy fuel oil.

In the fall of 1970 the price of residual fuel oil on the East Coast reached a level of about double the price at the beginning of the year. There are also indications that the price of imported crude oil had experienced a similar increase; imported crude oil had apparently risen to a point where it equaled or exceeded the price of domestic crude oil.

Imports of heavy fuel oil have been both constricted and its price has increased in part as the result of:

(1) air pollution standards restricting the importation of high sulfur Caribbean oil over and above the capacity of present desulfurization facilities,

(2) disruption of supplies in the Middle East and reduction in the quantity of exports from some

foreign countries causing a longer haul and consequent reduction in available tankers, and

(3) increase in competing world-wide demand for oil in Europe and Japan.

An increase in domestic production of heavy crude oil to the extent of the gap between imports and domestic demand should avoid a problem of critical shortage this winter.

The oil supply of electric utilities has improved over the past five months due to increased deliveries at higher incremental prices and the construction by utilities of expanded oil storage facilities. As more storage capacity is built, the inventory level should continue to improve.

Gas

The relative price increase for coal and heavy fuel oil, combined with national air quality concerns, have stimulated demand for gas as a clean burning fuel. The National Environmental Policy Act of 1969, effective January 1, 1970, and its implementation by the Environmental Council and various Federal agencies, the establishment by the Congress of the Environmental Protection Agency in the fall of 1970, and the Clean Air Act of 1970, signed by the President on December 31, 1970, as well as State and municipal action in Air Quality Control, will contribute to important environmental safeguards which, in turn, will further accelerate the demand for gas as a premium fuel.

FPC analyses of discernible demand-supply trends compel the conclusion that proved, deliverable reserves to service consumer demand are becoming increasingly inadequate. The problem of reduced reserves in relation to supply developed during the decade of the 1960's when the ratio of proved gas reserves to annual production narrowed. When 1970 figures become available, the staff estimates that the reserve production ratio will be about 12, compared to an R/P of 20 in 1962. Until 1968, annual reserve additions for new gas findings exceeded annual production.

During the late forties and mid-fifties, annual volumes of new reserve additions were generally twice the volumes of annual production resulting in an average annual finding to production ratio (F/P ratio) of about 2.0. Since then, this ratio has gradually decreased and for the last five years has averaged 0.89 (findings 11 percent smaller than production) contributing to the acceleration in the decline of the R/P ratio. In 1968, the F/P ratio dropped to approximately 0.6. This is the first time since the American Gas Association began publishing natural gas reserves and production data that annual reserve additions have not equaled or exceeded annual production. However, this occurred again in 1969, with the F/P ratio declining even further to 0.4.

Annual production rose from 4.9 trillion cubic feet in 1946 to 20.6 trillion cubic feet in 1969; an increase of 320 percent. This compares with a 69 percent increase in reserves during the same period. Both exploratory and total wells drilled in the search for oil and gas have been in a general downward trend since 1956. However, an increase in both categories took place in 1969, as compared to the preceding year. While encouraging, these increases occurred in areas traditionally supplying only minor reserve additions and in areas where intrastate buyers exert intense competitive pressures. The important South Louisiana supply area, furthermore, showed a decline in drilling activity which was especially pronounced offshore.

Both industry and government estimates of gas consumption have been unreliable in the past as demonstrated by unforeseen demand significantly exceeding these estimates. In order to meet the projected requirements of the September 1969 report of the Future Requirements Committee from domestic production in the next two decades, and maintain an R/P ratio of 10, we would need to add 781 trillion cubic feet of new reserves. This would require reserve additions to average about 37 trillion cubic feet per year, 50 percent above the additions of the peak drilling year, 1956, and more than double the average (16.4 trillion cubic feet) for the last five years.

Against this bleak picture, what remedies do we have? One answer is to increase our total drilling effort from the last five-year annual average of 34,130 wells drilled per year for oil and gas to approximately 77,000 total wells per year assuming the yield per well remains the same. 6/ This increased effort would require more than doubling the last five-year annual average drilling expenditure of $2.1 billion to approximately $4.7 billion per year. 7/

But it is obvious that if we are to meet the Nation's future demands for natural gas, we will have to turn increasingly to supplemental sources. Even so, it is doubtful if gas from these supplemental sources will be able to fill the gap between demand and domestic production before 1980. Imported natural gas by overland pipeline from Canada and on ocean tankers as LNG are the most promising of the supplementary sources for the near future. While 1969 net imports from Canada amounted to 3.2 percent of the U. S. natural gas consumption, it is estimated that this source may increase to about 3.5 to 4.0 percent by 1973. Further increases above this level, however, will depend largely on the successful development of potential gas supplies in Canada's frontier area. LNG is currently being imported on a small scale and several projects have been proposed or announced that will increase LNG imports several fold by the middle seventies if Commission approval is obtained. However, even if all of the proposed LNG import projects are in full operation

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6/ The average findings per well drilled for the past five-year period were 479,783 Mcf.

7/ Drilling expenditures include all costs incurred for drilling and equipping wells through the "Christmas Tree." Source: Annual Joint Association Survey Reports.

by 1975, total LNG imports would be equal only to about 3 percent of projected U. S. requirements.

The other supplementary sources expected to contribute gas, perhaps by the end of this decade, to help meet our increasing demand over the long term are: (1) gasified coal and (2) gas via overland pipeline, or possibly LNG, from Alaska. In addition, gas from the nuclear stimulation of impermeable reservoirs, and pipeline quality gas from oil shale are also possibilities for the longer term.

We cannot realistically expect to meet all incremental demands for gas in the course of the next five years, because the development of new gas by exploration, overland or LNG imports, or supplementary technologies for more efficient recovery for production of gas from coal will require several years before making substantial contributions to the gas stream. It is estimated that 6 to 7 years are required for the development of Alaskan and Canadian Arctic reserves, the installation of required pipeline transmission and compressor facilities, as well as essential laterals for serving Far-West and Middle West markets.

Since I became Chairman on August 1, 1969, the Commission has assigned top priority to the resolution of gas supply problems to serve growing consumer demands. Among the actions taken are the following:

1. A nationwide investigation to review existing rates and determine whether higher rates should be established for future supplies of natural gas dedicated to the interstate market.

2. Review of essential area rate proceedings in important gas producing areas.

3. Institution of rulemaking procedures designed to stimulate the search for natural gas by independent producers and pipeline companies.

4. Review of interstate and intrastate market conditions in terms of interfuel competition, review of the feasibility of exempting small independent producers from price regulation, termination of the moratorium on the filing of rates above the March 1969 ceiling for Southern Louisiana. Adequacy of return to stimulate capital investment in further exploration.

5. Establishment of accounting rules for advance payments and loans to producers by pipelines to stimulate further exploration and development and to increase pipeline responsibility for gas supply.

6. The establishment of emergency priorities and rules for the delivery of gas to interstate pipelines.

7. Initiation of a National Gas Survey to establish the dimensions of industry capability to deliver gas as may be required to meet the energy needs of the Nation at a reasonable price to the consumer.

8. The examination of the level of prescribed pipeline rates, to yield adequate returns to attract the necessary capital to be invested in gas supply and service facilities for the consumer.

An extremely important action to stimulate the search for natural gas (and oil) was taken by the Department of the Interior on December 15, 1970 in authorizing a general lease sale of one-half million acres, offshore Louisiana. The committed bids at the sale were $845,832,000, approximating the $900,000,000 invested in the Prudhoe Bay leases in 1968. Pipeline participation in committed bids is estimated at $364,000,000. The Potential Gas Committee estimates that the undiscovered potential of natural gas supplies in the offshore area of Louisiana, as of the end of 1968, is 89 trillion cubic feet.

Further lease sales should be scheduled as may be necessary to meet oil and gas resource requirements.

On December 4, 1970, under authority of Section 5 of the Outer Continental Shelf Lands Act of 1953, Acting Secretary of the Interior Fred J. Russell ordered the return of gas and oil prorationing responsibility to the Federal Government from the states to whom it had been previously delegated. This is a significant policy action concerning federal energy resource development.

Research and Development

In 1969 electric utilities and electric utility industry manufacturers invested a total of $150 million in research and development expenditures (electric utilities, $40 million; manufacturers, $110 million). Research and development expenditures as a proportion of operating revenue declined from 0.269% in 1966 to 0.226% in 1969. The level of research expenditures in the electric power industry for 1970 is estimated at less than a quarter of 1% of gross electric operating revenue. In 1969, interstate pipelines expended $8.7 million or 0.12% of operating revenues of $7 billion on research and development. Total expenditures by the gas distribution and transmission industries are estimated at $20 million, or one-tenth of one percent of operating revenues. Both the electric utility and natural gas industries should substantially increase their level of research and development expenditures to develop new and more efficient methods of utilizing our energy resources, develop new energy forms and create the necessary resource base for expanding service to the consumer. 8/ It is worthy of note that the coal industry's investment in research and development in 1969 was $5 million, or two-tenths percent of operating revenues. Federal coal research programs in 1969 are estimated to total about $23 million. Petroleum refining and extraction R&D (including

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8/ FPC Order No. 408, issued August 26, 1970, amended accounting and rate-making policies to encourage more extensive research and development activities by electric and gas utilities.

gas production but excluding petrochemicals) approximated $250 million. 9/

9/ Petroleum refining and extraction companies spend an almost equal amount on R&D in other fields (chemicals, aircraft, missiles, etc.). This total amounts to about 1 percent of their net sales according to the National Science Foundation. (See Research and Developments in Industry, 1967, National Science Foundation (Survey NSF 69-28), Page 61).

Among the promising programs undertaken by the American Gas Association is its participation in an intensive research effort to develop a commercially feasible fuel cell. Other programs requiring commitment by the gas industry and the energy interests are the establishment of expanded pilot projects for coal gasification and the initiation of new projects for oil shale gasification, improvement of storage and transportation facilities for both natural and liquefied natural gas, and further investment in nuclear or other methods of stimulating tight reservoirs of gas.

The electric utility industry must also embark on unprecedented programs of research and development to find new commercially feasible energy sources, and improved technology for the production, transmission and consumption of electricity consistent with preservation of and reduced impact on the environment.

Over the past four years, it is estimated that an average of about $100,000,000 has been spent annually on liquid metal fast breeder reactor research. Of this total the Atomic Energy Commission has spent about $75,000,000 per year, manufacturers about $25,000,000 and $5,000,000, or about 5%, by the private utilities. The electric utility industry should bear a substantially greater proportion of funding and consequent responsibility for this program to accelerate the development of vitally needed nuclear facilities to reduce environmental impact and meet power demand during the remainder of the twentieth century. In addition to the liquid metal fast breeder reactor program, the technology of a gas-cooled fast breeder reactor should be developed.10/

10/"Fast Breeder Reactor"by Glenn T. Seaborg and Justin L. Bloom from Scientific American, November 1970, Volume 223, Number 5.

Breeder reactor development on a commercially feasible scale by 1984 should not only greatly extend our nuclear fuel resources but also conserve our other energy resources, contribute to an ultimate solution of air pollution problems as well as reduce thermal pollution problems, and develop energy at a social and economic cost competitive with conventional thermal steam generating plants of the next generation. 11/

Additional programs which should be thoroughly reviewed to determine the level of funding and priority of development are the following:

-- basic fuel research to minimize air pollutant effects

-- pollution abatement procedures by improvement of technology for disposing of solid and gaseous wastes from fossil fuel plants and radioactive waste from nuclear power plants

-- high voltage direct current transmission

-- undergrounding of high-voltage transmission lines

-- fuel cell research

-- solar energy research

-- magnetohydrodynamics (MHD) or other methods for converting heat energy directly into electrical energy without the need for conventional turbines and generators

-- development of automatic data-processing techniques and methods for making regional and national electric

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11/ See Remarks by Clarence E. Larson, Commissioner, U. S. Atomic Energy Commission, before the Annual Convention of the National Association of Regulatory Utility Commissioners, Las Vegas, Nevada, November 19, 1970.

load forecasts and analyzing the environmental effects of planned systems

-- study of long-term effects on human health and other forms from effluents from nuclear and fossil-fueled power plants

-- basic research in ecology and the life sciences with respect to air and thermal pollution effects.

RELATIVE CONSUMPTION OF MAJOR ENERGY FORMS, 1950-1969
Percent of Total

Year	Anthracite	Bituminous and Lignite	Natural Gas, Dry	Petroleum*	Hydropower	Nuclear Power	Total Gross Energy Inputs
1950	3.0	34.8	18.0	39.5	4.7	---	100.0
1951	2.6	33.3	19.6	40.2	4.3	---	100.0
1952	2.5	30.0	21.2	41.9	4.4	---	100.0
1953	1.9	29.7	21.6	42.7	4.1	---	100.0
1954	1.9	26.2	23.5	44.3	4.1	---	100.0
1955	1.5	27.8	23.1	43.9	3.7	---	100.0
1956	1.5	27.0	23.4	44.3	3.8	---	100.0
1957	1.3	25.9	24.8	44.3	3.7	0.0	100.0
1958	1.1	22.9	26.2	45.7	4.1	0.0	100.0
1959	1.1	22.1	27.6	45.3	3.9	0.0	100.0
1960	1.0	22.2	28.3	44.6	3.9	0.0	100.0
1961	0.9	21.5	29.0	45.0	3.6	0.0	100.0
1962	0.8	21.3	29.6	44.6	3.7	0.0	100.0
1963	0.7	21.6	29.9	44.2	3.5	0.1	100.0
1964	0.7	21.9	30.2	43.5	3.6	0.1	100.0
1965	0.6	22.3	29.8	43.4	3.8	0.1	100.0
1966	0.5	22.3	30.3	43.2	3.6	0.1	100.0
1967	0.5	21.3	31.0	43.2	3.9	0.1	100.0
1968	0.4	20.9	31.3	43.4	3.8	0.2	100.0
1969	0.3	20.2	32.1	43.1	4.1	0.2	100.0

Source: 1950-1963 - Bureau of Mines Information Circular 8384, page 60.
1964 - Minerals Yearbook - 1967.
1965-1969 - Bureau of Mines, Mineral Industry Surveys, Petroleum Statement, Annual, December 15, 1970, page 32.

* Includes Natural Gas Liquids

TABLE 1

TABLE 2

PROJECTED GROSS CONSUMPTION OF ENERGY
IN THE UNITED STATES, 1980 and 1990

(Quadrillion Btu)

	1969 (Actual)		Projected			
			1980		1990	
Energy Source	Amount	% of total	Amount	% of total	Amount	% of total
Coal 1/	13.5	20.5	18.0	18.9	18.5	13.2
Gas 2/	21.1	32.1	26.5	27.9	35.7	25.5
Oil	28.5	43.3	38.0	40.0	50.0	35.7
Hydro	2.7	4.1	3.0	3.2	3.6	2.6
Nuclear	0.1	-	9.5	10.0	32.2	23.0
Total	65.9	100.0	95.0	100.0	140.0	100.0

1/ Anthracite coal and bituminous coal and lignite.

2/ A more rapid growth in gas consumption is indicated by the report published by the gas industry's Future Requirements Committee in September 1969. The Committee's projections show gas consumption of 31.8 in 1980 and 42.7 in 1990 (in quadrillion Btu).

Source: 1969: Bureau of Mines, Mineral Industry Surveys, Petroleum Statement, Annual, December 15, 1970, page 32.

Projections: Bureau of Mines, Information Circular 8384, page 114, given for 1980 and as implied for 1990, adjusted by FPC estimated heat rates and revisions due to expected changes in pattern of fuel use by electric utilities.

Table 3

PRODUCTIVITY, ENERGY CONSUMED PER CAPITA, AND GNP PER CAPITA, 1920-1970

Year	Index of Productivity 1/ (1957-59 = 100)	Energy Consumed Per Capita (Million Btu)	GNP Per Capita (1958 $'s)	Energy Consumed per $ GNP (thousand Btu
1920	NA	185.8	1315	141.3
1930	NA	181.1	1491	121.5
1940	NA	180.3	1714	105.2
1950	80.3	224.3	2333	96.1
1955	93.9	242.1	2653	91.3
1956	94.1	249.9	2654	94.1
1957	96.9	244.9	2643	92.6
1958	99.8	241.4	2568	93.9
1959	103.4	245.6	2687	91.4
1960	105.0	249.8	2710	92.3
1961	108.6	249.0	2716	91.7
1962	113.8	256.8	2850	90.0
1963	117.9	263.2	2921	90.0
1964	122.5	269.6	3037	88.6
1965	126.6	278.5	3197	87.4
1966	131.7	291.6	3359	86.8
1967	134.3	299.0	3413	87.7
1968	138.7	312.5	3538	88.4
1969 p.	139.9	326.4	3601	90.6
1970 est.	NA	335.0	3500	95.7

1/ Output per man-hour, based on GNP in 1958 prices and hours of all persons engaged in production in private industry.

Source: Economic Report of the President, February 1970, and Bureau of Mines, except for data prior to 1955 which are from U.S. Energy Policies: An Agenda for Research, Resources for the Future, Inc., 1968, p. 6.

Table 4

Relationship Between Energy Consumed and Gross National Product

Year	Total Energy Consumed (Quadrillion Btu)	Gross National Product (Billion 1958 $)	Energy Consumed Per $ GNP (000 Btu)
1955	40.0	438.0	91.3
1956	42.0	446.1	94.1
1957	41.9	452.5	92.6
1958	42.0	447.3	93.9
1959	43.5	475.9	91.4
1960	45.0	487.7	92.3
1961	45.6	497.2	91.7
1962	47.7	529.8	90.0
1963	49.6	551.0	90.0
1964	51.5	581.1	88.6
1965	54.0	617.8	87.4
1966	57.1	658.1	86.8
1967	59.2	675.2	87.7
1968	62.5	707.2	88.4
1969	65.9	727.1	90.6

Source:
Data from Tables 3 and 7.

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Table 5

Relationship Between Per Capita Energy Consumed and Disposable Per Capita Income

Year	Resident Population (000)	Energy Consumed Total (Trillion Btu)	Energy Consumed Per Capita (Million Btu)	Disposable Per Capita Income (1958 $)	Energy Consumed Per $ Disposable Income (Thousand Btu)
1955	165,069	39,956	242.1	1,795	134.9
1956	168,088	42,007	249.9	1,839	135.9
1957	171,187	41,922	244.9	1,844	132.8
1958	174,149	42,041	241.4	1,831	130.1
1959	177,135	43,508	245.6	1,881	130.6
1960	179,992	44,960	249.8	1,883	132.7
1961	183,057	45,573	249.0	1,909	130.4
1962	185,890	47,732	256.8	1,968	130.2
1963	188,658	49,649	263.2	2,013	130.6
1964	191,372	51,601	269.6	2,123	126.9
1965	193,815	53,969	278.5	2,235	124.6
1966	195,923	57,130	291.6	2,331	125.1
1967	197,864	59,156	299.0	2,398	124.7
1968	199,870	62,463	312.5	2,480	126.0
1969	201,921	65,912	326.4	2,517	129.7

Source: Population data used to obtain Total Energy Consumed Per Capita are from Series P-25 No. 450 of the Bureau of the Census. Disposable income is from Survey of Current Business, U. S. Department of Commerce. Energy data are from Table 7.

Table 6

Relationship Between Energy Consumed and Total Employment

Year	Total Energy Consumed (Quadrillion Btu)	Total Employment (000,000)	Energy Consumed Per Person Employed (Million Btu)
1955	40.0	62.1	644
1956	42.0	63.8	658
1957	41.9	64.1	654
1958	42.0	63.0	667
1959	43.5	64.6	673
1960	45.0	65.8	684
1961	45.6	65.8	693
1962	47.7	66.7	715
1963	49.6	67.8	732
1964	51.5	69.3	743
1965	54.0	71.1	759
1966	57.1	72.9	783
1967	59.2	74.4	796
1968	62.5	75.9	823
1969	65.9	77.9	846

Source: Table 7 and employment series from U. S. Department of Commerce.

Gross Consumption of Energy in the United States, 1950-1969
(Trillion Btu)

Year	Anthracite	Bituminous and Lignite	Natural Gas, Dry	Petroleum	Hydropower	Nuclear Power	Total Gross Energy Inputs
1950	1,014	11,900	6,150	13,489	1,601	-	34,154
1951	940	12,285	7,248	14,848	1,592	-	36,913
1952	897	10,971	7,760	15,334	1,614	-	36,576
1953	711	11,182	8,156	16,098	1,550	-	37,697
1954	683	9,512	8,548	16,138	1,479	-	36,360
1955	599	11,104	9,232	17,524	1,497	-	39,956
1956	610	11,341	9,834	18,624	1,598	-	42,007
1957	528	10,838	10,416	18,570	1,568	1.2	41,922
1958	483	9,608	10,995	19,214	1,740	1.5	42,041
1959	478	9,596	11,990	19,747	1,695	2.2	43,508
1960	447	9,967	12,699	20,067	1,775	5.5	44,960
1961	404	9,809	13,228	20,487	1,628	17.0	45,573
1962	381	10,160	14,121	21,267	1,780	23.0	47,732
1963	361	10,722	14,843	21,950	1,740	33.0	49,649
1964	365	11,295	15,562	22,386	1,873	34.0	51,515
1965	328	12,030	16,097	23,419	2,057	38.0	53,969
1966	290	12,740	17,295	24,692	2,056	57.0	57,130
1967	274	12,587	18,371	25,527	2,318	79.0	59,156
1968	258	13,069	19,564	27,119	2,324	129.0	62,463
1969	224	13,291	21,123	28,460	2,667	147.0	65,912

Source: Years 1950-1963, Bureau of Mines Information Circular 8384, p. 60.
1964, Minerals Yearbook 1967.
1965 through 1969, from Mineral Industry Surveys, Petroleum Statement, Annual December 15, 1970, page 32.

TABLE 7

TABLE 8

COMPARISON OF 1970 LOAD PROJECTIONS

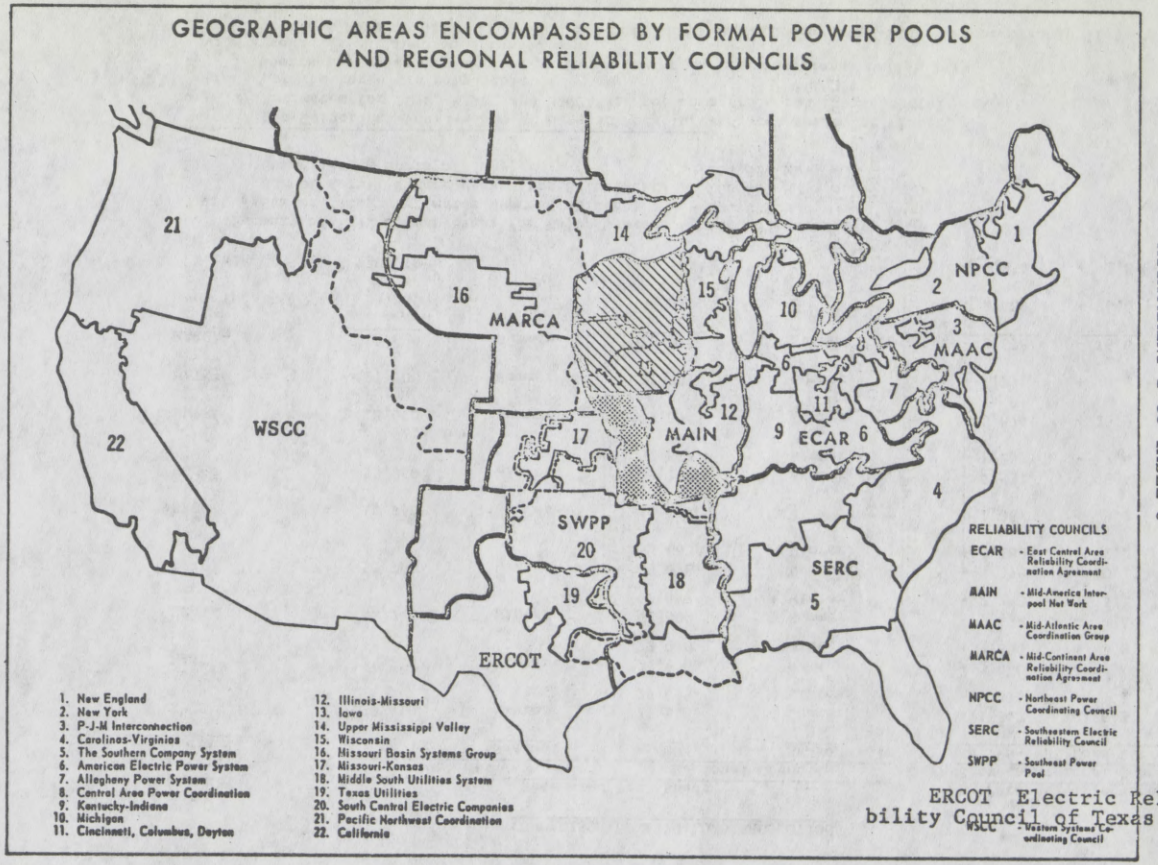
Regional Reliability Council 3/	Estimated Peak Loads: 1964 NPS MW	1964 NPS Season	Regional Council MW	Regional Council Season	Percent Difference Between Regional Council and 1964 NPS Load Estimate: MW	%
NPCC	29,410	Winter	27,563 4/	Summer	- 1,847	- 6.3
			29,095 4/	Winter	- 315	- 1.1
MAAC	21,210	Winter	24,900	Summer	+ 3,960	+ 17.4
			22,010	Winter	+ 800	+ 3.8
ECAR	44,740	Winter	42,302	Summer	- 2,438	- 5.4
			42,447	Winter	- 2,293	- 5.1
SERC	52,700	Winter	53,078	Summer	+ 378	+ 0.72
			53,863	Winter	+ 1,163	+ 2.2
ERCOT	14,960	Summer	16,347		+ 1,387	+ 9.3
WSCC	53,860	Winter	49,329 4/	Summer Est.	- 4,531	- 8.4
			52,593 4/	Winter	- 1,267	- 2.4
SWPP 2/	18,500	Summer	22,374	Summer	+ 3,874	+ 20.9
MAIN 2/	21,700	Summer	22,991	Summer	+ 1,291	+ 5.9
MARCA 2/	13,630	Summer	10,954	Summer	- 2,676	- 19.6
Sub Total 2/	53,830		56,319		+ 2,489	+ 4.6
Total	270,710 1/		275,564 1/		+ 4,854	+ 1.8

Summary of 1970 Summer Peaks for Major Systems (About 98% coverage):

Sum of latest Estimates (Non-Coincident)	274,229 MW
Sum of Actual Summer Peaks (Non-Coincident)	268,467 MW
Summer Peak (Month of July)	264,529 MW

1/ Non Coincident Peak -- Sum of Highest Peak in each area summer or winter.
2/ Estimates for SWPP, MAIN, and MARCA are not comparable but the sub total of the three are comparable.
3/ Geographic areas encompassed by former power pools and regional reliability councils outlined on attached map.
4/ Excludes Ontario Hydro from NPCC and British Columbia Hydro from WSCC. See membership list attached.

ATTACHMENT 1 to TABLE 8



ERCOT Electric Reliability Council of Texas

ATTACHMENT 1 to TABLE 8

Attachment 2 to Table 8

Individual Members of Regional Reliability Councils a/

Northeast Power Coordinating Council (NPCC)

Boston Edison Co.
Burlington Electric Light Dept.
Central Hudson Gas & Electric Corp.
Central Maine Power Co.
Central Vermont Public Service Corp.
Consolidated Edison of N. Y., Inc.
Eastern Utilities Associates
Green Mountain Power Corp.
Hydro-Electric Power Comm. of Ontario
Long Island Lighting Co.
New England Electric System
New England Gas & Electric Assoc.
New York State Electric & Gas Corp.
Niagara Mohawk Power Corp.
Northeast Utilities
Orange and Rockland Utilities, Inc.
Power Authority of the State of New York
Public Service Company of New Hampshire
Rochester Gas and Electric Corp.
The United Illuminating Company

Mid-Continent Area Reliability Coordination Agreement (MARCA)

Black Hills Power and Light Co.
Central Iowa Power Coop.
Cooperative Power Assoc.
Corn Belt Power Coop.
Dairyland Power Coop.
Eastern Iowa Light and Power Coop.
Interstate Power Co.
Iowa Electric Light & Power Co.
Iowa-Illinois Gas & Electric Co.
Iowa Power and Light Co.
Iowa Public Service Co.
Iowa Southern Utilities Co.
Lake Superior District Power Co.
Minnesota Power & Light Co.
Minnkota Power Coop., Inc.
Montana-Dakota Utilities Co.
Nebraska Public Power District
Northern Minnesota Power Association
Northern States Power Co.
Northwestern Public Service Co.
Omaha Public Power District
Otter Tail Power Co.
Rural Coop. Power Association
U. S. Bureau of Reclamation

Associates: Union Electric Co.
Manitoba Hydro-Electric Board of Canada

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a/ Membership reported by all electric reliability councils as of September 1, 19[illegible] except for the Electric Reliability Council of Texas which is reported as of November 20, 1970.

Southwest Power Pool Agreement (SPP)

Arkansas-Electric Coop. Corp.
Arkansas-Missouri Power Co.
Arkansas Power & Light Co.
Associated Electric Coop., Inc.
Board of Public Utilities, Kansas City, Kan.
Central Louisiana Electric Co., Inc. (The)
City Power & Light Dept., Independence, Mo.
City Utilities of Springfield, Missouri
Empire District Electric Co. (The)
Grand River Dam Authority
Gulf States Utilities Company
Kansas City Power & Light Co.
Kansas Gas and Electric Co.
Kansas Power & Light Co. (The)
Louisiana Power & Lt. Co.
Mississippi Power & Light Co.
Missouri Edison Co. b/
Missouri Power & Light Co. b/
Missouri Public Service Co.
Missouri Utilities Company
New Orleans Public Service, Inc.
Oklahoma Gas & Electric Co.
Public Service Co. of Oklahoma
St. Joseph Light & Power Co.
Southwestern Electric Power Co.
Southwestern Power Administration
Western Farmers Electric Coop.
Western Power Division - CT & U

Mid-Atlantic Area Coordination Agreement (MAAC)

Atlantic City Electric Co.
Baltimore Gas and Electric Co.
Delmarva Power & Light Co.
Jersey Central Power & Light Co.
Metropolitan Edison Co.
New Jersey Power & Light Co.
Pennsylvania Electric Co.
Pennsylvania Power & Light Co.
Philadelphia Electric Co.
Potomac Electric Power Co.
Public Service Electric and Gas Co.
UGI Corp.

Southeastern Electric Reliability Council (SERC)

Alabama Electric Cooperative
Alabama Power Company
Carolina Power & Light Co.
City of Tallahassee
Crisp County Power Commission
Duke Power Company
Florida Power Corporation
Florida Power & Light Co.
Georgia Power Co.
Gulf Power Co.
Jacksonville Electric Authority
Lakeland Dept. of Elec. & Water
Mississippi Power Co.
Nantahala Power & Light Co.
Orlando Utilities Commission
Savannah Electric & Power Co.
South Carolina Electric & Gas Co.
South Carolina Public Service Authority
Southeastern Power Administration
Tampa Electric Co.
Tapoco, Inc.
Tennessee Valley Authority
Virginia Electric & Power Co.
Yadkin, Inc.

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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
Interstate Power Company d/
Iowa Electric Light & Power Company d/
Iowa-Illinois Gas & Electric Co. d/
Iowa Power & Light Company d/
Iowa Public Service Co. 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.

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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
Los Angeles Department of Water & Power
Metropolitan Water Dist. of South Calif.
Montana Power Company
Nebraska Public Power District a/
Nevada Power Company
Pacific Gas & Electric Co.
Pacific Power & Light Company
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
Utah Power & Light Company
Washington Water Power Company
West Kootenay Power & Light Company

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e/ Also member of MARCA

APPENDIX A

Composition of National Power Survey Regions by States

Northeast Region

Connecticut
Delaware
Maine
Maryland
Massachusetts
New Hampshire
New Jersey
New York
Pennsylvania
Rhode Island
Vermont
(District of Columbia)

East Central Region

Illinois
Indiana
Kentucky
Michigan
Ohio
West Virginia
(Small areas in Western Pennsylvania and Western Virginia)

Southeast Region

Alabama
Florida
Georgia
North Carolina
South Carolina
Tennessee
Virginia
Eastern Mississippi
Southwestern Kentucky

South Central Region

Arkansas
Kansas
Louisiana
Oklahoma
Texas
Western Mississippi
Southern and Western Missouri

West Central Region

Illinois
Iowa
Minnesota
Nebraska
North Dakota
South Dakota
Wisconsin
Northern and Eastern Missouri
Upper Peninsula area of Michigan
Eastern Montana
Extreme Northeastern Wyoming

West Region

Arizona
California
Colorado
Idaho
Montana
Nevada
New Mexico
Oregon
Utah
Washington
Wyoming
Panhandle of Oklahoma
Small areas of West Texas
Western Nebraska
Minute area of Southwestern South Dakota

REMARKS OF COMMISSIONER JOHN A. CARVER, JR., FEDERAL POWER COMMISSION BEFORE 21ST SEMIANNUAL MEETING OF MANUFACTURING CHEMISTS ASSOCIATION, NEW YORK HILTON HOTEL, NEW YORK, NEW YORK, NOVEMBER 23, 1971

As the representation on this panel indicates, energy consumption in this country covers a wide array of forms and sources--from the burning of sawmill refuse to nuclear fission. In this complex picture, the electric utility industry represents the highest degree of complexity and impact on other industrial processes.

For the most part, all other energy forms are used in their natural state or after processing that has little effect on their basic nature or qualities. They are categorized as prime movers. Electricity, however, is a converted energy form derived from the gravitational force of falling water or the heat produced by fossil fuels or nuclear disintegration. The product thus derived is readily transportable, highly convenient, eminently clean at the point of use and, in general, the most versatile source of light, heat and industrial power.

These characteristics, plus a history of consistent reduction in cost, have made electricity both readily available and much in demand for domestic as well as commercial and industrial applications.

Since the inception of the electric utility industry, which we place somewhat arbitrarily at 1880, production and consumption has enjoyed an historic growth rate that is as remarkable for its consistency as for its volume. Starting from an almost zero level ninety years ago, use of this energy form has roughly doubled in each succeeding decade. To give this growth history some perspective and dimension, our population has quadrupled (from 50 to 200 million) since 1880; total electric energy production by utility companies alone (exclusive of industrial production) has increased more than 4-1/2 times since 1950.

During most of this period, the incremental additions required to meet rising demand were forthcoming without the aid of central planning or regulation. In large part, they still are--but through the process of cumulative growth the annual increments of addition have become ever

larger. To take a recent period, for example, data for 1969 show an increase of 8.5 percent in production and 7.4 percent in installed capacity over 1968. This net increase for one year, more than 112 billion kwh, exceeds by nearly one-fourth the total production of 1930; it is almost double the total increase experienced in the entire decade between 1930 and 1940.

The above experience of a recent year is significant for another reason. You will note that while total production increased by 8.5 percent in 1969, the rise in installed generating capacity amounted only to 7.4 percent. This was the second successive year in which the increase in generating capacity lagged behind the increase in production by more than a full percentage point. It is thus symptomatic of the most serious problem facing the electric utility industry today--the adequacy and reliability of service to a society and an economy that has become dependent on the flip of the switch.

This brings into sharp focus a very basic issue facing the electric utility industry and the economic and social structure which is dependent upon it. Will this increase in demand continue at the same rate and is it possible to provide the capacity needed to meet such a growth pattern?

Over the past decade and a half, numerous surveys, studies and projections of national energy requirements have been conducted by highly qualified organizations. Indeed, their number and methods presented such a complex challenge that the Office of Science and Technology found it useful to contract with still another research institute to summarize and tabulate in comparative format the conclusions of those earlier studies.

The Federal Power Commission contributed its fair share to this volume in the form of its National Power Survey, completed in 1964. The Commission's foresight in making this exhaustive analysis and projection of electric power requirements was perhaps overshadowed by the fact that the calamitous northeast blackout occurred almost exactly a year after its publication date, thus proving by hard experience what the Survey had preached about the

need for adequate generating reserves and reliable system interconnections.

Nevertheless, the 1964 power survey provides the basis for some observations relevant to the present. Like all but one of other energy studies that had been made, the Survey accepted as "given" that certain conditions concerning population and economic growth, international relations, fuel supplies, etc., would remain relatively constant. And yet, despite this rather bullish assumption, time has proved the resulting optimistic demand projections to have been short, even over the short term through 1970, by nearly 4%.

The Commission is now ready to publish a new, revised and updated National Power Survey which attempts, at least, to reflect the developments that have occurred since 1964 and carry projected demand another decade forward to 1990. The most dramatic point of comparison with the first survey arises from the revised estimate of demand upon electric utilities--now placed at 3113 billion kilowatt hours for 1980. This is more than double the actual consumption of 1970 and 15.5% higher than was forecast for the same year by the 1964 survey. As the current forecast breaks new ground into 1990, it projects a total utility demand of 5922 billion kwh--nearly four times the consumption of 1970.

These totals seem almost incomprehensible in the abstract and when you attempt to translate them into new plant capacity, even greater difficulties are foreseen. How can literally hundreds of giant generating plants, whether coal, oil or nuclear fueled, be constructed consistent with our evolving land and water ethic and with air quality standards? Do we have the reserves and productive capacity to deliver the fuel requirements for expansion of this magnitude? These are only a few of the questions we must face.

Two years ago I engaged in a similar discussion of this subject and concluded that our electrical energy requirements could only be met by a major expansion of nuclear technology because that seemed to offer the greatest promise for large capacity increases with

relatively less environmental impact. I remain of the same view, but I must say that events which have intervened have magnified the problems for a nuclear future. The hoped-for "breakthrough" has not come, while half a dozen major installations have been halted by litigation challenging their safety or their environmental impact.

Continuance of the present mix of generating sources would place a major burden on our fossil fuel supplies. In 1970, for example, 80.5% of total generation came from fossil steam plants and only 1.4% from nuclear. The new power survey counts on 28.1% nuclear generation in 1980 and nearly half of the total in 1990. If this shift in balance is not achieved and power demand increases as forecast, the competition for fossil mineral resources will be severe. It is estimated, for example, that the use of prime mover energy by electric utilities will increase from 26% of the total BTU's consumed nationally in 1970 to 41% in 1990. Quite apart from the air quality, surface mining and solid waste problems inherent in such a trend, it would have obvious competitive implications for an industry like yours which is also dependent upon the same hydrocarbons for some substantial part of your raw material base.

Fuel availability and our capacity to move into more efficient nuclear reactors may thus play a part in determining whether our electric power requirements are met in the future. In a sense also they may prove to be a form of involuntary restraint on future production and consumption. I would also place the element of cost in that category, although it may prove to be more in the voluntary restraint category if it has impact at all.

It has been said many times that electric energy is one of the few commodities that has consistently declined in price through three decades of inflationary pressures. In equivalent 1968 dollars, the cost per kwh to ultimate consumers has fallen from about 5¢ in 1940 to less than 2¢ in 1968. Even in the actual, inflated dollars by which energy is priced, the average rate per kwh has fallen, thus making electricity a consumer "best buy" by a wide margin.

And this, of course, contains a substantial part of the explanation for increased demand and consumption. Electricity has been cheap enough to permit the widest conceivable proliferation of gadgetry items and convenience aids, together with a significant amount of waste when we examine our own home and office practices.

There is evidence at hand, however, to indicate a reversal of this trend, and the work of our power survey committees confirms that development. Cost reductions since World War II resulted basically from increased efficiency in generation, primarily through use of larger, more economical units. In 1955, for example, the largest unit in operation was 300 mw and there were 31 units in the 200-300 mw size category; by 1968, the largest unit was 1,000 mw and there were 65 units in the 400 to 1,000 range. In 1955 the average size of all units in service was 35 mw; by 1970 the average size of all new units under construction was about 450 mw.

Thus many of the older and less efficient plants have been retired or expanded. Past price reductions have been largely achieved through economy of scale. In 1969, for the first time in our generation, there was a general trend toward higher costs and requests to regulatory agencies for increased rates. I know that this will be of interest to you--as industrial consumers of energy in this instance. Looking forward to future prospects for electricity costs, an increase in the average cost per kw from 1.54¢ per kwh (1968 constant dollars) in 1968 to 1.82¢ in 1990 is foreseen. It is further anticipated that the largest percentage increase (20.3%) and the largest increase per kwh (0.4¢) will occur in the Northeast region, with the smallest increase (9.3% and 0.17¢, respectively) foreseen in the West Central region. The Southeast area will remain the lowest cost area (at 1.50¢ per kwh in 1990) despite an increase of 0.23¢ and 18.9%.

These future costs have been derived by a careful analysis of capital investment requirements and costs thereof plus wage and price trends as they will affect the major functions in power supply and transmission.

Necessarily, however, such projections involve certain assumptions, especially as to future costs of basic energy fuels. To the extent that relatively stable price trends were contemplated, the resulting forecasts may prove conservative in the extreme if the wildly fluctuating condition that has characterized the coal and petroleum market over the last eighteen months continues or is repeated very often.

Will an average increase of more than 1/5 over twenty years have any deterrent effect on power demand? I don't know, but my inclination is to doubt it. One of the last things we renounce for any extended period is the kind of convenience and labor and time saving represented by electric power. Moreover, any small braking effect which price might have on present consumers could be quickly offset by new and different demands: The power requirements for pollution control and abatement, new industrial applications and mass transit expansion.

For better or worse, however, we are experiencing a definite slow-down or lag in meeting scheduled additions to total plant capacity. Yet our system is so sensitive to power supply requirements that serious dislocations can be foreseen if we do not reach accommodation on necessary development.

The use of electricity provides a rough barometer for measuring economic activity. The consumption line on an historical graph will clearly show the tremors and hiccups that punctuate the story of our times. Despite its persistent upward slope, the consumption of power sustained its only actual setback with the depression of the thirties, followed by a skyrocketing growth due to war production. The periods of economic slowdown that have occurred since can be plotted on that graph, even though they tell only of a slackened rate of increase.

On even a shorter term basis, economic pace is reflected in power statistics. The twelve month period ended last July 31, for example, left something to be desired in employment levels, productivity and other indicators. Over that same period, there was a net

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reduction of 4.3% in the amount of power generated by industrial plants for their own use. While electric utilities increased their output by 5.7% over the previous year, they fell substantially short of the 7.2% growth rate experienced in the period ending in 1969. One major utility company in the middle west noted that its industrial sales in August had been 3.2% lower than in the same month of 1970, although more customers in that category were served.

I am not, of course, suggesting that power consumption curves be used as the fever chart of our economic health. I hope, at least, that the data and the modeling techniques in use by economic forecasters are more precise than the one criterion furnished by one energy industry.

But I think the correlation between power use, especially by industry, and economic progress is significant for another reason which is closely related. If economic activity affects the use of electric energy to the degree shown, could not a marked shortage of electric power have the same or similar effect on productivity, jobs and profits? Our inability to produce and deliver the energy needed by industry could only result in economic slowdown. That is why it is so crucial that we keep abreast of demand trends and solve the problems in the way of meeting those trends.

FEDERAL POWER COMMISSION

NEWS RELEASE WASHINGTON, D.C. 20426

IMMEDIATE RELEASE
NOVEMBER 26, 1971 No. 17894
Electric Load Supply Situation

FPC ISSUES REPORT ON 1971-72 WINTER ELECTRIC LOAD SUPPLY OUTLOOK

All regions of the country, except the East Central states, have improved their reserve power margins since last winter, according to reports filed with the Federal Power Commission by the nation's electric utilities.

The reports cover 186 major utility systems and power pools, including 350 individual utilities in all states except Alaska and Hawaii. They account for about 98 percent of the nation's total electric load.

Current indications are that 56 reporting systems will have reserves of less than 20 percent. Sixteen will be less than 10 percent. Thirty-eight of the systems covered by the reports were excluded by the staff from these totals either because their reserves are carried by others or they are wholesale suppliers. Thus, their load and capacity contributions are included in other systems.

Although the specific reserve margins which may be needed by particular utility systems may differ significantly because of differences such as system electrical characteristics, types of generating facilities, capability of interconnections, and other related features, many systems now plan for reserve margins of about 20 percent of expected peak load demands. These reserves are to compensate for forced outages, required maintenance, uncertainties in load forecasting, and other related conditions. On summer peaking systems, the off-peak winter season is usually used for scheduled maintenance of generating units and will reduce reserves accordingly.

(over)

Planned generation reserves alone cannot be considered as a complete indicator, but they can represent a valuable measurement if used with caution in analyzing system capability to meet demands. The FPC staff points out that reserves must be viewed in terms of the various unpredictable conditions which may affect power supply.

Fuel problems resulting from the recent coal miners' strike affected a number of coal-burning power plants, and coal stocks at some locations are now low enough that serious shortages of electricity could occur in some areas if coal production and deliveries cannot be maintained at a sufficiently high rate to compensate for the low stockpiles available to meet the winter season needs. The estimates presented in today's report assume that required fuels will be available. Also the report does not reflect any possible reductions in capacity if one or more of five nuclear power units totaling about 3,200 megawatts and now operating were required to be curtailed pending AEC reviews for compliance with the National Environmental Policy Act as a result of the Calverts Cliffs decision. These units are: Robinson 1 (Carolina Power & Light Co.), Monticello (Northern States Power Co.), Point Beach 1 (Wisconsin Electric Power Co. and Wisconsin Michigan Power Co.), Millstone 1 (Connecticut Light & Power Co., Hartford Electric Light Co., and Western Massachusetts Electric Co.), and Dresden 3 (Commonwealth Edison Co.).

Within the areas affected by the miners' strike, reports received by FPC indicated conditions which were considered to represent critically low fuel stocks affecting some 60 power plants. These plants, with an aggregate generating capacity of 4,589 megawatts, require replenishment of inventories by production and timely delivery of coal during the winter months.

Information in the winter load supply study is based primarily on data reported to the FPC in the monthly power statements (Form 12-E) for August of 1971. The analysis compares estimated 1971-72 winter peaks with generating capacity expected to be in service at the end of October, increased or decreased by firm purchases or obligations expected to be in effect at the time of the winter peak. The study does not take into account emergency measures which might be used to improve low reserve situations. Net

(continued)

capacity that becomes available after October 31 will increase the indicated reserves.

As of the time the regional reviews were made, the potential additional capacity scheduled for service during November, December and January amounted to 9,236 megawatts, representing 3.3 percent of the estimated winter peak loads. This projected capacity included 2,933 megawatts from four nuclear units which may be delayed for periods up to several months because of pending license reviews or other matters not reflected in the regional reports. None of the four is now expected to be available for significant power production this winter. Both the Calvert Cliffs decision and the coal stock reductions due to the miners' strike have occurred since the detailed regional reviews of the prospective winter power supply situations were made and both could adversely affect capabilities to meet winter power demands.

On a nationwide basis, net dependable generating capacity is expected to be 351,317 megawatts this winter. The winter peakload is estimated at 276,283 megawatts. The capacity is 8.4 percent higher than last year and the winter peak is 7.4 percent over the 1970-71 winter.

Thus, for the nation as a whole the capacity available for reserves totals 75,034 megawatts, or 27.2 percent of the peak. The national and regional totals are summarized in the accompanying tabulation.

In the Northeast region the reserve margin is estimated at 29.5 percent of the winter peak load. These reserves indicate an improvement in the winter margin over the 25.9 percent in 1970 and 23.6 percent in 1969. The New England area has a 15.1 percent reserve margin; the New York Pool, 28.8 percent; and the Pennsylvania-New Jersey-Maryland Interconnection, estimated at 37.3 percent.

The East Central region has a reserve margin of 9,958 megawatts or 21.1 percent of the estimated winter peak load. Nine systems report reserves of less than 20 percent in this region.

The Southeast region has a reserve margin of 10,994 megawatts, or 18.6 percent of the winter peak. This is one of the two regions in the nation with estimated reserves of less than 20 percent for this winter.

In the West Central region the reserve margin is 8,808 megawatts, which is 27.8 percent of the estimated winter peak.

The South Central region has a reserve margin of 64.8 percent, the highest in the nation. Only two small systems have margins of less than 20 percent. This is a summer-peaking region.

The West region, with a reserve margin of 10,680 megawatts, or 19.2 percent, is the only other region below the 20 percent level. This region comprises a geographic area of about one third of the nation and is divided into four subareas which are for the most part extensively interconnected. Within the West Region the Northwest Power Pool could experience difficulties during this period because of less than desired levels of reserves.

Summaries of the reports filed by the utilities with the FPC are being distributed by the Commission's five regional offices -- Atlanta, Chicago, Fort Worth, New York and San Francisco. Copies are being sent to all affected utilities and to the state regulatory commissions. Copies of the regional reports are available upon request from the Office of Public Information, Federal Power Commission, 441 G Street, N.W., Washington, D.C. 20426.

A copy of the staff report, submitted by T.A. Phillips, Chief of the FPC's Bureau of Power, is attached.

-FPC-

For further information
call 386-6102 (Area Code 202)

DC-114

No. 17894

LOAD-SUPPLY SITUATION FOR 1971-1972 WINTER PEAK

Region	Net Dependable Capacity	Estimated Peak	Capacity Available for Reserves		Additional Capacity Scheduled for Service During Nov.-Dec.-Jan.	
	MW	MW	MW	% of Peak	MW	% of Peak
Northeast	69,881	53,983	15,898	29.5	2,262 1/	4.2
East Central	57,089	47,131	9,958	21.1	1,105	2.3
Southeast	69,975	58,981	10,994	18.6	2,091 2/	3.5
West Central	40,453	31,645	8,808	27.8	809 3/	2.6
South Central	47,569	28,873	18,696	64.8	1,820	6.3
West	66,350	55,670	10,680	19.2	1,149	2.1
Contiguous U. S.	351,317	276,283	75,034	27.2	9,236 4/	3.3

1/ Includes 513 MW Vermont Yankee Nuclear Unit.
2/ Includes 886 MW Oconee 1 and 725 MW Turkey Point No. 3 Nuclear Units.
3/ Capacity of Quad Cities No. 1 Nuclear Unit.
4/ Includes the four nuclear units listed above (2933 MW total), none of which are now expected to produce significant amounts of power during this winter.

MEMORANDUM TO: THE COMMISSION

FROM : CHIEF, BUREAU OF POWER

SUBJECT : 1971-1972 Winter Load-Power Supply Situation

URGENCY : Not an Agenda Item

A summary analysis of the reported loads and available supply of electric utilities in each of the National Power Survey Regions has been completed for the coming winter season, November 1971 through January 1972.

Information for the study was based primarily on data reported to the Commission on FPC Form 12-E, "Monthly Power Statement," for August 1971. The reports filed with the FPC cover 186 major utility systems and power pools in all states except Alaska and Hawaii. These major systems and pools include about 350 individual utilities and account for approximately 98 percent of the Nation's total electric load.

The analysis compares estimated 1971-1972 winter peaks with generating capacity expected to be in service at the end of October 1971, increased or decreased by firm purchases or obligations expected to be in effect at the time of the winter peak. Only those inter-system transfers that are reported to be covered by firm contracts are considered in this analysis. No endeavor has been made to account for emergency measures that might be resorted to for improving low reserve situations. The possible dependence of some systems on power imports from other utilities makes it imperative that operations be coordinated adequately to ensure the availability of supplemental power when needed.

Any capacity that becomes available after October 31 to carry load dependably in advance of the winter peak will increase the indicated reserves. As of the time the regional reviews were made, the potential additional capacity scheduled for service during November, December and January amounted to 9236 megawatts, representing 3.3 percent of the estimated winter peak loads. This projected capacity included 2933 megawatts from four nuclear units which may be delayed for periods up to several months because of pending license reviews or other matters not reflected in the regional reports. None of the four nuclear units are now expected to be available for significant power production this winter.

Although the specific reserve margins which may be needed by particular utility systems may differ significantly because of differences such as system electrical characteristics, types of generating facilities, capability of interconnections, and other related features, many systems now plan for reserve margins of about 20 percent of expected peak load demands. These reserves are to compensate for forced outages, required maintenance, uncertainties in load forecasting, and other related conditions. On summer-peaking systems, the off-peak winter season is usually used for scheduled maintenance of generating units and will reduce reserves accordingly. Planned generation reserves alone cannot be considered to be a complete

indicator, but they can represent a valuable measurement if used with caution in analyzing system capability to meet demands. Reserves must be viewed in terms of the various unpredictable conditions which may affect the power supply.

Current indications are that 56 of 148[1/] reporting systems will have reserves of less than 20 percent; 16 of these systems will have less than 10 percent reserves. It may be pointed out also that 25 of the 56 systems with less than 20 percent reserves have peak loads which are less than 500 megawatts. In some instances, systems that appear to have adequate reserves may experience difficulty if one or two large units become unavailable or if scheduled new units are delayed.

For the contiguous United States, net dependable generating capacity increased during the past year by 8.4 percent to 351,317 megawatts, while the winter peak load increased 7.4 percent to 276,283 megawatts. New capacity coming into service has increased the reserve capacity by 1.2 percent of the winter peak load during the past year. All regions except the East Central Region have improved their reserve margin positions since the 1970-1971 winter peak period. Some systems have reliability problems from low generating reserves which are discussed in the regional comments.

Northeast Region

In the Northeast Region, the reserve margin is 29.5 percent of the estimated winter peak load. These reserves indicate an improvement in the winter margin over the 25.9 percent in 1970 and 23.6 percent in 1969.

The initiation of central dispatching, a provision of the interim NEPEX Agreement, provides improved reliability for the fifteen utility systems in the New England area of the Northeast Region. The NEPEX reserve margin is expected to total 1,889 megawatts or 15.1 percent of the winter peak. Firm power purchases of 500 megawatts from adjacent pools have been made possible by the recent completion of 345 kilovolts interconnection facilities with both the New York Power Pool and New Brunswick.

The NEPEX system reserves at the winter peak are less than had been expected earlier because of delays of the 650-megawatt Pilgrim Unit No. 1 and the 514-megawatt Vermont Yankee Unit No. 1 originally

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1/ Certain systems for which reserves are carried by others and certain wholesale suppliers have been excluded from these figures although their load and capacity contributions have been included in the regional totals.

scheduled for commercial operation in December 1971 and July 1971 respectively. These two nuclear units would have increased capacity reserves to 2,653 megawatts or 21.2 percent of peak load without firm power purchases from outside the NEPEX system.

The New York Power Pool has a reserve margin of 5,240 megawatts or 28.8 percent of the winter peak. The summer-peaking Consolidated Edison System appears to have a more than adequate reserve for the 1971-72 winter peak despite the limited interconnection facilities with adjacent systems and the Company's inability to bring new base load generating capacity into service. The 873-megawatt Indian Point Nuclear Unit No. 2 is not included in the Company's winter capacity reserves of 2,921 megawatts, which is 46.9 percent of the projected peak load.

The Pennsylvania-New Jersey-Maryland Interconnection has a reserve margin of 8,769 megawatts or 37.3 percent of the winter peak. In addition, a total of 1,584 megawatts of new capacity is scheduled to come into commercial service during the winter period. No new nuclear units are included in this additional capacity.

East Central Region

The East Central Region has a reserve margin of 9,958 megawatts or 21.1 percent of the estimated winter peak load. Nine systems report reserves of less than 20 percent. One system with load less than 500 megawatts, Big Rivers R.E.C.C., reported negative reserves of 14.3 percent. Additional capacity is available in an emergency from the Southeastern Power Administration, and the cooperative has scheduled 170 megawatts of new capacity for commercial service in December 1971. If available, the new capacity will increase reserves to 100 megawatts or 20.4 percent of peak load.

The Consumers Power Company's 700-megawatt Palisades Nuclear Station is completed but unlicensed for commercial operation. The addition of this unit would improve reserves on the Company's system from 445 megawatts or 12.1 percent of peak load, to 1,145 megawatts or 29.7 percent of peak load. A corresponding improvement in regional reserves would be realized and would increase the total to 10,658 megawatts or 22.6 percent of peak load.

Southeast Region

The Southeast Region has a reserve margin of 10,994 megawatts or 18.6 percent of the winter peak. Six systems within the region indicate reserves of less than 20 percent. Two of these systems, with reserves less than 10 percent and located in the Virginia-Carolinas Group, have capacity available from other systems within the group.

One small system with a peak load less than 500 megawatts reports a reserve margin of 5.2 percent. This system, located in the Southeastern Power Administration area, has standby capacity under contract with SEPA adequate to meet its needs. Two major systems in the Florida peninsula which serve two-thirds of the area load requirements, the Florida Power Corporation and Florida Power and Light Company, have reserve margins of 1.3 and -0.2 percent respectively, based on extremely cold weather conditions. Although interruption of industrial loads and emergency purchases of supplemental power from a neighboring utility offer means of some relief if necessary, the low reserves indicate a questionable outlook for the winter peak period in the Florida peninsula. Loss of any substantial amount of generating capacity during a cold wave will create a system emergency.

A total of 3,551 megawatts of new nuclear generating capacity, originally scheduled for commercial operation between August and December 1971 in the Southeast Region, has been delayed and will not be available. The four delayed nuclear units in the Southeast Region and the applicant's system capacity reserves without them are tabulated below:

Unit	Rating	Company	Reserves
Surry No. 1	800 MW	Va. E&P Co.	32.9%
Browns Ferry No. 1	1,152 MW	TVA	17.6%
Oconee No. 1	874 MW	Duke Power Co.	5.3%
Turkey Point No. 3	725 MW	Fla. P&L Co.	-0.2%

West Central Region

The West Central Region has a reserve margin of 8,808 megawatts or 27.8 percent of the estimated winter peak. Eighteen systems, thirteen with loads less than 500 megawatts, have reserves less than 20 percent. Three systems have reserves less than 10 percent, which includes the Edison Sault Electric Company with negative reserves of 1.9 percent.

The Commonwealth Edison Company's 809-megawatt Quad Cities Nuclear Unit No. 1 and Wisconsin Michigan Power Company's 497-megawatt Point Beach Nuclear Unit No. 2 are completed but unlicensed for commercial operation. The addition of these units would improve the reserve margins of their respective systems, and would also increase regional reserves to 10,114 megawatts or 32.0 percent of the winter peak load.

South Central Region

In the summer peaking South Central Region, the reserve margin of 64.8 percent is the highest in the Nation. Only two small systems, both with loads less than 500 megawatts, have reserve margins less

than 20 percent. Although about 50 percent of the 18,696 megawatts of reserve capacity is located on Texas systems and is isolated from the Southwest Power Pool, adequate reserves are available to both pools to meet the anticipated winter peak load.

West Region

The West Region has a reserve margin of 10,680 megawatts or 19.2 percent of the non-coincident winter peak. Comprising a geographic area of roughly one-third of the Nation, the Region is divided into four sub-areas and is for the most part extensively interconnected. Eighteen systems have indicated reserve margins of less than 20 percent seven of which have reserve margins of less than 10 percent. Eight of those with reserves less than 20 percent, are small systems with loads less than 500 megawatts. Eight systems with reserves less than 20 percent are located in the winter-peaking Northwest Power Pool. Power Supply Area 41 has a reserve margin of 5.3 percent. Power Supply Areas 42, 43, 44 and 45 combined have a negative reserve margin of 1.1 percent, with a combined winter peak load of 21,727 megawatts forecast.

The summer peaking Pacific Southwest Area, comprised of the States of California, Nevada, and Arizona, has reserves totaling 8,715 megawatts or 30.2 percent of the estimated winter peak. Bulk power transfers to the Northwest Power Pool are practical by the 500-kilovolt Pacific Interite and lower voltage transmission lines. The 750-kilovolt direct current line, damaged in the February 9, 1971 earthquake, will not be available during this winter peak period.

The Northwest Power Pool is considered a critical area during the 1971-72 Winter Peak Period. In terms of the Bonneville Power Administration's power supply responsibilities, it has negative reserves of 1,347 megawatts. The shortage of local generating capacity reserves in this winter-peaking region could precipitate a serious electric power emergency if severe winter conditions should be experienced or major interconnections to the Pacific Southwest should be disrupted at a time of need. The peak load in the Northwest Power Pool includes 1,609 megawatts of interruptible industrial load. Service of these industrial customers can be curtailed if system conditions become critical

Subsequent to the October 31st evaluations and detailed tabulations for this report, the Idaho Power Company (West Region PSA 41) on November 3, 1971 suffered the loss of its 90 megawatt Brownlee No. 1 hydroelectric unit because of coil failure. The Company estimates this unit may be out of service for from 45 to 60 days, which would include a part of the period during which a winter peak could possibly occur. While the contingencies included in reserve margin planning

are designed to allow for such forced outages, the loss of this unit is of significance to the Company and the Region with the currently estimated reserve margins for the 1971-72 winter.

General Observations

On a national basis, the peak load and capacity requirements anticipated for the 1971 summer peak load period were not realized primarily due to reduced industrial productivity levels and the absence of prolonged spells of hot weather in the more critical areas. Repetition of protracted winter weather similar to that experienced in some areas during the 1970-71 winter peak period, however, could result in higher peak load and energy demands during the 1971-72 winter peak period than the present projections indicate. Any such conditions could produce prolonged periods of high system demand that might result in increased forced outages and jeopardy to system power supplies in the affected areas.

Fuel problems resulting from the recent coal miners' strike affected a number of coal-burning power plants, and coal stocks at some locations are now low enough that serious shortages of electricity could occur in some areas if coal production and deliveries cannot be maintained at a sufficiently high rate to compensate for the low stockpiles available to meet the winter season needs. The estimates presented in the foregoing analysis assume that required fuels will be available. Also not reflected are any possible reductions in capacity if one or more of five nuclear power units (Robinson 2, Monticello, Point Beach 1, Millstone 1, and Dresden 3) with an aggregate capacity of about 3200 megawatts and now operating were required to be curtailed pending AEC reviews for compliance with the National Environmental Policy Act as a result of the Calvert Cliffs court decision.

Within the areas affected by the miners' strike, reports received by FPC indicated conditions which were considered to represent critically low fuel stocks affecting some 60 power plants. These plants, with an aggregate generating capacity of 4589 megawatts, require replenishment of inventories by timely production and deliveries of coal during the winter months if power supply emergencies are to be avoided.

T. A. Phillips

T. A. Phillips

Senator GRAVEL. Many of the statements made by the AEC and the proponents of emergency nuclear licensing talk in terms of blackout, and in terms of a loss of air conditioning, in terms of loss of home heating.

If there is a power emergency, is there any assessment, any game plan worked out as to what would be the priority of the cutbacks and who would be the sufferer? Is it automatically the homeowner; is it automatically blackouts? Wouldn't there be any priority, first shut off neon lights or something like that? Doesn't it strike you as flamboyant or "Madison Avenuish" to talk of blackouts? One, is the situation that critical; two, is that the only course of action?

Mr. RAMEY. I should think, Mr. Chairman, you might want to get testimony from utility owners—I believe Mr. Luce may have some testimony on this—and from State regulatory agencies such as in New York State who do have requirements and guidance on load shedding or what one might call sort of rotating load shedding. We had this rotating load shedding occur in this area a time or two last year. It was done in terms of certain areas, usually suburban areas, and it did affect all of the power in homes or offices.

Senator GRAVEL. They were blackouts?

Mr. RAMEY. They were sort of rolling blackouts. They were planned and lasted for a certain amount of time in each of a number of areas. They then have brought the power back to those particular areas.

Another technique which has been used where there is a marginal power supply is to lower voltages. But these things do affect some of your important types of use, there is just no getting around it. The fringe uses such as electric toothbrushes and neon lights, and this kind of thing, are a relatively small proportion of your total power usage.

Mr. DOUB. This is an area that concerned me when I was chairman of the Maryland Public Service Commission. The utilities in the Public Service Commission are very much involved in the matter of load shedding and other problems associated with lack of capacity. It depends, of course, upon the region. This is not an area that AEC gets into directly. Our information comes from the Public Service Commission, the utilities and the Federal Power Commission. But——

Senator GRAVEL. They say there will be blackouts, and Commissioner Ramey just used the word "blackout." It has a severe impact upon people.

Mr. DOUB. I don't know where we have used it, sir.

Senator GRAVEL. Mr. Schlesinger also used it.

Mr. DOUB. I think he used it to illustrate a point, perhaps.

Senator GRAVEL. It is a pretty strong point. If we don't have enough power we don't have any light.

Mr. DOUB. I don't believe he used it in that context.

Senator GRAVEL. I would like to see specific studies with respect to power that warrant the steps the nuclear industry has taken. I have no further questions at this point in time. Senator Bellmon, I will go vote now and you just continue the hearing, how is that. I have no further questions, and I will look forward to seeing you when we meet again in the winter.

Mr. DOUB. Your comment about the Chairman's use of the word blackout concerns me, I would like to look into that. I am sure he didn't mean to imply what you said.

Senator GRAVEL. Well, if somebody says nuclear power is great and if we don't have it, we are going to have blackouts, I would interpret it just like that.

Mr. DOUB. Perhaps he used it in the context that industry has applied it.

Senator GRAVEL. Then he is doing the same thing as the rest of us, taking the words from somebody else. I would hope that you could be more circumspect, and we will analyze the data provided from Calvert Cliffs and the FPC. I will provide the Chairman's blackout statement for the record. Thank you, gentlemen.

U.S. SENATE,
Washington, D.C.

REFERENCE TO "BLACKOUTS" BY AEC CHAIRMAN SCHLESINGER

Excerpt from address October 20, 1971 by James R. Schlesinger to the Banquet of the Atomic Industrial Forum/American Nuclear Society Annual Meeting.

". . . Environmentalists have raised many legitimate questions (about nuclear power) . . . I believe we shall receive from the responsible environmentalists considerable assistance in resolving our present difficulties . . . Good answers will still have to be provided regarding safety, transportation, and waste management. Moreover, the responsible environmentalists are keenly aware that the present situation can boomerang. If there are power interruptions, brownouts, and blackouts, the environmental movement will pay a severe price along with the rest of us, and that is the situation the environmentalists wish to avoid."

Senator BELLMON (presiding). I have no further questions of the panel, thank you very much for your testimony here today.

Mr. DOUB. Thank you.

(The following letters and questions were submitted to Chairman Doub subsequent to the hearing; their answers appear in app. 2.)

United States Senate
COMMITTEE ON
INTERIOR AND INSULAR AFFAIRS
WASHINGTON, D.C. 20510

November 30, 1971

Commissioner William O. Doub
Atomic Energy Commission
Washington, D. C. 20545

Attention: Mr. John Hoyle

Dear Commissioner Doub:

May I take this opportunity to express my appreciation for your excellent statement on November 3 on the implications of the Calvert Cliffs court decision. Your statement was very informative.

In reviewing the transcript of the hearings, additional questions have arisen from the members and the staff which are enclosed for your response. While some of the questions were touched upon in your prepared statement, you may wish to expand upon your testimony.

Receipt of your response by December 15, 1971, would assist the Committee in our evaluation of the hearings.

Thank you for your assistance and cooperation in this regard.

Sincerely,

Henry M. Jackson
Chairman

ATOMIC ENERGY COMMISSION

QUESTIONS FOR THE RECORD

SENATE INTERIOR AND INSULAR AFFAIRS COMMITTEE

November 3, 1971

(1) Commissioner Doub, in his speech of October 18, 1971, before the Atomic Industrial Forum, stated:

> "The Calvert Cliffs decision regardless of individual personal opinions as to its merits, leaves no doubt as to its 'holding' and, I believe that the AEC is being responsive to its clear definition of the agency's responsibilities under NEPA."

(a) Would you supply a written analysis of the court decision on Calvert Cliffs for the record?

(b) Would you supply for the record the relationship of the provisions in Appendix D to Part 50 to its analysis of the "holding" of Calvert Cliffs decision. As part of this analysis would you indicate specifically the parts of the decision which require: (1) a cost-benefit analysis prior to full power operation for plants which have been constructed and are ready to operate and for plants which have been substantially constructed; (2) the consideration of low probability accidents; (3) the treatment of a plant which has yet to be constructed substantially the same as a plant which has been constructed and is ready to operate; and (4) the provisions for or limitation on operating licenses to 20% of full power except in emergency situations.

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(2) Chairman Schlesinger, in his speech of October 20, said:

> "It is not the responsibility of the Atomic Energy Commission to solve industry's problems which may crop up in the course of commercial exploitation. That is industry's responsibility, to be settled among industry, the Congress, and the public. The AEC's role is a more limited one, primarily to perform as a referee serving the public interest."

(a) Does the foregoing statement mean that the AEC will not initiate any legislative changes which it believes necessary to better accomplish the dual objectives of the licensing provisions under the Atomic Energy Act of 1954, as amended, and the environmental protection goals expressed in the National Environmental Policy Act and other applicable laws? In other words, does the AEC believe that as an independent regulatory agency it has limited responsibility in this regard?

(b) Would you supply for the record an opinion on the consistency of your position on implementation of the Calvert Cliffs decision with the National Environmental Policy Act, in particular Sections 101(b) (1); 101 (b) (3); 102 (D); and 102 (E).

(3) Chairman Schlesinger, in a speech of October 20 before the Atomic Industrial Forum, said:

> "A suitable cost-benefit study can normally be developed on the order of two months, particularly if there is a suitable format. There are scores of

qualified individuals who can do the requisite work. The cost will be miniscule in relation to the total cost of a plant--or in relation to the cost delays. You will need guidelines for such studies and you shall have them."

(a) Has the AEC identified a specific format for the cost-benefit analyses which are to be included in the environmental impact statements?

(b) What guidelines have been provided in addition to those published in Appendix D?

(c) In formulating these guidelines, to what extent will the Commission look to state regulations or the regulations of other Federal agencies?

(d) When additional guidance to applicants is anticipated?

(4) Would you supply for the record:

(a) A list of the plants which are affected in the near term by the revised regulations including your best estimate of the delays which will be involved;

(b) An assessment of the long-term effect of the revised regulations in light of the overall workload, considering such factors as the increasing number of applications to be reviewed, the pre-licensing antitrust review responsibilities placed on the Commission last year by P. L. 91-560, the adequacy of the existing Atomic Safety and Licensing Board Panel to deal with these new responsibilities, and the impact on the Commissioners' workload.

(c) If the order to show cause requirements of Section E of Appendix D to Part 50 result in contested hearings, could the existing licensing organization stand the strain or would it collapse?

(d) Are you aware of any utilities which plan to shift from nuclear to fossil fueled plants as a result of the implications of Appendix D to Part 50?

(5) Generally, is the supplemental information which the AEC is requesting under its revised (Appendix D to Part 50) regulations expected to reveal anything about the environmental impact from the particular nuclear plant which is not already known?

(6) In the "statement of considerations to Appendix D to Part 50" reference is made to the regulations as an "interim statement." It is further stated that the Commission is "examining steps that can be taken to reconcile a proper regard for the environment with the necessity for meeting the Nation's growing requirements for electric power on a timely basis." Would you elaborate on these two statements?

(7) Anthony Z. Roisman, who wrote the brief for the petitioners in Calvert Cliffs, asserts that the final impact statement on a nuclear power plant will have to relate the plant to the total incremental environmental impact on the whole nuclear fuel cycle--that it, its relation to uranium mining operations, to fuel reprocessing, to ultimate waste disposal, and to transportation of wastes and fuel.

To what extent does the AEC require that the final impact statements include consideration of the off-site effects of a nuclear power plant over which the applicant has no control?

(8) Assume that a plant has passed a full environmental review at the construction permit stage and that at the operating license stage new environmental knowledge is obtained which renders the plant environmentally undesirable: If the cost of corrective action is demonstrated to be prohibitive, will the Commission consider the applicant's substantial investment in evaluating whether an operating license should be issued, or will the standard applicable to environmental issues be the same as with radiological safety. where (under the reasoning of the Supreme Court's Power Reactor decision) the applicant's investment is not a relevant factor?

(9) What is the current and anticipated review function Advisory Committee on Reactor Safeguards regarding issues other than nuclear safety?

(10) Would you supply for the record a description of the charter of the Atomic Safety and Licensing Boards?

(11) What criteria and guidance has the Atomic Energy Commission provided the Atomic Safety and Licensing Boards for their use in the evaluation of environmental impact statements regarding:

(a) assessment of the environmental effects of a particular plant;

(b) determination of the social costs of a particular plant;

(c) determination of the best available control technology; and

(d) the performance of cost-benefit analyses.

(12) During the period of implementation of the Calvert Cliffs decision, the Atomic Safety and Licensing Boards are allowed to issue interim operating licenses up to 20 percent of full power. In uncontested cases no public hearing is required; in contested cases such as Indian Point No. 2., a public hearing is required.

What guidance has been provided the A.S.L.B.'s for issuance of such interim licenses?

(13) The regulations in Appendix D to Part 50 state that operation beyond 20 percent of full power will not be authorized except in emergency situations or other situations where the public interest so requires.

(a) What constitutes an emergency situation?

(b) What do you envision as the other situations where the public interest so requires?

(c) If an emergency situation justifies exceeding 20 percent of full power, what is to prevent an Atomic Safety Licensing Board from granting such an interim operating license on the same grounds in both contested and non-contested grounds?

(14) Does the Commission anticipate review of Licensing Board decisions to eliminate inconsistencies?

(15) How many hearings by Atomic Safety and Licensing Boards are anticipated to examine operating licenses and operating permits applications issued since January 1, 1970? How does this required workload compare with the availability of experienced Boards?

(16) Reportedly, the Atomic Safety and Licensing Boards are provided final environmental impact statements as well as agency comments. In evaluating the cost-benefit analysis for a given nuclear power plant does the Board have the flexibility to consider the implications of the rationing or limiting the use of electricity as an alternative to building a particular nuclear powerplant?

(17) The new regulations in Appendix D, Section E, part (c) state that "the power needs" will be "of utmost importance" in the A.E.C.'s decision whether or not to suspend permits and licenses pending completion of the Court-ordered environmental and safety review. Your testimony indicated that the A.E.C. will rely on reports from the Federal Power Commission to analyze the "need". The F.P.C. reportedly obtains its estimates of "need" from the license applicants.

(a) What other sources does the Atomic Energy Commission employ to assess the "power needs" or energy demand besides the license applicants or the Federal Power Commission and to what extent is this information made available to the public prior to ruling under section E on an application?

(b) To what extent and on what basis is it possible for the public to challenge the applicants' claims for "power needs" during the licensing procedures?

(18) Would you supply for the record a summary of the major factors which will be considered by the Commission in determining whether an environmental hearing would be held prior to the operating license stage or at the operating license stage?

(19) After the AEC has issued a construction license or operating permit for a nuclear power plant, what are the applicable AEC procedures under which an interested member of the public can petition the AEC to take regulatory action to minimize environmental impact which the protestant alleges to exist?

(20) Would you submit for the record the regulatory surveillance and authority which the AEC exercises over a nuclear power plant after it is licensed and the regulatory actions which the AEC may take and have taken either on radiological or other environmental impact grounds?

(21) The new regulations reflect a decision by the Commission to include consideration of low probability accidents in environmental statements.

(a) What input from other agencies does the Commission expect to receive on the discussion of these accidents?

(b) In view of the fact that the possibility of these accidents has previously been discussed in detail in the applicant's safety analysis and the AEC staff's safety evaluation, what purpose is to be served by also requiring the consideration of such accidents in the environmental statement?

(22) In the past, the Atomic Energy Commission has distinguished between inplant nuclear safety and environmental safety during routine operation.

In light of the involved and time-consuming character of the power plant licensing procedure post-Calvert Cliffs and the fact that it will in large measure involve non-nuclear issues, and the added fact that the A.E.C. has many other responsibilities involving the regulation of atomic energy, has the Commission given any consideration to the desirability for a separate agency or another agency to handle the environmental safety license with the A.E.C. handling the nuclear safety license?

(23) Reportedly, the manufacturers of nuclear power plants of either the "boiling water" or "pressurized water" types have standardized designs.

(a) For a particular nuclear reactor type, is it feasible to also standardize the environmental impact statement requirements for consideration of the radioactive waste discharges or the non-radioactive waste discharges, such as waste heat?

(b) Could such an approach contain sufficient flexibility to effectively consider the additional regional or local factors such as energy supply and siting?

(24) (a) What is the status of the Commission's "as low as practicable" regulation on radiological effluents?

(b) Would you describe the regulatory philosophy associated with the "as low as practicable" requirement?

(c) Is this requirement consistent with the policies expressed in the National Environmental Policy Act, the Calvert Cliffs decision, and the AEC's regulation in Appendix D to Part 50?

(d) Was it initiated prior to the Calvert Cliffs decision or as a result of that decision?

(25) Commissioner Doub, in his October 18 speech, emphasized the need for the AEC to move ahead under its existing authority to achieve procedural reforms which are particularly applicable to contented hearings. Would you supply for the record:

(a) the specific reforms which are contemplated;

(b) the target dates for the completion of each project;

(c) the extent to which the Administrative Conference of the United States will assist in the reforms; and

(d) has the AEC evaluated whether an issue-by-issue approach to the hearing, under which some issues might be considered at the hearing stage while other issues were still in discovery, is practical?

(26) Earlier this session the AEC sought early site legislation (H.R. 9268 and S. 2152), an objective of which was to provide for early resolution of environmental issues associated with nuclear power plant siting. The Joint Committee on Atomic Energy's

Subcommittee on Legislation recently announced that it would not report the proposed legislation to the full committee this year.

(a) In view of the wide rule making authority bestowed on the Commission by the Atomic Energy Act of 1954, as amended, would you comment and supply for the record an analysis of the extent to which the foregoing objective of the early siting legislation could be accomplished under existing rule making authority? (Note: Under existing rules (10 CFR 50.10 and 50.12) the AEC permits certain on-site activities prior to the issuance of construction permits and usually upon request of an applicant grants an exemption under which on-site construction work, up to the puring of concrete to ground level, can proceed prior to the issuance of a construction permit. The Commission uses its rule making authority to establish these rules.)

(b) Does the Commission plan to use the same rule making authority to establish an early site authorization procedure which would accomplish the objective if the AEC's proposed legislation at least on an interim basis until overall power plant siting legislation is enacted, and, if so, when?

(c) Does the Atomic Energy Commission not now permit certain on-site activities prior to the issuance of construction permit? For example, the proposed Bodega Head facility of Pacific Gas and Electric in California?

(d) Is it reasonable to permit such site development before the facility design has been approved?

(27) What does the Commission see as its role in the water quality area and how does this role interface with -

(a) The responsibility of EPA and the Corps of Engineers at the Federal level?

(b) State agencies with responsibilities in this area?

(c) Do you feel your role under the applicable requirements of NEPA and the Water Quality Improvement Act of 1970 and their legislative history are consistent or conflicting?

(d) Is this role consistent with steps already taken to vest Federal environmental regulatory responsibility in the Environmental Protection Agency?

(e) Is the Commission now staffed to carry out this role? If not, what are its plans to acquire the necessary staff?

(f) What will be the impact of this added responsibility on the performance of the AEC's responsibility for radiologic safety?

(28) Would you supply for the record your views on legislative changes which would be required in existing legislation such as the National Environmental Policy Act, the Water Quality Improvement Act of 1979 and the Atomic Energy Act of 1954, to better accomplish the dual national goals--expressed in the President's energy message of June 4, 1971--of an abundant supply of energy with minimum impact on the environment?

(29) Would you supply for the record the action taken or planned by States such as Maryland and Connecticut regarding power plant siting legislation? Would you include discussion of the specific plans of the AEC to help assure that site approvals at the State or regional level take into consideration the particular siting factors which are uniquely characteristic of a nuclear power plant?

(30) Reportedly, construction will be completed on approximately 60,000 megawatts of nuclear electric generating capacity by 1975. Their combined operation will produce an estimated 36,000 pounds of plutonium each year. If released into the environment, this amount of plutonium would be equivalent to the maximum permissible lifetime body-burden for about 25 trillion people.

(a) To what extent do the ACE Commissioners believe that successful containment of 99.999% of the plutonium and its fission products can be achieved or is required? What percentage do you feel is acceptable and on what basis is that figured?

(b) On the basis of what experience do you believe a physical substance can be controlled to a level of 99.9 percent, 99.99 percent, or 99.999 percent?

(31) On June 4, 1971, the President issued a message on Clean Energy transmitting a program to insure an adequate supply of clean energy in the future. The message states that the President has requested the early preparation and review by all

appropriate agencies of a draft environmental impact statement for the breeder demonstration plant in accordance with Section 102 of the National Environmental Policy Act. What is the status of this statement?

(32) The Atomic Energy Commission staff currently analyzes NEPA environmental impact statements. Reportedly, it takes two-thirds to one man-year of AEC staff work to analyze the draft and final statements.

(a) What was the AEC's budget and man-years for this effort prior to the Calvert Cliffs decision?

(b) What is the estimated AEC costs and man-years 1972 and 1973 to handle pending applications for construction and operating licenses?

(c) How much of the current effort represents National Laboratory personnel reassigned from the other work and assigned to environmental impact analysis?

(d) How many of these individuals were reassigned from nuclear safety analysis?

(e) To what extent are contractors being employed for this review?

(f) Does the AEC propose to request increased appropriations for Fiscal Year 1973 to reflect these anticipated increased work-loads?

(g) If not, does this not increase the possibility of delays affecting power reliability?

JANUARY 14, 1972.

Hon. JAMES R. SCHLESINGER,
Chairman, Atomic Energy Commission,
Washington, D.C.

DEAR MR. CHAIRMAN: I was pleased to receive Commissioner William O. Doub's letter of January 7, 1972, responding on your behalf, to additional questions in connection with your November 3 testimony before the Senate Committee on Interior and Insular Affairs.

The answers to some of the questions reflect continuing developments affecting the Atomic Energy Commission's nuclear power plant licensing program and the implementation of the National Environmental Policy Act. Of particular interest to the Committee are the implications of the December 1971 *Quad Cities* decision of the United States District Court for the District of Columbia in the civil actions *The Izaak Walton League of America, et al. v. James Schlesinger, et al. and others*, and, *People of the State of Illinois, ex. rel., William J. Scott v. U.S. Atomic Energy Commission et al., and others.*

It is recognized that this decision is currently under appeal; however, assuming the decision is not reversed would you furnish the Committee with an evaluation of the implications of the *Quad Cities* decision for—

(1) the Atomic Energy Commission licensing program in general;

(2) those nuclear electric generating plants receiving construction permits or operating licenses prior to January 1, 1970; and

(3) those nuclear electric generating plants receiving construction permits or operating licenses since January 1, 1970.

Of particular interest to the Committee is the impact of the *Quad Cities* decision on those plants and regions identified by the Federal Power Commission as critical to the meeting of projected 1971 and 1972 electricity demands. For this reason would you please coordinate your response with the Federal Power Commission.

Your early response to this request which has been discussed with your General Counsel, Martin R. Hoffman, would be appreciated.

Sincerely yours,

HENRY M. JACKSON, *Chairman.*

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., January 7, 1972.

Hon. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate.

DEAR SENATOR JACKSON: I am pleased to provide the enclosed responses to the additional questions forwarded with your letter of November 30, 1971, in connection with my November 3 testimony before the Senate Committee on Interior and Insular Affairs.

As you may appreciate, the answers to some of the questions reflect continuing developments affecting the Commission's implementation of NEPA, and we will seek to keep your Committee currently informed of any significant changes in these areas.

Sincerely,

WILLIAM O. DOUB, *Commissioner.*

Senator BELLMON. We will call Mr. Charles F. Luce, chairman of the board of Consolidated Edison Co. of New York.

STATEMENT OF CHARLES F. LUCE, CHAIRMAN OF THE BOARD, CONSOLIDATED EDISON CO. OF NEW YORK, ACCOMPANIED BY JOHN CONWAY, EXECUTIVE ASSISTANT

Mr. LUCE. Thank you, Mr. Chairman.

With me today is John T. Conway, my executive assistant, who prior to joining me in New York 2 years ago was staff director of the Joint Committee on Atomic Energy.

I have a statement which I would like to offer in full for the record and if I may I will read it.

Senator BELLMON. Fine.

Mr. LUCE. Mr. Chairman and members of the committee. My name is Charles F. Luce, and I am chairman of the board and chief executive officer of Consolidated Edison Co. of New York, Inc. I appreciate this opportunity to appear before the committee in connection with its consideration of the impact of the *Calvert Cliffs* decision upon the availability and reliability of electric power generating capacity. In that case, the U.S. Court of Appeals for the District of Columbia undertook to interpret the National Environmental Policy Act of 1969 as it applied to AEC regulations for the licensing of nuclear powerplants and in particular to a plant under construction at Calvert Cliffs, Md.

Con Edison provides electric energy for New York City and most of Westchester County. We serve the nerve center of the financial and communications industries of America, the corporate headquarters of more than 200 national and international business enterprises, and the home of the United Nations. More importantly, we serve the homes of almost 9 million persons whose safety, security, and well being depend upon electric energy.

Our company's involvement with the *Calvert Cliffs* decision comes about because we are relying heavily, though not entirely, upon nuclear power to meet the needs of our customers. Near Peekskill, N.Y., at Indian Point, on the Hudson River, we have three nuclear generating stations. Indian Point No. 1 has been in operation since 1962. Indian Point No. 2 is essentially complete, and nuclear fuel is now being loaded into it. Indian Point No. 3, a virtual twin of No. 2, is about 60 percent completed and is scheduled for commercial service in early 1974. In addition, we applied in 1969 for a construction license to build a fourth and fifth nuclear plant at Verplanck, a site about a mile south of Indian Point. In total, the capacity of these plants will be about 4 million kilowatts—4,000 megawatts—equal to one-half of our 1971 peak load.

I do not appear before this committee today to criticize the basic philosophy underlying the decision of the court in *Calvert Cliffs*. I subscribe to the view that under NEPA nuclear licensing should include a full consideration on environmental issues, although I would have read the legislative history differently than did the court as to AEC's authority to defer to water quality standards devised and administered by State agencies and approved by the Federal Government under the Federal Water Pollution Control Act.

It is my understanding that the Senate yesterday has undertaken to correct that particular point in the *Calvert Cliffs* decision.

In my judgment, the problems caused by *Calvert Cliffs* arise not so much from the decision itself as from the way it has been applied by AEC in the recently promulgated amendments to its licensing regulations. The case of the nearly completed plant was not before the court in *Calvert Cliffs*. As I read the court's opinion, it did not foreclose AEC from prescribing a reasonable means for implementing the National Environmental Policy Act with regard to plants which, like Indian Point No. 2, are virtually completed and close to the end of the hearings on radiological safety issues. Nor did the court direct AEC to refuse to allow a plant to operate while the investigation required by NEPA is being undertaken if the plant is substantially ready for operation and significant aspects of its environmental impact are already an accomplished fact. Indeed, the court noted with

approval a lower court opinion to the effect that NEPA does not require a moratorium on all projects which may have an environmental impact while the investigation required by NEPA are going forward. Nevertheless, AEC did not utilize the full measure of discretion available to it under the court's opinion when it recently amended its licensing regulations. On the contrary, it subjected to substantially the same kind of preoperational environmental review all nuclear plants which did not have an operating license on January 1, 1970, the date NEPA became effective.

It is true that the new regulations do provide that nearly completed plants can receive a limited power license after a preliminary environmental hearing. This was referred to in some length in the testimony and the answers to questions from the staff of the Atomic Energy Commission here today. But even this procedure is rife with opportunities for delay from applicants whose engineers and scientists are overloaded with work, litigious intervenors, overworked AEC staff and counsel, and overscheduled hearing examiners and AEC commissioners. Such delays could well mean the difference between adequate power and blackouts. And I use that term advisedly, for the people of a city, State, or region. Most assuredly, they will mean higher cost electricity. For example, every day's delay in the startup of Indian Point No. 2 ultimately will cost electric consumers about $130,000. One year's delay would cost them about $48 million.

A wiser course for AEC to have followed in the wake of *Calvert Cliffs* would have been, I believe, to authorize issuance of provisional operating licenses to nearly completed plants at the conclusion of the hearings on radiological safety and health. And assuming the hearing board found that the radiological health and safety would be protected. Such licenses, by their terms, could be subject to revocation or modification if subsequent investigation of the environmental issues are required by the National Environmental Policy Act proved this to be necessary.

Any changes required in nearly completed nuclear plants for environmental reasons ordinarily can be made almost as easily after the plant has operated as before. Indeed, such changes often can be better designed after a period of operating experience. And such a course would have greatly reduced the avalanche of work that AEC's new regulations inevitably will produce at a time when that agency is not yet staffed to deal with the complexities of environmental issues.

I realize the Commission testified today that they are doing the very best they can to get the staff and consultants to administer these new regulations and I have no question they are trying as hard as human beings can try. I have great concern, nevertheless, that the avalanche of work through new regulations will produce is going to be very difficult for them on the time schedule that the public interest requires.

The complexities of the issues raised by the National Environmental Policy Act, as conceived by the AEC staff making the environmental investigation for the licensing of Indian No. 1—which has been operating under a provisional license since 1962—and Indian Point No. 2—which is now loading fuel—are well illustrated by the extraordinarily broad scope of their interrogatories to our company, of which the following are several examples:

In regard to the site and environs since the economic structure of the community is affected by the power plant, would you please indicate updated infor-

mation on the type of industry in the area, the current population and population growth trends, the educational resources, the housing accommodations, and the recreational facilities. If possible, include the condition of sewage treatment facilities, highway and transportation facilities. Also, please include the contrbutions of the power plant to the tax base direct employment, school subsidization or other means which the power plant owner contributes to the community welfare.

During the construction please indicate what the average and peak manpower level was, and how the construction in the region affected those realizing no direct benefit from the construction through business relationship or property returns.

Provide a list of terrestrial plans and animals, including mammals, birds, arthropods, et cetera, in the area including relative abundance and explain how they will be affected by operation of Indian Point 1 and 2.

I just give these as examples of the extraordinary breadth of the examinations and scope of the examinations of the environmental and economic issues that are going to be involved. I give these examples to illustrate or document our concern that with all their best efforts and all the best intentions, it is very difficult for the Commission really to handle this avalanche of paperwork. We have looked into this question as to how many plants and animals, arthropods which include insects and other lower forms of life there are in the vicinity of Indian Point No. 1 and 2. Of course, we don't have such a list, we have asked the various municipals and other institutions around New York about how many there might be.

First of all they will tell you they don't really know but our best guess based on these inquiries would be upward to 30,000. If we actually tried to make a list of 30,000 plants, mammals, birds, arthropods in the area, including the relative abundance, this isn't just a list but how many of each and explain how they would be effected by the operation of Indian Point No. 1 and 2. We couldn't possibly do this in time to get that plan on the line. All we can say in answer to that question is "we don't know," we can't answer the question. But this is the type of very broad examinations which is the way the AEC staff has interpreted the act passed by the Congress in the Calvert Cliffs decisions.

I am happy to be able to report to the committee that, in cooperation with the interveners in our Indian Point No. 2 operating licensing case, we have proposed to the Atomic Safety and Licensing Board and to the Atomic Energy Commission a procedure and a timetable which, if adhered to by them, makes it probable that even under AEC's amended regulations a favorable decision on Indian Point No. 2 can be reached in time to make the plant available to meet next summer's peak demands. Without the public-spirited attitude of the interveners, it is extremely doubtful that such regulations would have enabled AEC to license Indian Point No. 2 in time to serve the people of New York City and Westchester County next summer. The consequences of not having Indian Point No. 2 on the line next summer could be extremely serious. I will review them briefly.

In short, our reserve position would drop to the point that the probability would be high that we would not only have frequent voltage reductions of 3, 5 percent, but would have blackouts of portions of our territory from time to time. Since 1969 Con Edison has been encountering serious difficulties in its efforts to meet the increasing demands upon its system for electric power. The problem is that everyone wants more power, but no one wants more powerplants. In both 1969 and

1970 the company had to request large customers to reduce load voluntarily, to appeal to the general public to conserve electricity and to institute voltage reductions on 9 days in 1969 and 16 days in 1970.

On one occasion in the latter year we have to resort to discontinuance of service to approximately 1 percent of our customers. Discontinuance of service to any customers is a drastic measure and every effort must be made to avoid its recurrence.

In the summer of 1971 we had a reserve installed on our system equal to only 9 percent of the estimated peak load. By contracting for 920 megawatts of firm capacity purchases, we were able to raise the reserve to 21 percent. This reserve was of the same order of magnitude as those with which we faced the summers of 1969 and 1970, and again we had to resort to the frequent use of voltage reduction. So far this year we have reduced voltage on our system on 15 occasions. Major problems were avoided this summer only because both the weather and forced outages were more favorable than in the preceding summers.

We are making vigorous efforts to encourage conservation of energy and have both ceased our sales promotion activities and instituted a "Save-a-Watt" program to further that goal. We are urging our customers to conserve electric energy at all times but particularly during periods of peak demand. Nevertheless, the threat of power shortage continues.

Looking ahead to the summer of 1972, we foresee the potential of a worsened situation. Our estimated peak load is 8,550 megawatts and our installed capacity, assuming that Indian Point No. 2 is online, is expected to be 9,996 megawatts. We have, in addition, contracted for 395 megawatts of purchased capacity. Included in these figures for installed and purchased capacity are 873 megawatts which are to be provided by units now under construction and which are not estimated to be completed before July 1972. Assuming no delay in completion of these units, our reserve will be 21.5 percent which is substantially less than is desirable. It is at this level of anticipated reserve, and greater, that we have experienced severe difficulties in 1969 and since. If the 873 megawatts of capacity from Indian Point No. 2 were not to be available, our reserve margin for 1972 would be cut almost in half, that is, to 11 percent. This margin would be intolerable. It would represent at the very least a serious potential threat to the health, safety, and economic well being of the millions of people living and working in the New York metropolitan area.

Con Edison's appraisal of the need for Indian Point No. 2 for the summer of 1972 and its concern about the consequences of the unavailability of the plant are shared by both the State of New York and the city of New York. In a letter to Chairman Schlesinger under date of October 8, 1971, Governor Nelson A. Rockefeller stated:

> A serious danger of a power supply emergency in New York City during the summer of 1972 impels me to urge your Commission to invoke with all possible speed whatever extraordinary procedures may be available in handling the application of Consolidated Edison for an operating license for its Indian Point No. 2 plant.

Also, by letter to Chairman Schlesinger, Mr. Milton Musicus, chairman of the Mayor's Interdepartmental Committee on Public Utilities of the City of New York, wrote on August 31, 1971, as follows:

> In the light of the current deliverations of the Atomic Energy Commission to formulate rules regulating the environmental impact of nuclear power plants, the Mayor's Interdepartmental Commitee on Public Utilities strongly urges im-

mediate consideration be given to the City's vital need for electricity. Unless Consolidated Edison's Indian Point No. 2 Plant starts operation in sufficient time prior to the summer of 1972, the City faces a serious shortage of power.

Copies of the full texts of these letters are appended to this statement.

What I have said about the new AEC licensing procedures for Indian Point No. 2 applies as well to Indian Point No. 3. At the present time a work force of 800 men is putting in substantial overtime to try to keep it on schedule. The committee can see from the attached photograph of the Indian Point site the stage of construction of No. 3. Yet, we have been ordered to state reasons why construction should not be indefinitely suspended, and the work force disbanded, while environmental proceedings that may take a year or longer are conducted—proceedings that, as a practical matter, will involve mainly the environmental wisdom of modified cooling and fish protection facilities that can be built as well or better after the plant is completed as before.

In fairness to the Atomic Energy Commission, it must be conceded that Solomon himself would have difficulty writing licensing regulations which comply with the broad directions of the National Environmental Policy Act. In the first place, the act does not mention Federal licenses and permits at all. The procedures it requires are not those normally associated with regulatory proceedings, but rather with the procedures used by Federal agencies which are recommending legislation to Congress, or seeking appropriations to construct public works. I am referring to a statement which is circulated to all of the agencies.

That is not the way a regulatory proceeding normally proceeds. It is the way the Congress gathers complaints on a proposed piece of legislation. So far as we have been able to ascertain, the published legislative history of NEPA provides no specific guidelines to the AEC, or for that matter to any other regulatory agency, as to the application of NEPA to their respective licensing procedures. Thus, without congressional guidance the Atomic Energy Commission by regulation is having to decide such questions as are presented by the application of NEPA to nearly completed nuclear plants. For example, the whole question of the nearly completed plant which one might have supposed would have been considered in an act of this scope isn't touched upon at all in the hearings or proceedings, the enactment of NEPA. The Corps of Engineers is having to decide the proper scope of its environmental inquiries prior to issuance of the dredging licenses and discharge permits which it must issue for the same nuclear plants as AEC must license.

Thus, for Indian Point No. 2 we have to get a discharge permit. The question hangs there, will the corps have to go through the same investigation as the Atomic Energy Commission, or can it rely on the Atomic Energy Commission to handle that? Nothing in the legislative history tells us which answer is the right answer.

The National Environmental Policy Act rightly has been called, " * * * (a) truly landmark legislation in history of man and his efforts to protect and improve his environment * * * ". But it is not strange that an act of such breathtaking scope, drafted more in the language of ecology textbooks than in language traditional to the law, should require interpretation and refinement. The Congress, I suggest, should not expect the several Federal regulatory agencies and the courts to do this job all by themselves. There is not time.

It is therefore my recommendation to the Congress that hearings be scheduled in the near future to consider the need for amendments to NEPA as it applies to Federal licensing procedures, including not only nuclear powerplant licenses, but other types of Federal licenses and permits, such as those granted by the Corps of Engineers. I might point out that the committee—the committee may already know that for any kind of powerplant you are going to have to get one or more Federal licenses. If it is not nuclear plant, a coal plant, or other plant, there will be other licenses needed. To what extent does NEPA apply and how is it to be administered? You can't find anything in the legislative history of the act to tell you.

The purpose of such hearings should not be to repeal or reduce the effectiveness of the National Environmental Policy Act. NEPA is a landmark in America's struggle to protect its endowment of natural resources. Rather, the hearings should consider how to eliminate uncertainties, and define administrative and judicial procedures. As regards the licensing of nuclear powerplants, I suggest that such hearings should consider, among other questions:

One, should nuclear plants in advanced stages of construction under valid construction licenses issued by AEC be permitted to be completed without interruption, and be granted provisional operating licenses at the conclusion of expedited hearings on issues of radiological health and safety? Meanwhile, the NEPA environmental review could be undertaken and, pursuant to the terms of the provisional operating license, operation of the plant could be suspended, if necessary, to accommodate any changes required as a result of the NEPA review.

Two, another question I think the committee and Congress ought to look at, at this hearing, is should AEC be authorized in its judgment to rely on State certificates of reasonable assurance that water quality standards will be complied with? Apparently that has been taken care of since I drafted this statement.

Third, should AEC, having primary responsibility for the licensing of nuclear plants, have exclusive authority to conduct the NEPA environmental review respecting such plants, with other Federal agencies that must issue licenses or permits for the same plants directed to accept the environmental findings of AEC? This question was touched on, I noticed this morning, but I don't recall hearing the resolution on it.

Fourth, what should be the extent of the alternatives to a proposed nuclear plant to be considered by AEC in a licensing proceeding? How many nuclear site and design alternatives? In what detail? A detailed application may cost the applicant as much as $5 million. Must AEC consider nonnuclear plants as alternatives? Well, we have some regulations now that say they must be. Over what areas should it consider alternate sites for nuclear and nonnuclear alternative possibilities?

Technically you can bring power in New York from Chicago. Over what area must we consider alternatives. Pennsylvania, New Jersey, Canada, Illinois, Ohio, and so forth. What transmission line alternatives should be considered? We know from experience in our own State there would be bitter protest to lines with every township we went through. What should we show the AEC to alternate routings for these lines? Should they be underground? If they are under-

ground they are going to cost 15 times, roughly, as much as overhead. Is the AEC in a position to make any decisions as to the transmission that has to go along with alternatives.

Should AEC be permitted to consider the alternatives of slowing economic growth or rationing electricity so that only beneficial uses of electricity are permitted?

Fifth, to what extent shall AEC consider indirect environmental effects of nuclear plants, such as mining of uranium, transportation and disposal of nuclear wastes, et cetera. If AEC considers fossil-fired alternatives, to what extent should it investigate their direct and indirect environmental effects, for example, air pollution, strip mining, ash disposal, et cetera? A very big problem in New York, what do you do with the ash from a coal-fired plant? Should we get into an environmental statement on every alternative?

Sixth, should not offsite environmental issues such as raised by uranium mining, fuel enrichment, nuclear waste transportation and disposal, et cetera, be excluded from the issues in a license application for a particular plant, and dealt with in a separate environmental investigation of issues common to all nuclear powerplants? I understood Commissioner Doub's comments here today, he was suggesting the Commission explore in some way segregating the issues common to all nuclear plants and settling them in some consolidated proceeding so they don't have to be relitigated in every single application for an agency license. They can take forever to settle this very great problem. It would seem there are a number of these issues, national in scope, that could be settled in a single solid rulemaking procedure.

Seventh, if AEC is to balance all of the engineering, economic, and environmental considerations involved in a proposed nuclear plant, and its possible alternatives, should it have authority to make a final determination in favor of an alternative? This is where you get into problems with alternatives. Suppose an alternative is decided by AEC to be a better proposal than the particular nuclear plant proposed? Suppose it is a coal-fired plant on Lake Ontario? The AEC can't license that plant on Lake Ontario, it can simply tell you to go seek it. We would go seek it and presumably we would have to file environmental statements for that plant and I suppose the Corps of Engineers would hear those proceedings and again you have a new set of intervenors and a new set of alternatives to be considered. You can see the problem. The AEC can't give you, if you are considering the alternative, they can't license the alternatives. I think that is something Congress ought to look into. This is very strong medicine if the Congress were to give AEC that kind of authority, to take this alternative plant because we decided it is better for there to be a coal-fired plant than a nuclear plant.

Eighth, should AEC have authority to override any other State or Federal agency by granting a permit to construct and operate a nuclear plant if, after balancing all considerations, it concludes this would be in the public interest? Presently if AEC concludes that the State's water quality certificate should not have been issued, AEC refuses to license the plant. But suppose the State refuses to issue the water quality certificate and AEC decides we should have? If we understand the regulation, AEC would not act under that kind of situation. In other words, the State exercises veto power but not affirmative

power. Is that the way the Congress would have that situation. I am not altogether assured that the amendment adopted yesterday in the Senate is going to answer that question. I hope so.

Ninth, finally, what should be the scope of judicial review of issues raised by intervenors in licensing proceedings based upon the National Environmental Policy Act? What measures can be taken to assure that administrative proceedings, as well as any judicial review, are conducted expeditiously?

Many of these uncertainties, and others, could be resolved in large part by the rulemaking authority of the executive branch. But the experience of the past 22 months suggests that the executive branch has not yet taken the initiative in such a way as to remove as many as possible of the doubts and uncertainties that beset those who must build projects requiring Federal approvals. I hope that this committee, working with the executive branch, will find ways to remedy this very serious situation.

In closing, let me say again that we fully endorse the objectives of the National Environmental Policy Act. This committee and its chairman, Senator Jackson, are to be complimented for initiating a national environmental policy that was urgently needed. What is required now, I believe, is specific guidance to those charged with its implementation so we can meet the overall objectives of NEPA in a practical and timely fashion.

(The documents referred to follow:)

EXECUTIVE DEPARTMENT,
EXECUTIVE CHAMBER,
Albany, N.Y., October 8, 1971.

Hon. JAMES SCHLESINGER,
Chairman, Atomic Energy Commission, Washington, D.C.

DEAR CHAIRMAN SCHLESINGER: A serious danger of a power supply emergency in New York City during the summer of 1972 impels me to urge your Commission to invoke with all possible speed whatever extraordinary procedures may be available in handling the application of Consolidated Edison for an operating license for its Indian Point #2 plant.

It is my understanding Consolidated Edison's peak demand for the hottest days next summer has been estimated at 8550 megawatts and that sustained demands in the range of 7700–8100 megawatts will occur on many warm days. The Public Service Commission advises that Consolidated Edison's supply situation is such that the peak demand cannot be met next summer without Indian Point #2, and absent this plant the loads on many warm days can only be met if Consolidated Edison is able to import much greater amounts of power than it has ever been able to secure on a firm basis.

The overall power situation in the state and in the whole Northeast is very tight, and Consolidated Edison reports it has thus far been unable to contract for more than a fraction of the firm power imports available in the past summer. The life of the City of New York should not depend on the accidents of availability of massive amounts of power capacity not required by other utilities to meet their own loads on a particular day next summer, especially when the prospects seem so bleak.

These circumstances demonstrate, in my view, a compelling need for you and your agency to give the highest priority for completing the proceedings on Consolidated Edison's Indian Point #2 license application, consistent, of course, with your obligation to assure the public against hazards from radiation and unnecessary environmental damage.

To make progress on this matter, I urge you to use every possible means to resolve the procedural problems in such a way as to avoid, if possible, the catastrophe of power blackouts in New York City next summer.

Sincerely,

NELSON A. ROCKEFELLER.

OFFICE OF THE MAYOR,
INTERDEPARTMENTAL COMMITTEE ON PUBLIC UTILITIES,
New York, N.Y., August 31, 1971.

Hon. JAMES SCHLESINGER,
Chairman, Atomic Energy Commission,
Washington, D.C.

DEAR CHAIRMAN SCHLESINGER: In the light of the current deliberations of the Atomic Energy Commission to formulate rules regulating the environmental impact of nuclear power plants, the Mayor's Interdepartmental Committee on Public Utilities strongly urges immediate consideration be given to the City's vital need for electricity. Unless Consolidated Edison's Indian Point No. 2 Plant starts operation in sufficient time prior to the summer of 1972, the City faces a serious shortage of power.

The need for Indian Point No. 2 both for purposes of meeting electrical demand and for system reliability must not be underestimated. Briefly, the outlook for the coming year is as follows:

Peak demand for the summer of 1972 is forecast at 8,550 megawatts. Although there is possibility of 395 megawatts of purchased power and power from a plant being built jointly with a nearby utility, the anticipated need for power cannot be met without Indian Point No. 2 in operation. Because of forced or scheduled outages of about 1,000 megawatts at all times, seldom has the Company been able to have 7,500 megawatts on line at one time.

Consolidated Edison has 38 generating units totaling 2,176 megawatts that are obsolete and unreliable machines. In fact, 30 units are more than forty years old—hardly suitable equipment to produce electricity or act as reserve for the City of New York. Furthermore, 1,984 megawatts of installed capacity is gas-turbine powered which makes them unsuitable for continuous base load operation.

Under these conditions, there exists a real hazard to the health, safety and welfare of the 7.9 million inhabitants and 3.7 million persons who work in the City of New York.

A major anticipated source of power for the coming year—525 megawatts—is the jointly-owned Bowline Point Unit No. 1 which is presently under construction. A recent strike has caused a delay in the manufacture of the plant's turbine, and there is now serious doubt as to whether the plant can be on the line as of its scheduled operation date of 1972.

Furthermore, we are advised by Consolidated Edison that its 1,000-megawatt unit, Ravenswood No. 3 ("Big Allis") has continued to experience vibration of the main shaft of the high-pressure machine. The unit has been shut down for maintenance every weekend in August, thus far. This unit will not be considered reliable until it undergoes a complete overhaul. Because the Company is so deficient in generating capacity, it cannot undertake such an extensive overhaul unless Indian Point No. 2 is available for service. We are also informed by the Company that its efforts to buy additional firm power for the coming year have been thus far unsuccessful.

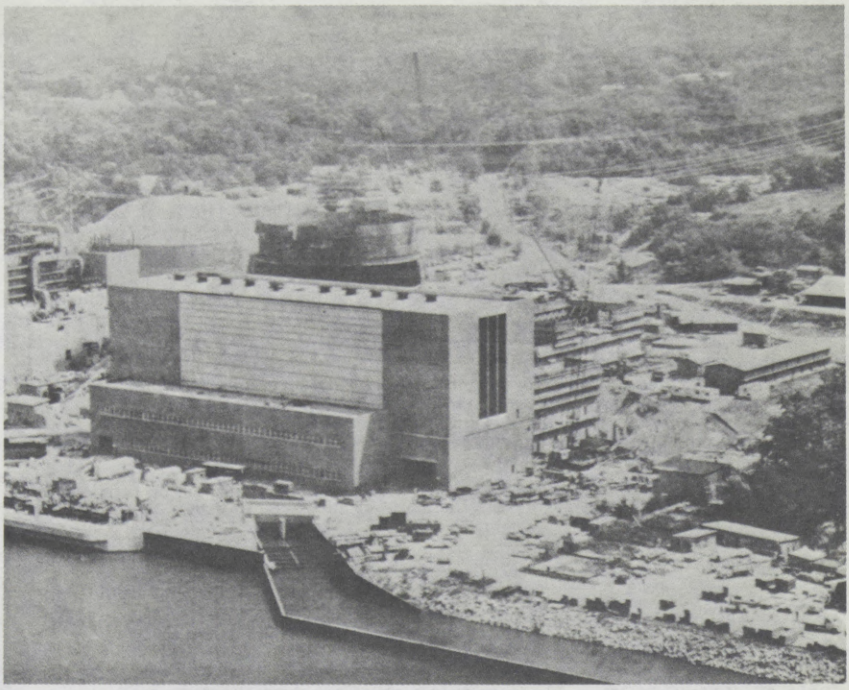
Thus, we believe that without the Indian Point No. 2 unit on the line, the City faces the real hazard of a power crisis in 1972. Whenever voltage reductions and load shedding episodes occur, the health, safety and welfare of the people of the City of New York are placed in jeopardy. Furthermore, an adequate supply of electricity is vital to the City's economic well-being.

Clearly, the Indian Point No. 2 Plant is needed to avert a power crisis in the City in 1972. Just as clearly, the Commission must comply with the mandate of the Court in the *Calvert Cliffs'* decision that the entire environmental impact of projects not yet granted an operating license be promptly and fully considered.

The Committee, therefore, earnestly requests the Atomic Energy Commission to consider these factors and to act promptly on its forthcoming rules and on the pending license for Indian Point No. 2 Plant.

Sincerely,

MILTON MUSICUS, *Chairman.*



Procedures for Load Adjustment by Consolidated Edison Company of New York, Inc. in Times of Emergency as set forth by Order of the Public Service Commission of the State of New York, issued August 9, 1971.

1. Consolidated Edison Company of New York, Inc. ("Consolidated Edison") is directed to give effect to and carry out the following sequence of emergency procedures, as needed, whenever its available supply of electric power is insufficient to meet demand:

(1) Bring all units to sustained rating (except any unit limited by silica).
(2) Purchase additional power, if available, from external sources.[1]
(3) Place gas turbines in service at base load.[1]
(4) Bring Group I stations to short time ratings.
(5) Request Group II stations to exceed sustained ratings by maximum possible without making smoke.
(6) Increase loading of gas turbines to peak rating.
(7) Disregard silica limitations on any units applicable.
(8) Bring Group I stations to maximum ratings.
(9) If not already done, arrange for leased boiler plants to start.
(10) Import extraordinary supplemental power.
(11) Curtail load on Consolidated Edison's own facilities.
(12) Insure that New York Power Pool Dispatcher has requested Pool members to prepare for voltage reduction.
(13) Place in service any gas turbines undergoing active construction work but capable ef operating, at permissible rating, up to peak rating.
(14) Reduce voltage by 3 percent.
(15) Request large customers to reduce loads (telephone requests).[2]
(16) Request all customers to reduce loads (public appeals via mass media).[2]

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[1] The system operator is permitted the discretion of alternating the sequence of Steps 2 and 3 based on economic considerations.

[2] These steps are to be initiated at any point in the procedure where it becomes apparent that steps beyond No. 17 will be necessary.

(17) Reduce votage by 5%.

(18) Obtain emergency generation, if available, from the Power Authority of the State of New York, involving emergency release of Lake Ontario water.

(19) Increase Group II stations to maximum ratings.

(20) Reduce voltage by 8%.[3]

(21) Request traction customers (subway system) to cut off heat on operating cars.[3]

(22) Request assistance from upstate aluminum plants if transmission capability permits.

(23) Disconnect load, as necessary and/or as requested by the New York Power Pool Dispatcher, in the less densely populated areas identified in these proceedings as suitable for emergency disconnection, to the extent and in a manner not inconsistent with the foregoing opinion.[4]

2. This order does not preclude Consolidated Edison from taking further load curtailment measures if they should be necessary to meet its obligations under the New York Power Pool agreements, or, in rapidly developing emergencies, from taking manual or automatic load reduction measures varying from the foregoing prescribed sequence, provided that, as soon as possible thereafter, Consolidated Edison shall give effect to the prescribed sequence.

[3] Step 21 is available only during the heating seasons. It may be employed only where the temperature in subway cars will not be reduced below 45° F. If heat in subway cars will not be reduced below 55° F., Step 21 may be employed in advance of Step 20.

[4] Subways may be transferred to "series operation" as an alternative or supplement to this step but only on weekends or during the hours of 8:00 p.m. to 6:00 a.m. on weekdays.

Agency	Description	Permit issued
FEDERAL		
Department of the Army, New York District, Corps of Engineers.	Permit No. NANOP-E: Dredge flotation channel and construct ramp in Lents cove, Hudson River.	Dec. 11, 1967
STATE OF NEW YORK	DISCHARGE CANAL AND OUTFALL STRUCTURE	
Department of Health	(No permit number): Approval of final plans for 14 foot cooling water discharge channel facilities.	Aug. 22, 1966
Water Resources Commission, Conservation Department.	Permit No. 8-4-66: Construction of extension of discharge canal to separate discharge from intake to a point 300 feet south of present location.	Mar. 2, 1966
Do	Permit No. 8-22-70: Extend discharge canal 98 feet downriver and protect with sheet piling at Indian Point generating station.	June 30, 1970
Department of Health	(No permit number): Outfall construction, construction of an effluent channel with a submerged diffuser.	May 19, 1970
Department of Environmental Conservation, Division of Pure Waters.	Outfall Construction, construction of effluent channel with 12 submerged openings, 4 by 15 feet each, with 18 foot centerline depth submergence, including adjustable ports. Supersedes permits of Aug. 22, 1966 and May 19, 1970.	Dec. 10, 1970
	CHEMICAL DISCHARGES	
Department of Health	Sewage and waste disposal	June 10, 1959
Department of Environmental Conservation	Permit to discharge chemical solutions	Nov. 13, 1970
Do	do	Feb. 10, 1971
	DREDGING	
Water Resources Commission, Conservation Department.	Permit No. 8-1-66: Deposit 50,000 cubic yards of rock spoil in Hudson River at Indian Point.	Feb. 4, 1966
Do	Permit No. 8-11-66: Dredge an area of 135 by 63 by 22 feet deep. Dredged area to be used for concrete screenwell construction.	Apr. 13, 1966
Do	Permit No. 8-31-67: Fill and dredge to carry out construction of new screenwell and relocate discharge canal.	June 22, 1967
Do	Permit No. 8-78-67: Dredge a channel approximately 150 feet wide by 1,800 feet long in Lents Cove of the Hudson River.	Nov. 30, 1967
	AIR QUALITY[1]	
Department of Health	Permit No. HA 680101: Permission to construct 2 Babcock and Wilcox integral furnace boilers.	Apr. 12, 1968
	ENVIRONMENTAL	
Hudson River Valley Commission	Screenwell and discharge line	Sept. 14, 1967
Do	Dredging in Lents Cove	Dec. 7, 1967
Do	Changes in discharge canal	Mar. 26, 1971

See footnote at end of table.

Agency	Description	Permit issued
FEDERAL—Continued	WATER QUALITY CERTIFICATE [1]	
Department of Environmental Conservation	Water quality certification Indian Point generating station—units Nos. 1 and 2.	Dec. 7, 1970
LOCAL		
Village of Buchanan	Permit No. 373: Building permit for excavation for nuclear steam electric generating station.	Dec. 1, 1965
Do	Permit No. 381: Building permit for intake screen-well structure.	May 16, 1966
Do	Permit No. 387: Building permit for turbine room, water bay and discharge water tunnel.	May 24, 1966
Do	Permit No. 404: Building permit for primary auxiliary building and waste hold-up tank pit.	Sept. 28, 1966
Do	Permit No. 405: Building permit for fuel storage building	Do.
Do	Permit No. 406: Building permit for containment building	Do.
Do	Permit No. 411: Building permit for control room	Feb. 18, 1967

[1] This department was created in 1970 to take over and replace various functions of other State departments. Among other duties, it took over those of the conservation department which was abolished and those of water and air pollution control wnicn had previously been under the department of health.

FUTURE ENVIRONMENTAL APPROVALS

Future environmental approvals required for the operation of Indian Point Unit No. 2 will include obtaining operating permits from the New York State Department of Environmental Conservation (Article 12, Public Health Law), the Department of the Army, Corps of Engineers (The Navigation and Navigable Waters Act, S407—Refuse Act), and of course, an operating license from the Atomic Energy Commission.

Application has been filed with the Department of Environmental Conservation for a permit for discharge of chemical solutions and an operating permit for the service boilers, and with the Corps of Engineers for a permit to discharge effluents through the channel and diffuser into the Hudson River. These approvals, together with the licenses and permits listed above, which have already been issued, constitute all the approvals which are required.

Agency	Description	Permit issued
FEDERAL		
Atomic Energy Commission	Construction permit No. CPPR-21	Oct. 14, 1966
Department of the Army, New York District, Corps of Engineers.	Permit No. NANOP-E: Place fill in Hudson River	Feb. 23, 1966
Do	Permit No. NANOP-E: To construct a discharge channel extension wall, a screenwell structure, to place fill and to dredge.	Mar. 15, 1966
Do	Permit No. NANOP-E: Approval of revised plans to place fill in Hudson River. Such approval to supersede plans approved permits dated Feb. 23, 1966 and Mar. 15, 1966.	Jan. 19, 1967
Do	Permit No. NANOP-E: Construct a screenwell, bulkheads, a discharge channel, to dredge, to place dredged material behind the bulkheads and to install temporary dolphins in the Hudson River.	Sept. 29, 1967
Do	Permit No. NANOP-E: Revised plans approved permit dated Sept. 29, 1967.	Nov. 24, 1970
Do	Additionally, install a steel outfall section consisting of 12 submerged openings.	Do.

Senator GRAVEL. A very good statement, Mr. Luce. Mr. Bellmon.

Senator BELLMON. I would also like to compliment you on the statement. You certainly raised many valid points which the Congress and this committee wish to get into.

Let me ask you some specific questions. What does Consolidated Edison estimate the delay will be in bringing Indian Point No. 2 into operation?

Mr. LUCE. In view of the very cooperative attitude that the intervenors in our case have taken in setting up hearing schedules and limiting the issues, we don't anticipate any delay because of the *Calvert*

Cliffs case as to nuclear No. 2. This is providing the Atomic Energy Commission and the hearing board can do their part of the review process on the schedule that the applicant, Con Ed and the intervenor can agree upon. We had assurances, I thought I heard today, that AEC believes it can.

Senator BELLMON. Let's assume the intervenors could not be so accommodating, how long could the delay be?

Mr. LUCE. That is hard to say. I met personally with the Board of Directors and the principal intervenors to talk about this problem. Before I asked to meet with the Board of Directors of the Environmental Defense Fund, our counsel was telling us we couldn't possibly get through the hearings until some time in the summer and this plant would not have been available for next summer but perhaps by a year from now.

Senator BELLMON. You testified this delay would cost $130,000 a day or about $48 million a year.

Mr. LUCE. That is correct. That is because of the cost of buying fuel or purchased power to replace the 800 or so megawatts of power we would get out of Indian Point No. 2, plus the substantial interest during construction. You have this investment in the plant siting there and that is a real cost.

Senator BELLMON. How much would such cost, assuming it had been incurred after the cost of generating electric over the anticipated lifetime of Indian Point No. 2?

Mr. LUCE. That's a hard figure to give, certainly until you can get an alternative on the line, the figure of $4 million a month or $48 million a year would be a valid figure. If we were told we can't ever start Indian Point No. 2, we have to try to find some other alternative. I couldn't tell you what the cost of that alternative would be. It would be much higher than Indian Point No. 2, because of what escalation has done to construction costs.

Senator BELLMON. Would you tell the committee who the intervenors were and who they are?

Mr. LUCE. I will be glad to list them from memory. The Environmental Defense Fund was one of the intervenors; the Hudson River Fishermen's Association is another intervenor, which has counsel provided for it by another group called the National Resources Defense Council; then the third principal intervenor is the Citizens Committee for the Protection of the Environment which is a committee that a man named Bogard is organizing and inspiring. Then, two New York State agencies also intervened. The New York State attorney general is in the proceeding and the New York State Atomic Energy Council.

Senator BELLMON. Did Con Ed have the right to appeal the *Calvert Cliffs* case?

Mr. LUCE. No, we were originally in the case in the capacity of amicus curiae. We did, after the decision came down, ask the court to permit us to intervene for the purpose of taking an appeal. We also asked the court to reconsider the decision as to its application to any nearly completed plant, such as our Indian Point No. 2, which wasn't really involved in the *Calvert Cliffs* case. The court denied our motion without comment.

Senator BELLMON. I notice on page 2 that you say your company is relying heavily on nuclear power to meet the demands of the consumers. Would you tell us why?

Mr. LUCE. Principally, it is to try to clear up air pollution in the New York area. In 1966, the year before I joined the company, the company entered into a memorandum of understanding with the city of New York whereby it agreed that to the extent possible it would not add new fossil-fired plants in the city of New York but rather would build nuclear plants outside of the city of New York. At the same time, the company agreed on a 10-year schedule to reduce air pollution in which the nuclear plants were really the key. So Indian Point No. 2 and No. 3 and, as I mentioned, nuclear 4 and 5 have gone forward in an attempt to carry out out that program.

Senator BELLMON. You went into the nuclear power generation business because of the environmental consideration and you have been delayed and perhaps interrupted because of the same kind of argument?

Mr. LUCE. Yes, Senator. There is no form of powerplant that we are trying to build that is not subject to serious environmental objections. Our hydroplant, Storm King, has been before the Federal Power Commission and in the courts since 1963, the fossil-fired plants that we are building and testing, have been subject to threats of litigation, transmissions we have built are in various administrative contests and threats of appeals to the court. It is a way of life, unfortunately. There is no form of power generation that we can build that is free of objections from some source.

Senator BELLMON. You make the statement here on page 3, that the problems caused by Calvert Cliffs arise not so much from the decision but from the way it has been applied by the AEC. Do you feel if the Congress can proceed to consider the recommendations you have made, beginning on page 13, that this would give the AEC guidance and perhaps the directives it needs to apply these kinds of decisions more equitably?

Mr. LUCE. Yes. And more expeditiously and more practical. It would seem to me that it would be helpful to the Atomic Energy Commission if some open hearings were held. If some of the specific questions really were gotten into in the hearing here today in detail, and that the AEC was given some statement as to the sense of Congress as to the framing of regulations, to carry this out. It may be at the conclusion of these hearings you may need some amendments to the law, but it seems to me just some oversight hearings would be helpful. I realize this is in your energy study and this isn't quite the place to do that.

Senator BELLMON. It is as good a place as any. You state that you have proposed to the Atomic Safety Licensing Board of the AEC a procedure and timetable which would make it possible under AEC to amend regulations, do you mind telling us what these procedures are and what the timetable is?

Mr. LUCE. Yes, I will do the best I can from memory. At the time the *Calvert Cliffs* case came down, we had been in hearings looking toward an operating license for Indian Point No. 2 since last December. The hearings start and stop, and start and stop. But they began December 1970, and it was expected that the hearings would be concluded in the latter part of November 1971. When the *Calvert Cliffs* case came down and the new regulations from the Atomic Energy Commission were issued as to how they propose to implement NEPA we now expect a full license will be issued by April 15, 1972.

Now, I want to emphasize the very fine attitude of the intervenors in our case. They are not protesting but they are getting their case in on a schedule that will enable the decision to be decided in time to protect the public interest and I think they are certainly to be commended for that.

Now, there were some other parts of our agreement. We agreed they could have access to all of the documents that bear on the licensing problem. We set our own documents room up now like the AEC has so they could come in and look at the documents. We agreed to issue pass permits so that they could have inspectors come in and out of that plant whenever they want to, to see what is going on.

Senator GRAVEL. You say you cooperated with them, and you received cooperation in return, and that has saved a lot of time. Is that the point you are making?

Mr. LUCE. Yes.

Senator GRAVEL. I think that should be underscored. Of course, people can take a negative attitude in this, or take a constructive approach. I think your reputation precedes you. In fact I have quoted you extensively around the country in some of the statements you have made. I want to compliment you on a fine statement today and also upon your record as a leader in the industry in this regard. I think when you keep talking about fine intervenors, you get them because you treat them properly and as equals.

I note one of your conclusions, No. 7, the obvious one. Of course, with the other companies in New York and the public service commission that covers the whole broad spectrum of energy alternatives.

I wonder, based upon your experience, if you think it is possible to create an energy prototype, a computer model? Because when you must decide whether or not to plan a nuclear plant in one location, or to go to Ontario, or tie into a gasification plant, or what have you, there is no continuous body or group that does research in that regard. You would have to start your study fresh with each individual plant, is that not correct?

Mr. LUCE. That is correct. We would start with our own studies and we would take them to the New York power pool and review them with the other companies in New York and the public service commission, then we would take them to the Northeast Power Coordinating Council which includes the utilities of New York, New England. We would start there but before we reach any decisions we would have to go through the consultive process.

Senator GRAVEL. That process is percolating up from the bottom rather than down from the top. If this power pool was to do some planning as to the power needs, they would be guiding from on top as to where the needs are and where we should begin to look in those areas, rather than you people from the local perspective.

Mr. LUCE. The tremendous detail that is required in forecasting load and analyzing how best to meet them is great. The impact on localities where these are proposed to be situated, I would think it would make it very difficult for all of this to be done at the top. I think it has to start at the grassroots. It certainly needs review at the top, there is no question of that, but I think as a practical matter it has to start at the grassroots.

Senator GRAVEL. But starting at the grassroots alone, you get stopped by the area that has the greatest amount of environmental opposition. That, of course, is what propelled people into the atomic area. Now that knowledge is being spread about that hazard, it may be stopped there. What I was suggesting, is it possible, through a systems-type approach, to set up a national prototype so that we can define changing energy needs and then, of course, locate plants and make environmental determinations? Part of this model would assess which is the best possible plant to solve the energy needs of a particular area. Look upon it nationally as a prototype. Pick someplace in the country and start developing the system, like Redondo Beach did for part of our space program to get to the moon.

Certainly the complexities of providing power alone aren't that much more difficult than putting men on the moon.

Mr. LUCE. I think they are. Because you are dealing with so many more people and affecting so many more people. I think the moonshot has a much more limited objective. The facilities you are building are not all that objectionable. In fact, by and large, you are trying to get new plants and new jobs.

But to answer your main question, I suppose it would be possible to do anything and it would be possible to try to get someone from a national basis.

Senator GRAVEL. Well, you are the largest company in the country, aren't you?

Mr. LUCE. We have one of the smallest territories and the largest capitalization, yes.

Senator GRAVEL. And you plan ahead, how many years ahead?

Mr. LUCE. Fifteen to twenty years.

Senator GRAVEL. Is it so difficult to expand that to a national prototype?

Mr. LUCE. We speak with other utilities on the same basis.

Senator GRAVEL. We could do that, then, naturally on a prototype basis?

Mr. LUCE. Yes, it is being done. New England, New York, and Ontario is duplicated by other regional companies around the country, each of them send their studies to the Federal Power Commission. They make the forecasts that the studies be made.

My only point is, from an administrative standpoint you get a better result if you start at the bottom and work up, than starting at the top and working down.

Senator GRAVEL. I don't think we disagree on that, the data comes from the bottom and you collect it at a central point. Regarding the *Calvert Cliffs* decision. I don't understand why you don't just go fossil fuel. Let's take Commonwealth Edison; it decided to build a fossil plant. Why did you decide not to build a fossil plant and build a nuclear plant?

Mr. LUCE. To reduce area pollution.

Senator GRAVEL. Then the plant in Chicago is going to pollute air?

Mr. LUCE. Commonwealth Illinois that serves Chicago is building far more nuclear plants than Con Ed is in New York. We and they are building both. They have five or six of them where we have three.

Senator GRAVEL. But they are building a $100 million, 840,000-kilowatt generating unit, coal-fired power station in Illinois. They say it will be a clean one.

Mr. LUCE. Compared to what is always the question. There is no way to burn fossil fuel without some emissions from the smokestack; principally carbon dioxide. There is no way to stop carbon dioxide because combustion is simply combining oxygen with carbon. In addition there will be other pollution. Now, we put on precipitators and do all kinds of things to reduce emissions. I am sure in Chicago they have done a great deal and we have, too, but there is no technology by which a fossil plant can remain as clean as a nuclear plant.

Senator GRAVEL. If you are talking about all of the radioactive waste that has to be taken care of, I don't consider that clean.

Mr. LUCE. For a fossil plant, if we can ever get the sulfur out of the stack, we are going to end up with it and we have to do something with it.

Senator GRAVEL. Can you recycle it?

Mr. LUCE. Not economically at this time.

Senator GRAVEL. How much money has been spent by you, a large electric producer, or by the Government as far as you know, in looking into clean fossil-fuel technology?

Mr. LUCE. I can't testify as to the Government. When I was in Interior we had $5 or $10 million worth of this kind of project.

Senator GRAVEL. And you know how that compares with what we are spending on the fast-breeder reactor. Supposing we appropriated $130 million for clean fossil-fuel technology, which is what we are spending this year on the fast-breeder reactor, what do you think the likelihood of some success in that area might be?

Mr. LUCE. I think there would be greater success faster. I didn't finish answering your question, though. We are now constructing a pilot plant to test one of about 15 or 20 methods that the Environmental Protection Administration is wanting to have tested out to take sulfur out of smokestacks, at the cost of, I guess, about $4 million. A number of other utilities are doing other things. So it isn't a program that has been totally neglected. But my point is, when you get all through with this, none of the processes take all of the sulfur out or nitrous oxide, there isn't one. I don't think you are ever going to find one. Of course, if you spend more money your chances are better.

Senator GRAVEL. How much does your company spend on advertising a year?

Mr. LUCE. Nothing.

Senator GRAVEL. You don't advertise?

Mr. LUCE. We don't advertise sales, I suppose that is what you are talking about.

Senator GRAVEL. Did you use to?

Mr. LUCE. Yes.

Senator GRAVEL. How long ago did you discontinue that?

Mr. LUCE. Totally, about a year ago.

Senator GRAVEL. You were one of the first companies in the country to do that?

Mr. LUCE. We advertise nonsales now, power conservation. "Save-a-Watt."

Senator GRAVEL. I appreciate that. How much research money do you spend on solar energy?

Mr. LUCE. Nothing on that.

Senator GRAVEL. What do you do research on?

Mr. LUCE. Let me run through the expenditures that the company made. R. & D. Indian Point No. 1 was a research project of considerable magnitude itself. It was the second, I think, of the commercial plants.

Senator GRAVEL. That is atomic, isn't it?

Mr. LUCE. That is right. Approximately $10.8 million was allowed by the Public Service Commission as R. & D. expense. We have contributed over $5 million more to the ESADA pool of New York utilities, mainly for nuclear research. Our current budget this year for research and development was about three to three and a half million dollars and that is mostly for environmental research, the Hudson River and Long Island Sound. I already mentioned the pilot plant to test out one of the methods of taking sulfur out of the stacks, that is another $4 million. We are starting that this year.

In terms of percent of gross receipts, these are not high percentages. I wish they were higher, they ought to be.

I have advocated for some time that the industry ought to be spending at least an additional $300 million a year for research and development. I think the general recognition of the industry is that we are going to have to spend a lot more money. I don't know if the $3 million will be an occurrence, but the industry is now putting a program together to raise that money.

Senator GRAVEL. What are your gross sales; what is the gross amount of money you handle a year?

Mr. LUCE. Now, for sales of electric and gas and steam I think this year is about $1.2 billion. Something in that neighborhood.

Senator GRAVEL. And your final R. & D. figure is what, $10 million, from the figures you were throwing out?

Mr. LUCE. In this year's budget, about three and a half million dollars.

Senator GRAVEL. And you have gross sales of $1,000,200,000.

Mr. LUCE. We also agreed to put $8 million in the breeder reactor program.

Senator GRAVEL. The only research you are doing is part of the Government program, and mostly atomic. One of the largest companies in the Nation in this field is making just about negligible investment in R. & D. research regarding the source of your revenue.

Mr. LUCE. I don't think it is accurate to say it is negligible.

Senator GRAVEL. $1.2 billion and you are investing something like $10 million, that is not negligible?

Mr. LUCE. We buy equipment from manufacturers who do R. & D. We pay taxes from everybody else and the Federal Government is putting a tremendous amount into research and development. I agree we ought to do more. I would suggest that industry, if it can't raise the money on a voluntary basis there ought to be a tax on every power bill and every environmental trust fund if you will.

Senator GRAVEL. Suppose we just reversed the situation, so that as you consume more power you don't get a price-break. Suppose you keep rates consistent regardless of what quantity a customer uses, which would provide a considerable sum of additional money, and applied it to R. & D.

Mr. LUCE. I didn't understand that, sir.

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Senator GRAVEL. Well, you pay less per kilowatt-hour as you consume more power. In my home, if I expend more power, I pay less for the additional kilowatt-hours I use. Supposing that wasn't the case, and the power price was steady?

Mr. LUCE. We proposed to the New York Power Commission that the increase be put on the big users and less on the small, proportionately. That has been challenged in court and we are now in court in Albany; the allegation being made by some of the big users that this is unfair to them because it costs them less, they say, to serve them. We are finding it out all along that there is nobody up there helping us out. There are a lot of people who have this theory that you just stated and I think the theory to a degree is a correct one. We are trying to apply it in a very modest way. We do have to stand in there all by ourselves.

Senator GRAVEL. I will volunteer to go to New York and be a witness on your case.

Mr. LUCE. All right.

Now there are some complexities in this. Our biggest customer is the subway system and they demand a special rate. We could raise the rates for them but that means more people bring automobiles into the city and that means more pollution from automobiles.

Our second biggest customer is the public housing.

Senator GRAVEL. Do you have AEC as a customer anywhere?

Mr. LUCE. I think they have an office up there.

Senator GRAVEL. But they don't buy power from you?

Mr. LUCE. Just an office.

Senator GRAVEL. For the record, in order to make more nuclear fuel material at the gaseous diffusion plants, the AEC needs about 40 percent of the power now generated by civilian nuclear powerplants. Next year the diffusion plants will use 38.3 million megawatt-hours of electricity.

Let me throw this figure out, as I recall, the amount of money spent by the electric industry in 1969 for advertising was $320 million, and the amount spent on research was $41 million.

Mr. LUCE. The $41 million rings a bell; the other figure I cannot comment on.

Senator GRAVEL. Let me compliment you. Your company did cut out promotional advertising. I would only hope you would realize the benefit of putting some of this money into research, and other than atomic research. Because if we are making a mistake about nuclear electricity, we are acting like sheep all going in one direction.

Mr. LUCE. We have as much nonnuclear capacity under construction as we have nuclear. I didn't emphasize that.

Senator GRAVEL. That is very good, I didn't realize that.

Mr. Bellmon.

Senator BELLMON. Yes; Mr. Chairman. I would like to compliment you, Mr. Luce, on your recommendation that the Congress schedule hearings in the near future to consider the proposals you have made. But, in your comments, I have been impressed by the complexity of your job. I can sympathize with them.

Can you give us a statement about how long it takes from the time you decide that you need a source of power, a new powerplant, until

you can get through all of the regulatory and environmental procedures to construct the plant? Or at least to acquire a site? How long does it take?

Mr. LUCE. In the case of the hydro project at Storm King, the company made the decision to go forward in 1962, applied for the license in 1963, and we are still in the courts.

Senator BELLMON. That is 8 years?

Mr. LUCE. Yes; we just received a decision from the Second Circuit Court of Appeals confirming the license granted the second time around by the Federal Power Commission and the intervenors said they are going to take it to the U.S. Supreme Court, so it will be another year before we know that we can ever begin to construct the project. Then it will take 6 to 7 years to construct. So in that case it will be from 1962 to nearly 1980, 16 or 17 years. That is the most dramatic case underway.

For nuclear plants now, we would think 8 or 9 years. In the case of Indian Point No. 2, Mr. Conway points out, the company applied for a license for that on December 6, 1965 and we hope to have it for the summer of 1972.

Now, the fossil-fired plant, you can get one on the like in 4 to 5 years if you don't run into litigation. It is so hard to predict the litigation or predict the seriousness of it and how long it would take. But we would say for a fossil plant we would allow about a year.

For a transmission line, our major transmission line has been running about 7 years. Now, we could build the transmission line in 18 months but by the time you go through all of the jurisdictions and battle out your right-of-way problems and multiplication problems, we would say about 7 years.

Senator BELLMON. From what you just said, you apparently decide to build the plant and then proceed with construction before you get all of the governmental clearances.

Mr. LUCE. We have to. The way licensing is done you cannot get all of your permits before you start on it. Indian Point No. 2 is exactly like that. We have a construction permit issued by the Atomic Energy Commission to build that plant and in reliance on that we have invested $150 or $160 million. But under the procedure we can't get an operating license until the plant is ready to operate. Of course, what has happened in the case of Indian Point No. 2, after we got the construction permit Congress passed the National Environmental Policy Act and changed the duties of the Atomic Energy Commission and the Corps of Engineers. So we have this large investment that we are relying on to supply power to the people but we don't have all of our permits.

The fossil plant is the same. We can't get all of the permits before we start out. We have arranged in the State of New York to adopt one-stop siting where one agency can give us all of the permits and consider all of the alternatives and tell us which alternative to build and give us all of the permits but that isn't the law presently.

For the plant we are building in Astoria, Queens, which is subject to great controversy, we need 25 or so permits. The last plant is the boiler operating control and you get that after the boiler permit. So there is no way to get it to begin with. It is just the way the permit system works.

It isn't that we like to make such a big investment, it is actually the only way we can do it.

Senator GRAVEL. There is really no surprise in the AEC licensing problem. They don't have the necessary safety technology available for the reactor core cooling system, or for storing radioactive waste. We are pessimistic, regardless of the testimony we received today. The construction license was granted under one set of engineering assumptions, and those assumptions haven't proved out, and they put the whole safety system in jeopardy and made it obsolete, unless the engineers find a way to improve it and demonstrate effectiveness. They haven't devised the way yet.

Mr. LUCE. My understanding is contrary, Mr. Gravel. We have been ordered by the Commission under our license to operate Indian Point No. 1 to install an emergency core cooling system that is going to cost us $12 million for a relatively small plant.

Senator GRAVEL. Has it been tested, though, Mr. Luce?

Mr. LUCE. Yes. But I can't tell you just what tests have been run.

Senator GRAVEL. I can only say that if you provide me for the record with data on realistic tests that have been conducted on emergency core cooling systems, it could be a great revelation to us.

Mr. LUCE. All tests were assimilations.

Senator GRAVEL. The last one was the Idaho test.

Mr. LUCE. I don't think that was the last one.

Senator GRAVEL. I would like you to give me the results of more recent tests for emergency core cooling. I was the one who fought for money on the floor of the Senate for additional safety studies. If you can give us assurances and data on emergency cooling which the AEC is giving you for your future planning, I would like to have it provided for the record, because I think it is very important. If the AEC has made representations to you about safety, and you have gone on the hook for hundreds of millions of dollars, and if AEC claims prove to be wrong, not only has Government made a mistake but you all have been a party to the same mistake.

Mr. LUCE. We will be glad to provide the information that you request. Of course, we deal in several different kinds of energy, electrical, gas, steam. There isn't any of them free of hazard. The most dangerous form of energy that we deal in on the record is gas. Last year in New York there were 30 or more people killed in gas explosions, but, generally, it is urged that we should sell more gas. So, of course, we have to keep these risks to a minimum, but there is no way in society to eliminate risks.

Senator GRAVEL. I don't claim there is, but if there is a problem of gas, you can go clean up the area. If you irradiate an area, you can't clean it up for a couple of thousand years. We do know how to clean up water and air, we know how to take care of gas and oil and the rest of it, but we don't in this area of radioactive contamination.

Mr. LUCE. Based on the hard facts we have, nuclear is the safest. We have to keep trying to make it more safe but that is what experience shows.

Senator GRAVEL. This is another point of Dr. Walter Jordan. We only have 100 nuclear reactor-years of experience. Before you can make that safety statement with credibility, you need 10,000 reactor-years of experience at least. All we need is something nuclear to go

wrong in Detroit or some other populous area and man, when we reach 6,000 reactor-years of experience, all of a sudden the safety claims just disappear. They would have no validity at all.

Mr. LUCE. How do we get 10,000 years' experience without building plants and getting experience?

Senator GRAVEL. That is a very good point, but it is different from pretending you do have them. The only point is, we are using the same approach that we used with automobiles. We make a tremendous investment for one technology without spending a little more money on R. & D. to find out ahead of time what the problems are.

Mr. LUCE. I am for more R. & D.

Senator GRAVEL. Then I would hope we see a change at your next fiscal board meeting.

Mr. LUCE. I hope we see a change in Congress. I hope we see a change in Congress, I think you are right. You said it, I didn't.

Senator GRAVEL. The blame should be placed right here. Congress is a larger culprit, or equal to private industry in this neglect of safety research.

Mr. LUCE. Yes.

Senator GRAVEL. Thank you.

Mr. LUCE. Thank you.

(The following letter and questions submitted to Mr. Luce; the answers appear in app. 2.)

United States Senate
COMMITTEE ON
INTERIOR AND INSULAR AFFAIRS
WASHINGTON, D.C. 20510

November 30, 1971

Mr. Charles F. Luce
Chairman of the Board
Consolidated Edison Company
4 Irving Place
New York, New York

Attention: Mr. Conway

Dear Mr. Luce:

May I take this opportunity to express my appreciation for your excellent statement on November 3 on the implications of the Calvert Cliffs court decision. Your statement was very informative.

In reviewing the transcript of the hearings, additional questions have arisen from the members and the staff which are enclosed for your response. While some of the questions were touched upon in your prepared statement, you may wish to expand upon your testimony.

Receipt of your response by December 15, 1971, would assist the Committee in our evaluation of the hearings.

Thank you for your assistance and cooperation in this regard.

Sincerely,

Henry M. Jackson
Chairman

CHARLES F. LUCE
CHAIRMAN OF THE BOARD
CONSOLIDATED EDISON COMPANY
NEW YORK, N.Y.

QUESTIONS FOR THE RECORD

SENATE INTERIOR AND INSULAR AFFAIRS COMMITTEE

November 3, 1971

(1) With regard to relations between Consolidated Edison Company and the Atomic Energy Commission:

(a) What formal guidance, criteria, etc., has been received from the AEC regulatory staff since Calvert Cliffs?

(b) What guidance has been received on whether the environmental effects of the entire nuclear fuel cycle must be included in the information furnished the AEC?

(c) What informal guidance has Consolidated Edison received from the AEC regulatory staff on Indian Point-2?

(d) What information has been received from AEC on the criteria to be used in granting interim operation at power levels greater than 20 percent of design capacity?

(e) What are your impressions regarding the experience and expertise of the AEC staff assigned to your license applications?

(f) What is your understanding regarding the conditions under which the Atomic Safety and Licensing Boards will consider environmental factors other than radiation and radioactive materials?

(2) With regard to Indian Point-2:

(a) What does Consolidated Edison estimate the delay will be in bringing Indian Point-2 into operation because of Calvert Cliffs?

(b) How much will this delay cost both in fixed charges on Indian Point-2 and in costs of imported electricity?

(c) How much will these costs add to the cost of electricity generated by Indian Point-2 over its anticipated working lifetime? What will be the cost per kilowatt hour? How does this compare with the presently estimated cost of generation?

(d) The Atomic Energy Commission regulations permit interim operating licenses up to 20 percent of full power. Because the Indian Point-2 operating license is being contested, a hearing is required on even an interim license equivalent to what would be required for a full power operating license. Therefore, what is your evaluation of the feasibility and usefulness of an interim operating license?

(3) Have any environmental groups attempted to negotiate directly with Consolidated Edison to withdraw their intervention in exchange for changes in plant design, construction, or operation?

(4) For the Consolidated Edison Company's service area, would you supply for the record your estimate of 1972 sales attributed to the following uses, where data is available:

(a) industry;

(b) Department of Defense;

(c) public works, such as sanitation and street lighting. (Please specify what is included in your estimate);

(d) anti-pollution activity (Please specify)

(e) transportation (Please specify);

(f) airconditioning (Please specify overlaps into other categories);

(g) heating (Please specify overlaps); and

(h) residential use (exclusive of airconditioning and heating).

(5) What relationship exists in your service between increasing electrical consumption and employment?

For instance, is a 5% increase in electrical consumption accompanied by a 5% increase in employment?

(6) In your prepared statement you said that "everyone wants more power". What efforts has Consolidated Edison made to determine the validity and implications of that statement for your service area?

(7) In your prepared statement, you said that nuclear licensing delays "could well mean the difference between adequate power and black-outs for the people of a city, state, or region." To what extent could this situation be averted within your service area through restriction of electrical energy to non-essential uses?

Senator GRAVEL. Our next witness is Mr. Edward Berlin, partner in the firm of Berlin, Roisman & Kessler, appearing on behalf of the Sierra Club.

STATEMENT OF EDWARD BERLIN, PARTNER, BERLIN, ROISMAN & KESSLER ON BEHALF OF THE SIERRA CLUB; ACCOMPANIED BY OLIVER A. HAUCK, COUNSEL, NATIONAL WILDLIFE FEDERATION

Mr. BERLIN. In view of the hour, I would appreciate submitting my prepared statement for the record and just taking a few moments to summarize some of the points in it, if that would be agreeable with you.

Senator GRAVEL. Very well, that would be without objection.

Mr. BERLIN. I hoped Tony Roisman, one of my partners, would be here today. He is the one that took the *Calvert Cliffs* case to the court of appeals.

We represented the Environmental Defense Fund in that case, so I beg your indulgence to bear with my comparatively inexpert presentation this afternoon.

The National Wildlife Federation and the Sierra Club are pleased to accept the committee's invitation that they appear at these hearings to explore the impact of the *Calvert Cliffs* decision and the necessity to be sensitive to environmental concerns generally, upon the ability of the electric utility industry to maintain an adequate level of service. In our prepared statement we acknowledge the fact that NWF and Sierra, together with a consortium of local Maryland groups are the litigants who precipitated the *Calvert Cliffs* decision.

We use the word "precipitate" somewhat advisedly, because we feel the actual procedure is nothing more than a catalyst to bring to the fore that which was inevitable.

I think it is important to spend a few moments to focus on what the *Calvert Cliffs* decision is all about. The *Calvert Cliffs* court, and I say this without qualification as to all courts that have yet to or are about to pass in the future on such litigation, has made it clear that they will not inject themselves into the substantive decisionmaking process. It has not happened in any environmental case thus far in society and I guarantee you it will not happen in the future.

The courts recognize they have an extremely limited role to play, and they are quite satisfied, to play an extremely limited role. The role is precisely one of fashioning procedural new processes. That is all *Calvert Cliffs* was about.

In the National Environmental Policy Act the Congress reformed the administrative process to a very significant extent and the *Calvert Cliffs* decision is no more than an effort to give new meaning to the procedural requirements that were laid down by the Congress. We think that Congress, when it passed the Environmental Policy Act, declared environmental considerations are appropriate in exercising administrative and regulatory judgment and, more significantly, that citizens have a role, a very important and vital role to participate in the culmination of that administrative and regulatory judgment.

Calvert Cliffs does no more than to seek to give meaning to that very important declaration of congressional will.

Now, NEPA, of course, was a product of the Congress. If the Congress disagrees with the *Calvert Cliffs* decision which seeks only to give meaning to an act of Congress, you gentlemen are certainly free to enact amendments.

It has been suggested by the previous speaker, although not directly, that perhaps the Congress might want to be looking in that direction. I suggest to you that if you think in terms of enacting amendments in light of *Calvert Cliffs*, what you are really saying is that you do not really intend to give the citizen a meaningful opportunity to participate in the exercise of administrative determinations and judgments that vitally affect the lives of each and every one of us. I suggest to you that to suggest those type of amendments, I think, does an injustice to the Congress. It certainly does an injustice to the American public which at long last has, with your assistance, declared its intention to participate, to participate meaningfully and to participate responsibly.

We talk about responsible participation for just a moment.

Senator BELLMON. You were very concerned, and properly so, about irresponsible intervenors coming in and delaying, inappropriately the exercise of administrative discretion. It is an extremely valid concern.

I suggest to you, sir, that history does not substantiate that that is a reality. Mr. Luce cited to you, and I would if I were in his situation, the *Scenic Hudson* case, the *Storm King* case, the pump storage project on the Hudson River. But why has that case taken as long as it has and as long as it will? It was because in 1960–65, Consolidated Edison Co., and it is true of every company, did not deem it in its best interest to disclose on a timely basis its plans for the public to react. More significantly, had the Consolidated Edison Co. undertaken to discharge that disclosure requirement, the Federal Power Commission would not have committed meaningful participation.

We can immediately chop off the first 6 years of that delay because the Federal Power Commission completely closed the door on meaningful administrative procedure. It denied due process.

So I think the example, while a dramatic one, certainly is not a very appropriate one.

Now, what is the recent history of environmental intervention? Mr. Luce cited one, the situation of the Environmental Defense Fund in the *Indian Point No. 2* case. Mr. Luce made a presentation at his request to the Board of Directors of the Environmental Defense Fund, which we were most pleased to receive, in which he was able to persuade that Board, made up of extremely responsible citizens, scientists, a former Chairman of the Federal Power Commission, that in fact there was a serious scheduling need and that while Consolidated Edison had no intention to abort the intentions of the Congress by precluding a meaningful examination of the environmental considerations, was it not possible to somehow square that analysis with the schedule and needs of Consolidated Edison?

The Environmental Defense Fund agreed, together with the Consolidated Edison Co., and has applied to commit not 20-percent operation, as the regulations provide, but 50-percent operation. So, if the schedule proceeds in accordance to our current estimation, that plant will be on line to meet the estimated summer peak of Consolidated Edison this coming July.

Let me give you one additional incident, the case of the Palisades Plant in Michigan, I believe. The situation was the necessity to get plant on line to meet a peak. The intervenors in that case did not object to an application by the company to permit 60-percent operation of that plant in order to permit the company to meet its peak.

So I suggest to you, Senator Bellmon, though I share your concern, I think we have got to have that concern in light of the history that we are experiencing and not be, forgive my choice of words, buffaloed into believing that the situation is far more critical than it is.

I certainly can understand and appreciate how the rhetoric we have been hearing would certainly suggest to a responsible public official that there is a very serious problem. I suggest that the industry perhaps is guilty of the overemotional response and rhetoric that it for so long has been accusing the environmental intervenors of espousing. We think when you look at the record, and I am sure you will, you will see that the history thus far has been a quite responsible intervention, not by people who were out to seek delay for the purpose of delay, but by serious scientists, serious attorneys, if I can add that, and concerned citizens who are only seeking to participate, that is all, to make their voice felt in decisions that ultimately and profoundly affect the quality of their lives.

We have suggested—I say, "we"—not the Sierra Club but the Environmental Defense Fund, I have to keep my organizations straight, suggested this summer to the Atomic Energy Commission that there are indeed procedures for greatly expediting administrative proceedings before the AEC. We detail some of this in our prepared testimony.

One that we mention is to do away with the unnecessary lag between the filing of an original application with the AEC and in noticing the hearing which is the first time that the public has an opportunity, has knowledge of the pendency of an application.

That lag historically has been approximately a year. We suggest to the AEC, if you are indeed anxious to speed up the regulatory process, let us know about an application when it is filed. Put the burden upon us, which we are willing to accept, to begin our discovery, the preparation of our interrogatories, the short processes involved in the preparation of our own technical expert case. After all, the utilities worked on their case for 6 years before they come to the agency.

Senator GRAVEL. When that happens, do you have access to the file data?

Mr. BERLIN. No, we have not. I believe in this situation there was great cooperation, but that was unique.

Senator GRAVEL. What about the AEC?

Mr. BERLIN. It is my understanding that they take the position up until the time the case is formally noticed for hearing, all of the communications between it, the staff and the company, are treated confidential.

Senator GRAVEL. A year is lost before you are told that the application is there. How much of an interval is there before you are permitted to see the data in question?

Mr. BERLIN. I cannot answer that. I can probably supply that for the record.

Senator GRAVEL. Will you supply that for the record?

Mr. BERLIN. Yes, we shall.

Senator GRAVEL. Isn't it a fact that you don't have the data at hand?

Mr. BERLIN. It is not necessary to go to court, the AEC now recognizes that we have an adequate opportunity to prepare our case. So they have acknowledged the necessity for delay. But we have suggested in our comment to the agency, the AEC, that if they gave us simultaneous access to the information, then at the end of this 1-year period, during which time we would be very busy doing our own homework, when the notice of hearing was filed in the Federal Register we would be prepared, speaking of the experiences of the environmental groups across the country, to commence continuous hearings within 90 days.

Senator GRAVEL. But right now they don't do that?

Mr. BERLIN. That's correct.

Senator GRAVEL. So they use a very secret advisory situation to keep you in the dark as to their best position?

Mr. BERLIN. Well, I don't wish to attribute any motives to their actions.

Senator GRAVEL. If they don't give you any data, they don't want you to find out what is going on.

Mr. BERLIN. It may be that they are not finalized during the review process. If that being the case, is somewhat shocking in which the utilities have a great period of time to prepare its presentation.

I think the sum and substance of this, I was delighted to see Commissioner Doub recognize the fact that it is possible to construct procedures that not only will comply with the court of appeals mandate in the *Calvert Cliffs* case but will expedite the administrative proceedings before the AEC.

Senator BELLMON. If the AEC and other regulatory agencies were willing to make available to the advisory groups information you want, would it be reasonable to set a time limit on the appeal process?

You said you can be ready in 90 days. One thing that disturbs me is the long delay from the time the decision is made until they can be finally put in service.

Would it be reasonable for some length to be set on the total time for appeal?

Mr. BERLIN. I think so. I think the AEC with its new procedures recognizes they have the flexibility, as the court of appeals, to set their own expedited schedule with appropriate limitations.

Let me emphasize one point which I think people tend to ignore. Although utilities can point to the fact that delay is extremely costly to them from an economic standpoint, delay, I submit, hurts most the environmental intervenor. The cost of delay in such proceedings to environmental intervenors that operates on relative shoestrings is enormous. We cannot afford the tariff imposed by delay. Every time we have to move for postponement, I assure you it hurts us. We are not seeking to delay the ultimate resolution of the case but merely to be able to prepare ourselves to make a meaningful contribution. We would even welcome the Atomic Energy Commission's suggestion for the one-stop certification procedure.

There is a general misconception that the necessity for 50 or 60 or 25 or 10 permits somehow is the ally to the environmental group. I submit to you it is not the ally; in the final analysis of the serious environmental intervenor that seeks to put on an expert case, this hurts us because our resources do not permit that kind of chaotic procedure. We would welcome any movement in the direction of an orderly administrative process.

Senator GRAVEL. Now, we picked up two areas where, if the other side gave more timely notice, we could save years.

How could Congress promote justice in the type of adversary proceeding required in the AEC procedures? I talked of an ombudsman earlier, and I was satisfied that the Government could not develop this; if they could, they would have. How could Congress equip the citizens who must come forward? We did this in some types of OEO situations. How could we do this environmentally? This would equip you, in a sense, with a faster way to work more efficiently.

Mr. BERLIN. I think there is no question about it.

One of the reasons you have delay in many situations is precisely because of the fact that environmental groups become agitated at a very late date and lack the capability, from a technical standpoint, to thoroughly analyze the situation and pick out the points that are the principal concern to them. So they are coming to a proceeding, a rather shotgun approach, and cause chaos.

That is a direct product of the fact that they operate with an extreme paucity of expert assistance. Not just attorneys. Attorneys are to some extent a miniscule problem at this point. Because you can find, if you look around, attorneys who will be willing to do this, either on a greatly reduced fee basis or on a free basis. The area where we need help is in a technical scientific area. Unfortunately the industry has captured all of the technicians. When you find an attorney that gets together with a group and gets served by Consolidated Edison, I think their final preliminary analysis report came to our office in eight cartons. Well, what does an attorney do with that. He tries to find a scientist who can spend a couple of weeks reading, it and there ain't none to be found, I can assure you. You can't even buy it. Because those scientists have grown up in the industry, they are dependent upon the industry and they ain't about to jeopardize their standing with those who would challenge the industry.

Senator GRAVEL. Suppose we turned around and funded adversary scientists within NEPA, under Mr. Train? Would that be the way to go, or would the scientists have to be directed by the citizens? Could the scientists, just as a matter of course, take automatic adversary positions and make critical assessments of reports, and put out their own reports, and rely upon the good intelligence of the American people to seize these reports?

Mr. BERLIN. I think it would be a considerable first step providing, and I don't mean to suggest anything with respect to the CEQ when I say this, that those scientists are housed in an agency that has no promotional function.

Senator GRAVEL. That goes without saying. They would take a total adversary position and be funded permanently.

Mr. BERLIN. Right.

We have played around on the consumer side as to how to fund consumer agencies, independent consumer routes, and the funding problem is a considerable one.

Will we have assurances, for example, that Mr. Train's scientists would be free to do serious work in coal gasification as an alternative, or solar as an alternative when the administration refuses to come forward with meaningful money for that activity?

I would prefer to have an entirely independent agency.

My problem with that is twofold. One, of funding, and second, independent agencies sometimes lose their accountability and I have great faith in the ultimate accountability of Federal agencies. At least we have the ability to have oversight efforts accountability. But it is a most serious problem.

We have got to find some way of having made available to us the scientific and expert technical assistance that would permit us to, on an expedited basis, make a meaningful contribution. Or else we will be floundering around and the administrative process will suffer, necessarily.

Let me say in conclusion, Mr. Luce suggested that perhaps there should be oversight hearings on NEPA itself. With the possibility of amending the Environmental Policy Act. I think from what I said you can certainly conclude that I disagree with the necessity for that kind of hearing. But I do think there is a necessity for hearing to consider a motion that the Chair explored with Consolidated Edison which has a remarkably commendable record with respect to this issue. That is the question of power need. The committee explored with the AEC what to do to determine need and found out they consult with utilities and with the FPC. I suggest to you, you really have got to do some soul searching on the question of need. It is not satisfactory to assume that utilities or the FPC, because I assure you I spent a couple of years over at the FPC, and the FPC relies on the industry figures. They have no independent capability of assessing long-term needs and if they profess to you that they do, I suggest they are fooling themselves and trying to fool you as well.

So, in essence, what we do is rely on the utility industry estimates of need. That raises a serious question. From whence does this need emanate? What is causing it? Are the utilities causing it?

Someone pointed out to me as I was coming into the hearing room this morning and I would like to put this in the record with the chairman's permission, *Calvert Cliffs* came down July 23 and Edison Electric prepared testimony, and I assume they will appear before this committee sometime, come before you crying "chaos," the country is going to be blacked out because of *Calvert Cliffs*.

In the September 1971 issue of Saturday Review there is a full page ad saying, "Come live in the electric climate." It is a very charming picture of one of my favorite pastimes, two people playing billiards.

Senator GRAVEL. Did that company put that out?

Mr. BERLIN. It was put out by the Edison Electric Institute. A full page ad in the Saturday Review. It may be that the lead time was such that they couldn't stop the presses between July 23 and September 21, but I suspect it existed before July 23.

Senator GRAVEL. May we have that?

Mr. BERLIN. Yes. I think there is need for oversight hearings but I think they should be directed at really the gut question, what is this need everybody is talking about and who is causing it?

I know the figures that you cited about $340 some odd million versus 40, over at the Federal Power Commission Lee Wyatt was aghast when he found out the electric utility industry and gas utility industry,

combined, spent one-half of 1 percent on R. & D. I hope we can really work this into these hearings, I am sure they will. I am sure you can put to one side the question of amending EPA, it is far too early. The case has not yet been developed and I hope Congress turns its attention to getting public imput. We can't have imput as individuals but you as our representatives can.

Thank you very much.

Senator GRAVEL. Thank you.

Any questions?

Senator BELLMON. No questions.

Senator GRAVEL. Thank you very much.

(The full statement follows:)

STATEMENT OF EDWARD BERLIN, BERLIN, ROISMAN, AND KESSLER, FOR THE NATIONAL WILDLIFE FEDERATION AND THE SIERRA CLUB

Mr. Chairman: The National Wildlife Federation and the Sierra Club are pleased to accept the Committee's invitation that they appear at these hearings to explore the impact of the *Calvert Cliffs* decision, and the necessity to be sensitive to environmental concerns generally, upon the ability of the electric utility industry to maintain an adequate level of service.

NWF and Sierra, together with a consortium of local Maryland groups, were the organizations responsible for precipitating the *Calvert Cliffs* decision. We say "precipitate" quite deliberately. For while it was our lawsuit which triggered issuance of the decision, the decision itself marked the culmination of a history of judicial frustration with the performance of the Atomic Energy Commission and with the industry which it regulates.

It was, however, and this is critical, frustration not with the ultimate resolution of substantive determinations by that expert Commission, but with the complete absence of procedural due process in the decision-making scheme. We urge you to recognize this distinction for no doubt you have, and will be told, that the federal courts have, through *Calvert Cliffs* and other decisions in environmental cases, demonstrated an eagerness to usurp the exercise of judgment entrusted by the Congress to administrative and regulatory experts. Nothing could be further from the truth.

Despite the seeming plethora of environmental litigation no federal court has yet, nor is at all likely to in the future, usurp the substantive decision-making function. Historically the courts have resisted that role and, if anything, they have reaffirmed this notion of judicial restraint in environmental cases.

Properly viewed *Calvert Cliffs*, as is true of each and very environmental case thus far decided, was concerned with one objective—the realization of procedural due process as defined by the relevant Acts of Congress.

In the National Environmental Policy Act the Congress laid down procedural safeguards intended to insure that major federal actions which could significantly affect the environment are considered in light of their environmental impacts. The burdens of consideration and analysis were placed on the federal agency and the public's right to participate was assured. The *Calvert Cliffs* decision is a reality because, in the words of the Court of Appeals, "the Commission's crabbed interpretation of NEPA ma[de] a mockery of the Act."

The Court was endeavoring, as it took pains repeatedly to point out, merely to give effect to the will of the Congress. To the Court, its duty was clear—"to see that important legislative purposes, heralded in the halls of Congress, are not lost or misdirected in the vast hallways of the federal bureaucracy." Since it was Congressional will that was being determined and implemented, the Congress, to be sure, is free to disagree with the Court's construction. No doubt this Committee has had directed at it impressive sounding rhetoric designed to instill a need for legislative reformation. The industry, we fear, is guilty of the emotional overreaction which it has so long ascribed to environmentalists.

When *Calvert Cliffs* is viewed in its proper scope, when the Congress focuses on the Court's emphatic declaration that it will not in any way usurp the substantive decision-making function but will concentrate on assuring procedural due process, we are confident that the emotional rhetoric will fall of its own weight. For we are confident that in NEPA the Congress intended to alter administrative procedures, to guaranty the consideration of environmental impacts, to

assure responsible citizen representation in that consideration. *Calvert Cliffs* seeks no more. To reject it to any extent is to reject the principle that important administrative decisions, which could profoundly affect the quality of our environment, are to be made frankly, openly and with the public permitted to participate.

To be sure, procedural due process takes time. But it need not, and it will not, result in prejudicial delay if reasonable procedures are formulated. It is to this that the AEC, quite properly, has urned its attention. Hopefully the industry too will soon abort its effort to frustrate the public's right to participate by threatening blackouts and brownouts, and cooperate meaningfully in this effort.

No doubt if one is intent on finding blame for past delays, it can be found on all sides. Commissioner Doub, in an October 18th speech to the Atomic Industrial Forum, chastised industry for its "old-line, close to the vest approach" which dictated that the public must not be permitted to know of a utility's plans until they are "finalized." "[A] philosophy of managerial prerogatives that is," according to Commissioner Doub, no longer viable.

We agree with him that largely the utilities themselves hold the key to unlocking much of the regulatory delay. That they must, at the first possible moment, openly and fully communicate their future construction plans and invite and encourage frank public discussion which must be predicated on the full disclosure of all relevant information in their possession. It is perhaps trite, but nonetheless true, that utilities are after-all protected public trusts and can and must act accordingly.

Delay is not the ally of the citizen inervenor. The resource tariff that it extracts is far too enormous. There is a mutual interest in the formulation of procedures which permit the most expeditious resolution of proceedings consistent with the full and frank analysis of issues by all interested persons.

We share Commissioner Doub's optimism that such can be accomplished without any alteration of the now applicable statutory law as construed by the Courts. All that is required is a cooperative effort to achieve fair administrative procedures and we are gratified that the AEC is moving in that direction.

Early this summer, in response to the Commission's proposed changes to its hearing procedures, the Environmental Defense Fund commented that in its view, which we share, the single weakness which most permeates the then proposed procedure is a failure to provide techniques for easy and prompt access by all parties to all of the relevant data. A large part of the problem is that public access to much of the data which underlies the safety analysis report, the safety evaluation, the environmental report and the environmental statement is not available to the public until a notice of hearing is filed. But the notice of hearing is filed at or near the conclusion of the review of most of this data by the AEC staff, the applicant and the Advisory Committee on Reactor Safeguards. Thus, when the notice of hearing is filed, all the parties, except the intervenors, are ready to begin the hearing and there is no patience with an intervenor who seeks to obtain this underlying data and the time to study it thoroughly. The result of this problem has been growing antagonism between intervenors and the applicant which antagonism itself tends to lengthen the hearing by the use of imaginative procedural strategies.

Procedures for the early participation of intervenors in licensing proceedings are essential. While full intervention at an early stage may be the most desirable course of action, as a start a limited intervention should be permitted and it should be available as soon as an application for a nuclear power reactor construction permit or operating license is received by the Commission. The petitioner should merely be required to show that it is an interested party. No specification of issues should be required and the intervenor should be encouraged to file written interrogatories and motions for production of documents (not to require the preparation of documents) and to file comments on technical matters.

In exchange for being permitted early intervention in the proceeding the intervenor would carry a major obligation which would be imposed shortly after the completion of the staff and ACRS review of the application. At that time the intervenor would be required to submit a detailed statement of each legal and factual issue which it intended to raise in the proceeding, the documents and answer to interrogatories upon which it would rely in support of those issues, the scope of cross-examination which it intended to undertake with respect to those issues, and where known the direct testimony which it intended to present.

Within a short time after the intervenor has presented its detailed statement of issues, applicant and the staff each should be required to produce a similarly detailed statement of their issues and of any direct testimony upon which they intend to rely but has not already been disclosed. The comments submitted by the intervenors during the staff review and the interrogatories filed should give the applicant and the staff a good idea of the direction which the intervenor is taking and preparation of their detailed statements should not require very much time.

With the submission of these detailed statements by the parties the hearings should be ready to commence on a continuous basis within 90 days of completion of the staff and ACRS review. At a pre-hearing conference the Board can schedule receipt of evidence, cross-examination and presentation of direct testimony. Once the hearing commences deviation from the pre-hearing statements would have to be justified by the parties.

The advantages of this procedure would be three-fold: (1) it would enable all parties to conduct their review of the plans simultaneously, (2) it would emphasize the need for intervenors to have all the facts as a pre-condition to presentation of their case, and (3) it would impose stringent requirements on the parties once an opportunity for all the facts has been developed which requirements will result in a far speedier and orderly hearing.

We do not insist that these procedures represent the most reasonable approach. We do suggest that they demonstrate that, moved by a spirit of cooperation among the Commission, the industry and the public, the AEC's procedures can accommodate the Congressional desire for full analysis, the public's right to be heard, and the industry's need to realize the timely implementation of plans. Like Commissioner Doub, we do not view these competing stresses to be at all incompatible.

No doubt you will, however, be told by some that any delay, as to plants soon to be ready for operation, will create a highly prejudicial situation and threaten a given utility's ability to meet its peak demand. Accepting for a moment the validity of the industry's peak estimates, there is simply no basis to that claim.

The Court in *Calvert Cliffs*, while refusing to permit the wholesale abdication by the Commission of its Congressionally mandated responsibilities through generalized threats of power shortages, recognized the need for and legality of flexibility in individual cases and the Commission's post-remand procedures provide for limited plant operation in advance of completion of full administrative consideration. The shocking fact is that notwithstanding this option, and the constant industry admonition that blackouts are a certainty, with few exceptions industry has failed to avail itself of the benefits of limited operation, operation which would carry companies over their peaks.

In the few situations where limited operation has been sought, companies have received the full support of their environmental "antagonists." Thus, Con-Ed is able to commence testing its Indian Point plant at 50% capacity because of the concurrence of the Environmental Defense Fund notwithstanding the company's failure to submit relevant environmental data in sufficient time to permit the completion of orderly hearings. Con-Ed has a summer peak and requires a six month testing period prior to the commencement of actual generation. EDF's concurrence in the testing program, to run simultaneous with administrative hearings on the operating license application, will permit the Company to keep to its schedule. We consider this demonstration of cooperation highly responsible and a clear indication that environmental intervenors do not seek simply to obstruct.

Similarly, the operators of the Palisades Plant will be able to operate at 60% capacity, and meet peak requirements, precisely because of the cooperation of the citizen intervenors.

In view of the opportunity to obtain limited operational authority in advance of completion of the required administrative procedures, in view of the industries failure to utilize that opportunity, and in view of the deep sense of responsibility and cooperative attitude displayed by environmental intervenors where such authority has been sought, it simply is fallacious, we submit, to attribute any delay or crisis to the *Calvert Cliffs* decision. Today, as has always been the case in the past, utilities hold the key to delay and they have not seen fit to act accordingly. We must simply conclude that the crisis, if indeed any exists, has been magnified way out of proportion in an emotional overreaction to a decision, and a country-wide mood, that declares it no longer satisfactory to permit utilities to operate "close to the chest"; that affirms the public's right to participate.

In closing let us reaffirm our gratitude for these hearings for we are confident that the Committee's deliberations will accomplish much if it puts *Calvert Cliffs* and the threat of impending crisis in their proper perspective. In so doing we would hope that the Committee would pause to consider the question of power need. If oversight is appropriate as to any issue, it is as to that one.

What is the nature of this escalating power need? Are the utilities themselves largely responsible for it? Is it in the National interest and if not what steps should and must be taken to reverse this alarming trend?

These are the critical questions. They demand full, open and expedited consideration. Yet regulators, be they Federal Power Commissioners or members of the Atomic Energy Commission persist in their blind deferral to industry projections.

Here too the public has a right to participate. It has a right to examine the costs and the benefits of "growth" and to proclaim its view. No utility should have a right to use the public's money to promote the escalation of electric consumption, and of necessity the consumption of the public's resources (fuels, air and water) without affording the public a right to participate.

Yet it seems clear that without Congressional oversight the public will continue to be excluded, will be denied the ability to influence basic decision which will affect profoundly the quality of life. We urge the Committee to turn its attention in that direction.

Thank you.

(The following questions were submitted to Mr. Berlin subsequent to the hearing; answers had not been received as of publication of this record.)

United States Senate
COMMITTEE ON
INTERIOR AND INSULAR AFFAIRS
WASHINGTON, D.C. 20510

November 30, 1971

Mr. Edward Berlin
Berlin, Roisman and Kessler
1910 N Street, N. W.
Washington, D. C.

Dear Mr. Berlin:

May I take this opportunity to express my appreciation for your excellent statement on November 3 on the implications of the Calvert Cliffs court decision. Your statement was very informative.

In reviewing the transcript of the hearings, additional questions have arisen from the members and the staff which are enclosed for your response. While some of the questions were touched upon in your prepared statement, you may wish to expand upon your testimony.

Receipt of your response by December 15, 1971, would assist the Committee in our evaluation of the hearings.

Thank you for your assistance and cooperation in this regard.

Sincerely,

Henry M. Jackson
Chairman

EDWARD BERLIN, PARTNER,
BERLIN, ROISMAN, AND KESSLER

QUESTIONS FOR THE RECORD

SENATE INTERIOR AND INSULAR AFFAIRS COMMITTEE

November 3, 1971

(1) The Atomic Energy Commission's revised regulations reflecting the Calvert Cliffs court decision state explicitly in Appendix D, Section E, part (c) that "the power needs" will be "of utmost importance" in the A.E.C.'s decision whether or not to suspend permits and licenses pending completion of the Court-ordered environmental and safety review. In testimony on November 3, Commissioner Doub indicated that the A.E.C. will rely on reports from the Federal Power Commission to analyze the "need". Reportedly, the F.P.C. gets its information about the "need" from the utilities.

(a) Are you aware of any other sources for information on "power needs" other than the utilities--who are the license applicants?

(b) Is it possible for an intervenor to challenge an applicant's claims for "power needs"?

(c) What recommendations, if any, would you make for Congressional investigation of "power needs"?

(2) Under the Atomic Energy Act, the A.E.C. has the assignment of promoting the use of nuclear energy as well as regulating it for the protection of public health and safety. The A.E.C. appoints the members of the Atomic Safety and Licensing Board who rule on construction permits and operating licenses for nuclear power plants. Frequently members of the Atomic Energy Commission staff appear at

permit and licensing hearings and testify in favor of the licence applicant.

To what extent is "due process of law" affected in such an instance where the reviewers (the members of the A.S.L.B.) are appointed by one of the participants in the proceedings (the A.E.C.)?

(3) As a result of the Calvert Cliffs court decision, the final decision on the cost-benefit analysis for a given nuclear power plant application resides in the Atomic Safety and Licensing Boards. What is your opinion on the desirability for placing such a decision on the social and economic impacts in a three member Board appointed by the Atomic Energy Commission? What alternative would you suggest?

(4) Based upon the experience of your law firm, what changes would you advocate in the current Atomic Energy Commission permitting and licensing hearings to allow for maximum presentation of divergent views or nuclear safety and environmental effects while providing for orderly and timely decisions on applications?

(5) In the experience of your law firm, to what extent is consideration given in nuclear license hearings to the following sections of the National Environmental Policy Act:

Section 101 (b) (1); Section 101 (b) (3); Section 102 (d); and Section 102 (E).

Senator GRAVEL. The next gentleman is Mr. Donald Allen, president of the Yankee Atomic Energy Electric Co.

STATEMENT OF DONALD G. ALLEN, PRESIDENT, YANKEE ATOMIC ELECTRIC CO., ON BEHALF OF THE EDISON ELECTRIC INSTITUTE, ACCOMPANIED BY JOHN J. KEARNEY, VICE PRESIDENT OF EDISON ELECTRIC INSTITUTE

Mr. ALLEN. Thank you, sir.

Senator GRAVEL. Mr. Allen, are you appearing on behalf of the outfit that just paid for this advertisement?

Mr. ALLEN. I am appearing on behalf of the Edison Electric Institute, Senator, and with me is Mr. John J. Kearney, vice president of the institute. I come from New England, I am a vice president of the New England Electric System.

In view of the time, if I may have the privilege of submitting my statement in full as if read, I would be happy to attempt to summarize and answer any questions.

Senator GRAVEL. It will be included as if read.

Mr. ALLEN. I take it I need not introduce the Edison Electric Institute. Our companies serve the great majority of the electric consumers in the United States, and in terms of today's hearings own substantially all of the nuclear powerplants affected by the *Calvert Cliffs* decision, with the exception of those owned by some of the more substantial public power bodies.

TVA, Sacramento, two in the Northwest, two in Nebraska, two in New York are not owned by Edison Electric companies.

My prepared statement is merely a recital of the event that brought us here today. I would like to clear up what I think is a misapprehension on Senator Gravel's part, that the *Calvert Cliffs* decision decided nuclear power was so unsafe that the court had to stop it; and that no one else in the Federal Establishment had the wit to do so.

I think, as Mr. Berlin correctly pointed out, this is not the holding of the District of Columbia Circuit Court. This is limited solely to the procedural mechanism for dealing with the NEPA issues in the AEC licensing process.

The *Calvert Cliffs* decision says this must be an integral part of every step of the AEC review which heretofore had been devoted almost exclusively to safety. This will, we think, take additional time. We feel as a practical matter this will add substantial delays in the licensing process for all nuclear reactors from here on.

We think the plants most affected are those well along in the licensing process, approaching completion of construction, and counted on to go on-line this coming year or during the next 2 or 3 years to satisfy needs which, regardless of how they happened are here and must be met.

I point out in my statement the essential fact is that for these plans it is too late to look for alternatives, there is not that much time; and I would like to expand upon that later.

Furthermore, there is no replacement power available in the quantities that may be needed. Virtually every area in the country is affected either by the delay in nuclear capacity or by restrictions imposed on the operation of fossil fired plants.

We think there will be serious power supply situations in many parts of the country—I will detail them later. The point which I don't think has been made sufficiently here is that there is a normal leadtime for planning nuclear capacity or any generating capacity: these are very large machines and take a great deal of time to design, engineer, and construct.

So if you slip a year's vintage of generating plants of major size, you have a continuing hole until, in your planning in the future, you can schedule a double vintage of plants.

If, as we believe, there will be quite critical power supply situations that arise because of the effects winter peaks have in the Northern States, summer peaks in the Middle and Southern States, in 1971 and 1972, we feel we cannot assure ourselves—and therefore you—that the situation can be righted in anything less than about 5 years.

So if we are indeed, as I think we are, coming to the stage where we haven't got enough power to meet the demand, we are going to have to go in for some sort of power rationing for the next 5 years before the situation clears.

We point out, and many others have, that the costs of delay, be it a day or a year or 2 years, are very substantial. I don't want to argue that as something which the utilities shield is a personal problem for them. We feel this is a problem which will affect our consumers. We feel it is very possibly an appropriate cost to pay for environmental protection.

We hope that the environmental costs which are being factored into the cost of power, the cost of all other energy, in the future be used as wisely as possible and I have a suggestion on that before I finish.

It will, of course, be short-termed effects on this environment, also pointed out before, in that if we do not have what we believe is the cleanest sort of electric energy production, nuclear, we will necessarily have to run, rather more than we hoped, power older, less efficient fossil burning plants and we will contribute to the air pollution that we hoped to avoid. We don't feel that the outlook is wholly bleak. We are very encouraged to hear the Atomic Energy Commission planning to give their utmost priority attention to speeding up the critical cases and to doing everything they can to expedite the licensing process generally for the nuclear plants.

We feel efforts are needed to make sure we have procedural changes in the licensing process which will reveal and bring to the surface the real issues, both safety and environmental and dispose of them within a reasonable time schedule.

Over the longer term, I think there are areas where I am not wise enough now to predict but remedial legislation may well be needed. Some of the obvious things have been suggested today by numerous witnesses, legislation directed toward the first group of nuclear plants which are being delayed are greatly needed for the power supply situation.

We may well want to have legislation to make certain that these plants can go on the line upon a showing there is no irreversible environmental damage and, as Mr. Berlin's client in the *Con Edison* case agreed to, to debate thereafter what can be done to minimize the environmental impact of needed plants.

Turning to my statement I give you the details as to why the Edison Electric Institute thinks there will be substantial delay.

Let me summarize.

We do not think that the delay from the environmental review is going to occur in major part at the staff level prior to the public hearings. We were very encouraged to hear the extraordinary steps which the AEC is taking to obtain the cooperation and support at the national laboratories, to find contractor help, and to beef up their own staff.

Even then it is an enormous job. We can't be sure it will happen overnight—and indeed if it does it will not happen meaningfully.

Senator Gravel and Mr. Berlin have deep doubts, and they are merely proxies, and very able proxies, for other people who have deep doubts as to whether the environment will not be adversely affected and whether there are appropriate tradeoffs.

These are not easy issues and this is what we are debating here. To expect that these issues, even with the best of good will, will be debated and resolved through the adversary process of discovery, direct testimony, cross examination, briefing and ultimate decision in the course of 2 or 3 weeks, even 2 or 3 months, certainly in the early cases, I find very difficult to believe in all realism.

Senator Gravel. But there is nobody here, and I have been here all day, talking in terms of 2 or 3 weeks. They are all talking in terms of years delay. So there is nobody hallucinating that it will be very brief.

Mr. Allen. I agree. I think there will be a few plants licensed in less than a year. But I think it is realistic to believe, on the average, that both the plants now in the licensing stage and in the future will take an extra year to resolve these issues.

This is merely prelude, I think, to the statement EEI has prepared and circulated, which has been referred to by virtually every witness here today. This is a survey to determine what would happen to power supply in the various power supply regions in the country if we did have an average delay of about a year on in-service date of the nuclear powerplants.

This was not done by EEI sitting and dreaming, but EEI asked each of the reliability councils (there are nine of them throughout the country) what would happen to their power supply if the nuclear plants scheduled between now and 1975 were delayed for a year. The analysis, as I happen to know in my own area, was very carefully done and all possible alternatives were explored including replacement power, additional to gas turbines, practically anything that the imaginative power engineers I know could think of.

The results are set forth in the survey which is appended to my statement. Perhaps the easiest way to catch the summary is to turn to the last page to see which areas will be seriously affected in the years 1971 through 1975.

Doing this geographically as it appears there, we anticipate serious power supply situations in the Northeast, which includes New England and New York. In the Middle Atlantic States, which includes the PJM interconnection: New Jersey, Pennsylvania, Maryland. In the southeast region the TVA territory, the Carolinas and Virginia, the southern system. In the Midwest, the Chicago area and the Wisconsin

and upper Michigan area. In the north-central region, which extends from Minnesota west to the Dakotas and on to the Rockies. In the south-central region. In the Pacific Northwest, which is already in a difficult situation if water conditions are below average. And, finally, in the northern and central California region.

This I think is pretty close to two-thirds, if not three-quarters of the geographic area of the United States.

We did not say there will be blackouts, Senator, we have every belief we have the skill to prevent blackouts. When I say blackouts, I am talking about situations that are comparable to that which affected the Northeast in 1965. This was the out-of-control blackout, where a power fault resulted in instability of the entire system and one after another of the generating plants was knocked off the line. With skill and foresight, and with the many additional monitoring devices that all of us have put on our systems since then, we believe we can prevent blackouts of that massive type.

What we have to do is find some means of rationing power if we don't have enough to go around. The first thing we can, and will, do is reduce voltage. This affects everybody, but just a little bit.

The next thing we can do is to appeal, on a voluntary basis, for industries to close down over a peak period, for supermarkets and shopping centers to turn out the lights and close their doors, and, if you like, to turn off the neon signs and stop using the electric toothbrushes or air conditioners. This has been done in other situations, most recently by our friends in the gas industry; it can be done.

The next thing we would expect to do would be actual load shedding. This can be done on a selective basis, first interruptible customers of whom there are few that can be shut off. But ultimately this gets down to the most equitable form of load shedding, the one which Con Edison was forced to use last summer, in which each sector of the company's territory was disconnected for an hour or so, and after you have your turn, Senator Bellmon has his turn and then I have my turn or perhaps the order should be in reverse.

This is not something which we expect to be greeted with joy. It is not something we want to do.

The problem that affects us is that we believe we so planned our supply on a regional basis that this should not have happened. If this is to be the result of a longer regulatory review, we trust this is an appropriate price for the environmental review and any changes which may come from it.

Again, I would like to repeat, if we do find ourselves in a critical supply situation and I trust we will not have to go as far as actual load shedding. But we may not have an adequate supply situation, and we may well live on the brink of potential load shedding for a number of years before we can remedy the situation.

In my statement I will skip over the cost of delay, beyond pointing out that even on a minimum basis . . . I find within the industry I am something like 50 percent below anybody else's estimate because I have taken only the absolute minimum, unavoidable costs of carrying charges on idle production facilities.

On this minimum basis, we are thinking in terms of something like 5-percent increase in cost to the electric consumer as the price of the environmental reviews.

I would like to point out we do not feel this is without hope, we think there are solutions. We are very encouraged to hear AEC first say they are going to give priority attention to the environmental review internally. We are also encouraged to hear Commissioner Doub say today that very serious thought is being given to trying to rationalize the present rules of practice and procedure in public hearings. We feel one of the very difficult problems here is the tossing back and forth of the ball, of saying, "Don't tell me that you have confidence that this is safe that you have high confidence that this will not result in a change in the aquatic life. Prove to me this is absolutely 100 percent true; that no findings of a Nobel Prize winner in nuclear physics, and no incident in a reactor in Pakistan tomorrow can change your views that nothing can happen."

I believe that the entire problem is one of how we make decisions. We should not make decisions with anything less than full investigation and high confidence in our results. But we can never make decisions if we are asked to prove that something is absolutely 100 percent true, that it can never change. We have never found a man since Plato, on through to the present day, who can honestly say that he knows anything 100 percent correctly. This search for absolute certainty is one of the enduring problems in the public hearing.

We feel that NEPA basically is a workable document; that it tells every Federal licensing agency to hear, to listen, to investigate, to make as responsible and reasonable a judgment as possible of the probabilities of environmental impact versus environmental benefits; but having done an honest and thoughtful and responsible job, then to make a decision.

We have at the moment created a proceeding that is simply designed to carry on the investigatory procedure forever and never reach a decision one way or the other; or, in terms of actually living in this environment of ours, either deciding there should be this plant or, if not, there should be an alternative. The point Mr. Luce made I thought was most effective.

Getting back to the procedural problems, we feel it is very important that the basic agency safety and the environmental review proceed on the same time track. This means that the AEC must go forward before all of the underlying permits at the State and Federal level have been granted. This may be difficult. But in no other way can we expect to do anything more than double our licensing time.

I was much encouraged by Mr. Train's statement, echoed by Commissioner Doub, that means are being explored to see whether the dual Federal "view from Olympus" on the environmental matter, first by the AEC and then the Corps of Engineers, cannot be consolidated. We would urge that this be done and we think it is entirely consistent with NEPA.

We also look to the AEC for some definitive guidelines on what the cost-benefit analysis shall be, how many other alternatives we must investigate, and whether they shall be reasonable alternatives or imaginative alternatives for supplying power.

We are looking for help, particularly in the examples set in Indian Point and Palisades, in workable arrangements for putting plants on line without prejudice to a further environmental review. But as Sena-

tor Hatfield pointed out he is not sure this can be done without the consent of an intervener, and we hope that will be forthcoming. If the situation becomes an unbearable stalemate, we hope the AEC will examine their regulations to permit the procedures Mr. Ramey spoke of; if not, that there be some remedial legislation either from the joint committee or this committee.

We do feel in the longer term that NEPA was intended not as a final piece of legislation to guide all agencies in detail, but as a ringing declaration of concern for the environment—which utility managers share as much as anybody else.

NEPA is necessarily a broad act, and it is going to be interpreted, not just in Calvert Cliffs, but by many agencies and courts.

There may be times, it seems to me, when Congress may want to not only review but also to give some guidance. I suggest this can be done through oversight hearings as you are doing. I also think it is worth while exploring the possibility of a joint resolution interpreting some of the details from time to time as to how you would like to see NEPA administered.

I think there is clearly a possible need for future amendments.

Finally, I think a long-term solution—and many people have talked about this—is some kind of consolidation of the environmental reviews.

The number of environmental permits which are involved in building any kind of powerplant, nuclear or otherwise, is staggering. They are disjointed, they are duplicative, they run on different time tracks. Starting from the local municipal level to the Federal level there is a different focus in each. The net result of this is that it is very difficult to know where the action is, to know just what the environmental impacts are.

You see first one aspect of it, fish let us say; then this aspect, perhaps swimming; then his aspect, say, air pollution. There should be one place where all these things can be brought together and decided. There should also be every possible input. There should be the input of the responsible State, local, and Federal agencies. There should be the input of the utility, and the input of the concerned and affected citizen.

The thing we need is some way of making a single decision so that definitive plans may go forward at minimum cost in two respects: minimum cost in dollars, obviously; but more importantly minimum cost to the environment.

Or putting this another way, that the dollars we spend are spent as wisely as possible for as broad benefits as possible.

I believe this is not now being done under our duplicative and somewhat disjointed system of a series of individual reviews on different aspects.

I want to thank you for this opportunity to testify I will be happy to answer questions to the extent I am able.

Senator GRAVEL. Senator Bellmon.

Senator BELLMON. Mr. Allen, let me express my appreciation for your statement and appearance here.

I would like to ask you a couple of questions and this one may be a little off target but while you are here I would like to raise it.

You raised the possibility of giving us information that we have delayed in putting some of our new generating plants on stream, that we may be forced to black out areas or otherwise reduce the use of electric energy.

Now, does your institute feel we are also likely to face blackouts because of a shortage of basic energy, natural gas, or coal?

Mr. ALLEN. Certainly, we don't feel that is an immediate problem. If I may give my personal answer to this, we do know our natural gas supply is limited and has been extremely limited in the past few years. We know we are dependent on offshore oil in an increasing measure for our oil supply. We know we have adequate reserves of coal, but coal mining has its own problems, both environmentally and in health. We know we have a limited source of the uranium which we now use for the light water reactors, because we must have the light isotope, U2–35 which is fissionable. Putting all of this together, I am completely convinced that the way we should go is toward breeders for electric generation. It means we will be tapping a new fuel, in effect. We are tapping the U–238 isotope which now, in effect, we throw away. It is something we have in great abundance in our own country and we are not dependent on offshore supplies.

To my way of thinking, this is the best hope for not running out of energy in the rest of this century. I worry about the abundance of the other sources of supply with the exception of coal.

Mr. KEARNEY. May I just make an observation?

The institute is carrying out a study of energy and fuel availability and we have communicated with the chairman of your committee, Senator Jackon, and told him we would make it available to him when it is concluded, which is probably going to be early next year.

Without giving any preview on it, it is basically in accordance with the observations Mr. Allen made.

Senator BELLMON. You are then hitching your hopes to the breeder reactor.

How long will it take to get breeder reactors into widespread and common production?

Mr. ALLEN. I think we have to build on the experience of the light water reactors. It seems very clear that we have to go through the demonstration period, both from the point of view of knowing what we are doing and how this new reactor will live on a utility system.

My own company, Yankee, was responsible, for an early demonstration plant of the pressurized water reactor failing. It was based on what we found as to the reliability of this plant and its safety, that we were all able to go forward with the pressurized water reactor. This is the sensible way to go forward, it is the next step in the breeder program, and we hope to have one or more demonstration reactors on line by the early eighties.

If history repeats itself, this should mean commercial size plants to go on stream in the late eighties.

Senator BELLMON. So it will be 1990 before we have substantial quantities of energy available from the breeder reactors?

Mr. ALLEN. Yes.

Senator BELLMON. Are you concerned about what we will do between then and now?

Mr. ALLEN. Yes; I am concerned, naturally. I am concerned but I don't have the answer.

Senator BELLMON. Your study treats this question I assume?

Mr. KEARNEY. Yes, sir.

Senator BELLMON. I will look forward to seeing that because I am also very concerned. I am not sure we can pin our hopes to the breeder reactor and solve that kind of problem. I want to ask one other question and I will finish.

You mentioned the need for, you might say, one stop service here as far as getting all of the questions answered and permits granted. Do you feel that the Congress or the regulatory agencies would be justified in setting some reasonable time frame for the complaints to be heard and the permits issued?

Mr. ALLEN. I am a lawyer by trade and you ask me a difficult question. Yes; indeed we must set our sights on expeditious handling. This does not, and I don't think it could ever mean we will go in for star chamber justice and say, "Senator Bellmon, you have had 5 minutes and we don't want to hear you any further."

Senator BELLMON. Well this is the senatorial process. [Laughter.]

Mr. ALLEN. Somehow we must find means of accommodating this.

I have reasonable faith in the way that we Americans finally solve our problems. I believe that we can, but how we are going to do it, I don't know. I think having a single forum to debate these issues is certainly the first step. It would not be an easy proceeding, with, let us say, 100 participants.

Senator GRAVEL. The study you talk of, is there any attention focused on solar energy?

Mr. KEARNEY. This study that I referred to that we will send you is limited to the period between now and the eighties.

Now, as far as other forms of generation is concerned, Mr. Luce alluded to a study that was made by the Electric Research Council which is an organization for the coordination of research within the electric utility industry. It has both investor-owned and noninvestor-owned systems on it.

Just recently they put together a task force called R. & D. Goals Task Force which looked out to the year 2000 for the needs of the electric utility industry.

It was a rather unique study, I think it was the first time an industry examined itself in such detail.

Senator GRAVEL. Could you send us a copy of that?

Mr. KEARNEY. Yes, we will send you that.

But to answer your question, it is coming in there. This is one of the goals. The indications or recommendations are that this should be followed at a moderate funding level and not at the level of some of the other types of generations such as fusion or MHD and the breeder.

Senator GRAVEL. So you recommend more funding for fusion and MHD?

Mr. KEARNEY. Yes, sir.

Senator GRAVEL. Do they agree with the funding of the breeder reactor to an extent?

Mr. KEARNEY. These are recommendations of a goals task force. This has not been acted upon by the Research Council. One of the top priorities is the breeder reactor, yes, sir.

Senator GRAVEL. As I interpret your concluding recommendation, it is that we should have a 102 statement to cover either the entire breeder reactor or entire water-cooled reactor program, so we don't have repetition of certain arguments at every license hearing?

Mr. ALLEN. Senator Gravel, I have difficulty in reading NEPA as meaning that. Possibly the way to get at this is to require a NEPA statement when you appropriate money for the breeder program for the AEC. I don't know how you are going to get congressional business done if you do this generally. I am not at all clear that NEPA itself contemplated this or requires it. It could easily be amended to do so.

But as things now stand I don't think it is required; if it is desirable perhaps it could be done.

Senator GRAVEL. Well, we just had a conversation with Mr. Train on this. Do you think it is desirable? All I am suggesting is that if we have one big 102 statement on the breeder reactor and also the water cooled reactor, we might be able to shorten the 102 statements on individual plants.

Mr. ALLEN. Well, if I may I would answer in two parts. First, I think it is desirable and, second, I think it already has been done in great depth. The basis for the AEC breeder program, the basis for the industry's belief that this is the way to go. It has been carefully considered by Congress, among others, and it has considered the environmental impact as well.

Senator GRAVEL. If it has already been done in great depth, why would the President of the United States call for an environmental statement on the prototype?

Mr. ALLEN. I assume that this is by way of speeding up the demonstration reactors which would require an environmental statement and environmental hearing.

Senator GRAVEL. How much money does your institute have annually? How much do you collect from your members?

Mr. KEARNEY. The basic budget is several million dollars, the research is more than that.

Senator GRAVEL. How much research money do you collect?

Mr. KEARNEY. I haven't the exact figure.

Senator GRAVEL. Can you provide figures showing how much money the EEI spends for research, how much you spend on advertising, and what your total budget is?

Mr. KEARNEY. Yes, sir. You realize we don't do all of the research.

Senator GRAVEL. No; I realize that. I would like to know the total utility research funding.

Mr. KEARNEY. The total research is running about $150 million a year, which is a figure a little different than the one you have because it includes that portion of the research done by equipment manufacturers which can be identified as going toward electric power production.

Senator GRAVEL. Do equipment manufacturers put research into transmission poles and cable and things like that?

Mr. KEARNEY. Yes, sir; all types of equipment and of course, we pay for that in the price of the product.

Senator GRAVEL. You are customers. So it is no different from any other manufacturer who is trying to improve his product?

Mr. KEARNEY. Yes, but I think there is one difference in that we are a service industry. If you compare it with other service industries, the level of our expenditures is about the same.

Now, we recognize the need for more research being done and funded directly by the industry, and that the traditional way of doing it through the equipment manufacturer cannot continue. This is the purpose of the goals task force.

Senator GRAVEL. Very good.

I would like you to break out and submit separately the figures spent by the equipment manufacturers. I would like to get a feeling on how much money the utilities are spending in sheer research, so we could make an assessment of how much effort we are seeing today.

My other question is, regarding advertisements like this by your institute, how much money do you spend on this?

Mr. KEARNEY. We will supply that.

(Subsequently the following information was supplied for the record.)

EDISON ELECTRIC INSTITUTE
90 PARK AVENUE • NEW YORK 10016 • (212) 986-4100

November 19, 1971

Honorable Henry M Jackson, Chairman
Interior and Insular Affairs Committee
United States Senate
3106 New Senate Office Building
Washington, D C 20510

Dear Senator Jackson

During their appearance before your committee on November 3, witnesses for the Edison Electric Institute were asked to supply the following:

1. Electric Utility Industry R&D expenditures, broken down as follows:

   a) Expenditures of Electric Utility Companies
   b) Expenditures of Edison Electric Institute
   c) Contributions of the manufacturing industry that can be identified as expenditures for electric utility industry R&D

2. Budget of the Edison Electric Institute, broken down as follows:

   a) General expenses
   b) Research and Development expenditures
   c) Advertising and sales promotion expenditures

3. Comparison of the efficiency of home heating with electricity and with gas or oil.

The requested information is set forth below.

1. Electric Utility Industry Research and Development Expenditures

In the mid 1960's, according to surveys conducted by the Edison Electric Institute, annual R&D expenditures by electric utility companies and EEI amounted to approximately $47 million. An estimated additional $105 million was being spent annually by leading electrical equipment manufacturers on R&D activities specifically identified with electric utility equipment. The re-

sulting total annual R&D expenditure of approximately $150 million is estimated to be the current level. The Institute's R&D budget for 1971 is approximately $10.2 million. The level of expenditures for research through EEI increased by a factor of about 30 during the period 1961 to 1970.

As indicated during the question period following the EEI testimony, planning activities initiated during the past year will in the near future lead to an unprecedented expansion of the electric utility industry research program. Two task forces of the Electric Research Council -- the organization that coordinates research within the electric utility industry -- are conducting in-depth studies of industry R&D goals and financing.

An R&D Goals Task Force group has identified research goals, priorities, timetables and cost estimates to the year 2000. Annual research expenditures averaging $1.12 billion over the next 29 years were recommended. This report has been accepted by the Electric Research Council as a benchmark in planning an expanded industry R&D effort, and it is the consensus of industry leaders that immediate steps must be taken toward the program outlined in the report. Moving toward an expanded program, the investor-owned segment of the industry has made commitments to date for more than $208 million to assist in building a liquid metal fast breeder reactor demonstration plant.

Concurrently, a finance task force of the Electric Research Council has been working on an administrative and financial plan for meeting industry R&D needs. Within the next few months we expect that conclusions will be reached on these matters.

2. Edison Electric Institute Budget

The regular activities expense budget of the Institute for 1971 is approximately $4.5 million. For the same year the industry's advertising program through EEI's Live Better Electrically Program amounts to $2.5 million. As previously indicated, R&D expenditures for 1971 are budgeted at approximately $10.2 million.

The objective of the Live Better Electrically Program is to inform consumers of the beneficial uses of electric energy and the contributions electricity makes to the environment and the quality of life. Insofar as practical, the advertising program informs consumers of those end uses of electricity which enhance system load factor and contribute to load balancing, thereby aiding in the control of costs for the benefit of users.

3. Comparison of the Efficiency of House Heating with Electricity and with Gas or Oil

In the generation of electricity, an initial input of 9,000 to 10,000 Btu produces a kilowatthour with a heat content of 3,413 Btu. An average of roughly 7% of these remaining Btu is lost in transmission and distribution.

At the point of use, however, electric resistance heating is virtually 100% efficient. With the electric heat pump, even more usable Btu of heat are produced than are fed in from the electric power source. This occurs because the heat pump recovers heat from the outdoor air and adds it to the heat produced electrically. The heat output of a heat pump in a typical single-family home is about double the amount of the equivalent electrical input.

In the case of oil and gas, pumping, refining and leakage losses typically add up to 10% or more. These losses occur prior to the point of use.

At the point of use, the maximum efficiency of an oil or gas furnace under controlled conditions can be as high as 80%, but on a seasonal basis is typically about 50%. Moreover, much heated air is used for combustion and must be replaced with outdoor air. The additional Btu required to bring this outdoor air to room temperature can be substantial on a cold day.

Taking all of these factors into consideration, in the complete energy conversion process, the over-all seasonal efficiency of the residential electric heating system varies from 30% to 40%. The over-all seasonal efficiency for oil and natural gas heating systems ranges from 36% to 58%.

If further information is desired, please do not hesitate to let me know.

Respectfully yours

W Donham Crawford
President

rce

Senator GRAVEL. What is the motivation for advertisements for electric home heat?

Mr. ALLEN. I think we would both like to respond to that. I have not seen the ad, would you hold it up?

Senator GRAVEL. Yes.

Mr. ALLEN. I would like to get quite fundamental here.

I will take this in two bites. First, what we are talking about throughout this hearing is quality of life. It seems to me that it is unthinkable that we are going to tell all Americans that they might not aspire to a warm home, to a home with reasonable appliances in it.

I have a son who just came back from the Peace Corps. If I told him he would have to limit his electric use to the extent that he couldn't run his stereo, I feel it might have something to do with his quality of life. Of course, it might have a reverse effect on my own. [Laughter.]

So we are talking about one aspect of the quality of life and I for one do not want to apologize for it. There are other aspects as well, and unspoiled wilderness is one.

In my own private life I am active in the outdoors clubs; my release from problems is to get out of doors.

Second, on electric heat, I would like to point out when you take into consideration all aspects—all the way back to the source of fuels, the pipelines, the barges, the tankers, the entire problem and add up the entire bill, you wind up with an interesting offset as to whether it is wiser to heat with oil or gas or heat by electricity. The one thing that stands out for me is that in the final balance I heat by oil, I blush to admit it, but on a cold day I know that what I am doing soils the atmosphere in my neighborhood. I know that if I made the investment to heat by electricity there would be a higher level of efficiency in burning an equivalent amount of oil. And I worry about it. There is something to be said from the environmental point of view and I don't think the question is foreclosed either way.

Senator GRAVEL. Well, in the ratio of 2 to 1 in fuel efficiency——

Mr. ALLEN. You have to then ask what is the efficiency of that oil burner. If mine is typical I don't think I am getting anything like the performance my friends in the powerplants are getting.

Senator GRAVEL. Maybe you could supply for the record, then, where heating a home is cheaper and more efficient——

Mr. KEARNEY. Not necessarily cheaper.

Senator GRAVEL. Well, an efficient use of fuel compared with home furnaces.

Now, regarding the point that you make about not telling your son that he can't use the tape deck and the TV, there is a difference between advertising for it and forbidding it.

Mr. ALLEN. Well, this is philosophy and emotion now, I happen to be proud that I am working for an electric utility. I am proud of the fact that what we have done has given us an increased quality of life. And I do not blush because of advertising, to tell the story that the use of electricity can contribute to the quality of life. That is what I think you are trying to pin on me with this advertisement.

Senator GRAVEL. No; I just think it is a waste of money.

Mr. ALLEN. We don't.

Senator GRAVEL. When we get people coming to us from the utility industry and telling us they don't have enough power sources, while they are out advertising to sell more power, there is something wrong.

Mr. ALLEN. I would like to respond to that. If the power shortages that we think may be imminent are realized, we are going to have to do a massive job of having to ask people to please limit their electricity use. Institutional advertising, I think, necessarily will have to go in that direction. Had it not been for the *Cavert Cliffs* decision, I don't think we would have been there.

Senator GRAVEL. Then you will have to advertise just the opposite of what you presently advertise.

Mr. ALLEN. Yes. Until we can remedy the situation.

One of the biggest problems of electric utilities is that everybody expects us to be there and we like to occasionally let them know we are doing a good job. I think this is worthwhile.

Senator GRAVEL. Well, I don't think we can arrive at anything on this subject. Your answer will stand for the record.

I hope your institute will benefit from the wisdom of your biggest member, Con Edison, and not put efforts on advertising for greater consumption of electricity.

I would like to insert Mr. William Gould's statement in the record at this point. Unfortunately Mr. Gould had to leave to catch a plane for Los Angeles.

The record will remain open for a period of 2 weeks for additional testimony and also for the submission of questions and answers from the members.

The committee stands adjourned subject to the call of the Chair.

(Whereupon, at 5:50 p.m., the committee adjourned.)

(The statements of Mr. Allen and Mr. Gould follow:)

Before the

Senate Committee on Interior and Insular Affairs

STATEMENT OF EDISON ELECTRIC INSTITUTE

November 3, 1971

Hearings on

Energy Implications of the Calvert Cliffs Decision

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My name is Donald G Allen. I am a vice president of New England Electric System and president of Yankee Atomic Electric Company.

I am appearing today on behalf of the Edison Electric Institute, and want to express our appreciation for this opportunity to testify on the energy implications of the recent Calvert Cliffs decision.

The Edison Electric Institute is the principal national trade association of the investor-owned electric utility companies. Its 186 member companies serve over 98% of all the customers of the investor-owned segment of the electric power industry in the United States. These customers comprise more than three quarters of our nation's users of electricity. In terms of today's hearings, member companies of the Institute are the owners of 84 of the 97 power units listed by the Atomic Energy Commission as immediately affected by its new regulations under the Calvert Cliffs decision. These plants represent approximately 78,200 megawatts of new generating capacity committed to serve the needs of the 1970's.

The background events of today's hearings are already a part of the record. The National Environmental Policy Act of 1969 1/ expresses a national

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1/ P.L. 91-190, 83 Stat. 852, effective January 1, 1970.

commitment to the preservation and enhancement of man's environment, and requires a consideration of environmental values by all Federal licensing agencies. The Calvert Cliffs decision [2/] of the Court of Appeals for the District of Columbia has resulted in a revision of the Atomic Energy Commission's regulations which became effective on September 9. [3/] The new regulations affect the licensing of all future nuclear power plants, and have an immediate impact on the plants which have been licensed by the AEC since January 1, 1970 (the effective date of the National Environmental Policy Act) or which are now in the AEC licensing process and scheduled for in-service dates within the next few years.

The Institute believes that the impact of the Calvert Cliffs decision and the new AEC regulations is potentially serious and severe:

1. Substantial delays appear to be unavoidable for most, if not all, the nuclear power plants scheduled for service in the next few years. In the great majority of cases it is already too late to construct alternative generating capacity and put it into service when needed. Replacement capacity, by and large, is not available for purchase from neighboring utilities or power pools. As a result, critical power supply situations may affect many parts of the country during the next several years. If these developments occur, power rationing in one form or another will almost inevitably be necessary, in order to balance demands with the available generating capacity.

2. The new licensing procedure may lengthen lead times for the installation of future plants as well. As a result a critical power supply situation

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2/ Calvert Cliffs' Coordinating Committee v. AEC, C A D C Nos. 24,839 and 24,871, decided July 23, 1971.

3/ 36 Fed. Reg. 18071, 19158.

which might develop during 1971 and 1972 would be expected to continue for at least five years before the picture clears.

3. The cost of the licensing delays would be substantial, and would increase the cost of electricity when these plants come on line. This would be true even though no added environmental safeguards may ultimately be found necessary after completion of the required environmental review. The capital costs of a year's delay would amount to at least $20,000,000 for a 1,000 megawatt plant, and could exceed $1.0 billion on a nationwide basis, even without considering the cost of any replacement power that might be available. As a rough approximation, this translates into a 5% increase in the cost per kilowatthour as the price for the environmental reviews required under the Calvert Cliffs decision.

4. There would be environmental costs as well, since the delay in planned nuclear capacity would require the continued operation of older fossil-fueled plants which would otherwise be retired or seldom operated. It would also increase pressures on the cost and availability of low sulphur fuels which are already in short supply.

Nevertheless, the outlook is not wholly bleak. The Atomic Energy Commission has undertaken to do all within its power to minimize delays, and the electric utilities will cooperate fully in this effort. Procedural changes in the pace of the licensing process will be necessary, and over the longer term remedial legislation may also be required. I shall plan to outline our suggestions in this regard at the conclusion of my testimony.

1. Extent of delay

The Institute believes it is realistic to expect that, on average, the Calvert Cliffs decision and the new AEC regulations may delay the in-service dates of nuclear plants by at least a year.

This is admittedly a judgment figure. It is also an average, par-for-the-course figure, which will not be realized in some cases and may well be exceeded in others.

The problem here is to estimate the incremental delay involved. There are two basic factors. First, there will be no added delay if the environmental review can be conducted in parallel with the basic safety review of nuclear plants. This is clearly impossible for those plants where the safety review is already substantially completed; in such cases the time required for the environmental review is necessarily additive. Plants at earlier stages of the licensing process may well be less severely affected so far as the internal AEC Staff review is concerned.

The second factor, however, is not within the control of either the AEC or the utility, and affects every plant in the licensing track. Under the Calvert Cliffs decision the public hearings required by the Atomic Energy Act have been made checkpoints for the AEC's environmental review. Experience over the past few years indicates that intervention should be expected on the environmental issues. In view of the complexity of these issues, and the judgmental factors involved in the balancing of costs and benefits required by the Calvert Cliffs decision, it is apparent that very extended hearing schedules may results in contested cases.

The AEC has indicated that it will give priority attention to the plants at the head of the licensing queue -- those due to come on line within the next few months -- and will do everything possible to keep those plants on schedule. We believe that this is a correct ordering of priorities and, with the Commission, we hope that these schedules can be maintained. We are somewhat less sanguine, however, in believing that even in these priority cases the internal Staff review and the full public hearing can be conducted within a matter of weeks or even a few months.

In short, we believe that it is realistic to anticipate an average increment of delay of at least a year for licensing nuclear plants in the future. No one would be happier than we if our estimates should prove to be unduly pessimistic.

2. Effects on power supply.

The Institute has made a preliminary survey to determine the effects of a delay of in-service dates of the nuclear plants scheduled to come on line through 1975. Each of the regional reliability councils was asked to estimate the effects of a one-year delay of these plants and, alternatively, of a more extended two-year delay. The regional councils were also asked to consider the further consequences of a shut-down of the five nuclear power plants which have gone into operation since January 1, 1970.

The results of this survey are reported in an EEI statement dated October 28. A copy is attached to my prepared remarks, and I would ask that it be made a part of the record.

Table II of the statement summarizes the situation by geographical regions. Potentially serious power supply situations are indicated in the northeast, which includes New England and New York; in the middle Atlantic states served by the PJM interconnection; in the southeast region, including TVA, the Virginia-Carolinas area and the Southern Company system; in the midwest, which includes the Chicago area and the Wisconsin and upper Michigan area; in the north central region, which extends from Minnesota west to the Rockies; in the southcentral region; in the Pacific northwest, which already faces a capacity shortage if water conditions are below average; and in northern and central California.

In each case a delay of in-service dates of nuclear plants would cause reserves to fall below targeted figures designed to achieve the reliability of power supply which we believe is required for present-day industry, commerce and residential use. If demand exceeds supply, the only alternative available to the utilities is to limit demand. This can be accomplished through voltage reductions or load shedding during peak periods. Load growth can also be limited by a temporary moratorium on new service applications, a step which natural gas companies have reluctantly taken in recent years as a result of the gas shortage.

We believe these are potentially serious consequences, which would have a direct effect on jobs, on industrial output, on the housing industry, on the shelf-life of food the housewife purchases at the supermarket, on air conditioning in homes and offices and the use of electricity in a variety of ways to help improve the environment.

Yet there is no easy remedy -- and where power supply deficiencies arise, the situation is likely to extend over a period of years. It is already too late to construct alternative generating capacity in time to meet the planned in-service dates of the delayed nuclear units. Lead times for fossil-fired plants are a minimum of 4 years; and if the Calvert Cliffs decision extends to discharge permits issued by the Corps of Engineers under the Refuse Act of 1899, a lead time of 5 years or more is in prospect. Gas turbines and diesel generators can be installed on a shorter lead time; but massive reliance on this source appears to be beyond the capacity of the manufacturing industry to supply or the fuel industry to fire. Existing fossil-fired plants are already limited by low-sulphur restrictions and by difficulties in obtaining suitable fuel supplies; thus replacement power from neighboring utilities or power pools is a wan hope at best.

Given lead times of five to eight years, for fossil fired and nuclear plants respectively, it seems clear that power supply shortages realized in 1971 and 1972 cannot be fully remedied earlier than 1975 or 1976.

3. Costs of delay

The direct costs of delay are the carrying costs on an idle investment. These can conservatively be estimated at about $20 per kilowatt for a year's delay in a nuclear power plant. For a 1,000 megawatt plant this would indicate an added capital cost of approximately $20,000,000. If 50 of the 97 nuclear units listed by the AEC should be delayed for a year, the total national bill would come to a conservative figure of $1.0 billion. If other costs beyond the bare-bones carrying charges are factored in, the national cost would be significantly higher.

These are, of course, one-time capital costs which will be reflected in higher costs per kilowatthour of production over the useful life of the plants. As a rough approximation, the added costs will be in the order of 1/2 mill per kilowatthour, or something in excess of a 5% increase in unit costs. This is an additional environmental cost to the consumer, who is already footing the bill for low-sulphur fuels required for coal-and oil-burning fossil plants in the interests of minimizing air pollution.

There are environmental costs as well. A delay of the in-service dates of nuclear plants will force the continued operation of older fossil-fired plants which would otherwise be slated for retirement. The environmental trade-off will be an added increment of air pollution in exchange for the environmental review of nuclear plants required by the Calvert Cliffs decision.

4. Possible solutions.

Grave as the outlook appears to be, we do not believe it to be either hopeless or inevitable. A number of possible remedies are available:

(a) AEC hearing procedures. We have every confidence that the Commission will expedite to the fullest extent the required Staff review of environmental statements and the issuance of draft and final detailed statements. The major source of uncontrolled delay lies in the public hearings. Public participation in the resolution of environmental issues is healthy and desirable, but public intervenors must recognize the penalties of delay and focus on the real issues involved. Above all, it should be recognized that the intent of the National Environmental

Policy Act is to reach a responsible judgment of the overall balance between benefits and costs. In the nature of things mathematical certainty is unachieveable, and extended discovery and cross-examination to demonstrate this obvious fact is neither necessary nor desirable. The AEC Rules of Practice give the Licensing Boards ample authority to limit unduly extended proceedings. We believe that a more vigorous exercise of this authority will go far to expedite public hearings without prejudice to responsible public intervenors.

(b) Parallel review of safety and environmental issues. As noted earlier, delays will be kept to a minimum if the basic safety review and the environmental review proceed in parallel and on the same time-track. If this is to be accomplished, the environmental review by the AEC (and, if necessary, in the public hearings) must go forward even though the state certification required by the Water Quality Improvement Act has not as yet been issued and other environmental reviews by state and federal agencies have not been concluded. A major source of potential delay would be eliminated if the environmental reviews by the Atomic Energy Commission and by the Corps of Engineers under the Refuse Act were consolidated in a single joint proceeding.

(c) Definition of the scope of the cost-benefit analysis. The Commission has already recognized that guidelines are necessary to define the scope of the cost-benefit analysis and the number of alternatives which must be examined. Rulemaking proceedings to establish such

guidelines should be instituted as promptly as possible, in order to avoid the delays involved in establishing precedents on a case-by-case basis in adversary proceedings.

(d) Provisional operation. The AEC regulations make provision upon request for low power testing and provisional operation of nuclear power plants which have completed the basic safety review and can be placed in operation without prejudicing the ultimate conclusions reached on unresolved environmental issues. The practical availability of these provisions is as yet untested and unknown, but they would seem to be available only if no party opposes the request. 4/ The Commission should be encouraged to use these provisions where a critical power supply situation is in prospect; and to re-examine and revise its regulations if they are not useable in contested cases.

(e) Interim licensing. If the provisions in the AEC regulations authorizing provisional operation prove to be ineffective, we believe Congress should consider the desirability of affirmative legislation to authorize operation of needed nuclear generating capacity on an interim basis, pending the resolution of the environmental review and subject to any conditions which may subsequently be imposed as a result of that review.

4/ See 10CFR Section 50.57(c)

(f) Congressional interpretation of the National Environmental Policy Act. The National Environmental Policy Act is a broad statement of a national environmental policy, which clearly was intended as the cornerstone for an evolutionary development of federal agency practice. Just as an individual agency implements the details of a broad organic Act through interpretative regulations, so here, where many agencies are involved, it may be desirable for Congress itself to provide guidance from time to time through committee reports, interpretative Joint Resolutions, or through amendments to the National Environmental Policy Act.

(g) Consolidation of environmental reviews. At the present time the environmental review of power plants, both nuclear and conventional, is conducted in a series of separate local, state and federal proceedings. This cumbersome procedure is not only duplicative and time-consuming; it is now so complex that the overall balance of benefits and costs is obscured, and design changes to minimize adverse environmental effects are made on a piece-meal and uneconomic basis. Over the longer term, we believe it is in the public interest to consolidate the environmental review in order to prevent conflicting, duplicating and overlapping standards and procedures. Despite the obvious jurisdictional difficulties involved, we believe that only by moving in this direction will it be possible to achieve in the energy field the basic objective of the National Environmental Policy Act: to supply the energy necessary to maintain and enhance the American standard of living and quality of life, with minimum impact on the environment.

I thank you for this opportunity to present our views.

November 1, 1971

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October 28, 1971

STATEMENT OF EDISON ELECTRIC INSTITUTE

Preliminary Study of Effect on Nation's Electric Power Supply of AEC Regulations to Implement National Environmental Policy Act

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Electric power systems have turned to nuclear power as a safe, reliable, economical, and environmentally acceptable way to meet the future electric power needs of our nation. Since January 1, 1970, five nuclear power units, aggregating almost 3200 megawatts of generating capacity, have been issued operating licenses. Between now and 1975, 61 additional nuclear power generating units with an aggregate capacity of approximately 53,000 megawatts are scheduled for operation. Attached Table I lists the five units with operating licenses, another with a provisional operating license, and the 61 scheduled additions. These 61 nuclear units account for about 35 percent of the electric power industry's scheduled thermal additions during this period. Together with other capacity additions scheduled by electric power systems, they will assure that the nation's electric power consumers will have adequate supplies of electric energy in the years ahead.

The procedures prescribed by the Atomic Energy Commission for its compliance with the U.S. Court of Appeals decision on implementation of the National Environmental Policy Act of 1969 (NEPA), 1/ are expected to hinder the ability of electric power systems to complete their current nuclear expansion plans on schedule. This could result in inadequate power supply in many areas of the country with a consequent deterioration in reliability and service quality.

1/ United States Court of Appeals for the District of Columbia Circuit, No. 24871, July 23, 1971. Petitions for Review of an Order of the Atomic Energy Commission. Atomic Energy Commission Regulation 10CFR50 - Licensing of Production and Utilization Facilities, Appendix D - Interim Statement of General Policy and Procedure: Implementation of The National Environmental Policy Act of 1969 (Public Law 91-190)

With respect to nuclear power plants that are completed or are scheduled for completion within the next few years, it is estimated that operation may be delayed one or even two years if the environmental review prescribed by the new AEC regulations is required prior to the issuance of an operating license. This is particularly true if the hearing authority permits the scope of the hearing to deal with all the environmental aspects of these nuclear power plants.

Following is a summary of the situation that will result if nuclear power plants are delayed one or two years and alternative means of generation are not available to the affected power supply regions or systems. This summary is based on data received from the regional reliability councils.

Delays in the operation of this needed generating capacity will cause serious electric power supply problems in the Northeast, Middle Atlantic, Southeast, Midwest, North Central, South Central, **Pacific Northwest, and Northern and Central California regions of the country.**

NORTHEAST

New York

The New York area has three nuclear generating units scheduled for completion by 1975. These units represent a combined capability in excess of 2,700 megawatts, which is approximately one-third of the planned generation additions in this period. A year's delay of any of these units would make it impossible to obtain desired reliability. An extended delay affecting all these units would very seriously jeopardize the power supply to the entire New York State area. For example, Consolidated Edison Co., which has had great difficulty within the past few years in building needed generating facilities, has indicated that a delay in the operation of the 873-Mw

Indian Point No. 2 nuclear generating unit would result in the lack of an adequate and reliable supply of electric power in the New York City area that would jeopardize a vast array of critical services and facilities.

New England

The New England pool has three nuclear units scheduled for operation in late 1971 and during 1972. This represents about 50% of the capacity additions scheduled for December 1971 through December 1973. A one-year delay in this capacity does not allow the pool to meet its designed reliability criteria; in fact it seriously jeopardizes the region's power supply and creates a situation where the dispatchers will be faced with the danger of some form of load curtailment on a day-to-day basis during both the winter and summer peak periods. Undoubtedly, some actual curtailments will take place. The two-year delay puts the pool in a much more serious condition and will increase the day-to-day problems of regional dispatch, with additional load curtailment actually taking place.

With Millstone No. 1 shutdown for a one or two-year period, in addition to the delay cited earlier, the New England area would require frequent load shedding during the entire period from December 1971 through the winter 1973-74.

MIDDLE ATLANTIC

The companies in the Pennsylvania-New Jersey-Maryland Interconnection (PJM) are relying heavily on nuclear power to meet their future power requirements. During the period 1973-75, they have scheduled almost 8,000 megawatts of nuclear capacity for operation. This accounts for 57% of the planned PJM expansion. A delay of one year in the installation date of these facilities would cut reserve capacity by 28% in 1973, and by 33% in 1974. Under these

conditions, the ability to meet load requirements at all times would be seriously hindered. If there is a two-year delay, the PJM Interconnection would have only 44% of its planned reserve in 1974 and only 48% of planned reserve in 1975.

SOUTHEAST

If there is a delay of one year in the availability of nuclear power plants scheduled for operation next year, electric power supply in most sections of the Southeast may be inadequate to meet all customer demands. A two-year delay would further aggravate the situation. The ability of the Southern System to carry all firm load throughout 1973 would be reduced. On a probability basis, it is possible that without the planned nuclear capacity, the system could not meet all requirements on about 15 days during the year. 2/

The Tennessee Valley Authority, and the systems in the Virginia-Carolinas areas would be faced with more severe problems of inability to meet continually their load responsibilities, if their planned nuclear power plants, although ready for operation as scheduled, are not permitted to operate pending a NEPA review. TVA might not be able to meet all its firm commitments on 8 days during the year 1972, on 82 days during 1974, and practically every weekday in 1973. A two-year delay in licensing would result in electric power shortages practically every weekday in 1973 and 1974.

2/ An electric power system cannot be expected to meet all load requirements from its own resources at all times (i.e., 24 hours a day, 365 days a year). The level of reliability which has been deemed acceptable, and for which systems are generally designed, provides that the system will not be able to carry some portion of its load one day in a ten-year period. The acceptable criterion of the number of such days may vary from one part of the country to another.

The Virginia-Carolinas Systems would experience difficulties in 1972 with a one-year delay and considerable difficulty if scheduled nuclear plants were delayed for two years. In the latter situation their ability to meet load would be questionable on 180 days in 1972, 122 days in 1973, 61 days in 1974 and 110 days in 1975.

MIDWEST

The Commonwealth Edison Co. also could have problems in meeting its responsibilities. If this utility cannot rely upon the approximately 2200 megawatts of capacity from Quod Cities No. 1 and 2, and Zion No. 1, its 1972 reserve capacity will decrease from about 24% of peak load requirements to an alarming figure of 5.4%. Under these circumstances the company believes that 900 megawatts of firm replacement power would be required to provide minimum levels of reliable service to its customers. Firm replacement power of this amount is not available. A two-year delay will prevent Commonwealth Edison from having sufficient capacity to meet the estimated peak demands of Chicago and the surrounding area in 1973. Commonwealth Edison Co. would actually have a negative reserve under these circumstances.

The Wisconsin Upper Michigan Systems (WUMS) would be in a similar situation. That group would have 0.5% reserve in 1973 if there is a two-year delay in the schedule operation of Point Beach No. 2 and the Kewaunee nuclear power units.

NORTH CENTRAL

Members of the Mid-Continent Area Reliability Coordination Agreement (MARCA) 3/ also may have difficulty meeting load requirements if the Monticello nuclear power

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3/ Member utilities of MARCA serve consumers in Iowa, Minnesota, Nebraska, the Dakotas and parts of Wisconsin, Colorado, Illinois, Wyoming and Montana.

plant, which has an operating license, and the nuclear power plants scheduled for operation in the 1972-75 period are not permitted to operate as planned. With a one-year delay, the MARCA systems may have difficulty in meeting load on 29 days during 1973. If there is a two-year delay the systems could experience trouble every day of the year in 1973 and a third of the time in 1974.

SOUTH CENTRAL

The Southwest Power Pool (SWPP) could have serious energy problems beginning in the fall of 1973 with any appreciable delay in the operation of Arkansas Nuclear I -- the first nuclear unit in the region. While the pool reserve is expected to be in excess of 17% at that time, mounting fossil fuel shortages are already being experienced with daily gas fuel curtailment throughout the entire year. Additional nuclear units are currently scheduled for possible operation in 1976 and 1977, and a number of systems are contemplating nuclear units now that fossil fuel is in short supply. Any nuclear delay would obviously require that additional energy be produced by the then existing fossil fuel plants, the operation of which are already being curtailed because of fuel shortage.

These problems are similar to the problems existing in the TVA system and they could jeopardize each group's ability to deliver 1500 megawatts (and associate energy) under the term of the TVA - SCEC diversity exchange agreement.

PACIFIC NORTHWEST

The Pacific Northwest, under critical water conditions, is facing a firm energy shortage of approximately 200 megawatts in 1974-75 even if Portland General Electric Company's 1130 megawatt Trojan nuclear plant comes on line as scheduled in September, 1974. Because several large water storage projects

are scheduled for completion by 1973-74, the region will require better than critical water conditions to assure the initial filling of these projects. Consequently, if the Trojan plant were to be delayed for as much as one year, the area would be in serious danger of being unable to meet customer loads. Even though adequate transmission capacity between the Pacific Northwest and the Pacific Southwest is available, it does not appear likely that any appreciable amount of energy could be imported to offset the loss of the Trojan plant because of fuel problems being encountered by utilities outside the region. The only feasible alternative to meet the resulting area deficiency of approximately 1100 megawatts would be the installation of that amount of gas turbine capacity.

NORTHERN AND CENTRAL CALIFORNIA

For Northern and Central California the Rancho Seco Nuclear Unit (834 megawatts) and the two Diablo Canyon Nuclear Units (1060 megawatts each) represent 90 percent of the additions to capacity resources between 1973 and 1975 and almost 100 percent of the net gain in available resources, because a large block of power now supplied from the Pacific Northwest will be withdrawn after April 1, 1975 due to critical power supply problems in that area.

All three nuclear units are needed if the eight million people of Northern and Central California are to be provided with a dependable bulk power supply which is not constantly operating under the threat of brownouts and blackouts and experiencing fossil-fuel supply shortages.

Delays of one year in the commercial operation dates of the three nuclear units will substantially increase costs to the area's electric power customers because the utilities would be forced to replace inexpensive energy projected to be generated by nuclear plants with expensive energy generated by the use of either low-sulphur oil or gas, both of which are in short supply. Further-

more, any reduction in capacity installed in Northern and Central California would adversely affect the reliability of power supply to the people of the entire West Coast, because of the reduced ability to provide short-term support over interconnections.

Delays of two years or more in the scheduled operating dates of the three units would result in seriously reduced reserve margins and cause a severe power supply problem beginning in 1974 which would adversely affect the people of the area. Of course, such delays will make even more severe the fossil-fuel supply situation noted for a one-year delay and will reduce or eliminate any possibility of support to adjoining systems.

* * * * * * * *

Table II summarizes the serious capacity situations which would result if there are delays in the installation of needed nuclear generating capacity in the immediate future.

If some of these supply problems develop, they possibly may be alleviated by the transfer of energy from regions with more adequate generating capacity to those areas which are deficient. During the summer of 1970, this form of assistance was of considerable value to power deficient areas in the East. Power was made available to electric power systems in the East from Canada and the Midwest. But there is a limit to the amount of assistance that can be rendered when the generating deficiencies are large. Transmission systems alone cannot substitute for adequate generating capacity.

While reliance on nuclear capacity in some regions of the country may not be great, any delay in the installation of nuclear capacity in these regions will reduce system reserves. When this is coupled with slippage in the construction

of conventional units and availability problems with existing generating facilities, the power supply situation can become critical within these regions and thus reduce a region's ability to provide power to adjacent regions. For example, with a two-year delay in the installation of its nuclear units, the East Central Area Reliability region (ECAR) projected reserve in 1975 will be 67% of the planned reserve. This significant reduction in reserve capacity, which does not take into account slippage and equipment availability problems which may occur, will not only degrade reliability within the region but also will substantially reduce, if not eliminate, the region's ability to assist neighboring areas. Since ECAR, because of its central location and extensive transmission network, has traditionally been an exporter of power to other regions, the effect on other regions could be substantial.

The installation of gas turbines also may help. However, it is questionable as to whether they could provide relief in the next summer peak load season. Even in the latter part of the time period under discussion, the potential deficiency of generation (53,000 megawatts over a four-year span) would seriously strain the capacity of the gas turbine industry to supply replacement generating capacity. 4/ Each electric power system which attempts to install large quantities of gas turbine capacity as an interim substitute for nuclear capacity would be faced with additional siting and financing requirements. The availability of fuel also would present problems which may not be solvable. The wisdom of a decision to attempt to install a large number of gas turbine peaking units to meet base load requirements is not in the best interest of the nation's electric power consumers.

4/ During 1970, the delivery of gas turbines, 4000 kw and larger, amounted to about 6,000 Mw. As of July 1, 1971, scheduled deliveries for 1971 amounts to about 7,7000 Mw.

Finally, a large reduction in the amount of scheduled nuclear capacity will play havoc with maintenance schedules with the result that the availability and reliability of existing generating equipment will suffer. This will not only compound the system operator's problem of meeting daily load schedules but its effect on system reliability will be felt long after the nuclear capacity is eventually placed in operation.

Delay in the installation of needed nuclear generating capacity can result in possible disruption of the nation's economy, in addition to serious inconvenience and expense to electric power consumers.

October 28, 1971

TABLE I
Nuclear Capability Licensed or Placed in
Operation Since Jan 1, 1970
and
Capability Scheduled for Operation During
Period 1971-75

New England	Plant	Operating Capability[1] (MWE)	Scheduled or Actual Date of Operation[1]	Status of License [2]
Northeast Utilities	Millstone 1	650	1970[3]	O
Boston Edison Co	Pilgrim 1	654	1971	O/P
Vermont Yankee N P Corp	Vt Yankee	540	1971	O/P
Maine Yankee Atomic Power Co	Wiscasset 1	855	1972	O/P
Northeast Utilities	Millstone 2	830	1974	C
New York				
Consolidated Edison Co	Indian Pt 2	873[4]	1971	O/P
Power Authority State of N Y	FitzPatrick 1	821[4]	1973	C
Consolidated Edison Co	Indian Pt 3	965[4]	1974	O/P
PJM Interconnection[5]				
Baltimore Gas & Electric Co	Calvert Cliffs 1	845	1973	O/P
General Public Utilities	Three Mile Is 1	830	1973	O/P
Philadelphia Electric Co	Peach Bottom 2	1,065	1973	O/P
Public Service Electric & Gas Co	Salem Is 1	1,095	1974	C
Baltimore Gas & Electric Co	Calvert Cliffs 2	845	1974	O/P
General Public Utilities	Three Mile Is 2	950	1974	C
Philadelphia Electric Co	Peach Bottom 3	1,065	1974	O/P
Public Service Electric & Gas Co	Salem Is 2	1,107	1975	C
East Central Area Reliability Group				
Consumers Power Co	Palisades 1	700	1971	O/P
Duquesne Light Co	Beaver Valley 1	847	1973	C
Indiana & Michigan Electric Co	Cook 1	1,100	1973	O/P
Indiana & Michigan Electric Co	Cook 2	1,100	1974	O/P
Toledo Edison Co	Davis-Besse 1	870	1974	C

	Plant	Operating Capability[1] (MWE)	Scheduled or Actual Date of Operation[1]	Status of License[2]
Detroit Edison Co	Fermi 2	1,123	1975	C/P
Cinn Gas & Electric Co	Zimmer 1	840	1975	C/P
Southern Co				
Georgia Power Co	Hatch 1	764	1973	O/P
Alabama Power Co	Farley 1	807	1975	C/P
Virginia-Carolinas Group				
Carolina Power & Light Co	Robinson 2	663	1971[3]	O
Duke Power Co	Oconee 1	886	1971	O/P
Duke Power Co	Oconee 2	886	1972	O/P
Virginia Electric & Power Co	Surry 1	819	1972	O/P
Virginia Electric & Power Co	Surry 2	819	1972	O/P
Duke Power Co	Oconee 3	886	1973	O/P
Carolina Power & Light Co	Brunswick 2	821	1974	C
Virginia Electric & Power Co	No Anna 1	890	1974	C
Virginia Electric & Power Co	No Anna 2	890	1975	C
Carolina Power & Light Co	Brunswick 1	821	1975	C
Duke Power Co	McGuire 1	1,150	1975	C/P
Florida Group				
Florida Power & Light Co	Turkey Pt 3	725	1971	O/P
Florida Power & Light Co	Turkey Pt 4	725	1972	O/P
Florida Power Corp	Crystal River 3	825	1972	O/P
Florida Power & Light Co	Hutchinson Is 1	850	1974	C
Tennessee Valley Authority				
Tennessee Valley Authority	Browns Ferry 1	1,065	1972	O/P
Tennessee Valley Authority	Browns Ferry 2	1,065	1973	O/P
Tennessee Valley Authority	Browns Ferry 3	1,065	1974	O/P
Tennessee Valley Authority	Sequoyah 1	1,125	1974	C
Tennessee Valley Authority	Sequoyah 2	1,125	1974	C

Commonwealth Edison Co	Plant	Operating Capability[1] (MWE)	Scheduled or Actual Date of Operation[1]	Status of License[2]
Commonwealth Edison Co	Dresden 2	809	1971	O
Commonwealth Edison Co	Dresden 3	809	1971[3]	O
Commonwealth Edison Co	Quad Cities 1*	809	1971	O/P
Commonwealth Edison Co	Quad Cities 2	809	1972	O/P
Commonwealth Edison Co	Zion 1	1,100	1972	O/P
Commonwealth Edison Co	Zion 2	1,100	1973	O/P
Commonwealth Edison Co	LaSalle 1	1,078	1975	C/P
Iowa Pool				
Iowa Electric Light & Power Co	Arnold 1	550	1973	C
Upper Mississippi Valley Power Pool				
Northern States Power Co	Monticello 1	545	1971[3]	O
Northern States Power Co	Prairie Is 1	550	1972	O/P
Northern States Power Co	Prairie Is 2	550	1974	O/P
Wisconsin Upper Michigan System				
Wisconsin Michigan Power Co)	Pt Beach 1	497	1970[3]	O
Wisconsin Electric Power Co)	Pt Beach 2	497	1971	O/P
Wisconsin Public Service Corp	Kewaunee 1	527	1972	O/P
Southwest Power Pool				
Arkansas Power & Light Co	Nuclear 1	830	1973	O/P
Nebraska Systems				
Omaha Public Power District	Ft Calhoun 1	455	1972	O/P
Nebraska Public Power District	Cooper Nuclear 1	800	1973	O/P

* 404 MW is part of resources of Iowa-Illinois Gas & Electric Co

Colorado Power Pool	Plant	Operating Capability[1] (MWE)	Scheduled or Actual Date of Operation[1]	Status of License[2]
Public Service Co of Colorado	Ft St Vrain 1	330	1972	O/P
Pacific Northwest				
Portland General Electric Co	Trojan 1	1,130	1974	C
California				
Sacramento Municipal Utility District	Rancho Seco 1	834	1973	O/P
Pacific Gas & Electric Co	Diablo 1	1,060	1974	C
Pacific Gas & Electric Co	Diablo 2	1,060	1975	C

Notes

1. EEI Electric Power Survey Committee data as of July 1, 1971, unless noted otherwise.

2. Central Station Nuclear Plants, Units Operable, Under Construction, Or On Order, AEC Division of Industrial Participation - 5/12/71

3. Licensed since January 1, 1970

4. Initial rating - additional capacity will be affected as periodic upratings are scheduled

5. Information supplied by PJM Interconnection

O - Operating License
O/P - Operating License Pending
C - Construction Permit
C/P - Construction Permit Pending

TABLE II

Effect of one and two-year delay in operation of scheduled nuclear generating capacity

REGION	ONE YEAR DELAY				TWO YEAR DELAY			
	1972	1973	1974	1975	1972	1973	1974	1975
Northeast								
New York	X	X	X	X	X	X	X	X
New England	X	X			X	X		
Middle Atlantic								
PJM Interconnection		X	X			X	X	X
Southeast								
Southern		X				X		
TVA	X	X	X		X	X	X	X
Virginia-Carolinas	X				X	X	X	X
Midwest (MAIN)								
Commonwealth Edison	X				X	X		
WUMS		X				X		
North Central								
MARCA		X				X	X	
South Central								
SWPP		X	X			X	X	X
Pacific Northwest			X				X	X
Northern and Central California			X	X			X	X

NOTE:

"X" mark indicates serious power supply problem

STATEMENT OF
WILLIAM R. GOULD
SENIOR VICE PRESIDENT
SOUTHERN CALIFORNIA EDISON COMPANY

ON BEHALF OF THE
WESTERN SYSTEMS COORDINATING COUNCIL
AND THE
ATOMIC INDUSTRIAL FORUM, INC.

BEFORE THE
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS
SENATE
CONGRESS OF THE UNITED STATES

NOVEMBER 3, 1971

HEARINGS ON NATIONAL
FUELS AND ENERGY POLICY

* * *

I am William R. Gould, a Senior Vice President of Southern California Edison Company. My oral presentation today is made in my capacity as Chairman of the Western Systems Coordinating Council. My written statement on behalf of the Atomic Industrial Forum, Inc., is appended hereto.

Western Systems is one of nine regional reliability councils whose inter-regional activities are coordinated by the National Electric Reliability Council. Western Systems consists of 19 investor-owned electric systems and 21 publicly or cooperatively-owned electric systems. The service area of the member systems includes slightly less than two million square miles, and the population served exceeds 36 million people. The total electric demand on the member systems is currently about 52,000 megawatts, and we estimate that an additional 56,000 megawatts of

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generating capacity will be required over the next decade.

Although the members of Western Systems currently forecast average reserve margins in excess of 21 percent for the next five years, delays in installation of scheduled new generation and transmission facilities could adversely affect the adequacy and reliability of electric service in the region. Moreover, it is my belief that unless meaningful and effective legislative action is undertaken to eliminate the causes of regulatory delays, the adequacy and reliability of electric service in the region will be adversely affected.

Your initial reaction to my statement may be the thought that my words represent merely another example of utility industry overreaction to regulation. If such a thought did cross the minds of some it is understandable, because, in all candor, the industry has overreacted on occasions in the past. However, I firmly believe that I am not overreacting today when I say to you that the electric utility industry is facing a crisis of the gravest proportions, a crisis which could jeopardize the strength of our national economy.

The cost impact alone is staggering. It has been estimated that if all nuclear plants in service or under construction at the end of last year, some 91,000 megawatts of electric generating capacity, are delayed an average of one year beyond the originally scheduled dates, the cost of the delays to the utility industry, and ultimately to the

consuming public will be between $5 billion and $6 billion. Based upon current trends, an average delay of one year appears to me to be a distinct possibility. Furthermore, such delays are by no means unique to nuclear generating facilities. Significant quantities of fossil-fueled generating capacity are likewise being delayed, and the cost of such delays will likewise be borne by the consuming public.

A corollary economic effect will be a tendency to depress the capital goods sector of our economy since a high proportion of expenditures in this all important area of our economic activity are made in the electric utility industry. A significant slowing of these expenditures must certainly be felt in the total economy.

In addition, each delay in construction and operation of a needed generating or transmission facility has the effect of diminishing to some extent the reliability of electric service on the affected system. Taken separately, the delays and their effects may seem inconsequential. But, taken collectively, the delays and their effects on the adequacy and reliability of electric service are unquestionably significant. The power shortages which occurred along portions of the eastern seaboard this last summer are an example of the types of problems which could multiply and spread across our Nation if effective action is not taken.

Now, in order that there may be no misunderstanding of my remarks, I wish to make it exceedingly clear that the

members of Western Systems recognize environmental protection as an important element of the total public interest. We also recognize that current widespread public concern makes it appropriate that environmental factors be considered explicitly in proceedings where meaningful public participation can take place. However, we do not recognize any necessity for the unwieldy system of redundant, provincial, and sometimes inconsistent regulation which has been permitted to develop.

"Unwieldy system of redundant, provincial, and sometimes inconsistent regulation" may at first appear to be an overstatement, but a few examples of the experiences of a single company, Southern California Edison Company, will, I think, indicate to you that it is an accurate statement.

The condenser cooling systems for proposed new nuclear generating units at San Onofre Nuclear Generating Station near San Clemente, California, must be designed to comply with water quality standards established by the State Water Resources Control Board and approved by the Administrator of the Environmental Protection Agency. The proposed structures and discharge must undergo reviews to determine compliance with applicable standards and/or environmental compatibility by the Regional Water Quality Control Board, San Diego Region, the State Water Resources Control Board, the State Lands Commission, the Public Utilities Commission, the United States Army Corps of Engineers, the Environmental Protection Agency and the Atomic Energy Commission. Regulation of the condenser

cooling system at San Onofre must by any standard be considered to be redundant.

The proposed expansion of Huntington Beach Generating Station exemplifies provinciality. There, the Public Utilities Commission of the State of California, after extensive public hearings which considered in depth the environmental aspects of the proposed expansion, ordered construction of one additional unit and authorized construction of a second additional unit. Notwithstanding the approval of the Public Utilities Commission, the expansion project was blocked by the Orange County Air Pollution Control District, an agency which is concerned only with air quality and only with a limited area of the Los Angeles basin.

The disposal of sand excavated from the San Onofre site illustrates inconsistent regulatory policies. There, the Resources Agency of the State of California requested disposal along sand-deficient beaches to the south of the site so as to improve the recreational potential of the beaches. Notwithstanding such request, the Bureau of Sport Fisheries and Wildlife actively opposed the sand disposal program in proceedings before the United States Army Corps of Engineers. The program eventually had to be modified to eliminate sand disposal below the line of mean lower low water.

I firmly believe that this situation can be remedied. I have faith that the people of our Nation and their

representatives have the will and the ability to devise an efficient and workable system of regulation. But, as is usually the case, recognition that a problem exists is a prerequisite to corrective action. I hope that I have conveyed to you my urgent belief that a serious problem does exist and that decisive corrective action by the Congress is required.

In the short term, I believe that modifications of the National Environmental Policy Act are required. The specific areas of my concern are as follows:

1. The language of the National Environmental Policy Act is subject to an interpretation that duplicative NEPA reviews are required in cases where multiple federal licenses or permits are needed in connection with a single project. It is recommended that the National Environmental Policy Act be amended to clearly provide in such cases for a single, non-duplicative NEPA review by the Federal agency with principal regulatory responsibility.

2. It is my understanding that the Calvert Cliffs' case holds that cost/benefit analyses must be performed even though a facility complies with applicable environmental protection regulations, and that in appropriate cases, Federal agencies must impose standards more stringent than those promulgated by agencies having direct regulatory jurisdiction. Such a holding can

only be disruptive of planning processes. Regulations should be developed and tested in rulemaking proceedings where all can participate, not on a case-by-case basis in licensing proceedings where only limited participation is possible. It is recommended therefore that the National Environmental Policy Act be amended to provide that compliance with applicable environmental protection regulations will satisfy the requirements of the National Environmental Policy Act.

3. There is lack of guidance as to what constitutes a major federal action or an appropriate alternative. Guidance should be provided in such areas so as to eliminate costly and time-consuming NEPA evaluations in situations where they are not warranted by the circumstances.

In the longer term, I believe that provision must be made to establish one-stop, non-duplicative licensing of electric generating and transmission facilities at the State and Federal levels of government. Only in this way can all the various social, environmental, and economic costs and benefits be weighed together in such a manner as to arrive at decisions in the total public interest.

Brief statements by members of Western Systems associated with nuclear generation projects detailing the impacts of regulatory delays on specific projects are appended hereto. Also appended hereto is a statement I am making on behalf of

the Atomic Industrial Forum, an organization of which I am a Vice President and whose Board of Directors have authorized me to speak in their behalf. The general thrust of this AIF statement is similar to that which I have just read, but it presents examples and solutions more specifically oriented toward the nuclear industry. I urge your careful consideration of this statement also. As you will note, some of the appended materials deal more specifically with the impacts of the Calvert Cliffs' case than I sought to do in this oral presentation.

Thank you for your attention to our thoughts on this problem.

* * *

STATEMENT
OF
WILLIAM R. GOULD
VICE PRESIDENT
ATOMIC INDUSTRIAL FORUM, INC.

BEFORE THE
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS
SENATE
CONGRESS OF THE UNITED STATES

NOVEMBER 3, 1971

HEARINGS ON NATIONAL
FUELS AND ENERGY POLICY

* * *

My name is William R. Gould. I am a Senior Vice President, Southern California Edison Company, Vice President of the Atomic Industrial Forum, Inc. and Chairman of the Forum's Senior Management Committee on Licensing. I am appearing here in my capacity as Vice President of the Forum.

The Forum is a nonprofit association composed of utilities, manufacturing companies, labor unions, universities, professional firms and other groups not only in the United States but in some 25 other countries that are interested in the uses of nuclear energy for peaceful purposes. Because of the diversity of its membership and their views, the Forum as a matter of policy does not take official positions on matters pending before the Congress. However, at its meeting on

October 19, 1971, the Forum's Board of Directors adopted a resolution calling attention to the delays currently being encountered and expected to be encountered in the licensing of nuclear power plants and expressing the sense of the Board that all appropriate steps should be taken to solve this critical situation. The Board has also authorized me to appear before you today on behalf of the Forum.

The Calvert Cliffs' decision, and the Atomic Energy Commission's regulations issued on September 9, 1971 in response to the decision have placed in jeopardy the construction or operation of 92 nuclear units which are badly needed to maintain an adequate supply of electric power. This includes 46 units for which construction permits are outstanding and five which have already received operating licenses, all of which are subject to outright suspension, and 19 construction permits and 22 operating licenses which had been scheduled for licensing action in the near future. Together, these units account for approximately 80,000 megawatts of electrical generating capacity, or more than 20 percent of the present installed capacity in this country. There are another 10 units covered by provisional operating licenses and 25 applications for construction permits in an early stage of licensing review which may also be affected by the new regulations. In addition there are more than a dozen other types of facilities subject to licensing delay, such as fuel fabrication and reprocessing

facilities, which are essential links in the fuel supply chain.

All of these projects are required to meet projected power requirements. While the ultimate delays which will be encountered in the case of individual projects is not yet known, there has already been nearly a three month period since the Calvert Cliffs' decision during which licensing activity has virtually come to a halt. FPC Chairman Nassikas has said that further significant delays in the 33 plants having the highest priority "would have severe impact on the adequacy and reliability of electric service." This situation cannot be permitted to continue much longer without seriously jeopardizing the ability of electric utilities to meet their public service obligation of supplying the needs of their customers.

In addition to the effect on the electric power availability, the cost of delay to the industry, and ultimately to the public through higher utility bills, may prove to be enormous. Each day of delay for plants in the thousand megawatt range which are nearing completion can cause additional cost increases of as much as $200,000 per plant. If the 91,000 megawatts of nuclear capacity on order at the beginning of the year is delayed an average of one year, taking into account carrying charges on investment and the incremental increase in the cost of replacement power, the cost of that delay would be $5-6 billion, or almost one half of the entire utility industry's capital outlay for the last calendar year.

Whether the costs are in this range or even somewhat less, it is clear that these added costs represent substantial and unnecessary expenditures which would seriously aggravate utility financing problems and could divert investment funds which would otherwise be available for badly needed programs in other sectors of the national economy. A near term and specific program that will probably suffer delay is the development of fast breeder reactors.

An objective of the National Environmental Policy Act (NEPA) is to assure that in the conduct of Federal activities appropriate consideration is given to environmental values. We believe that efforts to achieve the objective may be impeded because of the interpretation placed on NEPA by the Calvert Cliffs' decision and AEC's implementing regulations. Let me be more specific in this regard.

The Calvert Cliffs' decision is disruptive of the existing pattern of Federal-State relations in the area of environmental protection. The Water Quality Improvement Act established a state system of certification for compliance with water quality standards. In spite of this, the Calvert Cliffs' decision would require AEC independently to evaluate matters of water quality and perhaps to impose its own standards as license conditions. This not only results in duplicative

review, but nullifies Congress' intent in establishing the state certification procedures. It could also discourage states from establishing other types of environmental standards if AEC is free to ignore them. In this regard, it should be noted that AEC's regulations are silent on the weight to be accorded to existing standards in its review.

Moreover, if AEC must in each individual licensing case reevaluate applicable State and Federal standards, including its own standards and criteria adopted through rulemaking, it is difficult to see how these standards can be relied upon by the plant designer to establish acceptable design bases for AEC licensing purposes. While all standards pertaining to radiological, thermal and other environmental effects must be complied with, they may be determined to provide insufficient protection to the environment in the course of the AEC's licensing process. In effect, the result will be that different standards and criteria will be enforced on a case-by-case basis in the licensing process.

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The Calvert Cliffs' decision and the AEC's implementing regulations fail to distinguish adequately between the status of the various projects to which they would apply, for example those substantially constructed or already operating, as opposed to those where construction has not yet begun. The new rules have caught many projects at an extremely critical stage where further delay could have a serious impact on power supply. Although the new rules do provide for some limitation of the duration of public hearings for certain of these projects, the procedures which would permit partial operation pending resolution of all environmental issues are such that it is not at all certain that extensive delays can be avoided. Moreover, there is no recognition that plants already in operation or substantially constructed should be in a different status with respect to the scope of environmental review, including alternatives to be considered, than plants in an earlier stage of licensing.

Under the AEC's licensing regulation, lead times for plants are now so long that meaningful planning is almost rendered impossible. Several years of study must now be undertaken before an application can be made to construct a facility. The time from construction application to commercial operation of a facility may easily take 8 to 10 years. With lead times of this magnitude, not only are plants likely to be technologically obsolete before they are completed, but such long term load forecasting is required that it will be impossible

to accomplish it with any degree of accuracy.

The Commission's regulations contain little guidance as to what applicants or licensees are required to do to comply with them. Important examples are their complete failure to define the scope of the required cost-benefit analysis, or the types of alternatives which must be considered. The regulations also are deficient in defining and limiting the issues which may properly be raised in contested reactor licensing proceedings and in establishing standards for the consideration of such issues by the staff, the hearing boards and the Commission. Moreover, for uncontested cases the regulations go further than is required for matters of health and safety in requiring hearing boards independently to evaluate environmental matters.

In summary, implementation of the regulation will result in duplicative review of environmental considerations at the Federal level and in unnecessarily complex, uncertain and protracted hearing procedures. The sheer magnitude of the paper work associated with these procedures may well obscure the environmental objective sought to be obtained and suggests the possibility of a complete breakdown of the administrative process. These regulations serve only to further complicate an already overburdened and understaffed licensing process.

It would appear that a number of actions are now required if we are to have a viable AEC licensing system.

All Federal and State agencies concerned with nuclear power plant licensing must give the highest priority to assuring that needed projects will not be unnecessarily delayed to the detriment of the public's interest in an adequate and reliable supply of electric power. The Atomic Energy Commission must implement expedited procedures for processing those projects where it appears that further delay would have the most serious and direct impact upon power requirements; at least for these situations, a procedure should be devised which would authorize operation pending completion of the NEPA review process. The AEC must also provide explicit guidance to license applicants, to its staff and its hearing boards to assure prompt and expeditious licensing review. Finally, the relationship which is intended to exist between the AEC and other Federal and State agencies with respect to environmental standards and review should be clarified and, to this end, additional legislation should be enacted if appropriate.

In conclusion, I would like to call to the Committee's attention the two reports on the AEC licensing process issued within the last year by the Forum's ad hoc lawyers group. Although both of these reports were issued prior to the Calvert Cliffs' decision, they contain many specific recommendations which, if implemented, would significantly improve the licensing process. Also, the lawyers group will soon be issuing a third report which will take the Calvert Cliffs' decision into account and make additional recommendations. If the Committee wishes,

I will make copies of the first two reports available for the record and submit the third report as soon as it becomes available.

Thank you for providing me with the opportunity to appear before this Committee today.

* * *

BONNEVILLE POWER ADMINISTRATION

EFFECT OF A SIX-MONTHS' DELAY IN TROJAN AND HANFORD NO. 2 NUCLEAR GENERATING PLANTS

Effect on the Pacific Northwest Region.

The Pacific Northwest power situation over the next seven years will be very tight even if all generation, including the two scheduled large nuclear plants (Trojan scheduled for September 1974 and Hanford No. 2 scheduled for September 1977, each 1100 megawatts) are on time. With six-months' delay in either plant, under critical water conditions, firm loads in the area would have to be curtailed unless power were available from outside the region. With the tight power situation throughout the West, it is unlikely that much energy and any peaking capacity will be available to substitute for these plants.

With the hydrothermal program, all utilities in the Pacific Northwest are relying on each project to be completed on schedule. It is not only the utility building the project that would be affected in case a plant is delayed, but the whole regional power supply would be affected.

The Trojan plant and Hanford No. 2 have multiple participation. The effects of delay would be widespread and would force individual utilities to seek alternate power supplies on their own. Such actions would be disruptive to the cooperative plan in the region, which is designed to provide power at the lowest practicable cost and with the smallest impact on the environment.

Effect on Bonneville Power Administration.

The Bonneville Power Administration will secure 30% of the power output of the Trojan plant and 100% of Hanford No. 2. The power from both of these plants is necessary for Bonneville Power Administration to meet its obligations. A six-months' delay in the Trojan plant will leave Bonneville with inadequate resources in 1974-75. Since initial filling of Mica Reservoir starts in 1973 and Libby Reservoir will also be filling that year, there is some probability that these cyclical reservoirs will not be full in 1974 and consequently the deficiencies will be even greater if Trojan is not on schedule.

In the case of Hanford No. 2, Bonneville will be short both peaking capacity and firm energy in 1977-78. Although in some recent industrial contracts, Bonneville reserved the right to cut back firm power deliveries in

case of delays in this plant, such cutbacks would not be adequate to account for a six-month's loss of this large resource. Bonneville would have to curtail firm load under adverse water conditions if it could not secure power from other regions. As indicated above, it is unlikely that power will be available from other sources.

Hanford No. 2 is presently estimated to cost approximately $400 million including initial nuclear core and all financing. If the plant is completed but operation is delayed for six months, there would be an additional cost of $15 to $18 million. If initial construction is delayed six months, the cost of the plant will increase by $7 to $10 million.

PACIFIC GAS AND ELECTRIC COMPANY

A. Delay of the Diablo Canyon Units Will Have an Adverse Effect Upon the Public Interest

A delay in the proposed operating dates for the Units would have an adverse effect on the over 8,000,000 people in PGandE's service area and on the public served by other utilities, both publicly-owned and investor-owned, with which PGandE is interconnected.

1. Power Needs:

Between now and 1975 planned additions of resources to the integrated area system in northern and central California include the following:

a. Several geothermal units totaling 530 Mw (PGandE);

b. A 735 Mw gas-and-oil-fired unit (PGandE);

c. Sacramento Municipal Utility District's (SMUD) Rancho Seco nuclear unit (approximately 900 Mw); and

d. PGandE's nuclear Units 1 and 2 at Diablo Canyon, each 1060 Mw.

The Rancho Seco unit is scheduled for operation in May 1973 while the Diablo Canyon Units are planned for commercial operation in the Spring of 1974 and the Spring of 1975.

In addition to power from the new units shown above continued reliance will be placed upon power imported to the area system over the intertie from the Pacific Northwest for part of the resources required to serve the public. In 1974, this will be in excess of 800 Mw. For the years 1975 and 1976, imported power will be over 500 Mw.

Table 1 attached shows for the years 1974, 1975, and 1976 estimated loads, resources, and reserve capacity for the two months of the year with the highest peak loads, August and December, and for the average of the twelve months during the year. These reserve capacity levels are considered necessary and required by prudent planning to provide adequate margins for reliable service to the public during the early years of operation of the three nuclear units planned for initial operation during this period.

As pointed out in the Federal Power Commission's 1970 National Power Survey, Part III:

> "...In planning generation, it is realized that first-of-a-kind units will continue to require: more test time prior to commercial operation and substantially more lead time because of lengthy licensing process and unpredictable construction delays. Shake-down of the more complex generating units

> requires temporarily increased amounts of reserve capacity until a mature, more reliable performance status is achieved..." (p. III - 3-10)

Table 2 attached indicates the serious reduction in reliability if both the Units are delayed. Table 2 shows that without the Units PGandE's reserve capacity margins would be substantially reduced. Moreover, the reserve capacity shown assumes that all other planned additions to area resources will be completed on schedule and that imports of firm capacity will not be jeopardized by delays of resource additions in other interconnected areas. Recent experience in the PGandE area, like that elsewhere, has demonstrated the extreme difficulty in bringing new units on line when scheduled. Therefore, the margins are probably optimistic.

Table 3 attached shows the margins in 1974 and 1975 if both Rancho Seco and the Diablo Canyon Units are delayed. With these low levels of reserve capacity, the ability to render reliable electric service would be seriously impaired with resulting adverse effects on persons within and adjacent to PGandE's service area.

2. Interconnections:

PGandE is interconnected with utilities in the Pacific Northwest and in Southern California through

the Pacific Northwest-Southwest Intertie. In 1961, PGandE entered into an agreement known as the California Power Pool Agreement (FPC Rate Schedule No. 27) with Southern California Edison Company and San Diego Gas & Electric Company. One of the purposes of the Agreement was to furnish more dependable, economic, and efficient service to the public by providing for the purchase, sale, and exchange of electrical capacity and energy among the participating systems.

PGandE is a member of the Western Systems Coordinating Council which consists of 40 investor-owned, publicly-owned, and cooperatively-owned electric utilities engaged in bulk power generation or transmission in the 13 western states and western Canada. Its purpose is to increase reliability of service to the public by coordinating electric planning and operations.

Any reduction in PGandE's resources would in turn adversely affect the reliability of these other utilities along the West Coast, which have several times in the past few years found it necessary to call upon PGandE for substantial amounts of power to supply their customers. These deliveries were

possible because of PGandE's long-term policy of maintaining adequate reserves.

3. Alternative Sources of Power:

If the Units are delayed the only alternative resource that might be added in time to bring the reserve margins to an adequate level is gas turbine capacity. No other sources of generation would be available. If gas turbines are a feasible alternative, it would be necessary to have such capacity available by the end of 1974 at the latest. The amount of such capacity that would be required would depend on the extent of delay of the Units, considerations of loads and resources of interconnected utilities, and available sites for locating gas turbines. Because of the number of unknowns it is impossible to give a reliable estimate of the extra costs that would be incurred by PGandE, and ultimately its customers, in installing this capacity, but they would be sizeable.

4. Delay Costs:

Additional costs resulting from delays will ultimately be borne by the public.

If the Units were delayed by only six months, PGandE estimates that such a delay would increase

the cost of constructing the Units by at least $16,000,000. Any additional delay would, of course, increase this cost. Other elements to be considered in assessing costs of delay include the necessary start-up time, re-establishment of a smoothly coordinated engineering team and contractor force, and the possible economic effects on the local area due to lay-offs of construction workers.

A major impact of a delay in construction of the Units would be the increase in the amount of natural gas and low-sulphur oil to be burned in fossil-fueled power plants to replace the generation planned to be available from the Units. Since the supply of both of these fuels is limited it is not known how much of the replacement generation would be furnished by each. However, assuming that the lost nuclear energy is replaced by generation supplied by the burning of low-sulphur oil, the additional amounts of oil required would be 6.8 million barrels in 1974, 17.5 million barrels in 1975, and 21.4 million barrels in 1976. At current price levels of low-sulphur oil the estimated additional cost of energy would be $23,700,000, $61,100,000, and $74,800,000 in 1974, 1975, and 1976, respectively. These avoidable additional

costs to the public as well as the increased consumption of fossil fuels would not be in the public interest.

TABLE 1
ESTIMATED LOADS AND RESOURCES[1]
WITH DIABLO CANYON UNITS

	MEGAWATTS								
	1974			1975			1976		
	Aug.	Dec.	Avg. Monthly	Aug.	Dec.	Avg. Monthly	Aug.	Dec.	Avg. Monthly
Estimated Load	12662	12329	11650	13496	13149	12412	14371	14009	13217
Resources:									
Existing in Area (As of 9/71)	12463	12308	12401	1246	12308	12401	12463	12308	12401
Imports from Pacific Northwest	805	805	805	550	550	624[2]	543	543	543
Planned Additions:									
Unit 1 - Diablo Canyon	1060	1060	618[3]	1060	1060	1060	1060	1060	1060
Unit 2 - Diablo Canyon	-	-	-	1060	1060	618[3]	1060	1060	1060
Other	1795	1827	1766	1890	1932	1859	2097	2234	2051
Total Additions	2855	2887	2384	4010	4052	3537	4217	4354	4171
Total - Existing and Planned	16123	16000	15590	17023	16910	16562	17223	17205	17115
Planned Maintenance Outage	181	359	1016	46	239	1024	0	124	1074
Net Reserve Capacity	3280	3312	2925	3481	3522	3127	2852	3072	2825
% of Estimated Load	25.9	26.9	25.1	25.8	26.8	25.2	19.8	21.9	21.4

TABLE 2
ESTIMATED RESOURCES AND RESERVES
WITHOUT DIABLO CANYON UNITS

Resources	15063	14940	14972	14903	14790	14884	15103	15085	14995
Planned Maintenance Outage	0	159	1016	0	0	936	0	0	895
Net Reserve Capacity	2401	2452	2306	1407	1641	1536	732	1076	883
% of Estimated Load	19.0	19.9	19.8	10.4	12.5	12.4	5.1	7.7	6.7

TABLE 3
ESTIMATED RESERVES WITHOUT DIABLO CANYON UNITS
AND RANCHO SECO UNIT 1

Net Reserve Capacity	1571	1670	1546	577	811	776
% of Estimated Load	12.4	13.5	13.3	4.3	6.2	6.3

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[1] Company's latest estimate

[2] Imports for first three months higher than remainder of year

[3] Not in for full year

PORTLAND GENERAL ELECTRIC COMPANY

In its statement required by subsection E(3) of "Appendix D - Interim Amendments to Statement of General Policy and Procedure: Implementation of the National Environmental Policy Act of 1969", Portland General Electric Company made the following comment regarding costs of a six-months' delay of the Trojan Nuclear Plant. Total effect of a six-months' delay would be to increase Portland General Electric Company's capital expenditures by $48.6 million. This is composed of $32.4 million for gas turbines and $16.2 million for escalation of Trojan costs. The gas turbines would be required to supply energy otherwise supplied by Trojan and which is unavailable either outside or inside the region. In addition to the added capital expenditures, the Company's revenue requirements for the 1973-76 period would be increased by $48.7 million. This is composed of fixed costs and operating and maintenance costs associated with the gas turbines. An additional annual cost of $2.1 million per year would be incurred in order to pay the fixed charges associated with the increased cost of Trojan.

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In reaching these estimates, the following assumptions were used:

1. Critical water during the 1974-75 operating year.

2. Natural gas only available on interruptible basis 75% of the time to the 1973 gas turbine installation at a rate of four cents per therm. (5.2 mills/kwh).

3. Diesel oil available at $4.54 per barrel. (9.6 mills/kwh).

4. Maintenance costs of $1.00 per kw/yr plus two mills per kwh.

These cost assumptions were used to compute operation and maintenance costs on an annual basis. Estimated gas turbine installation cost was $76.93 per kw (excluding interest during construction).

PUBLIC SERVICE COMPANY OF COLORADO

On September 17, 1968, a construction permit was granted to the Public Service Company of Colorado to construct the Fort St. Vrain Nuclear Generating Station, near Platteville, Colorado, approximately 35 miles north of Denver, Colorado. The Fort St. Vrain Plant utilizes a High Temperature Gas Cooled Reactor (HTGR) and is being constructed as a part of the AEC Power Reactor Demonstration Program specifically authorized by Congress in Public Law 89-32 of the 89th Congress. Fort St. Vrain is a key step in demonstration of the commercial application of the advanced converter reactor concept.

This nuclear station when completed will produce, at rated capacity, about 842 megawatts of thermal energy and 330 net megawatts of electrical energy at design thermal input. Construction at the present time is 95% complete.

In December, 1970, Public Service Company submitted its Environmental Report in support of its application to the Atomic Energy Commission for an operating license. Thereafter copies of such Report and the Draft - Environmental Statement of the AEC were transmitted to appropriate Federal and State agencies for comment. Replies from such affected agencies have been received, none of which contain any significant adverse environmental comments.

On October 15, 1971, the Company filed its Statement with the AEC, pursuant to the revised Appendix D regulations of the AEC following the Calvert Cliffs' decision, to establish that the construction permit for Fort St. Vrain should not be suspended in whole or in part pending completion of environmental review by the AEC. On October 21, 1971, the Company submitted to the AEC its Supplemental Environmental Report in support of its application for an operating license, furnishing to the AEC the supplementary information required by the AEC under the revised Appendix D regulations.

This nuclear station is perhaps somewhat unique, in that construction has proceeded on schedule. The construction schedule has been timed to coincide with the anticipated requirements for generating capacity on the Public Service system in 1972. The plant is now scheduled for completion (exclusive of testing and fuel loading) on January 1, 1972, and but for the Calvert Cliffs' decision and the attendant supplementary environmental review necessitated thereby, this plant could reasonably be expected to be on the line and ready for commercial operation in late spring or summer of 1972, or reasonably close to the original target date of April 1, 1972.

To meet this schedule would require that Public Service Company receive its operating license from the AEC by January 1, 1972, and I am advised by the Company that

every effort has been made to comply with the revised schedule D regulations of the AEC and to supply the supplementary environmental data required in support of its application for an operating license. Because of the further environmental review required by the Calvert Cliffs' decision, the Company cannot now expect a full power operating license until March or April of 1972.

Without the Fort St. Vrain unit, in the summer of 1972, Public Service Company will not have sufficient generating capacity reserve margin to cover the ordinary contingencies to be expected in day to day operation of a large utility system such as that operated by Public Service Company and to enable this Company to meet system loads during the summer and winter months of 1972-1973. The need to have Fort St. Vrain in operation by the summer of 1972 is well established by a letter from the Federal Power Commission to the AEC dated August 10, 1971, a copy of which is attached hereto.

FEDERAL POWER COMMISSION
WASHINGTON, D.C. 20426

IN REPLY REFER TO:

AUG 19 1971

Mr. Harold L. Price
Director of Regulation
Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Price:

This is in reference to your letter of June 15, 1971, requesting comments on the draft detailed environmental statement for the Fort St. Vrain Nuclear Generating Station prepared by the Atomic Energy Commission and the environmental report dated December 1970, prepared by the Public Service Company of Colorado. The Company is a member of the Rocky Mountain Power Pool and the Western Systems Coordinating Council.

These comments are in accordance with the National Environmental Policy Act of 1969 and the Guidelines of the President's Council on Environmental Quality dated April 23, 1971. The environmental aspects of the plant, which we understand is the first major commercial nuclear unit of this type, must be analyzed thoroughly. We understand that will be done. These comments are directed to a review of the capacity load situation on the system of Public Service Company of Colorado. The St. Vrain Plant is now virtually completely constructed and the plant is scheduled for commercial service in March, 1972.

The plant is located in the southwest corner of Weld County, Colorado, two miles south of the confluence of the South Platte River and St. Vrain Creek and approximately 35 miles north of Denver, Colorado. The plant utilizes a high temperature gas cooled reactor and is designed for a dependable capacity of 330 megawatts.

The Need for Power

According to the applicant's 1970 Power System Statement (FPC Form 12) submitted to the Federal Power Commission, the net dependable capacity owned by the Public Service Company of Colorado is expected to be 2,108 megawatts (including the capacity of the Fort St. Vrain unit) during the summer 1972 and the winter 1972-1973 peaking seasons.

Mr. Harold L. Price

The respective peak loads expected are 1,586.0 megawatts and 1,724.6 megawatts. If these peak loads are achieved, the applicant's reserve during summer 1972 will be 521.8 megawatts or 32.9 percent and during the following winter peaking season 383.2 megawatts or 22.2 percent.

If the Fort St. Vrain in-service date were to be delayed until after the winter 1972-1973 peaking season, the applicant's reserve during summer 1972 would be reduced to 191.8 megawatts or 12.1 percent and the following winter 1972-1973 reserve to 53.2 megawatts or 3.1 percent.

The preceding discussion is summarized in the following table:

	Summer 1972	Winter 1972-1973
Capacity, Megawatts	2,107.8	2,107.8
Peak Load, Megawatts	1,586.0	1,724.6
Reserves, including Fort St. Vrain Unit		
Megawatts	521.8	383.2
Percent	32.9	22.2
Reserves excluding Fort St. Vrain Unit		
Megawatts	191.8	53.2
Percent	12.1	3.1

In its April 1, 1971, reporting in accordance with FPC Order No. 383-2, the Western Systems Coordinating Council includes the Fort St. Vrain Unit in its expected resources to meet the 1972 summer and future peak loads. With the unit, WSCC expects to have 26.3 percent reserves for the 1972 summer and 21.4 percent reserves for the 1972-1973 winter.

On the basis of data available to the Federal Power Commission, there can be no doubt that the capacity of the Fort St. Vrain unit is needed by the Public Service Company of Colorado before the summer of 1972 in order to provide a sufficient reserve margin to cover the ordinary contingencies to be expected in day-to-day operations of a large electric utility system.

Mr. Harold L. Price

Alternate Capacity Considerations

In view of the fact that the construction of the Fort St. Vrain Nuclear Plant is nearly complete and due for commercial operation in less than a year, it is apparent that undertaking an alternate supply as a substitute for the St. Vrain capacity would at this stage be impractical.

Sincerely,

John N. Nassikas

John N. Nassikas
Chairman

SACRAMENTO MUNICIPAL UTILITY DISTRICT

The effect upon the Sacramento Municipal Utility District (SMUD) of the September revision of Appendix D to 10 CFR Part 50 will depend upon the manner in which the revised regulations are interpreted and applied and upon the speed with which the A.E.C. Division of Reactor Licensing conducts the contemplated environmental reviews.

SMUD received a provisional construction permit for its 930 megawatt Rancho Seco Nuclear Generating Station, Unit No. 1, in October 1968. Construction of the major structures at the site is approximately 80% complete, and the unit is scheduled for commercial operation in summer of 1973. The final safety analysis report was filed on May 1, 1971, and SMUD has been informally advised that the Division of Reactor Licensing will attempt to schedule the ACRS meeting during September of 1972.

Despite its best efforts, SMUD does not expect to be able to file all of the material called for in the revised regulations by November 8, 1971. The chief reason for the delay is that its nuclear steam system supplier was unable to provide SMUD with the input for the accident analysis until this week. A separate computer calculation

based on this input must now be run for each of the specified accident classes. SMUD hopes to complete this work and to get all of the requested material on file by early December. The significant question from SMUD's standpoint is whether, assuming such a filing in early December, the Division of Reactor Licensing will be able to complete the environmental review without delaying the ACRS meeting now planned for September of 1972.

If the environmental review delays the ACRS meeting and thereby makes it impossible for SMUD to get the plant on stream by the summer of 1973, the consequences will be those described in the "show cause" statement which SMUD filed on October 19th of this year. Among these consequences would be the loss of approximately $1,000,000 each month that operation is delayed due to loss of revenue from plant sales and cost of replacement power. In addition, the increased construction costs resulting from a delay have been estimated by the Bechtel Corporation, SMUD's architect-engineer, at approximately $700,000 a month. As SMUD is a utility of only medium size with total operating revenue for 1970 slightly over $41 million, the overall impact of such losses would be serious.

SOUTHERN CALIFORNIA EDISON COMPANY

EFFECTS OF SIX-MONTH AND ONE-YEAR DELAYS
IN THE SAN ONOFRE 2 & 3 PROJECT

Under the assumption that replacement resources could not be provided, delays of either six months or one year in the installation of the San Onofre 2 & 3 units (Edison's 80% share of each unit is 912 megawatts) would reduce the ability of the Edison system to supply reliable service to less than minimum acceptable levels. The greatest reductions in system reliability would, of course, occur during the longer periods of reduced system capacity occasioned by such circumstances. However, some degradation of system reliability would continue for up to six years beyond the scheduled in-service dates of June 1, 1978 and June 1, 1979 due to corresponding delays in unit maturation cycles and necessary changes in scheduled maintenance of other generating units.

Because of interconnection and other operating arrangements, interconnected utilities would also suffer adverse effects due to the lowering of Edison's reliability.

To avoid unacceptable levels of system reliability caused by such delays, adequate replacement capacity would have to be provided. To suppose that this type of resource could be even temporarily obtained from neighboring utilities is not realistic. Acquisitions of the required magnitude would be unlikely under normal conditions and the utilities

that otherwise might be capable of providing these resources would be experiencing effects of similarly caused delays in the installation of their own nuclear facilities.

If Edison were to construct its own supplemental resources, they would necessarily be of types with shorter lead time requirements and would most likely be a type of peaking unit. While from a capacity standpoint peaking units might satisfy reliability criteria, a majority of the energy deficiency would have to be supplied from existing oil and gas fueled units. Since no increase in gas allotments would be available, essentially all additional fuel would be in the form of low-sulphur oil.

The amount of electrical energy that would not be available from nuclear sources would be approximately 6,460,000 MwHr for a six-month delay and 12,920,000 MwHr for a one-year delay. Corresponding quantities of additional low-sulphur oil to supply these amounts of energy would be approximately 9,372,000 BBLS and 18,745,000 BBLS and there is no assurance that these quantities of oil could be secured. Comparable increases in operating fuel expenses would be approximately $31,000,000 and $61,000,000.

It should be realized that delays in the construction of relatively clean nuclear units causing replacement of the lost nuclear energy by increased consumption of low-sulphur oil would result in an increase in NO_x emissions on the order of 6,000 tons for a six-month delay or 12,000 tons for a

one-year delay in the operation of the San Onofre project.

Increases in capital costs of the project due to escalation alone for the delay periods of six months and one year are estimated to be $14,000,000 and $28,000,000, respectively.

All of the foregoing figures apply only to Edison's 80% share of the San Onofre project; a similar effect could be anticipated for San Diego Gas & Electric Company's 20% share of these units.