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PROPOSED EXTENSION OF AEC INDEMNITY LEGISLATION

HEARINGS

BEFORE THE

SUBCOMMITTEE ON LEGISLATION

OF THE

JOINT COMMITTEE ON ATOMIC ENERGY

CONGRESS OF THE UNITED STATES

EIGHTY-NINTH CONGRESS

FIRST SESSION

ON

PROPOSED EXTENSION OF AEC INDEMNITY LEGISLATION

JUNE 22, 23, AND 24, 1965

Printed for the use of the
Joint Committee on Atomic Energy

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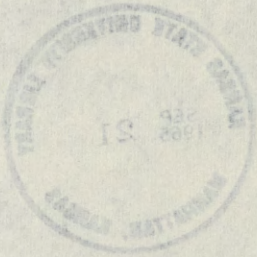
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PROPOSED EXTENSION OF AEC INDEMNITY LEGISLATION

TUESDAY, JUNE 22, 1965

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON LEGISLATION,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D.C.

The subcommittee met at 10:15 a.m., pursuant to call, in room AE–1, the Capitol, Representative Chet Holifield (chairman of the Joint Committee) presiding.

Present: Representatives Holifield, Price, Morris, Hosmer, Anderson, and McCulloch; and Senator Aiken.

Also present: John T. Conway, executive director; Edward J. Bauser, assistant director; Leonard M. Trosten, staff counsel; George F. Murphy, Jr., professional staff member; James B. Graham, technical adviser; Jack Rosen, staff consultant; and William T. England, legal consultant.

Chairman HOLIFIELD. The committee will be in order.

Senator Pastore, the chairman of the Subcommittee on Legislation, is unable to be here this morning. I will open the meeting by reading his statement.

This morning the Subcommittee on Legislation of the Joint Committee on Atomic Energy is beginning a series of hearings on bills (H.R. 8496 and S. 2042) relating to one of the most important pieces of legislation in the atomic energy field—the Price-Anderson Act.

These identical bills were introduced on May 26, 1965, by Congressman Melvin Price and Senator Clinton P. Anderson and without objection the bills will be included in the hearing record. (See app. 1, p. 235.)

The Joint Committee announced these hearings on May 27, 1965, and instructed all persons who desired to testify to so notify the committee. Without objection, the press release of May 27, 1965, and succeeding announcements will be included in the record at an appropriate point. (See app. 2, p. 236.)

This press release identified the following key policy questions to which the committee would address itself during these hearings.

1. Will there still be a need for Price-Anderson type legislation after August 1967?

2. Will additional nuclear liability insurance be available from commercial sources in the immediate future, and if so, in which amounts? Will increasing amounts of such insurance become available over the next several years?

3. If Price-Anderson type legislation should be extended, what should be the period of the extension?

4. If an extension of a governmental indemnity program in the nuclear field is warranted, what changes, if any, should be made in the Price-Anderson legislation?

5. Should the amount of the governmental indemnity available under the Price-Anderson legislation be reduced as more commercial nuclear liability insurance becomes available?

Every individual and organization that requested permission to testify has been invited to appear before us. In view of the significance of these legislative proposals, the committee also requested several other organizations affected by the Price-Anderson legislation to participate in the hearings.

In addition, the Advisory Committee on Reactor Safeguards and, of course, the Atomic Energy Commission, have been asked to be here today to give the committee the benefit of their thoughts on these bills and related matters.

The Price-Anderson Act was enacted in 1957 for a twofold purpose:

First, to protect the public by assuring the availability of funds for the payment of claims arising from a catastrophic nuclear incident.

Second, to remove a deterrent to private industrial participation in the atomic energy program which flowed from the threat of tremendous potential liability claims. In turn, it was considered that enlarged private participation in this program would speed the further development of peaceful uses for atomic energy.

It is generally recognized that the possibility of a catastrophic nuclear accident is extremely remote because of, among other things, the safety requirements imposed by the AEC upon persons engaged in the atomic energy business. Nevertheless, an accident of uninsurable dimensions is conceivable.

The Price-Anderson Act accordingly affords protection to the public and to AEC licensees and contractors from the risks associated with atomic energy by providing for a program of private insurance and governmental indemnity currently amounting to a maximum of $560 million to cover damages that conceivably could arise from a nuclear accident.

The act further provides for a limitation of liability of all persons indemnified in the event of a catastrophic nuclear incident resulting in claims which exceed the total amount of private insurance and governmental indemnity, subject, of course, to future congressional action in light of the particular circumstances.

The Price-Anderson Act is limited by its terms to AEC licenses and contracts which become effective on or before August 1, 1967. When the act was passed by Congress in 1957, it was understood that a comprehensive review would be undertaken by the Joint Committee toward the end of the act's 10-year term in order to determine whether the need which originally prompted Congress to approve this legislation still existed. Now, with almost 8 years of experience in administration of the act, the Joint Committee is conducting that review.

H.R. 8496 and S. 2042 would extend the effective period of the Price-Anderson Act for an additional 10 years, to 1977. They further provide for a decrease in governmental indemnity—currently $500 million

—to the extent of any increase in the amount of nuclear liability insurance available from private sources, currently $60 million.

As I have already indicated, these hearings will not be confined to a consideration of only those changes in the Price-Anderson Act reflected in the bills introduced by my distinguished colleagues; any other appropriate revisions of the act suggested at these hearings will be fully considered by the committee and possibly recommended to Congress. For that matter, it remains to be seen whether any legislative action is necessary or desirable.

Before proceeding, I would like to take this opportunity to compliment the atomic energy industry for the truly remarkable safety record that has been compiled during the 8 years that the Price-Anderson legislation has been in existence.

The record is a tribute to the diligent efforts of all concerned to assure that all possible safety precautions are taken. Because of this good safety record, and as was anticipated in 1957, not a dollar of Government money has been paid out under a Price-Anderson indemnity agreement executed with an AEC licensee.

The Joint Committee has, of course, always had a vital interest in the subject of nuclear safety, which is integrally linked with the indemnity provisions of the Price-Anderson Act.

We will begin now with testimony from the AEC.

Commissioner Ramey, you may proceed.

STATEMENT OF JAMES T. RAMEY, COMMISSIONER, U.S. ATOMIC ENERGY COMMISSION

Mr. RAMEY. Mr. Chairman, Mr. Palfrey and I will give the Commission testimony. We also have a background statement on reactor licensing procedures and reactor safety which we would like to introduce into the record at the appropriate time (see app. 3, p. 239) and also at the committee's request, we have a short statement on site criteria. (See p. 36.) The ACRS will then follow with their statement.[1]

H.R. 8496 and S. 2042, introduced by Congressman Price and Senator Anderson, provide for extension of the indemnity provisions of the Atomic Energy Act of 1954, as amended, for a second 10-year period. They would also provide for a reduction in the amount of Government indemnity equivalent to any increase above the present $60 million of liability insurance available.

The Atomic Energy Commission supports both objectives and favors enactment of the bills.

BACKGROUND OF PRICE-ANDERSON LEGISLATION

Beginning with the passage of the Atomic Energy Act of 1946, each administration, each Congress and the Atomic Energy Commission in the public interest have committed themselves to the development and application of peaceful uses of atomic energy, and

[1] As indicated on p. 38, it became necessary to postpone until later in these hearings the appearance of several witnesses, including Mr. William D. Manly and Dr. Herbert J. C. Kouts of the Advisory Committee on Reactor Safeguards, who were originally scheduled to testify on June 22, 1965. Subsequently a conflict of schedule developed which precluded the Joint Committee from receiving the oral presentations of Messrs. Manly and Kouts. Their prepared testimony was submitted for the record and appears in app. 4, p. 248.

particularly atomic power. The years since 1946 have seen the development of experimental and prototype power plants. We have now reached the stage of large nuclear power plants.

In fostering the development of atomic energy, the Congress and the Commission have not been unmindful that the special characteristics of nuclear materials, which make them useful for so many purposes, are also potential sources of danger to employees and to the general public, if the materials are not safely handled and properly controlled. For this reason, all our programs for the development and use of atomic energy have been accompanied by an unprecedented emphasis on safety.

EMPHASIS ON SAFETY IN NUCLEAR ACTIVITIES

The comprehensive revision of the Atomic Energy Act of 1946, which was effected by the Atomic Energy Act of 1954, was designed to remove the statutory restrictions which had theretofore precluded the possession and use of atomic energy on a large scale by private and non-Federal organizations for scientific or industrial purposes. This recognition of national benefit to be derived from the development of peaceful uses of atomic energy was accompanied by recognition of the responsibility of the Federal Government to assure that there is appropriate protection of the public against hazards associated with uses of atomic energy materials.

Interest in protection of the public safety has been evidenced in congressional legislation in several ways. The Congress included in the 1954 act (and in subsequent amendments as the need appeared) provisions designed to establish a comprehensive regulatory program to assure that the health and safety of employees and the public would be adequately protected. In 1957, the Congress enacted the Price-Anderson Act which was designed to protect organizations participating in the atomic energy program and the public by assuring that in the event of a serious accident funds would be available for the payment of damages. Amendments to the act were adopted in 1959 under which States may assume, and the Commission discontinue, responsibility for regulatory uses of atomic energy materials. This legislation does not include nuclear reactors or large quantities of fissionable materials. The Joint Committee on Atomic Energy and the Atomic Energy Commission have also taken active steps to encourage a reexamination of our State workmen's compensation laws and to encourage the States to adopt appropriate amendments of these laws when needed to afford proper coverage of radiation injuries. Since 1947, extensive research programs have been undertaken by the Commission in aid of its safety control programs.

Under the Commission's regulatory program, each person or organization must obtain a license in order to possess and use atomic materials (except for certain insignificant quantities). Before a license is issued, the applicant must demonstrate that his personnel, equipment and procedures are such as to assure that the material will be used safely from the standpoint of radiation hazards. Inspection programs are carried out to assure that licensees comply with the Commission's safety requirements. The files of licensing proceedings

are available in the Commission's public document room in order to assure full opportunity for public information concerning the Commission's licensing and regulatory actions. In certain licensing proceedings, such as those involving nuclear power and testing reactors, public hearing procedures are observed to provide fullest opportunity for public information and participation.

An applicant for a power reactor construction permit or operating license is required to furnish a hazards summary report as a part of his application. This report describes the proposed site and design of the reactor and plans for its operation, and contains an analysis of the safety considerations involved. Each application receives successive careful safety reviews:

1. Review by the AEC's regulatory staff

A staff safety analysis is published upon the conclusion of the staff review. This analysis summarizes the staff safety review of the application and the staff conclusions.

2. Review by the ACRS

Each application for construction permit and operating license for a nuclear power reactor is also reviewed by the Advisory Committee on Reactor Safeguards. When it has reached a conclusion on the safety aspects of the reactor, the ACRS reports its views to the Commission. This report is made public.

The Price-Anderson law includes provisions establishing the Advisory Committee on Reactor Safeguards as a statutory committee, requiring certain of its safety reports be made public, and requiring that public hearings be held on certain reactor license applications.

3. Public hearing

The next major step in the regulatory process on an application for a construction permit for a power reactor is the scheduling of a public hearing to consider issuance of the permit.

The public hearing is usually conducted by an Atomic Safety and Licensing Board as provided under amendments to the Atomic Energy Act introduced by Chairman Holifield and Senator Pastore and enacted in 1962.

In the absence of a request by an applicant or an intervenor, the Commission will not normally direct that a hearing be held at the operating license stage unless there is a difficult safety problem of unusual public importance or there is substantial public interest which would warrant that course.

4. Commission review

Decisions by an Atomic Safety and Licensing Board after hearing are subject to review by the Commission upon its own motion or upon filing of a petition for review which has been accepted by the Commission. In addition, the Commission, as a matter of practice, informally reviews proposed construction permits and operating licenses in cases where no hearing is held.

Equally effective radiation safety controls are exercised over Commission contractors under the terms of the applicable Commission contracts.

The nuclear safety record is one in which all involved in the atomic energy program should take pride, including the Joint Committee on Atomic Energy, the Atomic Energy Commission, the Commission's contractors and licensees, and the plant employees and their labor unions.

The Commission regards its safety responsibilities as paramount and overriding. We are determined that the outstanding safety record of the past 20 years will be surpassed in the years ahead. The relatively few radiation injuries and fatalities which have occurred are, however, a reminder that no safety programs can be 100 percent effective; and, in spite of all precautions, some accidents can and do happen.

BACKGROUND OF THE PRICE-ANDERSON ACT

Recognizing that there would be a need for insurance in atomic energy activities, the insurance industry has made strenuous efforts to meet the insurance needs of the nuclear industry. Insurance has been made available in unprecedented amounts and in a variety of unique forms to meet the special needs of the various groups engaged in atomic energy activities and to make possible the effective implementation of the Federal indemnity legislation.

INSURANCE FOR NUCLEAR ACTIVITIES

In these endeavors, the insurance industry, both stock and mutual companies, have demonstrated their faith in the growth and safety of nuclear activities and their desire and ability to assist and participate in that growth.

Although $60 million represents an unprecedentedly large amount of third-party insurance, it is possible to postulate extremely unlikely, theoretical nuclear accidents which, under certain circumstances, conceivably could cause damage considerably in excess of $60 million. This theoretical possibility was recognized soon after passage of the 1954 act as constituting a risk to the public, and a deterrent to private atomic energy activity, for which the availability of funds to satisfy liability claims should be assured. The Price-Anderson indemnity law was intended to meet these needs; namely, to assure the availability of funds to satisfy public liability claims in the event of a catastrophic nuclear accident causing damages in excess of the insurance made available by the insurance industry; and to remove the deterrent to private participation in atomic energy activities presented by the theoretical possibility of such an accident.

LEGISLATIVE HISTORY OF PRICE-ANDERSON ACT

Public hearings on nuclear energy insurance problems were held before the Joint Committee on Atomic Energy at two successive sessions of Congress. Two bills were introduced by Joint Committee members early in 1956. H.R. 9701, introduced by Mr. Price, provided for full governmental indemnity against uninsured liability without a maximum limit. H.R. 9802, introduced by Mr. Cole, limited the liability of the reactor owners to twice the original cost of the facility. The bill supported by the Atomic Energy Commission (H.R. 11242) would have provided a voluntary system of Government liability

insurance in excess of the amount of insurance available from private carriers.

In March 1956, the Joint Committee held a seminar of people interested in the various aspects of this problem, including representatives of the AEC, companies which build reactors or parts, companies which would operate reactors, and of insurance firms. After the seminar, Chairman Anderson sent out a letter on April 26, 1956, to the industry and others interested, which suggested possible legislation incorporating features of both the Price and the Cole bills, and including a ceiling of $500 million on the Government indemnity. This new proposal was based on Joint Committee staff studies and recommendations (in which George Norris, committee counsel, and I were the chief participants) with respect to the indemnity problem and the results of the seminar.

I can remember this period very well, since the indemnity legislation constituted my first assignment when I became staff director for the Joint Committee in April 1956.

Subsequently, after public hearings before the Joint Committee in May 1956, Senator Anderson introduced a bill, S. 3929 (84th Cong., 2d Sess.), which followed the lines of his letter of April 26, 1956.

Following additional hearings in June 1956, and after further meetings in executive session and deliberations to consider the bills and testimony submitted, the Joint Committee voted out S. 4112 introduced by Senator Anderson, and H.R. 12050 introduced by Mr. Price, which included coverage of the liability of all persons. These bills, with certain committee amendments, were reintroduced and enacted in 1957.

During this same period, a study of atomic energy insurance and indemnity problems was conducted by the Legislative Drafting Research Fund of Columbia University Law School and its preliminary report was available to the JCAE staff.

Commissioner Palfrey and Arthur Murphy were participants in this study.

The final Columbia report, "Financial Protection Against Atomic Hazards," was issued in January 1957, by Atomic Industrial Forum, Inc.[1] The study included a comprehensive analysis of the legal and insurance problems which warranted consideration in connection with possible indemnity legislation and evaluated the various approaches which had been under consideration.

As noted earlier, one of the approaches considered before adoption of the Price-Anderson law included the feasibility of establishing a system of Government insurance rather than indemnity. This approach was rejected as being impractical because of the impossibility of establishing any actuarial basis for this protection. The possibility of the Government ever making any payments is so exceedingly remote and speculative that it is not possible to assign any sensible dollar value to the Government indemnity.

Each year since adoption of the Price-Anderson law, the Commission has furnished a written report to the Joint Committee as to operations under the indemnity provisions of the act and the operations of the Advisory Committee on Reactor Safeguards; and in most of these years, the JCAE has held hearings on these activities. Numerous amendments to the Price-Anderson Act have been adopted as

[1] See Joint Committee on Atomic Energy print, "Selected Materials on Atomic Energy Indemnity Legislation," June 1965, p. 180.

the need for them has arisen, including the amendment of last year.

The considerations which led to adoption of the Price-Anderson Act have not been unique to the United States. Legislation to achieve similar objectives has been enacted in most of the countries of the world having advanced atomic energy programs, including the United Kingdom, Germany, Japan, and others. In addition, a number of international conventions have been drafted which are designed to serve substantially similar objectives in the various situations where national legislation alone might not be fully effective. These conventions are described in our study of the Price-Anderson Act.[1] Although there are some significant differences as among various conventions and foreign legislation, almost all have in common the basic elements of Price-Anderson:

(1) Underlying liability insurance from commercial sources;

(2) A limitation upon the liability of persons liable; and

(3) A recognition of the obligation of Government to provide compensation to those injured and for property damage.

At this point Commissioner Palfrey will consider the Price-Anderson Act as such.

Chairman HOLIFIELD. If it is all right with the committee, we will have the Commission's full statement and then we will question both witnesses.

Representative PRICE. That is a good idea.

Chairman HOLIFIELD. Proceed, Commissioner Palfrey.

STATEMENT OF JOHN G. PALFREY, COMMISSIONER, U.S. ATOMIC ENERGY COMMISSION

Mr. PALFREY. The basic approach of the Price-Anderson Act, with respect to licensed activities, is to require licensees (other than certain educational institutions and Federal agencies) who are covered by Price-Anderson to furnish financial protection (in the form of insurance or otherwise as provided in the act) to cover public liability claims in an amount specified by the Commission; to require the Commission to provide indemnity protection in the amount of $500 million for each nuclear incident over and above the amount of financial protection required; and to limit the liability of all persons liable to the sum of the financial protection and the Commission's indemnity of $500 million. The legislation does not establish any new rules of liability; it is indemnity legislation designed to assure the availability of funds to satisfy liability claims up to the amounts indicated.

In adopting the limit on total liability, the Congress was not unmindful of the extremely improbable, but theoretical possibility, of a reactor accident causing damages in excess of the limit on liability and funds made available by the Price-Anderson Act. This limit was incorporated in the law, not to deprive the public of protection, but in order to give the Congress the opportunity to act in light of the circumstances of the particular situation if such a catastrophe should occur. The report of the Joint Committee on the bill which became the Price-Anderson law makes it very clear that the—

> . . . limit could be subject to upward revision by the Congress in the event of any one particular incident in which, after further congressional study, the Congress felt more appropriations would be in order.

[1] See Joint Committee on Atomic Energy print, "Selected Materials on Atomic Energy Indemnity Legislation, June 1965, p. 50.

Under the act, the requirements of the indemnity law are mandatory with respect to licensed production and utilization facilities such as nuclear reactors and chemical reprocessing plants. The Commission is, however, given discretion as to the coverage of other kinds of activities involving atomic energy materials.

INSURANCE PREMIUMS AND INDEMNITY FEES FOR REACTOR OPERATORS

With the permission of the committee, I would like to furnish for the record a statement showing the premiums which are paid by licensees for nuclear energy liability insurance covering typical power reactors.

(The document referred to follows:)

ATOMIC ENERGY COMMISSION

Licensed power reactors—Insurance premiums and indemnity fees

Reactor	Power level (megawatts-thermal)	Financial protection		Indemnity fee
		Required	Premium	
Carolinas-Virginia Nuclear Power Associates, Inc., Columbia, S.C.	44.3	$6,645,000	$28,297	$1,329
Commonwealth Edison Co., Chicago, Ill.	700	60,000,000	233,000	21,000
Consolidated Edison Co., New York, N.Y.	585	60,000,000	266,500	17,550
Consumers Power Co., Jackson, Mich.	240	36,000,000	153,000	7,200
Yankee Atomic Electric Co., Boston, Mass.	600	60,000,000	125,000	18,000

Mr. PALFREY. For example, the annual premium by Commonwealth Edison Co. for liability insurance for the 700 megawatts-thermal (200 megawatts-electrical) Dresden plant is $233,000. These premiums, of course, are subject to refunds under the liability insurance pools' industry credit rating plan. The statement also shows the amount of the annual indemnity fee paid by the licensee. In the case of Commonwealth Edison, the fee is $21,000.

At the time my statement was drafted, we had not yet been advised as to premium rates for the larger reactors now planned or under construction. Since then we have received the information and with the permission of the committee I would like to furnish for the record a statement showing the estimated annual indemnity fees and insurance premiums which will be paid for designated large power reactors now planned or under construction.

(The document referred to follows:)

Nuclear liability insurance premiums for power reactors currently under construction

Company	Power level (megawatts-thermal)	Amount of financial protection	Annual premium	Indemnity fee	In operation
Connecticut Yankee	1,473	$60,000,000	$269,750	$44,190	1967
Jersey Central [1]	1,600	60,000,000	200,000	48,000	1968
Niagara Mohawk	1,538	60,000,000	221,000	46,140	1967
Philadelphia Electric	115	17,325,000	73,354	3,450	1965
Southern California Edison	1,210	60,000,000	260,000	36,300	1966

[1] Base rate used by insurers computed on power level of 1,700 megawatts-thermal as requested by Jersey Central.

INDEMNITY COVERAGE OF AEC CONTRACTOR ACTIVITIES

Mr. PALFREY. The approach of the act with respect to contractor activities is basically similar to that for licensed activities. Principal differences include the grant of full discretion to the Commission as to what contract activities involving the risk of a substantial nuclear incident should be made subject to the act. The act also gives the Commission discretion as to whether financial protection should be required. Since the Commission has estimated that nuclear liability insurance premiums covering its facilities would cost the Government several million dollars annually, the Commission has not required its contractors to maintain financial protection; in such cases, the Government indemnity begins with the first dollar of liability. The Commission has offered to negotiate with the NELIA-MAELU pools for the procurement of nuclear liability insurance on a retrospective rating plan basis by those contractors operating AEC facilities.

The Commission has entered into indemnity agreements with all prime contractors engaged in an activity involving the risk of a substantial nuclear incident. In addition to the coverage of all major AEC installations operated by AEC contractors, indemnification agreements have been entered into with manufacturers and carriers of weapons components, manufacturers of naval reactor core components, contractors involved in the conduct of research and development experiments connected with the Commission's space applications program (for example, Rover), operation of Government-owned reactors abroad, systems for nuclear auxiliary power (SNAP) program, peaceful nuclear explosives applications (Plowshare) program, contractors operating nuclear reactor plants under the Commission's cooperative power demonstration program, and certain special nuclear materials processors. The Commission has also entered into an indemnity agreement covering the NS *Savannah* under specific authority contained in the act.

CLAIMS ADJUSTMENT AGREEMENTS

Arrangements have been made with General Adjustment Bureau; National Association of Independent Insurance Adjusters; NELIA and MAELU for claims investigation and settlement services, and coordination of claims handling between AEC and the insurers, so that claims may be promptly and properly processed and paid in the event of a serious accident.

Experience in the administration of the law since its enactment in 1957 demonstrates that the second of its two objectives—removal of the deterrent to industrial activity in atomic energy—has clearly been achieved. We believe also that we have achieved its first objective: assurance of the availability of funds to satisfy public liability claims in the event of a catastrophic nuclear accident.

Fortunately, there has been no accident which has tested the degree to which we have achieved this objective. We do not expect to have one.

We will not go into detail in reviewing our experience in the administration of the Price-Anderson law. We have reviewed this experience in detail in our recently published study of the Price-Anderson

Indemnity Act, which was included in the extremely useful Joint Committee print on "Selected Materials on Indemnity Legislation." [1]

The Commission study has not disclosed any serious weakness in the act or its administration which poses an immediate need for rectification. The report does identify a number of problem areas and describes measures or programs for the resolution of these problems. We will discuss some of these later.

THE PRICE-ANDERSON ACT SHOULD BE EXTENDED FOR AN ADDITIONAL 10-YEAR PERIOD

In view of the demonstrated effectiveness of the Commission's safety programs in the plants and laboratories of the Commission's contractors and licensees, and the safety requirements which are imposed upon them, we are confident that accidents of greater severity than the amount of nuclear energy liability insurance commercially available will not happen. We would not authorize or license any plant to operate if we believed that its operation might result in such an accident.

Our experience, however, has not yet been so extensive, and the technology has not yet sufficiently developed, that we can deny the theoretical possibility of such an accident.

The Commission has directed inquiries to the nuclear liability insurance pools as to whether or not they are in a position, at the present stage in the development of the nuclear industry, to increase the amount of nuclear energy liability insurance which they can make available as financial protection to licensed operators of nuclear facilities. We understand that at these hearings the companies will advise that they are in a position to make an increase in the amount of insurance available. This increase, however, is not sufficient to protect industry and the public from the theoretical consequences of a major accident and thus is not sufficient to eliminate the need for the continuance of the indemnity legislation.

We understand that the insurance industry's inability to increase the amount of insurance available to a much higher figure is not due to lack of confidence in the safety of nuclear powerplants, but is due solely to the present small number of potential customers and consequently the lack of an economic incentive for making additional capacity available. There are only three licensed power reactors which, at the present time, are required to purchase the maximum amount of liability insurance available.

Thus, for substantially the same reasons as justified the adoption of the Price-Anderson Act in 1957, we believe that the act should be extended for a second period of 10 years as provided in H.R. 8496 and S. 2042.

Extension of the act for a second 10-year period will provide the public and the industry with the assurance of continued indemnity protection for a reasonable period of time, in light of the long lead-times required by utilities in planning the construction of nuclear power reactors. At the same time, the proposed extension is not so long as to postpone indefinitely a further congressional review of the

[1] See Joint Committee on Atomic Energy print, "Selected Materials on Atomic Energy Indemnity Legislation," June 1965.

indemnity legislation and the decisions which must eventually be made as to the long-term role of the Price-Anderson indemnity program.

H.R. 8496 and S. 2042 provide also that the amount of Government indemnity should be reduced by the amount that the financial protection required exceeds $60 million. The Atomic Energy Commission supports this amendment to the act. Under this amendment, the total amount of indemnity protection available to the public would not be affected; there would merely be a substitution of liability insurance from private sources for Government indemnity to the extent that insurance is furnished in amounts above $60 million. Such a substitution would constitute a step in the direction of replacement of Government indemnity with commercial insurance.

THE DESIRABILITY OF FURTHER STUDY CONCERNING CERTAIN TOPICS RELATED TO THE PRICE-ANDERSON LAW

The report of our study of the Price-Anderson law identifies a number of topics with respect to which further consideration and study by industry, Government and interested members of the public appear to be desirable. We would like to emphasize that as to none of these topics does it appear to be desirable to enact legislation at the present session of the Congress; further attention and further study of each of these topics is needed before legislation is considered.

1. The desirability of amending the act to establish the basis for liability under the act

As noted earlier, the Price-Anderson Act is designed to assure the availability of funds for the payment of damages in the unlikely event of a serious accident; it does not establish the basis of liability on which these funds will be paid to claimants. Part I of our report summarizes various considerations relevant to the question whether the act should be amended to provide for the payment of damages caused by indemnified activities without regard to fault, and the section considers various mechanisms by which such a result could be accomplished.

Our analysis of the various factors involved in this question has convinced us that consideration of such legislation would be desirable. Presently, there is uncertainty as to whether claimants for personal injuries or property damage caused by nuclear incidents covered by Price-Anderson indemnity agreements will be able to recover in the absence of proof of fault or without protracted litigation. There is a question whether the elaborate Price-Anderson system of private insurance and Government indemnity, which includes a limit on total liability for a nuclear incident, is complete unless those injured have greater assurance of recovery through the adoption of rules establishing the basis upon which claims for damage will be paid. Any legislation should include a specification of the period within which suits must be filed, taking into account the need to provide for cases in which there is delayed manifestation of injury.

Although we have concluded that consideration of such legislation would be desirable, we do not believe it should be included in the present deliberations concerning the extension of the act. On the

contrary, we believe that further study is needed to determine whether such legislation would be desirable and, if so, the type of legislation which should be adopted. For example, consideration should be given to the various possible techniques (discussed in part I of our report) by which the basis for liability might be established; and of such associated questions as whether the liability established should be exclusively that of the facility operator and whether the legislation should preserve the rights of recourse on common law principles against those who, in fact, may be found to have caused an accident.

All of the international conventions on nuclear liability drafted thus far have been based on absolute liability of the operator. Accordingly, adoption of absolute liability in the Price-Anderson Act would clearly facilitate U.S. acceptance of international conventions.

2. The statutes of limitations problem

The section (part I) of our report which discusses the desirability of adopting legislation to establish the basis for liability under the Price-Anderson Act suggests that the States examine their statutes of limitations to determine whether they provide adequately for claims where there is delayed manifestation of injury.

The Atomic Energy Commission, the Bar Association of the City of New York and the Council of State Governments are sponsoring a study of the statutes of limitations of the States with respect to the time periods within which legal actions may be brought in cases of radiation injury.

The study is being carried out by the School of Law of New York University and is under the direction of Prof. Edward J. Bloustein.

The scope of the study includes a survey of the existing statutes of limitations of the States to determine their adequacy with respect to the permitted time within which suits may be brought for radiation injuries, taking into account delayed manifestations of such injuries; and preparation of drafts of possible model State legislation if the survey suggests the need for legislation. It is expected that the study will be completed this summer.

3. The 2-year discovery provision contained in the insurance policies

As discussed in part I of our report, the nuclear energy liability insurance policy (facility form) provides that:

> This policy applies only to bodily injury or property damage (1) which is caused during the policy period by the nuclear energy hazard and (2) which is discovered and for which written claim is made against the insured, not later than 2 years after the end of the policy period.

The problem presented by this provision arises from the possibility that termination of the policy after a nuclear accident may result in exclusion of a significant portion of the insured's liability from the coverage of the policy. Such a possibility has particular significance in connection with radiation injuries because such injuries may not become evident until many years after exposure has occurred. The possible problems presented by this provision were extensively considered by the Commission before it approved the facility form of insurance policy as financial protection; they were also the subject of congressional hearings. It was concluded at that time that, in light of the explanations furnished by the insurance pools of the reasons why they believed it necessary to incorporate the provision, the prob-

lems presented by the provision were not so significant as to preclude Commission approval of the policy form.

In the light of experience since that time, however, and in light of the fact that the insurance pools have offered to bridge, tunnel, port, and toll road authorities (upon payment of an additional premium in the first policy year) an endorsement to extend the discovery period to 10 years after policy cancellation, it may now be that the insurance pools can offer such an endorsement to other segments of the transportation industry and to purchasers of the facility form, or develop some other solution to the problem.

4. Amendment to subsection 53e.(8) of the Atomic Energy Act of 1954

Subsection 53e.(8) of the Atomic Energy Act provides that each license issued for the use of special nuclear material contain a condition that:

> except to the extent that the indemnification and limitation of liability provisions of section 170 apply, the licensee will hold the United States and the Commission harmless for any damages resulting from the use or possession of special nuclear material by the licensee.

As noted in part I of our report, the applicability of this subsection is questionable. It has been the AEC position that the exception applies only above the amount of financial protection, but the correctness of this position is not free from doubt. The uncertainty has not created practical present problems, perhaps because liability of licensees to the United States under section 53e.(8) is (subject to applicable policy limits and provisions) covered by the nuclear energy liability insurance (facility form).

In light, however, of the various amendments to the Atomic Energy Act adopted in 1964 to provide for the private ownership of special nuclear material, consideration should be given to the desirability of either eliminating subsection 53e.(8) or amending it to make the subsection applicable only to special nuclear material owned by the United States.

Although the Atomic Energy Act of 1954, and its legislative history, do not clearly define any specific reasons for inclusion of subsection 53e.(8) in the act, it seems likely that this subsection was intended to protect the United States against possible damage claims based merely on the Government's title to special nuclear material. With elimination of the requirement that the United States have title to all special nuclear material and the consequent possession and use by licensees of privately owned special nuclear material, the desirability of retaining the provision should be reexamined.

Our report recommends also that the insurance pools consider the feasibility of broadening the definition of "insured" in the facility form of nuclear energy liability insurance furnished as financial protection to include the Federal Government and its agencies. In view of the fact that the definition of "insured" already includes all persons and organizations other than the United States, including persons not in privity with the licensee and including Federal employees, the expansion of coverage to include the United States would not appear to be an appreciable additional risk for the insurers.

5. Problems as to transportation

Beginning in early 1960, various organizations engaged in transportation activities have brought to the attention of the Commission and the Joint Committee on Atomic Energy questions as to the adequacy of their insurance and indemnity coverage. These problems have received extensive attention in hearings before the Joint Committee on Atomic Energy and have been extensively discussed in various meetings among representatives of the insurance industry, carriers, and toll authorities, the Atomic Energy Commission, and others.

The two categories of organizations which have expressed particular concern as to these problems of insurance and indemnity have been the bridge, tunnel, port, and toll road authorities and a number of railroads in the northeastern part of the United States.

A number of these authorities and railroads have restricted the movement of shipments of radioactive materials over their rights-of-way pending further resolution of some of these problems.

At hearings held in 1962 before the Joint Committee on Atomic Energy on the subject of indemnity and reactor safety, representatives of the American Bridge, Tunnel, and Turnpike Association urged adoption of an amendment to the Price-Anderson Act to cover property damage and loss of revenue to public transportation facilities from radioactive materials.

Recently, representatives of the Association of American Railroads have discussed with AEC proposed amendments to the Price-Anderson Act prepared by representatives of the Association which would, among other provisions, authorize the Commission until August 1, 1977, to enter into indemnity agreements with and require financial protection of common and contract carriers of source, byproduct, and special nuclear material; and, with respect to persons engaged in the transportation of such material, extend indemnity coverage to nuclear incidents occurring outside of the United States. Their proposed bill is designed also to clarify certain provisions of the present law. The amendments they proposed are included in the report of our study of the act.

The questions which have been raised by these groups, and the measures which have been developed or are under consideration to meet their problems are discussed in detail in the report of our study of the Price-Anderson Act.[1] For that reason, we will attempt to provide only a general summary in this statement.

Some of the principal difficulties which have arisen are due to the fact that a nuclear energy liability exclusion has been incorporated into the conventional liability and property insurance policies; this clause makes the policies inapplicable to losses due to radiation or radioactive material.

Some of the problems which have resulted from the adoption of these exclusions, and a number of others, have been resolved by the issuance of formal interpretations by the insurance pools and some have been resolved by the insurance companies making available special insurance policies or endorsements. (See app. 34, p. 377.)

[1] See JCAE print, "Selected Materials on Atomic Energy Indemnity Legislation," June 1965.

The Atomic Energy Commission has also assisted by issuing interpretations of the Price-Anderson indemnity agreements and by other steps designed to eliminate difficulties or uncertainties as to the coverage of the indemnity agreements.

The principal remaining problems are in the area of first party property coverage against damage to the facilities of the authority or carrier from an accident on their right-of-way.

Although the insurance policies furnished as financial protection and the indemnity agreements both provide coverage for "off-site" property damage, including damage to the property of persons liable, many of the authorities and eastern railroads believe that such coverage is not an adequate substitute for conventional first party insurance coverage, in view of what they consider to be the potential difficulty in establishing liability and recovering judgments following a nuclear accident.

The services furnished to the atomic energy industry by the authorities, the railroads and other groups in the transportation and related industries are as vital to the atomic energy industry as to other segments of the American economy. These groups and the insurance companies have made and are making strenuous effort to solve their problems without further legislation. The Atomic Energy Commission is cooperating with them and is providing whatever assistance it can. We believe that very substantial progress has been made and we expect additional progress. We do not, however, exclude the possibility that it may turn out ultimately that some of the difficulties will not be amenable to resolution without an amendment to the Price-Anderson Act. We plan to keep in touch with the various interested organizations and will report further to the Joint Committee on Atomic Energy on this matter in our next annual report under the Price-Anderson law.

In conclusion, Mr. Chairman, the Price-Anderson Act represents a viable and effective integrated program of private insurance and Government indemnity. It is serving the public interest and should be extended for the additional 10-year period proposed in H.R. 8496 and S. 2042. Accordingly, the Commission favors the enactment of these bills.

AEC VIEWS ON NATIONAL COAL ASSOCIATION'S PROPOSALS

Chairman HOLIFIELD. The National Coal Association has adopted a threefold position in a brochure mailed to the Members of Congress; namely, (1) end the limitation of liability feature of Price-Anderson; (2) end the Government indemnity authorized by Price-Anderson; and (3) authorize the Government to sell "excess insurance" to cover potential nuclear liability, at commercial rates. (See app. 8, p. 294.)

Please let us have AEC's views on each of these points.

Mr. RAMEY. The Atomic Energy Commission is not in favor of these recommendations made by the Coal Association. We believe that the Price-Anderson indemnity act as described by Mr. Palfrey and myself is a law that is difficult to tinker with.

If you ended the limitation of liability feature, this would certainly be a deterrent to the utility operators and the equipment manufac-

turers. They would not know what their liability would be then over and above the governmental indemnity. To be consistent on eliminating the limitation of liability, you would almost have to have an unlimited indemnity by the Federal Government.

So, that is pretty well our position on No. 1.

On the ending of the governmental indemnity authorized by Price-Anderson, we believe as explained in our testimony that we are not yet at that stage in our atomic power program where we can have commercial actuarial rates that could cover the insurance of these facilities; and we believe in order to protect the public and in order to protect our utilities and equipment suppliers, we have to have this governmental indemnity over and above the amount that the private insurance industry can provide.

On No. 3, to authorize the Government to sell excess insurance, again the answer to that is that we really don't have a commercial actuarial rate to cover the whole extent of the liability. We have these rates which have this retrospective feature that the private insurance industry is providing. The Government does charge a fee that does not represent an actuarial insurance rate for this indemnity coverage. Over the next 10 or 20 years we hope it will be possible, as the atomic power industry does become a completely economic and commercial industry, to develop commercial rates that would cover the extent of the liability as then determined.

SALE OF EXCESS INSURANCE BY AEC

Chairman HOLIFIELD. Is it not true that the Commission in 1956 favored the sale of excess nuclear liability insurance by the Government? This coincides with the present position of the National Coal Association. Do you believe the law should be changed to carry out this approach?

Mr. RAMEY. At that time the Commission, as then constituted, and with the advice of the Bureau of the Budget, did take that position. However, when the Price-Anderson legislation was introduced by the Joint Committee, the Commission did indicate that it would support the features of the Price-Anderson law as they were enacted. I think the Commission's view now is that in view of the experience that we have had with the Price-Anderson law and on further consideration we believe it is the most desirable type of indemnity insurance arrangement.

FOREIGN LIMITATION OF LIABILITY STATUTES

Chairman HOLIFIELD. Relative to the limitation of liability, is it true that some foreign nations do not have such a provision?

Mr. RAMEY. I believe that is correct, Mr. Holifield. However, more nations probably do have it; for example, in England, the United Kingdom. Also, these international conventions contain a limitation of liability along with the indemnity provided. Most of them are quite a bit lower than is provided in the Price-Anderson law.

Chairman HOLIFIELD. It is also true that we have not signed those conventions, is it not?

Mr. RAMEY. That is true and one of the problems is that because they are rather low. I believe Mr. Hennessey has a statement to make.

STATEMENT OF JOSEPH F. HENNESSEY, GENERAL COUNSEL, ATOMIC ENERGY COMMISSION

Mr. HENNESSEY. I would like to expand Commissioner Ramey's answer to the question about the absence of limitation of liability in foreign legislation. As far as we know, there is only one country which has failed to have a limitation of liability, and that is South Africa. On the other hand, in Europe most of the European nations which would include Switzerland, Denmark, the Federal Republic of Germany, Italy, Spain, Belgium, United Kingdom, all have limitations of liability in their national legislation.

Mr. CONWAY. How about Japan? Does Japan have a limitation?

Mr. HENNESSEY. It is not quite clear in the Japanese legislation. There is provision for review by the legislature in the event that claims exceed the amount of indemnity. It would appear that they have left open a road to obtaining additional coverage.

CONSTITUTIONALITY AND ADVISABILITY OF LIMITATION OF LIABILITY

Chairman HOLIFIELD. If we did eliminate this limitation of liability from the law what would be the effect upon AEC licensees and also AEC contractors?

Mr. RAMEY. It would introduce this element of doubt as to what their liability is over and above the governmental indemnity. In the event of a catastrophe, it would be a rather difficult sort of thing to parcel out the liability. It would also, as I mentioned earlier, be a deterrent and you will want to ask the utility companies their views on this—it is our view that it would be a deterrent to the utility companies and to a certain extent to the equipment companies by reason of this unlimited liability over and above the governmental indemnity.

Chairman HOLIFIELD. There have been some charges made that the law is unconstitutional. I would not expect you to give an opinion on that in detail at this time. I would suggest that you submit a brief on that to the committee. If you care to make any comment at this time, you may go ahead. (See apps. 40, 41.)

Mr. RAMEY. I believe Mr. Hennessey could make a comment, our General Counsel.

Mr. HENNESSEY. I will be glad to make some preliminary comments on the subject, Mr. Chairman.

The constitutional problem really involves two issues. First, whether the Constitution prohibits the enactment of legislation that would limit the liability of a tort feasor.

The second issue is whether the Congress has a constitutional basis for acting in this area.

On the first question, the Constitution does not guarantee that any person will recover full compensation for any injuries that are caused

as a result of the tortious action of another. The courts have upheld the constitutionality of a multitude of State and Federal legislative enactment which have altered and limited the rights of an individual under the common law. For example, the Supreme Court has upheld the constitutionality of State workman's compensation acts which deprive an employee of his common law rights and limit the amount that an employer is required to pay an employee.

In the Federal area we have the Longshoreman and Harbor Workers Act which has a comparable objective.

In arriving at these decisions the courts have taken the position that nobody has a vested interest in any partciular right under the common law and that the legislatures can act to alter and limit the liability of a person for his tortious conduct.

Perhaps the closest parallel to our own Price-Anderson situation is the Shipowners' Limitation of Liability Act. Under that act the liability of a shipowner is limited to the value of the ship and its cargo. The statute has been in effect now for over a hundred years and has consistently been upheld in the courts. One of these courts said that the authority of the Congress to limit liability could not be questioned.

Turning now to the second issue, whether the Congress has a constitutional basis for acting, I think it is completely clear that there is a sound basis for the Price-Anderson limitation of liability in the commerce clause of the Constitution. I do not think there is any doubt that the atomic energy industry is in interstate commerce and the courts have rendered decisions to that effect. The materials that constitute the fuel for the industry are transported in interstate commerce from mine to refinery to processing plant to gaseous diffusion plant to fabrication plant and eventually to a nuclear reactor.

After the fuels have been consumed, they are shipped in interstate commerce to a chemical reprocessing plant and there, after separation, they again enter the channels of commerce.

The nuclear powerplant itself produces electric energy which is transmitted in interstate commerce.

If there ever should be a major accident in one of these plants involving the release into the environment of radioactive fission products, it could be anticipated that that radioactivity would cross State lines and damage channels of interstate transportation and commerce.

I think it is completely clear that the commerce clause is a sound basis for the action of the Congress, but I think there is another sound basis and that is the war powers. Clearly as to the Commission's production and weapon manufacturing activities, limitation of liability would be a proper exercise of the water powers.

But beyond that I think that the nuclear power industry, itself, has a sufficiently close association with the national defense and security that the exercise of war powers with respect to the civilian nuclear power industry would also be a proper exercise of congressional authority. I think this is a very important subject as far as utility operators are concerned, and to my knowledge it has never been raised in any of the considerations by this committee of the act or any of its amendments.

I would appreciate the opportunity, Mr. Chairman, to present for inclusion in the record a formal opinion on the subject.

Chairman HOLIFIELD. The Chair will welcome that submission and it will be received without objection.

Representative HOSMER. May I ask in just that connection, there would appear to be some legitimate arguments or bases for a contrary opinion, would there not?

Mr. HENNESSEY. I don't think there is any basis really on the second issue, Mr. Hosmer.

Representative HOSMER. On the war powers?

Mr. HENNESSEY. No, the interstate commerce.

Representative HOSMER. What about on the war powers?

Mr. HENNESSEY. On the war powers, I think that to the extent that the war powers have been relied upon for the enactment of the Atomic Energy Act and all its regulatory provisions, that this is simply a part of the overall system of Government regulation, control, and promotion of the industry.

Representative HOSMER. Let me say this: If in the preparation of this document that you desire to have introduced in the record, your staff runs across any articles expressing a contrary opinion, I would hope that reference to or at least a summary of the contrary arguments might be included so that we will have a clean picture.

Mr. HENNESSEY. We will make sure that all authorities pro and con are included. (See apps. 40, 41.)

Chairman HOLIFIELD. Mr. Price?

DAMAGES FROM THEORETICAL NUCLEAR ACCIDENTS

Representative PRICE. Mr. Ramey, on what evidence do you base your statement that it is possible to postulate extremely unlikely theoretical nuclear accidents which under some circumstances conceivably could cause damage considerably in excess of $60 million?

Mr. RAMEY. Mr. Price. in 1956 and 1957 when the Joint Committee was considering the enactment of the Price-Anderson law, it requested the Commission to do some studies which were of a theoretical nature, that postulated some of these accidents. At that time the studies indicated that there could be, conceivably, damages of more than the $500 million that was contained in the limitation of liability.

Again I would emphasize that these were theoretical types of assumptions used, including the assumption that there would be no containment, that the containment of a reactor would somehow be completely breached.

Since that time the Commission has from time to time taken a look at these estimates, again on this theoretical basis, and since reactors now are larger and the fuel elements stay in them a longer time, there is bound to be a larger amount of fission products there. So, again, if you just took the same theoretical basis the damages would certainly not be less.

On the other hand, since 1957, due to improvements in engineering safeguards and means of operating reactors, the probabilities of accidents have gone down significantly, we think. (See app. 20, p. 347.)

Representative PRICE. In the history of the operation of the power development program, both here and abroad, there has been no accident even approaching a scale that would test this indemnification program; isn't that correct?

Mr. RAMEY. That is correct, Mr. Price.

EXPERIENCE WITH ACCIDENTS IN REACTORS

Representative PRICE. What has been the largest accident; the Windscale incident in England?

Mr. RAMEY. That was not exactly an explosion, but it was a meltdown of the reactor. That reactor of course did not have a containment shell either. It did not have containment.

Chairman HOLIFIELD. It was not contained?

Mr. RAMEY. No, sir. I suppose our worst accident was to this small experimental reactor, the SL–1 in Idaho.

Representative PRICE. Which was not a power reactor. I mean, was not an operating central station reactor.

Chairman HOLIFIELD. It also was not contained?

Mr. RAMEY. No, sir, it was not. It was interesting that even though the reactor was in a kind of "Butler type" building that the fission products were, to a certain extent, contained in the structure.

Chairman HOLIFIELD. There was no explosion involved such as the explosion of a bomb. I think that this is the thing that is in the minds of many people, that there might be an explosion similar to a bomb because it involves atomic energy materials. In these instances it was an overheating and a melting of the material.

Mr. RAMEY. Yes, sir, and then the steam expanding rapidly.

EFFECT OF LIMITATION OF LIABILITY ON TREATIES

Representative PRICE. Now if the United States were to adopt the principle of removing the limitation of liability, or "no recourse" feature, in our national atomic energy legislation, what effect would this have on our ability to conclude satisfactory treaties covering international aspects of atomic energy?

Mr. RAMEY. I think it would make it more difficult. Commissioner Palfrey has studied this matter in greater detail.

Mr. PALFREY. I think Mr. Hennessey can talk to this.

Mr. HENNESSEY. Certainly, Mr. Chairman, one problem that arises under the international conventions that have been adopted is that they do include limitation of liability provisions. If under our domestic legislation limitation of liability were to be rescinded, it would make it that much more difficult for the United States to adhere to any convention.

NEW INFORMATION TO BE AVAILABLE WITHIN NEXT 10 YEARS

Representative PRICE. If Congress extends the act for 10 years, will you not be back here 10 years from now asking for pretty much the same thing, another extension for 10 years? Do you feel this is going to be a permanent law? What new information will we obtain in the next 10 years?

Mr. RAMEY. Mr. Price, I hope I will be here 10 years from now. I come up for reappointment in 1969.

Representative PRICE. We will try to assist you on that.

Mr. RAMEY. We believe that in 10 years from now the atomic power industry will be more on a commercial basis. The estimates, as you know, for the increase in atomic power capacity between now

and, say, 1980, are that we have maybe 2 million electrical kilowatts of capacity now, in 1970 we would have perhaps around 5 million electrical kilowatts of atomic capacity, in 1980 it is estimated anywhere from 60 to 90 million electrical kilowatts of capacity.

This would mean that in that period approximately 70 to 150 atomic powerplants of 500 megawatts to a thousand megawatts would be constructed.

This should certainly provide the kind of actuarial base in terms of our experience, a better actuarial base for our insurance industry to make calculations of risk. We will have obtained a great deal more operating experience and design experience in terms of our safety features and the numbers would provide greater premiums to the insurance industry so that they would be in better shape to determine that they could take on more of a commercial type policy coverage for atomic powerplants.

So, I do not think that it would be just the same old thing. We will of course want to study this carefully as the program progresses. If it does not progress nearly as fast as we predict, then it might be different.

NUCLEAR LIABILITY INSURANCE FOR AEC CONTRACTORS

Representative PRICE. Would you explain for the record the AEC's position with respect to requiring its contractors to obtain nuclear liability insurance and how that position compares with your position on their purchasing conventional liability insurance?

Mr. RAMEY. I believe Mr. Hennessey can comment on that.

In general of course the Commission acts as a kind of self-insurer on its governmental activities.

Mr. HENNESSEY. In our indemnity agreements with our contractors we have retained the right to require that they provide financial protection. The Commission has not been willing to purchase the insurance that is available at commercial rates from the nuclear insurance pool. This would be a very large premium expenditure, in the millions of dollars annually, by the Commission.

We have, however, advised the insurance pools that we are prepared to purchase nuclear liability insurance on a kind of retrospective rating plan basis. This is completely consistent with our insurance arrangements in the nonnuclear area. All of our contractors operating AEC installations from the outset have been insured under retrospective rating plan policies. So that what we would like to do is make similar arrangements to cover the nuclear liability of our contractors.

CURRENT NECESSITY FOR LEGISLATIVE RESOLUTION OF INDEMNITY PROBLEMS

Representative PRICE. Mr. Palfrey, in your statement you identified a number of problem areas. We have identified these problems now. As a matter of fact, we have had different hearings on several of the problems that I think you probably were talking about. Why don't we try to resolve them between now and 1967 instead of just putting them off until later? Do you not think this would be the best way to proceed?

Mr. PALFREY. Mr. Price, it may be possible to resolve some of these between now and 1967. But I think as you look over each one of them there are things that need further to be looked at. For example, in the statute of limitations problem we have this study being conducted by Professor Bloustein and his group. I think we ought to see the results of that on the statute of limitation.

On the question of the 2-year discovery provision, I think we ought to see whether we can make some headway in getting this extended to a 10-year period, for example.

Representative PRICE. On the statute of limitation study how long has that been going on and how long do you anticipate it will take before you reach some decision?

Mr. PALFREY. I believe this will be completed this summer.

Representative PRICE. How long has it been going on?

Mr. LOWENSTEIN. The contract was signed in April.

ABSOLUTE LIABILITY

Mr. PALFREY. Perhaps on the more complicated question, the one of absolute liability, it seems to me we have reached the stage where something perhaps comparable to the background hearings that were held by the Joint Committee prior to the Price-Anderson Act in which we could have an opportunity to explore the dimensions of this in the legislative forum would be very desirable.

We are presently convinced this is one stage removed from being ready to act. We are all convinced that the importance of the extension now is so urgent that we need to go ahead with it.

TRANSPORTATION PROBLEMS

Representative PRICE. I know you are familiar with the number of hearings and informal meetings that the committee has held on the problems of the railroads, the bridges, tunnels, turnpike and toll road authorities. We have been working with these problems for several years.

From time to time, there have been suggestions for legislation. There have been other indications that perhaps the problems could be handled without the need of legislation. Is it not possible now to say whether the legislative solution is necessary in these particular areas?

Mr. PALFREY. I think our present feeling is that headway is being made sufficient to justify a belief that we can work it out and that our present position is we don't think legislation is needed.

Mr. LOWENSTEIN. That is correct. The progress which is being made, Mr. Price, as a result of these conversations has in our view clearly removed a need for some of the amendments which have been talked about over a period of years. We don't know yet whether we will be able to work out all the remaining problems—and they are certainly fewer in number than we had some time ago—without further legislation, but we are hopeful that this is the case.

We, the insurance companies, the various segments of the transportation industry, are all working on this. The Joint Committee staff has been very helpful to us and the industry on it. We are hopeful that with further time we will be able to avoid the need for legislative solutions.

REQUIREMENT FOR FINANCIAL PROTECTION IF INSURANCE POLICY LIMITS ARE REDUCED AS RESULT OF INCIDENT

Representative PRICE. An area that frequently comes to the attention of the committee is the legal basis of the AEC's position that it can require the operator of a large reactor, whose liability insurance coverage has been reduced by payments under the policy and not reinstated, to provide other proof of financial protection. We have had testimony in here from different people who are greatly concerned if they do have an accident and liability payments are made, the $60 million available to the operator of a large power reactor could be reduced by the amount of any claim under the policy so that only the reduced amount of insurance is available for protection against a second incident. Would you comment on that situation?

Mr. PALFREY. This is quite a complicated question. Perhaps Mr. Hennessey might comment on it.

Mr. HENNESSEY. Speaking only to the question of our legal authority, financial protection under the act encompasses more than insurance. It can also include self-insurance or other arrangements that would provide funds to compensate the public for nuclear liability. So I think that we do have legal authority to impose requirements of financial protection that would apply in the event that the insurance companies are not in a position to provide insurance as such.

Whether we should do that, the policy question that was raised in your question, Mr. Price, I think Mr. Lowenstein could respond to.

Representative PRICE. Mr. Lowenstein?

Mr. LOWENSTEIN. Yes, sir.

The question that you have asked presupposes a case where there has been some sort of incident or accident and payments have been made by the insurance company.

Representative PRICE. And the maximum amount is thereby reduced.

Mr. LOWENSTEIN. For that particular company because presumably of a bad experience.

Representative PRICE. At that point would that not be consistent with the AEC policy of requiring the maximum amount of liability insurance available?

Mr. LOWENSTEIN. As Mr. Hennessey pointed out, the question we had was whether the act meant generally available to the industry or available after such an experience to the particular licensee.

We decided to leave the question open in our regulations. That is to say the indemnity agreement requires the licensee to use his best efforts to obtain reinstatement of the original amount of nuclear-energy liability insurance. If he is unable to get it, he is then required to use his best efforts to furnish the financial protection in some other form. If he is unable to do that, the Commission has a question then what to do—whether to reduce the amount of financial protection or to require the shutdown of the reactor because of the licensee's inability to furnish financial protection in some form.

We testified at hearings before the Joint Committee previously that we expected that such a situation would be exceedingly rare. However, we did not feel that in the public interest we should commit the Commission in advance to accepting whatever amount of insurance

was made available. We felt that we had to keep this question open in order to provide an incentive, some pressure, if you will, on the licensees operating power reactors and the insurance industry to use their best efforts to furnish as much insurance as possible.

Representative PRICE. You certainly would not go so far as to withdraw the license or shut down a highly successful reactor because they were not able to keep the liability insurance level at the maximum originally required by the Commission through no fault of the operator?

Mr. LOWENSTEIN. That is correct, Mr. Price. The situation in fact could even theoretically only come about after bad experience in a particular reactor, which we have not had and do not anticipate having.

SUBSIDY

Representative PRICE. Now some people charge that the Price-Anderson Act constitutes a subsidy to atomic power. Mr. Palfrey, do you agree that the act does afford a subsidy?

Mr. PALFREY. Mr. Price, in the traditional sense the term subsidy connotes payments, payments of something, and thus far there have been no payments. On the other hand, there is no doubt that this constitutes something of value. It is a contingent promise to pay upon the happening of an event. Of course it is of value to the licensee. But you have the situation where the likelihood of the Government ever having to take this action is so remote that it is almost impossible to give a dollar value to this thing that they are undertaking to do.

I think the most important point is to emphasize what from the beginning has been in all our minds, to be sure that the public is protected and this is really what the undertaking does more than anything else. It is an undertaking by the Government to come to the help of the public if something should happen. I think it is the kind of undertaking that often is implicit in any other situation. But here it is a formalized and explicit undertaking. So I am not quite sure whether it makes sense to say is it or is it not a subsidy.

LIABILITY OF AEC FOR NUCLEAR INCIDENT

Representative PRICE. Can the AEC, itself, be held legally liable beyond $500 million for a nuclear accident involving an AEC contractor or licensee?

Mr. PALFREY. My understanding is that it cannot. Perhaps Mr. Hennessey would like to enlarge on that.

Mr. HENNESSEY. The $500 million limitation of liability would not apply to the liability of the AEC. Under the Atomic Energy Act the AEC alone, of all entities, is not a person and consequently is not a person indemnified within the coverage of the act.

However, I should point out that the AEC would be liable only to the extent that the Federal Tort Claims Act would make us liable for the negligence of an employee.

Representative PRICE. That is all I have, Mr. Chairman.

Chairman HOLIFIELD. Mr. Hosmer.

DIFFICULTIES IN SETTLING CLAIMS COVERED BY PRICE–ANDERSON

Representative HOSMER. Let me say that I am rather disappointed that after 8 years' experience with Price-Anderson, we are up to a point where the best that we can do is to recommend a 10-year renewal with some band aids on the old act.

I guess I had better direct my questions mostly to Professor Palfrey.

Let us assume for the purpose of these questions that the incredible has happened and the maximum credible has occurred, and we find ourselves with property damage and personal injury and in the normal course I suppose that citizens of different States would be involved. We have a claim settling organization ready and going to work settling claims.

First, with respect to non-judicial claim settlements, would it be possible in any way to make a claim payment until such time as it was determined whether or not the total property and bodily injury claims exceeded the $500 million figure, so that the possibility of proration of payments would be out of the way?

Mr. PALFREY. You put your finger on one of the basic problems which I think leads us to what I hope will happen, which is a thorough examination of the whole question of liability, because I think until you remove these uncertainties, you are going to be confronted with no certain knowledge as to how this thing would operate.

Representative HOSMER. In other words, Professor Palfrey, at the present moment we do not have a procedure which would in any way, shape, or form provide prompt settlements of claims. More than that, it would involve an indefinite and unlimited time before anybody would be able to get payment on an established claim.

Mr. PALFREY. My understanding is that we do have a standby agreement with some of the insurance companies which would go into effect in case something like this happened.

Perhaps Mr. Lowenstein would like to enlarge on it.

Representative HOSMER. What would happen in this event then?

Mr. LOWENSTEIN. It provides essentially for a claims committee to be set up, Mr. Hosmer, consisting of representatives of NELIA, MAELU, and the Atomic Energy Commission.

Representative HOSMER. Come over near the microphone.

PROCEDURE FOR SETTLING CLAIMS

Mr. LOWENSTEIN. The agreement which has been entered into among AEC, Nuclear Energy Liability Insurance Association, and the Mutual Atomic Energy Liability Underwriters, does establish a procedure and organization which will handle claims in the event of that type of accident.

Representative HOSMER. I understand that. I hypothesized the occurrence of that accident. I also have hypothesized the establishment of liability and the ascertainment in many thousands of cases, let us say, of the actual amount of damages due an individual claimant. Then comes the question of paying the man. How can you pay him until you know whether or not the claims exceed in total $500 million and are certain whether or not proration will be involved?

PRORATION OF CLAIMS; NEED FOR ADDITIONAL FUNDS

Mr. LOWENSTEIN. It is anticipated that best judgment would be used at that time, that this group would begin to make payments initially under the insurance policies and when that money is exhausted, from the Government's $500 million.

It is anticipated also that if best judgment at that time indicates that the amount of claims would exceed the combined amount of insurance and indemnity, we would come to the Congress for additional funds. The law provides for a report by the Atomic Energy Commission of the result of its investigations of the accident and how it is doing under Price-Anderson.

The committee report which was issued by this committee at the time the law was adopted speaks generally to this situation, but does indicate that the Congress would expect to consider this situation if the amount of damages exceeds the $500 million.

Representative HOSMER. We don't know at this point whether it exceeds the $500 million. Your answer essentially is this. We have a $500 million limitation in the law, but if we get an accident then you come back to Congress and get a public appropriation to take care of whatever the actual amount is. Is that right?

Mr. LOWENSTEIN. Yes, sir. We would begin paying claims immediately. If it is clear in the beginning that the amount of claims will exceed the $500 million, this would go into the Federal district court for the allocation of funds as among the various claimants.

Representative HOSMER. How can a district court make an allocation of funds among the claimants when in fact the total claims have not yet been established, only a part of them?

Mr. LOWENSTEIN. This is a real problem that you are touching on. As Mr. Palfrey said, this is one of the things that does need to be studied during the coming year.

Representative HOSMER. That is why I said I am disappointed after 8 years we have not come up yet with anything except a plaster patch extension.

DIVERSITY OF CITIZENSHIP; COURT PROCEDURE

Professor Palfrey, in this hypothetical accident where we have a diversity of citizenship, I assume that those claims which go to court would go into a Federal court on that basis, would they not?

Mr. PALFREY. That is right.

Representative HOSMER. But the Federal court would be required to apply the law—the applicable law—of a State?

Mr. PALFREY. Right.

Representative HOSMER. Now in this case where you have the accident in one State and a bodily injury in a second State, which State's law would apply?

CONFLICTS OF LAW

Mr. HENNESSEY. I believe most jurisdictions would say that the law of the jurisdiction where the accident occurred would apply.

Representative HOSMER. If a person aims across the boundary and shoots a man over in the next State, the law of the State where the trigger was pulled applies.

Mr. HENNESSEY. Where the act was performed. (See app. 25. p. 366.)

Representative HOSMER. In that instance you do have a standardization of statute of limitations?

Mr. HENNESSEY. I could not say that the statute of limitations in the State of the occurrence would be applied in all other States.

Representative HOSMER. Substantive law applies but not procedural, so we have already got into one murky area. Is that right?

Mr. HENNESSEY. I think this is right, Mr. Hosmer.

Representative HOSMER. I suppose there are probably others. What State's rules of damages apply, the State of injury or the State where the tort originated?

Mr. HENNESSEY. I believe there the State of the tortious act, the occurrence. But there are differences in views on that. There are recent decisions contrary to that.

FEDERAL PREEMPTION

Representative HOSMER. So we find ourselves in another spider web.

Now apparently you believe, Professor Palfrey, that insofar as the basis of liability is concerned, the law of the State would apply and that is what the act provides. But insofar as the assessment of damage the Price-Anderson law would apply.

Mr. PALFREY. That is right.

Representative HOSMER. At least in connection with the maximum recoverable amount?

Mr. PALFREY. That is right.

Representative HOSMER. And as a consequence the Federal Government has, in this type of situation, the power to preempt State law as to damages which are a matter of substance, is that right?

Mr. PALFREY. That is my understanding.

Representative HOSMER. And therefore the Congress would have the power to preempt State law in all substantive matters?

Mr. HENNESSEY. I think the same principle that is applicable to the limitation of liability, itself, would be applicable there, Mr. Hosmer.

Representative HOSMER. And the same as to exoneration and defenses if the Congress wanted to make it standard.

Mr. HENNESSEY. That is right. There is no constitutional guarantee that those will remain available.

Representative HOSMER. And the same as to the determination of who shall be liable for a nuclear incident.

Mr. HENNESSEY. I think the same is true there. If the Congress acts in this area, one alternative would be the establishment of a new Federal tort.

Representative HOSMER. How about in connection with the limitation effect, which is procedural somewhat? Does the Federal law also preempt that?

Mr. PALFREY. Yes.

Representative HOSMER. Then we have a sound legal basis for resolving these questions that we cannot give answers to now but could give answers to if the Commission made up its mind to grapple with the situation and so do. Is that correct? We could write a law.

Mr. PALFREY. You could write a law establishing a basis of absolute liability under the Federal statute. You could write a law providing for statute of limitations, yes.

Representative HOSMER. In that connection you say that with all your peregrinations out in Germantown you have almost come up to meeting this absolute liability philosophy, did you not?

Mr. PALFREY. Yes, sir. We have come to the point that we think it ought to be discussed in legislative forum.

Representative HOSMER. You are a little bit further away in discovery of injury and statute of limitations but you are making a study on that that should not take an indeterminable amount of time.

Mr. PALFREY. One of the things that the States are also taking action on is having the statute run from the discovery rather than the time of the event.

Representative HOSMER. Some States are doing that, and they are doing that in a number of ways I presume.

Mr. PALFREY. That is right.

Representative HOSMER. So we are buying uncertainties rather than buying certainties which may not be exactly right but at least would be determinative.

Mr. PALFREY. And there has also been a model State statute proposed, I believe. This would be another possible way of going about it. (See app. 15, p. 33.)

Mr. RAMEY. Mr. Hosmer, you appreciate, of course, on the question of absolute liability there are a number of different points of view and differing interests involved. The insurance industry has very definite views on this matter. I am sure even perhaps the legal profession has different views.

DIFFERENCE IN PROBLEMS OF PERSONAL INJURY AND PROPERTY DAMAGE

Representative HOSMER. I appreciate that. I also appreciate the matter of absolute uncertainty which exists under the terms of this act which I think there is some obligation to rectify in the best possible manner.

Perfection was not assumed by Mr. Price and Mr. Anderson when they initated the first bill. It was never achievable. This is a world consisting of humans. But we can make a stab at it.

Now I want to introduce one other line of questioning here for Professor Palfrey and that has to do with the jumbled intermixture of property damage liability and bodily injury liability that now exists within the law.

I state that from this background, that we have had considerable experience in the insurance industry with diastrous accidents—Texas City, for instance. (See app. 21, p. 348.) The determination of whether damage has actually occurred in connection with physical property is almost immediate as compared with the possible latent occurrence or evidence of damage to the human body. You get your cattle situation, that is somewhere in between. But does it not seem that a reasonably good approach would be one that separates property damage from the bodily injury question—which is exceedingly more difficult—and makes provision for property damage, settlements and

termination of claims and so forth, and amounts of liability separate and apart from the bodily injury situation?

Mr. PALFREY. Perhaps Mr. Lowenstein would like to add to this. My understanding is that the property damage part of this piece has been handled successfully. What particular problems have been posed in that field?

Representative HOSMER. Let me say my question is largely directed at this maximum limitation which is in connection with both types of claims.

Mr. LOWENSTEIN. My reaction to that, Mr. Hosmer, is that this is certainly something that we should look very hard at during this study that Commissioner Palfrey has referred to. From the standpoint of preserving funds for payment of personal injuries you are suggesting perhaps also that different statutes of limitations may apply to personal injury and property damage.

Representative HOSMER. I am suggesting specifically that the property damage situation may be at this time sufficiently predictable so that property damage as such would not have to be considered under a Price-Anderson type of legislation but may at this moment or within the reasonable future be totally a subject for arrangements between the utility and so forth and an insurance company.

Then the more sticky problem of bodily injuries, of an indefinite nature, extent, amount, limitation, discovery, and so on, might be the logical ones to come under this kind of approach.

Mr. Ramey, you look anxious to talk to that one.

Mr. RAMEY. Having gone through the property sequence in the 1956 and 1957 legislation, it is a complicated field, also, Mr. Hosmer. You are talking about third-party property, not property of the utility, itself, or wherever the accident occurs. Of course the property where it occurs is taken care of by insurance without indemnity under the present law. Then there are complications about property on the fringe of the utility area or if it were, say, a university which has a reactor, and whether that is third party property.

I agree with my colleagues that this is something that we should look at. We should look at ways of cutting down on the Government's role here and bringing in the insurance industry.

Representative HOSMER. Let us go back. Is it not a generally less elusive field in connection with property than it is in connection with personal injury?

Mr. RAMEY. I think the determination of damage will be less elusive.

Representative HOSMER. The amount of damage?

Mr. RAMEY. Yes, sir, and the time factor. You won't have a latent injury problem.

Representative HOSMER. The discovery period is semi-immediate. Therefore, if you separate out types of injury of this category from the ones that are more elusive to determine, to discover and assess the amount of damage, might it be a more logical approach?

Mr. RAMEY. Yes, sir, I think that is worth looking at.

Representative HOSMER. Let me say this: before this consideration is through, I would like to have those areas explored a little more thoroughly to see if we cannot come up with something more imagi-

native and useful than this defeatist, surrender, and let-us-extend-as-we-are-and-meet-problems-sometime-later proposition that we have before us today.

Thank you, Mr. Chairman.

Chairman HOLIFIELD. Mr. McCulloch.

SUBMISSION OF PROBLEMS TO JUDICIARY COMMITTEE

Representative MCCULLOCH. Mr. Chairman, I make this suggestion with some fear and trepidation, being a newcomer to the committee. I am almost astounded at the magnitude of this problem, and without criticism of the members of the Commission or any staff member thereof, the number of questions that are not yet answered, as indicated by the very brief but penetrating questioning of Craig Hosmer.

At the risk of indirect self-praise and without authority from anyone and upon the precedent established here 4 or 5 years ago, I would be pleased if the committee could give consideration to the Judiciary Committee taking cognizance of this problem with recommendations thereon. I am sure all members of this Joint Committee know that the Finance Committee of the Senate, the Interstate and Foreign Commerce Committee of the Senate, the Ways and Means Committee of the House, the Interstate and Foreign Commerce Committee of the House, all have jurisdiction in the field of the impact of State taxation on the movement of goods and services in interstate commerce.

It seems to me from these questions which I have indicated that there is very great expertise needed in this field and much study needed with many people contributing to the solution.

I just throw that out as a possible suggestion, Mr. Chairman. I do not expect, and it would be unfair to you, to expect comment.

I would like to ask a couple of questions and I regret that I must then soon leave.

How many claims have been filed either against AEC or against companies with whom the AEC has contracted since the Price-Anderson Act became effective?

CLAIMS FILED SUBJECT TO PRICE-ANDERSON ACT

Mr. HENNESSEY. There has been only one claim, Mr. McCulloch, a claim for death resulting from the SL–1 incident.

Representative MCCULLOCH. Might I inquire the amount of the settlement in that case?

Mr. HENNESSEY. Yes, sir; it was $70,000.

Representative MCCULLOCH. There are no other claims pending at this time?

Mr. HENNESSEY. There are no other claims pending against any contractors. I believe none against licensees.

Mr. LOWENSTEIN. There are none pending against licensees. One claim was filed with respect to a licensee. There was a small leak in a shipping container for irradiated materials. The claim was in the amount of $3,500.

Representative MCCULLOCH. Does this record here, "Selected Materials on Atomic Energy Indemnity Legislation,"[1] show the total

[1] See Joint Committee on Atomic Energy print, "Selected Materials on Atomic Energy Indemnity Legislation," June 1965.

amount of insurance premiums that have been paid by licensees as well as the Federal Government, if the Federal Government pays any insurance premiums, for this type of coverage?

Mr. LOWENSTEIN. Contained in the book on selected materials, Mr. McCulloch, is the AEC's report on the Price-Anderson Act. There is a table in there which shows the amount of all insurance premiums paid by all reactor licensees. One would have to calculate it for the number of years, but the level of premiums is in there.

Representative MCCULLOCH. Does the Federal Government pay any insurance premiums under the Price-Anderson Act, any direct cash premiums?

Mr. HENNESSEY. No, sir. We do not have a nuclear insurance coverage. We have offered to consider proposals for it. We do not have proposals as yet.

Representative MCCULLOCH. Except by reason of the Federal Tort Claims Act or the various nuclear energy acts would there be any liability on the part of Government whatsoever for injuries or damages to private individuals or other licensees?

Mr. HENNESSEY. Only if a claimant were able to establish that some employee of the Federal Government was negligent and that that negligence caused his injury.

Representative MCCULLOCH. You are convinced that there is liability even if that be proven, in the absence of the Tort Claim Act——

Mr. HENNESSEY. Oh, in the absence, I am sorry. I missed that part of your question, Mr. McCulloch.

Mr. RAMEY. That would be under the old rule that you can't sue the king.

Representative MCCULLOCH. Yes.

Mr. HENNESSEY. Under the Tort Claims Act, no.

TEXAS CITY DISASTER

Representative MCCULLOCH. All of which, of course, is so important in this broad study of this field.

Of course, Craig Hosmer mentioned the Texas City disaster and you are familiar with that case and the amount of money that was expended by the Federal Government in addition to the insurance payment of claims. That totaled approximately $23 million, as I remember it, did it not?

Mr. HENNESSEY. It was a substantial amount.

Representative MCCULLOCH. Again, so that the record is unmistakably clear, in the period since the Price-Anderson Act has been effective there has only been one claim filed upon which payment has been made, either by a licensee or against a licensee or the Federal Government?

Mr. HENNESSEY. One in each category. One contractor and one licensee; yes, sir.

Representative MCCULLOCH. I noted that you said that you had no question in your mind about the constitutionality of the limitation of liability; in addition to the cases cited one comes to mind, that of the lovely and lovable Jane Froman who was so badly injured in an air transport accident. The liability was fully discharged by insurance companies and the Federal Government supplemented that out

of the goodness of its heart, out of the king's conscience to a very great extent, all of which in my opinion, Mr. Chairman, should have the most careful consideration of this committee and its possible result on the decision that we make in this very important field.

Chairman HOLIFIELD. The Chair is very grateful for the contribution of the gentleman from Ohio. He wishes at this time to pay his respects to the high standing which he has in the House of Representatives as one of our best and most respected lawyers. Of course any suggestion he makes will receive full consideration by the staff and by the members of the Committee.

Mr. RAMEY. Mr. Chairman, I might comment that in the 1957 legislation, Mr. McCulloch, we did look pretty hard at the experience in the Texas City case. As I recall, there were limitations placed on settlements, percentage limitations.

Chairman HOLIFIELD. By the way, was that handled by the Judiciary Committee?

Representative MCCULLOCH. It was.

Chairman HOLIFIELD. I suppose this was one of the greatest so-called manmade disasters we have ever had.

Representative MCCULLOCH. I am sure it was up to that time or it was the most disastrous in which the Federal Government assumed any responsibility.

PATTERN OF INSURANCE IN THE NUCLEAR INDUSTRY

Chairman HOLIFIELD. Could I ask, Mr. Ramey, do you think the present pattern of insurance in the nuclear industry, whereby the utility essentially purchases coverage for manufacturers and suppliers and so forth, should be a permanent feature of the industry?

Mr. RAMEY. I think it has certain elements of convenience so that you are thereby assured that everyone is covered. It has that element. This might make it a desirable feature to be continued permanently in that sense. I think once the indemnity features are removed, then it will be more of the judgment of the insurance industry, and their bargaining with the utility industry and the equipment companies on what are the best features. This type of thing traditionally, of course, has been under your State insurance commissions and your insurance associations and so on. But I think this element of convenience is something that should certainly be considered.

EFFECT OF PRICE-ANDERSON LEGISLATION ON REACTOR SAFETY

Chairman HOLIFIELD. It could be argued that since Price-Anderson indemnity would cover damages resulting from a serious reactor accident, the effect of this arrangement would be to work against the safety of such plants; that is, the design, construction and operation would be carried out in a less conscientious fashion than might otherwise be expected. Has the AEC in the conduct of its licensing reviews or compliance inspections seen any evidence of such an attitude in the nuclear business?

Mr. RAMEY. No, sir; we have not seen any such attitude. It is my understanding that the utility companies' reputations, of course, are on the line on the safety of their plants. The Commission has fol-

lowed a very conservative path in its licensing regulations. So, I don't believe this has been the case.

Chairman HOLIFIELD. In 1957 when this act was first passed, as you know, Mr. Ramey, the present occupant of the chair had grave doubts as to whether or not the existence of the Government nuclear indemnity program might cause a letdown on the part of the AEC in its safety requirements, rules and regulations. These doubts caused this occupant of the chair to redouble his scrutiny of the safety standards over the years to see that there was no letdown in the primary objective of safety.

In the siting of reactors and in the advancement of containment and engineering methods this committee has been very vigilant to see that there was no compromise along the line of safety in either design or engineering or construction in order to obtain economic advantages. Those original fears have been allayed to a great extent because of the constant attention to safety and the constant improvement of engineering safeguards which have occured during the intervening years. I think it has been to the credit of this committee and equally and possibly more so to the credit of the Atomic Energy Commission that they have had this problem of safety uppermost in their mind and there has been no let down, but rather an acceleration of concern during the years. That concern has been amply repaid, I think, by the advances in the engineering design and safeguard features.

Mr. RAMEY. Mr. Chairman, in that connection I have a brief statement on our more recent consideration on this matter that I could read into the record.

Chairman HOLIFIELD. We will be glad to hear it at this point. How long is it?

Mr. RAMEY. It will be about 7 minutes, I would say.

Chairman HOLIFIELD. Go right ahead.

AEC SITE CRITERIA AND SAFETY ACTIVITIES

Mr. RAMEY. This is on our site criteria and our activities relating to safety.

In April of 1962 the AEC issued Reactor Site Criteria (10 CFR 100) to guide evaluation of proposed sites for stationary power reactors, primarily of the pressurized and boiling water types. These guides were developed in consulation with the AEC statutory Advisory Committee on Reactor Safeguards and the nuclear power industry. One of the objectives of these guides was to familiarize industry, State and local officials and the general public with the factors considered by AEC in evaluating proposed reactor sites.

In acknowledging the continued need for competent technical judgment by both the applicants and the AEC in implementation, flexibility was deliberately written into the guides. The Commission endeavored to set forth the criteria in such a way that they could be administered in an evolutionary manner. In so doing, it was recognized that insufficient experience had been accumulated to permit the writing of detailed standards for either the design or the siting of reactors.

The basic principle underlying the reactor safety program is recognition of the necessity for effective engineered safeguards in the construction and operation of reactors both to prevent major accidents and to control their consequences in the unlikely event they should occur. Under the site criteria (see p. 36 for digest of site criteria), provision is made to balance such engineered safeguards in relation to the distance between reactor and population centers. The application of this concept has had the effect of continuing the AEC practice of keeping central station power and test reactors a reasonable distance from densely populated centers.

The safety record achieved by the nuclear power industry has been outstanding. In no instance has a reactor accident in the operation of a central station electrical generating reactor plant caused any radiation damage to the public or its environment, or to the plant workers. These operations in the United States have involved the production of over 14 billion kilowatt hours of electrical energy.

This exemplary safety record is the result of the general recognition by the Commission and the industry of the problems of potential accidents; the expanding knowledge of phenomena associated with such potential accidents; and the application of sound engineering principles in the design and the construction of reactor systems and appurtenances. The Commission's research, development and test programs have materially assisted designers in specifying proper system requirements and safety evaluators in assessing the safety of specific system designs. One part of the Commission's research and development program identified as nuclear safety is budgeted at about $24 million in fiscal year 1966 (see p. 37 for a summary of this nuclear safety program).

The participation of industry has been most encouraging and many recent and improved safety systems have been developed through their efforts; more definitive and uniform criteria for the construction and operation of power reactors have evolved. Efforts along these lines are continuing and are recognized as vital to the healthy growth of the industry. Consequently, it has been possible in recent years to accept certain engineering safeguards as a partial substitute for the amount of geographic isolation formerly required.

The rapid expansion and development of the nuclear power industry involving different reactor types and increased reactor size for broader applications (for example, desalting), and the incentives to locate in closer proximity to metropolitan load centers, have focused attention on the continuing need for careful attention to all matters which potentially could affect the health and safety of the public. Consequently, further important advances in reactor plant design, in the capability of safety systems and engineered safeguards, in adapting critical components and systems to accommodate their inspection and testability, and in practical demonstration of dependability of performance of such critical systems, must evolve to keep pace with the development of the nuclear power industry.

In recognition of these increasing needs, the Commission has decided to augment efforts and redirect emphasis to define and develop the improvements in reactor plant design and capability of critical systems and engineered safeguards. This effort will be carried on in

cooperation with industry and in conjunction with the Commission's safety research and development programs in order to obtain the accumulation of meaningful experience with respect to capability and reliability of important safety systems. In the course of this undertaking, new and improved methods must be developed for design, construction, and operation of central station reactors from the standpoint of safety, including means of testing and inspecting the safety aspects of important systems. Additional efforts also will be undertaken, in cooperation with appropriate groups, in the development of standards and codes for the design and construction of reactors and their principal components.

This research and development work, together with increased emphasis on the development of more specific reactor standards will be necessary as reactors increase in size and are built closer to metropolitan load centers.

As the augmented reactor safety program progresses, the Commission will continue to consider applications for reactor construction permits and operating licenses on a case-by-case basis. As new data and improved safety devices are developed, they will be taken into account in the regulatory process. In recognition of this evolutionary development, the AEC has encouraged applicants and industrial organizations to come in and obtain informal review of their siting problems and reactor plant and component design. In this manner, maximum advantage can be taken of the current knowledge and proposed plans as these may affect the health and safety of the public and the growth of the nuclear power industry.

Chairman HOLIFIELD. Would you like to have the attachments to your statement introduced at this point in the record?

Mr. RAMEY. Yes, sir. We would also appreciate if you would incorporate in the record our background statement on reactor licensing procedures and reactor safety. (See app. 3, p. 239.)

Chairman HOLIFIELD. Without objection, those items will be received for the record.

(The statements referred to follow:)

[Attachment No. 1]

DIGEST OF SITE CRITERIA

The Atomic Energy Commission published "Reactor Site Criteria" part 100, title 10, Code of Federal Regulations, as an effective regulation on May 12, 1962.[1] The fundamental purpose of part 100 is to provide guides for the evaluation of the suitability of proposed sites for stationary power and testing reactors. The regulation specifically recognizes that insufficient experience has been accumulated to permit the writing of detailed standards and emphasizes that part 100 is intended as an interim guide to identify a number of factors considered by the Commission in evaluating reactor sites.

The particular factors considered in determining the acceptability of a site are the characteristics of reactor design, including power level, safety features and similar design considerations, population density and use characteristics of the environs, physical characteristics of the site, and the engineered safeguards designed to minimize the consequences of any accident.

The point of departure for the evaluation of site suitability and plant design is the concept of the "maximum credible accident." This represents the upper limit of practical hazard to the public which can be expected from the proposed facility.

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[1] 27 F.R. 3509.

The guides make explicit, and define, the concepts of population zones around a reactor which had been observed in practice all along by the Commission; the exclusion zone, where people, if any, are highly mobile and under the direction of the reactor operator in emergencies; the next succeeding low population zone, where evasive or protective measures for people could be taken in case of dangerous releases from the plant; and the city distance, where people are not very mobile, but the distance is sufficient to prevent the worst aspects of danger should a serious accident occur.

The guides provide numerical values for potential radiation exposure doses that might occur to offsite personnel in case of a maximum credible accident for the reactor in question, to be used as measuring indixes for evaluating the acceptability of the reactor in the site proposed.[2] These values are 25 rem whole body and 300 rem to the thyroid.[3]

The guides identify problems of meteorology, hydrology, and seismology which must be considered in evaluating the suitability of a site.

Finally, the principle is articulated that "where unfavorable physical characteristics of the site exist, the proposed site may nevertheless be found to be acceptable if the design of the facility includes appropriate and adequate compensating engineering safeguards." This has been interpreted to mean that where appropriate and adequate compensating safeguards are provided, there may be some reduction in the isolation distance of the reactor which otherwise would be required.

[Attachment No. 2]

SUMMARY OF NUCLEAR SAFETY PROGRAM

In augmentation of selected results from individual reactor projects and technical programs, the nuclear safety research, development, and test program coordinates the technology, focuses effort, and provides data and information required for the location, design, construction, and operation of safe reactors and the application of reliable engineered safeguards for effective accident prevention and control.

The primary objective of the nuclear safety program is to provide sound technical bases for designing safe reactors and preventing accidents by obtaining quantitative data from a coordinated sequence of laboratory studies and experiments and engineering scale tests, and through improved analytical techniques and processes. Concomitantly, the program's objective is also to provide the required technical bases for evaluating the safety of proposed reactor designs and installations.

The nuclear safety program includes the following:

1. Nuclear safety research and development, which involve both fundamental and applied research in nuclear reactor safety, including studies in reactor kinetics, fuel meltdown, phenomena and fuel-coolant interactions (chemical reactions), reactor containment, and other engineered safeguards, including those related to fast reactor safety studies.

2. Effluent control research and development, which is directed toward the development of more effective means of managing radioactive wastes resulting from nuclear reactor operations, and toward determining and controlling the behavior of these residual radioactive effluents in the environment.

3. Engineering field tests, which extend laboratory scale test results on both aerospace and terrestrial nuclear systems into full engineering scale field test results.

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[2] These values are not permissible limits for public exposure and are not guides for determining measures that should be taken in case an accident should occur to limit exposures of offsite personnel. They are measuring indixes to be used in the context of maximum credible accidents to evaluate reactor designs and reactor sites. To the extent that the protective action guides recently developed by the FRC are applicable, it is assumed that these would be used by persons responsible for deciding protective measures to be taken after an accident.

[3] In view of the extremely small probability that an accident would occur of the type that would result in such exposures, and in view of the existence of emergency procedures which would reduce still further the likelihood of such exposure, the use of these values in evaluating reactor sites are considered to represent extremely small risks to individuals. Further, calculations show that for presently used reactor sites, these exposure values, in the unlikely event that serious accidents should occur, would result in cumulative total population doses well below the limits which have been recommended by the International Committee on Radiological Protection and others for such population exposure doses.

4. Reactor safety analysis and evaluation, which conduct safety analysis studies that supplement other program activities, and provide assistance in planning and directing the overall nuclear safety program.

The kinetics program is characterized by the SPERT reactors which involve study of all phases of abnormal reactor behavior including nuclear excursions beyond the threshold of damage.

Reactor containment studies include large-scale experiments of energy releases, the efficiency of engineered safeguards, fission product release and control, and pipe rupture.

Work carried out under effluent control research and development includes environmental studies associated with the safe disposal of radioactive effluents into the environment including gaseous activity, low, intermediate, and high activity waste disposal, the development of waste treatment processes, and the development of countermeasures for trapping fission products resulting from a reactor accident.

The engineering test program is characterized by the LOFT program which involves the test and control of a full-scale loss of coolant accident for a 50-megawatt (thermal) pressurized water reactor. In many respects, this program is the synthesis of and focus for other parts of the safety program. The aerospace safety program is also conducted under this activity.

The nuclear safety analysis and evaluation effort involves the coordination of safety related work outside of the base safety programs, pressure vessel research, safety analysis of reactors, surveys of reactor operating experience and adequacy of engineered safeguards, probabilistic studies of reactor accident occurrence, and nuclear safety data dissemination.

Currently, an important part of the analysis and evaluation work is the initiation of development of more uniform and better engineering codes, material and component specifications, and quality control and inspection practices. It is intended that ultimately there will be a comprehensive set of codes or specifications for all components of reactor systems that, if properly implemented and followed through, will maximize the safety of reactors at any location, both in terms of protecting the public and maintaining the integrity of the operating plant.

Chairman HOLIFIELD. We are going to have to adjourn in a few minutes but Congressman Hosmer has a short question.

NUCLEAR LIABILITY INSURANCE PREMIUM

Representative HOSMER. This is for Professor Palfrey. In connection with the nuclear liability insurance premium sheet for reactors under construction, Jersey Central and Southern California Edison both get $60 million in insurance (see p. 9). Jersey Central is 1,600 thermal megawatts; Edison is 1,210. The premium for Jersey Central is $200,000; for Southern California Edison it is $260,000. The indemnity fee for Jersey Central is higher than that of Southern California, whereas the premium for insurance is higher for Southern California. Why is there this discrepancy?

Mr. PALFREY. I think probably the insurance companies can explain this difference but the fee is based on the megawatts.

Mr. LOWENSTEIN. $30 a megawatt.

Representative HOSMER. The insurance company takes other items into consideration?

Mr. LOWENSTEIN. That is right.

Chairman HOLIFIELD. The Chair would like to announce a rescheduling of our hearings this afternoon. We had planned on hearings from the insurance representatives and others at that time. However, because of floor activity this afternoon on the public works appropriation bill, which includes funds for the AEC, it will be necessary for the Joint Committee members to be on the House floor.

Therefore, we are asking the witnesses scheduled to appear before us for the remainder of the day to present their testimony on Thursday afternoon instead.

We regret the necessity for shifting their testimony due to the press of the legislative business on the floor which we were not aware would be scheduled at this time. We appreciate their cooperation in agreeing to appear before us on Thursday afternoon.

In the meantime the committee will stand adjourned until tomorrow morning at 10 a.m.

(Whereupon, at 12:15 p.m., Tuesday, June 22, 1965, the committee adjourned, to reconvene at 10 a.m., Wednesday, June 23, 1965.)

PROPOSED EXTENSION OF AEC INDEMNITY LEGISLATION

WEDNESDAY, JUNE 23, 1965

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON LEGISLATION,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to recess, in room AE–1, the Capitol, Representative Chet Holifield (chairman of the Joint Committee) presiding.

Present: Representatives Holifield, Price, Hosmer, Bates, and Anderson.

Also present: John T. Conway, executive director; Edward J. Bauser, assistant director; Leonard M. Trosten, staff counsel; George F. Murphy, Jr., professional staff member; James B. Graham, technical adviser; Jack Rosen, staff consultant; and William T. England, legal consultant.

Chairman HOLIFIELD. The committee will be in order.

The Subcommittee on Legislation of the Joint Committee on Atomic Energy today continues hearings on H.R. 8496 and S. 2042, bills to amend and extend the Price-Anderson Act.

Yesterday we heard from the AEC concerning their recommendation that the act simply be extended for 10 years.

Today we shall hear from representatives of electric utility operators as well as manufacturers of equipment and other products associated with the atomic energy industry.

The purpose of these hearings is to explore the policy issues associated with the Price-Anderson legislation as it exists today and with any extension of this legislation. These issues are complex and involve many uncertainties and matters of judgment. In arriving at any conclusion, we want to be certain that we have received the benefit of the best thinking of those who have studied and lived with the problems with which this legislation was designed to cope.

With that preface, we will proceed to our first witness for the day, Mr. Hobart, representing the American Public Power Association.

STATEMENT OF LAWRENCE HOBART, DIRECTOR, ATOMIC ENERGY SERVICE OF THE AMERICAN PUBLIC POWER ASSOCIATION

Mr. HOBART. My name is Lawrence Hobart. I am director of the Atomic Energy Service of the American Public Power Association, a national trade organization representing 1,200 local publicly-owned electric systems in 45 States and Puerto Rico. Offices of the association are located at 919 18th Street NW., Washington, D.C.

APPA supports the recommendation of the Atomic Energy Commission, contained in its February 15, 1965, study of the Price-Anderson Indemnity Act, calling for extension of the act for a second 10-year period.

Members of our association have a keen interest in the present nuclear power program of the Federal Government and the future application of the technology which this program has fostered.

Today five APPA members are participating in nuclear power projects. These systems include (1) the city of Piqua, Ohio, Municipal Power Plant, (2) Consumers Public Power District of Columbus, Nebr., (3) the Puerto Rico Water Resources Authority, (4) the Washington Public Power Supply System of Kennewick, Wash., and (5) the City of Los Angeles Department of Water and Power.

Two of these projects are being carried out under "second round" terms. One project is a modified "first round" demonstration reactor. One is planned under the modified "third round" criterion. And one—the Hanford project—involves use of waste heat from an AEC plutonium production facility.

In four of these cases, the nuclear facilities are currently owned in whole, or in large part, by AEC. In the fifth case, the Malibu project of Los Angeles, the reactor will be owned by the city. These systems all have a stake in Price-Anderson indemnity, through existing operating contracts and present, planned, or prospective ownership of nuclear power facilities.

If the growth of nuclear power proceeds as presently projected, many other local public power systems will acquire a similar interest in the provisions of the Price-Anderson Indemnity Act. In 1962, these utilities—which number in excess of 2,000—had 20,638,000 kilowatts of generating capacity, representing 10.8 percent of the electric utility industry's total generating capacity. By 1980 according to statistics of the Federal Power Commission, load growth will require access to about 2.5 times the generating capacity owned and operated by this segment of the industry today. Presumably, a significant portion of the added capacity will be in the form of nuclear plants.

As the AEC has pointed out, two principal objectives of the Price-Anderson legislation were (1) to assure the availability of funds to satisfy public liability claims in the event of a catastrophic nuclear accident, and (2) to remove the deterrent to industrial activity in atomic energy presented by the threat of large liability claims if such an accident were to occur.

The Commission concluded that the second objective has been achieved, and that achievement of the first cannot be demonstrated because there has not been a catastrophic accident.

AEC pointed out that the need for the Price-Anderson program continues because (1) there is no evidence to indicate that nuclear liability insurance pools are willing or able to supply insurance in amounts necessary to protect the industry and the public in a fashion comparable to the present program, and (2) utilities and contractors believe that availability of present protection is essential to the nuclear power program.

APPA believes that these conclusions and assumptions are correct.

In addition to the general values of nuclear power which justify the expenditure to date of approximately $1.8 billion in Federal funds

to advance specifically the technology of civilian power reactors, there are special advantages which can accrue to cities and towns. These include the potential opportunity to obtain low-cost power from nuclear plants located near the concentrated load provided by a metropolitan area where conventional fuel expenses are high; the ability to maximize the economic leverage of low-fixed charges in constructing a "capital sensitive" nuclear facility; and the chance to eliminate problems of air pollution associated with other fuels.

Realization of these benefits is directly related to assurance that adequate means exist for handling liability claims. While stringent safeguards are required at nuclear plants to insure maximum protection of the public, there also exists a need to provide adequate means of compensating for losses in the event of an accident.

Another aspect of the Price-Anderson Indemnity Act which is of interest to local public power systems is the relationship of this program to small nuclear power reactors.

The "National Power Survey" issued recently by the Federal Power Commission notes that 3,190 of the Nation's 3,617 electric systems, or 88 percent, can be classified as small—having annual energy production or requirements of less than 100 million kilowatt-hours. Assuming an annuual load factor in the range of 45 percent, the definition would represent a system with peakload requirements of about 25,000 kilowatts or less. Included by the FPC in the same "small" category are 1,997 publicly owned systems, 904 cooperatively owned systems, and 289 privately owned systems. Of the small systems, 899 or 28.2 percent generate all or part of their requirements.

Present technical and economic factors favor construction of large nuclear plants, which are capable of obtaining economies of scale. However, it is recognized that there is a need for small nuclear plants in sizes under 100,000 kilowatts.

In a message to the third United Nations Conference on the Peaceful Uses of Atomic Energy, held in Geneva last September, President Johnson noted advances in big power reactors and asserted: "Not every country and not every community can use this large size. But our rapid rate of progress should soon lead to economic production in small reactors, too."

Dr. Glenn Seaborg, Chairman of the AEC, told the Conference that "focus of competitive nuclear power today is on large-size plants," but also declared that "the other end of the spectrum also requires attention."

In April Dr. Seaborg stated before the American Power Conference meeting in Chicago that: "While such emphasis and attention is being given today to the larger reactors, we also recognize the importance of developing efficient smaller reactors."

This statement followed a decision by the Commission to prepare a new report on small power reactors to include technical and economic information developed from the design, construction, and operation of existing U.S. power reactors of less than 100,000 kilowatts capacity, together with an assessment of possible areas of technical development leading to improved commercial potential of small nuclear powerplants.

A number of cost cutting possibilities are scheduled for consideration, including scale down of proven reactor concepts, multiple pur-

chase by utilities of a single concept, use of traveling crews or consultants on a joint basis to reduce operation and maintenance expenses, automation, and simplified design.

Although a number of local power systems are participating in power pooling arrangements now underway or planned because of legal, physical or economic reasons many systems cannot share generating sources in order to achieve the benefits of "bigness." If these utilities are to have a chance to gain the advantages of nuclear power for their community, a reduction in construction and operation costs of small atomic stations is required. Effective liability protection is, of course, one element of these costs.

The Price-Anderson program makes such protection available at reasonable costs and with consideration of the size of the facility involved. If identical coverage were offered through nuclear liability insurance pools, which it is not, the price would undoubtedly be substantially higher, with a consequent increase in overall costs.

The effect would be to increase the economic burden to be carried by small plants, just as would an increase in the price charged by the Federal Government under the current program.

REDUCTION OF GOVERNMENT INDEMNITY

Chairman HOLIFIELD. Thank you, Mr. Hobart. What do you think of the proposal that Government indemnity be reduced to the extent of any increase in private insurance capacity?

Mr. HOBART. Our association does not have a position on that question, Mr. Chairman. However, the city of Los Angeles has a witness who will testify this morning, I believe, and I think he might be in a position to answer that question.

ELIMINATION OF LIMITATION OF LIABILITY; SALE OF EXCESS INSURANCE

Chairman HOLIFIELD. What do you think of the National Coal Association proposal, that is, to eliminate the limitation of liability and indemnity features of Price-Anderson and have the Government sell excess insurance at comparable commercial rates?

Mr. HOBART. Again, our association does not have a specific position on that question. However, as my statement implies, with respect to the small reactors any increase in operating or construction costs obviously operates as a detriment to the perfection of such economically competitive plants.

Chairman HOLIFIELD. In other words, they are already at a disadvantage because of the size of the plant and to add an additional cost in the form of insurance would provide an additional disadvantage.

Mr. HOBART. Yes, sir.

Chairman HOLIFIELD. What do you think will be the effect of simply removing the limitation on liability?

Mr. HOBART. Because of the sparseness of the historical record on the application of Price-Anderson—the fact that there have not been numerous nuclear powerplants in existence—there has not been substantial opportunity for claims. The safety record has been extremely good. Limited experience to date does not offer a basis for making a change of that type.

Our position is, as indicated in our statement, that the act should be extended for an additional 10 years. In view of the projected figures for the growth of nuclear power, I think a much better determination can be made in the future as to the wisdom of taking a course such as the one you pose.

Chairman HOLIFIELD. I am curious about your statement on page 2 about the advantage of nuclear plants where you say (see p. 43):

> The ability to maximize the economic leverage of low fixed charges in constructing a capital sensitive nuclear facility.

What is your meaning there?

Mr. HOBART. The basis for that statement is this, Mr. Chairman. The fixed charges of municipal electric utilities are approximately half those of private companies. In an area where captial cost is important as a major element of overall power costs, a utility which has lower fixed charges has an economic advantage in construction. In the case of nuclear plants, which have heavy capital costs and, hopefully, low fuel costs, this becomes an extremely important matter. It can have a very direct impact on the ultimate cost of power from such a plant. Because of their lower fixed charges, municipalities and other public bodies have an advantage in this area.

Representative HOLIFIELD. Mr. Price.

Representative PRICE. I have no questions, Mr. Chairman.

Chairman HOLIFIELD. Mr. Anderson.

Representative ANDERSON. Mr. Chairman, I am sorry I am late this morning. I will pass. Thank you.

Chairman HOLIFIELD. Thank you, Mr. Hobart.

Mr. HOBART. Thank you, Mr. Chairman.

Chairman HOLIFIELD. Our next witness is supposed to be Mr. Samuel B. Nelson, general manager and chief engineer of the Department of Water and Power of the City of Los Angeles. However, I see we have substitute witnesses this morning.

STATEMENT OF MEL FRANKEL, ON BEHALF OF THE DEPARTMENT OF WATER AND POWER OF THE CITY OF LOS ANGELES

Mr. FRANKEL. That is correct. My name is Mel Frankel. I am a nuclear engineer with the Department of Water and Power of the City of Los Angeles.

Mr. Nelson regrets that he was unable to attend but has asked me to read his statement.

Chairman HOLIFIELD. You may proceed, sir.

Mr. FRANKEL. On behalf of the department of water and power of the city of Los Angeles, I would like to express our appreciation for this opportunity to present our views on the question whether the Price-Anderson indemnity legislation which expires in August of 1967, should be extended.

The department is a municipally owned public utility furnishing water and power to the 2,713,000 residents (estimated as of January 1, 1965) of the city of Los Angeles. During the 1963–64 fiscal year, the water system served almost 600,000 customers and the power system served over 1 million customers.

As of June 30, 1964, the power system's net dependable capacity was 2,475,000 kilowatts. Net energy supplied to department customers amounted to 10.6 billion kilowatt-hours, 85 percent of which was supplied by steam powerplants and about 15 percent by hydroplants.

NEED FOR NUCLEAR POWER IN LOS ANGELES

The department is vitally interested in the subject of this hearing, since it is related to its proposed 500-megawatt-electric Malibu nuclear plant. Los Angeles needs nuclear power. It is the best solution for our power demands which double each 10 years. Fossil fuels cannot meet the challenge of ever-increasing power needs because:

1. They are becoming too expensive.
2. They should be conserved for other more productive uses such as the raw material for chemical products.
3. They are a significant source of air pollution.

In January 1963 the department submitted a proposal to build the Malibu nuclear plant in response to the U.S. Atomic Energy Commission invitation for proposals under the supplemental program for third-round arrangements of the Commission's power reactor demonstration program. As a result, AEC contract AT(30–1)–3266 was signed by the department in March 1964. An important provision of this contract is that the department may terminate the contract if it cannot obtain the Government indemnity or private liability coverage.

UTILITY RELIANCE ON PRICE-ANDERSON ACT

We understand that this provision is standard in most similar contracts. Without the protection, which presently is provided by the Price-Anderson Act, it is doubtful that any utility would consider it prudent to build nuclear plants.

Some may argue that the nuclear power industry has "arrived" and needs no assistance of any kind from the Government. We do not hold with this view. Although we are convinced of the promise of economical nuclear power, we wish to emphasize that nuclear power costs today are based on predicted rather than demonstrated costs.

These costs can only be determined by building nuclear plants and logging experience. For utilities to enter the nuclear field on the promise of low costs, these predicted costs should be attainable and stable. Liability insurance cost, because of the Price-Anderson Act, is one cost component which can presently be reliably determined and hopefully will continue to be so.

LIKELIHOOD OF SERIOUS NUCLEAR INCIDENT

Our experience in the nuclear power field has convinced us that engineered safeguards in plants have greatly reduced the likelihood of a serious nuclear accident. The probability that such an accident would adversely affect public safety is almost zero. Past experience confirms this view. But since the consequences of an accident, though unlikely, could be costly, we believe the present coverage arrangement consisting of $60 million private insurance and $500 million government indemnity (making $560 million total coverage available) is necessary and represents a reasonable amount of coverage.

REDUCTION OF PREMIUMS FOR NUCLEAR LIABILITY INSURANCE

The $60 million private coverage plus the Government indemnity coverage represent an annual expense of about $300,000 which is a considerable portion of the expected annual expense of about $15,500,000 for the department's proposed 500-megawatt-electric nuclear unit. A very encouraging development, however, occurred last year. It was announced by the nuclear liability insurance pools (Nuclear Energy Liability Insurance Association and Mutual Atomic Energy Liability Underwriters) that rates to be paid by operators of six commercial power reactors on the private portion of the liability coverage would be reduced.

These reductions were appreciable, ranging from approximately 10 to 19 percent. We hope this reduction is a forerunner of a general lowering of rates.

COMPARATIVE PREMIUMS FOR NUCLEAR AND CONVENTIONAL LIABILITY INSURANCE

Chairman HOLIFIELD. Could I ask you at this point, how does this $300,000 payment compare with the amount that you would carry for a conventional plant of the same size?

Mr. FRANKEL. We have liability insurance in the Department of a hundred million dollars which costs us about $360,000 for 3 years, but it covers not only all of our powerplants but all of our total liability is wrapped up in that one package. That amounts to about $120,000 a year. As I say, that covers all our dams, all the water facilities, plus all of our hydroplants, and all of our steam powerplants. So it is difficult to put it in terms of how this coverage compares to the coverage for the Malibu nuclear plant as one unit. In addition we have of course property damage insurance.

Chairman HOLIFIELD. It would be reasonable to say I think that this is quite a bit more expensive.

Mr. FRANKEL. Nuclear liability insurance is a lot more expensive, that is right.

In the future the proportion of the total $560 million liability coverage supplied by private companies is expected to increase. It is my understanding that $12 million additional insurance will be made available by private insurance companies by January 1, 1966, to bring the total coverage available from private companies to $72 million.

We hope that, with the increase in the number of those insured and the continued excellent nuclear plant safety record, this transition will not result in increased liability insurance costs to utilities.

In conclusion, I strongly urge and recommend that, in order for the nuclear power industry to continue to develop and grow, the Price-Anderson Act be extended for at least an additional 10-year period.

Chairman HOLIFIELD. Thank you, sir. Mr. Price?

Representative PRICE. I have no questions, Mr. Chairman.

Chairman HOLIFIELD. Mr. Hosmer?

Representative HOSMER. I have no questions.

INCREASING COSTS OF GAS AND OIL

Chairman HOLIFIELD. Mr. Bates?

Representative BATES. I have no questions except perhaps your reference to fossil fuels becoming too expensive. Where did you get that information?

Mr. FRANKEL. Our statistical group which follows the price of oil and gas. We operate mostly on gas because we are practically committed to gas now. We only operate on oil in our steamplants, when we cannot get gas. Generally we operate on gas.

As far as I am informed gas prices continue to rise.

Representative BATES. I think coal is cheaper.

Mr. FRANKEL. We can't use coal in Los Angeles.

Representative PRICE. You were referring to gas and oil because the records I think indicate that the coal industry has done a tremendous job in holding down the price of coal. I think it is a more reasonable cost fuel now than it has been for some time.

Mr. FRANKEL. Yes. That reference should be to oil and gas and particularly to gas upon which we are so dependent.

Representative HOLIFIELD. And it affects particularly the area on the coast where we are deficient in local supplies of oil and gas. Also, it is not economic at the present time to import coal.

USE OF COAL IN LOS ANGELES

Mr. FRANKEL. And we cannot burn coal in the Los Angeles basin.

Chairman HOLIFIELD. And your city ordinance prevents you from burning coal because of the effluents that will be put in the air?

Mr. FRANKEL. That is right.

Chairman HOLIFIELD. Because of our smog problem in southern California?

Mr. FRANKEL. That is correct.

Chairman HOLIFIELD. Mr. Anderson.

Representative ANDERSON. I have no questions, Mr. Chairman.

ELIMINATION OF LIMITATION OF LIABILITY

Chairman HOLIFIELD. Would you express your organization's feelings about the removal of the limitation of liability as now contained in Price-Anderson, whether it should be changed or not?

Mr. FRANKEL. Well, I believe, as was stated, that the total amount of coverage that is stipulated, $560 million, we consider a reasonable amount. If the utility were responsible for anything beyond that I think there would be serious question as to our going ahead with a plant on that basis.

Chairman HOLIFIELD. I notice you used a figure of $300,000?

Mr. FRANKEL. Yes.

Chairman HOLIFIELD. Is that the proposed premium which would be charged you by the insurance group in the event you built the plant?

Mr. FRANKEL. That $300,000 premium is calculated on the basis of published figures found in the AEC handbook, for example, that puts out figures on insurance, so much premium stipulated per unit

of coverage, based on the plant's thermal capacity. The private portion of insurance I think amounts to roughly about $260,000. Then there is about $40,000 which is the Government indemnity and makes a total of $300,000. These are rough numbers.

Chairman HOLIFIELD. And you are willing to assume that in the event you build the reactor?

Mr. FRANKEL. Yes, we are planning on this. As was said in the statement, this is at least one cost we can rely on, provided the Price-Anderson Act continues. Other utilities, I believe, feel the same way, they can rely on this coverage.

Chairman HOLIFIELD. Thank you. The Rochester Gas & Electric Corp. is next, represented by Mr. Francis E. Drake.

STATEMENT OF FRANCIS E. DRAKE, VICE PRESIDENT, ROCHESTER GAS & ELECTRIC CORP.

Mr. DRAKE. Mr. Chairman and members of the committee, my name is Francis E. Drake, and I am vice president of the Rochester Gas & Electric Corp. Mr. Ginna, chairman of our company who was to present the following statement was unable to be here today due to the fact that our board of directors is meeting and he has some important matters of a nuclear power nature to discuss with them.

With the committee's permission I would like to read Mr. Ginna's statement.

Chairman HOLIFIELD. Proceed, sir.

Mr. DRAKE. Our company has participated actively in the development of nuclear energy over the past 10 years. Through 1964 we contributed over $3 million to various programs.

First, to High Temperature Reactor Development Associates, Inc., which helped in the development of the Peach Bottom plant.

Second, to Empire State Atomic Development Associates, Inc., which has sponsored work by General Electric, by General Dynamics and by Atomics International.

Third, to Power Reactor Development Co. and to Atomic Power Development Associates, Inc., for the development of the Enrico Fermi atomic powerplant.

As the members of this committee know, we have also been interested in building a nuclear powerplant on our own system if we can be assured that the plant will meet the test of reliability which is a necessity for a relatively small company like ours. For example, a 400,000-kilowatt plant would represent an 80-percent addition to our present system generating capacity.

We have invited proposals from six manufacturers or engineering firms for the construction of a plant—either nuclear or conventional—to go into commercial operation in mid-1969. We hope the plant can be nuclear but before making a final decision about that we must be confident of the economics of operation in comparison with those of a coal-fired plant.

A significant factor in our decision will be the availability of the combined nuclear liability insurance and governmental indemnification provided under the Price-Anderson system.

Since the Price-Anderson Act went into effect in 1957, no reactor accident in the United States has caused off-site harm. In the now in-

tervening period, the nuclear industry and independent experts have enormously increased their knowledge of how to construct and operate nuclear plants so as to assure the health and safety of the public.

This is borne out by the additional data and experience that have been accumulated. Today, persons both in and out of Government share a firm confidence that no major accident will occur in nuclear powerplants and that such plants can be safely operated. Until it can be said, however, either that nuclear accidents are impossible or that any lack of confidence is wholly unreasonable, it would seem to be wise to provide some kind of coverage for such improbable accidents.

The Price-Anderson program has afforded the coverage to date, at no cost to the Government. There would seem to be no reason not to continue it.

Other projects to date have had the benefit of the Price-Anderson system which has been reassuring to cooperate stockholders as well as to the public. I believe that the public in our community and our stockholders will ask for the same kind of encouragement of nuclear power and as a corollary, recognizes that claims arising out of this encouragement should be met from public funds rather than from the assets of one or more private companies when any claims exceed the limits of available private insurance. I fully believe that in time we will be able to secure adequate insurance at a reasonable cost on nuclear plants just as we are able to do on conventional plants.

I realize that there are certain related considerations with respect to extending the program which may need to be examined at some future time. Most of these considerations are set forth in the recent report issued by the Atomic Industrial Forum. (See app. 6, p. 263.) The forum report concludes that there is no need at this time to reach decisions about some of these auxiliary questions.

I agree with that conclusion and urge the committee to report an extension of the present statute.

Mr. Ginna asked me to express his personal appreciation to the members of the committee for the opportunity to present his statement.

Chairman HOLIFIELD. Thank you, Mr. Drake. Mr. Price.

PRESENT PATTERN OF INSURANCE COVERAGE

Representative PRICE. Do you believe that the present system of having the utility procure insurance to cover not only itself but others who may be responsible for a nuclear incident is a reasonable provision?

Mr. DRAKE. Yes, sir; I do.

ELIMINATION OF LIMITATION OF LIABILITY

Representative PRICE. Do you believe that your company would be willing to proceed with construction of a nuclear powerplant if the limitation of liability feature of the Price-Anderson Act were terminated?

Mr. DRAKE. No, I don't believe we would be able to continue with the nuclear concept.

Representative PRICE. What if there were no Price-Anderson Act at all, if the act itself were terminated in the next 2 years?

Mr. DRAKE. I don't believe our directors would permit us to go ahead with the construction of a nuclear plant with the unlimited liability and inability to get private insurance to cover at reasonable cost.

Representative PRICE. Does that mean then that since the act does terminate in 2 years, that you will be cautious in your procedure now?

Mr. DRAKE. Perhaps I misunderstood you.

Representative PRICE. No, you did not misunderstand me. I developed that question after I asked the first one.

Mr. DRAKE. I think what we would probably do—we would go ahead now as we are in this with the intent of securing a construction permit prior to the termination of the Price-Anderson Act in 1967. If we were unable to do that, unable to complete and receive a construction permit, then we would probably have to consider the cancellation of the construction.

Representative PRICE. Do you have any comments to offer on the premium currently being charged for nuclear liability insurance?

Mr. DRAKE. By the private insurance field? I think they are very adequate, Congressman Price.

Representative PRICE. You also take into consideration the rebate after a certain period?

Mr. DRAKE. Yes, that is the unknown in this and very probably the result of this will be to effectively reduce the premiums. In all deference to the insurance industry we must realize that we don't have an acturial table built up and their risk is spread over very few plants. Their premiums are based on very few plants. As the industry expands we are—they are going to have a wider spread of their risk.

Chairman HOLIFIELD. Then it does show a certain amount of growing confidence on the part of the insurance companies that they are now willing to obligate themselves to certain refunds, does it not?

Mr. DRAKE. Very definitely, Congressman Holifield.

REFUND OF INSURANCE PREMIUMS AFTER 10 YEARS

Chairman HOLIFIELD. I suppose this is based on the experience that we have had with the plants that are in existence and also with the new engineering safeguards that have been added?

Mr. DRAKE. And the increased knowledge in the entire field. The work that the AEC has done in this field on safeguards and safety, also the manufacturers, has been very effective.

Representative PRICE. That is all.

Chairman HOLIFIELD. Mr. Hosmer.

SUBSIDY

Representative HOSMER. In the light of your answer to Mr. Price, how do you view this Price-Anderson thing? A lot of people say this is a big subsidy. Some other people say it is a method, a technique, to permit the installation of nuclear electric generating plants in this country. I suppose there are some other variations in concept of its philosophy. What is Rochester's view, yours in particular?

Mr. DRAKE. My view, Congressman Hosmer, is that the Price-Anderson indemnity provision has been a most effective encouragement to the private industry and also the manufacturing industry to go for-

ward with an industry which is in the public interest. Nuclear power as a source of energy is one that we are all very optimistic about. Without the Price-Anderson Act I do not think that the progress we have made would have been made and could have been made in the industry. I think it has been very farsighted of the committee and of Congress to have passed the Price-Anderson Act.

Representative HOSMER. That answer of yours describes this two different ways. One time you said it was an encouragement. Then you said it was a removal of a bar from the utilities considering nuclear generators. Now is it both or one or is it one or the other or it is more one than the other?

Mr. DRAKE. I think, Congressman, it is both, because in the first place when nuclear power and the first plants were considered, had there been unlimited liability it would have been a strong deterrent and possibly a bar to the construction of those first plants.

The confidence of Congress, of the Atomic Energy Commission, of the industry itself, has been encouraged by the existence of the Price-Anderson indemnity provisions. So I think it could be said that it is both, sir.

Representative HOSMER. Well, let us examine that in the light of your answer to one of the previous questions. You said that Rochester, if this extension were not enacted, would not contemplate going nuclear, did you not?

Mr. DRAKE. Provided we could not get a construction permit before the expiration of this act; yes, sir.

Representative HOSMER. Then the nonextension of the Price-Anderson would in effect be a bar so far as your company is concerned?

Mr. DRAKE. Yes, sir; it would be.

Representative HOSMER. Whether it is encouraging or not is of little importance before you pass the bar; is that right?

Mr. DRAKE. Yes, sir. In our case.

Representative HOSMER. Now let me ask you next. Are you familiar with your company's insurance setup?

Mr. DRAKE. Reasonably well informed on it.

Representative HOSMER. Is it a self-insurer in any respect?

Mr. DRAKE. Only for the first $50,000 of public liability. Beyond that we carry public liability insurance to the extent of $15 million.

Representative HOSMER. Do you divide that up into personal injury and property damage types of insurance?

Mr. DRAKE. No, it is public liability.

Representative HOSMER. Do you have a comprehensive policy of some kind?

Mr. DRAKE. Yes, sir.

COMPARATIVE PREMIUMS FOR LIABILITY FOR PROPERTY DAMAGE AND PERSONAL INJURY

Representative HOSMER. Do you know on what basis the rates in that policy have been ascertained?

Mr. DRAKE. The rates differ with the different blocks of coverage, of course.

Representative HOSMER. That is right but I am talking about as between the liability for bodily injury and the liability for property damage.

Mr. DRAKE. This is a negotiated premuim, Congressman.

Representative HOSMER. I understand it comes as a package.

Mr. DRAKE. Yes, sir.

Representative HOSMER. And a specified sum. But your insurance carrier surely must have at least two considerations in mind. His degree of risk relative to bodily injury and his degree of risk relative to property damage. I think you would calculate that those are not the same degree, either monetarily or actuarily. Is that right?

Mr. DRAKE. I assume that is correct, sir.

Representative HOSMER. So, you would say that the end premium that is negotiated is at least a composite of these two different rates so far as the insurance company is concerned?

Is that right or do you know?

Mr. DRAKE. Yes, within limitations I know, Congressman. The insurance company, if my knowledge of the insurance company is correct, is not putting a rate on one or a rate on another. They are looking at the exposure of their company to a liability claim. It is a composite picture. I am sure that there is a consideration, as you have put it.

Representative HOSMER. Now let me ask you this then. You buy a policy for 3 years or some other term of time and haggle about a rate, do you not?

Mr. DRAKE. Yes, sir.

Representative HOSMER. Now does your company prepare arguments based on the number of property damage claims you have not had and the number of personal injury claims you have not had, or do you just say we have had x number of dollars less claims under this policy than we had under the prior one?

Mr. DRAKE. This aspect of it is actually handled by our insurance broker but he does consider the experience rating of the company for claims, Congressman, so this is part of the argument; yes.

Representative HOSMER. As a matter of fact, your company, itself, in regard to the safety of its personnel has a safety program aimed at people; does it not?

Mr. DRAKE. Very definitely.

Representative HOSMER. It also has a program aimed at keeping your things from getting busted up and other people's things damaged by Rochester employees, do you not?

Mr. DRAKE. We are very conscious of this responsibility.

Representative HOSMER. So that you will know what this is about, I think there is a variation in consideration as to personal injury liability and as to property damage liability that has been blanketed in the Price-Anderson concept and my feeling is that it is time now possibly to evaluate whether or not we should split these considerations up or at least componentize them in our consideration of the extension of the act.

Thank you.

Chairman HOLIFIELD. Mr. Anderson.

PROBABILITY OF SERIOUS REACTOR INCIDENT

Representative ANDERSON. The witness who preceded you in the witness chair said that the probability of a serious nuclear accident that would adversely affect public safety is practically zero. I take it that you and your company would not dispute that fact?

Mr. DRAKE. No, sir; we would not dispute that fact. If we thought there was a real hazard to the public in our territory we could not afford to go out killing our consumers.

Representative ANDERSON. Yet you say in response to these questions that this is a sine qua non, the reenactment or extension of the Price-Anderson, to your going nuclear with your next plant. I am wondering if this response on the part of industry does not tend to be a little bit rote in nature. Here is a nice, comfortable cushion that everybody has adjusted himself to. But when you equate the two statements, the one that the possibilities are zero and yet that you have to have this or you are not going to go through with nuclear power, do they really add up?

Mr. DRAKE. I think they do add up, Congressman. Our experience in the nuclear field is admittedly limited. There has been a tremendous amount of work done on the safety of these plants.

We can estimate very accurately our liability in the field of conventional power. We as an industry are not as capable of computing the various intangibles that go into a conceivable limitation on our liability in the nuclear.

I think it is in the public interest to continue the development of nuclear energy. They are the people who are going to benefit from this. In that area I think it is also a very proper function of Government to see that this new industry is encouraged and developed for the benefit of the public.

Representative ANDERSON. I can certainly see that with respect to the developmental phase of this industry. But now that you have these established concepts as far as power reactors are concerned I wonder whether it is as necessary now as it was when we first started with them.

Mr. DRAKE. The first nuclear powerplant went critical in 1957 so we have had roughly 8 years of experience. That is a pretty limited time with the number of plants actually in operation to base all knowledge on for the industry. I think a 10-year extension will be very effective in extending this knowledge to a large number of new plants and over a wider area of size.

Representative ANDERSON. Thank you, Mr. Chairman.

Chairman HOLIFIELD. Thank you, Mr. Drake.

Mr. DRAKE. Thank you, sir.

Chairman HOLIFIELD. The next witness will be Mr. George C. Kinsman, vice president of the Florida Power & Light Co.

Proceed, Mr. Kinsman.

STATEMENT OF GEORGE C. KINSMAN, VICE PRESIDENT, FLORIDA POWER & LIGHT CO.

Mr. KINSMAN. Thank you. My name is George Kinsman. I am vice president of the Florida Power & Light Co.

Our company serves nearly a million customers along the east coast and lower west coast of Florida. Our generating capability is 3,800,000 kilowatts and we have an additional 1,300,000 kilowatts under construction and ordered.

I am here today because of our interests in and our plans for building nuclear power units at our Turkey Point site some 25 miles south of Miami. We are currently negotiating with manufacturers and architect-engineers for the first nuclear unit which will be comparable in size to Dresden No. 2, recently ordered by Commonwealth Edison Co. If satisfactory proposals are received, we expect to have the plant in operation about 1970.

The reasons for nuclear power's importance in our plans are clear if we look at the key factors. The three essentials for a powerplant site are:

1. An ample supply of circulating water which can be fresh or salt.
2. A location reasonably close to the market areas where the power will be used.
3. And in our case, for a fossil fueled plant, a waterway for delivery of oil fuel. I might explain that coal is not now, and never has been, competitive in our service area so that our basic fuel is oil supplemented by natural gas from the Texas-Louisiana area.

SCARCITY OF POWERPLANT SITES

As elsewhere in the country, the growth of the metropolitan areas has given us problems in these areas which, while they enlarged our markets, have helped make powerplant sites more scarce. This is because good ites must be on or close to a reasonably large body of water.

People also like to be on or close to the water, particularly in a mild climatic area because they like to swim in it, ski on it, ride on it, and look at it. Too, the public generally is not enthusiastic about having our plants as neighbors so that zoning approval is becoming increasingly difficult to obtain.

VENTILATORY CAPACITY OF AREA FOR FOSSIL FUELED PLANTS

Powerplants, due to area growth and the increasing use of electric service by all customers, are becoming extremely large. Our Turkey Point site, for example, is laid out for an ultimate capability of 4 million kilowatts. Even in its isolated location in a mangrove swamp (it is a mile from the plant site to the edge of our property and several miles to the nearest house) we believe that 2 million kilowatts of fossil fueled units would be about all that it would be desirable to

put in this one location. More than that might, as the U.S. Public Health Service says, exceed the ventilatory capacity of the area.

So here (and it is happening and will happen with greater and greater frequency elsewhere) a strong reason for nuclear power's place in the picture is the plant size limitation on oil- and coal-fired plants due to the volume of the products of combustion emitted at one location.

We hope, of course, that the economic aspects will also be favorable. Another competitive fuel source is welcome, to say the least.

Because of our interest in nuclear power, we are concerned about extension of the Price-Anderson law. The importance of the extension is emphasized by the inclusion in the first proposal we have received on our nuclear project which contains the following statement: "The offer is based on the extension of governmental indemnification authority." This indicates to us that this matter is considered essential by the manufacturing industry.

We, therefore, concur in the recommendation of the Atomic Energy Commission and the Atomic Industrial Forum Study Group that the Price-Anderson Act be extended for a second period of 10 years. (See app. 6, p. 263.)

Chairman HOLIFIELD. Thank you, Mr. Kinsman.

Mr. Price.

NECESSITY FOR EXTENSION OF PRICE-ANDERSON ACT

Representative PRICE. Mr. Kinsman, you say in your statement that this matter—the extension of the Price-Anderson Act—is considered essential by the manufacturing industry. Now what about the utility industry and particularly what does your company think about the necessity of extension of this act?

Mr. KINSMAN. We feel the same way, Mr. Price.

Representative PRICE. You think it is essential to the continuation of the nuclear power development program?

Mr. KINSMAN. Yes, sir; I do. I say our company thinks so. Our position in this thing I think I might explain. We are just getting our feet wet in the nuclear business. So perhaps we are not as well informed as some of the utilities. We feel that the original reasons for putting in the Price-Anderson Act still apply in that all of us 10 or 12 years ago were much more optimistic about the fast progress of nuclear power than as the actual developments have worked out.

I think we are just now getting into the big forward movement in nuclear power that we had all hoped would take place in 1958 or 1960. The development of the large units, the fact that manufacturers today are in a position to guarantee firm prices for the construction of these units and the fact that these utilities like our own have grown to the point where they can use large units has put the industry in a position where I think they can move forward very fast from now on and the experience we had hoped to get in the first 10 years of the Price-Anderson Act we might get in the next 10 years.

WILLINGNESS OF COMPANY TO PROCEED WITHOUT INDEMNITY

Representative PRICE. If you felt that your company could not secure its construction permit before the expiration of the Price-Anderson Act in 1967, would you continue your interest in the building of an atomic powerplant?

Mr. KINSMAN. That is a decision that I don't know that I can speak to entirely. I think our directors would take a very hard look before they went ahead, Mr. Price.

Representative PRICE. The committee has been told that there are hundreds of millions of tons of coal in the ground which can be used to fuel powerplants. You say that you do not use coal in your area; is that right?

Mr. KINSMAN. That is right.

AIR POLLUTION PROBLEMS WITH FOSSIL FUELED PLANTS

Representative PRICE. That nuclear power should be developed because of the plant size limitations on oil- and coal-fired plants due to the volume of products of combustion emitted at one location. Is this latter a problem of cost as a practical matter?

Mr. KINSMAN. No, sir; it is air pollution.

Chairman HOLIFIELD. If the gentleman will yield I would like to commiserate if I might with my friend in view of the natural controversy as to whether people should retire in California or Florida. I can say that I commiserate with you that you are suffering from one of the same problems we are, which is air contamination. That puts you on, I hope, about the same level.

Mr. KINSMAN. Thank you, Mr. Holifield.

LIMITATION OF LIABILITY

Representative PRICE. What is your view of the desirability of the limitation of liability feature of the Price-Anderson Act so far as you are concerned and your company is concerned?

Mr. KINSMAN. We think that the act should be continued exactly in its present form.

SUBSIDY

Representative PRICE. Do you feel that the protection of the Price-Anderson Act provides a subsidy for your company?

Mr. KINSMAN. No, sir; I do not consider that a subsidy in the sense that we think of Government subsidies such as the ones given to the airlines and the maritime situation where actually cash money is paid out. If it is a subsidy—I think so far as at least it has been a theoretical subsidy.

Representative PRICE. That is all I have, Mr. Chairman.

Chairman HOLIFIELD. Mr. Hosmer?

Representative HOSMER. I would like to join the chairman in his ventilatory comparisons between the two States.

Now with respect to this statement of yours that you want to see this Price-Anderson continued and extended exactly as it is now, exactly how much time have you given to the consideration of the issue of whether it should be extended exactly as it is now or with certain variations and improvements, if any can be conceived?

Mr. KINSMAN. I might have used too strong a word in "exactly." Maybe I should have said "essentially." I think I am relying actually on the recommendations of the Atomic Energy Commission and the Forum.

Representative HOSMER. You want protection continued in some way and I don't think it really matters too much to you how it is done so long as it is done and you get the same end result that you have now. Isn't that it?

Mr. KINSMAN. I will agree with that.

Representative HOSMER. Now you are using gas or oil or both?

Mr. KINSMAN. Both.

Reprsentative HOSMER. But you are not using coal?

Mr. KINSMAN. No, sir.

IMPACT OF NUCLEAR POWER IN FOSSIL FUEL COSTS

Representative HOSMER. You have not got much out of this nuclear business over the last decade, you said, but you are hoping to get something out of it in the future?

Mr. KINSMAN. I don't know as I understand you. You mean we have not gotten anything out of it? We have not been in the nuclear power picture.

Representative HOSMER. The thing has not moved very fast, and so forth, but in the next decade you are going to get something out of it.

Mr. KINSMAN. I think the whole industry is going to progress faster in the next decade than it has in the past, if that is what you mean.

Representative HOSMER. That is not exactly what I meant. Let us put it this way: A few weeks ago Chairman Seaborg was up here on another matter, and I asked him if it was essentially so that because of the existence and momentum of the nuclear power generating industry and its effect, relative to conventional fuels costs, if a fair figure for the amount of money being saved generally over the country by the fact that the existing power rates are lower than they would be except for the competitive presence of the nuclear alternative was about a billion dollars annually.

Chairman Seaborg replied that was about it. Now do you have any feeling that over the last decade there has been at least some influence as regards the price you pay for fuel, some suppressing influence on what might otherwise be the price if somebody could push a button and totally eradicate all thoughts of atomic energy from anybody's mind?

Mr. KINSMAN. I don't think that is quite true in our territory, Mr. Hosmer. The elements that have influenced our fuel cost far more than any other was the importation of natural gas in our State in 1959 and the fact that the coal industry has been successful in coming into the markets in the north gulf side of our State where they can have water transportation across from New Orleans and the Mississippi River. That element is not present in our territory. So I think that the

greatest influence on our oil price which has been our basic fuel has been the natural gas and the fact that the coal people are getting closer.

Representative HOSMER. Then your only consideration in going into this nuclear plant is a ventilatory one?

Mr. KINSMAN. I would not say that is the only one. We hope it will be an economical one, too. That is a very important factor, the ventilatory one, just as in the case of Los Angeles. As Mr. Holifield says we have about the same problems, we are about to have them.

Representative HOSMER. Except for that we could forget about the nuclear industry?

Mr. KINSMAN. Well, if nuclear power proves to be more economical we would go into it regardless of whether it would save us from air pollution.

Representative HOSMER. Do you have contracts on the gas?

Mr. KINSMAN. We have 20-year contracts on the gas, 10 years on oil, firm.

Representative HOSMER. You do not anticipate any trouble renewing those contracts, at the same price as that which you are paying now, when they expire?

Mr. KINSMAN. On the oil contract I do not anticipate any. On the gas contract I doubt if there will be difficulty. We have about 14 years yet to go on the gas contract. The transportation rate on the gas is of course, subject to the Federal Power Commission and there might be some rate changes on the transportation costs. Gas in the field is today cheaper than it was at the time we entered into this gas contract.

In fact we have now signed a contract for additional gas subject to Federal Power Commission approval.

Representative HOSMER. Are we to understand that Florida is outside the world area of inflation?

Mr. KINSMAN. No, sir; definitely not.

Representative HOSMER. So, really, Mr. Kinsman, you do not have the same interest in this as the gentleman who was here from Los Angeles Water & Power Department, do you? It is not breathing down your back as it is his.

Mr. KINSMAN. The burning of oil has not been prohibited in our area yet.

Representative HOSMER. I am talking pricewise.

Mr. KINSMAN. From a price standpoint?

Representative HOSMER. Yes. He said his figures showed that every time around it is going to cost him more for conventional fuel and this is why, at least one of the reasons why, nuclear looks good to him.

You say that does not make any difference to you in Florida because you are going to have all the fuel you want from other sources at the price you like to pay.

Mr. KINSMAN. I would not go so far as to say the price we would like to pay. We are always anxious to get lower prices because then it helps our customers. In our State under the State utilities commission there are fuel clauses in our rates. The minute the fuel price goes down, or we put in a more efficient plant, that saving goes to the customer next month. Anything we can do to lower the price of our product means we sell more of it. So we are interested in holding

the price down, Mr. Hosmer, and getting the most economical production we can.

Representative HOSMER. Thank you.

Chairman HOLIFIELD. Thank you, Mr. Kinsman.

Mr. KINSMAN. Thank you, Mr. Chairman.

Chairman HOLIFIELD. Our next witness will be Mr. James Davenport, Southern California Edison Co.

STATEMENTS OF JAMES DAVENPORT, EXECUTIVE VICE PRESIDENT, SOUTHERN CALIFORNIA EDISON CO.; ACCOMPANIED BY ALAN M. NEDRY, SPECIAL COUNSEL, AND WILLIAM GOULD, VICE PRESIDENT

Mr. DAVENPORT. Mr. Chairman.

Chairman HOLIFIELD. You may introduce your associates.

Mr. DAVENPORT. Mr. Chairman and gentleman of the committee, my name is James F. Davenport. I am the executive vice president of the Southern California Edison Co., of Los Angeles. With me are my associates. On my right William R. Gould, vice president in charge of engineering, who is working I might say strenuously at the present time not only on atomic matters but also on some programed coal-fired projects. On my left is Alan M. Nedry, special counsel.

Southern California Edison Co. is pleased to submit views concerning the proposed extension of the Price-Anderson indemnification authority.

Southern California Edison Co. is a Cailfornia electric utility corporation serving portions of central and southern California and southern Nevada. It has installed capacity of approximately 7 million kilowatts of generating capacity and expects to have a peakload this year of approximately 6 million kilowatts of gross load.

Southern California Edison Co. and San Diego Gas & Electric Co. are currently building unit No. 1, a 450-megawatt nuclear electric generating plant, at their San Onofre nuclear generating station on the Marine Corps base, Camp Pendleton, Calif. We contemplate that future additions to our system generating resources will include nuclear generating units.

We believe that it is essential that the Price-Anderson Act be extended through a second period of 10 years. In general, we support the conclusion and recommendations of the Atomic Energy Commission study of the Price-Anderson Indemnity Act, dated February 15, 1965, and the report of the Price-Anderson study group of the Atomic Industrial Forum, Inc. (See app. 6, p. 263.)

The objectives of the Congress in adopting the Price-Anderson indemnity provisions are as significant today as they were when originally enacted in 1957. In our opinion the failure to extend the Price-Anderson Act would be a significant deterrent to continuing industrial activity in the nuclear energy field.

We support H.R. 8496 and S. 2042 in their present form, including the provision for an increased percentage of the total financial protection of $560 million to be supplied by private insurance companies, when this is possible and desirable and when the cost thereof would not be adverse to the projects.

The Price-Anderson Act has been of assistance to the growth of the nuclear power industry, and has not required an outlay of public funds. In the case of most power reactors licensed after August 1, 1967, the amount of financial protection furnished by the private insurers and the nuclear facility owners would be at least $60 million.

ELIMINATION OF LIMITATION OF LIABILITY

We believe that it would be unwise to remove the aggregate limitation of liability provided by the Price-Anderson Act. The removal of this feature of the Price-Anderson system would result in the exposure to uninsured liability claims which also could be a deterrent to future developments in the nuclear energy field.

We believe that the Price-Anderson program is fully warranted since it is the only means of providing the necessary nuclear liability coverage for the nuclear power industry.

Thank you, sir.

Chairman HOLIFIELD. Thank you, Mr. Davenport, Mr. Price.

INCREASED PRIVATE INSURANCE CAPACITY

Representative PRICE. Mr. Davenport, I see a little ambiguity in your statement when you state that—

> We support H.R. 8496 and S. 2042 in their present form, including the provision for an increased percentage of the total financial protection of $560 million to be supplied by private insurance companies.

I think it is a little ambiguous in the next part of your statement when you say:

> When this is possible and desirable and when the cost thereof would not be adverse to the projects.

Now what do you mean by that?

Mr. DAVENPORT. We assume that the cost of insurance that could be supplied by the private carriers over and above $60 million would not be greatly in excess of the present premium that is now applicable to the $60 million insurance.

Representative PRICE. You feel then that possibly there should be some increase in the amount of this $560 million on the part of the insurance companies and you feel that this should possibly be done without any increase in the cost of premium?

Mr. DAVENPORT. Let us say a modest increase, if any. It is my understanding that the maximum possible insurance that might be obtained from private carriers might be no more than about $10 million more than the present amount which we are able to obtain at the present time.

Chairman HOLIFIELD. The committee is not assuming that by any means. The committee feels—I would not speak for the committee at this time but I will speak for myself—that we have gone quite a ways in this engineering safeguards and we have gone quite a ways in experience. Our experience in handling reactors and even more dangerous types of reactors in the production of plutonium goes back at least 20 years.

Neither in our military reactors nor in our civilian reactors have we had any occurrence of damages to amount to anything. With this background now of some 20 years of experience in both the mil-

itary and civilian field we believe that we are approaching the point where private insurance companies can come forward with a reasonable increase in the amount of insurance they are offering.

Certainly the fact that they have been willing to make a refund on present premiums is an indication that they too have come to the conclusion that notwithstanding the fact that we do not have decades of actuarial history, that they are taking into consideration the almost spotless record of lack of accidents in this new science, nuclear industry, and they are willing to make refunds.

Now we think it is time for the private utility companies to assume a reasonable increase, if necessary, and we also think it is time for the insurance companies to increase the amount of insurance they are offering.

Personally, speaking as an individual member of the committee, I think that $10 million is not enough. I think they have to come forward with a little bit better offer than that.

Mr. DAVENPORT. At the same overall rate, Mr. Chairman?

Chairman HOLIFIELD. I was not discussing a limitation on the rate. But the fact that they have given you a rate and are now willing to give 10 to 20 percent refund on your premiums is an indication——

Mr. CONWAY. I think what the Chairman has in mind here is that within the past year there was a 10 to 20-percent reduction in the annual premiums that had originally been charged. You must couple that with the expectation that in 10 years, assuming no accidents, there will be a refund of approximately 70 percent of the premiums.

Mr. DAVENPORT. That will be very encouraging.

Chairman HOLIFIELD. Encouraging enough that as one member of the committee I feel that this industry is moving along now to the point of near maturity and that the private industry sector should pick up a reasonable increase at this time.

I recognize they cannot pick up the complete liability that is contained in the Price-Anderson bill, but certainly they can do better than what they are doing now in view of the actions of the insurance companies and in view of the safety records.

Mr. DAVENPORT. We would certainly agree with your statement.

Chairman HOLIFIELD. We are talking about a reasonable increase.

Mr. DAVENPORT. I believe I used the word "modest."

Chairman HOLIFIELD. I don't think a $10 million increase is reasonable. It does not go far enough in my opinion.

Representative PRICE. The fact that you have heard of the possibility of the increases on the part of the insurance companies indicates serious consideration being given to them picking up an additional amount of protection?

Mr. DAVENPORT. Yes, sir.

Representative PRICE. I think before these hearings are completed this will be further developed. I have confidence as far as I am concerned that some adjustments will be made along this line, certainly before the hearings are completed.

IMPACT OF NUCLEAR POWER ON COSTS OF CONVENTIONAL POWERPLANTS

Do you feel that the competition of atomic power has reduced the cost of building and operating conventional powerplants?

Mr. DAVENPORT. I certainly do. Very definitely.

Representative PRICE. What are the indications that cause you to have this feeling?

Mr. DAVENPORT. I believe that, by reason of our atomic plant now being developed in San Onofre, there seems to be a leveling off of the price for conventional fuels and also in early negotiations for fuel contracts it appears that the coal contracts are levelized to meet the atomic competition, giving due regard of course to the difference in distance between the location of the coal plants as contrasted to the atomic plants which are much nearer our load center.

Representative PRICE. Of course this reduction of building and operating costs because of the nature of the industry and the State regulations of the rates and so forth are passed to the consumer.

Mr. DAVENPORT. Yes, sir; very definitely, just as Mr. Kinsman indicated.

SELF-INSURANCE BY UTILITY

Representative PRICE. Now do you believe that your company would want to self-insure for loss of the reactor or for third party liability due to a nuclear incident in the near future?

Mr. DAVENPORT. Over and above the $560 million limit?

Representative PRICE. Yes.

Mr. DAVENPORT. No, I believe we could not go ahead if there were not the indemnity and limitation of liability provided under the proposed extension of the Price-Anderson Act.

Representative PRICE. You do not have your construction permit yet, do you?

Mr. DAVENPORT. Yes, sir; we do. The plant I might add is coming along in very good shape. We have our containment sphere completed and tested. The reactor vessel is on hand. The plant should be ready to fuel I would say about 14 to 16 months. So, overall, it is around 25 to 30 percent completed. I hope you gentlemen will visit the plant in the near future.

Representative PRICE. You received your construction permit in March of 1964, is that right?

Mr. DAVENPORT. I believe that is the date. I don't recall offhand. I believe it is.

Representative PRICE. You can look at the problem in connection with the extension of the Price-Anderson a little bit differently than some of those who are still in the planning stage and have not yet received their construction permit.

Mr. DAVENPORT. That is true, Mr. Price. On the other hand we contemplate building additional atomic plants so it is very important to us that this act be extended as proposed under these Senate and House bills.

ELIMINATION OF LIMITATION OF LIABILITY

Representative PRICE. Do you feel that the public would have the same amount of protection if the limitation of liability feature of the Price-Anderson Act were eliminated?

Mr. DAVENPORT. As the chairman indicated, there have been no accidents and with the built-in safeguards we expect no accidents and would not build a plant if we thought there was any likelihood. On the other hand the situation is very similar to insurance you take out on a house or any type of liability insurance.

You do not expect an accident but if there is one you need protection. As stated in my prepared statement, we believe that the public would be protected by the Price-Anderson Act in its present form and if extended it would be adequate. We just can't foresee any type of accident which would exceed the limits of the present act.

SUBSIDY

Representative PRICE. Do you feel or does your company feel that the Price-Anderson Act provides a subsidy for your company?

Mr. DAVENPORT. With the present rates of insurance I would not say it provided any substantial subsidy. I think there has been previous testimony that the insurance cost is in the order of around $300,000 a year. I would have to check that figure. I don't have it with me. I could furnish the committee if it desires, with our insurance program if necessary.

Representative PRICE. Percentagewise can you estimate the difference in cost for the premiums for a nuclear powerplant as against a conventional powerplant?

Mr. DAVENPORT. Yes, sir. It is substantially higher.

Representative PRICE. Could you estimate percentagewise what it is?

Mr. DAVENPORT. I don't have that figure but I can furnish it to the committee.

Chairman HOLIFIELD. Please furnish those figures on your insurance program on this new plant for the committee's benefit.

Mr. NEDRY. As related to the conventional?

Representative PRICE. Yes, as related to the conventional whether it be oil or gas.

Mr. DAVENPORT. It probably would be more intelligible if we did that on the basis of the charge on a kilowatt basis.

Chairman HOLIFIELD. Yes.

(The document referred to follows:)

Southern California Edison Co., comparison of estimated insurance costs of nuclear and nonnuclear electric generating plants

	Premium
San Onofre nuclear generating plant—plant capacity, 450,000 kilowatts:	
NELIA—liability insurance: $60,000,000 limits (estimated)	$325,000
Government indemnity of liability: $500,000,000 limits	36,300
Estimated annual liability premium	361,300
NEPIA—Insurance of property: $60,100,000 limits (estimated)	300,500
Optional coverage to full value of $100,117,000 (estimated)	150,000
Estimated annual insurance of property premium	450,500
Total estimated annual insurance premium 450,000-kilowatt nuclear generating plant	811,800
Nonnuclear generating plant—plant capacity, 450,000 kilowatts:	
Liability insurance: $50,000,000 limits $50,000 deductible; estimated annual liability premium	6,508
Insurance of property: $50,000,000 limits $100,000 deductible; estimated annual insurance of property premium	12,530
Total estimated annual insurance premium; 450,000 kilowatt nonnuclear generating plan	19,038

COAL-FIRED POWERPLANTS

Representative PRICE. You have no coal fired plants in your system?

Mr. DAVENPORT. We have no coal fired plants. As I mentioned, in our introductory statement we now have two coal fired projects underway and my associate here, Mr. Gould, is working strenuously on these projects. One of them will be located in the Four Corners area, in New Mexico. The other is proposed to be situated in Nevada on the Colorado River. We have to locate these plants where there is a substantial amount of cooling water.

That really locates the plant so far as its feasibility is concerned as well as the coal supply.

Chairman HOLIFIELD. On the Nevada plant you bring the coal in from where, from the Utah field or the New Mexico field?

Mr. DAVENPORT. We have several alternates, Mr. Chairman. It can be brought in from New Mexico or Arizona or Utah. We are studying right now the most feasible, the most economical location to bring the coal into that plant in Nevada.

COMPETITION BETWEEN NUCLEAR AND CONVENTIONAL PLANTS

Chairman HOLIFIELD. You are going to be in a unique position then. You are going to have plants that are fired with oil some months of the year, when the atmospheric conditions are right, as I understand it, and with gas a great deal of the year when the atmospheric conditions in southern California are "oppressive" or "depressive," whichever word is correct.

And you're also going to have mine mouth or close to mine mouth coal plants. This puts you in a unique position of using all three types of fossil fuels and also the nuclear?

Mr. DAVENPORT. Yes, sir; you are exactly right.

Chairman HOLIFIELD. You would not see any one of those types of fossil fuels or the nuclear fuel eliminating the other types, would you?

Mr. DAVENPORT. Not at all. They are all supplementing one another.

Chairman HOLIFIELD. They are again supplemental and complementary?

Mr. DAVENPORT. Complementary to one another.

Chairman HOLIFIELD. Where the economics justify it you would have no compunction at all against continuing the use of coal, oil, and gas?

Mr. DAVENPORT. That is right.

AIR POLLUTION PROBLEMS

Chairman HOLIFIELD. And also where the economics or the local regulations on what has been described here as the "ventilatory problem" are concerned, you of course would then look to nuclear?

Mr. DAVENPORT. That is right. As you know we have this air pollution problem in California which is a fact to be considered in erecting new gas- and oil-fired plants in the coastal basin.

Chairman HOLIFIELD. I know you must have the figures on the types and weights of pollutants that are emitted into the air from gas, oil, and probably coal. Do you not have those figures?

Mr. DAVENPORT. I do not have them with me; no, sir.

Chairman HOLIFIELD. No, I would not expect you to. But could you either testify or furnish for the record your experience in that? I know that these figures do exist.

Mr. GOULD. We are not prepared today to testify as to the volumes of pollutants from various types of fuel. There are data, however, that have been derived through the years. We could easily furnish them for this committee if they would be interested in them.

Chairman HOLIFIELD. We will be glad to have you submit that.

Mr. GOULD. Fine.

Chairman HOLIFIELD. And also submit to us the rules and regulations under which you operate in relation to the requirement to shift from oil to gas in your operation in southern California.

Mr. GOULD. As you are probably aware, this is covered by county air pollution control district rules 62 and 62.1. We will be glad to furnish the information.

(The documents referred to follow:)

DATA OF AIR POLLUTION CONTROL DISTRICT, COUNTY OF LOS ANGELES [1]

Comparison of emissions from powerplants burning fuel oil and natural gas

Contaminant	Contaminant emissions—Pounds per thousand equivalent barrels [2]	
	Fuel oil	Natural gas
Hydrocarbons	33.9	[3]
Aldehydes and ketones	24.9	6.0
Other organic gases	114.2	18.0
Oxides of nitrogen	5,000.0	2,340.0
Sulfur dioxide	11,000.0	2.5
Carbon monoxide	1.8	[3]
Aerosols	893.0	90.0
Total	17,068.0	2,457.0

[1] Filed as Exhibit No. 52—Transwestern Pipeline Co., et al.—Federal Power Commission Docket No. CP63-204, et al.

[2] 6,000 cubic feet of natural gas is equivalent to 1 barrel of fuel oil.

[3] Negligible.

AIR POLLUTION CONTROL DISTRICT, COUNTY OF LOS ANGELES

Rule 62. (Amended Mar. 16, 1961) Sulfur contents of fuels. A person shall not burn within the Los Angeles Basin at any time between May 1 and September 30, both dates inclusive, during the calendar year 1959, and each year thereafter between April 15 and November 15 both inclusive, of the same calendar year, any gaseous fuel containing sulfur compounds in excess of 50 grains per 100 cubic feet of gaseous fuel, calculated as hydrogen sulfide at standard conditions, or any liquid fuel or solid fuel having a sulfur content in excess of 0.5 percent by weight.

The provisions of this rule shall not apply to:

(*a*) The burning of sulfur, hydrogen sulfide, acid sludge or other sulfur compounds in the manufacturing of sulfur or sulfur compounds.

(*b*) The incinerating of waste gases provided that the gross heating value of such gases is less than 300 British thremal units per cubic foot at standard conditions and the fuel used to incinerate such waste gases does not contain sulfur or sulfur compounds in excess of the amount specified in this rule.

(*c*) The use of solid fuels in any metallurgical process.

(*d*) The use of fuels where the gaseous products of combustion are used as raw materials for other processes.

(*e*) The use of liquid or solid fuel to propel or test any vehicle, aircraft, missile, locomotive, boat or ship.

(*f*) The use of liquid fuel whenever the supply of gaseous fuel, the burning of which is permitted by this rule, is not physically available to the user due to accident, act of God, act of war, act of the public enemy, or failure of the supplier.

Rule 62.1. (Adopted Jan. 14, 1964) (*a*) A person shall not burn within the Los Angeles Basin at any time between the days of November 16 of any year and April 14 of the next succeeding calendar year, both dates inclusive, any fuel described in the first paragraph of rule 62 of these rules and regulations.

(*b*) The provisions of this rule do not apply to:

(1) Any use of fuel described in subsections (*a*), (*b*), (*c*), (*d*), (*e*), and (*f*) of said rule 62 under the conditions and for the uses set forth in said subsections.

(2) The use of liquid fuel during a period for which the supplier of gaseous fuel, the burning of which is not prohibited by this rule, interrupts the delivery of gaseous fuel to the user.

(*c*) Every holder of, and every applicant for a permit to operate fuel-burning equipment under these rules and regulations shall notify the air pollution control officer in the manner and form prescribed by him, of each interruption in and resumption of delivery of gaseous fuel to his equipment.

COAL-FIRED POWERPLANTS

Representative PRICE. Are the New Mexico and the Nevada plants entirely new operations?

Mr. DAVENPORT. Yes. They are in the planning stage right now, Mr. Price.

Representative PRICE. They are not yet under construction?

Mr. DAVENPORT. They are not yet under construction.

Representative PRICE. Are these the first coal-fired plants in your system?

Mr. DAVENPORT. They are the first coal-fired plants which will furnish energy to our system.

Representative PRICE. What are the kilowatt capacities of these two plants?

Mr. DAVENPORT. The installation at Four Corners in New Mexico will consist of two 750-megawatt units. That is 750,000 kilowatts each.

Representative PRICE. That is a pretty big operation?

Mr. DAVENPORT. That is a big operation.

Representative PRICE. And it is a coal-fired operation?

Mr. DAVENPORT. It is a coal-fired operation. The two that are proposed for the Colorado River will be of the same size. So the two projects which we are talking about right now, which are well underway as far as the planning and programing are concerned, will total 3,000 megawatts or 3 million kilowatts.

Representative PRICE. 3 million kilowatts in the first coal-fired operation in your system?

Mr. DAVENPORT. Yes. Some of that energy of course will be supplied to other associates, other utilities, other neighboring utilities which will have an undivided joint interest in the project. So all of this power will not go to Edison Co. I would say just about half of it.

Representative PRICE. What is the general location of Four Corners?

Mr. DAVENPORT. Four Corners applies to the point where the four States, Colorado, Arizona, Utah, and New Mexico meet.

Representative PRICE. In that four-State area?

Mr. DAVENPORT. In those four States there is considerable oil and gas developed in that area and there are coal deposits that can be developed through strip mining. That will be the way that we will obtain coal for these plants, by strip mining, taking off the over burden there, approximately 50 feet and then getting to this coal.

Chairman HOLIFIELD. These are pretty much desert, mountainous areas where the population is very sparse?

Mr. DAVENPORT. Very, very sparse.

Representative PRICE. So that we have a situation here where we are going to have a nuclear power plant for the first time, you are also going to coal plants for the first time?

Mr. DAVENPORT. Exactly. So, in all probability these two coal-fired plants will be built and will be in operation prior to the development and operation of the second San Onofre unit. We again want to get some operating experience with the San Onofre unit No. 1 before developing the No. 2 unit.

As you may recall, sir, we have site availability for four operating units there at San Onofre. So it is capable of much greater development.

SAN ONOFRE NUCLEAR POWERPLANT

Representative PRICE. That is all I have, Mr. Chairman.

Chairman HOLIFIELD. I want to say that Mr. Price and Mr. Hosmer were both very helpful in helping you get the San Onofre site.

Mr. DAVENPORT. I wish to thank all of you gentlemen for your help. If it had not been for this committee I am sure this plant would not be under construction today. I wish to express my sincerest appreciation to all of you.

Representative PRICE. I did not really realize we had moved along this fast. I had forgotten that we already had the construction permit, that you were under construction and you were looking forward to reasonably early operation.

Mr. NEDRY. Mr. Price, I will be glad to furnish to you some current photos that will give you an indication of the status of construction, the site location and so forth.

Representative PRICE. Time has moved so quickly that I had sort of forgotten that you were at this point.

Mr. DAVENPORT. When there is demand for power, we work awfully fast out there in California, as Mr. Holifield knows, in developing our plants once we get the site and the go-ahead.

Representative PRICE. That is all.

Chairman HOLIFIELD. Mr. Hosmer.

Representative HOSMER. I think I ought to add that the principal credit for the San Onofre operation, being the first time that Marine territory has been taken in the history of the corps, is due to our fearless leader, Chairman Holifield. We have not yet received our purple hearts for that operation.

Chairman HOLIFIELD. In honesty to Congressman Price I want to say that the actual legislation had to go through the Armed Services Committe and Mr. Price is on the subcommittee which reported it. So I am not going to take away any credit from Mr. Price on this.

We had wonderful cooperation from Chairman Vinson on that committee and the other members, all the members of the Armed Services

Committee. It took that to get this particular site because of the Marine Corps; you know what they have they hold.

This is one instance in which we had the cooperation all the way up and down the line including, I might say, the Commandant of the Marine Corps, and the President of the United States also had a little help to give us on this matter.

So there is enough credit to go around, I think, for everybody.

Mr. DAVENPORT. We thank you all.

Chairman HOLIFIELD. I will let Mr. Hosmer speak for himself but we are very proud of the progress you have made on this San Onofre plant. I was by there a few months ago on the highway. As you know I attended the dedication of it and have seen some of the recent pictures of it. It is going along very fast. We certainly want to say that we are pleased with the cooperation that you folks have given us on this plant.

It will be the first big plant in California and we are looking forward to its being the first economic plant in existence, economically competitive plant. We believe it will be—hope it will be, at least.

Mr. DAVENPORT. Yes; right.

Chairman HOLIFIELD. Mr. Hosmer.

COOLING WATER REQUIREMENTS

Representative HOSMER. Mr. Gould, do you have some kind of rule of thumb as to the number of acre-feet of water required for so many installed kilowatts of generating capacity?

Mr. GOULD. Yes, we have. For 1,500 megawatts it takes about 30,000 acre-feet of water. That means that for 1,000 megawatts it takes about 20,000 acre-feet of water.

Representative HOSMER. For the 3 million kilowatts, 60,000 acre-feet?

Mr. GOULD. Yes, 60,000 acre-feet for 3 million.

SUBSIDY

Representative HOSMER. Now these areas that you mentioned, where you are going to put these plants, are involved in large-scale Federal reclamation projects?

Mr. GOULD. This is correct.

Representative HOSMER. And a fair share of the cost of those projects is not reimbursable to the Government. Have you heard of any accusations by the petroleum industry or the gas industry of Government subsidy to the coal industry because you are going to get your water partially through the benefit of the reclamation project? Yes or no?

Mr. GOULD. No.

Representative HOSMER. You have on your system some hydro power at Hoover. You have a contract that you pay back all the costs to the Government involved with specific features of the project that have to do with generation of power. But those features would not be available except for the total project in which again we get into the area where there is a large amount of nonreimbursable Federal expenditure.

Have you heard, yes or no, any accusations by the coal industry that there is a Government subsidy here on behalf of hydro power?

Mr. GOULD. Yes.

Representative HOSMER. In other words, they are getting sensitive when it has to do with coal but not so sensitive when it has to do with petroleum? Well, I think that establishes something.

Chairman HOLIFIELD. Are there any further questions?

Representative HOSMER. No further questions.

Chairman HOLIFIELD. Thank you, gentlemen. Your testimony has been particularly valuable in view of the fact that you are operating in the field of power generation, hydroelectric, gas, oil, and nuclear—five different sources.

I don't believe that there has been any other utility before us that can make that wide claim of source for power generation.

Mr. DAVENPORT. Thank you, Mr. Chairman. I might also add we have a small diesel plant on Catalina Island.

Chairman HOLIFIELD. And also a small desalting plant, I understand?

Mr. DAVENPORT. That is right. We are now supplying a portion of the water for domestic use from our desalting plant which we had initially installed at one of our steam stations up near Oxnard. Now we have taken it over to Catalina because of the shortage of natural rainfall this year.

Chairman HOLIFIELD. What is that water going to cost you, by the way—per thousand gallons?

Mr. DAVENPORT. It all depends on how you figure the fixed charges on the plant. If it is written off, why it is quite a nominal figure. It is not too high.

Chairman HOLIFIELD. Give us a general cost. Is it a dollar a thousand gallons, 80 cents?

Mr. DAVENPORT. It is more than that I am sorry to say. It is a small plant. It produces just a hundred thousand gallons a day. Until you get up in scale you just can't bring this water down to 30, 40, 50 cents as they are talking about on this proposed project of the Metropolitan Water District.

Chairman HOLIFIELD. You folks are not participating in that Metropolitan water desalting, are you?

Mr. DAVENPORT. Yes, as far as the power supply is concerned. The city of Los Angeles and ourselves are jointly proposing to furnish the heat for the desalting.

Chairman HOLIFIELD. But you are not putting any money in the desalting plant, itself?

Mr. DAVENPORT. No, sir.

Chairman HOLIFIELD. But the Los Angeles Water Department is putting up some money in the desalting modules, aren't they?

Mr. DAVENPORT. Just the Metropolitan Water District.

Chairman HOLIFIELD. Just the Metropolitan Water District?

Mr. DAVENPORT. Yes, together with the Office of Saline Water, Department of the Interior, and they are jointly working out a development contract right now, which I am sure you have heard about.

Chairman HOLIFIELD. Yes, thank you very much, gentlemen.

Our final witness for the morning will be Mr. R. G. Rincliffe, chairman of the board, Philadelphia Electric Co.

Mr. RINCLIFFE. Good morning, Mr. Chairman.

Chairman HOLIFIELD. You may proceed with your statement.

STATEMENT OF R. G. RINCLIFFE, CHAIRMAN OF THE BOARD, PHILADELPHIA ELECTRIC CO., PHILADELPHIA, PA.

Mr. RINCLIFFE. My name is R. G. Rincliffe, and I am chairman of the board of Philadelphia Electric Co., a utility serving nearly 4 million people in a 2,300-square-mile area in southeastern Pennsylvania and northern Maryland.

As early as 1952 Philadelphia Electric Co. became an active participant in the development of nuclear power through its participation in the project which brought about the construction and operation of the Enrico Fermi plant.

Our company contributed substantially in both manpower and funds to this project. More recently, our production and participation in the nuclear field has been in the development, design, and construction of the Peach Bottom atomic power station in association with the Atomic Energy Commission and 52 other utilities. This plant is scheduled to go critical this fall.

Philadelphia Electric Co. is vitally interested in the continuance of the insurance and indemnity program established by the Price-Anderson Act of 1957, both as the owner and operator of the Peach Bottom plant and as an electric utility company whose future plans contemplate further commercial use of nuclear power.

Our current projections for the next 15-year period indicate that about half the capacity to be installed on the Pennsylvania-New Jersey-Maryland interconnection is expected to be nuclear.

There can be no question that much of the progress and accomplishments in the nuclear energy field over the past decade would not have taken place without the financial protection provisions of the Price-Anderson Act.

This act resolved the problem of financial protection in connection with operation of reactors which had been a major deterrent to private participation in the development of commercial uses of nuclear energy. Its provisions did much to establish public acceptance of nuclear energy as a useful source of power and to give corporate managements the necessary confidence to invest their assets in nuclear development.

Although the cumulative experiences of the past 10 years fully justifies the confidence in the safety of nuclear reactors I believe the Price-Anderson system of financial protection should be continued. The extension of the act's indemnity provisions to facilities whose construction is licensed after August 1, 1967, will indicate continued Government confidence in the safety of nuclear plants and in the adequacy of regulatory programs aimed at insuring safety. It will also aid in the continued expansion by the electric utilities of the development and use of nuclear power to the benefit of their ratepayers and investors and to the civilian power program.

I therefore urge that the present system of financial protection provided by the Price-Anderson Act be continued in its present form.

And I don't mean exactly in its present form, as previously stated but substantially in its present form, with whatever corrections would be made in order to make it more acceptable with the present coverage substantially in the same form and level for at least another 10 years beyond the present termination date.

I would like to add a comment concerning the question as to whether the private insurance industry should assume an increasing portion of the responsibility for providing nuclear liability protection with a corresponding reduction in the Government's responsibility.

INCREASED PRIVATE INSURANCE CAPACITY

Assuming that the insurance industry is willing and able to provide some increased indemnity at this time at, of course, rates commensurate with both industry's present technical knowledge and exemplary safety record, I support the view that the private insurance market assume a larger share of the risk.

SUBSIDY

The Price-Anderson program has been called a subsidy to assist the growth of an industry and the electric utilities have been referred to as one of the principal beneficiaries of this subsidy. As an electric utility company, we most sincerely do not feel that we are the beneficiaries of any special subsidy as our contribution to the present system of public protection in premium costs is by no means modest when compared to the insurance costs to which we have become accustomed for public protection against accidents arising out of our so-called conventional operations.

Our nuclear liability insurance policies, premiums for which are our obligation and responsibility, extend to provide financial protection to all our suppliers, manufacturers, and contractors.

This feature, unique to nuclear liability insurance, is not found in any other commercial form of insurance.

Chairman HOLIFIELD. This is a joint effort on the part of industry, the insurance companies, the manufacturers, utilities, and the Government to bring forward a new source of energy to the American people.

Mr. RINCLIFFE. That is right, sir.

COMPARATIVE INSURANCE COSTS FOR NUCLEAR AND CONVENTIONAL POWERPLANTS

Chairman HOLIFIELD. If it be termed a subsidy by a narrow interpretation it might be said that it is a potential subsidy in the event that the liability obligation of the Government should be called upon, but certainly from the standpoint of the utilities paying a higher rate of insurance than you do on your conventional plants—and you are in a position where you can say that you are certainly paying your way on this.

Mr. RINCLIFFE. We certainly are. I can give you a little statistics on that.

Chairman HOLIFIELD. We would like to have that because we want to put the facts on the record here to show that this is a mutual endeavor on the part of all of the entities that I named in order to bring benefits to the American people.

Mr. RINCLIFFE. We are estimating our insurance on Peach Bottom will be $221,000 a year. And that our existing——

Chairman HOLIFIELD. That is what size plant?

Mr. RINCLIFFE. That is 40,000 kilowatts.

Chairman HOLIFIELD. 40,000 electrical.

Mr. RINCLIFFE. Based on a pro rata of what 40,000 kilowatts would cost on our system we have estimated our insurance cost to be $18,000 on an equivalent conventional plant. So the ratio there is about 12 to 1.

Representative PRICE. That $221,000 is the insurance premium. You also have a fee for the indemnification.

Mr. RINCLIFFE. That includes the indemnification feature. That is the total cost.

Chairman HOLIFIELD. This is a valuable figure for us to have. Thus it shows, as I said, that the utilities are doing their part.

Mr. RINCLIFFE. We are doing our part.

Chairman HOLIFIELD. Well, you are going beyond the conventional cost of insurance by a factor of 12 to 1 as you say to get this new source of energy off the ground.

Mr. RINCLIFFE. Yes, sir.

Chairman HOLIFIELD. Go right ahead.

Mr. RINCLIFFE. We say this not in criticism of the coverage which the private insurance industry has provided but to illustrate that the electric utility companies have and are assuming a by no means inconsiderable share of the cost to provide public protection.

The insurance industry is to be praised for providing what was of utmost necessity at a time when it was vital.

My statement that I support the view that the private insurance market should assume if they are able to do so at equitable premiums, a larger share of the nuclear liability risk, should indicate that I do not regard the Price-Anderson program as any kind of a subsidy for the benefit of a limited segment of industry. I look upon it, for at least the next decade, as primarily a means to bolster public confidence in the normal development of the many potential uses of nuclear energy, as an incentive to encourage American industry to participate more actively in the nuclear program, and as a means to motivate further research and development in the nuclear field.

Chairman HOLIFIELD. Thank you; Mr. Price.

ELIMINATION OF LIMITATION OF LIABILITY

Representative PRICE. Mr. Rincliffe, do you believe that if the limitation of liability feature of the Price-Anderson Act were removed utility companies might be more prone to purchase light water-type reactors than reactors with which there is less operating experience, such as a high-temperature, gas-cooled reactor?

Mr. RINCLIFFE. I certainly do. I feel that not only in the gas-cooled reactor but in the breeder-type reactor there is still much research and development work to be done on both those types of reactors and I feel that this type of insurance is necessary not only for the ease of mind of our directors who have to approve moneys to be used for this research and development but also to the public.

If the public feels that the Government is in there for a $500 million overlay or reduced by an amount that you might increase the private insurance, that that is a psychological assurance that the Government feels that everything is being done to insure safety to the public.

ACCIDENTS IN CONVENTIONAL POWERPLANTS

Representative PRICE. We have already made some reference previously in the hearing to the remarkable safety record that has been the history of the nuclear power reactor development program. I think that everyone who has followed the program will agree that it has had this remarkable record. Sometimes as we talk about the possible hazard of the nuclear reactor we forget the fact that we also have accidents in conventional powerplants.

You don't hear much about these because they are not major and are not catastrophic. But is it not a fact that you have frequent accidents, boiler accidents, boiler explosions, in the conventional plant?

Mr. RINCLIFFE. Yes; unfortunately we do.

Representative PRICE. How frequently would you say they occur? We have had testimony in some of our backup material, and from people we have talked to, which indicates that it is a pretty normal situation for a conventional plant to have boiler explosions.

Mr. RINCLIFFE. We really don't call them explosions any more. We call them a loss of a tube, fortunately, that is usually contained in the boiler itself. Today the boilers are of such size and there is enough space in the combustion area so that it will accommodate usually the large volume of steam that might be released in the case of loss of a boiler tube.

It has been some time since we have had anyone hurt, fortunately, in such an explosion or loss of a boiler tube but I can assure you that the loss of a tube happens only too frequently.

Representative PRICE. You have, in your statement, praise for the insurance industry for the protection that they have provided in this program. I want to join you in that praise because I remember the problems at the outset of this program in working out some kind of indemnification program and securing protection through the private insurance companies.

I recall how the experts of the major companies throughout the country cooperated with us and worked long hours trying to devise a program that would make it possible to get the power reactor development program off its feet and now into actual operation.

We know that without them we probably would not have had any power development program. I also want to compliment the private insurance companies for the work that they did in setting up this program and the long hours they worked with the committee staff here and with members of the committee in devising a system that has been workable.

That is all I have, Mr. Chairman.

Chairman HOLIFIELD. Mr. Hosmer.

SUBSIDY

Representative HOSMER. Mr. Rincliffe, you have lived in Pennsylvania for a long time, have you not?

Mr. RINCLIFFE. Yes, sir; I have.

Representative HOSMER. It is a large coal-producing State?

Mr. RINCLIFFE. Yes, sir.

Representative HOSMER. Your system uses a considerable amount of coal as fuel?

Mr. RINCLIFFE. Yes, sir.

Representative HOSMER. Have you every heard anybody in the coal industry complain, based on your expert knowledge now, about the reclamation projects being in effect a subsidy which benefits them through their ability to sell coal as fuel out in the West where there is cooling water available? "Yes," or "No"?

Mr. RINCLIFFE. No, sir.

Representative HOSMER. Then we have completed that circle. I just wanted to get it from an expert. Thank you. They can complain about hydropower in reclamation that it is a subsidy but when it helps coal they don't complain.

Thank you.

Chairman HOLIFIELD. Mr. Bates?

Representative BATES. No questions.

Chairman HOLIFIELD. Mr. Anderson?

Representative ANDERSON. No questions.

COMPARATIVE INSURANCE COSTS FOR NUCLEAR AND CONVENTIONAL POWERPLANTS

Mr. RINCLIFFE. I may add one more figure, Mr. Chairman. I am sort of violating the old principle that when you have made a sale you ought to quit. In connection with the cost of insurance in 1964 for all our forms of property and liability insurance the total premium was $772,000.

This covered the company with a generating capacity of over 3,300,000 kilowatts and with gas operation serving 245,000 customers. As I mentioned, Peach Bottom when it attains full operation, will have a capacity of 40,000 kilowatts. The liability premium for this plant we have estimated to be $221,000 at our present rates.

Chairman HOLIFIELD. Now that is without the projected refund.

Mr. RINCLIFFE. That is without the projected refund.

Chairman HOLIFIELD. Have you been notified, and, if so, how much refund are you expecting?

Mr. RINCLIFFE. We have not been paying this long enough. I don't believe we can expect a refund until after a 10-year period.

Chairman HOLIFIELD. It would have to be after a 10-year period.

Mr. RINCLIFFE. Yes.

Mr. CONWAY. That $221,000 is only for liability insurance. In addition presumably you would cover property damage.

Mr. RINCLIFFE. This covers property and liability which represents a one-third increase in our present insurance cost. I wanted to put that in for the overall picture.

Chairman HOLIFIELD. One-third increase for 40,000 kilowatts capacity as against two-thirds for 3 million?

Mr. RINCLIFFE. For 3 million; yes.

Chairman HOLIFIELD. So it is far more than a third relatively speaking?

Mr. RINCLIFFE. Yes.

Chairman HOLIFIELD. For the kilowatt measure of power?

Mr. RINCLIFFE. Oh, yes.

Chairman HOLIFIELD. Those are very interesting figures.

They are good to have in the record, Mr. Rincliffe.

Thank you for your testimony.

Mr. RINCLFFE. I would also like to say we are also a five-fuel utility.

Chairman HOLIFIELD. What?

Mr. RINCLIFFE. We are a five sources of energy utility—water, gas, oil, coal, and nuclear power at Peach Bottom.

Chairman HOLIFIELD. Well, we are glad to add you to the list.

Mr. RINCLIFFE. Thank you.

Chairman HOLIFIELD. The meeting stands adjourned until 2 o'clock.

(Additional correspondence on Mr. Rincliffe's testimony follows:)

PHILADELPHIA ELECTRIC CO.,
Philadelphia, Pa., August 13, 1965.

Hon. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
U.S. Capitol, Washington, D.C.

DEAR CHAIRMAN HOLIFIELD: In my testimony on the extension of Price-Anderson legislation before the Joint Committee on Atomic Energy on June 23, 1965, I stated (transcript, p. 153) that the estimated total cost of insurance and the AEC indemnity fee for the Peach Bottom Atomic Power Station was $221,000 per year.

Later in my testimony (transcript, p. 159), in response to a question from Mr. Conway, I indicated that the $221,000 estimate included property insurance.

To avoid any misunderstanding on this point I wish to make it clear for the record that the estimate of $221,000 per year covers the cost, for the Peach Bottom Atomic Power Station, of (1) liability insurance (NELIA and MAELU), (2) property insurance (NEPIA and MAERP), and (3) the indemnity fee to the AEC.

Sincerely yours,

R. G. RINCLIFFE.

AFTERNOON SESSION

(The subcommittee reconvened at 2 p.m., Hon. Chet Holifield presiding.)

Chairman HOLIFIELD. The committee will be in order. The Subcommittee on Legislation resumes its hearings on the Price-Anderson extension this afternoon to hear testimony from atomic equipment manufacturers.

Our first witness will be Mr. Weaver of the Westinghouse Electric Corp. Mr. Weaver.

STATEMENT OF CHARLES H. WEAVER, VICE PRESIDENT, WESTINGHOUSE ELECTRIC CORP.; ACCOMPANIED BY A. M. PITCHER, ASSISTANT GENERAL COUNSEL FOR WESTINGHOUSE

Mr. WEAVER. Good afternoon, Mr. Chairman. I have asked with your permission, Mr. A. M. Pitcher, who is assistant general counsel for Westinghouse, to sit with me. He has followed the indemnity problems of atomic power development for the past 10 years or so.

The question is whether the Price-Anderson type of nuclear indemnity protection should be extended beyond 1967. This is a well-timed question, and Westinghouse appreciates the opportunity of commenting to the Subcommittee on Legislation of the Joint Committee on Atomic Energy.

I say the question is well timed because the original Price-Anderson amendment to the Atomic Energy Act was necessary for the growth of an infant nuclear power industry.

Today, 8 years later, that industry is far beyond infancy. In size, in proven safe accomplishment, and in height of confidence for a vital and safe future, the industry is growing up. That this can be said, after only 8 years, is a tribute to those in the Congress who made possible the original Price-Anderson amendment. But with the industry in a healthy condition today, why should Price-Anderson be extended?

Although Westinghouse does recommend to you the extension, I think we should divorce this question from the doubts and concern of yesterday's infancy. Let's highlight present circumstances, with the industry proving itself and building a record of public safety.

The difference between today and yesterday deserves to be called marvelous, even in an age of marvels. My personal memory goes back to development of the first atomic submarine *Nautilus*, cornerstone of so much later progress in commercial as well as military applications of nuclear power. Believe me, the development days of the *Nautilus* were not long ago, a little more than a decade.

Getting just one ship underway on nuclear power was all the task our minds could handle. The thought of 50 ships and more underway on nuclear power by 1965, with the nuclear plants operating reliably and safely, would have overwhelmed us beyond anyone's ability now to reconstruct.

My own memory also goes back a shorter time to the first atomic central station plant at Shippingport. Do you recall that we designed Shippingport for an initial 60 megawatts of electric power?

This is about one-third the power rating of commercial nuclear plants since designed, built and successfully operated. It is about one-eighth the power rating of commercial nuclear plants now in process of design and construction. It is something like one-twentieth the power rating of commercial nuclear plants which today Westinghouse, as one example, offers at home and abroad, at a firm price and firm schedule, with output guaranteed.

Take the case of Westinghouse alone. The reliability and simplicity of our pressurized water reactors for utilities are featured in five operating plants, which have produced more than 7 billion kilowatt-hours of electrical power. This kind of performance has led to new Westinghouse commercial projects with a combined power rating of some 2,000 megawatts—the equivalent in capacity of 30 plants the size of the initial Shippingport station.

The dependability of Westinghouse commercial atomic fuels is suggested by the fact that not one of our fuel elements has ever had to be replaced due to failure in operation. To say that technical progress exceeds expectations at the time of the original Price-Anderson debate, as illustrated by just one company, Westinghouse, is certainly an understatement.

With more than 50 atomic ships at sea, with commercial atomic plants helping to meet energy demands at home and abroad, and with applications of atomic power for space fast being developed, we

might suppose that by now the safety record of the American atomic power industry would include some incident, however minor, damaging individuals outside the industry.

SAFETY OF NUCLEAR POWER REACTORS

People outside the industry, or third parties, are the ones whom the existing Price-Anderson amendment especially aims to help. They are the people assured financial recourse in case of damage. To the best of my knowledge, however, no third party has ever been hurt by the operation of an American nuclear power reactor, military or commercial.

People inside the industry, those who build and use atomic power—or the first and second parties, as lawyers might call them—have benefited from a safety performance which is statistically magnificent. In terms of the number and nature of accidents per man-years worked, atomic power ranks among the safest of all American industries.

I make these points about demonstrated safety not in any spirit of complacency. The atomic power industry, the Atomic Energy Commission, the Commission's Advisory Committee on Reactor Safeguards, the Congressional Joint Committee on Atomic Energy—all have been safety conscious and safety cautious to an extreme degree. All have worked hard for the safety record to date; and we must never let up a moment in the struggle to keep that record as proud as it stands right now.

Atomic powerplants are safe to propel ships inside the harbor of a great city; and they are safe to generate electricity in the midst of the same great city. Whether ship based or land based, atomic power is a good neighbor. From a safety viewpoint, I would be entirely happy to live, with my family, right next door to an atomic-electric power station.

WILLINGNESS OF INDUSTRY TO PROCEED WITHOUT INDEMNITY

If you asked me whether Westinghouse would continue offering nuclear powerplants to commercial and military customers, assuming Price-Anderson type protection were not extended, I would respond that the answer cannot be mine alone nor that of my company alone.

Would our key suppliers and subsuppliers continue to sell us? Would utility customers continue to buy? And would the public accept nuclear plants without Price-Anderson assurances? I cannot say what the answers would be if Price-Anderson were allowed to expire.

The confidence level has simply not move upward, in all cases, as fast as warranted by the accomplishments and performance of the atomic power industry. On the other hand, perhaps it is too much to expect that this confidence level will increase significantly until we have at least another 10 years of experience with the actual operation of the large reactor plants now being built. Thus, we recommend that 10 years be the period of Price-Anderson extension.

There is no inconsistency between saying, on the one hand, that atomic powerplants are safe for location in large cities and that, on the other hand, Price-Anderson protection should be extended. There is only recognition that some men continue to feel concern. If Price-Anderson were not extended, we might well encounter the argument in reverse; namely, that we cannot locate atomic powerplants in large cities because there is no Price-Anderson protection.

Another illustration of the human capacity for concern is seen in my own company's insurance program covering ordinary, everyday liability risks. Our Westinghouse liability coverage is $50 million. Yet we have never been found liable in a personal injury case, nor have we ever settled a personal injury claim, for more than $250,000. Why does Westinghouse carry insurance so far beyond any need found in our experience? I can only reply that we would rather be over-insured than underinsured.

Eight years ago, the Joint Committee made a formal finding that the problem of possible liability in connection with the operation of power reactors was a deterrent to industrial participation. Today and for the decade ahead, I believe you would be justified in finding that, absent Price-Anderson extension, there would still be a deterrent.

The study group of the Atomic Industrial Forum reached this same conclusion. Westinghouse took part in the study group and warmly endorses its report.

Mr. Chairman, at this time if that report of the Atomic Industrial Forum has not been introduced formally into the record, I would like to do so. (See app. 6, p. 263.)

Chairman HOLIFIELD. The staff informs me that it has not been introduced, but we will accept it for the committee's disposition.

INDEMNIFICATION OF GOVERNMENT CONTRACTORS

Mr. WEAVER. Thank you.

Here let me emphasize the importance of Price-Anderson extension to the future of Government power reactors and space applications. Developments must go forward for the military defense of our country and the conquest of space that may entail risks greater than could ever be considered commercially. Price-Anderson provides the mechanism for protecting tiers of contractors and subcontractors who might otherwise seriously hesitate to contribute in these essential areas.

Because of the sheer complexity of the entire subject, Westinghouse would recommend that you give priority to extending the present law. From our viewpoint, no other change is urgent today.

To be sure, if the private insurance companies are ready to offer more coverage at reasonable rates, we certainly see no reason why the present Government indemnity amount of $500 million should not be reduced correspondingly. But I hope this will not interfere with the simple overriding need, which is to add a decade of life to the law we have on the books now and thus enable the builders and users of atomic powerplants to formulate their plans.

From our review, therefore, Senate bill 2042 introduced by Senator Anderson and House bill 8496 introduced by Representative Price meet the need and should be approved by the Congress.

Remembering the long leadtime before plans for atomic powerplants ripen into firm decisions, the present year is by no means too soon for Congress to clear the air of uncertainty.

Thank you, Mr. Chairman.

Chairman HOLIFIELD. Thank you, Mr. Weaver.

Mr. Hosmer?

Representative HOSMER. Mr. Weaver, this portion of your testimony relating to the possible risks to people in the military and defense industry is interesting to me. It has not been brought up before in the hearings. How would that work? If we put something into

orbit possibly, a nuclear power source, and something went wrong with it, the person contracting with the Government to produce that unit might be held liable for any damage?

Mr. WEAVER. Yes, or what is perhaps even more important, the problem connected with subcontractors and subsuppliers where, without Price-Anderson which permits us to pass this protection on to them, they would not have this protection. We did not have this protection in the case of the military program in the early days of development.

Representative HOSMER. What happened then? Did anybody get uneasy about it?

Mr. WEAVER. Extremely so. I can only say before we encountered any volume of equipment or number of plants, the problem was solved, but a lot of people were simply operating in faith that this question would be answered adequately before they got into production.

Representative HOSMER. They were willing to run a short-term risk, a few months or a year or two, but your judgment is at the present time they would not want to run an indefinite risk in time or amount either?

Mr. WEAVER. I do not feel so, no.

Representative HOSMER. What about your own company? Do you have any contracts with the Government for nuclear devices that this kind of protection would afford you some satisfaction?

Mr. WEAVER. Yes, very definitely. It still relates to the naval program and it certainly relates to the Nerva nuclear rocket engine development program, as two examples.

Representative HOSMER. I suppose if we let this act expire, your board of directors would have to make a pretty hard decision about whether to keep on in this field, would it not, or would you go on anyway?

Mr. WEAVER. We would have this problem wherein we are subcontractors. I would have to ask for some legal advice here as to whether or not we stop short in case of contracts to which it had already been applied. I think we must specifically apply it to a given contract, is that right?

Mr. PITCHER. Yes, Mr. Hosmer. I think as long as the contract has been entered into prior to 1967, it would still apply to coverage until the expiration of our work.

Representative HOSMER. We are talking about a possible expiration in 1967, and then I would not conceive of your division of the company not posting the board of directors on the problem.

Mr. WEAVER. I think the question here, which I want to be sure is answered properly, is whether or not the contract exists and Price-Anderson has already been applied to the contract and whether it would stay in effect even if Price-Anderson as an act expired.

Mr. PITCHER. I think it would as far as existing pre-1967 contracts.

Mr. WEAVER. We are talking of new contracts as we enter into them and which we will be doing regularly in the areas I have discussed.

Representative HOSMER. Now as a prudent vice president of Westinghouse Electric Corp., assuming that Price-Anderson were not extended and you had contracts that you were about to enter into that would not benefit by such protection, what would you do in relation to your superiors in the company, if anything, before committing the company?

Mr. WEAVER. Where we had this type of liability facing us, we would have to seriously consider whether we could afford to continue such contracting. I question that we would.

Representative HOSMER. Of course you could not contemplate what the decision would be, but certainly the company would have to go into that very deeply.

Mr. WEAVER. I think we come back in the case of these applications, other than commercial atomic powerplants, to the fact that the same problem of its being a deterrent to us and to our suppliers would exist.

Representative HOSMER. Now you are familiar with a number of other companies that are in the field in a similar position. Do you think that they, too, would see the caution flag run up and start to scramble the same way you might do under the circumstances?

Mr. WEAVER. I suppose the only answer I can give to that would have to be based on both discussions that have taken place in the Forum study group with other companies as well as our own experience with subcontractors and suppliers when the protection was not available and the problems they felt at that time.

Representative HOSMER. And they would share the same concern as you?

Mr. WEAVER. The same concern.

Representative HOSMER. Now, the Forum that you keep mentioning, is that the Atomic Industrial Forum?

Mr. WEAVER. Yes, the Atomic Industrial Forum.

Representative HOSMER. And that is an organization composed of people in this business?

Mr. WEAVER. Both suppliers and users of nuclear equipment.

Representative HOSMER. You have a title in that organization, do you not?

Mr. WEAVER. I am a past president of the Atomic Industrial Forum, and currently a director and member of the executive committee.

Representative HOSMER. So you are familiar with that from a broad standpoint as well as your company standpoint?

Mr. WEAVER. Quite so, yes.

Representative HOSMER. Thank you.

EFFECT OF DELAY IN EXTENDING INDEMNITY LEGISLATION

Chairman HOLIFIELD. In your opinion, what would be the effect of the delay until next year in acting on the proposed Price-Anderson extension?

Mr. WEAVER. Mr. Chairman, I think the problem there is simply the longer you delay the more difficult it is for people to formulate their plans with any degree of finality. Particularly in the commercial area, the electric utility industry is certainly actively considering what they are to do. I would feel that they would question the desire to continue the development of atomic power to the extent we have indicated is our wish to date if we were not to act on this promptly, once having brought it to the table the way we have.

Chairman HOLIFIELD. The committee is moving in ample time to pass this extension, whether it is passed this session of Congress or next year. We are not, at this time, making any statement as to when it can be brought to the floor for consideration. It will have to take its schedule along with other legislation but certainly the intent of the committee is to proceed in an expeditious manner on this.

Mr. WEAVER. I hasten to say that the committee is to be complimented for considering it 2 years in advance of expiration. This is very timely.

ELIMINATION OF LIMITATION OF LIABILITY

Chairman HOLIFIELD. What do you think of the National Coal Association's proposel to eliminate the limitation of liability and indemnity features of Price-Anderson?

Mr. WEAVER. Well, a limitation of liability is a very difficult one. I remember discussing this with the committee back in 1956 and 1957. The simplest answer I can give is that a liability of unknown amount resting with industry, over $560 million, would be just as much of a deterrent as if we didn't have any Price-Anderson coverage. The deterrent, because of the unknown liability, still would exist.

Mr. CONWAY. Mr. Weaver, I do not think you want to make it appear, however, that it is as bad as not having Price-Anderson because if you are going to have any accidents or incidents, the chances are that it is going to be a minor accident and be limited within the $60 million and the $500 million.

Mr. WEAVER. As I said, it is a difficult question to answer. The fact that there would be a theoretical void created above $560 million would, I feel, still be a deterrent to industry.

Mr. CONWAY. But if we ever have an accident that is going to run $560 million or greater than that, that basically would be classified as a national catastrophe.

Mr. WEAVER. Well, and as I understood it, this is what the committee intended when the original Price-Anderson legislation was passed. That is, that we look at such a catastrophe in the light of the circumstances that prevail at the time and determine what we should do in the public interest.

Mr. CONWAY. Something of that magnitude would normally attract the attention of the legislative and the executive branch of the Government.

Mr. WEAVER. Yes.

RELIABILITY OF NUCLEAR POWERPLANTS

Chairman HOLIFIELD. How many reactors has Westinghouse made? I suppose we would include in that the reactors that have been made for submarines and surface ships as well as central station plants.

Mr. WEAVER. The operating submarines now number over 50. In terms of commercial plants, Westinghouse has provided six plants, which are currently operating, with a total generating capacity, gross, of 600 megawatts. I referred to approximately 2,000 additional megawatts in plants under construction or committed. These are made up of six plants totaling 2,050 megawatts, gross. They include the San Onofre plant, the Malibu plant, Connecticut Yankee, and plants in Spain, Pakistan, and France.

Chairman HOLIFIELD. I think we can say that your company has produced, particularly because of its military contracts, far more reactors than any other plant in the world.

Mr. WEAVER. I am sure this is the case.

Chairman HOLIFIELD. With this experience behind you and advanced technology over the past 10 years, how do you appraise the degree of progress in the field of design and engineering safeguards? Has there been considerable progress over, for instance, the first *Nautilus* reactor which was constructed in 1955?

Mr. WEAVER. There has been tremendous progress in the engineering of plants and I think in our appreciation of the ability to engineer safeguards in the plants, to take into account the specific location of the plant, the environment in which it was going to operate, and treat it and apply to that design, that particular design, what is needed to assure that it is a safe plant.

There have been many developments both from the viewpoint of equipment design and the design of the containment for such reactor plants.

Chairman HOLIFIELD. And the quality of the materials used.

Mr. WEAVER. That is right.

Chairman HOLIFIELD. You have moved along a number of lines increasing the quality of materials used in cladding?

Mr. WEAVER. Both the materials in the fuel for the reactors as well as the materials utilized in either the primary or secondary containment of the reactor.

Chairman HOLIFIELD. How about the integrity of the action of the control rods and that sort of thing? Have there been improvements along that line?

Mr. WEAVER. Insofar as control rods specifically are concerned, I know of no problems and there you would be more concerned if the rod did not operate properly. We have had no problems of that nature.

Insofar as fuel is concerned, I mentioned in my statement we have never had a fuel rod failure.

Chairman HOLIFIELD. Can you give us how many thousands of fuel elements you have manufactured?

How many fuel elements are in the Shippingport plant, for instance?

Mr. WEAVER. If we break it down into the number of rods—I am going to have to give you that statement for the record. I would hesitate to guess right now. It is well in the thousands for Shippingport alone.

Chairman HOLIFIELD. I am sure it would run into thousands, because most of these fuel elements are only about 4 or 5 or 6 inches long, aren't they?

Mr. WEAVER. I would consider an element a full-length, clad plate or a rod, with the fuel that was contained therein.

(Mr. Weaver subsequently submitted the following statement for the record:)

The number of fuel elements manufactured by Westinghouse which have operated or are operating in commercial power reactors alone now totals over 214,000. The length of these fuel elements ranges from about 10 inches to 10 feet.

Chairman HOLIFIELD. This is a quite important statement I think. I think it would be helpful to the record to have a considered estimate as to how many fuel elements have been perfected and then to say that none of them has failed, and of course this is the key to the

safety of the plant, is it not? The failures of fuel elements could very well cause trouble.

Mr. WEAVER. It certainly is an important factor.

Chairman HOLIFIELD. It is an important factor, not the only factor, of course.

How do you feel about the suggestion that is sometimes made that more companies, including manufacturers and suppliers, subcontractors, could purchase liability insurance rather than the utilities purchasing it all?

Mr. WEAVER. I wanted to compare notes with Mr. Pitcher, but I don't think we have ever heard the proposal before, Mr. Chairman.

Chairman HOLIFIELD. It has been made.

Mr. WEAVER. It is quite unconventional insofar as normal operation of equipment that we would produce is concerned, sir.

Chairman HOLIFIELD. In other words, we might give an analogy of requiring General Motors or Ford to carry liability insurance on an automobile just because they made it in their factory?

Mr. WEAVER. Based on some recent experiences I have had, I think that is a fine idea.

Chairman HOLIFIELD. But not when it is applied to Westinghouse?

Mr. WEAVER. Oh, no.

Chairman HOLIFIELD. Thank you, Mr. Weaver, for your testimony.

Mr. WEAVER. Thank you, Mr. Chairman.

Chairman HOLIFIELD. Our next witness is Mr. James F. Young, general manager of the Atomic Energy Division of the General Electric Co.

STATEMENT OF JAMES F. YOUNG, GENERAL ELECTRIC CO., GENERAL MANAGER, ATOMIC PRODUCTS DIVISION; ACCOMPANIED BY WILLIAM F. KENNEDY, COUNSEL, ATOMIC PRODUCTS DIVISION

Mr. YOUNG. Mr. Chairman, I have Mr. Kennedy with me. He is counsel for the Atomic Products Division of General Electric Co.

Chairman HOLIFIELD. You are wise to bring him with you.

Mr. YOUNG. There might be some references as there were in the last testimony.

Chairman HOLIFIELD. You may proceed.

Mr. YOUNG. I am grateful for this opportunity to appear before the Joint Committee and to testify on the need for extension of the Price-Anderson legislation.

Studies made by the Atomic Energy Commission and by the Atomic Industrial Forum both conclude that extension of the Price-Anderson legislation for another 10 years is essential to continued progress in nuclear power. I share this conviction.

In my testimony today, I would like to respond to the key policy questions contained in the Joint Committee's May 27, 1965, announcement of these hearings. I will take them in order, except that I will leave comment on the second question dealing with available private insurance to representatives of the insurance industry and to power-plant owners.

THE NEED FOR EXTENSION

Question 1: Will there still be a need for Price-Anderson-type legislation after August 1967?

The principal reason why the law is still needed is that it is vital both to industry confidence and public acceptance of nuclear power. I want to expand on this point; however, before doing so, I would like to mention a number of other reasons why the law has served the national interest:

(1) The Price-Anderson law applies not only to private commercial ventures in atomic power, but also to a wide range of other activities carried on for the account of the Commission. In some of these other activities, the economic risk is potentially greater than that associated with licensed reactors. Moreover, there is an increasing number of industrial participants in these programs. An extension of Price-Anderson is desirable for the effective conduct of Commission activities that are essential to the national defense and to the exploration of space.

IMPACT OF PRICE-ANDERSON ACT ON FOREIGN RELATIONS

(2) Continued participation by American industry in international atomic ventures promotes the national interest in several ways, including balance of trade and gold flow, and through technical-economic ties. Such participation requires that there be in place treaties and national laws which deal adequately with the liability question. The progress made in this field thus far has depended largely on the precedent of the U.S. law, and on the support given by the Joint Committee, the AEC, and the State Department. Failure to extend Price-Anderson legislation could frustrate these efforts; it would constitute a reversal of the position which both the executive and legislative branches of the Government have taken in dealing with foreign governments; and it would be inconsistent with the interest of the United States in protecting its domestic suppliers.

(3) In the 8 years since passage of the Price-Anderson law, a great deal of experience has been accumulated as to operating and safety characteristics of some reactor types. In the future the Commission and the industry can be expected to explore other types. While the design objective for these newer types will certainly be to make them as safe as the current plants, the difference will be in the degree of experience. It will be highly desirable to continue Price-Anderson coverage for this reason. Moreover, it is impractical to attempt legislative or administrative distinctions between current types and less proved types.

(4) Failure to extend the Price-Anderson law could have an upsetting effect on the present liability insurance structure. One key element of this structure is the coverage in a single policy for the utility operator, the engineer-constructors, and equipment manufacturers, including the many small component suppliers. This "umbrella" feature is a highly desirable arrangement for the public in assuring availability of funds. It also protects the insurance industry against pyramiding of coverage, and in this way enables the insurance industry to provide higher amounts of coverage at lower costs.

(5) There have been a number of efforts in recent years to develop a comprehensive system of protection for Defense Department and NASA activities that involve substantial economic risks. Extension of the Price-Anderson law for AEC contract activities would continue a valuable precedent and a useful model for effective treatment of NASA and DOD applications.

But as I indicated earlier, the principal reason for extension of the law is its importance to public acceptance and to industry confidence.

It is my understanding the Joint Committee recommended enactment of the Price-Anderson law in 1957 on the premise that the law was needed to protect the public and to advance the objective of the 1954 act—to encourage widespread participation in peaceful uses of atomic energy. In the intervening years the safety record in nuclear power has been remarkably good—quite outstanding in comparison with industry generally. There has never been a call on the Government indemnity by the civilian power program. Nevertheless, I believe that the 1957 premise of the Joint Committee still holds good. The law has promoted the growth of the industry. Failure to extend it would delay the benefits of atomic energy.

IMPACT OF NUCLEAR POWER ON COSTS OF CONVENTIONAL POWERPLANTS

I do not need to cite at length the benefits already achieved. The economic expectations of nuclear power have inspired innovations in conventional energy supply. Savings are already running at a rate which soon will equal the total AEC investment in civilian power. Capital resources to serve the Nation's future electrical energy needs will be reduced; a ceiling is developing on electrical energy costs; and improved geographic equality of energy costs is being achieved, with attendant stimulation to industrial area development.

Beyond this, the peaceful nuclear power program prepares for the future when nuclear contribution to our energy systems will be a must—when fossil reserves cannot do the whole job and when these reserves may have to be increasingly devoted to other uses.

The progress made to date has been the result of a combined Government-industry effort, depending crucially on strong support from the Joint Committee and the Congress. The basic issue involved in extension of the Price-Anderson Act is whether the committee and the Congress should continue this support that encourages the broadest and most vigorous industry participation in the national nuclear program.

THE PERIOD OF EXTENSION

Question 3: If Price-Anderson-type legislation should be extended, what should be the period of the extension?

I have already referred to the outstanding safety record of the nuclear power program. This record is attributable to the care and thoroughness employed in design, construction, and operation of nuclear electric generating plants. It has been aided by a regulatory system which has been both perceptive and rigorous. The regulatory system needs to be simplified, but it has gained extensive experience and competence.

NUMBER OF REACTORS IN OPERATION

The safety record of the Nation's nuclear program becomes more impressive as more reactors enter service each year. There are now about 500 reactors of all kinds in the world, of which 290 are in the United States alone. In the domestic power industry, including manufacturing and processing as well as reactor operation, the frequency and severity record of accidents of all kinds compares with the best in industry. So far as I am aware, no radiation injury has occurred at any licensed domestic power reactor; and persons offsite have never been exposed to radiation in excess of established limits as a consequence of operating such facilities.

The recent report by the AEC Division of Compliance indicated, for the period of 1960–63, that the day-to-day release of radioactivity to the atmosphere by licensed powerplants was about one seven-hundredths of levels permitted in operating licenses. This indicates one way that nuclear powerplants have proved to be good neighbors.

THEORETICAL REACTOR ACCIDENTS

Estimates of the consequences of a nuclear incident generally presume the fission-product inventory deep inside a reactor is somehow spread to the atmosphere under the most disadvantageous weather conditions. With this assumption, the projected economic costs of the inconvenience in moving people temporarily and cleaning up buildings can be very high. Effect of the reactor's inherent and engineered safeguards in limiting the probability or the feasibility of such a large release of the reactor's nuclear inventory is not taken into account. Yet these safeguards exist, and they are the basis for assuring protection of the public health and safety.

ENGINEERED SAFEGUARDS

The engineered safeguards provide a multiplicity of sequential barriers to release of fission products. There is the barrier of inherent fission product retention within the fuel itself, the cladding of the fuel, the reactor vessel and process system built to the most stringent standards, redundant core protection devices, reactor containment structures, pressure reduction systems, and filters. The combination of these features reduces the probability of a damaging reactor accident to just about the vanishing point.

Nevertheless, experience is not yet sufficient to say absolutely that the worst imaginable economic risk is less than the available insurance, even though the probabilities are infinitesimally small. Additional reactor operating experience will, of course, provide a better statistical basis for the confidence shared by knowledgeable nuclear engineers. But beyond this, two activities need to be encouraged and pursued.

First, the experimental work—like CSE, SPERT, and NSPP—undertaken by the Commission to actually measure the effectiveness of inherent and engineered safeguards is highly important. It should be accelerated and expanded in meaningful areas.

The second activity is the development of standards for engineered safeguards. This should be expedited, building upon the evidence from the experimental programs.

ASSESSMENT OF REACTOR SAFETY THROUGH OPERATING EXPERIENCE

Both of these activities will permit a more precise assessment of reactor safety margins. In this way, they should give improved assurance of the suitability and uniformity of reactor safeguards, regardless of geographic location of nuclear plants.

The 10-year period in the 1957 Price-Anderson Act was based on a recognition that Congress should periodically review the protection system in the light of experience, rather than commit indefinitely. A 10-year period also recognized that 5 years or so are required for just one cycle of design to operation experience. To get more than one cycle of such experience—and to gain the advantage of the experimental and standardization activities mentioned—it is necessary to provide a period matching the period of the initial statute. Among 120—9 megawatts and up—domestic reactors today, the current annual rate of accumulation of experience exceeds the grand total of all similar experience existing in 1957. Between now and 1977 we expect the experience to total about 2,400 reactor-years, or four times current levels.

Chairman HOLIFIELD. When you say "four times current levels," we have, at this time, according to your estimate about 600 reactor-years' experience?

Mr. YOUNG. That would be about right, yes.

Chairman HOLIFIELD. Does that include the civilian commercial reactors and the military reactors?

Mr. YOUNG. No, this is all reactors that have a thermal rating beyond 9 megawatts.

Chairman HOLIFIELD. But not necessarily our Hanford reactors?

Mr. YOUNG. Yes, it would include production reactors as well. It would not include, however, critical experiments or research and test reactors.

Chairman HOLIFIELD. The reason it would not include them is, as you have already testified, some of those reactors, most of them such as the CSE, the SPERT, and the NSPP, were experimental reactors without containment and they were deliberately pushed to a meltdown limit, you might say, or an abnormal——

Mr. YOUNG. They are designed to test abnormal circumstances under very controlled conditions.

Chairman HOLIFIELD. That is right; under controlled conditions. Even in the case of the reactor experiment in Idaho where the incident occurred, the SL–1 I am speaking of, that was an experimental type of reactor without containment.

Mr. YOUNG. That is right. It was planned that way and the conditions were controlled.

Chairman HOLIFIELD. You are talking here about 600 reactor-years as of now?

Mr. YOUNG. Yes.

Chairman HOLIFIELD. Without any trouble.

Mr. YOUNG. Yes, sir. In the 10-year period we would expect to multiply this four times, producing quite an experience log. It is a combination of running the ones that exist now plus the new ones that are coming on the line.

Chairman HOLIFIELD. This includes reactors that have been in operation close to 20 years, the older Hanford reactors.

Mr. YOUNG. Some of these according to the national program will be terminated soon.

Chairman HOLIFIELD. That is true, but they have been operated.

Mr. YOUNG. For 20 years with a magnificent record of safety experience.

Chairman HOLIFIELD. When was the first date of the Hanford reactor?

Mr. KENNEDY. I believe it is 1946.

Chairman HOLIFIELD. 1946?

Mr. KENNEDY. I believe that is right.

Representative PRICE. They were before 1946. We visited them in 1946.

Mr. YOUNG. I was debating whether it was late in 1943 or in 1944. I believe it is 1944. This can be corrected in the record but I am pretty sure it is 1944.

Chairman HOLIFIELD. That is approximately 20 years.

Mr. YOUNG. Yes, sir.

Chairman HOLIFIELD. Very close to 20 years of operation of a number of those reactors at Hanford.

Mr. YOUNG. I attempted to pull together the number of operator years experience because each reactor has a number of operators. It was difficult to get a meaningful number to cover the entire experience but it is a very substantial log of experience.

Chairman HOLIFIELD. I think these are valuable statistics for us to have because they are the first ones to be given. I have already asked the staff to make a study of this to accumulate these statistics. I would appreciate having your people confer with the staff and give us the breakdown on this.

Mr. YOUNG. I have it with me. I will be very glad to leave it with you. (See app. 14, p. 328.)

Chairman HOLIFIELD. Fine.

Mr. YOUNG. The purpose in bringing this out was to show how the 10-year period would add to our knowledge and provide greater public assurance and I think clarify any possible directions for future change in the law after the 10-year period.

Mr. YOUNG. If I may, I will go to question 4.

THE TERMS OF EXTENSION

Question 4:

If an extension of a governmental indemnity program in the nuclear field is warranted, what changes, if any, should be made in the Price-Anderson legislation?

The studies of the AEC and of the Atomic Industrial Forum have considered at length the need for change in the form of Price-Anderson legislation. Both conclude that the need for extension is the overwhelming consideration. They also note a few secondary issues, such as absolute liability and the statute of limitations, but conclude that these issues should be taken up separately. We concur in this determination.

LIMITATION OF LIABILITY

The limit-of-liability provision has also been challenged. I would like to make two points in this connection. First, removal of the provision would be an unfortunate precedent abroad where Government indemnity provisions have been much smaller than in the United States. Second, the limit of liability has been an integral feature of the Price-Anderson law from its earliest consideration to establish a ceiling on the Government's indemnity obligation. Private industry has taken responsibility for the first tier of risk and is handling this responsibility, as it handles other liability risks, through insurance. The insurance is mandatory under the law, it is the maximum available, and the premium burden is heavy. Because Congress recognized that the financial integrity of industry, and particularly of electrical utilities, is in the national interest, the Government assumed responsibility for any risk beyond the full insurance capability. As the Forum study points out, the limit on liability should not be removed unless the ceiling on indemnity is also removed.

Question 5:

Should the amount of the governmental indemnity available under Price-Anderson legislation be reduced as more commercial nuclear liability insurance becomes available?

Certainly the availability of private insurance will rise in the future, as more plants are operated overtime, and as the insurers build the needed reserves through the premium burden undertaken by the electrical utilities. This will permit private insurance to make an increasing contribution.

Accordingly, we see no objection to reducing the governmental indemnity as private insurance increases. But if the law is changed to accomplish this—we would urge that the amounts do not have to correspond—nor should the present $560 million total receive status as a measure of economic risk of nuclear power.

CONCLUSION

The Price-Anderson system has been an essential building block on which the nuclear industry has developed to date. Extension this year would eliminate uncertainties in electric utility planning. It would also demonstrate the continuing congressional support of nuclear power development. I would therefore urge that the law be extended for 10 years.

Chairman HOLIFIELD. Thank you, Mr. Young.

Mr. Hosmer?

RESOLUTION OF OUTSTANDING PROBLEMS ASSOCIATED WITH INDEMNITY LEGISLATION

Representative HOSMER. Mr. Young, is it your feeling that this simple extension ought to be handled without getting into some of these other problems such as statute of limitations and forums and so forth, based more on the urgency to get something done than it is a neglect or a lack of desire to at some time, in the not too distant future handle these other peripheral questions?

Mr. YOUNG. I think both elements that you have mentioned in your question are present. I think these issues are secondary enough that they should not stand in the way of extension.

On the other hand, I think in connection with the statute of limitations that something should be done here. I think a little time will be required in order to accomplish it. It should not be lost, however, and something should follow in the future.

Representative HOSMER. Now at this time if we don't get into these other matters, don't get into analysis of possibly better ways to go about this provision of insurance or protection, we put a 10-year tag on this extension, how much pressure do you think there is going to be left to get in and solve some of these other problems?

Mr. YOUNG. With respect, again, to the statute of limitations I understand there is a detailed study underway now on the part of the Commission, the Council of State Governments, and the New York City Bar Association, trying to examine the best solutions to this problem, whether it be legislation at the Federal level or State level, the latter being uniform, or perhaps both.

I think there is sufficient recognition of the need here and action underway which I think would maintain pressure on solving this particular problem.

RESOLUTIONS OF OUTSTANDING ISSUES DURING PERIOD OF EXTENSION

Representative HOSMER. If we extend for 10 years, we are going to pretty well set the pattern for a decade. I would not anticipate any real analysis of this problem of handling property damage different from personal liability damage, even though it might be an unfeasible idea.

But I do not see any possibility of its being seriously explored under the terms of a 10-year extension.

Do you as a practical matter?

Mr. YOUNG. I am not sure I understand the concern you have here because it is my understanding that Price-Anderson does not cover plant damage.

Mr. CONWAY. He is talking of liability for personal injury versus property damage.

Mr. KENNEDY. I would say, Mr. Hosmer, that I think the Joint Committee would be able to take this up. It would be able to consider the appropriateness of Federal legislation to do this. The committee and the Commission would have a good deal of opportunity to encourage State action on this.

I don't believe that extending the law this year would prejudice the case for reexamination of some of these other questions.

Representative HOSMER. It would act as a club to get people lined up in some kind of common cause, to wit: the precedent of private ownership legislation. Would it not?

Mr. KENNEDY. I think that there is a general recognition on the statute of limitations question particularly——

Representative HOSMER. That is just one of many questions. Let us take the amount of liability to be handled by the private carriers, boost it up a little bit. Then we stay on that step for 10 years. I can't see you fellows coming in wanting to pay more insurance

premiums. I cannot see the insurance companies coming in. I cannot see any general foundation for action by the Congress which usually requires an irritating circumstance in somebody's backyard to bring it about.

Mr. YOUNG. This is a good point. I think there is a lot of truth in what you say. On the other hand, a delay of 1 year would not change these circumstances particularly.

Representative HOSMER. What do you mean it won't change them?

Mr. YOUNG. You might have a different level next year, but you would still need the same force and same urgency that you talk about, absent the Price-Anderson extension, if you were going to change something during the course of the extension.

Do I make myself clear?

Representative HOSMER. I think you do. I just don't understand it.

Thank you, Mr. Chairman.

Chairman HOLIFIELD. Would the witness like to clarify his remarks?

Representative HOSMER. I understand what he is talking about.

Mr. YOUNG. I was born in Pennsylvania and we often talk this way.

I had in mind this factor, that if a change should be made during the course of any 10-year period, it would still require the marshaling of the forces to create the acceptance of this change, whether you made the extension this year and effected it through the Congress this year or whether it was delayed 6 months or a year. There is not much difference in this problem.

FUTURE CONSIDERATION OF OUTSTANDING INDEMNITY PROBLEMS

Chairman HOLIFIELD. There is no reason why the Joint Committee cannot maintain its continuing interest in the problems as they arise and under new conditions I see no reason why we could not proceed to consider modifications or amendments to the law.

We do this all the time. Almost every year we have an omnibus amendment bill so far as that is concerned and we try to take care of those things that seem to be pressing, and we have initiated some of these amendments.

We have not waited for the Commission in many instances to bring something to our attention. Our staff is pretty alert and they are constantly in contact with the representatives of industry to find out what the problems are.

PERIOD OF EXTENSION OF PRICE-ANDERSON ACT

Representative HOSMER. On that basis, I have one more question for Mr. Young based on this current colloquy here.

You would not see any precipitating advantage in a 5-year extension rather than a 10-year extension?

Mr. YOUNG. I covered this I think partly when you had to be absent from the room, Mr. Congressman.

Representative HOSMER. I am sorry.

Mr. YOUNG. I think 5 years is too short a period if you are going to count on gaining any degree of experience that will help change the nature of this problem the next time that Congress must look at extensions.

Representative HOSMER. Thank you.

Chairman HOLIFIELD. We need this because the 5-year period is consumed in frequent 3-year lagtimes between design and construction and operation of a reactor.

Mr. YOUNG. Yes, sir; generally as much as 4 years between the time you start final design and actually have the machine operating.

Chairman HOLIFIELD. Mr. Anderson?

Representative ANDERSON. I have no questions, Mr. Chairman. Thank you.

Chairman HOLIFIELD. On page 10 you say:

> Accordingly, we see no objections to reducing the governmental indemnity as private insurance increases. But if the law is changed to accomplish this we would urge that the amounts do not have to correspond, nor should the present $560 million total receive status as a measure of economic risk of nuclear power.

Will you clarify that a little bit for this Dutchman?

LIABILITY RISK OF NUCLEAR PLANTS

Mr. YOUNG. Thank you, Mr. Chairman.

By this point I meant if private insurance should go up, for example, by $15 million, I see no need to say that the Government indemnification should go down precisely by $15 million or that the $560 million should be kept as a sacred number or status number that would suggest that all nuclear plants have an ultimate economic risk of $560 million, because this is not true.

Mr. CONWAY. The committee has the problem right now of drafting the legislation. What other language would you substitute or what approach would you suggest?

Mr. YOUNG. If I may make this type of suggestion, I see no reason today to change $560 million in the present bills.

I think the record of these hearings recognizing that the $560 million has no particular status should be adequate as far as the future is concerned.

Mr. CONWAY. Then if the insurance representatives come in with additional money for the power pool, you are constantly building on top of that, so that you have no ceiling whatsoever?

Mr. YOUNG. I was actually thinking in terms of the ceiling going in the other direction in the course of time.

Looking ahead to the time when we can gain the kinds of experience I outlined in the more formal part of the testimony, I can see nothing but a convergence—between the economic risk calculations on nuclear plants dropping with time, and increasing availability of private insurance in time. There will come a time when indemnification will not be necessary in dollars. But this is probably not in the next 10 years. It is farther out than this because it will take that time to get this statistical experience and proof of the determinable economic risk that can ever be associated with nuclear plants having the safety criteria that we carefully work toward today.

Chairman HOLIFIELD. Thank you, Mr. Young.

Mr. YOUNG. Thank you very much, Chairman Holifield.

Chairman HOLIFIELD. Our next witness is Henry C. Nickel, general manager of the Allis-Chalmers Manufacturing Co.

STATEMENT OF HENRY C. NICKEL, GENERAL MANAGER, ATOMIC ENERGY DIVISION, ALLIS-CHALMERS MANUFACTURING CO.; ACCOMPANIED BY LOREN K. OLSON, SPECIAL COUNSEL, ATOMIC ENERGY DIVISION

Mr. NICKEL. Thank you. Mr. Loren K. Olson, special counsel of our division, is with me.

I appreciate the invitation to testify in connection with pending bills H.R. 8496 and S. 2042 to extend the Price-Anderson Act. I wish to unqualifiedly endorse the pending bills.

I believe that nearly everything that needs to be said in connection with the technical and substantive aspects of the proposed extension of the Price-Anderson Act has been fully covered in the reports of the Atomic Energy Commission and the Atomic Industrial Forum. I believe these reports are thorough and complete in discussing all aspects of the problem, and I wish to subscribe to the recommendations made therein.

As the Joint Committee on Atomic Energy found in the original Price-Anderson hearings, the remote possibility of a substantial—but uninsurable—liability, arising out of a nuclear incident was a "major deterrent" to the development of a private nuclear industry. This was true both as to licensees and as to contractors. The thorough and efficient study of the problem, in connection with the Price-Anderson Act, encouraged the availability of private insurance coverage. The act itself provided adequate indemnification above available insurance, with a limitation on liability and with provision for an ingeniously effective procedure for marshaling and prorating claims.

The Price-Anderson Act has given the public the necessary protection and it has obviated the problem of an uninsurable risk that no private company could prudently assume. The cost to the Government for this substantial accomplishment has been de minimis, and purely administrative. As we all confidently expected, there have been no nuclear incidents to occasion claims under the indemnity provided. This would seem to be a situation where all would agree that the Government should continue to provide Price-Anderson coverage for another 10 years.

I am confident that a large number of additional nuclear facilities will be built during the next 10 years. This will provide a much sounder actuarial base for insurance. Also, as we gain more experience, public confidence and acceptance will increase.

I do not believe that any technical changes should be made in the Price-Anderson Act at this time. I think it is more important to have a timely extension well in advance of the August 1, 1967, expiration date. We accept the amendment which reduces the indemnity as more insurance becomes available, but, of course, we hope that a sounder actuarial base will result in a reduction of premiums, which are presently, and understandably, high. We feel that the 10-year extended term proposed is appropriate.

In summary, we feel that there is a continuing need for Price-Anderson coverage and strongly recommend the pending legislation. Thank you.

Chairman HOLIFIELD. Thank you. Mr. Price?

Representative PRICE. I have no questions.

Chairman HOLIFIELD. Mr. Hosmer.

WILLINGNESS OF INDUSTRY TO PROCEED WITHOUT INDEMNITY

Representative HOSMER. Mr. Nickel, what if this were not extended, you came up to new contracts that had no protection, what effect do you think it would have on your company's activities in the nuclear field?

Mr. NICKEL. It certainly would create a great deal of soul searching. Of course, my opinion would be that that probably would deter us from taking on further work, a conservative approach by the board of directors. This could have a very serious effect on future activities of the company in the nuclear field.

Representative HOSMER. Thank you.

Chairman HOLIFIELD. Mr. Anderson?

Representative ANDERSON. No questions.

LIMITATION OF LIABILITY

Chairman HOLIFIELD. You say that the Price-Anderson Act has given the public the necessary protection in connection with the atomic energy activities. Do you fell that this is so in light of the limitation-of-liability feature of the present act which prevents the public from reaching the assets of the person responsible for nuclear incidents covered by the act?

Mr. NICKEL. Yes, sir; I do. I feel that if such a catastrophe should occur and the $500 million limitation were exceeded, that at that point in time the Congress should reconsider whether further indemnification should be provided. Being able to reach the assets of a corporation would be the same type of deterrent that the absence of Price-Anderson would cause.

Chairman HOLIFIELD. Thank you, Mr. Nickel, for your testimony.

Mr. NICKEL. Thank you, Mr. Chairman.

Chairman HOLIFIELD. Mr. Sam J. Farmer, vice president and counsel of General Atomic Division of General Dynamics Corp., is our next witness.

STATEMENT OF SAM J. FARMER, VICE PRESIDENT AND COUNSEL, GENERAL ATOMIC DIVISION, GENERAL DYNAMICS CORP.

Mr. FARMER. Thank you.

Mr. Chairman and members of the Joint Committee on Atomic Energy, thank you for the opportunity to participate in the hearings of your committee today in connection with the question of extending the Price-Anderson indemnity legislation.

General Atomic Division of General Dynamics Corp. has participated actively in the nuclear energy field over the past 10 years as a developer and supplier of reactor systems and nuclear fuel. Our corporation's investment in this field is very substantial. As part of its activities General Atomic performs contract work for the Atomic Energy Commission and other Government agencies. Thus, General Atomic has had experience with the application of this law as a supplier, as a licensee, and as a contractor.

I. EXTENSION NECESSARY

General Atomic believes that it is vitally necessary that the Atomic Energy Act be amended to empower the Atomic Energy Commission to continue to enter into indemnity agreements with licensees and contractors after the present cutoff date of August 1, 1967.

A. ORIGINAL NEED CONTINUES

The Price-Anderson Act was formulated and drafted by the Joint Committee after thorough study during an extended period prior to 1957 of the special problems of financial protection in relation to nuclear energy hazards. This legislation was designed to meet, and has met, the special liability problems anticipated in the new nuclear field. We share in the general belief that this legislation has been effective to remove what was considered in 1957 to be a major roadblock to commercial development of nuclear technology. The need which existed for this legislation in 1957 exists now and will, we believe, exist 2 years from now. The qualitative nature of the nuclear hazard has not changed and, although we have learned much about the atom and how, it behaves, there still exists the possibility, however remote, of a nuclear incident in a reactor or other significant quantity of nuclear material. Therefore, we believe that, if the Price-Anderson indemnity provisions are not extended, the development of nuclear energy technology will again be faced with a major roadblock, and that the atomic energy program accordingly will suffer a serious setback.

B. ADVANCED CONVERTERS

As the Joint Committee knows, the objectives of the AEC's advanced converter reactor program are to conserve nuclear fuel resources, to develop more efficient reactor concepts, to develop use of thorium as a fuel, and to make progress toward breeder reactors. In many respects concerning experience with operation, the advanced converter reactors are now in the same position as the water reactors were several years ago. In order to help assure achievement of the goals of the advanced converter program, it is necessary that an environment of financial protection and indemnity similar to that which has been available for development of water reactors be available for those contemplating construction and operation of advanced converter reactors.

C. HTGR POWER REACTOR DEMONSTRATION PROJECT

As a specific illustration of the need for extending Price-Anderson, we might mention the arrangements now being finalized among the Public Service Co. of Colorado, General Dynamics Corp., and the AEC for the design, construction, and operation of a 330,000-electrical-kilowatt, high-temperature, gas-cooled reactor (HTGR) powerplant to be constructed in the State of Colorado. The Joint Committee is already familiar with this advanced converter reactor project as a result of the extensive hearings which the committee has held on the authorization act for fiscal year 1966. General Atomic will carry out

substantial research and development and design and engineering work before undertaking construction of this project. Under the current schedule the construction permit may not be issued by the AEC prior to the present Price-Anderson cutoff date of August 1, 1967, and thus the project probably would not be able to obtain indemnity protection unless the Price-Anderson Act is extended. The memorandum of understanding already executed among the Public Service Co. of Colorado, General Dynamics Corp., and the AEC contains a specific right of termination in the event that Price-Anderson coverage, or its equivalent, is not available for the project.

D. NEED FOR AEC CONTRACTOR INDEMNITY

The foregoing remarks are directed primarily to the need for continuation of Price-Anderson coverage for licensees. The need of AEC contractors for liability protection rests on a similar footing.

In addition, it is our opinion that the Price-Anderson Act has been beneficial to the AEC and contractors alike in providing a solution to some difficult problems of contracting. Prior to the Price-Anderson Act, the AEC and its contractors negotiated the indemnity provisions of a particular contract individually and sometimes strenuously. I beleive that the uniformity of the solution provided under the Price-Anderson Act is valuable in itself, in that the question of how much or how little liability protection a contractor could or would obtain is removed as a question for bargaining. This factor probably affords the AEC a somewhat wider range of choice than it would otherwise have in the selection of its contractors and, at the same time, assures that financial protection would be available for the public in the event AEC contract activities gave rise to public liabilities.

General Atomic, therefore, believes that the Price-Anderson coverage should be continued for AEC contractors as well as licensees. Much advanced work in the nuclear field is carried out under contract, and extension of the act will continue to permit the AEC to obtain the services of the best qualified contractors, as well as to continue to provide protection to the public in the event of an incident.

II. DURATION OF EXTENSION

The indemnity provisions should be extended, in our opinion, for a minimum of 10 years. This would permit the utility industry and nuclear reactor and equipment suppliers to plan ahead for new starts for a reasonable period and still provide an opportunity for another congressional review at the conclusion of the extension.

III. ENACTMENT OF EXTENSION

I would like to emphasize that we believe it is very important that the Price-Anderson indemnity provisions be extended by the Congress this year, if possible. I realize that the Congress is facing a full schedule of many important legislative matters during the remaining days of this session. However, in order to plan new projects, it is reasonable for the participants to wish to know as far in advance as possible that Price-Anderson provisions will be available for such

projects. Generally speaking, we believe that uncertainty concerning Price-Anderson extension has an unsettling effect on plans for new projects. Therefore it is highly desirable that the decision to extend the act be made as far in advance as possible.

IV. IMPORTANT QUESTIONS WITHIN PRICE-ANDERSON FRAMEWORK

There is no doubt that many interesting and important issues within the framework of the Price-Anderson Act remain to be considered or have yet to be formulated. Certain issues which have arisen in the past 8 years have already been resolved by amendments to the act making adjustments within this framework.

I think that it may require some forebearance by all of us to resist the temptation of digressing for these secondary questions to the detriment of completing consideration of the fundamental question of extension. The questions of absolute liability, channeling of liability, relationship between domestic law and international conventions, and so forth, are important and fascinating questions to many of us. But truly these questions are secondary to the original and still unchanged considerations which gave rise to this imaginative and effective legislation in the first place. It would be unfortunate, indeed, if these secondary questions diverted attention from the primary need.

During the past 8 years the Joint Committee has held almost annual hearings on the subjects of indemnity and reactor safety. We assume that the committee may continue this program and can, therefore, be in a position to consider and act on changes in the present structure which may be in the public interest as well as solutions to new problems which may arise.

We therefore strongly endorse the view expressed in the AEC report that there is no compelling and immediate need to consider other revisions and refinements to the Price-Anderson Act at this time.

V. CONCLUSION

We believe it is imperative that the basic provisions of the Price-Anderson Act be extended in order to carry out the congressional policy to encourage continued widespread industrial participation in the development and utilization of atomic energy for peaceful purposes.

Thank you, sir.

Chairman HOLIFIELD. Thank you. Mr. Price?

AMENDMENT OF INDEMNITY LEGISLATION TO EXCLUDE CERTAIN TYPES OF REACTORS

Representative PRICE. Mr. Farmer, do you believe that it would be desirable to amend the Price-Anderson Act to provide that it would cover only certain types of reactors such as the more advanced reactors which are not presently competitive with fossil fuel plants?

Mr. FARMER. I think it would be difficult to administer a distinction which gave a sufficient practical certainty to the people who are concerned about these risks so that they could plan their business. In

other words, I think to make that distinction as a matter of legislation between, say, advanced and proven reactors gets to be very difficult in the execution and we might wind up with some unfortunate gaps.

EXPERIENCE TO BE GAINED IN NEXT 10 YEARS

Representative PRICE. Do you think that in the next 10 years we will have enough experience so that further extension of the act will not be necessary?

Mr. FARMER. Well, of course, we are both speculating on that issue, Congressman Price. I would hazard a guess based on my past experience in this field that 10 years from now we may, as a matter of the national policy, want to continue to develop advanced forms of nuclear power reactor technology and therefore we might be looking at this question again in 10 years.

PERIOD OF EXTENSION

Representative PRICE. Some people have suggested a longer extension but more have advocated a shorter extension. What would you think of a shorter extension?

Mr. FARMER. I would think that any extension less than the reasonable cycle one would expect from the beginning of a project through its design and construction phases up to operation and some reasonable operating experience would be too short. In general I would think that 10 years would be a reasonable extension although I think you might even want to contemplate a longer one.

Chairman HOLIFIELD. This would actually only cover reactors you might say that would be started within 6 years if we allow a 3- or 4-year lag time.

Mr. FARMER. Yes, sir. And I believe your committee saw a specific problem in connection with the question of certainty of one project which started rather late which wanted to make absolutely sure it was covered under the provisions of the law.

RIGHT TO TERMINATE HTGR PROJECT

Representative PRICE. Your agreement on the high temperature gas reactor gives you the right to terminate if the Price-Anderson coverage or its equivalent is not available. Do you think you would exercise that right in this event?

Mr. FARMER. Congressman Price, we will have to cross that bridge when we come to it. That right exists both for the Public Service Co. of Colorado as well as for General Dynamics Corp. I would prefer not to speculate on how that would come out.

Representative PRICE. What would you consider equivalent coverage?

Mr. FARMER. The essence of the act is the requirement for financial protection in the amount available from private sources in effect and provides for the indemnification by the Government to all parties that might be liable in excess of this amount up to the total combined value of the two which we think of as $560 million today and then cuts off the liability at this point.

Now I would think some system could be equivalent which contemplated the availability of financial protection and the protection of a risk in a very large amount, whether it is $500 million or $499 million, it is hard to play with numbers when you get in that very large amount or range, something like that, and then as a number of the other witnesses have commented, it would be highly desirable to have some cutoff of the liability exposure after that.

RESOLUTION OF OUTSTANDING INDEMNITY PROBLEMS

Representative PRICE. Your statement, and I believe at least one or two others that have been made during the hearings, indicates that you would prefer to leave some of the problems that exist, even with the Price-Anderson Act, unresolved as far as the legislation now under consideration is concerned. In other words, you would like to see the Price-Anderson Act reenacted pretty much as it is now without treating with some of these problems that have been coming up year after year and which continue to go on unresolved. Don't you feel that continuing to put off the resolution of some of these problems, such as strict liability, channeling of liability, and others that we have mentioned during the last 2 days, between now and 1967, assuming for the moment an extension is desirable and which the committee has to resolve, we will just end up talking about the same thing in another 10 years?

Mr. FARMER. I really don't think so, Mr. Price. It seems to me that we are talking about a fundamental building block here which already exists and which works. I think many of the other issues which are before us are extremely important, but I feel that they are additional matters for legislative consideration in addition to this fundamental building block that we already have.

In one sense it gets to be a matter of priorities. The need that we saw in 1955 and 1956, which was met, I feel, by the Price-Anderson law, still exists. If the act is allowed to expire or lapse, then we are going to have a real problem. These additional questions of absolute liability, channeling of liability, and so forth, are important questions, and I feel that the leadership of this committee or the interest of this committee in these questions will be certainly sufficient incentive to encourage active pursuit of some of these highly complex but, as I say, necessarily important problems but which I feel are secondary to the fundamental question of extension.

ABILITY OF COMPANY TO INCUR LARGE LOSSES

Chairman HOLIFIELD. Mr. Hosmer?

Representative HOSMER. Mr. Farmer, your company has had experience of recovering from a disaster in connection with the 880's. That involved many, many, many millions of dollars, did it not?

Mr. FARMER. Yes, sir.

Representative HOSMER. Do you recall how many?

Mr. FARMER. I think it has been variously reported as on the order of $400 million or so.

Representative HOSMER. $400 million?

Mr. FARMER. Yes, sir.

Representative HOSMER. That is getting pretty close to the figure that we are talking about in this ball park, is it not?

Mr. FARMER. Yes, sir.

Representative HOSMER. I notice that General Dynamics stock today is around 39¾. It was up as high as 43¼ a couple of weeks ago. I think it went up to 65 3 or 4 years ago. Why do you need this Price-Anderson when General Dynamics can handle a problem like that?

Mr. FARMER. You are asking me to comment on the financial structure of our company, and I think it was——

Representative HOSMER. If you are looking for compliments, I will compliment you. I will compliment Mr. Crown, too, for his accomplishment in the last couple of weeks on the preferred stock.

Mr. FARMER. I want the record to clearly show this was not a loss in connection with any nuclear incident or claims of public liability.

Representative HOSMER. That is understood I think.

Mr. FARMER. This is a loss that took place over a number of years in connection with a program of our corporation and it is quite a different category qualitatively, I think, from the kind of accident insurance situation contemplated by Price-Anderson.

Representative HOSMER. I am not trying to embarrass you or the company. I think the entire financial community and the public realizes that you took a heck of a beating there and you came back. They admire the courage and staying power of the company, the imagination and ability and hard work which brought it about.

Here you had an experience with something that is akin to what Price-Anderson has in mind and you have survived. I think General Electric is probably bigger than General Dynamics. I guess Westinghouse is. Or are they?

Mr. FARMER. I think so.

Representative HOSMER. I guess Allis-Chalmers is. They are big boys, too. I would like to get a little better convincing as to why the Government should be fiddling around with this thing.

Mr. FARMER. One comment I think should be made and that is that when we talk about public liability exposure, the exposure to risks of claims arising out of negligence or fault in some way, these are things which normally industry has been able to buy insurance against. This is the kind of roadblock we saw in 1956 and 1957, that we just could not buy insurance for those kinds of things.

Now I am sure that in advanced technological programs of very great size, if there were some way to buy insurance against financial loss which is not a loss to third parties, but is a cost that the technology makes because you have misestimated how easily you could solve problems of nature, it would be highly desirable to buy insurance in that area, too.

Representative HOSMER. I realize that. You could not buy insurance against jets but if you could not buy insurance against this thing, the consequences would probably not be any more fatal, or nonfatal.

Mr. FARMER. Well, that is a subject for speculation, Mr. Hosmer. I don't know.

ABILITY OF SMALL COMPANIES TO INCUR LARGE LIABILITY LOSSES

Representative HOSMER. Let us get big in heart now and think about some of these outfits that are not the size of your company. I guess they could not ride it out, could they?

Mr. FARMER. I would doubt it.

Representative HOSMER. I suppose whatever liability there might be in this connection would be joint and several. Sue-everybody-in-sight sort of thing.

Mr. FARMER. I would guess so; yes.

Representative HOSMER. So even though one or two or three giants might be able to survive this sort of thing, it could wipe out hundreds and thousands of others, suppliers, subcontractors, people who are mixed up in it.

Mr. FARMER. And the injured people who have not been able to recover on their claims.

Representative HOSMER. Now, if we did not have this protection, I suppose it would only be possible for companies of your size to assume this kind of risk and I suppose in doing so you would have hold-harmless contracts with your suppliers and everything like that?

Mr. FARMER. Yes; if at all.

Representative HOSMER. That would be an alternative way of protecting these subs, suppliers?

Mr. FARMER. Ultimately someone has to bear this risk of embarking on a new technology.

NECESSITY FOR INDEMNITY LEGISLATION IN ADVANCE OF POSSIBLE INCIDENTS

Representative HOSMER. In that risk connection, yesterday we got into a conversation about what a mess it would be anyway if you had an incident, however remote, actually occurring, just to get these things settled, of the matter of proration and a lot of difficulties were produced for the record.

Mr. Lowenstein for the AEC said he would have to come up to Congress about it.

Now, how much easier do you feel by having Price-Anderson than you would by just riding on the confidence that if something happened they would bring the story to Congress and Congress would bail everybody out anyway?

Mr. FARMER. Considerably easier.

Representative HOSMER. You would not feel very easy with it?

Mr. FARMER. I think that relying only on future congressional action is not as firm a foundation as the industry should have to encourage widespread participation.

Representative HOSMER. Less of an expectation than a hope, I guess, in your mind even though it was the opposite with Mr. Lowenstein.

Mr. FARMER. Well, if you exceeded this amount, you would have a very serious problem. The Congress faced that in an earlier instance in the case of the Texas City disaster, and acted accordingly.

EFFECT OF INDEMNITY ON REACTOR DESIGN

Representative HOSMER. Now, assuming we did not extend that act and General Atomics got the big boys to say, "We will go ahead in this business anyway, we have had experience with these potentials," what do you think it would do to the design criteria and inventiveness and experimentation and progress in the nuclear power generation area and other areas that had to do with nuclear devices? Would it go on or would there be a total conservatism in this area?

Mr. FARMER. I think there are a number of questions wrapped up in that, Mr. Hosmer.

First of all, I can only make that assumption for the purpose of this discussion.

Representative HOSMER. Yes; it is a hypothetical thing. You are assuming that we are going to extend it. I just ask you not to for a minute.

Mr. FARMER. Secondly, I think we are assuming that we could get, I mean the insurance people would be in this picture in someway. I think that in terms of conception and design and engineering the technical people are irrespressible, you know, and they keep on designing and inventing regardless of how much insurance is available.

Representative HOSMER. If you were assigned a contract to build a HGTR three——

Mr. FARMER. I think for a very advanced plant that would really create some problems in going ahead without indemnity.

Representative HOSMER. You might even throw on some extra safety precautions on the design that you have already by way of insurance.

Mr. FARMER. It is a question as to whether that would be possible. You would have to look at what is involved. It might turn out to be——

Representative HOSMER. You have everything on it now.

Mr. FARMER. It might be completely unfeasible.

Representative HOSMER. Let us say we didn't extend it and people did start to overdesign and put everything that you put on a Christmas tree by way of safety features and the possibility of an incident is not even remote any more, it is impossible, might that not be a good thing?

Mr. FARMER. The industry was in that position in 1955 and 1956 and right up to the point when the Price-Anderson law was passed.

Representative HOSMER. They kept going right ahead.

Mr. FARMER. Well, I have some old clippings and the papers were just full of it. The people could not go ahead without this kind of protection.

Representative HOSMER. Then you don't think the effect of it would be to impose greater safety. You think it would be just to paralyze you.

Mr. FARMER. I just don't know, Mr. Hosmer. It is hard to say.

Representative HOSMER. Well, you are testifying in behalf of extending the act. You must have a feeling on it.

Mr. FARMER. It is conceivable that sometime in the distant future we can invent reactors which are sufficiently foolproof that a greater fool will not be able to come along and make an accident.

Representative HOSMER. But you will never know until you have built one and have had a lot of experience.

I think that is all.

Chairman HOLIFIELD. Mr. Anderson?

Representative ANDERSON. In this memorandum of understanding that has been executed on the high-temperature gas-cooled reactor, do both parties have this right of termination in the event there is not an extension of Price-Anderson?

Mr. FARMER. Yes, sir.

Representative ANDERSON. Both the Public Service Co. and yourself?

Mr. FARMER. Yes, sir.

Representative ANDERSON. Thank you.

Chairman HOLIFIELD. Thank you, Mr. Farmer.

Mr. FARMER. Thank you, Mr. Chairman.

Chairman HOLIFIELD. The next witness is Mr. Malcolm A. MacIntyre, vice president of the Martin-Marietta Corp.

STATEMENT OF MALCOLM A. MacINTYRE, VICE PRESIDENT OF MARTIN-MARIETTA CORP., AND CHAIRMAN OF THE BOARD OF ISOCHEM, INC.; ACCOMPANIED BY ROSS G. MacAULEY, COUNSEL

Mr. MACINTYRE. Thank you, Mr. Chairman.

Mr. Chairman and members of the Joint Committee, my name is Malcolm A. MacIntyre. I am a vice president of Martin-Marietta Corp. and chairman of the board of Isochem, Inc. The latter company was recently formed by Martin-Marietta and the U.S. Rubber Co. and is presently negotiating agreements with the Atomic Energy Commission which will provide, among other things, for the private construction and operation of a fission product conversion and encapsulation plant on the AEC Hanford reservation. I greatly appreciate the opportunity to appear before the Joint Committee in support of the proposed legislation extending the effective period of the Price-Anderson Act to 1977.

It appears to me that the same compelling reasons which led to the passage of Price-Anderson in 1957—encouragement in the development of a private nuclear industry and adequate protection of the public in the event of a catastrophic accident—are still valid, in spite of the great strides accomplished since 1957 in the nuclear field and the outstanding safety record of the nuclear industry.

As a specific case in point, Martin-Marietta and the U.S. Rubber Co., through Isochem, plan to spend in the neighborhood of $10 million in private capital in the construction of the FPCE plant. But neither company would think of investing its funds in the plant without satisfactory financial protection either through available private insurance or governmental indemnity. Indeed, management would be recreant in their duty to stockholders to take any other position. Accordingly, all commitments to the AEC with respect to both the FPCE plant and the operation of the Hanford 200 area have been conditioned expressly upon the receipt of adequate financial protection.

Beyond general support of H.R. 8496 and S. 2042, I suggest that the Joint Committee consider at this time the desirability of additional legislation that would correct what appears to be an unforeseen gap in the scope of indemnification coverage.

Section 81 of the Atomic Energy Act of 1954, as amended, requires in substance that persons producing, owning, or possessing byproduct material, apply for and obtain an appropriate license from the Commission. Section 170 of the act, among other things, authorizes the Commission to enter into indemnity agreements with persons licensed under section 81. Thus, under these two sections of the act the Commission has authority, in appropriate circumstances, to extend indemnification to persons using nuclear devices which involve substantial quantities of byproduct material. We are hopeful that the Commission will exercise this authority in the case of licensed customers of the products of the FPCE plant. A negative attitude on the part of the AEC in this respect will subject the public, the customer, and Isochem to unwarranted risk. Without such protection being made available it will be extremely difficult to achieve the goal of developing and expanding markets on a commercial basis for the fission products representing the output of the FPCE plant.

Assuming, however, that the AEC exercises its present authority and extends indemnification to users of the FPCE plant products, a potential risk still exists and is brought about by the gap in the legislation which I referred to previously. Whenever the Commission, acting pursuant to section 274 of the act, enters into an agreement with a particular State providing for the discontinuance of the regulatory authority of the Commission under chapter 8 of the act it would appear that its ability to extend indemnification to byproduct licenses in that State would be extinguished. It seems most unlikely that a State accepting regulatory authority would provide indemnification comparable to that available under Price-Anderson.

The apparent hiatus in indemnification coverage thus created has caused little concern in the past for the reason that few, if any, nuclear devices involving substantial quantities of byproduct materials have been produced for commercial use. Nuclear generators, such as those in the SNAP series, have been produced by the Government and produced under contracts containing Price-Anderson provisions extended under section 170d. of the act. Now, however, with the advent of Isochem and its contractual obligation to exert its best efforts to develop and expand fission product markets on a commercial basis the apparent gap in coverage becomes a matter of immediate and real concern.

It is submitted, therefore, that further commercial users of nuclear devices employing fission products should not be precluded from obtaining Price-Anderson indemnification, where such indemnification is otherwise appropriate, simply because he resides in a State that has accepted regulatory authority under section 274 of the act. Nor should the public be denied the protection afforded by indemnification because of such circumstances.

Thus, it is respectfully suggested that the Joint Committee consider legislation that would permit extending Price-Anderson coverage in appropriate cases to persons obtaining byproduct material licenses pursuant to State regulatory authority.

Thank you, Mr. Chairman.

INDEMNITY FOR ISOTOPE USERS

Chairman HOLIFIELD. Thank you, Mr. MacIntyre.

What you are actually advocating here is that the Government follow the release of an isotopic element to companies to use and indemnify the users of that isotopic measuring device or tracing device from liability, aren't you?

Mr. MACINTYRE. There is authority now for product liability coverage under the provisions of the act. We would be in two positions——

Mr. CONWAY. You say you have that now?

Mr. MACINTYRE. No; I say there is authority for that under the act to licensees.

Mr. TROSTEN. When you say authority for product liability coverage in indemnity agreements with licensees, you mean authority to indemnify the person who is handling these products, don't you?

Mr. MACINTYRE. That is correct.

Mr. TROSTEN. I see.

Mr. MACINTYRE. We in producing the isotopes will be selling to people who use the isotopes.

Chairman HOLIFIELD. This is carrying the protection activity pretty far when you move into the field of utilizing isotopes for measuring or other commercial uses, for the Government to follow that and be responsible for the right or wrong use of it. That is quite a bit different from covering a reactor.

Mr. MACINTYRE. I don't think so necessarily, Mr. Chairman. At the present time the Martin Co., has produced several of these generators, seven in fact, all under government contracts, and Price-Anderson coverage has been extended to us under those contracts in connection with those generators.

Chairman HOLIFIELD. Extended to you while you had the generators or to the parties you sold it to?

Mr. MACINTYRE. In this instance we don't sell it. It is put into governmental use. But anybody who might be harmed or suffer any injury as a consequence of its use or through our making of it would be covered.

Representative HOSMER. Mr. Chairman, would you yield?

Chairman HOLIFIELD. Yes.

MAXIMUM CREDIBLE ACCIDENTS RESULTING FROM USE OF ISOTOPES

Representative HOSMER. I fail to follow you on that one. Have you had any maximum credible accident studies in connection with these isotopic devices?

Mr. MACINTYRE. I believe we have.

Representative HOSMER. Has it run over $60 million?

Mr. MACINTYRE. Yes, sir.

Mr. MACAULEY. That is correct.

Representative HOSMER. What is the scenario for a maximum credible accident in connection with these isotopic sources?

Mr. MACINTYRE. I did not myself participate in the study, Mr. Hosmer, but it was made in connection with our Quehanna plant. Mr. MacAuley, our counsel, has.

Mr. MacAuley. What we are saying is this. With respect to these SNAP devices that we have made for the Atomic Energy Commission we have from time to time postulated incidents that could occur, all within the ambit of Price-Anderson philosophy of its being an accident that would probably never occur but if it did, this is what the result might be in terms of liability.

In a number of instances we have actually postulated an incident in excess of $60 million.

I might add that when we are talking about nuclear devices involving substantial quantities of isotopes, byproduct materials, we don't mean laboratory quantities. We don't mean necessarily measuring devices. We mean the type of generators that the Martin Co., has made under the SNAP program, for example, weather stations, buoys, that kind of thing where you are up in 40,000 or 50,000 curies.

Representative Hosmer. Those things are remote weather stations you are talking about, buoys out in the ocean some place?

Mr. MacAuley. That is one example.

Representative Hosmer. How can you total up $60 million of damage from one of those things?

Mr. MacAuley. Of course we have weather stations of that kind in our plant at Middle River. One of the difficulties, when you are talking about SNAP devices of this character, is that they are portable.

Representative Hosmer. We are not talking about in your plant where you have all of the rest of this junk in storage there and anything can happen. We are talking about your putting one together and you have met these severe safety requirements and license is issued and so forth, and out she goes. How in the world can you get a $60 million accident from anything like that?

Mr. MacAuley. I really don't know whether we postulated an incident occurring out in the Chesapeake Bay, where the buoy might be. I think in most instances we had a contract to make such a device and the incident was postulated based on something that might occur in the process of manufacture, for example.

Representative Hosmer. But Mr. MacIntyre wants this extended out all over the world, wherever one of these SNAP devices goes. That is incredible to me. I am trying to get myself "unincredibled."

Mr. MacAuley. I might make this comment. I believe the sense of the request we have made here today is simply to continue the mechanism that would permit this to be done in appropriate cases. We are not, certainly, saying that every time a commercial device involving strontium 90 or something is put into use that Price-Anderson should be extended. We merely say that under the present act as we understand it, there is authority for doing so so long as the Commission itself licenses the byproduct material.

Representative Hosmer. Then you are not talking about any extension of the act beyond what it is already. You are talking about something that the Commission might do if somebody talked them into it, and they could make up their minds.

Mr. MacIntyre. That is correct.

Mr. MacAuley. Except as we read the act, whenever the Commission turns over regulatory authority to a particular State to license byproduct materials, by virtue of doing that, it looses the ability to extend Price-Anderson assuming it is appropriate to extend Price-Anderson.

We feel it is a hiatus and our suggestion is that it might possibly be corrected.

Representative HOSMER. Yes; but not by us.

Mr. MACINTYRE. We are not suggesting that the coverage be automatic. We are simply suggesting that it be in the discretionary form. We point out if the State takes over the licensing, then there is lapse of authority.

Representative HOSMER. We have people on our backs now not to extend this act, let alone in time, let alone in area.

Mr. MACINTYRE. I understand that.

Representative HOSMER. Do you know anybody other than the coal people who are bucking this extension?

Mr. MACINTYRE. I don't happen to know.

Representative HOSMER. Thank you.

Chairman HOLIFIELD. Mr. Anderson?

Representative ANDERSON. No questions.

Chairman HOLIFIELD. I suppose you are, along with the other witnesses, against elimination of the limitation of liability in the present Price-Anderson legislation?

Mr. MACINTYRE. We don't have any firm position on that, Mr. Chairman.

Chairman HOLIFIELD. Are there any further questions, gentlemen? If not, why, we thank you, sir.

The next witness will be R. H. Harrison, Babcock & Wilcox Co.

STATEMENT OF RICHARD H. HARRISON, VICE PRESIDENT, BABCOCK & WILCOX CO.

Mr. HARRISON. Mr. Chairman, members of the committee, my name is Richard H. Harrison, vice president of the Babcock & Wilcox Co. I am here to testify in support of legislation extending Price-Anderson indemnity as incorporated in section 170 of the Atomic Energy Act of 1954, as amended, and in substantial accord with bills introduced by Mr. Price in the House and Senator Anderson in the Senate.

I would like to point out that I appear here as a member of management; my duties routinely include the making of decisions upon proposals and upon contracts in relation to my company's atomic energy activities. In this capacity, I have available the services of skilled specialists capable of advising me, in as much detail as I may need, of the indemnities and insurances available as well as the risks attached to any proposal or contract. My viewpoint is, therefore, one of overall management rather than one specifically oriented to legal matters and the complexities of insurance.

My company has traditionally served the utility and marine industries. Our product lines have always reflected our principal interest in these industries. Atomic energy is one of these product lines. Since the early 1950's, the company has pursued, and will continue to pursue, long-range and short-range plans of action designed to assure it of a substantial atomic energy position in these industries. Our interests in the matter of indemnification and insurance and our judgments upon them are, therefore, closely allied with the interests of the utility and marine industries.

Under the terms of the Atomic Energy Act of 1954, as amended, the authority, or obligation, of the Atomic Energy Commission to enter into agreements of indemnification will expire on August 1, 1967. It is our belief that section 170 should be amended at this time to change the above-specified date to August 1, 1977, and this statement is submitted in support of that position.

In September 1957 the Congress had two principal objectives in enacting section 170; namely, (1) to remove the deterrent to industrial activity in atomic energy presented by the risk of very great financial loss arising out of liability claims in the event of a catastropic nuclear accident, and (2) to assure the availability of sufficient funds to satisfy the liability claims of the public if such an accident were to occur. The number of utility power reactors presently operating, under construction, and being seriously considered, in the United States, demonstrates that the statute has served, and is continuing to serve, the first of these two objectives. The care and skill exercised by scientists of the Government and industry have been such that there has not been a catastrophic accident. The second objective has not, therefore, been tested either in terms of the sufficiency of amount or effectiveness of the form of protection provided.

There is a continuing need for this indemnity in its present form as a means of removing the deterrent to industrial participation. Section 170 was amended during the last session of Congress to provide that the protection afforded by an indemnification agreement would apply to facilities for which a construction permit has issued prior to August 1967.

RESOLUTION OF OUTSTANDING INDEMNITY PROBLEMS

We recognize that some provisions of section 170 of the act have been the subject of controversy. Among these are (1) the levels of private insurance which are required as a condition to entering into the indemnification agreement between an operator and the Atomic Energy Commission; (2) the relationships between various State legislation regarding the assessment of liability as opposed to concepts of absolute and channeled liability; and (3) the applicability of statutes of limitations with regard to the time in which claims resulting from a nuclear incident must be brought.

We concur in the view expressed in the Commission's report that the consideration of these subjects should continue but such consideration should not cause any delay in the extension of the expiration date of section 170 to August 1, 1977.

We believe the act should continue to specify a limitation of liability in the amount of $500 million with initial resort to available private insurance coverage, that is, $60 million, for the satisfaction of allowable claims. In view of the lack of any experience in handling and satisfying significant claims, we feel the required insurance coverage should be maintained at the present levels up to the $60 million maximum amount. By this, I mean at least $60 million.

The Atomic Energy Commission's study of the Price-Anderson legislation and its implementation since 1957, as it applies to the utility industry, is thoughtful and well-considered in respect of the action which they believe should be taken at the present time. We believe

that the Atomic Energy Commission has demonstrated its ability to properly administer all of the provisions of the Price-Anderson legislation and that the Commission should continue in its administration of these responsibilities.

I appreciate this opportunity to present the views of the Babcock & Wilcox Co. to this committee.

Chairman HOLIFIELD. Thank you, Mr. Harrison.

Mr. Price?

Representative PRICE. I think, Mr. Harrison, you have already clarified one question which occurred to me. That is, you stated in your original statement that you believe that the private coverage should be maintained at the present level up to $60 million maximum amount. You clarified that yourself.

Mr. HARRISON. I reread it and I could see that it could be taken two ways, so I clarified it. We say at least $60 million.

Chairman HOLIFIELD. But you have no objection to private insurance companies offering to insure up to $90 million?

Mr. HARRISON. I have no objection to that.

Chairman HOLIFIELD. Or $100 million.

Mr. HARRISON. I have no objection to that at all. If you can get them to do it, sir.

EXPERIENCE TO BE GAINED IN NEXT 10 YEARS

Representative PRICE. Now realistically speaking, are we going to acquire enough experience by 1977 to be in a better position than we are today?

Mr. HARRISON. I believe we are.

The witnesses who have preceded me have made statements in that respect and I concur with them in every respect. I believe that a shorter extension would leave us in a position just as we are today and that 10 years is the minimum I would say. I don't think it needs to be any more. I think it is a good time for another evaluation.

SUBSIDY

Representative PRICE. Do you think that the protection granted under the Price-Anderson act can be taken as a subsidy to the utilities or contractors in this program?

Mr. HARRISON. Some people may believe that that is the end result. However, I do not look at it that way. I consider that the indemnification is a protection of the public. That was the original intention of the law.

Representative PRICE. That was the original interest of this committee, the third party liability and protection of the public in the event of a nuclear incident or accident.

Mr. HARRISON. That is correct, and I consider it that way. I do not look upon it as a subsidy of the industry because it is really only a potential subsidy, if it were such. I look upon it as the Congress protection of the public.

Representative PRICE. That is all I have.

Chairman HOLIFIELD. Mr. Hosmer?

Representative HOSMER. Mr. Harrison, Babcock & Wilcox has some atomic business overseas, does it not?

Mr. HARRISON. Yes, sir.

Representative HOSMER. You have some separate companies or affiliates or subsidiaries or something?

Mr. HARRISON. The companies in Europe which bear the name Babcock & Wilcox are connected in no way with us except by agreements, mutual agreements. In other words, there is no financial connection or stock or ownership connection.

Representative HOSMER. These two other Babcocks & Wilcoxes——

Mr. HARRISON. There are three or four of them. Mr. Babcock and Mr. Wilcox started the company in America. They branched out to London in 1890. Three years later they decided it was a poor risk and so sold out to British interests, sold the name with them and there has been no connection between the two companies since except for the use of the name and some technical agreements which we continually have, exchange of patents and things like that. We are sort of like distant cousins.

Representative HOSMER. All the other Babcocks & Wilcoxes——

Mr. HARRISON. They are branches of the English.

Representative HOSMER. Do you have some contractual arrangements or agreements with them?

Mr. HARRISON. We have agreements with them, yes.

Representative HOSMER. You do business together in that sense?

Mr. HARRISON. We do business in that sense. I believe one of the ones you are referring to is the business we are doing with the German Babcock & Wilcox at the present time.

Representative HOSMER. Does your atomic energy division do business with any of these other people with the same name?

Mr. HARRISON. Yes, we do. We exchange information back and forth, write letters. We don't actually fabricate things for them. We don't actually do design work for them. It is more in the nature of exchanging ideas, studies, and things like that.

Representative HOSMER. Are you familiar with the conditions under which they operate with respect to the possibility of liability?

Mr. HARRISON. Yes, we are with the Germans.

Representative HOSMER. Specifically the German. Is it a better situation under the German law than under Price-Anderson, just roughly from the business standpoint of the company?

Mr. HARRISON. I don't know the details of the conditions over there well enough to make a determination. All I know is that they have an upper limit of $125 million instead of $500 million, but that is a diffence in their judgments which their judges hand down compared to the judgments which our judges hand down.

Representative HOSMER. Would it be better for you if we had a $125 million limit here?

Mr. HARRISON. Not necessarily.

Representative HOSMER. You don't have to pay for it anyway. All you have to do is to buy $60 million worth of insurance.

Mr. HARRISON. That is it. We do pay incidentally for some indemnification under the Price-Anderson, ourselves, to a very small degree for our test reactors and things like that.

Representative HOSMER. Would you be just as happy if we brought this down from $500 to $400 million?

Mr. HARRISON. I don't think that I care very much—I care, of course, but what I mean is that I am in no position to judge whether $400 million is a better figure than $500 million.

Representative HOSMER. Or $600 million?

Mr. HARRISON. Or $600 million.

Representative HOSMER. Thank you.

Mr. HARRISON. It is just somebody's guess.

Chairman HOLIFIELD. Mr. Anderson.

Representative ANDERSON. Mr. Harrison, I don't know whether you are the proper person to ask this question or not, but because of your long experience as a supplier to the utility industry has it been your experience over the years that private insurance companies have steadily improved coverage and increased coverage of these liability policies that they issue to utility companies protecting against boiler explosion or damgaes, off-site damages that might arise because of something happening in a conventional plant?

Mr. HARRISON. Yes; the relationships and the coverage have been completely adequate, much better today than that was previously.

Representative ANDERSON. Of course there has been no indemnity agreement of any kind in existence with respect to these types of plants?

Mr. HARRISON. No.

Representative ANDERSON. Do you feel that with the continued existence of this $500 million Government cushion that thisw ill serve as a disincentive in any way to the private insurance industry to correspondingly broaden and increase and improve the coverage which it now makes available to the utility companies with respect to nuclear plants?

Mr. HARRISON. I really don't think that I could answer that. Possibly it might. I had not thought of it.

Representative ANDERSON. That is all I have, Mr. Chairman.

Chairman HOLIFIELD. Thank you, sir.

Mr. HARRISON. Yes, sir.

Chairman HOLIFIELD. The last witness will be Mr. Richard Bokum, United Nuclear Corp. Mr. Bokum.

STATEMENT OF WALTER A. HAMILTON, VICE PRESIDENT, UNITED NUCLEAR CORP.

Mr. HAMILTON. Mr. Bokum is not able to be present this afternoon. Since I have been chairman of the Price-Anderson study group for the Atomic Industrial Forum and deeply involved with this matter for an extensive period of time, he asked me to come in his place.

My name is Walter A. Hamilton. I am a vice president of United Nuclear Corp., a company engaged in the nuclear fuel cycle and reactor industries from uranium mining through complete fuel and plant systems.

I want to express the appreciation of United Nuclear for this opportunity afforded by the Joint Committee on Atomic Energy to present our views in support of extension of the Price-Anderson Act.

The Price-Anderson Act which would be extended from 1967 to 1977 by the proposed legislation has been of crucial importance to encouragement of the growth of the private nuclear industry in at least two respects. Both the customers for nuclear powerplants and

the suppliers of such plants and their nuclear fuel suppliers have had the protection and encouragement the act affords to their investments. Without this, the use of nuclear power would surely have developed less rapidly. Without competition from nuclear power, the cost of electricity in the United States now and in the years ahead would be higher. The shift of much of the cost of development of peaceful uses of nuclear energy from the Government to private enterprise would not have proceeded. These are developments which are not only in the interest of the nuclear industry and its customers, but in the public interest as well.

Introduction of new technologies frequently arouses public concern. Because the initial uses of nuclear energy were military and resulted in vast destruction, it was only natural that public concern regarding this new technology was unusually high. The Price-Anderson Act gave the necessary assurance that application of peaceful uses of nuclear energy would not create unreasonable financial risks for the public. The growing public acceptance of nuclear power which has been achieved since 1957 is evidence of the success of the approach taken in the Price-Anderson Act. There is no question but that the continued availability of the protection afforded by the Price-Anderson Act is an important factor in decisions of utilities to buy nuclear powerplants, of manufacturers to offer to build them, of fuel suppliers to serve them, and of the general public to accept them. Because of the leadtime required, the August 1, 1967, termination date in the law means this year in actual practice. No one can predict what the effect would be on the nuclear industry if the proposed extension to 1977 is not enacted. It is clear that all three interested parties would have to reassess the outlook—utilities, manufacturers and fuel suppliers, and the public.

We see nothing basic which has changed since enactment in 1957. Nuclear power has proved an effective stimulant to competition in the energy field. The commercial practicality of nuclear power is no longer just a hope but is within sight of demonstration. The public has come increasingly to understand the distinction between military and civilian uses and to accept nuclear technology in the same way as it has come to accept other new technologies.

But neither has anything changed to eliminate the need for Price-Anderson. The act stands as a positive affirmation that development and use of nuclear power is in the public interest. Not to extend the date would seem to imply that something has changed. Undoubtedly, some would interpret such action by the Congress as evidence that nuclear power no longer holds any special risks and does not need this specific assurance. Others might hold, however, that the Congress no longer felt that it could give such assurance and that further application of nuclear power was in some manner now to be discouraged.

FOREIGN IMPLICATIONS OF INDEMNITY LEGISLATION

There is another important and complex reason for extension. The United States has encouraged other nations individually and collectively to create comparable indemnification systems. These systems not only protect the public but American suppliers as well. In many instances the level of coverage provided is far below that

set forth in the Price-Anderson Act. In these, it is especially important for American manufacturers and fuel suppliers that the indemnification aspect of Price-Anderson be upheld in fact and in principle. Certainly many companies would have to reconsider their participation in oversea nuclear markets if their exposure to risk were unlimited above some arbitrary and often relatively low level.

Many other arguments for extension have been advanced. United Nuclear particularly urges consideration, however, of these two very simple reasons—

> The original reasons for enactment continue to be valid and failure to extend could lead to invalid but damaging negative conclusions;
>
> An entire system of coverage and indemnification has been encouraged and built upon the principles established in Price-Anderson; its elimination could lead to similar action by other nations and groups of nations to the detriment of American participation in the foreign nuclear market.

This position is not different because United Nuclear is an integrated nuclear fuel cycle supplier. Our interests stemming from domestic uranium mining and fuel fabrication are identical with those of our ultimate customers—the utility industry and consumers of electric power. We, therefore, urge adoption of the proposed legislation.

Thank you, Mr. Chairman.

Chairman HOLIFIELD. Thank you, Mr. Hamilton.

The Chair would just like to note for the record that Mr. Hamilton was for many years, up until about 1956, on the staff of the Joint Committee and helped to develop the Atomic Energy Act of 1954, as an amendment to the original McMahon Act. We are always glad to have you before us.

Mr. HAMILTON. Thank you, sir.

Chairman HOLIFIELD. Mr. Price?

URGENCY OF EXTENSION OF INDEMNITY LEGISLATION

Representative PRICE. Mr. Hamilton, evidently you feel that there is an urgency to enactment of this legislation for the extension of the act this year rather than wait another year to do that?

Mr. HAMILTON. Yes, Mr. Price, I do. I think that by the end of this year, by the time the Congress goes out of this session, utilities who are exploring and investigating competitive approaches to additions to their power systems, if they are uncertain as to what will happen with Price-Anderson beyond 1967, inevitably will tend to put the weight in their estimates and in their evaluations on the conventional systems.

I think therefore this will become a disadvantage for nuclear power.

Representative PRICE. You also seem to attach great importance to the effect that this would have on existing international agreements that our suppliers and so forth have throughout the world if we fail to extend this act.

Mr. HAMILTON. Yes. This is a matter in my mind of the United States having shown great leadership in tackling a very difficult

problem and a case where our leadership has been effective; our lead has been picked up and followed by not only individual nations but by many groups of nations now. These conventions and treaties have not all gone into effect, but I think we are moving in the direction of getting the coverage and these are quite essential to us.

Representative PRICE. That is all I have, Mr. Chairman.

Chairman HOLIFIELD. Mr. Hosmer.

Representative HOSMER. Mr. Hamilton has lost none of his persuasiveness since the years he has left here. He has demolished all the strawmen I tried to set up. I think I can report to him and also to the committee the great step forward in allaying public concern relative to nuclear safety. After making several speeches on it around the country I got a letter and a copy of a civil defense bulletin on which was a large mushroom cloud on the cover and sitting in front of the mushroom cloud was an atomic electric generating station. After tracing the thing down to the Office of Civil Defense, they denied they had anything to do with it and the Defense Department denied having anything to do with it, I found out that the Public Printer over here designs these covers. He has now promised to put a new cover on this publication.

Mr. CONWAY. He has already done so. I have the new one.

Representative HOSMER. I have no questions.

Mr. HAMILTON. I would like to say, Mr. Chairman, this is one of the problems I think this industry still faces. It is very easy for people who are trying to get a headline or who are not aware of our problem of safety to do just the kind of thing Mr. Hosmer cites. These then go out in very large numbers around the country.

Representative HOSMER. They write magazine articles too, don't they?

Mr. HAMILTON. Yes, sir; they do. These are not people who are responsible for looking into the problems of the business. They are people who are trying to sell copy.

Representative HOSMER. Do you want to name anybody specifically or do you just want to leave it there? You had better leave it there.

Mr. HAMILTON. Let me say that they are a very, very tiny minority of the press.

Chairman HOLIFIELD. Thank you, Mr. Hamilton.

Mr. HAMILTON. Thank you, Mr. Chairman.

Chairman HOLIFIELD. That concludes our list of witnesses for today. Tomorrow the committee will convene at 10 o'clock. The list of witnesses for tomorrow will be Mr. Brice O'Brien, general counsel of the National Coal Association, Mr. Joseph E. Moody, National Coal Policy Conference, Mr. Robert T. Person, Public Service Co. of Colorado, and Mr. Adolph J. Ackerman, consulting engineer from Madison, Wis.

In the afternoon we will return to our original schedule for Tuesday afternoon and we will have the various witnesses from the insurance associations and liability underwriters that are engaged in furnishing the $60 million from private insurance. We will also have Professor Cavers of the Harvard Law School and a spokesman for the Edison Electric Institute, Mr. James H. Campbell.

The committee is adjourned.

(Whereupon, at 4:10 p.m., Wednesday, June 23, 1965, the committee adjourned to reconvene at 10 a.m. Thursday, June 24, 1965.)

PROPOSED EXTENSION OF AEC INDEMNITY LEGISLATION

THURSDAY, JUNE 24, 1965

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON LEGISLATION,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to recess, in room AE–1, the Capitol, Representative Chet Holifield (chairman of the Joint Committee) presiding.

Present: Representatives Holifield, Price, Aspinall, Hosmer, and Anderson.

Also present: John T. Conway, executive director; Edward J. Bauser, assistant director; Leonard M. Trosten, staff counsel; George F. Murphy, Jr., professional staff member; James B. Graham, technical adviser; Jack Rosen, staff consultant; and William T. England, legal consultant.

Chairman HOLIFIELD. The committee will be in order.

The Subcommittee on Legislation continues its hearings today on a proposed extension and amendment of the Price-Anderson legislation.

For the past 2 days we have received testimony which generally favored this legislation and its extension. Included among our witnesses this morning are several who are critical of this law and the bills currently before the Joint Committee.

We want to receive the comments of all interested and informed witnesses on this subject which is so important to the welfare of all Americans. The committee invited these comments in our press release which was issued last month announcing these hearings.

In a society as complex as ours is today, the best hope for enlightened legislation is to bring together, in a forum such as this, the individuals who are familiar with the problems we face together.

Our first witness today is the able general counsel of the National Coal Association, Mr. O'Brien.

Mr. O'Brien, this committee has in the past complimented you on the clarity and candor of your testimony. We are happy to have you with us again today.

Please go ahead.

STATEMENT OF BRICE O'BRIEN, GENERAL COUNSEL, NATIONAL COAL ASSOCIATION

Mr. O'BRIEN. Thank you, Mr. Chairman.

I would like to save about 7 minutes of my time to comment on the testimony presented to this Committee in the last 2 days. For that purpose I have prepared a very brief summary of my formal presentation. I would like to read it and have the full presentation inserted in the record in full, if you please.

Chairman HOLIFIELD. That will be followed as you wish.

(Statement referred to follows:)

STATEMENT OF BRICE O'BRIEN, GENERAL COUNSEL, NATIONAL COAL ASSOCIATION, ON THE PROPOSED EXTENSION OF THE PRICE-ANDERSON ACT

Mr. Chairman:

My name is Brice O'Brien. I am general counsel of the National Coal Associtaion, which represents commercial producers and distributors of bituminous coal in the United States.

Our purpose in appearing today is to urge rejection of two identical bills—H.R. 8496 and S. 2042—which would extend the Price-Anderson Act for 10 years, or until August 1, 1977. We intend to suggest for your consideration what we are confident is a logical alternative to the present Price-Anderson Act, an alternative that will remove inequitable burdens from members of the public and from the coal industry as well.

It is necessary first, I believe, to outline the provisions of the act, since some of what we regard as the most important provisions of this law are not understood fully by the public and the press.

First, the Price-Anderson Act requires the operator of an atomic powerplant to purchase the "maximum amount" of commercial liability insurance available, to cover not only his own responsibilities but also those of the reactor manufacturer and others who, under ordinary provisions of law, might have financial responsibility for damages caused by the plant.

The "maximum amount" of commercial liability available at the present time is $60 million. There have been some indications that the insurance company pools will soon agree to raise this by a few million dollars.

Second, for a nominal fee, amounting to about $50,000 per year for a 500,000-kilowatt atomic powerplant, the AEC guarantees to insure the next $500 million in damages arising out of a "nuclear incident." Unlike the $60 million in commercial liability insurance, however, this $500 million in Goverment indemnity is available on a repeat basis, to cover each individual licensed plant with the same amount of protection.

The third provision of Price-Anderson is by far the most important from the standpoint of the public. And in our opinion it is by far the least understood.

In substance, this provision requires members of the public to subsidize atomic powerplants by being involuntary self-insurers, without compensation, for damages in excess of the $560 million combined private insurance and Government indemnity protection provided under the act. It requires this by establishing an arbitrary limit on the "aggregate liability" of persons responsible. The act provides that if the public liability from a "single nuclear incident" will probably exceed the limit of liability, the appropriate U.S. district court having jurisdiction in bankruptcy matters shall have authority to apportion payments from the specified fund among the injured persons, and these injured persons shall thereafter have no recourse to anyone for the balance of the uncompensated damages.

In fact, the total amount available for payments may be something less than $560 million. The act permits the total fund to be used to meet "the reasonable costs of investigating and settling claims and defending suits for damage." It also permits the district court to set aside "a part of the funds available for possible latent injuries not discovered until a later time."

This no-recourse provision—the arbitrary limitation of liability—seems to have escaped public knowledge and understanding completely. Very little publicity has been given to this provision of the act in official Government state-

ments. In the Commission's recently published study of the act there are some statements which recognize the existence and importance of the no-recourse limitation, but we submit that these statements are hard to find and hard for the general public to understand.

The general tenor of the AEC study is that the Price-Anderson legislation is necessary "(1) to assure the availability of funds to satisfy public liability claims in the event of a catastrophic nuclear accident; and (2) to remove the deterrent to industrial activity in atomic energy presented by the threat of enormous liability claims if such an accident were to occur."

I submit that proper attention to its responsibility to inform the public fully would have required the Commission to change the foregoing language of the Price-Anderson report to read in part as follows: "(1) to assure the availability of some funds to satisfy in part public liability claims * * *."

In a subject as complex as atomic energy, there is a peculiarly heavy duty on the part of informed persons to keep the public advised of all the facts. I do not believe this duty has been adequately discharged.

In discussing the AEC study and the Joint Committee release announcing these hearings it appears that no member of the press has even recognized the existence of the no-recourse provisions in the Price-Anderson Act.

The Joint Committee release, dated May 27, 1965, does not refer to the existence of the no-recourse provision. The release explains the substance of the act in these words:

"The act affords protection to the public and to AEC licensees and contractors from the risks associated with atomic energy by providing for a program of private insurance and governmental indemnity amounting to more than $500 million to cover damages that conceivably could arise from a nuclear accident."

Those portions of the act dealing with the private insurance and the $500 million Government indemnity do make a contribution to the protection of the public. But this is only half the story. Your colleagues in the Congress and the members of the public are entitled to know the rest of the story.

The no-recourse provision of the Price-Anderson Act—which the bills before you would extend for 10 years—does not afford protection to the public. Instead, this peculiar portion of the act removes protection which otherwise would be available under general rules of law.

Whether such an unusual provision is constitutional seems to warrant serious consideration. Perhaps it deserves to be considered by the Judiciary Committees which have had a great deal of experience in determining such questions. In any event, it should be recognized that grounds used in the past to justify this provision, and precedents cited in past discussions, are no longer the final answer.

Three specific grounds for justification were stated in the Joint Committee report on the 1957 Price-Anderson legislation. The first of these was stated by the Joint Committee as follows:

"Since many of the reactors which will be built will be producing special nuclear material which is vital for the defense of the country, it is in the interest of the common defense and security to see that these companies are protected in their operations by having moneys available to them for payment of public liability claims and having limitation of liability proceedings available when those funds are insufficient."

This argument can no longer be used to justify the propriety or constitutionality of this limitation of liability. It has been officially recognized by the Chairman of the AEC, in a letter to the Joint Committee, that there is no foreseeable military market for the byproducts of atomic powerplants. In the Chairman's own words, "the only large-scale ultimate use of power-reactor-produced plutonium now foreseeable is as fuel in power reactors." This view has been substantiated by the recent cutbacks in the production of weapons material in AEC-owned facilities because of the apparently abundant supplies now on hand.

The second reason stated in the 1957 Joint Committee report as justification for this unusual invasion of the ordinary rights of citizens—the limitation of the right to recover damages—was as follows:

"Since title to special nuclear material is in the United States, Congress has special powers and duties with respect to the use of that material."

Last year Congress adopted legislation permitting and later requiring private ownership of nuclear fuel. By the time atomic powerplants for which construction permits are granted subsequent to August 1, 1967, are in operation, they will be using privately owned fuel. It is obvious, therefore, that this ground for constitutionality of the no-recourse provision of Price-Anderson no longer has any validity.

In discussing the no-recourse provision, the Joint Committee set forth a third justification in its 1957 report, as follows:

"One of the other constitutional bases for the limitation of liability program is the bankruptcy power of the United States for it is improbable that any firm could survive claims against it of $500 million, over and above the insurance which might be available."

This reason was invalid in 1957; it is even more so today. It was invalid in 1957 because the "bankruptcy" jurisdiction of the United States is based on the assumption that most of the assets of the bankrupt have been used to pay creditors to the extent possible. Under the Price-Anderson scheme, however, no assets of the utility operating an atomic powerplant are subject to claims by persons suffering damages.

In addition, this excuse was invalid because of the assumption that no firm could survive liability claims of $500 million. Such a statement might justify the furnishing of $500 million in government indemnity, but it certainly did not—and does not—justify eliminating all liability of the company itself. It should be kept in mind that there are several firms, including utilities and manufacturers of atomic reactors, which have assets substantially in excess of $500 million.

I believe the foregoing discussion of the reasons advanced by the Joint Committee in 1957 for constitutionality of the no-recourse provision—a provision giving both the manufacturer and the operator of an atomic powerplant complete freedom from financial responsibility, at the expense of the public—shows clearly that these reasons no longer have any validity. I believe also that the reasons now given by the AEC for extending the Price-Anderson Act, as it stands, are equally without foundation.

Basically, the AEC's Price-Anderson study recommends a 10-year extension for two reasons:

First, "to assure the availability of funds to satisfy public liability claims in the event of a catastrophic nuclear accident."

As I have pointed out previously, such a statement may justify furnishing government indemnity in the amount of $500 million to cover damages in excess of the $60 million available from commercial insurance companies. But it cannot justify the no-recourse provision—the provision which limits the legal right of the public to recover damages—since the no-recourse provision reduces the amount of funds otherwise available to satisfy such claims.

Second, "to remove the deterrent to industrial activity in atomic energy presented by the threat of enormous liability claims if such an accident were to occur."

Statements made by the Atomic Energy Commission, atomic power reactor manufacturers, and the utilities themselves indicate that this reason for continuing the no-recourse provision is equally unfounded. The public record is replete with expressions of the utmost confidence in the safety of atomic power plants. The public has been assured time and again by those who should know that there is no danger to the public in operation of today's—and tomorrow's—atomic power plants. Thus it would appear that there is now no "deterrent" to industrial participation in atomic power "presented by the threat of enormous liability claims" in the event of a "catastrophic nuclear accident." The projections of increasing growth of atomic powerplants appear to bear out our conclusion that no deterrent is presented by the "threat" of a "catastrophic nuclear accident."

At this point, let me turn for a moment to the so-called precedents for legislation subjecting the public to a limitation of recovery of damages. It has been asserted in the past that such precedents exist in the Warsaw Convention governing international airline operations, and in legislation limiting the amount of damages which can be recovered in the death of an employee.

Every person is presumed to know the law, whether in fact he does or not. Therefore, every traveler who purchases a ticket on an international airline does so with knowledge that he agrees, by his actions, to assume a risk under circumstances where his recovery of damages will be limited by law. He consents, in effect, to the limitation.

Likewise, in accepting employment an employee does so with the legally imputed knowledge that the amount of recovery for an accident in that job is limited by law. Again, he consents, by his actions, to the conditions limiting his recovery.

As far as the members of the public are concerned, there is no such consent in matters pertaining to construction and operation of atomic powerplants. Under the Atomic Energy Act, the Government has preempted the field of radiation hazards control with respect to atomic plants.

On June 11, 1963, the present Chairman of the AEC told the president of the New York City Council, in commenting on proposed local bills to prohibit operation of a nuclear reactor in New York City:

"It appears that there is a substantial question as to whether the bills, if enacted, would be valid under the Constitution of the United States * * *. The Atomic Energy Act and its legislative history express the congressional intent that the control of the radiation hazards from certain facilities, including nuclear reactors, be the exclusive responsibility of the Federal Government."

This interpretation has been confirmed this year in comments made by the Commission to the Joint Committee on a bill—H.R. 448—introduced by Representative Leonard Farbstein, of New York. This bill would end the Government's preemption of authority and reestablish the right of the States and political subdivisions to ban atomic reactors.

The AEC told the Joint Committee it is opposed to Representative Farbstein's bill, pointing out once again that the Atomic Energy Act "and its legislative history express a congressional intent that control of radiation hazards from certain facilities, including nuclear reactors, be the exclusive responsibility of the Federal Government."

Under these circumstances, I think it is clear that Congress has said to the States and the local communities:

"You may not bar an atomic powerplant because of fear of radiation hazards, whether you want one in your community or not."

And in the limitation-of-recovery provision of the Price-Anderson Act—the no-recourse provision—Congress is saying to the citizens of the States and the local communities:

"Furthermore, if something goes wrong with an atomic powerplant, we are depriving you of your normal legal right of redress."

I do not believe, therefore, that there is any "consent" justification involved here, as there is in the case of the international airline passenger, for example. The precedents cited by supporters of the limitation of liability do not apply.

In rounding out the reasons why we believe you should refuse to extend the Price-Anderson Act, as recommended in the pending bills, let me mention very briefly the considerations we have put before you in greater detail in prior appearances before the Joint Committee.

There is enough low-cost coal to serve the energy needs of this Nation for generations to come. There is no need for a "crash" program to supplant coal with atomic power—and indeed there are definite disadvantages to the economy inherent in such a program. Fortunately, the United States is blessed with such an abundant supply of low-cost coal that we can enjoy the advantages, both financial and otherwise, which are inherent in the orderly development of atomic power without continued artificial stimulation.

In the present state of uncertainty, we assume there should be some logical alternative to the current Price-Anderson Act. If, as the AEC asserts, some form of Government indemnity is required in order to permit continued development of atomic power, we believe we should suggest an appropriate alternative course of action. We believe the following course of action meets the needs of the Government, the atomic power industry, and the public.

We suggest with respect to atomic power plants built and operated in the future a program to provide that:

1. Government insurance be made available, in any amount desired, to supplement the maximum amount of commercial insurance available.
2. Government insurance be made available at rates reasonably commensurate with commercial rates.
3. Ordinary rules of law be made applicable with respect to liability for damages in excess of the amount of Government insurance purchased.

The course of action we suggest here involves two difficult decisions.

—First, the Government must decide what rates are reasonably commensurate with commercial insurance rates.

—Second, each utility operating an atomic power plant must decide how much insurance it feels is necessary for reasonable protection of its assets against the risks involved.

Let me discuss each of these questions in turn.

As to the first question—that of deciding what rates for Government insurance would be reasonably commensurate with commercial rates—we find some evidence in the public record already made before the Joint Committee. It is true, of course, that the first $10 million of insurance coverage costs considerably more than the second $10 million, and so on down the line. But it would appear that most insurance companies would insist on a premium amounting to at least $1,000 per year for each additional $1 million in insurance.

This information is found in the testimony presented before the Joint Committee during consideration of the then pending Price-Anderson legislation. Speaking of conventional powerplants, Charles J. Haugh, representing the Nuclear Energy Liability Association, said in part:

"Mr. HAUGH. * * * Within my own organization, sir, as a rule we don't want to hazard a million dollars on such a risk for less than a thousand dollars premium a year. I mean excess of several million. We would like at least a thousand dollars for every milion of insurance we write on such a risk.

"The CHAIRMAN. Even for a conventional plant?

"Mr. HAUGH. That is right. Some have purchased it for somewhat less. I have seen a quote of one for $700 for a million of insurance in excess of $5 million. I don't care to write it for that. I have to write too many of them for the loss that happens at $700 apiece. I mention that only for the purpose of comparison * * *."

There is additional evidence which indicates that $1,000 per year per million dollars of insurance would be a fair premium to be charged by the Government under the alternate program we suggest. The liability insurance pools offer $60 million in insurance for premiums which, if the refund features materialize, may be in the order of magnitude of $170,000 a year, or an average of nearly $3,000 per million. The utilities voluntarily pay a substantially higher rate than this for insurance against damage to their own atomic powerplant.

The second question—that of how much insurance a utility should buy from the Government under our suggested program—would be left entirely to the utility management's evaluation of the risks to which the company's assets would be exposed.

Many utilities have told the public, as you know, that atomic powerplants are perfectly safe. Under these circumstances, such utilities probably would be content with, perhaps, $500 million in Government insurance in addition to the commercial liability insurance available. In the event that some utility managers feel a greater risk is involved, they would be able to cover such a risk by purchasing a greater amount of Government insurance.

In any event, under the alternative program we suggest, the members of the public would not be denied their ordinary legal rights to proceed against the assets of the utility operator of an atomic powerplant if the damages exceed the amount of insurance available from the commercial insurance industry and the Government.

Mr. Chairman, I believe the course of action we are recommending for the Joint Committee is both sound and reasonable in the light of the present and potential development of atomic power. I believe also that this course of action will take the subsidies out of the Price-Anderson Act and, in the bargain, do two important things:

1. It will restore the ordinary legal rights of the public to full compensation for damages.

2. It will restore the right of the coal industry to compete on equitable terms for its share of the electric utility fuel market.

In conclusion, I have one further suggestion to make. If the Joint Committee sees fit to reject the course of action we suggest and sees fit instead to recommend to Congress that the Price-Anderson Act be extended, consideration should be given to extending the act for a period less than the 10 years recommended in the bills before you. In 1957 the Joint Committee expressed the hope that a 10-year period of experience would result in nongovernment solutions to the problems involved here. "During the 10-year period," the Joint Committee stated, "it is hoped that there will be enough experience gained so that the problems of reactor safety will be to a great extent solved and the insurance people will have had experience on which to base a sound program of their own."

If you feel the Price-Anderson Act must be extended, you can stimulate efforts of private enterprise to solve the problems involved by making the extension cover a period of less than 10 years. Subsidies quickly become imbedded in the law. If the atomic power industry is led to expect automatic 10-year extensions or renewals of this subsidy, you cannot expect private enterprise to make serious efforts to take care of these problems.

We appreciate the opportunity to present to you our views on what we regard as one of the most important pieces of legislation to come before the Congress in this session.

Mr. O'BRIEN. Thank you, sir.

The National Coal Association represents the producers and distributors of commercial bituminous coal in the United States.

NO-RECOURSE PROVISION

We believe that the public does not understand the existence and meaning of the no-recourse provision of the Price-Anderson Act, the provision limiting total liability to the sum of the insurance available plus the $500 million Government indemnity.

In a matter so complex as atomic power, we think there is a high duty to give the public adequate information in understandable language. The $500 million indemnity furnished by the Government contributes to the ability of the public to recover damages for atomic catastrophe.

The no-recourse provision does not do so. Instead, it deprives the public of legal rights to proceed against the assets of the manufacturers and operators of atomic plants. In many cases these are worth far more than $500 million.

We believe there is serious doubt as to whether this no-recourse provision is constitutional. Certainly the grounds used to justify its constitutionality in 1957 have vanished. The defense needs no longer enter into the picture, since it is now conceded that the byproducts of these plants will not be used for military purposes.

Government ownership of fuel has vanished, or will have vanished by the time the plants affected go into operation. The bankruptcy power of Congress cannot be used to justify total excuse from liability.

The two primary reasons given for extending the act appear to be without foundation, at least with respect to the no-recourse provision. The no-recourse feature does not "assure the availability of funds to satisfy public liability claims in the event of a catastrophic nuclear accident."

The elimination of the no-recourse feature would not constitute a deterrent to the growth of atomic power, because the atomic power industry has repeatedly assured the public that these plants are safe.

The Government has preempted the authority of State and local governments to bar an atomic power plant on the sole grounds of fear of radiation. In the no-recourse provision, Congress is saying, "Furthermore, if something goes wrong with an atomic powerplant, we are depriving you of your normal legal right of redress."

GOVERNMENT INSURANCE PROGRAM

We propose the following program:

1. Government insurance should be made available in any amount desired to supplement the maximum amount of commercial insurance available.

2. Government insurance should be made available at rates reasonably commensurate with commercial rates. We suggest $1,000 per $1 million.

3. Ordinary rules of law should be made applicable with respect to liability for damages in excess of the amount of Government insurance purchased.

The course we recommend would restore the ordinary legal rights of the public to full compensation for damages. It would also restore the right of the coal industry to compete on equitable terms for its share of the electric utility fuel market.

If you disagree with us and feel that Price-Anderson must be extended, you will stimulate efforts of private enterprise to solve the problems involved by making the extension cover a period shorter than 10 years.

Subsidies quickly become imbedded in the law. If the atomic power industry is led to expect automatic 10-year extensions, you cannot expect private enterprise to make serious efforts to take care of these problems.

CONDITIONS CHANGED FROM 1957

Now, with respect to the testimony presented to this committee in the past 2 days, one of the items that was repeated on several occasions is that you had good reasons to pass this act in 1957, and those same good reasons exist today; nothing has changed.

Gentlemen, something has changed. In 1957 you were going to extraordinary lengths in an effort to bring into existence a new industry, a new source of energy. That effort has succeeded. Today you are dealing with an industry which is fully capable of standing on its own feet.

I hold in my hand a pamphlet published by General Electric. It is entitled "The Economics of Conventional Nuclear Power." GE says, and I quote:

> Computer studies of a typical 3,500 megawatt system show that a nuclear expansion would produce a clear present worth saving over a fossil expansion when fossil fuel costs are 19 cents per million B.t.u. or higher.

The average cost of coal used by the utilities in the United States today is about 25 cents per million B.t.u. The atomic power industry has arrived.

Another item deals with protection for the public. Witness after witness has told this committee that Price-Anderson protects the public.

The no-recourse provision does not protect the public. Instead, it deprives the public of ordinary legal rights, and it should be eliminated.

On the question of deterrent, when I prepared my statement, which was prior to these hearings, I asserted that our proposal, including the

elimination of the no-recourse provision, would not be a deterrent to the growth of atomic energy.

I made that assertion because I took at face value the statements which the atomic power industry has made to the public, statements indicating that these plants are safe, and we would not build them unless they were safe.

I have been astounded to find witness after witness coming before this committee and stating that they would not build these plants unless the no-recourse provision is continued.

I cannot explain the inconsistency. I do not believe that any witness before you has explained the inconsistency.

Another matter deals with the confidence of the insurance industry. In these hearings the view has been expressed that the insurance industry has shown its confidence in atomic plants by offering to increase the coverage a few million dollars, coupled with rate reductions.

I think it should be pointed out that the total coverage of radiation risk by the insurance companies has been decreased, not increased. They are writing into their casualty policies covering homes, factories, and office buildings an exclusion of damage from radiation.

CONSTITUTIONALITY OF NO-RECOURSE PROVISION

On the question of constitutionality, the General Counsel for the Atomic Energy Commission told this committee on Tuesday he has no doubt that the no-recourse provision is constitutional. Apparently he disagrees with at least one of his predecessors.

In the 1956 hearings on indemnity [1], at page 43, the AEC stated in a prepared statement:

> We have carefully considered the approach of limitation of liability and do not recommend this method, primarily on account of doubts as to constitutionality of this approach. Also, limitation of liability does not offer the degree of protection to the public that is offered by the indemnity or reinsurance approach.

SHIP OWNERS LIABILITY ACT

Now, the Ship Owners Liability Act has been offered in these hearings as the nearest precedent for the no-recourse provision. In that act Congress expressly refused to limit liability where the owners were negligent or privy to the negligence of the master and crew of the ship.

If the no-recourse provision goes before the Supreme Court, I believe the Court in determining its constitutionality will give great weight to the fact that this provision, the no-recourse provision, gives immunity from responsibility for negligence, and is therefore repugnant to the conscience.

I believe this committee should also give great weight to that fact in determining whether or not to extend the no-recourse provision.

The next matter deals with congressional consideration in the event of a catastrophic accident. It has been asserted before this committee that in the event of such a catastrophe, where damages exceed the $560 million, Congress will then weigh the circumstances and decide whether to furnish additional funds, and if so, in what amount.

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[1] See JCAE hearings, "Governmental Indemnity", May 15, 16, 17, 18, 21 and June 14, 1956.

Congress can do this without the no-recourse provision. I see no reason why this Congress should preclude some future Congress from determining that in the circumstances of reality the utility or the manufacturer was negligent and should bear some portion of the cost of the damages.

If the catastrophe is caused by an act of God, by an airplane accident, by sabotage, or other cause outside the scope of the operators' responsibility, Congress may very well decide that the Government should bear the total cost.

If no-recourse is extended, you will deprive Congress of the opportunity to let negligence meet with financial responsibility.

PUBLIC REASSURANCE

The final item I want to talk about is the question of reassuring the public.

It has been asserted in these hearings that extension of Price-Anderson would reassure the public that the Government and the atomic power industry have faith in the safety of atomic powerplants.

If the members of the atomic power industry want to reassure the public of their faith in the safety of atomic powerplants, they can do so in a very simple and direct manner. They can say to this committee, "Eliminate the no-recourse provision. We don't need it. We feel sure that our plant will not cause more than $560 million damages to the public. We feel so sure that we are willing to back our opinion by letting our assets be subject to the ordinary rules of law."

In other words, gentlemen, I think the time has come for the members of the atomic power industry to talk to this committee in the same way they talk to the members of the public.

Thank you for the opportunity to be heard, Mr. Chairman.

WORKMEN'S COMPENSATION STATUTES

Chairman HOLIFIELD. You are certainly welcome, Mr. O'Brien.

On this limitation of liability, you speak of this as though it is something new. However, we are all aware that there is a limitation of liability provision in workmen's compensation statutes affecting coal mine owners and operators, and others.

If a man is killed in a mine, or if he is injured, if his leg is cut off, there is a limitation of liability under the workmen's compensation act as to what has to be paid for a particular type of injury or casualty. Isn't that true?

Mr. O'BRIEN. That is true, Mr. Chairman, but if you will think a moment, you will agree with me that that involves an element of consent. When a man goes to work in a coal mine, in a factory, he knows what the law provides. Even if he does not know the law, he is imputed with that knowledge. He consents to those provisions by accepting employment.

The householder who lives next to an atomic plant has no voice. Congress has preempted his voice in the location of that atomic plant.

Chairman HOLIFIELD. The workmen's compensation laws of the different States also deprive the injured person of ordinary rights of unlimited suit for liability. Isn't that true?

Mr. O'BRIEN. That is true. But again——

Chairman HOLIFIELD. Everybody has to work for a living, and of course they have to consent to a situation in West Virginia or Kentucky where they work in the coal mines—they either have to consent to it, or they have to go without a job.

Mr. O'BRIEN. Or seek employment in some safer industry.

Chairman HOLIFIELD. Or seek employment elsewhere. The argument on consent it seems to me, falls on the basis of the fact that a limitation exists on liability. That is the main point that is involved. And it exists because of law.

Mr. O'BRIEN. Mr. Chairman, the workman is allowed under the law to choose his risk, to select which risk he will take. If he is afraid of coal mining, he can become a stenographer, if you will, where the risk is not so great.

The citizen living next door to the Enrico Fermi plant does not have that choice, unless he wants to get rid of his house and move.

Chairman HOLIFIELD. The man who selects another job, if he wants to go into coal mining and he lives in West Virginia he may have to go out to Colorado. He may have to move and sell his house and go out there.

Mr. O'BRIEN. That is correct.

I would like to point out one additional point, though.

WRONGFUL DEATH STATUTES

Chairman HOLIFIELD. Of course if he goes into stenography, there is a limitation there, too, although the risk is probably far less. Workmen's compensation laws apply to a sweeper of the floor or janitor or other professions.

It is true that they can select less hazardous employment, if they have the skills for it, but that still does not in my opinion affect the fact of the constitutionality and the actuality of limitation of liability. I have never heard anyone say that the so-called wrongful death statutes in a number of the States, which fix the amount recoverable, are unconstitutional.

Mr. O'BRIEN. I believe those are State statutes, aren't they, Mr. Chairman?

Chairman HOLIFIELD. Aren't the State statutes subject to constitutional review? We are looking into quite a number of State statutes on voting in Mississippi, Alabama, and a few places like that.

Mr. O'BRIEN. The States still have some, I grant you there are very few any more—the States still have some powers that the Federal Government does not have.

WAR POWER OF FEDERAL GOVERNMENT

Chairman HOLIFIELD. That is right, of course. Do you disagree that the interstate commerce and war powers of the Federal Government provide a constitutional basis for the limitation of liability features of Price-Anderson?

Mr. O'BRIEN. I want to speak first of the war powers.

In 1957 it was assumed that the war powers entered into this because you would need some of this plutonium to make bombs. It is

conceded that is no longer the case. Your war powers could enter into this only on the basis that every industry in the country is important to the country.

I cannot believe that Congress would, under the present circumstances, uphold the constitutionality on the basis of the war clause.

POWER TO REGULATE INTERSTATE COMMERCE

Chairman HOLIFIELD. How about the interstate commerce clause?

Mr. O'BRIEN. Under the interstate commerce clause I grant you there is some possibility it may be upheld.

As I said, I think there is serious doubt. Nobody can tell you. Mr. Hennessey cannot tell you, I can't tell you, only the Supreme Court, when they finally vote, can tell you whether the statute is constitutional.

Chairman HOLIFIELD. Has there been an attempt to challenge the constitutionality of this on the part of your organization, Mr. O'Brien.

Mr. O'BRIEN. No one has standing to sue, Mr. Chairman, until there has been an accident.

I do think on the interstate commerce clause it has been repeatedly held that even where Congress has authority under the commerce clause that the law which they enact must be reasonably designed to accomplish a proper end. And I suspect the court would say that because of the commerce clause, Congress has some jurisdiction in this field.

My view is, my prediction is, that if a case goes up involving negligence, the Court will say that this was not a reasonable means to an appropriate end.

LIMITATION OF LIABILITY OF AEC CONTRACTORS

Chairman HOLIFIELD. Do you intend your argument about the constitutionality of the Price-Anderson law to apply to AEC contractors as well as licensees, and to nonprofit educational institutions?

Mr. O'BRIEN. No, sir. We are concerned from the competitive standpoint with plants producing commercial power.

From the theoretical standpoint, we assume, we don't assert, but we assume, that there is justification for whatever special provisions may be necessary to enable the AEC to accomplish activities in the field of space and military efforts.

Chairman HOLIFIELD. Then if you accept these other functions of contractors and licensees, you accept them on the basis that they are not competitors. Do you object to the reactors, the utility's nuclear reactors, strictly on the basis that they happen to be competitive to your industry?

Mr. O'BRIEN. I don't think that is quite correct, Mr. Chairman. If I said it that way, I did not mean to.

Chairman HOLIFIELD. I do not want to put words in your mouth. If I misquoted you, please clarify it.

Mr. O'BRIEN. If the Government is acting by or through its contractors, the Government has constitutional authority to do what it will. You cannot sue the crown, except to the extent that the crown permits you to sue. The Government does have clearly the authority to limit its liability in such situations.

Chairman HOLIFIELD. We are faced with a situation which, of course, is not to your liking because it does provide another factor of competition in the field, and I understand that. I certainly think that you are within your rights to appear before the committee and protest this additional competitor of coal.

But we do have many of these reactors that are being operated. There undoubtedly will be many more, because they are either under negotiation or construction. So we are faced with a situation which, rightly or wrongly, exists.

Now, which do you think will provide greater protection to the public? This system, the Price-Anderson legislation, with its requirement of financial protection and Government indemnity, subject to a limitation of liability, or the system which you apparently propose, which leaves the protection of the public up to the decision of the individual organizations, some of whom may be irresponsible or without assets to satisfy any type of substantial claim?

You quoted organizations that do have tremendous assets, but there are also other organizations working with these reactors whose total assets I think are considerably less than $560 million.

FINANCIAL RESPONSIBILITY

Mr. O'BRIEN. Mr. Chairman, we did not propose to change that provision of the act which says that the AEC shall not issue a license unless it is—I am not using the exact words, I don't recall them—unless it is satisfied that the operator has financial responsibility.

Mr. CONWAY. Suppose the negligence is determined to be not that of the reactor operator, but of some component manufacturer, someone who manufactured a piece of equipment? If you follow the normal common law tort rules, the person legally responsible may not be the reactor operator.

Mr. O'BRIEN. I believe, Mr. Conway, that the record of past hearings is replete with discussions of the legal theories, the various legal theories, and most of them seem to agree that in the event of an accident the operator under one theory or the other will be held to absolute liability. A manufacturer will probably be held to be responsible only if negligence can be established.

Mr. CONWAY. I just suggest to you that this is not absolutely clear. This is some interpretation of what one might expect would happen. The definiteness which we have in the insurance and indemnity pattern established under the Price-Anderson Act would not apply, and we would be left in a very questionable position until we actually had a case and the legal doctrine became established.

Mr. O'BRIEN. Mr. Conway, I think when you spoke of the definiteness in Price-Anderson, the questionability of that description was brought out by questions the other day.

If you have a catastrophe, Congress is going to have to meet it. There are simply no funds available to pay it. There has to be an appropriation. I would suspect that in the event of a real catastrophe, the first person will get paid off in 5 years.

Mr. CONWAY. I am not talking about a real catastrophe. I am not talking of something that goes over $500 million. I am talking of something that may be $10 million, $50 million, maybe a hundred million dollars.

UMBRELLA PROTECTION WOULD CONTINUE

Mr. O'BRIEN. I should make myself clear. In our proposal when we said make available insurance to them in whatever amount they want, we were envisioning that the insurance would be on the same basis it is today. It would cover all parties.

Mr. CONWAY. The point we are making is that in the case of the act as it stands today, there is a requirement of the amount of insurance and indemnity which each reactor operator must have. There is a very definite amount of money that will be available to the public.

As we understand your proposal, you would leave this up to the individual utility who may in its own discretion decide to take $10 million, for example, or less insurance.

Mr. O'BRIEN. Not completely within his own discretion. It would be within his own discretion subject to the authority of the AEC to assure itself that sufficient financial protection is available.

Mr. CONWAY. I do not think that was clear, but if that is your intention, that will clarify your proposal.

Mr. O'BRIEN. Yes, sir.

COMPARATIVE INSURANCE COSTS FOR NUCLEAR AND CONVENTIONAL POWERPLANTS

Chairman HOLIFIELD. Why does the Coal Association say that the indemnity and limitation of liability program gives a nuclear plant an inherent economic advantage over a fossil fuel plant? The conventional plant operator is not required to maintain the financial protection required of the nuclear plant.

It was testified yesterday by one of our witnesses, I believe it was the witness for the Philadelphia Electric Co., that a plant of a certain size would cost him $221,000 for nuclear insurance, while a conventional plant of the same size would cost him only $18,000 for insurance. (See p. 73.) It seems to me that if the utility comes forth and pays $221,000 annually for a nuclear plant, as against a conventional plant for which only $18,000 is required for the same size kilowatt plant—it would seem to me that the conventional plant has quite an advantage on that point, at least.

Mr. O'BRIEN. Mr. Chairman, when you speak of advantages, we have advantages over nuclear in some fields. They have advantages over us in others.

We have a slight advantage, at least we hope we do, in the capital cost of the plant. They apparently have a fairly substantial advantage over us in the fuel cost. We have an advantage in the operating and maintenance cost, other than fuel, which includes insurance cost.

The insurance costs on coal plants are very, very low because coal plants are not only safe, but the operators and insurance companies know that they are safe.

I think it has been assumed that they are paying these high premium costs because the law requires them to. The Oyster Creek plant in its economic analysis has indicated that the first $60 million of private insurance, and the law does require this, is $170,000 a year.

Now, there is $500 million from the Government, and the law does require this, at a cost of $48,000 a year. That is a total required by law of $218,000 to protect the members of the public.

The Oyster Creek people are voluntarily paying a premium of $379,000 to protect themselves against the loss of their own plant. You do not have to force these people to buy insurance. If you make it available, they are going to buy it, if they are going to build these plants.

Chairman HOLIFIELD. But it is a much higher economic cost.

Mr. O'BRIEN. On that one element. On the total elements, which is where they decide to build a plant or not, we unfortunately cannot say the same thing.

Chairman HOLIFIELD. Do you have any questions, Mr. Price?

Representative PRICE. No questions.

Chairman HOLIFIELD. Do you have any questions, Mr. Conway?

Mr. CONWAY. No, Mr. Chairman.

Chairman HOLIFIELD. Thank you, Mr. O'Brien, for your testimony.

Mr. O'BRIEN. Thank you, Mr. Chairman.

Chairman HOLIFIELD. Our next witness is Mr. Joseph E. Moody, president of the National Coal Policy Conference, Inc.

Mr. Moody.

STATEMENT OF JOSEPH E. MOODY, PRESIDENT, NATIONAL COAL POLICY CONFERENCE, ACCOMPANIED BY GEORGE WEIL

Mr. MOODY. Good morning, Mr. Chairman and gentlemen.

Chairman HOLIFIELD. Good morning, gentlemen.

Mr. MOODY. I have with me my associate and counsel on atomic matters, Mr. George Weil, in the hopes he may be helpful in answering some of the technical questions, and I hope you have no objection.

My name is Joseph E. Moody. I appear here as president of the National Coal Policy Conference, Inc. The conference is an industrial complex built around the bituminous coal industry of the United States, and its membership is made up of coal operators, the United Mine Workers of America, coal-carrying railroads, coal-burning electric utitlities, and manufacturers of all kinds of equipment and machinery used by these industries.

I received a copy of a statement by W. A. Boyle, president of the United Mine Workers yesterday. I am told that was to be inserted in the record. Is that correct?

Chairman HOLIFIELD. If you request it, we will be happy to.

Mr. MOODY. I want to make sure it is in the record. I am not sure just what handling it has had.

Mr. TROSTEN. We have received a copy of Mr. Boyle's statement. There has been no written request that it be inserted in the record.

Chairman HOLIFIELD. Do you make that request?

Mr. MOODY. I do so.

Chairman HOLIFIELD. It will be received. (See app. 11, p. 322.)

Mr. CONWAY. Yesterday a representative from the United Mine Workers did approach me, and stated that they wished to have it put in the record.

Mr. MOODY. I called them, because the carrying letter I saw did not say to do anything about it. I was just checking.

Chairman HOLIFIELD. We will receive it.

Mr. MOODY. Thank you.

We appear here to discuss the extension of the Price-Anderson Act from 1967 to 1977, as recommended in the bills now before this committee, H.R. 8496 and S. 2042.

We have been told by very knowledgeable people that the nuclear power industry considers the insurance coverage provided by Price-Anderson of such importance that if it were not extended, the development of this new power industry would not only be slowed down, it would be stopped in its tracks.

SUBSIDY

As I am sure the members of this committee are aware, the NCPC has at no time ever opposed the development by private capital of the nuclear power industry. We have objected strenuously to the interweaving of vast Government subsidies into its structure by its enthusiastic advocates in the Government and Congress.

This emphasis on forced feeding has reached extreme measures in some instances.

One of these subsidies, of course, is the system whereby the Government provides indemnity protection for operators of nuclear plants at a negligible fee, compared to the cost of the limited amount of private insurance which the Nation's insurance companies are willing to risk against this hazard.

Our testimony today is directed to this massive Government operation which has been justified as being necessary to satisfy public demand for assurance that financial protection against the potential catastrophe of a nuclear accident will be provided.

We are aware that, even though all who should be in a position to know insist that the likelihood of a serious accident at a nuclear plant is remote, nevertheless very few plants would ever be built if this multi-million-dollar risk protection were not available.

Officials of Jersey Central Power & Light Co. have stated explicitly that without this Government-provided protection, they would not build their Oyster Creek plant.

I have listened attentively to the presentation of Mr. Brice O'Brien, general counsel of the National Coal Association. His very carefully thought out and clearly expressed recommendations have the full support of the National Coal Policy Conference.

They would provide an important step toward recognizing the cost of hazard insurance as a necessary and proper cost of the production of nuclear power. This is no different from the proper allocation of cost in other industries which have peculiar or particular characteristics.

Electric powerplants using fossil fuels must go to heavy expense to control effluents which might pollute air; coal producers spend millions of dollars to prevent stream pollution and to restore mined-over land; airlines and railroads must carry heavy indemnity insurance, and so on.

Thus, we insist that it is only just that the nuclear power industry consider as a normal cost of doing business the premium required to provide whatever insurance coverage they need.

At present, most of this coverage is provided by the $500 million indemnity offered by the Federal Government, and any claims against this would have to be paid by the general funds of the U.S. Treasury.

We think this is unjust and that, over the long term, some system must be devised whereby the Nation's taxpayers are not held in

escrow to nourish the nuclear power industry, but instead, the hazards of a catastrophic accident, or, if you wish, a nuclear incident, are provided for by persons who consume nuclear-produced power as a normal and proper part of their rates.

RATES FOR GOVERNMENT INDEMNITY

To accomplish this, I suggest a plan which would augment the proposals Mr. O'Brien has made; namely, to immediately provide that nuclear plant operators should assume a more equitable premium cost for the hundreds of millions of dollars of insurance now provided them, and to eliminate the unrealistic limit on liability, but, at the same time, permit utilities to purchase as much indemnification from the Government as they feel the hazards of a nuclear plant operation require. I will explain my additional proposal presently.

Some 8 years ago the Congress saw fit to pass the Price-Anderson Act, and, at that time, there was considerable discussion as to the reasons for it and the obligations that were involved.

Perhaps because Congress was dealing in an entirely new field, the legislation which emerged was a sort of poultice. It quieted the fears of the public over the unknown hazards of this new nuclear industry, but at the same time it took the pressure off the industry to attack the basic problem, which is for the industry itself to provide for public protection against these unknown hazards as a normal part of its cost of doing business.

The Joint Committee has recently issued a publication entitled "Selected Materials on Atomic Energy Indemnity Legislation," [1] which is very helpful to an understanding of this entire question, and to the considerations which originally resulted in passage of the Price-Anderson Act.

10-YEAR EXTENSION

This study certainly makes clear that, at the time Price-Anderson was passed, it was the belief of Congress that after 10 years sufficient experience would be available to provide for a complete revision of what certainly at first was a "stopgap" measure.

And yet, if my understanding is correct, the AEC at this time is not prepared to recommend any legislation, other than a simple extension of the act for a second period of 10 years. That is, "substitute August 1, 1977, for August 1, 1967." (Ref. p. 3, JCAE print.)

To that quote, I might add one more, "The lab'ring mountain scarce brings forth a mouse." (Horace Bartlett's Familiar Quotations, p. 41b.)

The AEC study states, and I quote:

> Our review has identified a number of topics with respect to which further consideration by industry, Government, and interested members of the public appear to be desirable * * *
>
> As to none of the items * * * does it appear important to reach a conclusion before adoption of legislation extending the act" (page 3, JCAE print).

[1] JCAE print, June 1965.

This may be the AEC's considered opinion, but from our point of view, we think there should be certain amendments, and we don't believe they should be further delayed, because, if they are, then in all probability 10 years from now they will simply ask for another extension and subsidized Government protection, provided by all taxpayers, and not by the consumers of nuclear power, will be a permanent policy.

BROOKHAVEN STUDY

It is also rather curious to us that, with full knowledge that this hearing was coming up in this session of Congress, and that the Joint Committee was to consider this important piece of legislation, a little special effort on the part of the Brookhaven Laboratory people could not have produced their new, basic evaluation for determining potential damages in the event of a nuclear accident.

The NCPC has consistently taken the position that the Price-Anderson Act represents a very substantial subsidy to the operators of nuclear powerplants producing electricity for commercial or public use.

We feel that this subsidy is probably greater in the sense of its being a blank check on the U.S. taxpayers to back this new industry. This is far more significant than the actual monetary assistance involved.

The problem and the potential hazard, as we have followed it through these years, is ever greater. To quote from a recent speech of Commissioner Palfrey:

> Since 1957, our experience has accumulated, but at the same time reactor sizes have increased and sites closer to population centers have been permitted.

Commissioner Palfrey has, perhaps inadvertently, highlighted the crux of our position. The fact that utilities are building larger nuclear powerplants, and locating them closer to population centers, is a formidable indication of the reasons reactor operators demand the protection of the Price-Anderson Act.

It has been argued that Price-Anderson is not a subsidy, since a modest premium is paid, and, more importantly, it costs the taxpayers nothing unless there is a catastrophic accident.

Mr. O'Brien, in his testimony has ably covered this area. However, there is a part of it that I think he did not cover, and I believe is of special pertinence at this hearing.

1957 VIEWS OF CHAIRMAN HOLIFIELD

The committee print, to which I referred earlier, contains a section entitled "Separate Views of Representative Holifield * * *" There are some five pages of this presentation by the very able chairman of this committee. While the section is not dated, it appears to be a part of the report in 1957 when the Price-Anderson Act was being considered.[1]

I commend the committee and Chairman Holifield for including the statement in their report, since it clearly and concisely expresses the very cogent reasons why the Government should not be in the business of insuring the safety of atomic plants as a Federal subsidy, and,

[1] See JCAE print, "Selected Materials on Atomic Energy Indemnity Legislation," June 1965, p. 130.

particularly, since recent statements by the chairman have indicated that his views may have changed.

I cannot, of course, say what has caused the chairman to alter his position, but his original statement is accurate and timely.

EFFECT OF PRICE-ANDERSON LEGISLATION ON REACTOR SAFETY

Chairman HOLIFIELD. I might say to the gentleman if there is any doubt in his mind because of the lack of a date on my statement I will be glad to clarify this matter. It was a part of the Joint Committee report dated May 9, 1957, on the bill which was enacted as the Price-Anderson Act, Public Law 85–256.

It was my opinion at that time, and my fear was expressed in that regard, that the issuance of Government indemnity might cause a tendency on the part of the manufacturers and the users of these reactors to let down on their safety requirements.

My genuine concern for safety, which was in existence at that time, has continued to this very day. During the intervening years I have consistently held forth that the most dominant concern should be the concern for safety of our people.

I have taken not only many hours of testimony on the subject of safety, but I have had many conferences with the AEC and with the ACRS. We even went so far as to make the ACRS a statutory, independent body so that it would not be subject to promotional ideas of those who were anxious to put these plants into being; so that they would at all times have independence of judgment and make their decisions for the benefit of the safety of the people without any fear of bureaucratic influence upon them.

During those intervening 8 years, we have accumulated experience. We have also accumulated a tremendous amount of engineering knowledge, and we have engineered into these plants safeguards which were not in existence in the plants that were built in 1945 and on up to 1954. Many of the plutonium reactors are still operating to this very day, notwithstanding the fact that they are not engineered as carefully as the civilian-type reactors that we have today.

I see nothing inconsistent in expressing concern for the public interest and then following up that concern with tangible efforts on my part to remove the reason for that concern. I feel that I have done that.

Mr. MOODY. Mr. Chairman, my use of these quotations was not in a manner of disrespect or antagonism.

Chairman HOLIFIELD. I understand that.

I requested that they be in the committee print because the Joint Committee wants to do everything that it does in a fair way. This chairman of the committee is not so proud as to be willing to hide something that he said at a previous time in order to make a certain side of the issue look better. I think the public is entitled to what I have said in the past, and what I say today.

Mr. MOODY. Mr. Chairman, quite obviously its inclusion in the book was with your full knowledge and intent.

Chairman HOLIFIELD. That is right.

Mr. MOODY. Also, knowing you over the years, and we both have been around quite a few of those, there was another thought, that

probably in reading it over, yourself, you had the same reaction that I did, that here was a very clear-cut, a very thoughtful evaluation of a situation.

Chairman HOLIFIELD. That is right.

Mr. MOODY. Some of it has developed exactly the way you anticipated it. But I thought also in reading it over that there was the other thought, which I am now following in my testimony, that unless something further is done about it, we may spend a lot more time coming to some effective means of eliminating this situation than otherwise would take place. That is the reason for my use of the testimony.

It is all the more intriguing to use because of the fact that recently I had the opportunity to discuss the extension of Price-Anderson with individual members of this committee.

EXTENSION OF ACT IN PRESENT FORM

From these discussions, I have the impression that there are doubts as to whether the extension of Price-Anderson in its present form is, indeed, good for the nuclear power industry. In fact, it was stated that it tended to present a massive facade to the public indicating a lack of confidence on the part of Congress and, indeed, of the utilities themselves in the extremely complicated machines used to produce nuclear power.

The alternative would be to take a strong positive approach and let Price-Anderson expire, which might well develop an industry guided and operated only by those who had confidence in it.

Several parts of Chairman Holifield's presentation, as expressed in the report to which I referred, are particularly pertinent to the position we take on this question, as shown by the following quotes:

> It would provide another Government subsidy to atomic power development without any commensurate benefits to taxpayers and power consumers.
>
> It would place upon the Federal Government an enormous potential liability that could reach several hundred billion dollars.

Later we find the following paragraphs which further spell out the objections he raised at that time:

> This bill is put forth by its proponents as a bill for the protection of the public. This amounts to making a virtue out of a subsidy. The bill is protective of large utilities, industrial companies, and insurance companies which are not willing to adhere to the tenets of free enterprise.

In a summary, the chairman made the following comment, with which we agree wholeheartedly:

> This bill is not a minor technical amendment to the Atomic Energy Act. It is a major piece of legislation. It goes far beyond anything I know in committing the Federal Government to future liabilities without any clear understanding or basis in experience as to the nature or the magnitude of those liabilities.

Eight years later the statements of the chairman apply just as sharply as they did then, and, unless something is done to amend the Price-Anderson Act and it is simply extended for 10 years, these very serious objections will remain valid.

I would like to take the time to read his statement in full at this hearing, but I realize that that is impossible in the time allotted to me. I therefore respectfully request that the complete text, pages 130

through 135 of the recent committee print, be inserted in the record immediately following my testimony.

Chairman HOLIFIELD. We have already printed the complete text in a Government document, so that won't be necessary.

Mr. MOODY. All right.

"PROVEN-TYPE" POWER REACTORS

There is, certainly, nothing at present to change the pertinence of Chairman Holifield's views. On the contrary, we are now operating and constructing "proven power reactors," and encouraging the utilities with Price-Anderson and other subsidies to build more and more of the same.

This is so, even though the AEC has now admitted that these plants will use or commit all of our low-cost uranium resources in about 30 years—the estimated lifetime of a single plant.

This is not the time nor the place to discuss the AEC's reactor development program. I have testified on this subject before, and I am sure that members of the committee are aware of our position.

This is the time, however, to eliminate the subsidies to nuclear power development involved in the Price-Anderson Act as it now stands.

SUBSIDY

It is interesting to realize that the AEC, the JCAE, and the congressional appropriation committees have all agreed that no subsidies will be provided "proven type" reactors, and yet, in the face of the fact that Price-Anderson represents a substantial subsidy, there is no suggestion by any of these groups that Price-Anderson protection be withdrawn from such reactors.

In 1963, the AEC submitted, at the request of the Joint Committee, a study of the types of subsidies and assistance, both direct and indirect, that occur in atomic power. With regard to governmental indemnity, the study states:

* * * it is not possible to estimate by extrapolation what the probable commercial indemnity rates might be in excess of the $60 million because of the small number of power reactors presently in operation, the wide variation in commercial insurance rates for different reactors due to considerations other than size or power level, and the provisional nature of the premiums during the first 10 years. Thus, the monetary value of assistance provided by Government indemnity cannot be estimated. JCAE, 202 hearings, February 1963, app. 3, pp. 243–244.)

On the basis of the overwhelming evidence that Price-Anderson is in fact a massive subsidy, it becomes very difficult to find an excuse for its extension in its present form.

The fact that the amount of subsidy cannot be estimated is hardly a reasonable argument. In 1957 the Government requested the private insurance companies to provide third party liability insurance and to establish premiums on the basis of considerably less experience than is available now in 1965.

The private insurance in an amount limited to $60 million for any plant has been provided by groups of insurance companies, but at a premium far greater than the nominal cost charged by the Government for the additional $500 million in indemnity for a nuclear plant.

RATES FOR GOVERNMENT INDEMNITY

Mr. O'Brien's proposal, which we strongly endorse, would require an immediate adjustment to bring the rates for the Government insurance more clearly in line with that which would be charged by private companies, if they were to assume the risks inherent in nuclear plant operation, even though they would still not be commensurate with the potential hazard.

As I have said, I propose an additional amendment which would have the merit of eventually replacing the Federal Treasury as the guarantor of this indemnification, without which apparently the nuclear power industry would come to a halt.

In this connection, I would like to quote and comment on a statement made by Commissioner Palfrey in his address to the Atomic Industry Forum. He declared:

> Since the full utilization of our energy resources demands the development of commercial atomic power, and since such development poses, however remotely, risks of catastrophic damage, the risks should be borne by those who benefit. Thus, those injured by a nuclear accident should be made whole by the consumers of energy (through private insurance reflected in the price of the energy) and, in case of a catastrophe, by the taxpayers of the country as a whole, who are the ultimate beneficiaries of abundant power.

Commissioner Palfrey defines a nuclear accident as one which can be covered through private insurance, and a catastrophe as one in which the financial burden must fall upon the taxpayers of a country as a whole.

I find this a strange and, to my mind, arbitrary classification, particularly in view of the fact that the continuing goal of AEC appears to be to encourage private insurance to assume ever-increasing coverage.

It certainly is our hope that there will be a time when the private insurance companies will, indeed, carry the full and total liability. At this point I assume that, under Commissioner Palfrey's definitions, a nuclear catastrophe would become only a nuclear accident.

This does point up the tremendous importance of adding to the Price-Anderson Act a provision by which private industry will bear, as a proper part of the cost of producing power with nuclear machines, the realistic expense of covering this liability.

NUCLEAR LIABILITY FUND

To accomplish this, we recommend that in addition to the amendment suggested by Mr. O'Brien, the Price-Anderson Act should also be amended to provide that a certain amount be assessed to utilities benefiting from Government insurance to create without undue delay a fund from which any damages caused by nuclear accidents would be paid.

We suggest that this payment be based on the number of kilowatt-hours of energy produced in each plant, and that such payments should continue for the term of extension of the Price-Anderson Act.

If this is to be through 1977, there should be a provision that prior to that time the situation be then reevaluated, and a determination made as to whether it is necessary to continue it at the cost level established, to increase or lower the rate of payment.

We suggest that this assessment should be based on 1, 2, or 3 mills per kilowatt- hour, whichever it is determined will build a cumulative fund within a reasonable time and yet not be unduly burdensome on nuclear plant operators.

This charge would not be excessive when we consider the drastic reductions in nuclear power cost which have taken place in just a few years, as well as further anticipated marked reductions in the future.

Certainly it is not when we consider the potential obligation as identified by Chairman Holifield in the section we have previously referred to. On page 132 of the committee print,[2] he is quoted as follows:

> If 100 such reactors were operating, surely not a great number in a country such as this, the burden of potential liability would be $500 billion.

This is an awesome amount of money, even in the United States in 1965, and even in the nuclear industry. If the potential hazard is this great, it certainly points to the justification of companies operating nuclear plants to produce commercial power for sale being required to bear, under the long term, at least a substantial part of the cost of insurance protection.

Chairman HOLIFIELD. Let us look at that for just a minute.

While it is probably true in the way it was said, it is like saying if every man in the United States that has life insurance dies there will be many billions of dollars worth of money paid to the survivors, if there were any.

Of course this is a true statement, but it is an unlikely incident to occur, as you very well know. It is very unlikely that 100 reactors would have a catastrophic accident, just as it is unlikely that every automobile on the highway will be in a wreck today and kill everybody in them.

Mr. MOODY. The automobiles come much closer to that day by day.

As far as the catastrophic accident, I happen to be one of those people——

Chairman HOLIFIELD. Let us not talk about potential liability as if it were actual liability, as you continuously do here.

Mr. MOODY. The Price-Anderson Act is a peculiar animal along that line. It tends to give that kind of impression. Evidently that is what has happened. There is some kind of basic psychological problem in the nuclear industry, otherwise, we would not have any Price-Anderson.

Chairman HOLIFIELD. The gentleman knows very well why that is. It stems from the fact that nuclear energy was used first in weapons and destroyed the cities of Hiroshima and Nagasaki, and created in the people's mind a fear of atomic energy.

The same fear might well have been put in their mind concerning gasoline if the first gasoline refinery had blown up and eradicated a town. We know that gasoline is highly explosive. We know that many high explosives are used in our society. Chemicals are conducive to high explosive damage, but we learn to live with them and work with them as time goes on, on the basis of knowing their properties and knowing how to control their properties.

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[2] See Joint Committee print, "Selected Materials on Atomic Energy Indemnity Legislation," June 1965.

Of course, that is what we are doing with nuclear energy.

Just like you had to do with the first boilers. The boiler incident or blow-up rate is I am sure much less percentagewise than it was when we first started making boilers.

Mr. MOODY. I am sure of that. The Hartford boiler insurance companies became very rich maintaining high rates long after it was necessary.

Chairman HOLIFIELD. The life insurance people are doing that today, too, by the way. They are maintaining rates based on obsolescent tables of mortality which have no relation to the present rates of mortality, and then they better their percentage further by eliminating anybody who has had a kind of illness that they don't like. So that is part of the money making system that we have.

Mr. MOODY. What you are doing is proving my point for me. My whole contention here is that this is a characteristic of this industry, and as a characteristic, as someone told me a long, long while ago in labor relations, the fact that it was thought to be a fact made it a fact even though it was not a fact.

Chairman HOLIFIELD. You have to deal with the fears of people, whether they are founded or unfounded.

Mr. MOODY. That is right. So we have here a characteristic of this industry, an industry that is coming along very well, from anything I can tell.

All we are asking is that they say, "All right, in our industry we have certain characteristics. Other industries have certain characteristics. Then it should be reflected in the cost of the product. The consumer should pay for the product a proper costing of its production."

That is all I am saying. That is what you are outlining for me, that this is a very deeply ingrown characteristic of this industry.

Chairman HOLIFIELD. I agree that this would be an ideal situation. It would be an ideal situation if the merchant marine operated with full support of that industry, and not with Government subsidies. It would have been an ideal situation if the railroads had not been subsidized with every other section of land.

Mr. MOODY. That is right, but with certain important qualifications.

Chairman HOLIFIELD. It would have been an ideal situation if the airplane companies, which are now carrying passengers by the millions in the United States, had built their own industry on their own research and development, but they did not. The Government has put in hundreds of millions and even billions of dollars into the production of airframe and air motors for the benefit of the American people. So no one will argue with you about the ideals, but we are talking about reality.

Mr. MOODY. We are talking about reality because we are being put out of business by it.

Chairman HOLIFIELD. No, you are not.

Mr. MOODY. That is about as real as you can get.

Chairman HOLIFIELD. You are selling more coal every year than you did the previous year.

Mr. MOODY. You know how hard it is to do that?

Chairman HOLIFIELD. Yes. I am a businessman along with being a Congressman. I have a private business. I know just how hard it is to operate in the business world.

Mr. MOODY. When you throw the weight of this sort of thing in the scale in a competitive job like we are up against in the fuel industry, and where coal has to compete on the lower end of the whole competitive graph, then I say to you, Mr. Chairman, this is something that has to be taken care of.

I think it is time it did. It has been going on 10 years. Then the AEC says, "Change the dot." But we don't happen to agree with them on certain things.

But I will go ahead.

Chairman HOLIFIELD. Go ahead.

INDEMNITY FEE BASED ON KILOWATT HOURS

Mr. MOODY. To indicate the results of the fee we have suggested, based on kilowatt hours produced by each plant, we have taken the AEC projection of nuclear power growth through 1980 as indicated on the chart on page 81 of the report of the hearings on the AEC authorizing legislation for fiscal year 1966. We have also used the publication entitled "Estimated Growth of Nuclear Power," put out by the AEC in March 1965.

On this basis, the following table shows the anticipated amount of nuclear generating capacity for the years 1965–80. We have then assumed 7,000 hours operation each year, and calculated the cost if one mill per kilowatt hour is charged as premium.

Columns 2 and 3 of the following table show, respectively, the annual contribution to the liability fund and the cumulative amount provided in each year through 1980.

(Table referred to follows:)

Forecast of nuclear capacity [1] and buildup of liability fund 1 mill per kilowatt-hour

	10^6 kilowatts	Annual total [2] 10^9 kilowatt-hour	Annual contribution [3] 10^6 dollars	Cumulative amount of fund 10^6 dollars
1965	1.0	7.0	7.0	7.0
1966	1.6	11.2	11.2	18.2
1967	2.8	19.6	19.6	37.8
1968	4.5	31.5	31.5	69.3
1969	6.8	47.6	47.6	116.9
1970	9.7	67.9	67.9	184.8
1971	13.1	91.7	91.7	276.5
1972	17.1	119.7	119.7	396.2
1973	21.7	151.9	151.9	548.1
1974	26.9	188.3	188.3	736.4
1975	32.7	228.9	228.9	965.3
1976	39.0	273.0	273.0	1,238.3
1977	45.9	321.3	321.3	1,559.6
1978	53.4	373.8	373.8	1,933.4
1979	61.5	430.5	430.5	2,363.9
1980	70.1	490.7	490.7	2,854.6

[1] Based on most recent AEC projections with yearly interpolations.
[2] 80 percent plant factor (7,000 operating hours per year).
Assuming premium at 1 mill per kilowatt-hour.

Mr. Moody. The Congress may decide it is necessary to increase it faster and decide on the figure of two mills or three mills per kilowatt hour.

The fund, which would be accumulated in 15 years under this plan, would be small compared to the potential liability when 100 or more plants are operating. Thus, we think that our proposal represents a reasonable and fair beginning toward the eventual necessity of taking the Government out of nuclear power insurance and that such an assessment would not materially affect the ability of nuclear plants to compete.

As it now stands, the Government's guarantee against the major hazards of the nuclear industry constitutes an important subsidy and distorts the true terms of competition between nuclear plants and conventional plants.

The cost of necessary insurance is a normal cost of doing business. It should be so recognized and integrated into the cost of power production by the nuclear industry, so that the consumers of such power pay for it knowingly.

We believe that the amendments suggested by Mr. O'Brien and myself would be important steps towards achieving the objective and cannot be seriously opposed by anyone who favors moving the commercial nuclear power industry into what has often been termed the "main stream" of private enterprise.

We strongly urge that the extended Price-Anderson Act reflect both these recommendations.

Thank you.

Chairman Holifield. Thank you, Mr. Moody. Your testimony is always challenging.

Mr. Moody. Thank you, sir. That is very nice.

I would like to say, and I don't care if it is on the record, that appearing before this committee is one of the more enjoyable things that happens to me. [Laughter.]

As soon as the hilarity dies down, I will say that sometimes I think it is also one of the most ineffective things I do. [Laughter.]

Chairman Holifield. I wouldn't agree to that fact. I think your testimony is very effective. It incites the sympathy of the members of the committee. We recognize the fact that you are in a competitive industry, but sometimes we think that the gas and oil people are giving you more competition than the nuclear people are.

Mr. Moody. Well, I can tell you on one of our problems right now, having to do with air pollution, we find ourselves working together.

Chairman Holifield. You are huddling together in common misery against society.

Mr. Moody. So be kind to us when we show up before your committee now.

Chairman Holifield. We have to be kind to these people who sell tobacco, for instance, that may cause cancer. We have to be kind to them. We have to be kind to you people who blow effluents into the air.

Mr. Moody. Mr. Chairman, you don't want in the record the statement that tobacco causes cancer, and I don't think you intended to have that in there.

DEPLETION ALLOWANCE

Chairman HOLIFIELD. Incidentally, the oil and gas business is subsidized by the Government with about a 27½-percent depletion allowance, aren't they? So you are up against a little unfair Government subsidy competition there, aren't you?

Mr. MOODY. Every once in a while we take a day off and we go after that, too.

Chairman HOLIFIELD. You only get 10 percent. Is that right?

Mr. MOODY. It is far too small. It certainly is far too small. I think some day we will be able to get it corrected. So far we have not been able to.

Chairman HOLIFIELD. You get about 8 percent depletion allowance?

Mr. MOODY. I believe that is right.

Isn't that right, Brice?

Mr. O'BRIEN. That is right.

Mr. MOODY. Do you want to comment on this, now that we have this opportunity?

Mr. O'BRIEN. I think the record should show that our other competitor, uranium, gets 23.

Mr. MOODY. Thank you, Brice. Sit down here. I need some help.

Chairman HOLIFIELD. When it gets to be as old an industry as the oil industry and coal industry, maybe it won't get so much. These are birth pains that we are bearing now.

Mr. MOODY. It bears on the testimony this morning, because quite obviously it has been set up without full knowledge of just what they do need, so I think in establishing this liability fund, in an effort to make sure that we have money available for this so-called incident, accident, catastrophe, or whatever you want to call it, it should be set up.

After all, we did set up a similar fund in social security to provide that people who benefit pay the costs. I think it is a method by which, if properly handled, funds provided by those who benefit from the power would be readily available to cover damages of several hundred millions of dollars if needed.

And it is not a large amount in any way at all, because when you think if you had 200 reactors or 100 reactors, or whatever number we are going to have, and I think there will be that many without any question, you do have a tremendous potential. Whatever it is, I don't know.

To have a situation where you would have to go to the Congress for special legislation for funds to pay for damages I think is not appropriate. I think the industry, because of this characteristic, should face up to it and recognize liability costs as a regular part of its business.

Chairman HOLIFIELD. Of course the industry is paying, as has been brought out before, for insurance for nuclear plants. They are paying at the rate of $221,000 for the same size nuclear plant that they would pay $18,000 for if it were conventional. Industry is certainly contributing from an insurance standpoint many times what it is paying for a conventional plant.

Mr. MOODY. Mr. Chairman, you put a similar statement to that in the record with Mr. O'Brien. I would like to point out that the very nature of those plants is not comparable on an itemized basis.

For instance, the stainless steel specially prepared container of a reactor fuel unit is not at all comparable in cost, construction, inspection, with the same container of a coal furnace.

There isn't any comparison. So, to make the comparison of the insurance is again to emphasize what I have been saying here, that we have this particular characteristic that pertains to the production of nuclear power.

The fact that it is $18,000 and $218,000 has nothing to do with it. It probably should not be $218,000. It, in all probability, should be $2,018,000,000, something like that.

Chairman HOLIFIELD. We are talking about liability insurance, not property insurance.

Mr. MOODY. All right, liability insurance.

Chairman HOLIFIELD. As a matter of fact, one reason why the insurance rate is so high is because we simply don't know yet. We do not have the statistical records.

The only way that you can proceed on insurance, if you don't have the statistical record, is to set an arbitrary sum which you feel will take care of any possible catastrophic incident, and go on that basis.

Mr. MOODY. Mr. Chairman, the only way we are going to have this experience is to have a catastrophic accident. If we do, I have 10 bucks that says every other reactor will be shut down for an awful long while after that, and you wouldn't get any insurance experience for a long while from then on. So I don't think that is a bona fide basis of argument. I just don't believe it answers the question.

Chairman HOLIFIELD. Mr. Price?

Representative PRICE. I have no questions.

Chairman HOLIFIELD. Mr. Hosmer?

Representative HOSMER. Mr. Moody, I am severely disappointed that I was not able to enjoy all your testimony this morning.

Mr. MOODY. Mr. Hosmer, I will be glad to accommodate you under any circumstances. You tell me where to be, and what time, and I will be there and we will put on all the spiel we have.

Representative HOSMER. I might not be there, and the place might not be satisfactory to you that I would suggest.

Mr. MOODY. You just try me on that.

Representative HOSMER. Now, we heard some testimony from the Florida Power & Light Co. yesterday about coal giving petroleum a hot foot down in the gulf area, as a competitive fuel for electric production. Is that correct?

Mr. MOODY. We hope so.

I have an authority on that here, if you want to discuss it seriously.

PUBLIC ASSISTANCE AFFECTING COAL INDUSTRY

Representative HOSMER. Let me ask you a couple of questions about it.

Where does that coal go? Into gulf ports?

Mr. MOODY. Mr. Hosmer, since you have asked the question, Mr. Blewett here is vice president of the Peabody Coal Co., which is the coal company that ships that coal into Florida. I am sure he knows a lot more about it specifically.

Since you are asking the questions, with your permission I will make him available to you.

Mr. BLEWETT. My name is W. G. Blewett, vice president, Peabody Coal Co., St. Louis, Mo.

Representative HOSMER. You are the man whose company is selling this coal down in the gulf?

Mr. BLEWETT. That is correct.

Representative HOSMER. What States are involved?

Mr. BLEWETT. Florida.

Representative HOSMER. West coast or east coast?

Mr. BLEWETT. West coast.

Representative HOSMER. Where does the coal come from?

Mr. BLEWETT. Immediately it will come from the west Kentucky coalfields.

Representative HOSMER. It is barged to Florida?

Mr. BLEWETT. It is barged down to New Orleans and transferred into an oceangoing tug across the gulf.

Representative HOSMER. It is barged down the Mississippi River and some of the other rivers, I guess.

Mr. BLEWETT. Yes, the Green River to the Ohio River, then down the Mississippi.

Representative HOSMER. The barges that carry it, I presume, take advantage of the navigation aids, dredging, and the other multimillions of dollars that have been spent by the Government in creating the inland waterways on which this travels.

Mr. BLEWETT. That is correct. But could I amplify this?

Representative HOSMER. Yes.

Mr. BLEWETT. All these waterway navigation projects come about because of acts of the Congress which make it almost incumbent on the engineers to develop these waterways, provided they meet a criteria set up by the Congress which is known as the benefit-to-cost criteria.

If the benefits to the general taxpayer are in excess of 1 to 1, then it is assumed to be a good project.

The reason that it comes out of the general fund is because it has been established over many years by the Congress that the general public gets the benefits from improving these waterways, and therefore they should pay for it out of the general fund.

Representative HOSMER. Well, any public benefit should be paid out of the general fund. That is a rule you don't argue with.

You are not arguing with this concept that you just described?

Mr. BLEWETT. No.

Representative HOSMER. In fact, it has enabled you to do business on the west coast of Florida, has it not?

Mr. BLEWETT. Yes.

Representative HOSMER. You do not regard it as a Government subsidy?

Mr. BLEWETT. No, I do not.

PUBLIC BENEFIT FROM COMPETITION

Representative HOSMER. We had Mr. Moody's testimony in one of our prior hearings on another subject regarding the public benefit to the people of the United States from the fact that rates for electricity have not risen over what they would have been if atomic electricity was not in the picture, of approximately a billion dollars a year in rate saving.

Price-Anderson has cost us nothing so far, so the benefit-to-cost ratio there would be better than a billion to one. Your colleague has just testified that a 1 to 1 ratio justifies public expenditure. Do you want to comment on that?

Mr. MOODY. I take it that your point is that Price-Anderson is not necessary, and there is no reason for it to exist. Is that your point?

Representative HOSMER. My point is that because Price-Anderson exists, we do in fact have utilities installing nuclear electric plants, and thereby the people are receiving these large benefits annually.

Mr. MOODY. Congressman Hosmer, you know, and I know, that in this complicated world in which we live, there are certain things that we call free private enterprise, and there are certain operations and companies that are more pure or less pure from that standpoint.

However, the activity of the Federal Goverment over my lifetime, and I am sure yours, has encroached more and more in that line. We have fought against it in many, many ways. We have accepted it in others.

I think it is probably impossible for you and I to go back and forth to work except to be on a road or something of some sort that does have some part of either Federal or State contribution to it as such.

So, what you are talking about here with Mr. Blewett is in the same manner that you would talk about a highway or anything else that happens to go into that kind of operation.

I do not think it pertains in the same way to what we are talking about here with Price-Anderson. Price-Anderson is trying to handle a peculiar characteristic of your atomic energy industry, recognized by you and other members of this committee very, very definitely in your testimony, in your conversations, in your records, in your statements of all kinds, in your speeches.

There is no question, so far, you have not figured out exactly what you think you should do with it. You recognize it as a fact.

As the chairman so well put it, when people become convinced of something, you have to consider it as a fact, and something that has to be taken care of.

So we are here this morning trying to figure some way that it could be done, and be more properly recognized, be more effective in case it were needed, and Lord knows that there isn't anybody here or in the United States anywhere that wants to see any kind of nuclear incident, accident, or what-have-you, happen. None of us, no matter what it is.

But it is like so many other things. We have discussed it, we have recognized it as a remote possibility in this case, and therefore there should be some provision made so that if it does happen, we have taken care of it.

Now, in the case of Price-Anderson, we have taken 10 years. The Atomic Energy Commission comes up with no recommendations, no suggestions, as if they woke up the other morning, and all they could say is, "We have to do it for 10 more years." They changed the date from 1967 to 1977, probably one of the most detailed recommendations for changing a date.

We are of the opinion that there is a better way to do it. We are trying to tell you what our suggestions are as to a better way to do it.

Representative HOSMER. Let me say that this ameliorative pill that you are suggesting has some side effects.

You recommend that a tax of 1, 2, or 3—I imagine preferably 3—mills would be imposed on this energy, and the side effect would be to eliminate this business, this competitor, rather rapidly, in the same manner that nonextension of Price-Anderson would do to it.

PRIVATE OWNERSHIP OF NUCLEAR FUELS

Mr. MOODY. No. We had some legislation that we discussed a year ago, Congressman, the matter of private ownership of fuel. You remember there was quite a discussion of the matter. It was recognized that the actual ownership of fuel, the actual handling of that fuel, the renewal of the fuel and all, was in fact a proper part of the cost of nuclear energy or nuclear power.

Now, that is just the same as this. Now, whether that whole handling of fuel and buying of fuel and investment in fuel is worth 1, 2, or 3 mills, I don't happen to know, but if what you say just now is true, and that is that an actual elimination of Price-Anderson would stop this industry, then certainly the ownership of fuel would also have done so, and it didn't.

It wouldn't, and you know it, and I know it, and the fact that they have not properly had this item in their costs up to this time is no excuse to give them another 10 years before they have to get down to an accounting system.

Representative HOSMER. I yield to Mr. Price.

Representative PRICE. Mr. Moody, you made the point that all we are doing at this time is determining whether or not it is important to extend the life of this act for another 10 years.

Now, that may be true, that this bill provides for extension of the act for 10 years, but I would not like you to leave with the inference that we have not done anything with the act in the last 10 years.

We have passed numerous amendments to it, and the last one was in the last session of Congress.

Mr. MOODY. To the Price-Anderson Act?

Representive PRICE. Yes.

Mr. CONWAY. You keep referring to the AEC's recommendations that nothing be done except extending the date.

Mr. MOODY. And they had other things they wanted to consider, but it was not necessary to decide it at this time.

H.R. 8496 AND S. 2042

Mr. CONWAY. The AEC's recommendation is not what is before us. Before this committee is a recommended bill—H.R. 8496 and S. 2042—introduced by two members of this committee, Mr. Price and Senator Anderson. This committee has not gone along with the Commission's recommendations. Did you read Chairman Holifield's speech in November in San Francisco? This bill accords with two recommendations made in that speech.

Mr. MOODY. In all fairness, Mr. Conway, I very carefully said Atomic Energy Commission, not the Joint Committee on Atomic Energy. I know the difference.

REDUCTION IN GOVERNMENT INDEMNITY

Mr. CONWAY. That is why I want the record to be very clear. The bill before this committee would do more than just extend the Price-Anderson Act for 10 years. This bill would also include a provision that as additional money is put in by private insurance, the Government's indemnification will be cut back by an equal amount.

The objectives of this bill are to encourage private industry to come in.

Now, the gist of your complaints, as I have been listening to them, is that we are just extending the Price-Anderson Act for another 10 years. This is not what this bill is doing. I suggest to you it is doing more. This bill takes the initiative of adding the proviso that as additional money comes in from private industry by way of insurance, the Government will start withdrawing its indemnification coverage in an equal amount.

Mr. MOODY. I think right at the present time—if my conversations with the insurance companies are accurate, they are presenting what? An additional $14 million?

Mr. CONWAY. They are to testify this afternoon.

It was suggested in Chairman Holifield's speech in San Francisco that he thought they should be able to come up to a total of $100 million.

I don't know exactly what they will be prepared to testify to this afternoon. I have also heard the figure of $14 million in addition to the present $60 million available.

The committee agreed with the point you have been raising, that after all this study just extending the act for 10 years was not sufficient. The committee has taken the initiative in this area.

Mr. MOODY. We keep talking about $14 million and $60 million. That is not what we are talking about. In the next 10 years certainly several hundred of them, let us use 200—it is a nice easy number—200 reactors you are going to have. Now, 200 times $60 or $70 million is a lot more money than that; and 200 times $500 million comes out $100 billion.

INCREASED COVERAGE BY PRIVATE INSURANCE

Mr. CONWAY. Mr. Moody, the point I was trying to make—and I wanted the record to be very clear—is that this bill, this proposed legislation, is not solely directed toward an extension of the act for 10 years.

When we hear from the representatives of the insurance industry this afternoon, I would hope you will be present, and possibly the committee may be exploring with them whether during the next 10-year period they can do something additional. That is, can we get more coverage from the private insurance industry during the upcoming 10 years? I think we want to explore this.

Mr. MOODY. If you take my suggestion, by the end of 10 years you will have something to work with.

NUCLEAR LIABILITY FUND

Representative HOSMER. Along that line, your suggestion and the response to the questions I asked you about side effects and so on, the general plea for private enterprise, if we took your suggestion about putting on the kilowatt tax, why should we not also put a $1- or a $2- or a $3-a-ton tax on the coal going down to west Florida that is going through these canals and channels that the Army Engineers worked on?

Mr. MOODY. I assume you would put the same thing on molasses, wheat, and pork. I think we would have quite a few people with us in Congress. It would be quite a conglomeration.

Of course I think you would have to turn around and take care of highways and byways.

Representative HOSMER. Let us put all these taxes on everybody. Why isn't that as logical as putting this kilowatt tax on that you want to do?

Mr. MOODY. Because you have here a particular characteristic of this industry that so far you have not answered, and you have not put it in as a cost in the production of the power, and it is a normal cost of the production of the power. We are talking here in terms of maybe $500 billion.

Congressman, $500 billion is more than all of the stock owned by 20 million stockholders in the United States at its value as of yesterday, which was $412 billion, all of the stock of all of the companies in the whole United States. You are now talking about an amount of money greater than that. I think when we are in these kinds of figures——

Representative HOSMER. We are talking of $500 million, not $500 billion. You are talking about $500 billion.

Mr. MOODY. That was Mr. Holifield's statement.

Representative HOSMER. I will ask you one other question.

I came down to work this morning and saw a sign on the bus, "Mr. Congressman, private enterprise needs your help." I wonder if you put them up, or Roy Chalk put them up.

Mr. MOODY. I tell you, Congressman, we don't have the kind of funds that Mr. Chalk evidently has at his command. Sometimes we would like to.

Representative HOSMER. Thank you.

Chairman HOLIFIELD. Are there any questions, Mr. Aspinall?

Representative ASPINALL. I have no questions.

I am sorry I was late.

Chairman HOLIFIELD. You missed a very fruitful morning, I must say.

Thank you, gentlemen, for your appearance.

Mr. MOODY. Thank you. Would you like us to submit any additional information?

Chairman HOLIFIELD. We are always happy to receive anything that you will send us.

Mr. MOODY. There isn't anything right now?

Chairman HOLIFIELD. No.

Mr. MOODY. Thank you.

Chairman HOLIFIELD. Our next witness is Robert T. Person, Public Service Co. of Colorado.

Mr. Person, you are appearing before us today as an accommodation to you because you could not be here yesterday because of your own duties. By scheduling you here at this time with the coal people, we are not expecting you to necessarily support their statement. [Laughter.]

STATEMENT OF ROBERT T. PERSON, PRESIDENT, PUBLIC SERVICE CO. OF COLORADO

Mr. PERSON. Thank you, Mr. Chairman.

I found their discussion quite interesting, as I am sure you did, too.

I do appreciate very much the accommodation that you have given me in arranging the time to suit my schedule which is a very busy one this week.

I will present my statement, if I may.

Mr. Chairman and members of the committee, I am Robert T. Person, president of Public Service Co. of Colorado, an investor-owned utility, engaged in the generation, transmission, and distribution of electric energy, and the distribution and sale of natural gas, in various portions of the State of Colorado.

H.R. 8496 and S. 2042, the Price-Anderson bills, to amend the Atomic Energy Act of 1954, as amended, are of particular interest and concern to Public Service Co. of Colorado. As this committee may be aware, from my previous appearances before this committee, Public Service Co. of Colorado has long been vitally interested in the advancement of nuclear power generation and has recently evidenced this interest by proposing to build a 330,000-kilowatt, high-temperature, gas-cooled reactor in the State of Colorado.

The memorandum of understanding recently entered into between the Atomic Energy Commission, General Dynamics, and Public Service Co. of Colorado, as well as the contemplated construction schedule of the proposed HTGR plant, places this company in a rather unique position with respect to the legislation you are considering today.

I am happy to report to this committee that since I was last before you, we have made real progress in finalizing definitive agreements between all of the parties to this cooperative program and have taken other constructive steps which indicate that construction of this plant can go forward as originally contemplated. Notwithstanding the speed with which we have proceeded and are now proceeding, all parties to the memorandum of understanding have been aware of the fact that the construction permit, in all probability, would not be issued by the Atomic Energy Commission for the construction of this plant prior to August 1, 1967, which is the existing cutoff date for the indemnity provisions of the current Price-Anderson Act.

We were thus faced with the very realistic problem of whether to proceed with the construction of the plant if the indemnity provisions of the act were not extended beyond August 1, 1967. Each party to the three-party memorandum of understanding recognized the importance of such an extension by agreeing that the contract to build the HTGR plant could be terminated in the event appropriate legislation was

not enacted by Congress to afford the indemnity provisions of the act to this plant prior to August 1, 1967.

I mention this at the outset only for the purpose of evidencing to this committee the very real interest that our company has in H.R. 8496 and S. 2042.

I am sure that each member of this committee is probably much more familiar than I with the precise provisions of the existing Price-Anderson Act and the proposed amendments represented by H.R. 8496 and S. 2042. I will, therefore, not address myself to the specific terms and provisions of the act, but will discuss what I think are two fundamental misconceptions which have been attributed to both the purpose and the actual terms and provisions of the Price-Anderson Act. In doing so, I hope I will point out what I consider to be the real issue facing this committee.

LIMITATION OF LIABILITY

It has been widely circulated that the Price-Anderson Act grants nuclear energy a competitive advantage over other sources of fuel, and that the general public is being required to act as a self-insurer due to the limitation of liability provisions. In my opinion, these contentions are either misdirected, or result from a misunderstanding of the actual facts and circumstances surrounding the endeavors of the Atomic Energy Commission and the public utility industry to advance the science of nuclear energy.

If there is any validity to the argument that AEC, by its program to further the advancement of nuclear energy, is making unfair assistance available to that method of generating electric energy, it is not because of the Price-Anderson Act. Rather, it is due to the inherent nature and purposes of the Atomic Energy Act of 1954, as amended. The Price-Anderson Act merely implements and makes possible the broad objectives set forth in the basic act itself.

It is stated in the Atomic Energy Act of 1954 that one of its fundamental purposes is to—

> * * * encourage widespread participation in the development and utilization of atomic energy for peaceful purposes * * *.

Therefore, the Price-Anderson Act is merely a means of carrying out the basic purpose of widespread participation in the development of atomic energy.

The Congress of the United States is charged with the duty and responsibility of determining public policy based upon its concept of what the public health, safety, and welfare requires. Public policy of the United States has been determined by Congress to require the advancement of atomic energy for peaceful purposes. Sharing that feeling of public policy, Public Service Co. of Colorado, desiring to make a real contribution to the advancement of the peaceful use of atomic energy, has offered to construct the HTGR plant on its system. We made our decision, not in an effort to gain a competitive advantage for one source of fuel over another, but to further and participate in what we consider to be a worthy program.

It also appears to me that any claim that the indemnity provisions of the act constitute unwarranted assistance to the overall program is

not justified. Here again, this portion of the Price-Anderson Act is necessary to effectuate the underlying purpose of developing the science of nuclear energy. I think all of you are aware of the very substantial cost to a public utility of obtaining the necessary, available liability insurance. Any company proposing to build a nuclear powerplant having a capacity of in excess of 100,000 kilowatts electric is required to obtain private liability insurance in the maximum amount obtainable, which is currently $60 million. The cost of this insurance is several times the cost of liability insurance for a conventional plant. As a result, any utility constructing a plant of this size must pay much more for liability insurance than it would otherwise be required to pay.

To this date, I understand, there have been no nuclear incidents requiring the payment by either the insurance industry or AEC of one dime to satisfy any liability arising from a nuclear incident in a nuclear powerplant.

RATES FOR PRIVATE INSURANCE

We must accept the fact that most insurance rates are based upon actuarial experience. In the case of nuclear energy there has not been sufficient experience to intelligently determine what a proper rate should be for each dollar of insurance made available. It could turn out that the private insurance rates are too low.

On the other hand, all evidence points to the fact, and most informed people in the industry confidently predict, that actual experience will demonstrate that such rates can soon be decreased because of the many safeguards which are taken to make a serious nuclear incident extremely improbable.

As a result, further experience may very well show that the owners of nuclear powerplants are paying too much, rather than too little, for liability insurance. Thus the public utility industry is bearing a sizable portion of the cost of providing protection for any risks associated with development of nuclear powerplants.

I, therefore, submit that the real issues brought into focus by the Price-Anderson bills, and thus the issues facing this committee, go much deeper than whether H.R. 8496 and S. 2042 should be enacted into law, and, in fact, go to the very heart of the question of whether it is still in the public interest for AEC and the public utility industry to continue and further the development and utilization of atomic energy for peaceful purposes. Without Price-Anderson, or some type of similar legislation, I feel this program would come to a standstill.

LIMITATION OF LIABILITY

It is also argued that the limitation of liability provision in the bills makes self-insurers of those who may sustain damage from a nuclear incident. It appears to me that such contention deserves little or no consideration by this committee. The proposed bills would limit the maximum liability from any nuclear incident to $560 million. To say that this requires everyone to act as self-insurers, however, is an entirely different question and such limitation of liability is certainly not something new, novel, or radical to the extent that it is contrary to public policy.

It is, of course, extremely improbable that, even if a serious nuclear incident occurs, it would result in a loss of more than this maximum amount. In addition and probably of more importance, is the fact that the rights and liabilities of people in this country have to a large extent been set and defined by legislative action for hundreds of years which has been accepted to be in the public interest.

Many States limit the amount of liability or recovery for wrongful death actions. The Congress of the United States has created a comprehensive set of laws relating to the recovery of debts or obligations of bankrupt persons, corporations, and other business entities. In almost any field of endeavor, there exists either Federal or State laws prescribing the basis of liability or recovery for those injured by, or engaged in, and given activity.

If it could be said that the public has been relegated to the status of a self-insurer because of Price-Anderson, it could with equal validity be said that everyone who is exposed to the hazards of vehicular traffic on the streets and highways of this country, and everyone who does business with a person or an organization which might later become bankrupt or reorganized under the bankruptcy laws of the United States, would also be a self-insurer.

In conclusion, I submit that the indemnification and limitation of liability aspects of the proposed Price-Anderson bills are not only consistent with public policy, but in addition, are absolutely imperative if the current program to encourage the development and utilization of atomic energy for peaceful purposes is to continue as set forth in the Atomic Energy Act of 1954.

Again, I submit that the real question which must be resolved by this committee is whether that purpose of the act is to be continued or modified, or in effect, repealed. The failure to extend Price-Anderson for an additional period of time would be just as effective in bringing this program to a standstill as would the outright repeal of some of the fundamental concepts and purposes of the Atomic Energy Act of 1954 itself.

Thank you very much, Mr. Chairman and members of the committee for this opportunity to make this statement.

Chairman HOLIFIELD. Thank you, Mr. Person, for your statement. Mr. Aspinall?

COMPETITION BETWEEN NUCLEAR AND CONVENTIONAL PLANTS

Representative ASPINALL. Mr. Chairman, I am sorry that I was not here when the representatives of the coal industry made their statements. I shall read them later on today or tonight.

I am glad that I have been here to listen to the statement of Mr. Person who is so efficient and so effective as the executive of the Public Service Co. of Colorado.

As I understand it, Mr. Person, you folks use all four of the known fuels at the present time and are contemplating a fifth fuel in producing your product. Is that correct?

Mr. PERSON. That is true, Mr. Aspinall. As a matter of fact, coal at the moment has a little edge on the thermal fuel that we are using and the unit we plan for 1968 is intended to be all coal. So, as we move forward in this energy picture certainly there is a great and vast opportunity for the coal people as well as gas, oil, and others to participate in that growth.

Representative ASPINALL. You are one of the larger users of coal in the State of Colorado?

Mr. PERSON. It is my understanding that we are the largest.

Representative ASPINALL. I think that your statement at the bottom of page 4 (see p. 151) where you state that you have "made your decision not in an effort to gain competitive advantage for one source of fuel over another but to further participate in what we consider a worthy program" is a very constructive statement.

As I understand your operation for the future you do not intend to give any special favoritism to either one of the fuels. You use them as you can in order to coordinate each into your own operation?

Mr. PERSON. That is true. As I view the picture now we will be using a substantial amount of coal and other fuels extending on into the foreseeable future. The technological nature and characteristics of your system and many other factors would dictate that this would be a prudent operation.

Representative ASPINALL. So far as the use of hydroelectric power, that is pretty well taken care of at the present time so far as potential in Colorado is concerned; isn't that correct?

Mr. PERSON. Yes, sir.

Representative ASPINALL. Thank you very much.

Chairman HOLIFIELD. Mr. Hosmer?

Representative HOSMER. With reference to this trilateral contract between you, the AEC, and the General Atomic, and the cancellation clause relative to Price-Anderson, at whose instance was that clause inserted in the contract?

Mr. PERSON. Mr. Hosmer, I am not sure that I can answer that precisely. I would say, frankly, that we were quite interested in it. I would have to assume that the General Atomic Division of General Dynamics shared that interest, and I believe that the AEC was understanding in its position as being the governmental partner to the three-party agreement.

Representative HOSMER. This is a hypothetical question. However, assume that the Price-Anderson was not extended, that the procedure went along to a point where you would not come under it before you still had an opportunity to exercise this option. If you have thought about it, would you tell us whether or not you would exercise the option to cancel on the basis of nonavailability of Price-Anderson and no substitute or alternative?

Mr. PERSON. Mr. Hosmer, I think as I indicated before in the hearings I did not like to treat these types of questions in terms of ways of getting out of a particular thing that we were wholeheartedly participating in. I say that by way of preliminary background. I would have to say that I consider Price-Anderson, or some reasonable substitute therefor which is not foreseeable at the present time, as being essential to our continuing the plant.

Representative HOSMER. In other words, you would cancel and that is the basis of your testimony that this is necessary legislation for the atomic industry to proceed and progress.

Mr. PERSON. Yes, sir, in the absence of an alternative.

Representative HOSMER. Thank you very much.

Chairman HOLIFIELD. Mr. Price?

Representative PRICE. No questions.

Chairman HOLIFIELD. Thank you, Mr. Person, for your appearance here this morning.

Mr. PERSON. Thank you again.

Chairman HOLIFIELD. Our next witness is Mr. Adolph J. Ackerman, consulting engineer, Madison, Wis.

The record will show that Mr. Ackerman appears as an individual unless he wishes to indicate otherwise. He appears at his request in his capacity as an individual citizen, I believe. Is that right, Mr. Ackerman?

STATEMENT OF ADOLPH J. ACKERMAN, CONSULTING ENGINEER, MADISON, WIS., ACCOMPANIED BY JOHN W. FORSTER

Mr. ACKERMAN. As an independent consulting engineer with the commitment to defend the public interest.

Chairman HOLIFIELD. Will you identify your associate for the record?

Mr. ACKERMAN. My associate here with me is Mr. John W. Forster, also of Madison, Wis., who has assisted me for a number of years in the study which has resulted in the statement I have prepared here formally.

Representative HOSMER. Mr. Chairman. I would like to ask the witness some qualifying questions at this point, if I may.

Chairman HOLIFIELD. You are recognized.

Representative HOSMER. You have an engineering degree?

Mr. ACKERMAN. That is right, I do.

Representative HOSMER. What is it?

Mr. ACKERMAN. I have a civil engineering degree and electrical engineering degree.

Representative HOSMER. From what university?

Mr. ACKERMAN. University of Wisconsin.

Representative HOSMER. You mentioned that you have done some visiting professorship work.

Mr. ACKERMAN. I have.

Representative HOSMER. At the same university?

Mr. ACKERMAN. Yes, at the University of Wisconsin and at Massachusetts Institute of Technology as a visitor, and at the University of Illinois as a visiting professor.

Representative HOSMER. You are a consulting engineer?

Mr. ACKERMAN. Right.

Representative HOSMER. With offices in Madison, Wis.?

Mr. ACKERMAN. That is right.

Representative HOSMER. And for how long have you engaged in the consulting engineering business?

Mr. ACKERMAN. Since 1952.

Representative HOSMER. When did you begin the work of engineering after you graduated from college?

Mr. ACKERMAN. In 1926.

Representative HOSMER. Have you been in engineering all that period of time?

Mr. ACKERMAN. I have.

Representative HOSMER. You have been in private work during all that period of time?

Mr. ACKERMAN. Most of the time. During the period of 1933 to 1937 I was in charge as chief planning engineer for construction of the Tennessee Valley Authority. That was a period of service for the Government.

Representative HOSMER. What was the occupation?

Mr. ACKERMAN. I was in charge of construction planning for all of the dams.

Representative HOSMER. Then what other governmental work did you participate in, if any?

Mr. ACKERMAN. During the war I served as a special consultant to the War Department on the Normandy invasion harbors. I also served the Navy on some of their special engineering studies. And I was director of shipyard planning and operation under a naval defense contract involving the design and the construction of the first 100 LST's and other various types of ships, destroyer escorts, and smaller types of invasion vessels.

Representative HOSMER. What of the period from the war to 1952?

Mr. ACKERMAN. During that period I was vice president in charge of engineering of the companies that are supplying electric power for Rio de Janeiro and Sao Paulo, Brazil. I was a resident in Brazil during that period. In addition to completing a number of large hydroelectric projects, I had charge of the design and initial stages of construction of two large underground power stations.

Representative HOSMER. Of what nature?

Mr. ACKERMAN. Hydroelectric.

Representative HOSMER. Have you ever done any design work for a thermal power station?

Mr. ACKERMAN. I have not. You mean coal- or oil-burning?

Representative HOSMER. Yes.

Mr. ACKERMAN. I have not.

Representative HOSMER. Have you had any experience in the design of an atomic powered power station?

Mr. ACKERMAN. I have a statement to make in that respect, but I can answer it here, that I have not engaged directly in the design or construction of an atomic powerplant and would have to refuse a professional contract to design such a project if it were intended to rely for the ultimate responsibility in the matter of public safety on the indemnity act.

Representative HOSMER. At the present time, Mr. Ackerman, does your firm hold itself open to design of an atomic powered station except for that qualification that personally you do not want to get into it under Price-Anderson?

Mr. ACKERMAN. My field is primarily at the level of basic planning where the first question is: "Should the project be built or not? Is it sound? Does it serve the public interest? Does it serve the interests of the client?" And other broad planning questions. We do not engage in actual design contracts because there is the possibility of a conflict of interest in dealing with such broad questions and retaining a freedom to advise against construction of a project.

Representative HOSMER. At the present time, are you or any of the members of your firm qualified by reason of professional training to

engage in the design of a nuclear power station, from particularly the health and safety standpoint?

Mr. ACKERMAN. I would say we are qualified to engage in the planning of such a project.

Representative HOSMER. As to the detail of the actual construction, engineering drawings, you are not qualified, is that correct?

Mr. ACKERMAN. We don't engage in that field.

Representative HOSMER. I did not ask you that. I asked you if you or any member of your firm are qualified to engage by reason of professional training in that precise field?

Mr. ACKERMAN. I believe that if you were to explore that, there are so many industry participations in the design of a project as complex as an atomic power project or, for that matter, a hydroelectric project, or a conventional steamplant, that it is necessary to rely on the engineering resources of the manufacturers and of other contributors to such a project, and no single firm has it within its resources to design a reactor and all of the related parts, including the structure and components. So that I would say that in that respect I would not undertake such an assignment, nor is it a proper one.

Representative HOSMER. The answer to my question is no. Is that right?

Mr. ACKERMAN. I don't think it is the kind of question that can be answered with a simple no.

Representative HOSMER. Well, I happen to think it is, and I think you in essence stated the answer in the negative.

Thank you, Mr. Chairman.

Chairman HOLIFIELD. You may proceed with your statement.

Mr. ACKERMAN. Thank you.

I would first like to make an introductory statement, Mr. Chairman. I am very grateful for this opportunity to appear here today, especially because in my position as an independent consulting engineer I find myself duty-bound to appear as a dissenter and in opposition to the proposal to extend the Price-Anderson Act for another 10 years.

Under present circumstances, this is a most difficult task, but I believe I would be disrespectful of this committee and its tremendous responsibilities if I were to withhold a word of caution at this time on what I regard as a matter of utmost importance.

My formal statement is rather lengthy, but it has been prepared with the greatest care. It is based on many years of analysis of the American atomic power program. As I have previously stated, I have not engaged directly in the design or construction of an atomic powerplant, and I would have to refuse a professional contract to design such a project if it were intended to rely for the ultimate responsibility in the matter of public safety on the indemnity act. This is a matter of ethical commitment. But this has made my present responsibility here all the greater, to present a carefully considered professional opinion.

I am basing my position, in part, on the terrible experiences of some of my colleagues when a major dam fails. I am impressed with the fact that practically all the experts who have appeared here in support of the act acknowledge that for atomic powerplants of present-day design, size, and location there is a tremendous peril. Although

many have expressed the opinion that extension of the Price-Anderson Act is needed to give the public the necessary protection, my preoccupation, as an independent consulting engineer, is primarily with the prospective victims instead of the prospective survivors.

Instead of reading my formal statement, I respectfully request that it be published as part of the official record of these hearings. This would provide a means of communication which is not otherwise available.

I have only one recommendation to offer which appears on page 7 of my formal statement (see p. 161), and that is, in essence, not to proceed hastily with the proposal here being considered. I believe the dissenting viewpoint deserves a greater consideration at this stage of the kind of study I have recommended.

In the final analysis what is of the utmost importance is not what I believe but that the full truth prevails.

Mr. Chairman, I think that really covers the substance of what I feel justified in taking the time for. I want to again express my gratitude for the great privilege of appearing before this committee.

Chairman HOLIFIELD. Mr. Ackerman, your request that your statement be printed in the record in its entirety will be accepted by the Chair.

Mr. ACKERMAN. Thank you very much.

(The statement follows:)

(For appendixes to Mr. Ackerman's statement see app 7, p. 269.)

STATEMENT OF ADOLPH J. ACKERMAN, CONSULTING ENGINEER, MADISON, WIS.

My name is Adolph J. Ackerman. I am an American citizen and an independent consulting engineer residing in the city of Madison, Wis. My practice is chiefly in the area of electric power and hydraulic engineering. This includes the financial appraisal and general planning and site selection for new powerplants and dams, and their safety of design and construction. I am a graduate of the University of Wisconsin and hold licenses in various States for the practice of engineering. In recent years I have devoted part of my time to engineering students as a visiting professor, and have served on visiting committees at two leading universities. As a member of various national engineering societies I have served on policy committees on education and on atomic power.

A STUDY OF ATOMIC POWER

During the past 10 years I have maintained a study of atomic power as a possible competitor in the production of electricity. I have also published some papers on questions of safety and engineering responsibility, and these have received generous commendations from colleagues in this and other countries. In 1961 I filed an amicus curiae brief in the Supreme Court of the United States in the case of the Detroit reactor. In that brief I attempted to identify the engineering responsibilities and ethical commitments to the public and their important relationship to the legal issue.

In recent years we have studied the reports on current experiences in various atomic powerplants, and particularly the failures in performance. This study was undertaken at great personal cost but with complete freedom to think. This necessitated foregoing other professional work to maintain my freedom from conflicts of interest. My statement here can give only a brief summary of our findings, part of which are presented herewith in the form of appendices.

I wish to acknowledge here the notable assistance rendered by my associate, John W. Forster, an engineer with unique competence and a high sense of dedication to the public interest, and to William J. Ackerman, who has done a tremendous job of organizing our library and maintaining close observation on a vast amount of published material relating to developments in this new technology. Without such references it would have been impossible to present the kind of responsible testimony which this Joint Committee on Atomic Energy has a right to expect.

THE IMPORTANCE OF THIS HEARING

This committee has before it one of the most important questions in its history. It involves a revolutionary new science identified in the U.S. Supreme Court as "the most awesome, the most deadly, the most dangerous process that man has ever conceived." With our limited human understanding we are dealing with responsibilities that stagger the imagination and call for the most prayerful consideration.

OPPOSITION TO PRICE-ANDERSON ACT

I am appearing here in opposition to H.R. 8496 and S. 2042 under which it is proposed to extend the Price-Anderson Act for another 10 years. My objective is (1) to meet a professional duty of serving the public interest; and (2) to show that allowing the Price-Anderson Act to expire will help to advance atomic power technology along safer and more realistic lines.

I am not opposed to atomic power development; but I am opposed to the terrifying breakdown in engineering and corporate responsibility which can now be identified more readily than was the case 9 years ago when the present act was first proposed. I am also opposed to false standards and the trend toward misleading the public and those in authority through invalid claims of safety and economy.

ENGINEERING RESPONSIBILITY

The questions to be considered here are not related to the military application of atomic energy. As a matter of fact, as a civil engineer I am directly concerned with the civilian applications of this new technology. In this respect history seems to be repeating itself because in the early days all engineering was carried out by military engineers until the necessity for civilian developments brought forth a new branch of engineering, then known as civil engineers.

It is a matter of deep regret that the disciplines of the civil engineering branch of our profession have not been fully employed to help in developing this new science to serve the best public interest. However, in the final analysis this calls for special qualifications and personal responsibility in the same way that a surgeon carries his responsibility in brain surgery.

Finally, it is also important for all concerned to remain mindful of the general public which has little understanding of the issues we are here attempting to examine. The public has every right to expect the highest standards of integrity and intellectual honesty in formulating policies in a new technology which has such tremendous power for good—or for evil.

THE DUTY TO DISSENT

Obviously, there are times when it is imperative for an engineer to face up to a major issue where the public interest is at stake. The freedom to dissent is basic to all progress. To disagree, or to express alarm on a policy which one honestly considers dangerous, surely, is not to express hostility. Throughout our history we have had the tradition of dissenting opinions in our courts.

It is a major tragedy that in the engineering profession we have largely lost that tradition. On several occasions I have been confronted with situations where the duty to dissent was vigorously opposed. As a consequence I have acquired a deep sense of gratitude for the privilege of appearing before a responsible committee such as this one, and for the freedom to speak about some very important issues. I am constantly mindful of the admonition given us by a distinguished engineer and respected statesman, Herbert Hoover, 14 years ago:

"Our greatest danger is not from invasion by foreign armies. Our dangers are that we may commit suicide from within by complacence with evil. Or by public tolerance of scandalous behavior. Or by cynical acceptance of dishonor. These evils have defeated nations many times in human history. The redemption of mankind by America will depend upon our ability to cope with these evils right here at home."

THE REVOLUTIONARY ATOM

Atomic power, as a revolutionary new technology, is impinging on practically all segments of our Nation, including:

1. The general public.
2. Our constitutional system of government and the rule of law.
3. Various segments of industry, particularly the public utility, manufacturing, transportation, and insurance companies.

4. The professions of engineering, law, medicine, and science.
5. Universities and colleges, and their educational programs.
6. Public communication, such as the press, radio, television, advertising, and propaganda.
7. A new governmental agency, established to administer the application of this new technology.

WHO WILL LOOK AFTER THE PUBLIC INTEREST IN THIS NEW TECHNOLOGY?

Atomic power can grow up either in freedom or in serfdom:

1. *The atom under freedom.*—This is the traditional multicentered American system guided by ethics, individual responsibility and self-discipline in engineering and in law, and with reasonable regulatory controls. (A well-known example in an older technology: Our drinking water.)

2. *The atom in serfdom.*—This is a revolutionary system founded on fear, with control by a centralized governmental authority over the application of the technology and communication with the public.

REVIEW OF SOME BASIC ISSUES IN CURRENT ATOMIC POWER POLICY

The basic issues involved in current atomic power policy are most readily identified by reviewing a specific example.

1. For the first atomic powerplant proposed near Detroit, a separate corporation was organized to isolate the responsibilities. Unfortunately this was followed by a breakdown in traditional corporate and engineering responsibility.

2. As the magnitude of the public peril in this and other places became better understood, a revolutionary idea in public liability insurance was conceived under which the Nation's taxpayers, without their knowledge and consent, would be committed to paying for the consequences of a major disaster.

3. This was followed by an amazing initiative designed to persuade Congress to adopt such a plan. It must be obvious, in retrospect, that a number of well-meaning people were persuaded to support this plan without being alerted to its inherent fallacy.

4. This unique initiative by a small group has now grown into broad commitments in the electric power, manufacturing, insurance, and transportation industries, under the incentives of profit, international competition, and fear.

5. This intensified activity is creating a general breakdown in traditional corporate and engineering responsibility. As a consequence atomic power development is being falsely oriented at the expense of public safety. A new centralized agency is attempting to administer a program that, in essence, is committed down a road to general chaos.

6. A massive campaign of advertising and propaganda has been mounted to "persuade" the citizens regarding the safety of atomic powerplants in their midst. Unfortunately, there is no adequate disclosure of the facts regarding the inherent peril or significant operating failures and accidents.

7. At this embryonic stage of a new technology, the "inevitability of failure" is largely being ignored.

8. The introduction of a new peril without the consent of an informed citizenry involves the exploitation of public confidence in the engineering and legal professions, university faculties, corporate management, insurance companies, and the safeguards under our judicial system and the rule of law.

I believe there is an ominous parallel in the problem before us and the recent story in the electrical industy where well-meaning men of high responsibility engaged in price-fixing until they suddenly found themselves before the court of public opinion. Then we heard excuses from top executives about being "too damn dumb" about the goings-on in their company, and that "we were diligent in the light of the facts as we knew them." Tragic as such explanations sound in retrospect, they only related to misdeeds in pricing. However, in the field of atomic power we are dealing with human lives, and such excuses simply won't stand up.

We would do well to remind ourselves that underlying this entire situation is a moral weakness which could well serve our enemies as a weapon far more deadly than anything science can provide.

I can't refrain from expressing my admiration to Chairman Holifield for his notable pronouncements and statesmanship against the Atomic Energy Liability Act when it was first proposed. His declarations at that time deserve to be

studied by everyone with the greatest care. They stand as a remarkable parallel to the foresight and precision of judgment displayed by Winston Churchill many years before the rest of the world could comprehend the oncoming disaster of World War II.

AN OPPORTUNITY FOR REAPPRAISAL

The Joint Committee is now being afforded an opportunity to reappraise a policy of profound importance to the future of our country, and to rectify a dangerous error. Current fallacious policies should be stopped as soon as possible. Instead, there is a great need for opening the door to the prospects of safe and sound development of atomic power. This would call for reestablishing the traditional lines of engineering and corporate responsibility and promoting the design of smaller, safer, isolated and insurable atomic powerplants. This is not a difficult task for American ingenuity and enterprise.

An example of a superior design has been adopted by the engineers of Switzerland for the first Swiss nuclear test power station at Lucerne. In this design the atomic powerplant is located completely underground in solid rock, a well recognized technique employed for the economic development of hydroelectric power in many parts of the world.

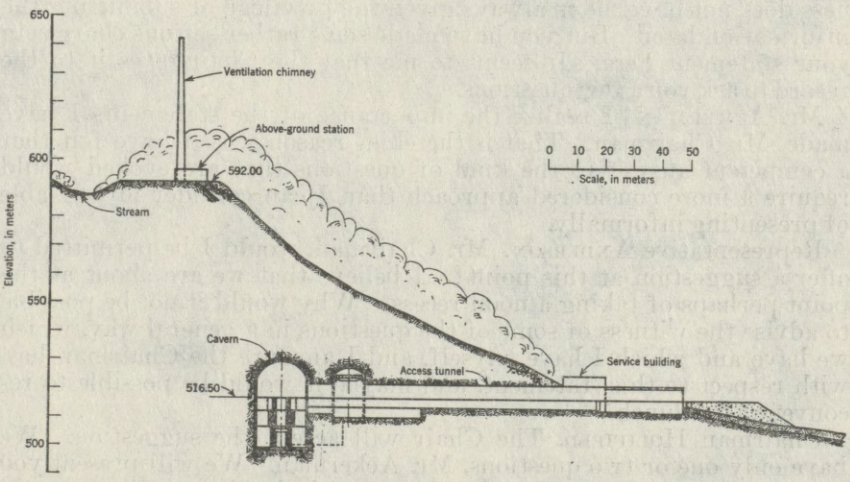


FIG. 1

Design for Lucens Nuclear Test Power Station in Switzerland

RECOMMENDATION

It would be presumptuous to appear here with the notion that one small voice with this brief testimony can change the present course of action or the viewpoint of this committee. It would also be disrespectful of an orderly democratic process to engage in categorical repudiation or condemnation of some of the testimony presented here. However, it would not be difficult to identify the defects in certain claims which I firmly believe violate the most elementary principles of good government and good corporate management and which, above all, violate the best interests of the public. Some of the basic issues are identified in the accompanying appendixes.

I can only hope and pray that this committee will recognize the need for a profound study of the issues about which we are here concerned. I believe this should include a careful survey of the opinions held by responsible executives and directors of the major utility companies, manufacturers and other leaders in our communities who can contribute their judgments on what is best for America. Such a study should also include a survey in depth of the current understanding and opinions of a broad cross-section of citizens. In view of its importance I believe a full year could advantageously be devoted to this effort.

I have in recent years carried on an informal opinion poll in both of these

areas and have found an amazing lack of comprehension of the issues which were here discussed by a few witnesses. I am confident that under proper circumstances a series of responsible questions could be developed for the suggested survey and that the results would provide a new resource of information for the benefit of all concerned. I believe this committee would then be in a better position to meet its tremendous responsibilities and do what is best for the people and for the United States.

Chairman HOLIFIELD. Would you care to answer some questions on your statement or do you want your statement to stand?

Mr. ACKERMAN. I think that in view of the great care that goes into answering questions, that I would prefer to receive them and take the opportunity to study them and come back with any responsible answer.

Chairman HOLIFIELD. This is not the custom of the committee. The committee ordinarily does question a witness on his statement. If it comes to the point of obtaining some information which the witness does not have, he is always given the privilege of submitting the information later. But you have made some rather serious charges in your statement here. It seems to me that the Chair owes it to the record to ask you a few questions.

Mr. ACKERMAN. I realize the importance of the statements I have made, Mr. Chairman. That is the chief reason why I have felt that a competent answer to the kind of questions that are evoked would require a more considered approach than I can consider myself able of presenting informally.

Representative ANDERSON. Mr. Chairman, would I be permitted to offer a suggestion at this point? I believe that we are about at the point perhaps of taking a noon recess. Why would it not be possible to advise the witness of some of the questions in a general way, which we have and which I have, myself, and I am sure the Chairman has, with respect to this statement, and maybe it would be possible to reconvene after lunch.

Chairman HOLIFIELD. The Chair will accept the suggestion. We have only one or two questions, Mr. Ackerman. We will present you with a copy of them. After lunch, at 2 o'clock, if you will reappear, it won't take but just a few minutes.

Mr. ACKERMAN. Very well. Thank you.

Chairman HOLIFIELD. The committee stands adjourned until 2 o'clock.

AFTERNOON SESSION

(The subcommittee reconvened at 2 p.m., Representative Chet Holifield (chairman of the Joint Committee) presiding.)

Representative HOLIFIELD. The committee will be in order. At the conclusion of the morning's hearings we had accepted a statement by Mr. Adolph J. Ackerman. The Chair asked Mr. Ackerman if he wished to respond to some questions and he said he would rather respond to them in writing. During the noon recess he has had access to a number of questions.

Mr. Ackerman, we can't go through all the questions because of other witnesses but at this time would you wish to respond to the first three questions and then submit answers to the others later on in writing?

STATEMENT OF ADOLPH J. ACKERMAN, CONSULTING ENGINEER, MADISON, WIS., ACCOMPANIED BY JOHN W. FORSTER—Resumed

Mr. ACKERMAN. Yes. I have had an opportunity to review the questions which you gave me, Mr. Chairman. I see there are also many other questions. It is the sort of thing that I anticipated. Whether or not it will be feasible to answer the second group of questions I cannot answer at the moment, but I would be glad to read the questions that you gave me and answer them.

Representative HOLIFIELD. I will read them.

Mr. Ackerman, you have made some rather serious charges here and if they can be substantiated this committee would be very interested in bringing to light all the facts of the matter. On page 2 of your prepared statement (see p. 159) you speak of a breakdown in engineering responsibility and corporate responsibility. Can you give a specific example of each?

Mr. ACKERMAN. In answer to that I would say first of all that requires a definition of responsibility. I have attempted to point that up in my testimony by referring to a very fine definition, given by an old engineer, Thaddeus Merriman, and I quoted him on page B–2. (See app. 7, p. 283.) I also quoted there Admiral Rickover and his references to the importance of the professional engineer in defending the public interest.

A good example, if I might add one, occurred in the case of the St. Francis Dam failure in California. That was probably one of the greatest demonstrations of professional responsibility in recent history. William Mulholland, then in charge of that project, stood up and said "Don't blame anybody but me. The responsibility is mine. I envy only the dead."

That is what I regard as professional responsibility. That type of personal assumption of responsibility has to a very large degree disappeared from the scene.

Representative HOLIFIELD. This is your judgment of it I suppose.

Mr. ACKERMAN. That is my judgment and it is very difficult to identify the individual engineer who has overall responsibility of an atomic powerplant.

Chairman HOLIFIELD. On page 2 (see p. 159) you speak of false standards and misleading the public in matters of safety. Can you give examples of such occurrence?

Mr. ACKERMAN. Here again we must deal with the question of the definition of what is safe. It depends on who is speaking—whether it is the man who has the ultimate responsibility—or the man who believes what he has been told.

I believe, for example, that this water is safe to drink and most everyone in the United States has that confidence in our water supply engineers, that safe water is being supplied. Yet it is necessary in most Latin American countries to first ask, is this safe to drink? The man who can answer that is the water supply engineer.

Chairman HOLIFIELD. So when you speak of false standards and misleading the public in matters of safety, you are relying on your own judgment as to the quality of the standards and the misleading?

Mr. ACKERMAN. Not entirely. I am also referring to the graphical charts which I presented which indicate the extremely low resource of experience on which to base a fair judgment regarding the safety of

the atomic powerplants. I had to enlarge on those graphical charts the generating capacity of power production from atomic powerplants in order to even permit them to appear relatively on the charts, so that they could be used to evaluate the resource of experience in the field of atomic power as compared with the tremendous resource we have in thermal powerplants.

Chairman HOLIFIELD. Of course this is always true in any new science and in any new development. Experience has to be gained over a period of years. All the other disciplines that have gone into conventional metallurgy and mechanical and electronic devices are available to transfer into a new discipline like this.

So, while you are dealing with a new subject matter, it is true you are also dealing with a great background of acquired experience and information when you do go into new disciplines.

Mr. ACKERMAN. I would like to answer that by saying that the process of normal mobilizing of such resources has not had an opportunity to develop. I feel that we need the great resources of private industry and of manufacturers and of insurance companies and of the utilities to concentrate their efforts on reaching the position where they can be as confident about safety as they now appear to be about the possibilities of disaster.

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

Representative HOLIFIELD. The second question. The AEC annual report available to the public lists the names and professional affiliations of the members of the Advisory Committee on Reactor Safeguards. The current list includes three university professors, three independent engineers, one representative of private industry, two employees of a national laboratory and one employee of the U.S. Weather Bureau.

This committee looks to these men to exercise independent judgment in reviewing the safety of the nuclear powerplant. They have a statutory obligation to do so. We believe them to be men of the highest integrity. Do you have any reason to believe that the ACRS is not carrying out its responsibilities in these matters?

Mr. ACKERMAN. In referring to these many professional men and their competence I have no question about their integrity and their dedicated efforts to render the best services within their capabilities. However in 1962 I made a study of the level of judgment that is emerging within the engineering profession, particularly among deans of engineering and professors, in this new technology. The result was a distressingly confused situation. I publicized that result.

I will be glad to file a copy of it with you to give some indication of how difficult it is to select men who have studied this subject in sufficient depth to acquire the kind of professional judgment that we have, for example, in our water supply. (See app. 16, p. 335.)

Representative HOLIFIELD. Now would you say that these men are not qualified professionally and have not studied the subject matter as thoroughly as you have? Or would you just say that they have arrived at different conclusions than you have arrived at?

Mr. ACKERMAN. I am not in a position to answer that question. I certainly should not generalize about the performance of other men.

Chairman HOLIFIELD. No, but your statement though has been a statement of generalization in many instances.

Mr. ACKERMAN. But I have, of course, referred to previously published information and to supporting expressions from other colleagues regarding the validity of my studies and findings.

Representative HOSMER. Will the chairman yield?

Chairman HOLIFIELD. Yes.

Representative HOSMER. Are we putting the engineering profession on trial here or are we talking about the Atomic Energy Commission and its safety record? I can't tell from what the witness has been saying.

Chairman HOLIFIELD. It seems that the witness is questioning the ethics and the morality and the competence of the engineering profession which by inference I suppose would apply to the members of the ACRS who are engineers. At least there are three independent engineers on that committee.

Mr. ACKERMAN. Mr. Chairman, may I just say that I do not want to create that kind of inference.

Chairman HOLIFIELD. We will pass on to question 3 then.

On page 1 (see p. 161) you have stressed the need for "a survey of the opinions held by responsible executives and directors of the major utility companies and manufacturers." That is exactly what we are doing during these 3 days of hearings and we have done it many, many hundreds of days in the past 18 years.

We have invited testimony in this instance from these types of people and of course we have given you the opportunity in this open forum in order to hear your opinions as well as the opinions of the others and have a complete record on which to base our judgment concerning the proposed extension of the Price-Anderson Act.

Mr. ACKERMAN. I would like to respond just briefly here that I have also explored in a personal and informal way the judgment at the level of corporate responsibility just as I did in the case of engineering education.

Chairman HOLIFIELD. You question the responsibility of men like Mr. Weaver of Westinghouse, Mr. Young of General Electric, and the other distinguished men who have appeared before this committee in their corporate capacity?

Mr. ACKERMAN. I don't propose to question any individual here. I respect their sincerity. But I have found many sincere and able directors of large corporations who have not had an opportunity either to study the controversial issues in this new technology or to apply the kind of judgment that they would prefer to have if they could study this matter in depth.

Chairman HOLIFIELD. Of course this is another generalized statement without any documentation. Are there any questions, gentlemen?

We will excuse you, Mr. Ackerman. Thank you for your testimony.

Mr. ACKERMAN. Thank you very much.

(By letter dated July 2, 1965, Mr. Ackerman submitted the following supplemental statement to be added to his remarks:)

A number of witnesses have referred to the fact that to date no third party has ever been hurt by the operation of an American nuclear power reactor. I believe this needs to be related to the summary of operating experiences I have presented in my statement under appendix A. The energy generated to date from

nuclear power reactors is an exceedingly small part of the total electric energy produced in this country. This limits the significance of any interpretation or conclusions, or of any projections into the future. Furthermore, in the very small number of atomic powerplants currently in public utility service the operations have been observed with more than ordinary care, and on a continuous routine, to anticipate any serious trouble. This would seem to explain the repeated shutdowns and extensive outages that have been accumulated to date in this group of powerplants. (See app. 7, p. 269.)

The claim that without the extension of the Price-Anderson Act the current atomic power program would have to be curtailed, or even lead to the cancellation of pending contracts, seems unduly disrespectful of American enterprise and skills and of our duty to place the public interest above all others. In my opinion it is completely feasible to build an atomic powerplant that would be so well engineered that it would qualify for commercial third-party liability insurance and make the Indemnity Act quite unnecessary.

The atomic powerplants currently covered by Price-Anderson liability insurance are likely to become identified as Price-Anderson plants. In the event of a major disaster the act may turn out to be a "one-shot" deal. Wouldn't public opinion likely become so violent as to compel the permanent shutdown of all other Price-Anderson atomic powerplants?

(Additional correspondence relative to Mr. Ackerman's testimony follows:)

ROCHESTER GAS & ELECTRIC CORP.,
Rochester, N.Y., July 7, 1965.

Congressman CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
Washington, D.C.

DEAR CHAIRMAN HOLIFIELD: On June 24, 1965, a Mr. Adolph J. Ackerman appeared before the Subcommittee on Legislation of the Joint Committee on Atomic Energy to testify on the Price-Anderson aspects of the Atomic Energy Act.

Accompanying his formal statement was appendix A, a paper presented before the American Power Conference in April 1965 entitled "Atomic Power Plants—What's Wrong With Them?" On page 16 of appendix A, Mr. Ackerman discussed "Cancellation of Three Atomic Power Plants" and on page 18 referred specifically to the cancellation of Rochester Gas & Electric Corp.'s proposed plans for an HTGR plant.

The entire connotation of the Rochester section is that the company broke off negotiations with General Atomic because of "safety considerations." Nothing could be further from the fact.

Quoting Mr. Ackerman's concluding sentence of item 3, paragraph 2, page 18, where he recounts a personal conference with one of the directors of the power company, he states "It was also apparent that some of the important matters under discussion had not previously come to this director's attention." Mr. Ackerman came to my office in October 1964 and requested a meeting with me. I can assure you that nothing Mr. Ackerman divulged in that meeting had any effect whatsoever on the company's decision not to go forward with the HTGR nor did he provide any pertinent information that I was not already aware of.

In the third paragraph of this same Rochester section, Mr. Ackerman quotes one sentence from a complete news release (attached) made on February 26, 1965 by the company. The inference gained by lifting this sentence out of context is that "we cannot gamble when our customer's welfare is at stake." The true press release dealt specifically with the responsibility of the utility to meet its ever-increasing loads and to serve Mrs. Jones "when she flips the switch to turn on her electric lights." That was the "customer's welfare" that was at stake. General Atomic Division of General Dynamics Corp. was unwilling or unable to assure us that the plant would be available for full commercial operation by the fall of 1972. That was the major reason for the breakdown of negotiations.

At no time was the safety of the HTGR concept an issue and whether Mr. Ackerman intended to leave such an impression or not is beside the point. The impression is certainly there. Had there been such a doubt in our minds after 6 years study of the HTGR concept, or any other reactor concept, we would not have progressed to the stage of attempting to negotiate a formal contract with

General Dynamics Corp.—nor would we be requesting bids for a water type reactor today to produce commercial power by June 1, 1969. Rochester, as well as every other responsible utility in the country, is very conscious of the health and safety of its employees and the public. It is nonsense to claim otherwise.

In view of Mr. Ackerman's statement about Rochester, I would appreciate this letter being made a part of the record to dispel any false impressions that might have been created regarding our nuclear power decisions.

Sincerely yours,

ROBERT E. GINNA,
Chairman of the Board.

[News release, Feb. 26, 1965, from Public Relations Department, Rochester Gas & Electric Corp.]

Peak electric loads on the Rochester Gas & Electric Corp. system topped 500,000 kilowatts in 1964, Robert E. Ginna, chairman of the board, announced today. This represents an increase of 8.5 percent over the high established in the previous year.

Although existing power supply facilities are adequate to meet any and all customer loads for the immediate future, Mr. Ginna pointed out that a utility company must plan for power requirements years in advance in order to meet the ever-increasing demands of its customers.

"A large electric generating station does not come into being overnight, and Mrs. Jones is not interested in excuses when she flips the switch to turn on her electric lights," he said. "It takes 3 to 5 years to build a generating plant, depending upon whether it is fossil fuel fired or a nuclear plant."

The fact that, as recently announced by the Rochester Co., it was unable to agree on contractual terms with General Atomic Division of General Dynamics for a high temperature, gas-cooled nuclear powerplant, will in no way impair the power supply of Rochester's customers. "As a matter of fact," said Ginna, "one of the major reasons for the breakdown in negotiations was the unwillingness of General Dynamics Corp. to provide assurances that the proposed nuclear plant would be available to supply power to our customers by the fall of 1972, and we cannot gamble when our customers' welfare is at stake."

Mr. Ginna pointed out that work at the Brookwood nuclear plantsite on Lake Ontario was continuing. Meteorological surveys, test borings for foundations, and design of the water intake facilities, are progressing on schedule. He said that it is too early to predict whether the next major generating unit on the Rochester system will be coal-fired or nuclear but that company engineers and consultants are making a comprehensive reappraisal of system requirements and the economics of various alternative methods of supplying future electric loads. "Nuclear power is still very much in the Rochester picture," Ginna said.

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D.C., July 6, 1965.

DR. GLENN T. SEABORG,
Chairman, U.S. Atomic Energy Commission,
Washington, D.C.

DEAR DR. SEABORG: During the recently concluded hearings relative to the legislative proposal to amend and extend the Price-Anderson indemnity legislation, the Subcommittee on Legislation received the prepared testimony of Mr. Adolph J. Ackerman, a consulting engineer of Madison, Wis.

In his prepared text, a copy of which is enclosed, Mr. Ackerman made some rather serious and startling charges with respect to, among other things, an alleged general breakdown in corporate and engineering responsibility insofar as the construction and operation of nuclear power plants are concerned. As a consequence, he asserts, atomic power development is progressing at the expense of public safety.

Because of the seriousness of Mr. Ackerman's allegation concerning the safety of atomic power plants and the irresponsibility of the persons and firms who build and operate them, the Joint Committee would like to have the views of the Atomic Energy Commission with respect to this charge. The committee also solicits your remarks on any other statements of opinion or assertions of fact by Mr. Ackerman on which the Commission cares to comment.

A letter identical to this one is being sent to the Advisory Committee on Reactor Safeguards.

Your expeditious reply will be appreciated.

Sincerely yours,

CHET HOLIFIELD, *Chairman.*

Enclosure: Statement of Mr. Adolph J. Ackerman.

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., July 22, 1965.

Hon. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. HOLIFIELD: I am glad to furnish the attached staff comments on the prepared testimony of Adolph J. Ackerman which was presented at the recent Joint Committee hearings on extension of the Price-Anderson indemnity legislation. These comments are in response to your letter of July 6, 1965, and are in addition to those forwarded earlier concerning an article in the Wisconsin Professional Engineer.

Your letter noted that a similar request for comments was being sent to the Advisory Committee on Reactor Safeguards. I have seen a copy of the reply by ACRS Chairman W. D. Manly, which I consider to be an excellent statement dealing conclusively with the major safety issues raised by Mr. Ackerman. We concur in the ACRS letter. The attached AEC staff comments, in summary, cover the following salient points:

(*a*) that no factual basis has been found to support Mr. Ackerman's charge of a "breakdown in engineering and corporate responsibility," attributed to the indemnity provisions of the Price-Anderson legislation;

(*b*) that Mr. Ackerman's apparent approach to the safety problem through the single discipline of civil engineering ignores the fact that the complex technology of nuclear power plant design and operation is more dependent on the vital talents of several other branches of engineering, such as mechanical, chemical, physical, metallurgical, electrical, electronic computational and instrument engineering. We believe that all appropriate engineering talents are being utilized;

(*c*) that the AEC, in carrying out the public health and safety responsibilities with which it is charged by the Congress, has exercised continuing research and regulatory efforts in the development of the safety philosophy which guides the design and safety evaluation of nuclear power reactors. This philosophy provides both for multiple safeguards against the occurrence of a serious accident, and for containment of fission product release in the extremely unlikely event of such an accident;

(*d*) that this "defense in depth" strategy has not been seriously challenged to date by any accidents or equipment failures, and this accident prevention philosophy is well demonstrated by the various component failure examples cited by Mr. Ackerman, none of which has resulted in any public safety problem;

(*e*) that, while catastrophic accidents can be postulated and their possibility cannot be absolutely ruled out, the probability of such accidents at nuclear power plants approved by the AEC is so remote that it does not constitute an undue risk to the public health and safety; and

(*f*) that the need for continuous, trouble-free operation is so vital to nuclear power economics as to coincide to a large degree with the objectives of protecting the safety of the public. This is counter to Mr. Ackerman's views that governmental indemnity is a controlling influence on engineering design of nuclear power plants to the extent that public safety is being sacrificed under competitive pressures.

Since the Joint Committee is familiar with the significant data on most existing reactors cited by Mr. Ackerman, and your inquiry was directed primarily at the public safety implications in his testimony, the staff comments have been confined to that subject. If you should need further information on this matter, let me know.

Cordially,

GLENN T. SEABORG, *Chairman.*

Enclosure: AEC staff comments on testimony of Adolph J. Ackerman.

STAFF COMMENTS ON TESTIMONY OF ADOLPH J. ACKERMAN AT HEARINGS ON PRICE-ANDERSON LEGISLATION BEFORE THE JOINT COMMITTEE ON ATOMIC ENERGY, JUNE 22–24, 1965

The testimony by Adolph J. Ackerman, a consulting engineer of Madison, Wis., who stated his practice was chiefly in the "electric power and hydraulic engineering" field, contains many detailed comments and data about specific reactor facilities, and concerning the economics of nuclear power. Without endorsing any of the figures on costs and operational experience cited by Mr. Ackerman, it is believed that the Joint Committee on Atomic Energy already is familiar with the significant facts concerning these reactors. However, the allegations in his testimony bearing on the AEC's responsibility of assuring public safety are of such a serious nature that they will be dealt with directly.

The principal thrust of Mr. Ackerman's testimony is that indemnity available under the Price-Anderson legislation has resulted in a general breakdown of corporate and engineering responsibility, which he states could be restored by abolishing the indemnity provision. His testimony also strongly infers that the AEC, as well as the nuclear power industry, is either overlooking or sacrificing public safety and withholding important operating accident information in pursuing its developmental objectives in the field of nuclear power. We disagree with this thesis.

The AEC's position on the desirability of extending the Price-Anderson indemnity legislation was set forth in detail in our testimony at the Joint Committee on Atomic Energy hearings. These comments will be confined to the public safety issue raised by Mr. Ackerman.

We have been unable to find any factual basis for Mr. Ackerman's apparent feeling that there has been a "terrifying breakdown in engineering and corporate responsibility" in the design and operation of nuclear power plants. We know of no one who is promulgating "false standards" which tend to mislead the public and those in authority "through invalid claims of safety and economy." It is not believed that these claims can be supported by the facts, and certainly not by the examples cited by Mr. Ackerman, most of which appear to lead to safety conclusions opposite to those reached by him.

The breadth and scope of engineering talent required in the design and safety analysis of nuclear power plants far transcends the single engineering discipline approach apparently envisioned by Mr. Ackerman when he expresses "deep regret that the disciplines of the civil engineering branch of our profession have not been fully employed to help in developing this new science to serve the public interest." Civil engineering is, of course, an important segment of the engineering sciences. However, the complex technology of nuclear power plant design and operation depends more on the contributions of mechanical, chemical, physical, metallurgical, electrical, electronic computational, and instrument engineering, all of which are vital to the safeguards being built into nuclear power reactors.

The protection of public health and safety, with which the Commission is charged by the Atomic Energy Act, is regarded by the AEC as a paramount obligation in the program for peaceful uses of the atom. In the field of nuclear power, the AEC has exercised continuing research and regulatory efforts in the development of the safety philosophy which guides the design and safety evaluation of power reactors. Briefly stated, this philosophy is (1) to prevent the occurrence of serious accidents through careful design and sufficient redundancy of critical components so that the failure of any one of them will not be decisive; and (2) to enclose the reactor in a containment structure designed to withstand the full impact of the release of everything inside the reactor system, including its complete load of fission products, all without significant exposure of the public, in the extremely unlikely event of a succession of multiple failures of the kind cited by Mr. Ackerman as having occurred in the electrical distribution system of Manhattan in 1959.

The "prevention" aspect of this philosophy is well demonstrated by the component failure examples given by Mr. Ackerman. It is true that from time to time there have been component failures and material failures, and more will be encountered in the future. But the significant factor from the public safety viewpoint is that none of the failures to date in nuclear power plants has posed any public safety problem. None of the failures has gone so far as to release significant amounts of fission products into the containment, nor even into the primary coolant system through substantial cladding failure or fuel meltdown.

The "defense in depth" safety strategy which has been built into nuclear power plants has never seriously been challenged by any accidents or equipment failures that have occurred to date. This strategy is the cornerstone of accident prevention philosophy in nuclear design.

Containment plays no part in the prevention of accidents. Its role is to protect the public in the unlikely event that multiple failures defeat all of the protective devices built into the plant for the prevention of fission product release from the fuel and primary coolant system. In such an event, release would be into the containment.

A catastrophic accident would necessarily involve a succession of multiple failures including the devices provided to protect containment integrity, such as air recirculation fans and containment spray systems necessary to remove fission product decay heat to prevent overpressurization of the structure. Such a situation is conceivable, though extremely unlikely. If it should happen concurrently with or following a major release of fission products into the containment, the public consequences could be very serious. It is this type of extremely hypothetical occurrence which cannot be absolutely ruled out that Price-Anderson indemnity is designed to cover. However, the AEC is confident that the probability of such accidents at nuclear power plants which it has approved is so remote that it does not pose an undue risk to the public health and safety.

We believe there is a fundamental fallacy in Mr. Ackerman's reasoning that governmental indemnity exercises a controlling influence on the engineering design of nuclear powerplants to the extent that public safety is being sacrificed under the strong pressures associated with vigorous competition for business. There is no question that all companies involved in nuclear power competition are actively seeking better and more economic ways of achieving desired objectives. But it requires only cursory observation of developments in this field to recognize that the most dominant competitive urge is to build plants which are completely reliable in their operation. We do not believe that any utility is interested in investing in a powerplant unless there is a high degree of assurance that its operation will be reasonably continuous and trouble free. Such assurance can only be achieved by careful attention on the part of reactor designers to see that ample margins of safety are provided on all operating parameters important to continuous operation so that the normal fluctuations of power demand and other operating variables can readily be accommodated. Since continuous, trouble-free operation is almost by definition a safe operation, the objectives of competitive economics coincide with those of protecting the safety of the public. Any attempt to cut the corners of operational safety to achieve greater competitiveness would almost certainly result in operational difficulties that would in time eliminate such a competitor, and hence would be self-defeating. There are certain areas where this might not apply, such as the containment design, but these are well known to the regulatory staff, and are covered by appropriate regulatory procedures.

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS,
U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., July 22, 1965.

HON. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. HOLIFIELD: In response to your request of July 6, 1965, we wish to make the following comments on the prepared testimony of Mr. Adolph J. Ackerman, presented at the recent Joint Committee hearings on the extension of the Price-Anderson indemnity legislation.

Mr. Ackerman states that there is a tendency on the part of the management of utility companies to abdicate responsibility for the safety of their nuclear plants, partly because of the indemnity provisions of Price-Anderson legislation. The committee has seen no evidence, during its reviews of nuclear reactor proposals, that supports this view.

The committee wishes to comment on two other aspects of Mr. Ackerman's testimony. The first is a general view on the nature of responsibility of scientists and engineers relative to nuclear reactors. The second is the question of how safe nuclear reactors are at present, as concluded from their operating records.

The first point is perhaps stated most succinctly by Mr. Ackerman on page 4 of his prepared testimony, where he contrasts what he calls the "Atom Under Freedom" and the "Atom in Serfdom." These are, as taken from the testimony:

"1. *The Atom Under Freedom.*—This is the traditional multicentered American system guided by ethics, individual responsibility and self-discipline in engineering and in law, and with reasonable regulatory controls. (A well-known example in an older technology: our drinking water.)

"2. *The Atom in Serfdom.*—This is a revolutionary system founded on fear, with control by a centralized governmental authority over the application of the technology and communication with the public."

We concur with Mr. Ackerman's view that the safe development of atomic power must be "guided by ethics, individual responsibility in engineering and law, and with resasonable regulatory controls." It is our opinion that this is precisely the course now being followed.

Nuclear reactors are designed, built, and operated largely by engineers, and the committee has seen no evidence of depreciation of the commonly displayed high feeling of responsibility of the engineers involved. In fact, a realization of need for safety is characteristic of the views and technical acts of engineers in the nuclear reactor field. However, we believe that the degree of governmental control now exercised is necessary, because the country cannot accept in atomic energy the occasional major accidents that have punctuated engineering progress in other fields, or such conditions as are represented by the present pollution of the atmosphere and our water resources. The committee believes that it is essential to note in this connection that independent technical reviews are important features of the analysis of the safety of every nuclear power reactor built and operated in the United States. Among the independent groups that must be satisfied on safety are successively the regulatory staff of the AEC, the Advisory Committee on Reactor Safeguards, and the Atomic Safety and Licensing Boards. That such careful attention must be given each project by each group of technical persons (scientists and engineers with no responsibilities to these projects other than regarding safety) testifies to the seriousness with which the Congress and the AEC regard the need for careful, independent study of nuclear reactor safety.

The committee disagrees strongly with Mr. Ackerman on the question of the safe conditions of existing nuclear reactor plants. His testimony cites the operating history of several power reactors, and underscores the shutdowns as evidence of faulty design or operation. Many of the shutdowns cited were periods of normal fueling and inspection. Others were for maintaining the integrity of one of the multiple protective barriers. We infer from the operating records that utility companies are acting in accordance with recognition of their responsibilities to the public.

The committee believes, as does Mr. Ackerman, that accidents to nuclear reactors beyond those commonly called "credible" can be postulated. Such accidents do not have a probability that is exactly zero. The committee does, however, believe that in cases where it has recommended approval of a proposal, the probability of such extreme accidents is so small as not to constitute a significant hazard to the public. This is counter to the views stated by Mr. Ackerman.

I hope that these comments will help you to assess Mr. Ackerman's views.

Sincerely yours,

W. D. MANLY, *Chairman.*

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D.C., July 23, 1965.

MR. ADOLPH J. ACKERMAN,
Consulting Engineer,
1250 Sherman Avenue,
Madison, Wis.

DEAR MR. ACKERMAN: Chairman Holifield has asked me to acknowledge and thank you for your letter of July 2, 1965, in which you requested that the statement contained in the attachment thereto be included in the record of the Price-Anderson hearings as an extension of your remarks. We shall include this statement in the record, noting that it was supplied by your July 2 letter.

It strikes me from perusing the transcript of the hearings and the written materials you recently submitted that you have not been fully responsive to the three questions which Chairman Holifield addressed to you during the afternoon session of the hearing on June 24. As you will recall, you were provided with

these questions at the end of the morning session in order that you might give a more considered response to them. For example, the first question, as you will recall, asked that you give some specific examples of the breakdown in engineering and corporate responsibility which you alleged has accompanied atomic power development. While your response to this question defines what you mean by the term "professional responsibility," notes its importance, and cites an instance of professional responsibility in connection with a dam failure in California, nothing is said about and no examples are given of the breakdown in responsibility which you say has accompanied atomic power development. In view of the foregoing, I believe you will agree that more specific information is required if your answers to Chairman Holifield's questions are to be responsive.

I also note that you have not availed yourself of the opportunity to furnish written answers to the supplemental list of questions which was presented to you in person at the hearing. The transcript of the hearing indicates that at that time you expressed to Chairman Holifield your willingness to submit prepared responses to these questions. While the preparation of answers to all of the questions on this list might be unduly burdensome to you in view of your other responsibilities, we believe the record would be incomplete without your answers to at least the following questions selected from that list:

1. You state that "atomic power development is being falsely oriented at the expense of public safety." Please give some specific examples to support your statement. Which atomic powerplants are unsafe and in what specific item of design are they unsafe?

2. The first full sentence in the next to last paragraph on page 3 of your appendix C states: "It should be noted that this act [that is, the Price-Anderson Act] did not provide compensation for damage to the public resulting from an accident in an atomic plant under Government ownership." What is your basis for that statement? (As you may know, the AEC's principal nuclear facilities and laboratories are operated by contractors of the AEC, not by AEC employees. These contractors are covered by Price-Anderson indemnity agreements.)

3. On page 2 of your appendix A, you speak of "the lack of reliability in reactors at this embryonic stage of the art."

(*a*) Some of the data you present is nearly a year old. Some atomic plants have emerged from the "embryonic stage" at a rapid rate. Are you familiar with the latest plant availability factors for atomic plants?

(*b*) Are you familiar with the reliability data on nuclear-propelled naval vessels in the United States, of which about 60 are in operation?

(*c*) To put reliability factors in proper perspective, it might be helpful to provide information on problems with conventional plants and conventional components of atomic plants for comparison with "embryonic nuclear plants."

For example, plant availability data on modern, first-of-a-kind conventional plants, such as supercritical plants, forced convection plants, and the first high-temperature plants immediately after start-up, would be useful in evaluating the plant availability factors of newly emerging nuclear plants. Do you have any such data?

4. Please be specific in support of your statement that civil engineers are not being employed in this new science to the degree you think is necessary.

The committee attempts to keep informed on all significant developments in the nuclear power field, particularly in the field of safety. When the committee receives information on deficiencies, corrective measures are investigated. This is the reason for our request to you for specific information concerning reliability and safety of reactor powerplants. We appreciate your cooperation in furnishing this information to us.

We hope to publish the record of these hearings in very early August. It is necessary, therefore, to request that you submit responses to the foregoing questions on or before August 9, 1965, to assure their inclusion in the published record.

Sincerely yours,

JOHN T. CONWAY,
Executive Director.

MADISON, WIS., *August 5, 1965.*

Mr. JOHN T. CONWAY,
Executive Director, Joint Committee on Atomic Energy, Congress of the United States, U.S. Capitol, Washington, D.C.

DEAR MR. CONWAY: Thank you for your letter of July 23. I have given this careful consideration on the assumption that your letter, as well as this reply, will be published as part of the official hearing record.

First of all, I want to express my thanks for including my supplemental statement of July 2 as part of the formal record of the Price-Anderson hearings.

Second, I want to correct what appears to be an erroneous impression regarding a "supplemental list of questions." Before the noon recess, Mr. Holifield had stated: "We have only one or two questions, Mr. Ackerman. We will present you with a copy of them. After lunch, at 2 o'clock, if you will reappear it won't take but just a few minutes." He handed me a copy of his questions and my answers are a matter of record.

No supplemental list of questions was presented to me in person at the hearing, nor did I express a willingness to submit prepared responses to such questions. At some stage my assistant was handed a 5-page printed statement: "Suggested questions for Adolph Ackerman." I testified: "Whether or not it will be feasible to answer the second group of questions I cannot answer at the moment * * *."

The "suggested questions" indicated no responsible authorship, and some of them appeared to reflect a disrespect for dissenting opinion. In general, the questions departed from the level of competence displayed by the chairman's questions, and I concluded that further exposition could become diversionary from the basic principles about which I am concerned.

You may have found it unique to receive such an initiative of dissent as I chose to take. Obviously this is a very difficult and costly undertaking, but it seems to me that the Joint Committee is not profiting from the contributions that could be found in "the voice of dissent." This, in part, was the basis for my recommendation that a special study be undertaken, preferably through nongovernmental channels, so that adequate evidence could be developed to the satisfaction of all concerned.

I had good reasons for offering that recommendation because I believe that an unbiased study would develop a confirmation of important information I have developed during the past 8 years. My testimony was based on extensive studies and references to an unpublished manuscript of some 800 pages (obviously not a venture for profit). I have devoted a number of years of my professional time to this study and have also financed the assistance of others with specialized competence. I undertook this work for the very simple reason that I found myself confronted with some challenges in my professional area that somehow had to be identified and communicated. This is the normal duty of a professional engineer. It is the kind of duty that Dr. Frances Kelsey met so admirably several years ago.

With reference to "the breakdown in engineering and corporate responsibility," I can briefly point out that this is not something new. An article, "Who Is Responsible For What? (When it comes to building nuclear facilities)," was written by the Chief Engineer of the Architectural Planning Division at Brookhaven National Laboratory (Engineering News-Record, June 2, 1960), and opens with the following statement:

"Construction has a problem in providing large-scale nuclear facilities, particularly powerplants: The problem is in dividing responsibilities among the separate groups whose combined technical talents are required. In addition to the owner-operator, there are at present four major and distinct groups involved:

Architect-engineers.
Nuclear consultants.
Equipment manufacturers.
Construction contractors.

"There is an inherent possibility of gaps and overlapping of responsibilities of these groups. This requires careful coordination, but most importantly it requires the maximum of guarantees from the only two groups properly capable of guarantees: the equipment manufacturers and the construction contractors.

"The complex relationships in the nuclear field (see 'The Crazy-Quilt Nuclear

Power Business,' Engineering News-Record, Nov. 28, 1957, p. 21) complicate the definition of varying areas of responsibility and the specification of nuclear-mechanical-electrical system guarantees."

In the new technology of atomic power we are confronted with an overriding problem of developing sound relationships in various areas of great responsibility: between government—the professions of law, engineering, and medicine—private enterprise in manufacturing and in public service—and in communications to the public. In all of these areas there is an overriding duty to be concerned with protecting the public health and safety. There are still many unknowns in all areas of this new technology. In the meantime one acts on limited knowledge, but there is one common bond that can serve as a guide for all concerned—and that is ethics. I have identified this in greater detail in the accompanying summary on "The Problem of Ethnics in Atomic Power."

Finally, in regard to your questions about responsibility I believe you will find a good answer in the annual Transactions of the American Society of Civil Engineers for 1963, volume 128, part V, paper No. 3497, "Atomic Power, A Failure in Engineering Responsibility." This includes an especially high number of discussions contributed by professional colleagues who have presented their views in support of my basic thesis. It also includes a copy of a brief I filed in the U.S. Supreme Court in 1961.

Sincerely yours,

ADOLPH J. ACKERMAN,
Consulting Engineer.

AUGUST 5, 1965.

THE PROBLEM OF ETHICS IN ATOMIC POWER

(By Adolph J. Ackerman, consulting engineer)

The subject of ethics was reviewed in a notable address by the Chief Justice of the United States in November 1962 at the Jewish Theological Seminary of America in these words:

"Society would come to grief without ethics, which is unenforceable in the courts, and cannot be made part of law * * *. Not only does law in civilized society presuppose ethical commitment; it presupposes the existence of a broad area of human conduct controlled only by ethical norms and not subject to law at all. * * *

"The individual citizen may engage in practices which, on the advice of counsel, he believes strictly within the letter of the law, but which he also knows from his own conscience are outside the bonds of propriety and the right. Thus, when he engages in such practices, he does so not at his own peril—as when he violates a law—but at peril to the structure of civilization, involving greater stakes than any possible peril to himself.

"This law beyond the law, as distinct from law, is the creation of civilization and is indispensable to it. * * *

"A person able to discern the right in the midst of great confusion and to pursue it, is a person of character. A person may be learned or ignorant; he may be old or young, rich or poor, well or sick; whatever his condition he has to act, and his actions have their effect on himself and generally also on his fellow men.

"The education of both ministers of religion and of lay specialists, qualified to help the confused find himself in the maze of ethical problems is, in my opinion, one of the urgent needs of Western democracy, as it attempts to preserve its tradition of freedom in competition with rival systems of life."

In the new technology of atomic power, it is my conviction that the Price Anderson Act is destroying the field in which the delicate roots of professional and business ethics could be cultivated. I shall attempt to interpret the Chief Justice's challenge to ethical commitment as it applies to this new technology. I do not propose to sit in judgment of others, but shall try to identify a number of basic issues in terms of the disciplines of my profession.

1. It may be legal, but it is not ethical for a chief engineer to design and locate an atomic powerplant where an accidental failure or sabotage could be disastrous for a city, when such a peril can be reduced or eliminated by an alternative plan costing more money.

2. It may be legal, but it is not ethical for a chief engineer to comply with instructions leading to the design and location of an atomic powerplant which may cost less—but imperil more people.

3. It may be legal, but it is not ethical for a chief engineer, in matters involving public safety, to shift his responsibility to his management or to a government agency.

4. It may be legal, but it is not ethical for a chief engineer to exploit public confidence in the engineering profession or in responsible corporate management.

5. It may be legal, but it is not ethical for a chief engineer to design an atomic powerplant without adequate knowledge of the magnitude of the energy released in the event of a reactor failure.

6. It may legal, but it is not ethical for a chief engineer to perpetuate the myth that it is not feasible to build a commercially-insurable atomic powerplant.

7. It may be legal, but it is not ethical for a chief engineer or a consulting engineer, in this new technology which is understood by very few, to extol its virtues without also clearly identifying its deficiencies and the peril it poses to the public.

8. It may be legal, but it is not ethical for a chief engineer of an atomic powerplant to certify that his design is safe when he has no resource of demonstrated experience as to what is safe, such as prevails with high pressure steam boilers.

9. It may be legal, but it is not ethical for a chief engineer or a consulting engineer to hide behind the false design criterion of a "credible accident," when all major failures or disasters have occurred under circumstances previously considered incredible.

10. It may be legal, but it is not ethical for a chief engineer or a consulting engineer to claim that he can produce energy from an atomic powerplant at costs competitive with energy from conventional steamplants without disclosing the high subsidies at public expense in atomic power.

11. It may be legal, but it is not ethical for a chief engineer to commit his company to the building of an atomic powerplant without having a valid long-term solution to the problem of waste disposal as part of the corporate responsibility.

12. It may be legal, but it is not ethical for a chief engineer to create a project which could precipitate a terrifying legal chaos in the event of a disaster from a reactor failure.

13. It may be legal, but it is not ethical for a board of directors to suddenly abdicate its corporate responsibilities and authorize construction of a new powerplant so perilous to the public that it is not fully insurable under its traditional policies.

14. It may be legal, but it is not ethical for a chief engineer, or a lawyer, or a board of directors to abdicate their traditional corporate responsibilities, in the event of a major reactor failure, and to rely on the taxpayers to compensate the survivors of such a disaster.

15. It may be legal, but it is not ethical for a board of directors to exploit public confidence by authorizing the construction of an atomic powerplant near a populous area without disclosing the fact that the available third party liability insurance is grossly inadequate.

16. It may be legal, but it is not ethical to create the illusion in the public mind that "insurance is insurance," whether damages are payable by a private insurance company or out of the Public Treasury.

17. It may be legal, but it is not ethical to lobby for the financial advantages obtainable under the Price-Anderson Act at the expense of the public—and at the expense of ethics among engineers, lawyers, and corporate manager.

18. It may be legal, but it is not ethical for leaders in public and private enterprise to claim that the Price-Anderson Act is intended to "protect the public" when the prospects are extremely uncertain for the survivors to collect compensation because most State laws first require a determination of legal liability.

19. It may be legal, but it is not ethical for a reactor manufacturer or operator to abdicate his responsibilities in view of the probability, in the event of a major failure, that it will be impossible to identify the cause or prove who is liable.

20. It may be legal, but it is not ethical for engineers, lawyers, and manufacturers to create a new vocabulary of propaganda designed to minimize public concern by avoiding such words as "peril," "public hazard," "failure," "disaster," etc., and introducing such words as "incident" for "accident."

21. It may be legal, but it is not ethical for editors to ignore or minimize the adverse factors and failures in this new technology, and to dismiss responsible criticism, an element indispensable to progress.

22. It may be legal, but it is not ethical for a vice president to commit his corporation to a policy jeopardizing public health and safety, while its president is demanding the observance of high ethical standards of business conduct.

23. It may be legal, but it is not ethical for an executive to advocate congressional action in the area of his corporation's interests without having first obtained the approval of his board of directors on questions of public and corporate policy.

24. It may be legal, but it is not ethical for a few utility executives to build atomic powerplants and thereby expose the entire utility industry to the threat of nationalization in the event of a major disaster which would awaken the public to the irresponsibilities inherent in current practices and policies.

25. It may be legal, but it is not ethical to ignore the principles of morality and ethics enunciated by Congressman Holifield when he opposed enactment of the Price-Anderson Act in 1957.

Chairman HOLIFIELD. Our next witness will be Mr. DeRoy C. Thomas, counsel of the Hartford Accident and Indemnity Co. representing the Nuclear Energy Liability Insurance Association. You may bring anyone you wish with you, sir.

STATEMENT OF DeROY C. THOMAS, ON BEHALF OF THE NUCLEAR ENERGY LIABILITY INSURANCE ASSOCIATION; ACCOMPANIED BY LESTER F. SENGER, ASSISTANT VICE PRESIDENT, AETNA CASUALTY INSURANCE CO.; ROGER J. FISHER, SECRETARY, TRAVELERS INSURANCE CO.; ASHLEY ST. CLAIR, REPRESENTING MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS; JAMES H. MERRITT, ASSISTANT VICE PRESIDENT, LIBERTY MUTUAL INSURANCE CO.; AND FRANCIS X. BOYLAN, GENERAL MANAGER, NUCLEAR ENERGY LIABILITY INSURANCE ASSOCIATION

Mr. THOMAS. They are following me, Mr. Chairman.

Chairman HOLIFIELD. I thought maybe the audience was going to participate.

Do you have a prepared statement?

Mr. THOMAS. I would like to introduce Mr. Ashley St. Clair on my right representing MAELU, Mr. Senger here who is with Aetna and represents NELIA, Mr. Merritt on my right, vice president of Liberty who represents MAELU and Mr. Fisher, secretary of the Travelers Insurance Co.

We have a prepared statement here of some length but due to previous testimony I find the things we have had to say on matters other than capacity have been amply covered.

Chairman HOLIFIELD. Would you like us to accept that statement for the record and then permit you to summarize it?

Mr. THOMAS. If I can. I perhaps would like to summarize——

Chairman HOLIFIELD. Summarize those points you feel you would like to give special emphasis to.

Mr. THOMAS. Yes, sir, the portion with respect to capacity is the only thing I would like to mention.

Chairman HOLIFIELD. We will put the complete statement in the record.

(The statement referred to follows:)

STATEMENT OF DEROY C. THOMAS ON BEHALF OF THE NUCLEAR ENERGY LIABILITY INSURANCE ASSOCIATION

My name is DeRoy C. Thomas. I am a counsel to the Hartford Insurance Group. Today, however, I am appearing on behalf of the Nuclear Energy Liability Insurance Association.

Soon after the 1954 amendment of the Atomic Energy Act paved the way for the private development of the atom, it became apparent that lack of adequate amounts of insurance was pictured by some as a major obstacle to substantial atomic development. Consequently in 1955, the Atomic Energy Commission created a group of insurance industry representatives to study liability and property insurance problems associated with the peaceful uses of atomic energy. As a result of their efforts, and with the encouragement of the Commission, the nuclear liability insurance pools were launched in the spring of 1956.

The stock casualty insurance companies formed an association known as the Nuclear Energy Liability Insurance Association (NELIA). It is made up of 124 stock companies which are able to issue a policy bearing an aggregate limit of $46,500,000 per risk. The mutual companies formed an association known as the Mutual Atomic Energy Liability Underwriters (MAELU). The mutual company members are able to offer a liability policy with an aggregate limit of $13,500,000 per risk. These figures include participation by the worldwide reinsurance market.

Despite the efforts of private insurers, it was the judgment of industry and the Congress that additional protection against the nuclear hazard was necessary. Therefore, on September 2, 1957, the Price-Anderson Indemnity Act was passed as Public Law 256 of the 85th Congress affording Government indemnity to certain Atomic Energy Commission contractors and licensees. Thereafter, the stock and mutual insurers, the Commission and members of industry cooperated so that indemnity and insurance coverage would dovetail, thus providing an unbroken pattern of financial protection. The extremely broad coverage afforded under the policy issued by the two pools is unprecedented.

Since, the early days of the nuclear pools, the Joint Committee, the Commission, the atomic industry, and insurers have met frequently to resolve insurance and indemnity problems which were brought about by the growth and development of the infant nuclear industry. Because of this continuing effort, a truly comprehensive program of public liability protection consisting of underlying financial protection and indemnity has been arrived at. In order to assure the orderly administration of claims arising from nuclear incidents at indemnified facilities, the Atomic Energy Commission entered into a contract for claims service with NELIA and MAELU in 1964. This agreement, which is described in the "AEC Study of the Price-Anderson Indemnity Act" (pp. 30–31, JCAE Print *Selected Materials on Atomic Energy Indemnity Legislation*, June 1965), provides for the smooth handling of claims and for cooperation between insurers and the Commission.

Another important aspect of the program has been the institution of a program of retrospective premium adjustment. The rating program, known as the industry credit rating plan, is designed to apply over a 10-year period to the experience of the insured nuclear industry as a whole. Between 67 and 75 percent of the premiums collected by the pools will be set aside as reserve premium. From these funds, losses and loss adjustment expenses will be paid. The balance of these funds will be placed in a special reserve. The portion of the reserve to be returned in the 11th year will be that percentage of it which corresponds to the relationship of the 1st year reserve premiums to the accumulated 10-year reserve premiums. The return will be made to the insureds who paid premiums in the first year of operation and will be divided among those insureds according to the proportion which each one's reserve premium bears to the total reserve premium in the first year.

More recently, the fact that the Price-Anderson Indemnity Act will expire in August 1967 has become a subject of concern. In that connection, Chairman Holifield, in the speech on December 3, 1964, pointed to the 1957 hearings in connection with the Price-Anderson Indemnity Act and the report of the Joint Committee which stated:

"The provisions of this bill provide governmental indemnifications to those licensees who obtain their licenses within the next 10 years. The indemnification agreement is to run for the life of the license. During the 10-year period it is hoped that there will be enough experience gained so that the problems of reactor safety will be to a great extent solved and the insurance people will have had experience on which to base a sound program of their own." (S. Rept. No. 296, 85th Cong., 1st sess., p. 9 (1957).)

In this connection, Chairman Holifield himself said:

"I believe, for instance, that it should be possible for the insurance industry to increase the insurance coverage from $60 million to say $100 million. Accordingly, a bill will be introduced early in the next session of the Congress to extend the Price-Anderson indemnity provisions from 1967 to 1977 with the indemnity coverage being lowered in an amount equal to the increased private insurance capacity. I believe that this is a sound step on the road toward normalizing the role of insurance in the nuclear power business. Ultimately, I would hope that we could completely dispense with the need for a governmental indemnity and rely entirely upon the private insurance market."

Private insurers were and are delighted with the opportunity to recapture an area for private insurance especially since so much concern has been expressed in recent years by insurers and other industries over Government intrusion into areas which can be occupied legitimately by private enterprise. Consequently, the pools canvassed their members and sought additional capacity from insurers which are not yet members. A copy of the letter sent out by NELIA is appended hereto. As the result of this appeal, as of January 1, 1966, NELIA will have 19 new members, and their participation plus increased participation by members of NELIA and by foreign reinsurers will bring NELIA's capacity to more than $56 million. As a result of these efforts, the stock and mutual pools will have available as of January 1, 1966, an aggregate capacity of approximately $74 million per nuclear facility. This additional $14 million represents almost a 25-percent increase over the $60 million aggregate capacity now available.

It is quite true that this increase falls short of the goal set by Chairman Holifield. However, there are several reasons for this result.

In the first place, at the present time only three licensed reactors purchase the full amount of insurance capacity available. In addition, much smaller amounts of insurance are purchased by the operators of 21 smaller reactors and 29 educational reactors insured by the nuclear liability pools. Furthermore, the pools now insure only 85 other facilities and some 200 supplier's and transporter's policies are in force. It is estimated that the total annual liability premium for both NELIA and MAELU for 1965 will be $2,300,000 which would increase the reserve fund of both pools to approximately $8,400,000. This amount has been accumulated since the inception of both pools by setting aside between 67 and 75 percent of the annual premium collected from each risk by the pools for the payment of loss and loss expense, or for return to insureds after a 10-year period.

Obviously, $8 million is an inadequate cushion against a catastrophic occurrence. Nevertheless, it has taken the pools 9 calendar years to assemble this small amount in premium reserves. If the present total annual premium of $2,300,000 were to remain constant, the pools would never be able to create a reserve fund capable of handling a single catastrophe since returns after a 10-year period of amounts not expended for loss and loss expense would tend to counterbalance amounts added each year. Therefore, it is not difficult to appreciate that given the present state of development in the nuclear industry, insurers are not given an adequate spread of risk against possible catastrophic incidents. Of course, this inadequate market has been further aggravated by the Commission's decision not to require underlying financial protection of its own contractors, preferring, rather, to afford them first-dollar indemnity.

A second factor to be mentioned is the unusually large net exposure that domestic insurers have assumed in order to meet the need for nuclear capacity. Because the capacity of the property and liability pools include all available worldwide reinsurance, the individual domestic insurers have not reinsured their participation. Furthermore, most companies have made commitments to the nuclear property insurance pools in amounts roughly equivalent to those committed on the liability side. Figures reveal that several companies have individual nuclear property and casualty exposures unreinsured in amounts as much as $4,500,000 per risk. Such amounts greatly exceed other property and

casualty exposures assumed without reinsurance. The fact that this extremely large net exposure is spread over such few risks is a matter of concern for those responsible for prudent insurance management. This problem is somewhat magnified by the fact that at the present time almost all property and casualty insurers are suffering extremely heavy underwriting losses and have been so for the last few years. Obviously, under such circumstances, managements are loath to expose their companies to large losses, especially where the exposure rests on an extremely small premium base.

A third factor also bears upon the situation. Nuclear property insurers have recently received several requests for additional capacity in excess of that presently available in the nuclear pools. Consequently, at about the same time, they too have sought additional capacity from their members and reinsurers. As we have already indicated there is a substantial identity of membership in the property and casualty pools. It is our present information that the members of the nuclear property pools have amassed enough additional capacity so that they will be able to provide nuclear energy property policies in amounts up to $72 million. Thus, stock property and casualty insurers have really increased available nuclear insurance against the nuclear hazard by more than $25 million per risk.

It should be emphasized that the additional capacity furnished by insurers constitutes more of a good-faith expression of appreciation of the suggestion by Chairman Holifield and others that private insurance plays an increased role than an appraisal of the immediate nuclear insurance market. However, the capacity presently amassed should not be considered the total limit available from casualty insurers for the next 10 years. We are convinced that as the nuclear industry develops and grows, and the present Atomic Energy Commission projections become realities, additional amounts of capacity will be available. Based upon the Commission forecast and assuming a continuation of premium development predicated upon 1965 standards, we have estimated that our annual premium for 1970 will be approximately $4,300,000 and for 1975, $9,500,000. Assuming continuation of virtually loss-free experience, it is our estimate that our reserve fund will be $20 million by 1970 and $40 million by 1975. Given these figures, it is quite likely that by 1975 the pools will be able to offer the $100 million capacity suggested by Chairman Holifield in his speech.

In order to reach the desired capacity, it is our plan to periodically test the insurance market in light of expanded nuclear development in order to increase our existing capacity. In our judgment, such periodic survey should be made every 2 or 3 years. If made more frequently, and only slight changes in the nuclear industry had occurred since the last request, there might be no impact in any request for additional capacity. Further, it could be quite disruptive to the smooth correlation of indemnity and financial protection if the maximum amount of insurance available were changed on an annual basis.

OTHER MATTERS

Since the inception of Price-Anderson, several problems have arisen in connection with the policy of Government indemnity which have been resolved in one fashion or another, generally to everyone's satisfaction. However, there are one or two outstanding items which were mentioned by the Commission in its report with respect to which comment should be made by insurers.

Bridge, tunnel and throughway authorities

Bridge, tunnel, and throughway authorities have raised several questions in connection with liability insurance and as the result of conferences between the authorities, insurers, the Commission and the Joint Committee, many of their problems have been resolved by written interpretation of the standard nuclear exclusion contained in conventional liability policies and by the agreement of the pools to furnish them with a specially limited supplier's and transporter's form, tailored to their problems. Also, the authorities expressed a desire for an amendment to the clause contained in nuclear liability policies issued to them limiting applicability of the policies to claims made within 2 years after the end of the policy period. In response, the liability pools have offered an endorsement for an additional premium which would extend the 2-year discovery period to 10 years in the event of termination of the policy.

It is probably pointless to describe in more detail modifications made by insurers to meet the problems of the authorities in view of the fact that this

area has been so carefully detailed by the Commission in its report to the Joint Committee (pp. 26–28, JCAE print *Selected Materials on Atomic Energy Indemnity Legislation*, June 1965). More important is the fact that the authorities have expressed general satisfaction with the actions taken by liability insurers in this area although they point out that their problems are not yet completely resolved.

Railroads

The staff of the Joint Committee, the Commission, and insurers have met, both together and separately, with railroad representatives in efforts to help allay the latter's concern with respect to liability and property damage arising from the shipment of nuclear material. At the present time there appears to be two remaining problems involving insurers.

The first involves the uncertainty by the railroads with the scope of the insurance coverage for their liability under the Federal Employers' Liability Act (FELA) for injuries arising from the transportation of radioactive material. The railroads have been satisfied that FELA coverage for nuclear exposures is available in the conventional market and, in addition, that the facility form policies issued to nuclear facilities cover this exposure. However, most railroads purchase FELA coverage with deductibles so that their conventional insurance applies only in excess of the deductible amount selected.

At least some railroads have indicated that they would like to be able to eliminate this deductible with respect to the nuclear exposure. Nuclear insurers have asked them to attempt to purchase this coverage through the regular market. In the event that the coverage cannot be obtained through the regular market and there is a sufficient demand for such coverage, nuclear insurers will attempt to find some way of providing it through the pools.

The second problem involves a desire on the part of railroads to purchase an extension of the 2-year-discovery period contained in the policy.

It should be pointed out that the policies issued by the pools are continous and that the clause has no application while the policies remain in force. The clause limits the application of the policy to bodily injury or property damage caused during the policy period and for which claim is made not later than 2 years after the end of the policy period.

The railroads have argued that if they elect to cancel pool coverage or if the pools elect to cancel, there should be some assurance that claims can be made up to 10 years after the policy termination for injuries caused during the policy period.

We have in the past explained our position on this matter to both the Commission and the Joint Committee.

In our view if an insured cancels his coverage, he is not unduly concerned with present or future losses. Further, the pools cannot afford to arbitrarily cancel coverage. One of the fundamental purposes behind the formation of the nuclear liability insurance pools is to obviate the need for Government intervention in the field of private insurance. Any assumption that the insurers would cancel arbitrarily in any situation, and particularly in the hope of escaping the consequences of a large incident, is unrealistic. From the beginning the insurance industry has maintained that it is the best qualified agency to adjust and pay the great majority of losses that are likely to result from the nuclear program. In consequence, it would always object to the intervention of the Government where private enterprise can perform. Arbitrary cancellation by the pools would constitute an invitation to the Government to intervene in this area—an invitation which the insurance companies will not willingly extend.

Nevertheless, the pools are willing to consider the railroads' request. It may be that as in the case of the bridge, tunnel, and throughway authorities, on reevaluation, the pools will be able to provide some satisfactory answer to the railroads' problem.

The Commission contractor program

Finally, the insurers continue to be unhappy with the Commission's decision to afford first-dollar indemnity to its contractors. Of course, although the Commission has decided to forego nuclear liability insurance, it has executed agreements with the insurance industry for the investigation and adjustment of claims for its contractors. In 1962, when the act was extended to provide protection to contractors for incidents occurring outside the United States, the nuclear pools urged the Joint Committee to change the word "may" in the second sen-

tence of subsection 170(d) of the Atomic Energy Act to "shall." This proposal would, in effect, remove from the Commission the discretion as to whether underlying financial protection should be required. At that time, the Commission indicated that it would be interested in negotiating with the nuclear liability insurance pools nuclear insurance of a retrospective rating plan basis for those contractors operating atomic energy facilities. However, in subsequent discussions with the Commission, it soon become clear that the type of plan the Commission had in mind would have almost completely removed any element of real insurance. Since it is improbable that the Commission will change its view and permit its contractors to purchase underlying insurance, it is likely that insurers will in the near future renew their suggestion with respect to the amendment of subsection 170(d).

However, despite the fact that we will probably recommend such an amendment in the future, the stock casualty insurers have no objection to the extension of the Price-Anderson Indemnity Act for another 10 years as proposed in H.R. 8496 and S. 2042.

We want to thank the members and staff of the Subcommittee on Legislation of the Joint Committee on Atomic Energy for permitting us to express our views.

NUCLEAR ENERGY LIABILITY INSURANCE ASSOCIATION,
New York, N.Y., January 29, 1965.

LETTER NO. 170 TO THE MEMBERS OF NELIA

(Mail response requested)

REQUEST BY CONGRESS FOR MATERIAL INCREASE IN NELIA CAPACITY

GENTLEMEN: The Price-Anderson Act, Public Law 85–256, grants statutory authority to the Atomic Energy Commission (AEC) to afford $500 million of Government indemnity to certain of its licensees and contractors above any financial protection which it may require. By its terms, the law does not permit the AEC to enter into contracts of indemnity with its licensees and contractors after August 1, 1967. Consequently, for some time the Joint Committee on Atomic Energy of the Congress (JCAE), the AEC, and representatives of the nuclear industry have been devoting serious study to the effectiveness of Price-Anderson and the desirability of extending the act for 10 more years.

Representatives of the NELIA governing committee and the mutual nuclear pool (MAERP) have had conferences on this subject with Government officials, including a recent informal conference with Congressman Holifield, the chairman of the JCAE for the 89th Congress, Congressman Price, a coauthor of the law, AEC Commissioner Ramey, and members of the staff of the JCAE and AEC. There have been many similar conferences with representatives of the nuclear industry during the past year.

Simply stated, it is the consensus that a 10-year extension of the Price-Anderson law is desirable. However, it appears that the enactment of extension legislation may very well hinge upon the ability of the insurance industry to offer additional nuclear liability capacity. Representatives of the coal industry, fearful of the impact of economically competitive nuclear power, have already served notice that they will oppose Price-Anderson's extension as being a form of subsidy of the nuclear industry. Spokesmen for the JCAE, AEC, and the nuclear industry have pointed out that if, because of the expiration of Price-Anderson, Government indemnity against a catastrophic nuclear loss is unavailable, the public may not be completely protected and the growth of private nuclear power will be badly stunted.

In a speech on December 3, 1964, delivered at the annual meeting of the Atomic Industrial Forum in San Francisco, Congressman Holifield made the following comment:

"I believe, for instance, that it should be possible for the insurance industry to increase the insurance coverage from $60 million to say $100 million. Accordingly, a bill will be introduced early in the next session of the Congress to extend the Price-Anderson indemnity provisions from 1967 to 1977 with the indemnity coverage being lowered in an amount equal to the increased private insurance capacity.

"I believe that this is a sound step on the road toward normalizing the role of insurance in the nuclear power business. Ultimately, I would hope that we could completely dispense with the need for a governmental indemnity and rely entirely upon the private insurance market."

Thus, at a time when some Government agencies are adopting administrative measures or urging legislation designed to intrude upon the present operation of private insurance, we are faced squarely with an opportunity to reverse the trend in at least one area.

So that you will have a more complete picture of our present position, we have enclosed a summary of our premium development since inception of operations in 1957. It is anticipated that with the addition of the 1966 premium, which is payable in advance as of the beginning of next year, our cumulative NELIA–MAELU standard premiums will exceed $14 million and the corresponding amount of reserve premium will be approximately $10 million. On July 2, 1964, the AEC released to NELIA and MAELU its forecasts of nuclear power growth through 1980. Based upon these forecasts and assuming continuation of a premium development on 1965 standards, we have estimated that our annual premium for 1970 will be approximately $4,300,000 and for 1975, approximately $9,500,000. If we assume further that our total premium for each year will reflect a reasonable increase over the next preceding year, we estimate our cumulative standard premiums will be approximately $30 million through 1970 and $68 million through 1975. Thereafter, if the current AEC projections remain valid, there should be a sizable increase in the standard premiums. If our current formula continues, approximately 72 percent of the 1975 standard premium would be assigned as reserve premium. If we assume a continuation of virtually loss-free experience and allow for reserve premium refunds to policyholders under the terms of the industry credit rating plan, it is estimated that the reserve fund will be approximately $20 million by 1970 and $40 million by 1975.

Of course, the governing committee has expressed repeatedly its opposition to AEC administrative decisions with respect to the low-level financial protection requirements for operators of licensed reactors having a rated capacity of less than 100 elecrtical megawatts (MW(e)). While they still feel that the financial protection formula developed by the AEC permits governmental indemnity to intrude in areas where private insurers are ready and anxious to perform, the fact that almost all of the proposed reactors will have a rated capacity in excess of 100 MW(e) lends substance to the belief that the problem will not be as serious in the future. The law itself provides that operators of licensed reactors having a rated capacity of 100 MW(e) or more must furnish financial protection equal to the maximum amount available from private sources. Furthermore, an increase in the liability insurance capacity may well result in an overall increase in the Commission's financial protection requirements with respect to the smaller licensed reactors now in operation, a position which our representatives have urged for some time. Similarly, although the Commission's decision to afford its own contractors first-dollar indemnity has been subject to constant protest by insurers, there are strong indications of a growing tendency to place virtually all new power projects under the licensee program and to shift some existing contractor projects to the licensee program when the initial contractual period has expired.

There is one other factor that should be considered. Both the stock and mutual nuclear property insurance pools are facing a growing demand for increased capacity caused by the increased values of the larger reactors now proposed or under construction. They are about to canvass their membership seeking an increase in capacity so that the stock and mutual physical damage capacity, including available foreign reinsurance, will approach $100 million per facility.

A $40 million increase in nuclear liability insurance capacity, as proposed by Congressman Holifield, would require a total increase in participations of about 66.7 percent, of which about $22,200,000 would have to be raised by the members of NELIA. However, in view of the present circumstances, it may be more practical to attempt to reach this goal progressively, in a series of steps. Therefore, the governing committee has set as an immediate goal a minimum total increase of 25 percent.

Attached is a list of the 1965 membership of NELIA, which has been arranged for your convenience alphabetically within susbcription groups. This listing should demonstrate that some insurers subscribed in the formative years of NELIA for proportionately higher amounts than other insurers of comparable

size. We hope that a substantial increase in capacity will be subscribed in response to this request and that any disproportions in participation will be eliminated.

In addition, the governing committee has instructed the staff to seek additional capacity from qualified domestic stock insurers which are not members of NELIA at the present time and from the foreign reinsurance market. A similar effort is being made by the mutual pool to furnish additional nuclear liability capacity. Further, it is the committee's intention to make a review of the situation every 2 or 3 years to determine whether the projected expansion of the nuclear industry materializes. If it does and the current favorable loss experience continues so that the premium levels and the reserve fund keep pace with the projections, they will again consult the membership recommending further increases in capacity.

It is anticipated that Congressman Holifield will shortly introduce a bill to extend the Price-Anderson law and hold hearings early in March. JCAE representatives have made it clear that insurers will be expected to testify as to any additional amount of nuclear liability insurance capacity we expect to make available next year and as to our estimates of future increases in capacity in light of present projections. In consequence, we urge each member to reevaluate its current subscription to NELIA and provide us by March 1, 1965, with an estimate of the amount by which such subscription will be increased effective January 1, 1966.

Your very truly,

F. X. BOYLAN,

General Manager, Nuclear Energy Liability Insurance Association, on behalf of the governing committee: the Aetna Casualty and Surety Co., the Continental Insurance Co., the Employers' Group of Insurance Cos., Firemen's Fund Insurance Co., Hartford Accident and Indemnity Co., Insurance Co. of North America, Maryland Casualty Co., Royal-Globe Insurance Co., the Travelers Indemnity Co.

Mr. THOMAS. For some time, private insurers have been given a forceful impression that they should consider the matter of increasing their capacity and because of this urging by both the Commission and the Joint Committee and because of the previous history of Price-Anderson which is included in the report in the 1957 hearings we have made efforts to increase our subscription.

I might add parenthetically that we are delighted with the opportunity to try to recapture an area for private insurance and we appreciate the expressions that people feel it is time for insurers to take over or recapture a portion of the insurance market which was lost to Government indemnity.

PARTICIPATION IN NELIA POOL

Consequently, the pools canvassed their members. A copy of the letter sent out by NELIA is attached. (See p. 181.) As the result of this appeal, as of January 1, 1966, NELIA will have 19 new members, and their participation plus increased participation by members of NELIA and by foreign reinsurers will bring NELIA's capacity to more than $56 million.

As a result of these efforts, the stock and mutual pools will have available as of January 1, 1966 an aggregate capacity of approximately $74 million per nuclear facility. This additional $14 million represents almost a 25-percent increase over the $60 million aggregate capacity now available.

It is quite true that this increase falls short of the goal set by Chairman Holifield. However, there are several reasons for this result.

In the first place, at the present time only three licensed reactors purchase the full amount of insurance capacity available. In addition, much smaller amounts of insurance are purchased by the oper-

ators of 21 small reactors and 29 educational reactors insured by the nuclear liability pools. Furthermore, the pools now insure only 85 other facilities and some 200 suppliers' and transporters' policies are in force.

It is estimated that the total annual liability premium for NELIA and MAELU for 1965 will be $2,300,000 which would increase the reserve fund of both pools to approximately $8,400,000. This amount has been accumulated since the inception of both pools by setting aside between 67 and 75 percent of the annual premium collected from each risk by the pools for the payment of loss and loss expense, or for return to insureds after a 10-year period.

Obviously, $8 million is an inadequate cushion against a catastrophic occurrence. Nevertheless, it has taken the pools 9 calendar years to assemble this small amount in premium reserves. If the present total annual premium of $2,300,000 were to remain constant, the pools would never be able to create a reserve fund capable of handling a single catastrophe since returns after a 10-year period of amounts not expended for loss and loss expense would tend to counterbalance amounts added each year.

Therefore, it is not difficult to appreciate that given the present state of development in the nuclear industry, insurers are not given an adequate spread of risk against possible catastrophic incidents.

Of course, this inadequate market has been further aggravated by the Commission's decision not to require underlying financial protection of its own contractors, preferring, rather, to afford them first-dollar indemnity.

Chairman HOLIFIELD. Would you explain your statement that—

> If the present total annual premium of $2,300,000 were to remain constant, the pools would never be able to create a reserve fund capable of handling a single catastrophe since returns after a 10-year period of amounts not expended for loss and loss expense would tend to counterbalance amounts added each year.

Mr. THOMAS. Well, sir, as we paid out our reserve that was due after the 10th year the new incoming amount would counterbalance it.

Chairman HOLIFIELD. Explain to me about this paying back the reserve. What does this mean?

INDUSTRY CREDIT RATING PLAN

Mr. THOMAS. We have set up an industry credit rating plan which is a revolving fund running over a 10-year period.

As we say between 65 and 75 percent of our premium goes into this fund. Assuming there are no losses or loss expenses paid out, the same percentage is returned to insureds at the end of 10 years who paid premium in the first year.

Chairman HOLIFIELD. Why should this be?

Mr. THOMAS. This should be done we felt for two reasons.

Chairman HOLIFIELD. You charge them a certain premium for a maximum of $60 million worth of coverage?

Mr. THOMAS. That is right.

Chairman HOLIFIELD. You knew when you went into this business that you did not have $60 million to pay out on a possible loss. Now why do you return premiums at the end of 10 years? They have had

the protection during that time. Why do you return the 65 or 75 percent?

Mr. THOMAS. We have two reasons. To be perfectly honest we have heard a lot of talk of actuarial experience in this area and frankly there was none.

Chairman HOLIFIELD. Everybody knows that.

Mr. THOMAS. This is one reason why we set up this fund. It helps to assure a type of equitable premium.

Chairman HOLIFIELD. When you pay back the reserves you continuously keep your fund weak. If the utilities have paid this in and they have been under an umbrella protection during this time why should not the insurance company keep this fund and continue to build toward your goal of being able to take care of the accident?

Mr. THOMAS. One, of course, we would never return if we were to keep it past 10 years because of the tax situation. In other words, this fund was set up under a tax ruling from the U.S. Treasury. We went down and got them to approve the arrangement where all the moneys would be returned to the insureds after a 10-year period of moneys paid in the first year. Had we kept it longer, I suspect such an arrangement would not have been permitted. They would have considered it income to us.

Chairman HOLIFIELD. Even though it was set aside in a reserve fund for liabilities?

Mr. THOMAS. Certainly 10 years is the longest we have ever been able to set up an arrangement like this, Mr. Holifield.

Mr. CONWAY. You would have paid tax on profits which presumably you made from that. You don't put that money aside and just let it sit without investing it? You make profits on that and that is what you would have been taxed on.

Mr. THOMAS. I am having trouble separating the questions. There are two here. One is, would we ever return money and the second question of yours, do we keep it for ourselves. In your case we think it would have provided an equitable premium and a fair arrangement in a situation where we had no experience of our own. This seemed a most equitable way of starting to collect a premium.

Assuming an adequate spread this will ultimately produce a proper equitable insurance arrangement which will protect us and the nuclear industry. At the moment the inadequate number of reactors is what is causing our difficulty.

Chairman HOLIFIELD. What kind of reserve are you allowed to accumulate against possible loss?

Mr. THOMAS. We set aside normally reserves specifically allocated to specific claims and a certain amount for unallocated claims but these are very closely circumscribed by both insurance departments and by the Treasury Department.

This matter is under some scrutiny at the moment by the Treasury Department.

Chairman HOLIFIELD. For instance, in the savings and loan industry the savings and loan people are allowed to set aside up to 8 percent, I believe it is now, which is not charged against them as income but that is set aside as a reserve against loss. Do you have some arrangement similar to that?

Mr. THOMAS. At the moment we have been paying out just that amount directly because our losses are exceeding our premium income.

Chairman HOLIFIELD. You are talking about the general insurance business?

Mr. THOMAS. The general insurance business, that is right.

But as a practical matter what we normally do is that we allocate to each claim as it comes in, we don't set aside unallocated funds for general catastrophies, we will say, in the automobile business. As each claim comes in for liability we set aside a portion of what we assume the loss will be.

There are some exceptions to that. This industry credit rating plan is some exception, in fact is is quite unique. There is nothing like it in the insurance business.

Chairman HOLIFIELD. When a company says it is paying several hundred thousand dollars in annual insurance premiums—if a company does say that to us, as several have—then can it look forward to up to 75 percent return on that provided they don't have a loss?

Mr. THOMAS. That is right, sir, provided experience continues in the same vein that it has in the past.

Chairman HOLIFIELD. So actually they are not paying 100 percent of their current annual premiums, they are paying 25 percent of that.

Mr. THOMAS. It remains to be seen. Assuming this fine experience they will receive a return. But the point you make about weakening the fund, I would like to return to that for one second. I don't think this would be a problem assuming the industry develops as it has been postulated it will develop in the future.

Chairman HOLIFIELD. Now you retain that 25 percent. Is that taxed?

Mr. THOMAS. Yes, sir; that is taxed and we pay a State premium tax, Federal tax.

Chairman HOLIFIELD. In other words, after you take your expenses of doing business out of that the remainder would be in ordinary terms profit and you would pay corporate income tax on that.

Mr. THOMAS. Certainly. Of course, there are a lot of other expenses in addition to the ones we have referred to besides taxes. There are acquisition costs to producers, and other things, engineering expense.

Chairman HOLIFIELD. If you did not return the 75 percent that would be subject to corporate tax also, is that right?

Mr. THOMAS. It certainly would.

Chairman HOLIFIELD. Up to 50 percent.

Mr. THOMAS. Fifty-two I believe—I stand corrected, 50 percent.

Chairman HOLIFIELD. The other 50 percent then could be put in the reserve?

Mr. THOMAS. No. If we made no provision to return it. Normally when you buy an insurance policy from us, take an automobile policy, it is a sort of aleatory contract, we each take a gamble. We assume you will have an x amount of losses and we have actuarially computed what the losses will be and we hope we won't have to pay off more than that. The money becomes ours as soon as you pay the premium. There is no return regardless of our experience.

There, of course, we have an actuarial base. We have the insurance departments carefully scrutinizing our rates. Unfortunately they are giving us rates that are inadequate. The point here is that at least here there is a basis for consideration and a multitude of statistics but in the industry that we are now examining there are no such statistics.

Chairman HOLIFIELD. Did you want to continue?

INCREASING INSURANCE CAPACITY

Mr. THOMAS. Yes, sir.

A second factor to be mentioned is the unusually large net exposure that domestic insurers have assumed in order to meet the need for nuclear capacity.

Because the capacity of the property and liability pools include all available worldwide reinsurance, the individual domestic insurers have not reinsured their participation. Furthermore, most companies have made commitments to the nuclear property insurance pools in amounts roughly equivalent to those committed on the liability side.

Figures reveal that several companies have individual nuclear property and casualty exposures unreinsured in amounts as much as $4,500,000 per risk.

Such amounts greatly exceed other property and casualty exposures assumed without reinsurance. The fact that this extremely large net exposure is spread over such few risks is a matter of concern for those responsible for prudent insurance management.

This problem is somewhat magnified by the fact that at the present time almost all property and casualty insurers are suffering extremely heavy underwriting losses and have been so for the last few years. Obviously under such circumstances managements are loath to expose their companies to large losses, especially where the exposure rests on an extremely small premium base.

A third factor also bears upon the situation. Nuclear property insurers have recently received several requests for additional capacity in excess of that presently available in the nuclear pools. Consequently, at about the same time, they too have sought additional capacity from their members and reinsurers. As we have already indicated there is a substantial identity of membership in the property and casualty pools.

It is our present information that the members of the nuclear property pools have amassed enough additional capacity so that they will be able to provide nuclear energy property policies in amounts up to $72 million. Thus, stock and property and casualty insurers have really increased available nuclear insurance against the nuclear hazard by more than $25 million per risk.

It should be emphasized that the additional capacity furnished by insurers constitutes more of a good-faith expression of appreciation of the suggestions by Chairman Holifield and others that private insurance play an increased role than an appraisal of the immediate nuclear insurance market.

However, the capacity presently amassed should not be considered the total limit available from casualty insurers for the next 10 years. We are convinced that as the nuclear industry develops and grows, and

the present Atomic Energy Commission projections become realities, additional amounts of capacity will be available.

Based upon the Commission forecast and assuming a continuation of premium development predicated upon 1965 standards, we have estimated that our annual premium for 1970 will be approximately $4,300,000 and for 1975, $9,500,000.

Assuming continuation of virtually loss-free experience, it is our estimate that our reserve fund will be $20 million by 1970 and $40 million by 1975.

Given these figures, it is quite likely that by 1975 the pools will be able to offer the $100 million capacity suggested by Chairman Holifield in his speech.

In order to reach the desired capacity, it is our plan to periodically test the insurance market in light of expanded nuclear development in order to increase our existing capacity. In our judgment, such periodic survey should be made every 2 or 3 years.

If made more frequently, and only slight changes in the nuclear industry had occurred since the last request, there might be no impact in any request for additional capacity. Further, it could be quite disruptive to the smooth correlation of indemnity and financial protection if the maximum amount of insurance available were changed on an annual basis.

Thank you.

Chairman HOLIFIELD. That concludes your statement?

Mr. THOMAS. Yes, sir.

Chairman HOLIFIELD. Mr. Price?

Representative PRICE. Mr. Thomas, if the industry was willing to put up $60 million in the beginning of this program per facility, at a time when we had fewer reactors than we have today and no reserve premium fund, why are they only willing to put up an additional $14 million now when you have more reactors, more experience, and a reserve fund of about $8½ million?

Mr. THOMAS. I think the answer in part is this. The last time we did increase our capacity, Mr. Price, or we did raise the initial capacity, it was in anticipation of things to come. The projections at that time were a lot more ambitious than realities have proven to have been the case. We expected by this time that we would have a much more substantial amount of money in our reserve fund.

It has been thought, for instance, when we went down to talk to the Treasury people that we would have about a $60 million reserve, revolving reserve fund. That is how we estimated the situation.

Chairman HOLIFIELD. How much?

Mr. THOMAS. We assumed at one time it would be approximately $60 million or close to it. This would be a cushion against one blow.

GOVERNMENT INSURANCE PROGRAM

Representative PRICE. It has been suggested that we end the Government indemnity program and substitute for it sale by the Government of excess insurance. Do you have any comment to make on that proposal?

Mr. THOMAS. Nothing except that we would be opposed to it. Generally speaking we think that this area is so highly speculative,

it is not a normal subject for insurance. I think the rate for instance that has been contemplated is a thousand dollars a million, we will say.

Representative PRICE. In the testimony given by the commission on this particular point reference was made to the impossibility of establishing an actuarial basis for a Government insurance program. If the insurance industry was able to do this why could not the Government be able to establish an actuarial basis?

Mr. THOMAS. I think the Government would have to adopt some type of device such as the one we did. It would be a very difficult thing to do up in those levels because of the small amounts of premium they will be charging for each million dollars of exposure. As you know our insurance premiums graduate. When we get up into the higher levels it is very often, for instance—well, the average price now at the higher levels, assuming a return, is $250 a million. This assumes of course a return after a 10-year period. The initial charge of course is a thousand dollars. Assuming a 75-percent return it would turn into exactly a $250 charge.

You can see how long it would take to amass the kind of money into a retrospective fund or come up with any type of credible experience.

In addition to that we know of no such catastrophe such as the one that is contemplated by the indemnity. We only know of one that would exceed the type of capacity that we have amassed.

Chairman HOLIFIELD. Will the gentlemen yield?

Representative PRICE. Yes.

Chairman HOLIFIELD. Would this be a field where in view of the lack of actuarial experience the Government should assume this risk, as it does in the case of war risk insurance?

Mr. THOMAS. No; I certainly don't think so.

Chairman HOLIFIELD. Why not? You can't estimate war-risk insurance liability and yet the Government has in the past recompensed people for loss due to war on the basis of claims filed by them. How would this type of insurance differ from that?

Mr. THOMAS. I think here you are talking about a growing domestic industry that we hope to grow with.

Chairman HOLIFIELD. Yes.

Mr. THOMAS. This is not an occasional, at least what we think is an occasional thing, a war. We think in this case we have established a sound insurance base for this program and as it grows we think we will grow with it. We think as experience improves the rates will reflect that experience.

Chairman HOLIFIELD. Yes, but you admit that you can't give the type of assurance which apparently is considered necessary.

Mr. THOMAS. Do you mean $500 million?

Chairman HOLIFIELD. Yes. You are not in a position to do that. We don't expect you to be in that position.

Mr. THOMAS. We certainly for that reason have never opposed the addition of the indemnity. But we certainly contemplate attempting to come up with the additional type of capacity, for instance that you suggested, Mr. Chairman.

We think that in due course perhaps reappraisal of the hazard with increased insurance will find some meeting of the two lines.

Chairman HOLIFIELD. Can you answer the question that Mr. Price asked you a moment ago when he said that in view of the fact that we have more reactors today than when we started and you do have an $8½ million fund, and you were willing at the beginning to give the $60 million coverage, then why is it unreasonable to ask you today for a greatly increased capacity? With the additional experience that we have had, the additional advance of the industry, additional safeguards that have been engineered in them, the improved metallurgical quality of metals, why aren't you in a better position today to offer $100 million coverage than you were to offer $60 million originally?

Mr. THOMAS. I think we are. I think the fact that we can say today that we think in 10 years we will be able to do that——

Chairman HOLIFIELD. Why can't you say it now because you have had 8 years experience now?

LIMITED ACTUARIAL BASE

Mr. THOMAS. The problem, Mr. Holifield, is that there are just not that many reactors in operation of a substantial size to give us an adequate spread for our exposure. This, as you remember, is not a group of insurers, one or two insurers deciding this. You have to canvass the market and ask each president or board of directors whether or not they will commit any more capacity.

We must in all honesty, tell them in each case exactly what their exposure is and exactly where the industry stands. Now we feel that the increase we have mustered is commensurate with the status of the industry at the moment. We do feel that if these projections that the AEC has given us do develop, we will be able to fund this $100 million.

Chairman HOLIFIELD. Well, your answer may be completely satisfactory to you but it is not satisfactory to me because I still can't understand—if you could cover $60 million with no experience, you might say—why you could not now cover $100 million with the experience and with the wider spread of risk now. I just don't understand it.

I am not arguing with you about it. I just can't understand why you can't do it.

Mr. THOMAS. I can only tell you that the spread at the moment is not what we would call an adequate spread.

Chairman HOLIFIELD. It wasn't in the beginning. It wasn't when you offered $60 million.

Mr. THOMAS. Perhaps the answer is that we went too far then.

Chairman HOLIFIELD. Now you are getting a little more cautious.

Mr. THOMAS. Perhaps sensible, Mr. Chairman.

Chairman HOLIFIELD. What has occurred to cause this caution in view of the fact that we have learned a great deal, our technology has advanced, our engineering skill and design skill have increased, and the number of reactor operating hours is so much greater than when you first came into the market?

UNPARALLELED SAFETY RECORD

Mr. THOMAS. I would like to say, Mr. Chairman, that we just don't have a comparable record in other industries. If we could do this in the automobile business, we could retire. I would like to make this point that the safety record of the industry is unparalleled and to manifest our confidence in this safety record is why we came up with this increased capacity.

Representative PRICE. In this connection have you ever had a substantial claim, and have you ever paid a substantial claim, under this program?

CLAIMS UNDER LIABILITY POLICIES

Mr. THOMAS. I would not call them substantial. We have had one or two minor claims.

Chairman HOLIFIELD. What did they involve? Would you mind telling us? We should have it on the record.

Mr. THOMAS. It was a transportation incident, Mr. Holifield.

Chairman HOLIFIELD. But it wasn't as a result of anything that happened in the reactor?

Mr. THOMAS. No, sir.

Chairman HOLIFIELD. This could have occurred in the transportation of any kind of high explosives like TNT or nitroglycerine?

Mr. THOMAS. Yes, sir.

Chairman HOLIFIELD. It was a hazard as a result of transportation or packaging for transportation, something like that?

Mr. THOMAS. That is right, sir.

Representative PRICE. Can you indicate to us the amount?

Mr. THOMAS. Exactly, Mr. Price, $3,500.

Representative PRICE. In 8 years' time?

Mr. THOMAS. That is right.

Representative PRICE. That is a pretty good safety record.

Mr. THOMAS. As I told you, it is unparalleled.

Representative PRICE. If action is delayed on this proposal until next year, do you believe that the industry would be in a better position to increase the amount available?

Mr. THOMAS. No, sir, I don't. I think the thing that will key an increase in capacity will be some increase in the development of the industry.

Chairman HOLIFIELD. More reactors?

Mr. THOMAS. That is right. I think more reactors will show our members that the base is sounder.

Chairman HOLIFIELD. In other words, you don't like to be in the position of writing a life insurance policy for $10,000 on one person?

Mr. THOMAS. That is exactly it.

Chairman HOLIFIELD. You want a thousand persons and then go back to your mortality tables for your actuarial experience?

Mr. THOMAS. For insurance to operate, that is exactly right.

INDUSTRY CREDIT RATING PLAN

Representative PRICE. What would be the effect of a substantial claim and payment, say in the neighborhood of a million dollars, on the anticipated refund to the operator after a 10-year period?

Mr. THOMAS. It would just of course reduce the refund by that much.

Representative PRICE. On a proportionate basis?

Mr. THOMAS. That is right. It is a rather complicated system of premium years involved here as well I might add but the fund would be reduced and payments in proportion would be reduced.

Chairman HOLIFIELD. Do you have foreign participation in this?

Mr. THOMAS. We do, sir.

Chairman HOLIFIELD. Lloyds of London?

Mr. THOMAS. Yes, sir. It goes past that. I think the only capacity we have refused was a small piece tendered to us from the Odessa pool.

REACTOR SAFETY

Representative PRICE. One of the statements I read here—maybe it was Mr. Ackerman's statement—referred to the Price-Anderson Act having an adverse effect on the safety program in regard to the operation of the reactors. What is your comment on that?

Mr. THOMAS. I can only point to our experience and say we just wish every industry had the same record. We are very delighted with the experience to date.

Representative PRICE. Aren't private insurers actually interested in the safety factors and don't they do just a little bit more than the insured to try to beef up the safety factors?

Mr. THOMAS. Certainly we have a safety program and our engineers make inspections independently of those made by the AEC.

Representative PRICE. You're constantly looking at them?

Mr. THOMAS. We certainly are.

Representative PRICE. You are not just putting out bulletins but you are actually——

Mr. THOMAS. We make recommendations in this area, that is right.

REDUCTION IN PREMIUM RATES

Chairman HOLIFIELD. I note on page 17 of our "Selected Materials on Atomic Energy Indemnity Legislation" [3] that there is a table at the bottom of the page there which shows a percentage change of old and new rates running from 10.4 to 17.6.

As I understand it that was a reduction in premium rates. Is that right?

Mr. THOMAS. In these cases it was; yes, sir.

Chairman HOLIFIELD. Why didn't you just leave the rates as they were and give them a little more insurance coverage?

Mr. THOMAS. I think the answer in large measure is that this rate change was made before the demand or the suggestion, that we increase capacity. I think the point is that we thought the industry had shown such a good safety record it merited a reexamination and

[3] JCAE print, June 1965.

we think we will make constant reexaminations in these areas. The rates should reflect the experience.

Chairman HOLIFIELD. Yes, but as a representative of the people I am also interested in reducing the indemnity coverage by the Government and increasing your part of it. As far as I am personally concerned, and I know the utilities won't be happy when I say this, I feel that looking at it from the taxpayer's standpoint probably the amount of Government indemnity should gradually be reduced and the amount of coverage that you folks give should go up rather than to allow for the benefit of a reduction in rates.

Mr. THOMAS. My only point is that this change in rates was made prior to the suggestion that we find increased capacity or seek it. I do feel however that it still depends on the growth of the industry. I think I can say with some degree of force that as this industry grows we will provide more and more capacity.

Chairman HOLIFIELD. You have shown some progress.

Mr. THOMAS. Thank you.

Chairman HOLIFIELD. You have come up a little bit, $14 million over the $60 million. We are now talking in terms of $74 million. That is, you are talking in those terms. I am talking in terms of $100 million. We are still $26 million apart.

Now would this $74 million be reflected in a recapture of part of this reduction or are you offering $74 million for the same premium that they paid for the $60 million?

Mr. THOMAS. We would charge for the additional premium, for the additional millions that we furnish, Mr. Chairman. We do have a minimum rate up in this level but nevertheless there is no doubt——

Chairman HOLIFIELD. It is pretty small when you get up to above $20 million. In that table you show the amount of premium for insurance above $1 million?

Mr. THOMAS. What page are you reading from, Mr. Chairman?

Chairman HOLIFIELD. Page 17.[4] I am looking at this amount of premium for insurance above a million dollars. Explain that table to me there, please.

Mr. THOMAS. I think it would be best if we asked our manager, Mr. Boylan, to do that. He is probably more experienced in this area.

Mr. CONWAY. It varies by the individual plant. You have to make an evaluation of each individual plant and then assign to it a certain base rate. Thereupon you follow this formula percentagewise and depending on the amount of the base rate.

Chairman HOLIFIELD. Now let us have the expert.

DETERMINING INSURANCE BASE RATE

Mr. BOYLAN. I do not mean to suggest that Mr. Thomas is not an expert but I live with this all the time. My name is Francis X. Boylan, general manager of Nuclear Energy Liability Insurance Association. On page 17 we talk about the factors to apply to liabilities above the first million dollars of insurance. Above that we speak of the factors we consider to determine the base rate. Once this base rate is adopted,

[4] See JCAE print, "Selected Materials on Atomic Energy Indemnity Legislation," June 1965, p. 17.

taking into consideration the five factors enumerated, then we apply percentages to that.

For example, if the premium for the first $1 million of insurance as noted in the table below on the old base rate for Commonwealth Edison Co. was $40,000—I use round figures—the premium for each of the next $4 million of insurance would be 50 percent of it or $20,000 for each of the 4 or a total of $80,000.

For each of the next $5 million of insurance it would be 20 percent and so on. It so happens when you get down to the bottom you hit a minimum under present rate schedules established by the rating organizations of $1,000 per million dollars of insurance.

Thus for $60 million any time the base rate is below $40,000 you would hit the thousand-dollar-minimum premium. For example, the $20,000 schedule for Yankee Atomic Electric Co. on the old schedule, applying these factors it would produce the thousand-dollar-minimum premium for the last $40 million of insurance, instead of going down to $500 per million dollars.

Chairman HOLIFIELD. Would that same rate apply above $60 million or would there be any reduction between $60 million and $75 million?

Mr. BOYLAN. All rates used by the insurers are rated by rating organizations. This matter is still under consideration for premium to be determined. We first wanted to establish what our capacity is. As of the present time, in the absence of a change in the rating structure by these rating organizations, it would continue to be $1,000 per million dollars of insurance.

Chairman HOLIFIELD. I see on page 17 of this print where you have reduced each one of these brackets by about 50 percent. Now you get down to where the last bracket is 2.5 percent——

Mr. BOYLAN. That is correct.

Chairman HOLIFIELD (continuing). Of the rate. Now if you go into the next $20,000 would it be 1.2 percent of the rate?

Mr. BOYLAN. This is a matter for the rating organizations to consider.

Chairman HOLIFIELD. I am not trying to pin you down.

Mr. BOYLAN. No. Again it seems to be the pattern that would be followed but a final decision has not been made pending the determination of the amount of capacity that we can muster in response to your request.

PARTICIPATION IN NELIA POOL

Chairman HOLIFIELD. Have any of the people who went into the pool with you dropped out?

Mr. BOYLAN. Yes, there have been, sir. Over the course of the years, sir, we have had a considerable problem in maintaining our capacity. In fact, we had a sizable loss of capacity at one time where the $60 million was jeopardized and we made a special request to several members of our governing committee to increase their individual subscriptions to make up for the difference and we are happy to note that they did it.

It so happens both of these companies again responded to the newest request to supplement that increase.

Chairman HOLIFIELD. In this last solicitation for participation did you have any new companies come in?

Mr. BOYLAN. Yes, 19, sir.

Chairman HOLIFIELD. You had 19 new companies?

Mr. BOYLAN. Yes.

Chairman HOLIFIELD. The difference between the $60 million and $74 million?

Mr. BOYLAN. That is correct, 19 new member companies, most of them smaller, sir.

Chairman HOLIFIELD. What does this indicate to you? Does this indicate to you a feeling of more confidence on the part of a wider range of companies?

Mr. BOYLAN. I don't think there is any doubt about it, sir. I think at the time of the initial request for capacity it was a brand new field and some of the companies took an extremely dynamic stand, made subscriptions far in excess of anything they would ever dream of doing in any other field in response to what appeared to be a national need. Some of the other companies were not so anxious, they would rather wait to see how things developed.

At this go-around it was the decision of our governing committee to appeal to all stock casualty companies above a certain minimum level. Or course we have to be concerned about their ability to perform you see, but we were quite encouraged by the response we received from the member companies. You have a copy of a letter we sent to them. It was quite an appeal we thought. (See p. 181.)

Chairman HOLIFIELD. Can you tell us how many insurance companies are now participating in this pool?

Mr. BOYLAN. Yes, sir, this is listed in the testimony.

Mr. THOMAS. 124 we have listed, Mr. Chairman.

Chairman HOLIFIELD. How many of those are domestic and how many foreign?

Mr. THOMAS. All domestic.

Chairman HOLIFIELD. All domestic?

Mr. THOMAS. Yes. The foreign reinsurance is only reflected in a lump sum.

Chairman HOLIFIELD. Is that reinsurance?

Mr. THOMAS. That is right.

Chairman HOLIFIELD. What you might call reinsurance a layoff.

Mr. ST. CLAIR. We don't lay off any of our domestic capacity, Mr. Chairman.

INCREASING INSURANCE CAPACITY

Chairman HOLIFIELD. Would it be reasonable to suppose that there would be a graduated increase in your capacity if we do extend this Price-Anderson Act? In other words, you might come forward in graduated steps between now and the end of the second 10-year period?

Mr. THOMAS. Yes. I tried to indicate that in my testimony. I think we could do that.

Chairman HOLIFIELD. I thought maybe you wanted to go at $74 million for the 10 years and then reconsider.

Mr. THOMAS. No.

Chairman HOLIFIELD. You would like to look at it every 2 or 3 years?

Mr. THOMAS. Yes.

Chairman HOLIFIELD. And if at that time you could get additional capacity, you would make an attempt to get additional capacity either through larger participation of existing participants or obtain additional participants?

Mr. THOMAS. Most certainly.

Chairman HOLIFIELD. You feel that you could, within reason, advance this gradually to where it would be around $85 million over a period of 10 years?

Mr. THOMAS. I have indicated we can go to $100 million between now and 1975.

Chairman HOLIFIELD. You feel you can go to $100 million?

Mr. THOMAS. I do. Of course, that is my personal estimate of the situation, but it squares with those of others who are in positions of some responsibility.

Representative HOSMER. It depends on the growth of the industry.

Mr. THOMAS. That is exactly it, Mr. Hosmer.

EXPIRATION OF PRICE-ANDERSON

Representative PRICE. Mr. Thomas, if Price-Anderson were allowed to expire, what would the impact be on the insurance industry and the nuclear liability policies they issue?

Mr. THOMAS. I think the answer to that would be made by our clients. You understand I am sure that this type of insurance that we furnish here where the utilities bear the premium on behalf of anyone who may be liable is quite unique. Normally purchasers like to see their own names on a policy and they don't particularly care to share their liability coverage with anyone else. I think there would certainly have to be a reevaluation within the industry itself as to what they would want to do. It would be my guess that the system of economic channeling that Price-Anderson more or less stimulates might very well break down. That would be my guess, and it would depend largely on the financial responsibility and integrity of each reactor operator.

Chairman HOLIFIELD. Mr. Hosmer?

Representative HOSMER. What incentive do you have to increase coverage limits other than Mr. Holifield's persuasion?

Mr. THOMAS. Our position has been right along in any case where the Government shows an interest in the insurance business that we like to field this problem, ourselves. This has been a continuing problem for us in any case where insurance capacity is wanted and in any amounts we do our best to find the answer to the problem. This was one of the great motivations in 1957 and one of the chief reasons advanced to the various companies for furnishing this capacity. Our patriotic effort was somewhat seasoned by self-interest. We do want to perform where we can because we feel that insurance sometimes has been in jeopardy from proposals just like this in other areas.

Representative HOSMER. In other words, you think the Government might come around and do the whole insurance job?

Mr. THOMAS. That is right, certainly.

Representative HOSMER. Aside from running up the flag like you have, I think you haven't fully answered my question as to incentives, and I direct your attention to the possible incentive in the economic area, if any.

Mr. THOMAS. Most certainly. I don't think there is any question we like to sell all the insurance we can. This is also motivation. I think the prime interest here, you understand this is not a competitive area we are in. We have been trying to muster a joint capacity. Our prime interest is performance, to be perfectly frank. I certainly would not disclaim the fact that we have a profit motive.

Representative HOSMER. But you are not exactly in the category of an eleemosynary institution?

Mr. THOMAS. Certainly not, in any sense.

Representative HOSMER. You do see some economic incentives on the horizon?

Mr. THOMAS. We certainly do.

Representative HOSMER. Like everybody else, you mentioned you would like to have a certain combination of certain circumstances that occur that would make you a retired millionaire.

Mr. THOMAS. No question about that.

Representative HOSMER. I suppose that if this thing is a go, that you will achieve some steps toward that goal.

Mr. THOMAS. Someone will. I am just not sure who will.

Representative HOSMER. I am trying to get a feel for how compulsive this economic situation is in this particular area because talking about increasing coverage to $100 million by 1980 or 1977 and doing it are a couple of different things. You can come back here with some other kind of story about your problems and your travails since you have been here last time.

Mr. THOMAS. And hope you would be sympathetic. I see your point. I can only say this. We have all these motivations. I think they are threefold. I think, one, we have more or less committed the industry to try now. Number two, there are very few areas of insurance where the spotlight is as focused on us as it is this. We have to make annual pilgrimages down here to explain our situation and what we are doing.

Chairman HOLIFIELD. You don't resist having the light-of-day play upon your business, do you?

Mr. THOMAS. Assuming that everything is going well, we love it, Mr. Chairman. And I think finally the economic motive as well as the desire to keep Government indemnity from spreading, all have an impact.

Representative HOSMER. Let us look at the horn from its other end now. You have gone up the pike here a way and things look pretty good and you do increase your coverage and this thing does turn out to be a good deal. It is going to be a monopoly; is it not?

Mr. THOMAS. Well, there is no question that the problem of amassing capacity in this area presents a problem. We have attempted to in all cases to conform to the various rating laws and to comply with the various requests but there is no question about the fact that in order to amass capacity in this area we must obtain it from as many sources as possible.

Chairman HOLIFIELD. Will you yield on that point?

Representative HOSMER. Yes.

PARTICIPATION IN NELIA POOL

Chairman HOLIFIELD. The thought occurs to me that this is not a monopoly in the sense of the word that we usually use for monopoly because, as I understand it, this pool is open.

Mr. THOMAS. Certainly.

Chairman HOLIFIELD. Open to any company that wishes to participate.

Mr. THOMAS. No question about it.

Chairman HOLIFIELD. Is it not more correct to say this is in the form of a cooperative venture on the part of the insurance companies?

Representative HOSMER. I don't know because if these fellows are as far as I think they are, somewhere down the pike here, they are going to start protecting their flanks. I think that is in the normal course of things. This thing will jell up in a pretty good size and profitable type of organization that is going to be exclusive in the fact that a competitor is not going to be able to really get started because he does not have the possibility of doing so.

Mr. THOMAS. We have never restricted membership and there is no contemplation of that.

Mr. CONWAY. You have a minimum however. There were some who wanted to join originally but only wanted to put in a small amount. You held that a certain amount had to be submitted.

Mr. THOMAS. We have indicated for accounting purposes that the minimum participation is $25,000. You understand in insurance parlance that is not really what you would call an undue restriction.

Mr. CONWAY. There were some who were turned down because they would not even meet that minimum amount in the early days.

Mr. THOMAS. I know of no one who seriously objected to the amount.

Representative HOSMER. If you can put on a limit of that kind, $25,000, you can put down some other kinds of limits, can you not? You have a group that gets together and passes these rules.

Mr. THOMAS. You must be thinking of another industry. I can only say as a practical matter——

Representative HOSMER. You indicated this $25,000 limit business—who set this limit?

Mr. THOMAS. I say those who made the initial suggestion did urge a $25,000 limit. As a practical matter, I think the answer is that we are very conscious of this problem. We have made great efforts to see that not only are our rates reasonable and the coverage adequate but that we try to respond to the needs of industry and suggestions by the Commission and the joint committee.

REGULATION OF RATES

Representative HOSMER. Who regulates these rates?

Mr. THOMAS. The varous state departments regulate the rates.

Representative HOSMER. In this particular type of insurance?

Mr. THOMAS. Our organization is a joint underwriting association and an advisory organization subject to the rating laws of the several States and examination by the several States.

We are deliberately subject to the rate laws.

Representative HOSMER. Has any of these people been before the rate-fixing board to have the reasonableness of the rates examined?

Mr. THOMAS. Fortunately, because of our rating plan, we have had very little complaint because of our rates. I think everyone realizes this is the most equitable way to do the job.

Chairman HOLIFIELD. Getting back to the point that Mr. Hosmer brought up a minute ago about some possible action on the part of your group, say, to limit it to only 10 people providing insurance, is there

anything in the charter of your corporation which would prevent that from happening?

Mr. THOMAS. I would say that the provision for acceptance of members and there is no undue restriction on them.

Chairman HOLIFIELD. Would you be in some type of antitrust trouble possibly if you did try to exclude from this specific field insurance organizations that are able and willing to join?

Mr. THOMAS. It certainly would not be beyond the realm of possibility. I can only say this is not that type of organization. This is really a service organization put together by the industry to meet a specific need. It is not in any sense a club. The number of these companies alone should give evidence of that.

Chairman HOLIFIELD. The magnitude of the risk would be a compulsion for your spreading this?

Mr. THOMAS. We knew of no other way to get the capacity requested.

Chairman HOLIFIELD. If, as we expect, the private enterprise system does take over more and more of what is needed in this field, there would be little likelihood of an exclusion of a participant because you are talking now about going to $100 million in private insurance in 10 years. You might well want to go beyond that. Also, as the operation of these reactors increases, as the designs are improved and safeguards are increased, it may be that there will be a little more realistic method of appraisal of the actual risk. We admit we have set an arbitrary figure of $500 million for the Government indemnity.

Mr. THOMAS. I think that is right. I think our attitude toward new members is manifested by the fact that when we went out for new subscriptions this time we canvassed the market. That is in the light of the fact that our experience today has been virtually perfect.

TEXAS CITY DISASTER

Chairman HOLIFIELD. Aside from what you have been talking about would you have any information as to what liability the Government assumed on the Texas City disaster? (See app. 21, p. 348.)

Mr. THOMAS. I think probably the man here who knows more about Texas City than anyone from our ranks is Mr. St. Clair who was very active at that time in the disaster.

Chairman HOLIFIELD. How was that handled, Mr. St. Clair? Were there private insurers involved in that? Did they discharge their claims or did the Government come in and pick up the tab?

Mr. ST. CLAIR. What happened, Mr. Chairman, was this. On the morning of April 16, 1947, a cargo of ammonium nitrate loaded on a ship moored at a dock in Texas City caught fire, cause never conclusively determined, and a short time later exploded. As a result several hundred persons were killed, more than 2,000 injured, and much property was destroyed or severely damaged. I believe that every insurance company that had any coverage applicable to the disaster paid its loss in full. My company, Liberty Mutual Insurance Co., suffered what was at that time the largest workmen's compensation loss from a single event, $1,370,000, in the history of the business. Texas Employers' Insurance Co. and other compensation carriers who had smaller losses discharged their liabilities promptly. I am happy to say that my company on April 30, when first payment of compensation benefits were due, mailed out the first payment in every claim, except in four or five cases where in each case more than one woman

claimed to be the widow of a man who had been killed. We had a slight difficulty in straightening those cases out.

The life insurance companies who carried group insurance on the employees of the several plants in which large numbers of men were killed paid their claims promptly and in full. I worked with their representatives because almost every one of my company's death claims also involved group life insurance.

The property insurers likewise paid their losses promptly. It so happens that Mr. Sumner Stanley, of Hartford, representing here Nuclear Energy Property Insurance Association, and also representing the insurance pool which had the largest property loss is here in the room. I do not know how much they paid but I do know it was well up in eight figures.

Benefits under the Texas compensation law were inadequate, $7,200 in a death case and $8,000 in a permanent total disability case. After the dust had settled and after the above-described claims had been settled the various claimants brought suit against the United States. There were several other possible defendants who might have been sued and probably judgments against some or all of them might have been recovered but unfortunately each of them was insolvent. Hence none of them were sued. The U.S. Supreme Court, by a 4-to-3 decision, held in 1953 that the United States was not liable to the Texas City plaintiffs.

After the conclusion of the litigation against the United States, Congress passed the Texas City Relief Act under which, as I recall, each person injured and the dependents of each person killed could recover up to but not exceeding $25,000. That does not mean that $25,000 was paid in each case. First, as I recall, the value of each claim was determined, either by agreement or by a master appointed by the U.S. district court. From the value thus determined was deducted the amount of compensation benefits paid in the case. Thus a widow with several children recovered a total of $25,000, $7,200 in compensation benefits and $17,800 paid by the United States, an amount grossly inadequate to provide for her and her children.

Comparable payments were made by the United States in property loss cases, not to exceed $25,000 for an individual claim. From that amount would be deducted the amount of property insurance which the owner had collected.

(For additional information on Texas City disaster see app. 21, p. 348.)

Chairman HOLIFIELD. What was the total cost to the Government on that?

Mr. ST. CLAIR. I could not guess. I did not bring with me the history of proceedings under the relief act which I have at home.

Chairman HOLIFIELD. Congressman McCulloch, who is on the Judiciary Committee, is also a member of this committee, remembered that it was approximately $23 million. (See app. 21, p. 362.)

Mr. ST. CLAIR. In many of the death and injury cases, Mr. Chairman, the amount paid was grievously inadequate, even at that time.

Representative HOSMER. I want to make sure that Mr. Thomas and his colleagues understand I was not attempting to infer any skulduggery on their part. The line of questioning was rather tongue in cheek to give you at least an intimation that I felt that this would successfully grow and become a profitable and large-scale enterprise.

Mr. THOMAS. We certainly hope so.

Representative HOSMER. At that time you will have another set of problems to worry about concerned with success.

Thank you, Mr. Chairman.

Chairman HOLIFIELD. Now we have Mr. St. Clair here as the next witness. Do you have an additional statement?

STATEMENT OF ASHLEY ST. CLAIR, ON BEHALF OF MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS AND MUTUAL ATOMIC ENERGY REINSURANCE POOL

Mr. ST. CLAIR. I do. I have already filed it.

My name is Ashley St. Clair, 129 Garden Street, Needham, Mass. I appear on behalf of the member companies of the American Mutual Insurance Alliance and particularly on behalf of the 120 mutual insurance companies who are members of the Mutual Atomic Energy Reinsurance Pool for which Mutual Atomic Energy Liability Underwriters (MAELU) is the underwriting agency for nuclear energy liability insurance, which is one of the matters of interest in these hearings. There are six members of MAELU: American Mutual Liability Insurance Co., Employers Mutual Liability Insurance Co. of Wisconsin, Hardware Mutual Casualty Co., Liberty Mutual Insurance Co., Lumbermens Mutual Casualty Co., and Michigan Mutual Liability Co. Each of the six is a mutual company which writes a substantial volume of casualty insurance.

The liability of each MAELU member under a nuclear energy liability policy issued by MAELU is reinsured by the American Mutual Reinsurance Co. of Chicago. The latter's liability, except for a small percentage retention, is in turn reinsured by the participants in MAERP, each participant accepting liability for a stated proportion, subject to a dollar limit, of any obligation owed MAELU by American Mutual Reinsurance Co. By this means, earned premiums, expenses, and losses under MAELU's nuclear energy liability policies are distributed ratably among the members of MAERP. It should be noted here, however, that each member of MAELU is directly liable, with respect to any loss suffered by or other obligation owed a policyholder, for its share, stated in the policy, of any such loss or obligation.

At this point, it is well to state that the mutual companies are in general agreement with the statement made on behalf of the members of Nuclear Energy Liability Insurance Association (NELIA) by D. C. Thomas, Esq., particularly with respect to the development of the nuclear energy liability insurance program, the dovetailing of the insurance with the indemnity under Price-Anderson, and the efforts made by NELIA and MAELU to satisfy the liability insurance requirements of those in any way engaged in or affected by the nuclear industry, including the railroads and other transporters, and bridge, tunnel, turnpike, and port authorities. On these points we have nothing to add to what Mr. Thomas has said.

For the information of the Joint Committee and its staff, we submit herewith specimen copies of MAELU's nuclear energy liability facility policy, together with the endorsements used with the policy. (See app. 9, page 305.) The facility policy, issued to operators of nuclear reactors, fuel fabrication and reprocessing plants, and any other nuclear facility as defined in the policy, has been approved by the Atomic Energy Commission for use in providing the financial protection re-

quired by the Commission pursuant to section 170 of the Atomic Energy Act. The MAELU policy and endorsements, except for necessary procedural provisions, are identical with those used by NELIA. This identity is necessary to make certain that a person who has purchased nuclear energy liability insurance covering the same risk from NELIA and from MAELU, for example, the operator of a large power reactor, has exactly the same coverage, except for limits of liability, under each policy. In such a situation, a loss or other obligation will be shared by NELIA and MAELU, each paying that proportion of the loss or other obligation which the limit of liability in its policy bears to the sum of the limits of liability of the two policies.

To spread losses and loss expenses among every insurer, stock and mutual, participating in the nuclear energy liability insurance program, MAELU and NELIA have entered into a reciprocal reinsurance agreement under which every nuclear liability loss arising out of the planning, construction, or operation of a nuclear facility in the United States (as defined in sec. 11(z) of the Atomic Energy Act) will be borne by NELIA and MAELU in the same proportion. All nuclear energy liability insurance written by NELIA or MAELU on risks within the United States is subject to the Industry Credit Rating Plan. A copy of the endorsement implementing the plan is submitted herewith. (See app. 9, p. 304.) Under the plan approximately 70 percent of the premiums received by NELIA or MAELU are placed in a reserve fund. Each pool operates and maintains its own reserve fund, but as a practical matter the two funds can be considered as a unit. The money in the reserve fund never becomes "earned premium" except insofar as it is used to pay losses and loss expenses. Funds not so used will be returned ratably to policyholders, beginning in 1967 when, unless there has been a substantial loss, premium refunds will be made to 1957 policyholders. Annually thereafter similar refunds will be made, provided the total aggregate reserve premium received exceeds the total aggregated losses and loss expenses incurred. The Industry Credit Rating Plan provides the nuclear energy liability insurers with a reserve for losses, particularly catastrophe losses. Because of the reciprocal reinsurance arrangements between NELIA and MAELU, it also spreads of distributes losses ratably among all segments of the nuclear industry. Finally, it makes certain that the cost of nuclear energy liability insurance will not be excessive but will reflect accurately the actual losses and expenses of the nuclear energy liability insurers.

"Insurance" has been defined as a risk shifting and risk distributing device. An insurance contract shifts the risk of any loss covered thereby from the policyholder to the insurer. Because the insurer writes many similar policies, the risk is distributed among such policyholders. If the policy carries a risk of substantial loss, the insurer may, and usually does, cede a part of its liability to reinsurers who in turn distribute the risk they accept among their policyholders and other reinsurers. In the event of a large loss, the amount paid by the insurer in settlement will be made up by contributions from many sources all over the world. The operations of NELIA and MAELU, with their reinsurers, domestic and foreign, all subject to the Industry Credit Rating Plan, provide an excellent illustration of how insurance works. Those operations also highlight a still unsatisfactory situation, an insufficient spread of risk, which faces the NELIA, MAERP,

and MAELU companies and which will continue for at least several years.

RISKS PRESENTLY INSURED

The underwriting capacity of an insurance company is the amount of insurance it is willing to write on a single risk. That capacity is the sum of two elements, one the amount of its own money it is willing to hazard, and two the amount of reinsurance it has or can secure. Sound underwriting principles limit that capacity, including reinsurance, to a small percentage—I might say a very, very small percentage—of the insurer's free surplus. One of the most important of those principles an insurer considers when fixing the amount of insurance it can place on a single risk, for example, a large power reactor, is spread of risk, or in other words, how many similar risks does it have? At present NEILA–MAELU insure a total of only 329 risks, as follows:

Type of risk	*Number of policies*
Reactors:	
Large power reactors	3
Smaller reactors	12
Educational reactors	29
Other nuclear facilities	85
Suppliers and transporters	200
Total	329

That this is an insufficient number of risks, particularly in the reactor class, to support indefinitely a sound, profitable insurance operation cannot be denied. For this reason, when it was first proposed last winter to NELIA–MAELU that they increase their capacity, and the capacity of NELIA and the capacity of Mutual Atomic Energy Reinsurance Pool is, in each case, simply the sum of the subscriptions of each of its members, plus foreign reinsurance, their representatives were doubtful that very much, if any, additional capacity could be secured.

At this point, at the risk of repeating some of what Mr. Thomas has said, a bit of ancient history may not be out of place. In 1956–57 when NELIA–MAELU were working to accumulate capacity and ultimately got together a total of $60 million for nuclear energy liability insurance, they expected that the Atomic Energy Commission would require its contractors operating reactors or engaged in other hazardous nuclear operations to buy nuclear energy liability insurance or to furnish other financial protection. Had the Commission done so, the nuclear energy liability insurance program would have started with a much larger base and today we would be much closer to having a self-sustaining nuclear energy liability program. As it is, we are still many years away from that situation. For these reasons, I wish to emphasize our agreement with Mr. Thomas that the word "may" in the second sentence of subsection 170(d) of the Atomic Energy Act should have been and sometime should be changed to "shall."

In spite of the still inadequate spread of risk, representatives of the insurance pools went to work last winter, in response to requests from the Atomic Energy Commission and members of the Joint Committee and its staff, on the capacity problem, which actually separated into two problems. The owner of a licensed nuclear facility buys two kinds of insurance—and I am talking of nuclear insurance—at least, (1) property or physical damage and (2) liability. On the stock in-

surance side, Nuclear Energy Property Insurance Association (NEPIA) writes property insurance. On the mutual side, the MAERP companies, through American Mutual Reinsurance Co. reinsure any mutual company writing property insurance on nuclear facilities. There is presently a property insurance capacity of a little more than $60 million, which has proved adequate, except in one or two instances. However, the new reactors, now under construction or on the drawing boards, will each cost close to $100 million or even more. For both stocks and mutuals, the same companies that provide capacity for liability insurance also provide capacity for property insurance. The insurance industry must provide property insurance adequate to protect the investment of utility companies in new reactors. We hope that in the future the insurance industry will be able to provide liability insurance for reactors and other nuclear facilities in amounts deemed to be sufficient for protection of the public. In short, we believe it possible, if the predictions of the Atomic Energy Commission and the Federal Power Commission materialize, that the nuclear energy industry, in the not far distant future, will generate funds sufficient to support an insurance program which will be sound from an underwriting standpoint. The mutual insurance industry will continue to participate in that program and will do all it can to make the program successful and adequate to protect the public and the nuclear industry.

PARTICIPATION IN MAELU

We submit herewith a letter sent each member (participant) of the Mutual Atomic Energy Reinsurance Pool, together with a report to participants and recommendations for increased capacity, prepared by the pool's underwriting committee. (See app. 9, p. 297.) In addition, much of the same material was sent to mutual companies, not members of MAERP, together with an invitation to participate in the nuclear energy insurance program. As a result, we secured 22 new members who have subscribed an additional total participation of slightly more than $1 million. Together with these new members, increased subscriptions by old members have increased the domestic capacity of MAERP from $17,385,000 to approximately $21,600,000. Of that, $9,567,000 has been allocated to property insurance; the remainder, $12,032,000 to nuclear energy liability insurance, all to be available January 1, 1966.

INCREASED INSURANCE CAPACITY

With foreign reinsurance MAELU will have effective January 1, 1966, an underwriting capacity of slightly more than $17 million. With NELIA's increased capacity, reported by Mr. Thomas, there will be available, on January 1, 1966, a total capacity approaching $74 million, an increase of close to $14 million, or almost 25 percent. It is possible that the two pools will be able to provide a total capacity of $74 million for nuclear energy liability insurance.

Finally, in recognition of the probable growth of the nuclear power industry, the Underwriting Committee of Mutual Atomic Energy Reinsurance Pool will, in 1968 and periodically thereafter, again review the situation and solicit increased subscriptions from its members as well as seek new members. In short, the mutual insurance companies will do their part in making certain that the insurance industry meets the insurance needs, not only of American industry,

but of the whole American public. We agree with Mr. Thomas, subject to the assumptions he has made, that by 1975 the nuclear energy liability pool will probably provide a capacity of $100 million.

The report of the Joint Committee to the Congress in 1957 recommending enactment of the Price-Anderson Act contained the following statement:

> The provisions of this bill provide governmental indemnifications to those licensees who obtain their licenses within the next 10 years. The indemnification agreement is to run for the life of the license. During the 10-year period it is hoped that there will be enough experience gained so that the problems of reactor safety will be to a great extent solved and the insurance people will have had experience on which to base a sound program of their own.

INSURANCE PROGRAM, ADEQUACY OF

Because different people will have different criteria by which to measure the adequacy of a nuclear liability insurance program, it is impossible to state that, with the aggregate capacity of the two liability insurance pools increased from $60 million to $74 million effective January 1, 1966, the insurance program is an adequate program from the standpoint of every interested person. If it be assumed that the basic criteria which must be satisfied are (1) a broad coverage protecting any person who may be liable for damages caused by a nuclear incident, (2) an amount of insurance sufficient to pay all the damages reasonably to be expected from a nuclear incident, (3) adequate machinery to process promptly and fairly a large number of claims, (4) technical services to minimize the possibility of nuclear incidents, and (5) a reasonable cost borne by the industry creating the exposure, the present nuclear energy liability insurance program provides at this time, and will continue to provide, insurance meeting all of the above criteria, with the possible exceptions of the second.

Opinions differ, both as to the extent of the damages reasonably to be expected from a nuclear incident and as to the dollar amounts which should reasonably be committed for the protection of the public and the nuclear industry. At present the maximum amount committed is $560 million, which includes $60 million of private insurance or other protection available from private sources. If it be the judgment of the Joint Committee and the Congress that this $560 million should be continued for a further period, the mutual companies believe that the Congress should enact the legislation now under consideration as set forth in H.R. 8496 and S. 2042.

I am grateful to the members of the Joint Committee and the committee staff for the opportunity to appear and state the position of the mutual companies on the above bills.

Chairman HOLIFIELD. Mr. St. Clair, do you associate yourself with the answers that Mr. Thomas gave?

INCREASED INSURANCE CAPACITY

Mr. ST. CLAIR. Yes. However, I would like to supplement his answer to one of your questions. You asked why the nuclear liability pools, instead of reducing premiums, did not increase the amount of coverage given insured reactors. With respect to the large power reactors NELIA and MAELU did not have authority and could not have written more than $60 million insurance on one reactor. With the exception of those nonprofit educational institutions which have purchased insurance on their reactors, the Atomic Energy Commis-

sion has, in every case, fixed the amount of financial protection required, and every insured reactor has purchased that amount of insurance. Even on a reactor with less than $60 million insurance, the pools could not unilaterally have increased the amount of insurance. Either the reactor owner would have to request an increase in the amount of his coverage or the Commission would have to increase the amount of financial protection required.

Mr. CONWAY. Will you have that type of authority during the next 10-year period? What about your authority during these incremental periods to which Mr. Thomas referred, at the end of which you will again canvass the industry to seek increased capacity?

INCREASING INSURANCE CAPACITY

Mr. THOMAS. We asked each of our members to increase its subscription. As a result the combined underwriting authority in the two liability pools is $74 million. Two or three years hence the governing committee of the two pools will again solicit increased subscriptions from their members and will seek new members. But it must be kept in mind that when either pool writes a risk it cannot bind any one of its members for an amount in excess of its subscription then in force. At any time the underwriting capacity of an insurance pool is the sum of the subscriptions of its members then in force.

Mr. ST. CLAIR. There is one other thing I would like to answer. You spoke of reinsurance as a layoff. It is in the ordinary case, Mr. Chairman. A company writes a $5 million risk and insures 90 percent of it, $4,500,000. In this case however, the reinsurance that we were able to get overseas was used wholly to increase our underwriting capacity. We didn't use it to reinsure the subscriptions of our members.

Chairman HOLIFIELD. Thank you.

Mr. CONWAY. Mr. Thomas and Mr. St. Clair, in both of your prepared statements you pointed out your desire and recommendations for a change to be made in section 170(d). You are not recommending at this time that this bill be amended for that purpose?

Mr. ST. CLAIR. We are not pressing that now.

Mr. THOMAS. We intended to say that we would be back in the future for that purpose.

Chairman HOLIFIELD. Mr. Stanley, you represent the property insurance pool. Do you have a prepared statement?

Mr. STANLEY. Yes, I do, sir.

Chairman HOLIFIELD. How long is it, please?

Mr. STANLEY. Very brief.

Chairman HOLIFIELD. Will you come forward?

Thank you, gentlemen.

Mr. THOMAS. Thank you, Mr. Chairman.

Chairman HOLIFIELD. Proceed, Mr. Stanley.

STATEMENT OF H. SUMNER STANLEY, ASSISTANT GENERAL MANAGER, NUCLEAR ENERGY PROPERTY INSURANCE ASSOCIATION

Mr. STANLEY. Mr. Chairman and gentlemen, my name is H. Sumner Stanley. I am assistant general manager of the Nuclear Energy Property Insurance Association, and I am appearing on behalf of that association, upon request of your staff. I should like to say at the

outset that we definitely do not consider ourselves a monopoly. We have recently been examined in detail, our operations have, by the insurance departments of the States of California, Connecticut, and Vermont, and we received what we consider a clean bill of health upon the completion of that examination.

The Nuclear Energy Property Insurance Association is an association of 144 capital stock insurance companies and was formed in 1956 for the purpose of providing onsite property damage insurance on nuclear reactor installations and other properties with operations involving substantial quantities of nuclear material.

Since insurance available through the association provides only coverage against loss resulting from onsite physical damage to property, it would be inappropriate for us to comment or express opinions on Price-Anderson legislation, which is the subject matter of these hearings. We have been asked, however, to make a statement, for background information, regarding the facilities and operations of NEPIA.

The basic NEPIA policy insures against radioactive contamination and all other risks of direct physical loss with certain conventional exclusions.

Business interruption insurance also is provided for organizations engaged in manufacturing operations, and transportation insurance is provided for coverage of special nuclear materials in transit.

Starting with coverage of one nuclear installation in 1956, additional properties have been insured and at the present time NEPIA insurance covers 77 nuclear risks with total liability of $740 million. The insurance is broken down by types of risks, as follows:

	Number
Nuclear power plants	11
Teaching and research reactors	26
Nuclear fuel processing and fabricating risks	27
Builder's risks, that is, nuclear plants in course of construction	3
Transportation risks covering shippers or carriers of nuclear material	5
Miscellaneous risks where substantial qualities of nuclear material is present	5

In addition, NEPIA participates as a reinsurer in the coverage of 31 risks insured in the mutual pool, with additional total liability of $156 million.

At present, the writing capacity of NEPIA for insurance of a single installation is $50 million. Mutual pool property insurance capacity of $10 million makes a total for both of $60 million.

Several nuclear powerplants, planned and under construction, will exceed this capacity and for this reason our members have been asked to increase their commitments, and those stock companies not now members of NEPIA have been asked to participate.

Foreign reinsurers have been asked to provide additional capacity and we understand the mutual pool has solicited its membership for increased property insurance capacity.

NUCLEAR PROPERTY INSURANCE, EXPECTED CAPACITY

The returns to date suggest $72 million per installation as a reasonable estimate of total combined insurance capacity of both NEPIA and MAERP for 1966.

The capacities of NEPIA and MAERP to date have been adequate for full insurance coverage of all plants seeking such coverage, ex-

cept one. In this one case, the property insurance industry provided outside the pools, as excess above pool capacity, an additional $40 million of coverage for a total of $100 million for that plant.

Other nuclear powerplants, planned and building, will exceed the combined capacities of NEPIA and MAERP and although we cannot commit the insurance industry beyond pool capacity, we do feel at this time that the property insurance needs of these plants will be met by the insurance industry and that capacity of the pools will continue to grow as the nuclear industry grows and the spread of liability for property loss becomes broadened.

Operating results from a property insurance standpoint have been generally satisfactory, but the limited spread and concentration of values tend to lessen the credibility of these results.

Thirty-nine losses have been experienced since inception of pool insurance of nuclear risks and of these, 23 were from conventional perils, such as fire, windstorm, and explosion, while 16 actually involved nuclear material.

We feel that the insurance industry has succeeded in meeting the property insurance needs of those engaged in the civilian application and utilization of atomic energy and that we shall be able to continue to do so.

That completes my prepared statement.

Chairman HOLIFIELD. I note that in one case $100 million of property insurance was made available to a facility operator.

Mr. STANLEY. Yes, sir.

Chairman HOLIFIELD. Why can't you make this amount available generally?

Mr. STANLEY. Because it is a different level of underwriting beyond the pool basic commitment. We have at the present time the $60 million to use for any risk. The $40 million is viewed from an underwriting standpoint differently than the basic $60. It is $40 million of excess. It does not participate in loss until the $60 million has been exceeded. There are underwriters who are willing to participate on such a basis who would not provide an equivalent amount of insurance for pro rata participation in insurance of all reactors from the ground up.

Chairman HOLIFIELD. It is a kind of $60 million deductible.

Mr. STANLEY. That is correct. It is a $60 million deductible to those insurers.

Chairman HOLIFIELD. Will the property insurance pools refund a portion of the insurance premium paid by the nuclear industry if your loss experience proves favorable?

Mr. STANLEY. No, sir, there is no plan for refund.

Chairman HOLIFIELD. There is no refund there?

Mr. STANLEY. No, sir.

Chairman HOLIFIELD. You are not as bighearted as these other fellows.

Mr. STANLEY. It is not entirely that. The mechanics of property insurance are considerably different than the mechanics of liability insurance. We are concerned with all perils, not solely the nuclear peril. We also have definite terms.

CLAIMS UNDER PROPERTY POLICIES

Chairman HOLIFIELD. You say 39 losses have been experienced since the inception of pooling insurance for nuclear risk. Twenty-three of these were from conventional perils such as fire, windstorm, and explosion, while 16 actually involved nuclear material. Where were those cases, the 16 nuclear cases? Were those in laboratories?

Mr. STANLEY. They were just about all types. One outstanding one was in a reactor. There was one accidental criticality.

Chairman HOLIFIELD. Was that a test reactor?

Mr. STANLEY. Yes; it was, a portion of a fuel rod burned due to overheating in that reactor.

Chairman HOLIFIELD. That was a property damage?

Mr. STANLEY. Yes, sir.

The property damage pool will always suffer a loss before the liability pool.

Mr. CONWAY. This is important because in each and every 1 of the 16 could they not have involved a third-party liability?

Mr. STANLEY. That is not for me to say, but they might have, yes. But the damage was confined to the premises.

Mr. CONWAY. I think this might be of some significance in that we have had some experiences of at least some damage, what might be classified as accidents or incidents. We have already had testimony on the liability side of the tremendously good record which has been established. Now when we have had incidents or small accidents so far they have all apparently been very restricted. At least the property side is the one that is being hit.

Mr. STANLEY. Yes; our record is not quite so spectacularly good.

Chairman HOLIFIELD. What was the largest claim you paid?

Mr. STANLEY. $1,004,040. I remember the figure precisely.

Mr. CONWAY. There was no damage to third parties?

Mr. STANLEY. No, sir.

Mr. CONWAY. This is the area in which the utility operators or the operators of these reactors are paying this insurance themselves. There is not a cent of Government indemnity going into the property side of the insurance?

Mr. STANLEY. Well, of those that we insure there are many reactors that are not insured in private insurance.

Mr. CONWAY. Those are Government owned?

Mr. STANLEY. Yes, sir.

Mr. CONWAY. I am talking about the ones right now in which there is insurance available other than Government. The operators are paying every cent of the insurance for the property side.

Mr. STANLEY. Yes, sir.

Mr. CONWAY. These are the ones that so far you have had 16 instances in which the insurance industry has made payments.

Mr. STANLEY. Thirty-nine in which we have made payments.

Mr. CONWAY. Yes, but 16 have involved nuclear material?

Mr. STANLEY. Yes, sir.

Chairman HOLIFIELD. The other losses, the 23 would be conventional peril, you say, such as windstorm, fire, or something like that.

Mr. STANLEY. Yes, sir.
Chairman HOLIFIELD. Nonnuclear.
Mr. STANLEY. Right.
Chairman HOLIFIELD. Mr. Hosmer?
Representative HOSMER. What component of your premium is allocated to the nuclear risk and what to the remaining risks?
Mr. STANLEY. There is no mathematical division by numbers. An overall rate is established for each risk.

RATES FOR PROPERTY INSURANCE

Representative HOSMER. In establishing a rate you just don't use a fuzz factor for the nuclear risk, do you, or do you?
Mr. STANLEY. Sometimes it is pretty near that. We attempt to use approximately the same factors that are used in the liability field which were outlined in Mr. Thomas' testimony; namely the type of reactor, the use to which it is put, and the containment. We don't use the other one, the location of the reactor because—this won't sound right—we are not concerned about people. It is only the on-site property. But we try to evaluate those and arrive at a reasonably relative figure in relation to other reactors.
Representative HOSMER. The loss experience you have had at least has given you at this time a better handle than when you first went into this business——
Mr. STANLEY. Yes, I think so.
Representative HOSMER (continuing). On the component that should be allocated, if you were thinking in those terms, to nuclear sites, is that right?
Mr. STANLEY. Better than when we started, yes.
Representative HOSMER. But you have not as yet had enough experience to really have an actuarial feel for the nuclear risk side that you do for the nonnuclear risk side?
Mr. STANLEY. No.
Representative HOSMER. That is still a problem of feeling your way on it?
Mr. STANLEY. Yes, sir.

ACTUARIAL DATA ON NUCLEAR PROPERTY INSURANCE

Representative HOSMER. How long have you been writing this kind of insurance?
Mr. STANLEY. Since 1956.
Representative HOSMER. That is about 10 years then?
Mr. STANLEY. The experience, however, of the first few years was very, very limited.
Representative HOSMER. Now at the end of the next decade do you anticipate that you will actually be able to prepare some tables on actuarial experience that would be meaningful?
Mr. STANLEY. Yes, I believe so; assuming the growth is as projected, the growth in the industry.
Representative HOSMER. So that if we go a little bit deeper into this thing, we can start to have a much better feel than we do at this present moment?
Mr. STANLEY. Yes.
Representative HOSMER. Very well. Thank you.

Chairman HOLIFIELD. You brought your beginning level up on the property insurance, have you not?

Mr. STANLEY. Yes, we have, from $60 to $72 million combined, all interests, reinsurers, mutual pool and stock pool.

INCREASE IN CAPACITY

Chairman HOLIFIELD. Would it be reasonable to assume that you will also have a graduated rise during the next 10 years such as has been testified by the other people?

Mr. STANLEY. Yes; we fully expect that will occur.

Chairman HOLIFIELD. At about 2- or 3-year intervals you will look at this?

Mr. STANLEY. Yes; we will, as needed. Our situation is a little bit different.

Chairman HOLIFIELD. In other words, as the reactors are built there will be——

Mr. STANLEY. We will try to meet the demand for capacity as it occurs, and believe we can.

Chairman HOLIFIELD. You have a reasonable expectation of being able to do this.

Mr. STANLEY. Yes; we do.

Chairman HOLIFIELD. Thank you, sir.

Mr. STANLEY. Thank you, Mr. Chairman.

Chairman HOLIFIELD. The next witness is Professor David F. Cavers of the Harvard Law School.

Professor Cavers.

What is your particular interest in this, Professor Cavers?

STATEMENT OF DAVID F. CAVERS, FESSENDEN PROFESSOR OF LAW, HARVARD LAW SCHOOL

Mr. CAVERS. As a student of the problems of the field and as an occasional participant in conferences I have developed ideas which I thought were relevant and which were not likely to have expression in terms of the interests that are being represented before the committee.

Chairman HOLIFIELD. You have acted as a consultant, have you? Is your background outside of your educational work as consultant to different atomic energy groups, study groups?

Mr. CAVERS. I have participated in study groups. I have never been professionally employed as a consultant except by the staff of the Joint Committee on Atomic Energy.

Chairman HOLIFIELD. We are aware of that, of course. Proceed.

Mr. CAVERS. My name is David F. Cavers. I am Fessenden Professor of Law at the Harvard Law School. At Harvard, I offered seminars in atomic energy regulation in 1955–63; I have also taught conflict of laws for many years, a subject which seems to have some relevance here. I have served as consultant to the staff of this committee; I was member of the Special Committee on Atomic Energy Law of the American Bar Association in 1959–63; and I have been a member of the Atomic Industrial Forum for many years and have served on certain of its committees. I have published articles in law reviews on

atomic energy law, most recently a 45-page article in the Harvard Law Review for February 1964 entitled "Improving Financial Protection of the Public Against the Hazards of Nuclear Power." (See app. 39.)

At the outset, I should like to make my position clear on two points. First, I strongly favor an extension of the requirements of financial protection against nuclear hazards and Government indemnity against nuclear liability. Second, I do not favor this because I am fearful of the risks created by nuclear power reactors. The precautions taken by the industry and the AEC under the Atomic Energy Act have held those risks to a minimum. However, it is the very fact that minimal risks cannot be eliminated, combined with the fact that they include the risk of a catastrophic incident, which makes the subject of these hearings important.

DOCTRINE OF STRICT LIABILITY

My main concern here today is to urge that, in extending the Price-Anderson Act, the Congress include appropriate provisions to prevent the victims of a nuclear incident from having to fight for years in the courts to get the protection that the act seems to promise them. Today that protection is far from clear under the laws of many States. Under some circumstances, it might be denied entirely by Federal law. There are various ways to provide the protection needed. I shall defer mention of these until I have explained why the act gives exposed private citizens and exposed nonatomic businesses less protection than it gives to the utilities which operate reactors and to their suppliers.

The principal but not the only cause of this one-sideness is the fact that financial protection of the public depends on proof that somebody is legally liable under State law for causing nuclear damage. Of course, it is fair to require plaintiffs to prove that a nuclear incident actually caused harm to themselves or to their property. However, once the plaintiffs have established that the nuclear incident did cause harm, the defendants, who are protected by Federal law from having to pay a dollar of their own money in damages, should not be heard to say, "All right, Mr. Plaintiff, but just try to prove that we were negligent."

In my judgment—and in the judgment of the leading authority in the law of Torts, Dean Prosser of the University of California—the courts will not stand for that (see Prosser, Torts 59, at p. 336 (2d ed 1955)). I think they will impose strict liability. I believe they will say, as many courts have said in much weaker cases:

> Here we have a corporation which has used its property in such a way as to expose its neighbors and even people many miles away to an unusual risk of loss. It has done this for its own profit. It has done so with the encouragement of the Federal Government which has required it to provide liability insurance and has itself indemnified the defendant from liability.

DOCTRINE OF RES IPSA LOQUITUR

Representative HOSMER. What about the doctrine of res ipsa loquitur?

Mr. CAVERS. I think this would be helpful in a number of cases in States where the standard of liability is negligence. I think there are difficulties to application in nuclear incidents.

Representative HOSMER. Is this one of the types of situations where there is a dangerous operation to which the court would automatically apply the doctrine?

Mr. CAVERS. I think there are problems in respect to the degree of control over the cause of the accident, whether it is a problem of a component which seems to have been at fault or whether the problem is the operation of the reactor.

Representative HOSMER. When the doctrine is imposed then it becomes the defendant's obligation to get into those matters and provide a defense otherwise he is going to be held liable, is he not?

Mr. CAVERS. Not automatically. In many States the jury would have the opportunity to reach its own conclusion. But I would guess in most of these situations that the jury would so find. I do think that one of the substantial protections of the public in this area would be the doctrine of res ipsa along with the other doctrines. I don't think one can so rely on it so as to say we don't have to worry about the public liability problem here.

Representative HOSMER. I am surprised to hear you say that because it just seemed to me that under these circumstances it would be clear to my mind at least that the application would be almost automatic.

Mr. CAVERS. "When a nuclear incident occurs"—and I turn again to my effort to improvise a judicial opinion—

> when a nuclear incident occurs, it may well be impossible to prove just what caused the reactor to run away, break containment, and scatter its deadly radiation over the countryside. Maybe the men at the controls were to blame; maybe the operating procedures were wrong; maybe the designer erred, or some one of the countless suppliers provided a defective part. Perhaps there was nobody at fault, but the trouble was due simply to the limitations of man's knowledge. In any event, we don't think it necessary to rest a decision that the defendant operator is liable on fault. The case is an apt one for strict liability.

This is the decision that I am confident most State supreme courts would reach. In many States the strict liability law is plain; in many others the plaintiffs would win—but after how many years of litigation? The insurance pools, with reinsurers throughout the world, might have $60 million or more at stake. No one could expect the pools to refrain from testing a doubtful legal question, however much the insured utility company disliked being cast in the role of the public-be-damned defendant. Moreover, if the insurance companies lost and the claims exceeded the amount of the insurance, their own legal expenses would be deducted from their own liability as insurers. What a pleasant prospect for company counsel (the inclusion of expenses in determining the limit of the pools' liability is authorized by Nuclear Energy Liability Policy (facility form), condition 3(b)) (See app. 9, p. 304).

Situations are conceivable where the defendant might be able to interpose a bigger barrier to liability. You will recall the legal worries of the seven potash mineowners who were doubtful of the legal liability of the AEC contractor engaged in underground nuclear blasting near their mines. This committee and the Congress recognized the justice of the potash mineowners' complaint and amended paragraph (d) of section 170 to remove the contractor's defenses that might have denied the mineowners Price-Anderson protection. All that I urge here is simply that other members of the exposed public receive equally fair play.

Thanks to Price-Anderson, every property owner in the country—the nuclear reactor property owner excepted—has been deprived of first-party property insurance protection against nuclear risks. Only strict liability under Price-Anderson can give them equivalent protection in its place.

The objections that have been raised to giving the public full protection within the act's dollar limits are the kind of arguments that lawyers use when the real reasons for their position won't stand scrutiny. Thus, we are told that the existing law should have "a fair trial." As long as there have been no nuclear incidents to test it, no doubt we must all assume that the law is working splendidly. Then, it is urged that the courts should be allowed to develop liability doctrine case by case. In view of the act's specialized purpose, I take it this means that nuclear liability questions must be resolved catastrophe by catastrophe.

MODEL NUCLEAR FACILITIES LIABILITY ACT

I need scarcely add that the opponents of change are greatly concerned lest the Congress invade State rights by encroaching upon State liability rules. However, they see no such encroachment when Congress orders the Federal courts to cut off claims against them which are valid under State law. Oddly, it is only when the State law might deny protection to the public that State law becomes sacrosanct. Moreover, this argument goes on to remark the fact that the States have not adopted protective laws to match the Federal. This point comes, I'll wager, from the same source that successfully blocked adoption as a uniform act of the Nuclear Facilities Liability Act by the National Conference on Uniform State Laws because the act provided for statutory strict liability. (As a compromise, the act was adopted as a "model act" which Commissioners are not required to support. As was expected, NCUSL, Proceedings, 1961, at 98, as yet no State has enacted the act.) (See app. 15, p. 333.)

The argument that tops them all is the plea that the Congress not embarrass the nuclear power industry in the eyes of the public by singling it out for strict liability. This from an industry that for 7 years has been singled out as the beneficiary of a unique half-billion-dollar protection plan at minimal cost to it and which is now insisting that it receive that same special treatment for the next 13 years. The industry doesn't mind letting the public know that the risk is too great for the industry to run. Apparently it fears only the danger of letting the public know that the public's protection is being improved.

Why this parade of palpably shoddy arguments? What is the real trouble? I suspect that what we have here is simply a small segment of a much bigger battlefront: the battle of the insurance industry and probably the electric utility industry—perhaps also its suppliers—against the spread of strict liability. In other fields in which liability insurance is written, including some in which the utility industry operates, strict liability is spreading by court decision as well as by statute. In these other fields, there is no benevolent Federal Government to pay jury verdicts and to limit liability. Therefore, even though, for nuclear incidents, statutory strict liability would plainly work to the advantage of all interests concerned, except the legal professions, it must be attacked "on principle" as a damaging precedent. What-

ever the merits of the strict liability controversy in other fields, the public exposed to nuclear hazards should not be denied full protection as a tactic to help win another and different controversy.

The Government as well as industry may take advantage of existing law to impair public protection. Cases may arise in which the only party that could be held liable would be a licensed Government agency. In other cases, a contractor could be held under State law only if the Federal agency were liable. That was the problem of the potash mine operators. Yet, in all such cases, it is far from clear that the victims could recover damages if they could not prove either the contractor's or the agency's negligence. Their claims would rest on the Federal Torts Claims Act, and some courts hold that the act does not extend to strict liability. The Supreme Court has a dictum to that effect.

CREATION OF FEDERAL TORT

Representative HOSMER. At this point, a strict liability statute would create a right in addition to whatever right you might have under State law, would it not?

Mr. CAVERS. You mean a Federal strict liability statute?

Representative HOSMER. That is right.

Mr. CAVERS. That would be true, sir.

Representative HOSMER. So that you would still have whatever rights you have under the State laws if you wanted to use that kind of cause of action and in addition would have this Federal strict liability right.

Mr. CAVERS. Of course.

Representative HOSMER. If the second would be so advantageous to the plaintiff they would forget about the others.

Mr. CAVERS. If the Congress thought it wise I suppose they could preempt the field and provide the exclusive rule.

Representative HOSMER. I am not too sure they could although I think it is rather academic because of the practical effect of this.

Then the procedural matters relating to cause of action would be governed by Federal law.

Mr. CAVERS. You mean in the event that you had a Federal cause of action so there would be a Federal cause to get into the Federal courts on?

Representative HOSMER. Right.

Mr. CAVERS. Of course, then the Federal rules would be applicable to the extent that they cover the issues involved. If you did not have a Federal cause of action then the problem would be whether you had diversity of citizenship. I think it must be remembered that in a good many of these situations that one can imagine——

Representative HOSMER. Wait a minute now. Dealing with non-diversity of citizenship if the right is created by Federal statute they would have to go into Federal court.

Mr. CAVERS. Yes.

PREEMPTION OF STATE LAW

Representative HOSMER. What is the situation where you do have a State statute imposing strict liability and you would have a Federal statute also? Would that then be interpreted so that the Federal law would preempt the State law or would you still have a choice of remedies?

Mr. CAVERS. I think that would create in the absence of an express provision a problem of interpretation as to what the Congress was seeking to do. It seems to me the situation would not be an unreasonable one for preemption.

Representative HOSMER. If you wanted to preempt you probably would have to spell it out by something additional to a strict liability statute, would you not?

Mr. CAVERS. This it seems to me would be a highly advantageous thing to do because in this area what one would be endeavoring to do would be to diminish the risk of lawsuits. Rather than leave to the interpretation process a matter that could be cleared up by statutory provision I think the decision should be one way or the other, either to preempt or not and that could be made express.

Representative HOSMER. If you did preempt that would eliminate the difficulty you mentioned with respect to getting paid after you did get a judgment until everybody got their judgments and you found out whether proration was involved, except for such intermediate payments as you might get in these cases. The bankruptcy law would probably provide a precedent.

Mr. CAVERS. I was thinking the other day, Congressman Hosmer, when this point was under discussion as a result of your questions that section 170 does authorize the Federal district court which has been called on to set the statutory limit, to authorize partial payments. They would perhaps be very difficult to set and they might have to be set very low but there is that authority.

Representative HOSMER. I am thinking of one additional difficulty if you do not preempt. We have a certain class of plaintiff in the State courts getting judgments on strict liability with a varying number of different damage rules and another one for the Federal courts. Then would your proration come on the dollar amount of the damage no matter who would set them or would some of these other factors have to be gone into?

Mr. CAVERS. This is a very difficult problem as to what Federal court which moved into that situation would do with respect to the varying claims.

Representative HOSMER. We seem always to be getting to the point where we had better get one forum and one set of laws and one set of rules of damages and so forth. Otherwise we are going to have ourselves an interminably difficult, murky, confused situation.

Mr. CAVERS. I think that is a very apt description of the situation that would be likely to arise if you did have a large incident if there were not enough Federal power to treat the problem as subject to one jurisdiction and one set of rules.

Representative HOSMER. In that connection this should not be done after an incident. You could not erase people's rights that had been created under law at that time. There is a perfected right in causes of action. If this is to be done it should be done before something like that occurs.

Mr. CAVERS. There is certainly leeway for changing remedies but in general since the line between remedy and substance is often indistinct a preparatory attack on the problem would certainly be better than waiting until after the event.

Representative HOSMER. I am sorry I interrupted you. I wanted to bring that out now.

Go ahead.

FEDERAL TORT CLAIMS ACT

Mr. CAVERS. Their claims would rest on the Federal Tort Claims Act, and some courts hold that the act does not extend to strict liability. Moreover, even where negligence could be proved, the Government might defend on the ground that its action was "discretionary." That was the defense, a successful one, in the Texas City case. (See app. 21, p. 348.) Here I gather the counsel for the potash companies felt that this might extend to the situation where the contractor, the Government's contractor, was acting. It might get under the umbrella of the Government's discretionary immunity.

Such tactics have been defended as being required by the Government's "traditional legal responsibilities." (I am quoting from the AEC's statement of the arguments against strict liability.) [1] They probably reflect the traditional legal thinking of the Claims Division but "legal irresponsibilities" is, I submit, an apter term. After the Government had created and required the great half-billion-dollar scheme of financial protection for the public, for the Government agencies then to sneak out from under liability would, I submit, be immoral.

If Price-Anderson is to be revised to use the strict liability standard which has been adopted by all the other non-Communist nations that have legislated in this field (a stopgap law by Belgium excepted) and by the draftsmen of all the multinational treaties governing nuclear liability, how should this be done? Several ways are open.

One. The act could be amended to impose strict liability in tort for damage caused by a nuclear incident arising out of the activities of the licensee; in other words, to create a Federal tort. Defenses inconsistent with the protection plan could at the same time also be eliminated. If and when the Price-Anderson Act expired, this Federal tort would expire with it. In the interim, it would assure the Federal courts' jurisdiction of nuclear claims cases even though diversity of citizenship were lacking.

CREATION OF ADMINISTRATIVE CLAIMS PROCEDURE

Representative HOSMER. At that point let me ask this other question. We are talking about everybody going to court in this thing. I am wondering if it is possible in any way, shape or form to establish some kind of administrative procedure that would be able to handle the total matter and get it handled without the long, litigious consequences that you stated the defendants might avail themselves of in any event.

Mr. CAVERS. And, even where the defendants were quite happy to cooperate in the procedure, might provide a mechanism which would be more satisfactory. Also in connection with this the Congress could consider what might be the most appropriate rules of damage. It could be that limitations on recovery would be regarded as reasonable.

Representative HOSMER. Do I understand you to say that such a system would depend on the agreement of the defendant?

[1] See JCAE print "Selected Materials on Atomic Energy Indemnity Legislation", June 1965—P. 36.

Mr. CAVERS. No; I was simply suggesting that defendants are not always going to be fighting the situation. They might find it to their advantage as well as to the advantage of those in the public who are making claims.

Representative HOSMER. You think under the constitutional provisions for trial, and so forth, that that kind of thing could lawfully be established.

Mr. CAVERS. It seems to me that the workmen's compensation laws, particularly the mandatory laws, provide a pretty good precedent for this type of solution but it obviously is one that would call for careful study in terms not only of the constitutional problems but the procedural mechanisms.

Representative HOSMER. Is it your feeling that this administrative procedural approach might be a better one than retaining the matter in the hands strictly of the courts?

Mr. CAVERS. I think that is quite possible. I have not attempted, myself, to make an inquiry into what would be ideal administrative machinery because it has been my supposition that in general the success of the Price-Anderson law would lead the Congress to wish to keep it as close to the original pattern as might be the case. But if the matter were to be opened up anew, then it seems to me it would be unwise not to explore the administrative alternative to the judicial proceeding.

Representative HOSMER. Do you know whether anybody has done any exploration along this line?

Mr. CAVERS. Not to my knowledge. I would not claim complete knowledge of what may have been attempted.

Representative HOSMER. If anybody knew about it I think you would.

Mr. CAVERS. I would put the AEC General Counsel's Office ahead of myself as a source of learning on this and Mr. Mitchell who has served as their consultant so often.

Representative HOSMER. They don't seem to be paying too intense attention to these things. I suppose they have other more current matters that they are working on for one reason. But it seems to me if any constructive, imaginative, effective thinking is to be done in this area it is probably going to have to be done outside the AEC unless we can light a fire under them in some way.

Go ahead.

Mr. CAVERS. I have no such incendiary purpose.

The second possibility would be for the act to specify that the Commission condition, its financial protection requirements, and its indemnity agreements on the insured's agreement that it would not assert a claimant's failure to prove negligence as a defense in a public liability suit against it.

Representative HOSMER. That kind of agreement could be broken and the Government could sue for damages I presume. Is that it?

Mr. CAVERS. That is a potentiality that had not even occurred to me. But if it were violated it would not be hard to establish the liability. I would think that the court would recognize the agreement as standing in the way of a pleading of the defense and in effect give specific performance to the agreement.

A third way by which the act could simply require as condition of the license that the licensee waive the defense of lack of negligence and other specified defenses. In my article in the Harvard Law Review (See app. 39) I submitted a draft amendment to this effect. Neither this nor the preceding suggestion would change State law an iota.

I see this is simply an arrangement between the licensee and the Government for the benefit of other parties that does not, therefore, intrude on State rights. I might add it also somewhat limits the opportunities for attacking some of the problems that you have mentioned. I am not sure that you could establish that there was a Federal cause of action after such a waiver.

Four: The AEC could even now require that the contractors it indemnifies not assert the plaintiff's failure to prove negligence or plead other specified defenses. While I take it the AEC could do this under the Atomic Energy Act as it now stands, doubtless the Commission would appreciate a congressional blessing before it took that step.

Five: The act could be amended to provide for strict liability in catastrophic incidents. The amendment would create a Federal cause of action for such incidents. Whenever claims exceeded a given figure, the Government would defend from the ground up. It would have to be given a right of recourse against the insurers to the extent of their policies. This seems to me a needlessly cumbersome method of assuring financial protection in the case of a serious incident, but at least it would represent a marked improvement over existing law on this issue.

CHANNELING OF LIABILITY

This alternative need not provide for the channeling of exclusive liability to the operator, a sensible arrangement adopted everywhere abroad except in West Germany. Channeling would facilitate the conduct of what would surely be extraordinarily difficult litigation, and it would protect suppliers from harassing forum-shopping. However, it is not essential to public protection.

Yet simplification of litigation after a large-scale incident would be important. AEC has noted that the Federal courts are now beginning to complete the electric supplier antitrust suits after 3 years. This should scarcely be reassuring. The equipment suit problem, though distinguishable in many respects from nuclear injury suits, did demonstrate how, by intelligent cooperation of courts and counsel, a vast array of very expensive legal talent could carry through to settlements a large number of complex cases in a few years' time.

Happily everyone concerned was an affluent private or municipal corporation. No one had lost his home. No one was threatened with a mortal disease. The suits were all in the Federal courts, unlike most nuclear catastrophe cases where the operator and most of the victims would be citizens of the same State and, unless the act is amended or unless the $560 million limit were approached, diversity of citizenship would be the only basis for Federal court action against nongovernment defendants.

TEXAS CITY DISASTER

A case which better exemplifies the situation that a nuclear incident could create today is the Texas City disaster (see app. 21, p. 348) in which liability was successfully contested in the courts, and the victims obtained relief from Congress 8 years after the explosion. This is the legal hazard that I should like to see insured against by appropriate revision of the Price-Anderson Act.

I may add I think of this not merely as a hazard of individuals who happen to live to the leeward of reactors. I think it is a hazard to the entire atomic energy program. If you did have such an episode and if that were locked in litigation for years, the impact on the program and on the particular companies concerned would, I think, be exceedingly serious.

STATUTE OF LIMITATIONS

The AEC has properly raised the question whether the Congress should provide a statute of limitations adapted to the actualities of nuclear injuries. In the countries abroad that have adopted financial protection laws and in all multinational nuclear liability treaties, appropriate special limitations are provided. In many of the United States, the statute of limitations, as applied to nuclear injuries, could be cruelly unjust to the injured person; in other States, the statutory test could expose potential defendants to the risk of personal injury lawsuits for an unreasonably long time. In no State has a special statute been passed to meet the problem, some workmen's compensation law amendments excepted.

Representative HOSMER. I suppose, Professor Cavers, you also have in mind the application of a different statute of limitations to a different category of cases, for instance property damage versus personal injury?

Mr. CAVERS. It is in the personal injury field with the delayed impact of the radiation that this becomes the great problem and where in general the attack on it has been to have a double barreled statute of limitations, a long period running as long as the person suffering does not know of the injury and then the shorter period after his knowledge of the injury.

Representative HOSMER. Property is different. You could have a very reasonably short period on property in comparison to your bodily injury limitation.

Mr. CAVERS. I would see no similar problem in the property field.

Representative HOSMER. In this model act you were talking about is there a distinction made there? (See app. 15, p. 333.)

MODEL NUCLEAR FACILITIES LIABILITY ACT

Mr. CAVERS. I could not say with assurance. As a member of the ABA committee at the time I did work on the special act. My guess would be that the special limitation related to personal injury but I would not want to assert it as a matter of my knowledge. I thought that model act was pretty good. I was regretful to see it relegated to the status of a model act which means that no commissioner is under any obligation to support it. In the course of the discussion in the conference, the National Conference of Commissioners on Uniform State Laws frankly regarded this action as a kiss of death.

(Further information supplied by Professor Cavers on this subject follows:)

Section 1, subsection (2) of the Model Act defines "injury" to mean "any harm to person or property for which damages may be recovered under the law of this State."

Section 5 [*Limitations.*] provides as follows:

> No action may be brought under this act more than 3 years after the person suffering or incurring the injury knows, or reasonably could have knowledge of the cause of the injury or more than 10 years after the date of the last occurrence to which the injury is attributed, whichever first occurs.

Following section 5 is a comment by the Commissioners reading as follows:

> Since the effects of exposure to radiation may not be manifested until several months or even years after exposure, a separate statute of limitations for actions under the act is included. The 3-year period combined with the maximum 10-year period generally follows the pattern of European radiation liability legislation and affords injured persons a reasonable period of time within which to bring their actions.

Representative HOSMER. You are expressing a justifiable pride of authorship, I take it, at this point.

Mr. CAVERS. I could detect certain phrases in the act which I authored but it was basically the objective which the act achieved that I am arguing for—except for the fact I do think this is an area in which Federal law can operate more effectively for all concerned.

STATUTE OF LIMITATIONS

Any of the methods of providing for strict liability under Price-Anderson that I have already outlined could be supplemented by provisions setting special periods of limitation. For radiation cases outside Price-Anderson, might not the inclusion of suitable limitations in Federal licenses covering special nuclear or byproduct materials meet the situation as far as suits against licensees, the usual defendants, were concerned?

Representative HOSMER. Can you have a Federal agency impose a statute of limitations in a court rule against a party who has no relationship with either the agency or the Government, the injured private citizen?

Mr. CAVERS. The only person who would be subject to this rule would be the licensee, the licensee who had acquired materials under Federal license, a condition of the license being that he not plead a statute of limitation shorter than the period of limitations specified in the license. We have limitations as you recall in insurance contracts of various sorts. This would be somewhat analogous.

Representative HOSMER. I was thinking your anticipating cutting down the period rather than extending it to some maximum.

Mr. CAVERS. If you had it cut down, we would get into some constitutional deep waters.

Representative HOSMER. Yes.

TREATIES RELATING TO NUCLEAR LIABILITY

Mr. CAVERS. The adoption of the strict liability standard for nuclear damage by the Congress would greatly facilitate our joining any of the multinational nuclear liability treaties. However, these treaties present special problems, and I shall not attempt to discuss them here.

I have discussed some of them in my articles. I know it would be

unwise for me to attempt to discuss them here. They are very complicated.[1]

Representative HOSMER. Did you discuss the possibility of doing all this by treaty?

Mr. CAVERS. I don't believe I did more than mention this. It seems to me that to stretch the treaty power to this extent would, if possibly constitutional, nevertheless run so squarely against the policy of the Congress in these matters as to make it rather unrealistic.

Representative HOSMER. Where have you been the last 2 years?

Mr. CAVERS. Maybe I am dated.

Representative HOSMER. You think it might be possible? I was just asking as a matter of curiosity whether the treaty power could conceivably extend that far. I suppose it is a hypothetical matter anyway so there is no use spending a lot of time on it.

Mr. CAVERS. But there is one relationship which I think is not hypothetical, at least not remote in the sense of the other possibility. Take a treaty such as the IAEA treaty which sets minimal standards. It is permitted under that standard for a nation signing the treaty to increase the protection accorded the persons injured within the reach of the treaty's coverage in that nation.

In a situation where this treaty was applicable in the United States, it would seem to me highly desirable, indeed necessary, that there be added to the treaty requirement a statutory requirement of coverage up to, say, the half billion dollar mark or to the $560 million mark. And we also have a problem that I think may be coming up in a few years with respect to foreign nuclear ships in American ports where under the Brussels Convention, if we join that, they would have $100 million or so in coverage. They have a strict liability standard under the Brussels Convention. Certainly we ought to have more protection than $100 million if a nuclear ship is in the port of New York or even the port of Boston. Then you have the problem of how to fit the two coverages together. I think one could see the $100 million or so protection which the foreign ship had provided as being the analog of the $74 million protection afforded by the nuclear insurance industry for land-based reactors. On top of that one might conceive a half billion dollar Government indemnity which would provide protection for the people ashore against the hazard of a nuclear accident occurring to that ship. Then you would have the problem whether the standard should be strict liability to fit the treaty standard, and I would say pretty clearly it should be, even though the standard for land-based reactors had not gone that far.

Before I close, I wish to correct any impression that my statement may have created that the Joint Committee in 1957 was unmindful of the problem of protecting the public. The contrary is true. With no little ingenuity, the act's protection was extended to the public even where the damage was caused by the act of an independent person, neither the licensee nor any of its employees or suppliers having been responsible. That, I may add, I think was a real tour de force, eliminating a very possible defense which might have been set up by a licensee or supplier.

Having thus overridden existing law, I suspect the committee understandably felt that the liability problem was well taken care of. The

[1]See JCAE print, "Selected Materials on Atomic Energy Indemnity Legislation," June 1965—p. 50.

committee may have been overoptimistic, but it was not indifferent. Its spirit is reflected in a rhetorical question by Representative Sterling Cole, who, at page 34 of the 1957 hearings, asked, "Can we in good conscience allow a situation to exist where the public can be damaged and yet the public cannot recover damages?"

Thank you very much for the opportunity to appear before you.

Chairman HOLIFIELD. We always value your testimony, Professor Cavers.

Mr. CAVERS. Thank you very much.

Chairman HOLIFIELD. Mr. Hosmer?

Representative HOSMER. I have no further questions, but I would like to observe after listening to Professor Cavers, that this situation of liability here is much like the vast Amazon basin, explored only in very, very small part by very, very few people and probably deserving development at as fast a pace as we can.

Mr. CAVERS. Congressman Hosmer, I may add——

Representative HOSMER. I feel that Mr. Cole's rhetorical question has not been answered.

CONFLICT OF LAWS

Mr. CAVERS. May I add that some of your questions the other day, Tuesday, with respect to the conflict of laws opened up some other vistas of uncertainty which, as a teacher of conflict of laws, I am fully appreciative of.

Representative HOSMER. I was not quite certain we were getting accurate answers, but possibly we were. I think that it is a very difficult area, is it not? (See app. 25, p. 366.)

Mr. CAVERS. No one I think at this present stage in the conflict of laws can give you certain answers which would be accurate. For example, I hope this afternoon the New York Court of Appeals rendered a decision in a pending case which may have a very important impact on the field of conflict of laws with respect to torts. I am holding up a chapter in a book awaiting that decision. The field is in flux, and conventional doctrine is no longer reliable. This of course adds to the uncertainty if you are dependent on State law.

Representative HOSMER. Of course, as long as you refrain from Federal preemption, you buy every possible problem of conflict in laws if this act has to go into effect.

Mr. CAVERS. Damages, liability, substance, procedure, the whole array.

Representative HOSMER. Thank you, Mr. Chairman.

Chairman HOLIFIELD. Thank you very much, sir, for your testimony.

Mr. CAVERS. Thank you.

Chairman HOLIFIELD. Our last witness today is Mr. James H. Campbell, president of the Consumers Power Co. of Michigan, who is speaking for the Edison Electric Institute.

We thank you gentlemen for allowing us to postpone your testimony the other day because of something we ran into.

Mr. CAMPBELL. We were happy to cooperate.

Chairman HOLIFIELD. I hope it has not caused you too great an inconvenience.

Mr. CAMPBELL. No, sir.

Chairman HOLIFIELD. Proceed.

STATEMENT OF JAMES H. CAMPBELL, EDISON ELECTRIC INSTITUTE, ACCOMPANIED BY JOHN J. KEARNEY, OF THE INSTITUTE PROFESSIONAL STAFF

Mr. CAMPBELL. My name is James H. Campbell. I am president of the Consumers Power Co., and a member of the Edison Electric Institute's Policy Committee on Atomic Power.

Accompanying me is John J. Kearney of the Institute professional staff.

It is on behalf of the Edison Electric Institute that I am testifying here today. We appreciate this opportunity to be heard.

I might say that my company subscribes fully to the institute's testimony, and we appreciate this opportunity to be heard.

The institute is a trade association of investor-owned electric utility companies. It includes 183 electric power operating companies serving over 97.5 percent of all the customers of the investor-owned segment of the electric utility industry in the United States. These customers comprise more than three-quarters of our Nation's users of electricity.

Commencing almost with the first public announcement of the technical feasibility of extracting large amounts of energy from controlled nuclear fission, the investor-owned electric utility companies recognized the possibility, and began to evaluate the potential, of nuclear energy as a heat source for the generation of electric power.

Since 1954, when Congress amended the Atomic Energy Act to permit industrial participation in the development of nuclear energy, the early interest of the utility companies has been translated into substantial financial and technical involvement in commercial nuclear power plant development.

Today, 130 electric utility companies are participating in one or more of 28 nuclear power projects. Twelve of these projects represent nuclear generating units now in operation, six are either in the design or construction stages, and a number are under contract negotiation. Nine other programs comprise study, research, and development work.

The aggregate investment represented by these projects is at least $1.1 billion. It is, therefore, clearly evident that the investor-owned electric utility industry is and will continue to be vitally interested in every issue that will affect the future growth and commercial use of nuclear reactors.

The availability of liability coverage under the Price-Anderson Act, which protects the public against the possible but highly unlikely event of a nuclear incident has had and will continue to have such an important bearing on the development and use of nuclear power that EEI deems it important to make known its views on the advisability of extending the indemnification features of this act beyond 1967.

SAFETY OF NUCLEAR REACTORS

Nuclear generating plants have operated safely and reliably on the interconnected systems of investor-owned electric utility systems. Their record has been outstanding. To our knowledge there has never been a nuclear accident in a commercial nuclear power plant in the United States.

Backing up this excellent operating record is a continuous research and development program directed at a constant improvement of our fund of positive knowledge of reactor operating behavior—particularly under transient or unnatural conditions.

The expanding knowledge derived from these programs has reaffirmed the convictions of Government and industry authorities concerning the safety and reliability of nuclear power plants.

Thus, in the opinion of the Edison Electric Institute, this research work on reactor safety plus operating experience with commercial reactors are convincing evidence that nuclear powerplants can be accepted as desirable sources of electric power for the ever-growing needs of our country.

Despite its conviction that nuclear plants are safe, the institute—and by that I mean the predominant consensus of its members—strongly believes it imperative that the Price-Anderson Act be extended through a second period of 10 years.

This belief is consistent with the desire of the institute that the public be protected even against risks of the very lowest order of probability so long as the consequences of a failure could affect the public welfare.

Private insurance resources alone cannot currently protect against this remote possibility, because of the very high concentration of risk coupled with the very small number of policies currently in force.

Consequently, we believe that Government provision of indemnity coverage is not only desirable, but absolutely necessary to protect the public interest.

We do not believe that this suggestion in any way contradicts or dilutes our confidence in the reliable operation of commercial nuclear powerplants. Our concern is only with the infinitesimal but nonetheless real chance of a nuclear incident of great magnitude.

The likelihood of occurrence is very small, but the consequence could be very large. Prudent judgment requires protection against this risk, however remote it may be.

The Edison Electric Institute believes that a simple 10-year extension of the Price-Anderson Act would be a logical and proper way to continue nuclear liability coverage by the Government.

Its indemnification features have contributed to the sound and steady development of an industrially oriented nuclear energy industry. It has been an important factor in encouraging broad industry participation in the Nation's nuclear power development program.

Without the continued existence of Price-Anderson coverage, the pace of nuclear power development might be significantly slowed or stopped completely, with a consequent loss of an additional competitive fuel source for electric power generation.

Indeed, it is my personal opinion that without the extension of the Price-Anderson Act, we could very well not have a nuclear industry, by virtue of the failure of equipment manufacturers and electric utilities to proceed.

To be more specific, I can tell you that the Consumers Power Co., which owns outright one reactor and is an important participant in the ownership of another—probably would not elect to enlarge its commitment in the nuclear business without Price-Anderson.

The institute believes that extending the provisions of the Price-Anderson Act for an additional 10 years will not constitute an unwar-

ranted subsidy to nuclear power. We fully expect that there will never be any need for the Federal Government to make payments under this act, but, if such need should ever arise, substantial payments will have previously been made by the private insurance pools.

In addition, regardless of whether there ever are any claims paid by Government or the insurance industry, electric utility companies owning nuclear reactors will be paying very substantial annual premiums.

Thus, while the availability of the Price-Anderson coverage will continue to have a beneficial influence on the growth of the nuclear power industry, the institute believes that future experience will demonstrate that the act will prove not to have been an outright financial subsidy to nuclear power.

As a matter of fact, there is no current payment or setting aside of funds on the part of the Federal Government, and thus there is no drain on the taxpayer.

At the present time the Price-Anderson Act is the only means of providing the necessary liability coverage for the nuclear power industry. With the accumulation of additional nuclear powerplant manufacturing, construction, and operating experience, and with the broadening of the premium base as more nuclear powerplants are built, there may come a time when the private insurance industry can provide a larger portion of the necessary financial protection.

The institute feels that until long-term experience with a large-scale nuclear industry becomes available, there is no basis for suggesting a change in either the aggregate limitation of liability or the amount of total financial protection for each nuclear incident.

Within this current total of $560 million, however, the institute favors the incorporation of sufficient flexibility to allow, when possible, an increased percentage of the total financial protection to be supplied by private insurance companies.

However, in view of the very high concentration of risk coupled with the very small number of policies currently in force with private insurance pools, the institute does not, at this time, favor the incorporation in Price-Anderson of an automatic schedule of increases in the private insurance segment of the Price-Anderson system.

The Edison Electric Institute holds that extension of the Price-Anderson Act for 10 years, with provision for allowing an increase in private insurance coverage, without altering total financial protection, will continue to spur confidence in the growth of the nuclear power industry.

I would appreciate it if this statement is included in the record of the proceedings of these hearings.

Again, I would like to express the appreciation of the Edison Electric Institute for the opportunity to appear before your committee.

Thank you.

Chairman HOLIFIELD. This will be included, of course, in the proceedings, as given.

Mr. CAMPBELL. Thank you.

NECESSITY FOR EXTENSION OF INDEMNITY LEGISLATION

Chairman HOLIFIELD. According to a news item in the Nucleonics Week magazine of March 4, 1965, on the Inter-American Conference on Nuclear Power in February, Mr. M. L. Waring, senior vice president of the Consolidated Edison Co., said that the Price-Anderson

Act undercuts public confidence in the safety of nuclear powerplants, and is no longer required.

To your knowledge, has this opinion any widespread support in the industry?

Mr. CAMPBELL. No, sir; in my opinion, and I believe I can speak with authority on the subject, and so far as I am aware, this is the only corporate view of that sort.

Chairman HOLIFIELD. I ask that question because, of course, I know they are one of the main corporations in the EEI.

Mr. CAMPBELL. Yes, sir.

Chairman HOLIFIELD. Have you discussed this matter with Mr. Waring?

Mr. CAMPBELL. No, sir; I have not.

Chairman HOLIFIELD. In your opinion, what would be the effect of waiting another year or so before acting on the Price-Anderson?

Mr. CAMPBELL. I think it would continue the degree of uncertainty over the future of the nuclear power industry, and, in fact, would probably be a stumbling block to reactor projects which currently may be under study, including one of my own company.

I believe that it would serve no purpose other that to introduce uncertainty into the situation.

GOVERNMENT INSURANCE PROGRAM

Chairman HOLIFIELD. How do you feel about the proposal of the National Coal Association, specifically the elimination of the limitation of liability and indemnity feature of Price-Anderson, and the sale of excess insurance at commercial rates by the Government?

Mr. CAMPBELL. I think I see two proposals from the coal people which seem to me to be somewhat in contradiction.

In one case it seems to me I see a proposal that this insurance be permissive in the sense that a licensee would be able to buy insurance from the Government at something approaching the so-called commercial rate, that he would be the sole judge as to what was prudent.

Under those circumstances, I would have the following comments:

First of all, I am not in favor of having the Government in the insurance business.

Secondly, it appears to me that an imprudent management might conceivably put the public in jeopardy by its failure properly to provide insurance protection.

Thirdly, having failed to provide that insurance protection, the assets of that company might well be completely depleted in attempting to meet claims.

In the process, then, you would bankrupt a company, and very well might have come to the Government in any event to fulfill claims, so you would have a very confused situation.

I thought I saw in Mr. Moody's proposal a somewhat different situation, not permissive, but compulsory.

My first comment would be to the effect that I see no really good correlation between risk and kilowatt-hour production.

It would appear to me that reactors in one location would be in a very different situation than reactors in another location, so far as risk is concerned.

I raise the question as to what real protection would be provided, particularly during the first years of his plan, since there would be a real dearth of reserve at the Government's command.

In the last analysis, it would appear to me that the ultimate situation would simply be one in which the Government would have a reserve, and I believe that under the process of Price-Anderson it will be possible for private industry to provide that same protection after that lapse of years.

Representative HOSMER. Do you really believe that the Government would have a reserve? We have a social security fund. The social security taxes that come in are spent as soon as they are in by the Government. They haven't got any fund.

Mr. CAMPBELL. As I understand it, social security funds go into the general fund and get spent as the general fund requires.

Representative HOSMER. All we have is a credit on the books.

Mr. CAMPBELL. I agree with that.

Representative HOSMER. Is it any more reasonable protection to the public than not having a credit on a book, but a law that says we will pay it out when it happens?

Mr. CAMPBELL. You are asking me to comment on the question of whether the Government can provide for something that it promises. I suggest that the Government is the people. I believe if the Government says it will pay, it can pay.

I think it will, yes, sir.

Representative HOSMER. Then the bookkeeping entry that Mr. Moody wants to make is not going to make a bit of difference, is it?

Mr. CAMPBELL. In the last analysis, no difference at all, except that he would have the general fund augmented by these so-called payments.

But I think he would be grossly deficient during the early years, and I take rather signal exception to the fact that it has no relationship, really, to risk.

Chairman HOLIFIELD. You said in your statement a minute ago that you were against the Government going into the insurance business.

Mr. CAMPBELL. Yes, sir; I did.

Chairman HOLIFIELD. I assume that you said that as a matter of principle, because you are acquiescing to the Government furnishing this $500 million worth of indemnity.

Mr. CAMPBELL. I think of it in a somewhat different light. I think of the Government's indemnity as not strictly insurance, as such.

I agree that there is a contingent commitment. There is no reserve committed.

Chairman HOLIFIELD. That is right.

Mr. CAMPBELL. Therefore I think of this an an indemnification agreement which really, as I see it, is the people themselves saying to injured persons in the remote case of an incident that the people as a whole will make these injured people whole financially.

But I do not think of that as essentially an insurance contract.

Chairman HOLIFIELD. There are some differences, of course, but essentially it is giving a protection which at this time cannot be obtained from private enterprise.

Mr. CAMPBELL. I agree with that statement; yes, sir.

Chairman HOLIFIELD. As you also say, it is an agreement brought about by legislation of the people's representatives.

Mr. CAMPBELL. True.

DOCTRINE OF STRICT LIABILITY

Chairman HOLIFIELD. That in the national interest to go forward with the expected benefits from this new source of energy, we are willing to spread the risk over the whole Nation, the financial risk over the whole Nation, if such a catasthrophe should occur.

You heard Professor Cavers' position expounded on strict liability?

Mr. CAMPBELL. Yes, sir.

Chairman HOLIFIELD. How do you feel about that?

Mr. CAMPBELL. I am not an attorney, and therefore I can't really say I am qualified to discuss the problems of encroachment of Federal law on State tort law.

I cannot discuss that.

Representative HOSMER. Let me ask the question in a different way, then.

You came out foursquare for protection to the public, did you not?

Mr. CAMPBELL. Yes, sir.

Representative HOSMER. You have either an effective protection of the public, or an illusory protection of the public.

It has been brought out through these hearings that although the $500 million plus private insurance is there, that any injured member of the public attempting to get his hands on it may have to go over some very severe and serious hurdles.

So, would you be in favor of establishing, insofar as possible, and insofar as is fair and lawful, procedures to eliminate those hurdles in advance, so that the public actually can be effectively protected, rather than enjoy only the illusion thereof?

Mr. CAMPBELL. I understand the implication of absolute liability, and I certainly agree with you that we should try to set up in advance a system of handling the problem if by some mischance it should ever occur.

Representative HOSMER. Without specific reference to approval or disapproval of the strict liability principle?

Mr. CAMPBELL. Yes.

And as a businessman on the subject of absolute liability, I am not inclined to favor it, chiefly for the reason that I can't see where it goes once precedents of that sort are established.

Chairman HOLIFIELD. But the intent of the Congress in passing this Price-Anderson Act initially was not to create an illusory hope, nor a deceptive promise to the people that indemnity would be paid. It was to create a confidence that if this unexpected catastrophe should occur, that there would be $560 million available, if we needed that much money to pay claims.

We did not intend to erect a series of hurdles and legal technicalities which would prevent the satisfaction of legitimate claims.

Mr. CAMPBELL. Congressman, I represent a corporation that is really involved in two industries, both the natural gas and electric power business. Both of those agencies are so-called dangerous agencies.

I must say that in my experience, both of those activities of my company have come awfully close on occasion to being called virtually absolute liability.

I do not enjoy the situation. As a businessman, I tell you I do not like it. But I do agree with you, that it should be possible, and I think it would be a worthy objective, to attempt to set out a system of avoiding delay in the case we ever need to make payments.

I have no solution to offer you, but to say, in effect, that an injured plaintiff can collect from my company without having to demonstrate that we were in some way negligent or someone in the chain of production in that plant was negligent is repugnant to me.

Chairman HOLIFIELD. I can understand why it would be strictly from a financial liability standpoint.

Mr. CAMPBELL. Yes, sir.

Chairman HOLIFIELD. I can understand that. None of us likes to pay for his mistakes.

Mr. CAMPBELL. But I would be inclined to say here that there is not necessarily a mistake. This is one of the things that gives me great pain.

Professor Cavers was at great pains to point out that this may very well be an act of God, or in fact beyond any human intelligence to assign the cause. To say that my company must assume the liability out of hand simply because it was operating with a dangerous agency is the thing I don't like.

Representative HOSMER. Let us just back up a minute, here.

Your company is not paying a darn thing except insurance premiums.

Mr. CAMPBELL. I am talking about the case of an accident.

Representative HOSMER. That is what I am talking about, too. Your insurers step in, the Government steps in, and if it gets up to $560 million, your company is out.

You are not paying any money. You are paying an insurance premium. That is the total extent of the obligation and liability that your company is taking in this business.

Chairman HOLIFIELD. We are talking about making available the principal of $560 million.

Mr. CAMPBELL. Yes, I understand.

Chairman HOLIFIELD. Without undue delay or technical legal hurdles, which the average small litigant, with limited resources, would be unable to cope with in the courts over a period of years.

In other words, we are thinking about the principle that justice long delayed is justice denied. We are thinking about the establishment of some type of procedures which would make a reality of the pledge and the promise of the Congress on the $560 million.

Mr. CAMPBELL. I think you misunderstood me a bit.

I don't mean to suggest we are paying out in the case of the nuclear incident. What I am trying to say, and I can only speak for myself on this score, I am not speaking for the industry, I am only trying to say that the concept of absolute liability seems to me to lead us into areas in terms of other incidents of all sorts that I cannot predict.

As an attorney, I can't discuss it at all.

Representative HOSMER. This is not a precedent, because in no other area do you have a top limit on your ultimate liability. In this area there is a top limit on ultimate liability. You incur no risk whatsoever of catastrophic payments. When your insurance company gets through paying off the claims, the Government steps in. When the Government gets up to the $500 million, it stops.

In the meantime, you are running your utility business. It is all out of your hands. It is not the same thing as any other liability that would be imposed upon you either by negligence or absolute liability.

If you are running a truckload of dynamite down the middle of Manhattan and it blows up, you are going to be paying forever to anybody who can establish a claim. If it goes over $500 million, you pay over $500 million, if you can shake it up some place. Here you don't.

Mr. CAMPBELL. Well, I have been at pains to ask a number of lawyers about this thing, because not being a lawyer, myself, it is difficult for me to have an opinion on the legal implications.

This, I think, is what really is bothering me: the legal implications that absolute liability does become a precedent. I am told that there is a great deal of fear that it can become a precedent, but you will have to accept my statement that on this score I am not a lawyer.

LIMITATION OF LIABILITY

Mr. CONWAY. Along that point, if it does become a precedent, merely because you pass it in a statute, in this statute we have a ceiling on liability. Now, are you going to say because we pass a statute that puts a ceiling on liability, that this now is going to become a precedent in the common law tort field?

Mr. CAMPBELL. It is my impression this is entirely possible. I don't know.

Mr. CONWAY. In other words, this statute, because it specifies this ceiling, could now become a precedent in the field of torts outside of the statute?

Mr. CAMPBELL. It has been said to me that the establishment of this sort of principle might very well lead in that direction.

Mr. CONWAY. Should we then eliminate that from the Price-Anderson Act, eliminate the ceiling?

Mr. CAMPBELL. In my opinion, certainly not.

The limit of liability? Is that what you are talking about?

Mr. CONWAY. Let me go back.

You took the position that by putting in absolute liability in the statute, this then could become a precedent in other tort fields, outside of the nuclear field.

Mr. CAMPBELL. It has been so claimed to me.

Mr. CONWAY. We have that situation here where $560 million is the ceiling on liability. Now, by having that in the statute, using the same logic that you have applied to the absolute liability field, could that then become a precedent in the field of torts, even though we don't have a statute in any other field?

Representative HOSMER. You are not running up to the legislature of the State and asking them to pass a law limiting your liability, saying, "Look at Price-Anderson, that is a precedent."

You are not doing that.

Mr. CAMPBELL. No, and I think there is very good reason. It seems to me there is very good reason. It seems to me that the reason we have this situation in the case of Price-Anderson, from my personal point of view, is because, I will call it the perimeter of the accident is not possible to define.

I can tell you pretty closely what a boiler accident will do. I can tell you about what limitation in terms of geography would be.

Representative HOSMER. They call it tube failure.

Mr. CAMPBELL. Call it what?

Representative HOSMER. Tube failure. You know, like the corpse is a deceased one, the boiler explosion is now a tube failure.

Mr. CAMPBELL. We have tube failures every day. We live with tube failures.

My point is that it seems to me in the case of a nuclear incident it is almost impossible to define the perimeter. There is a very real difference, it seems to me. In fact, I would like to say I think that is one of the most important cardinal points in everything we have discussed for 3 days, the fact that it is impossible to define the perimeter of the accident. That is the reason for this whole situation.

Mr. CONWAY. In the event of an accident, might it not be very difficult for the third party to go in and be able to prove negligence or prove that there has been negligence?

Mr. CAMPBELL. I am not capable of answering that question.

I would also call your attention to the fact that a man 3,000 miles downwind conceivably might also say he was damaged. I don't know.

Mr. CONWAY. That is different. That you have to prove. Even in absolute liability, you still have to prove damage. That is a completely different point.

Even if you have absolute liability, that does not mean that because a man is 3,000 miles away he can collect, unless he can prove he has been damaged.

Mr. CAMPBELL. I understand.

Chairman HOLIFIELD. I take it from your statement on page 5 (see p. 226) that the utility industry would have no objection if large reactor operators are required as of January 1 to obtain a larger amount of private insurance expected to be available on or about that date.

Mr. CAMPBELL. It is my clear understanding that the vast majority of our industry will have no aversion to that idea at all. I know of no dissident.

Chairman HOLIFIELD. And no objection to a comparative reduction in the Government's liability?

Mr. CAMPBELL. That is correct.

Chairman HOLIFIELD. Are there any further questions?

Representative HOSMER. Mr. Chairman, before we close, I would like to say that I think our conversation relative to Professor Cavers' proposal, the fact that we have used it as a conversation piece, does not necessarily mean we are stocking it in the store. That is just one of several panaceas.

In this area, in addition to whatever discussion we have had of the Price-Anderson extension, I think we have developed a field that must have attention separate and apart from whatever we do with this bill.

But that is in the procedural methods to make this an effective pro-

tection. I think that in that connection, the analogy to the Amazon Basin is indeed one that is fairly applicable here, and that we are going to have to do a rather large job of exploring this problem, defining it, and then picking up what seems to be the best way of handling it, and taking it up in statutory form in due time.

Chairman HOLIFIELD. Mr. Campbell, I share with you the problem of not being a lawyer, and so I can understand your lack of enthusiasm about delivering your opinions on technical legal points.

Mr. CAMPBELL. Yes, sir.

Chairman HOLIFIELD. But I am sure that both of us share also the feeling of common justice and common equity which is involved in the legislation which this committee has sponsored, the Price-Anderson Act.

Mr. CAMPBELL. I do share that.

Chairman HOLIFIELD. We don't want the $560 million to be an illusory hope or an unrealistic amount of money in case the event ever should occur, which God forbid, that it should be necessary. We don't want to be party to any kind of a procedural arrangement which would stand in the way of justice being done in case it is necessary to resort to this amount of money.

Mr. CAMPBELL. I subscribe to that view.

Chairman HOLIFIELD. I am sure as a matter of common equity you subscribe to that, too.

The committee will now recess and consultation will be had among the members of the committee as to whether additional information may be needed and additional witnesses on this subject.

For the time being, we will adjourn.

(Whereupon, at 5 p.m., Thursday, June 24, 1965, the committee adjourned, to reconvene at the call of the Chair.)

APPENDIXES

APPENDIX 1

H.R. 8496 [S. 2042 AN IDENTICAL BILL]

[H.R. 8496, 89th Cong., 1st sess.]

A BILL To amend section 170 of the Atomic Energy Act of 1954, as amended

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That subsection 170 c. of the Atomic Energy Act of 1954, as amended, is amended to read as follows:

"c. The Commission shall, with respect to licenses issued between August 30, 1954, and August 1, 1977, for which it requires financial protection, agree to indemnify and hold harmless the licensee and other persons indemnified, as their interest may appear, from public liability arising from nuclear incidents which is in excess of the level of financial protection required of the licensee. The aggregate indemnity for all persons indemnified in connection with each nuclear incident shall not exceed $500,000,000 including the reasonable costs of investigating and settling claims and defending suits for damage, *Provided, however:* That this amount of indemnity shall be reduced by the amount that the financial protection required shall exceed $60,000,000. Such a contract of indemnification shall cover public liability arising out of or in connection with the licensed activity. With respect to any production or utilization facility for which a construction permit is issued between August 30, 1954, and August 1, 1977, the requirements of this subsection shall apply to any license issued for such facility subsequent to August 1, 1977."

SEC. 2. The first two sentences of subsection 170 d. of the Atomic Energy Act of 1954, as amended, are amended to read as follows:

"In addition to any other authority the Commission may have, the Commission is authorized until August 1, 1977, to enter into agreements of indemnification with its contractors for the construction or operation of production or utilization facilities or other activities under contracts for the benefit of the United States involving activities under the risk of public liability for a substantial nuclear incident. In such agreements of indemnification the Commission may require its contractor to provide and maintain financial protection of such a type and in such amounts as the Commission shall determine to be appropriate to cover public liability arising out of or in connection with the contractual activity, and shall indemnify the persons indemnified against such claims above the amount of the financial protection required, in the amount of $500,000,000 including the reasonable costs of investigating and settling claims and defending suits for damage in the aggregate for all persons indemnified in connection with such contract and for each nuclear incident: *Provided*, That this amount of indemnity shall be reduced by the amount that the financial protection required shall exceed $60,000,000: *Provided further*, That in the case of nuclear incidents occurring outside the United States, the amount of the indemnity provided by the Commission shall not exceed $100,000,000."

SEC. 3. The first sentence of subsection 170 e. of the Atomic Energy Act of 1954, as amended, is amended to read as follows:

"The aggregate liability for a single nuclear incident of persons indemnified, including the reasonable costs of investigating and settling claims and defending suits for damage, shall not exceed the sum of $500,000,000 together with the amount of financial protection required of the licensee or contractor: *Provided, however*, That such aggregate liability shall in no

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event exceed the sum of $560,000,000: *Provided further*, That with respect to any nuclear incident occurring outside of the United States to which an agreement of indemnification entered into under the provisions of subsection 170 d. is applicable, such aggregate liability shall not exceed the amount of $100,000,000 together with the amount of financial protection required of the contractor."

SEC. 4. Subsection 170 k. of the Atomic Energy Act of 1954, as amended, is amended by striking out the date "August 1, 1967" wherever it appears and inserting in lieu thereof the date "August 1, 1977".

SEC. 5. Subsection 170 1. of the Atomic Energy Act of 1954, as amended, is amended to read as follows:

"1. The Commission is authorized until August 1, 1977, to enter into an agreement of indemnification with any person engaged in the design, development, construction, operation, repair, and maintenance or use of the nuclear-powered ship authorized by section 716 of the Merchant Marine Act, 1936, and designated the 'nuclear ship Savannah'. In any such agreement of indemnification the Commission may require such person to provide and maintain financial protection of such a type and in such amounts as the Commission shall determine to be appropriate to cover public liability arising from a nuclear incident in connection with such design, development, construction, operation, repair, maintenance or use and shall indemnify the person indemnified against such claims above the amount of the financial protection required in the amount of $500,000,000 including the reasonable costs of investigating and settling claims and defending suits for damage: *Provided*, That this amount of indemnity shall be reduced by the amount that the financial protection required shall exceed $60,000,000."

APPENDIX 2

JCAE PRESS RELEASES ON PRICE-ANDERSON EXTENSION (MAY 27, JUNE 14, AND JUNE 16, 1965)

[From the office of the Joint Committee on Atomic Energy, No. 483, for immediate release, May 27, 1965]

JOINT COMMITTEE ON ATOMIC ENERGY ANNOUNCES PUBLIC HEARINGS ON EXTENSION OF PRICE-ANDERSON INDEMNITY LEGISLATION

Chairman Chet Holifield and Vice Chairman John O. Pastore of the Joint Congressional Committee on Atomic Energy announced today that hearings on proposed legislation (H.R. 8496; S. 2042) to extend the effective period of the Price-Anderson Act to 1977 have tentatively been scheduled for the week beginning June 21, 1965. The hearings will be held before the Joint Committee's Subcommittee on Legislation, in the public hearing room of the Joint Committee on Atomic Energy, U.S. Capitol, Washington, D.C.

The Price-Anderson Act, so-called in recognition of its sponsorship by Congressman Melvin Price and Senator Clinton P. Anderson, was enacted in 1957 and applies to Atomic Energy Commission licenses and contracts effective prior to August 1, 1967. The act affords protection to the public and to AEC licensees and contractors from the risks associated with atomic energy by providing for a program of private insurance and governmental indemnity amounting to more than $500 million to cover damages that conceivably could arise from a nuclear accident. While it is generally recognized that the possibility of a catastrophic nuclear accident is extremely remote because of the safety requirements imposed by the AEC upon persons engaged in the atomic energy business, the fact that an accident of uninsurable dimensions is conceivable prompted the enactment of this special atomic energy indemnity legislation.

In addition to extending the effectiveness of the Price-Anderson Act for an additional 10 years, H.R. 8496 and S. 2042 (identical bills introduced on May 26, 1965, by Congressman Price and Senator Anderson, respectively) provide for a decrease in governmental indemnity to the extent of any increase in the amount of insurance currently available from private sources. These bills would not diminish the level of protection ($560 million in the case of large power reactors) presently afforded by the act, since any reduction in the Government's indemnity obligation would be offset by a corresponding increase in commercial insurance obtained by operators of nuclear facilities.

In announcing the hearings, Chairman Holifield and Vice Chairman Pastore stated:

"Fortunately, there has been no necessity during the past 8 years to fall back upon the tremendous sums made available by the insurance policies and indemnity agreements established under the Price-Anderson Act, for payment of claims due to a catastrophic nuclear accident. There have also been tremendous strides made in nuclear technology in the years since enactment of this legislation, particularly with respect to aspects of safety. Nevertheless, the risk of a potentially disastrous nuclear accident, remote though it be, still remains, as apparently does the problem of securing sufficient private insurance to cover the maximum conceivable liability that might result from a nuclear incident. These and other problems will be fully explored during the committee's hearings. If it appears from our deliberations that there is a continuing need for some form of indemnity legislation in the nuclear area, an appropriate recommendation to this effect will be made to Congress."

Chairman Holifield and Vice Chairman Pastore also identified the following key policy questions to which the Joint Committee expects to address itself with respect to these hearings:

1. Will there still be a need for Price-Anderson type legislation after August 1967?
2. Will additional nuclear liability insurance be available from commercial sources in the immediate future, and if so, in what amounts? Will increasing amounts of such insurance become available over the next several years?
3. If Price-Anderson type legislation should be extended, what should be the period of the extension?
4. If an extension of a governmental indemnity program in the nuclear field is warranted, what changes, if any, should be made in the Price-Anderson legislation?
5. Should the amount of the governmental indemnity available under the Price-Anderson legislation be reduced as more commercial nuclear liability insurance becomes available?

In the near future, the Joint Committee plans to publish a compilation of documents useful to a full consideration of extension of the Price-Anderson legislation. It is anticipated that there will be included in this compilation a detailed report by the Atomic Energy Commission on this subject. A draft of this report was informally circulated by the AEC in November 1964.

All persons desiring to testify at the hearings should inform the Joint Committee of their desire to do so, not later than June 10, 1965. Prepared statements should be submitted to the committee no later than June 17, 1965. Those selected to present oral testimony will be notified about a week prior to their scheduled appearance.

For further information in connection with these hearings, interested persons should contact Leonard M. Trosten, staff counsel of the Joint Committee on Atomic Energy, U.S. Capitol, Washington, D.C.

[From the office of the Joint Committee on Atomic Energy, No. 487, for immediate release, June 14, 1965]

JOINT COMMITTEE ON ATOMIC ENERGY ANNOUNCES DATES FOR PUBLIC HEARINGS ON EXTENSION OF PRICE-ANDERSON INDEMNITY LEGISLATION

Chairman Chet Holifield and Vice Chairman John O. Pastore of the Joint Congressional Committee on Atomic Energy today announced that public hearings on extension of the Price-Anderson indemnity legislation have been scheduled for June 22–24, 1965, before the Subcommittee on Legislation. At the same time it was announced that a Joint Committee print entitled "Selected Materials on Atomic Energy Indemnity Legislation" would be released today. The print includes the study of the Price-Anderson Act which was recently furnished the Joint Committee by the Atomic Energy Commission.

The committee plans to issue a press release shortly containing a tentative list of the witnesses who will testify at the hearings.

The hearings, which will be held in the public hearing room of the Joint Committee on Atomic Energy in the U.S. Capitol, will begin at 10 a.m. on June 22 with testimony from representatives of the Atomic Energy Commission. The AEC's witnesses will be followed by representatives of the Advisory Committee on Reactor Safeguards, and the insurance, utility, equipment manufacturing, coal,

and railroad industries. Other interested persons will also testify. The hearings will conclude on the afternoon of June 24 with a roundtable discussion among a number of the participants in the hearing.

The morning session of each day's hearing will begin at 10 a.m. Afternoon sessions start at 2 p.m.

Specifically, the subcommittee will consider identical bills (H.R. 8496; S. 2042) recently introduced by Congressman Melvin Price and Senator Clinton P. Anderson which would extend the effective period of the Price-Anderson Act to 1977 and provide for a decrease in governmental indemnity to the extent of any increase in the amount of insurance currently available from private sources. Presently operators of large nuclear reactors are required to maintain financial protection in the amount of $60 million. This amount is supplemented by a governmental indemnification of $500 million, thus providing up to $560 million to cover public liability arising from any nuclear incident.

In an earlier press release dated May 27, 1965, Chairman Holifield and Vice Chairman Pastore announced these hearings and identified the following key policy questions as ones to which the Joint Committee would address itself:

1. Will there still be a need for Price-Anderson type legislation after August 1967?

2. Will additional nuclear liability insurance be available from commercial sources in the immediate future, and if so, in what amounts? Will increasing amounts of insurance become available over the next several years?

3. If Price-Anderson type legislation should be extended, what should be the period of the extension?

4. If an extension of a governmental indemnity program in the nuclear field is warranted, what changes, if any, should be made in the Price-Anderson legislation?

5. Should the amount of the governmental indemnity available under the Price-Anderson legislation be reduced as more commercial nuclear liability insurance becomes available?

For further information on these hearings, contact Leonard M. Trosten, staff counsel of the Joint Committee on Atomic Energy, U.S. Capitol Building, Washington, D.C.

[From the office of the Joint Committee on Atomic Energy, No. 488, for immediate release, June 16, 1965]

JOINT COMMITTEE ANNOUNCES WITNESS LIST FOR PRICE-ANDERSON HEARINGS

A tentative list of witnesses to present testimony before the Joint Committee on Atomic Energy at public hearings on bills to amend and extend the Price-Anderson indemnity legislation (H.R. 8496; S. 2042) was announced today. This list is subject to adjustment to accommodate the needs of witnesses and the committee.

The hearings, which are scheduled for June 22–24, 1965, will be held in the Joint Committee's public hearing room, U.S. Capitol, before the Subcommittee on Legislation. The hearings were announced earlier in Joint Committee press releases issued on May 27 and June 14, 1965. Morning and afternoon sessions have been scheduled to begin, respectively, at 10 a.m. and 2 p.m.

The tentative list of witnesses in their order of appearance, is attached. For further information on these hearings contact Leonard M. Trosten, staff counsel of the Joint Committee on Atomic Energy, U.S. Capitol Building, Washington, D.C.

Attachment: List of witnesses.

TENTATIVE WITNESS SCHEDULE FOR HEARINGS ON EXTENSION OF PRICE-ANDERSON

Tuesday, June 22, 1965

Morning (10 a.m.):

Atomic Energy Commission:
Commissioner James T. Ramey.
Commissioner John G. Palfrey.

Advisory Committee on Reactor Safeguards:
W. D. Manly, Chairman.
Dr. Herbert J. C. Kouts.

Afternoon (2 p.m.) :
Nuclear Energy Liability Insurance Association; DeRoy C. Thomas, Counsel, Hartford Accident and Indemnity Co.
Mutual Atomic Energy Liability Underwriters; Ashley St. Clair.
Mutual Atomic Energy Reinsurance Pool; Ashley St. Clair.
Nuclear Energy Property Insurance Association; H. Sumner Stanley, assistant general manager.
Prof. David F. Cavers, Harvard Law School.
Edison Electric Institute; James H. Campbell, president, Consumers Power Co. of Michigan.

Wednesday, June 23, 1965

Morning (10 a.m.) :
American Public Power Association; Alex Radin, general manager.
City of Los Angeles, Department of Water & Power; Samuel B. Nelson, general manager and chief engineer.
Rochester Gas & Electric Corp.; Francis E. Drake, vice president.
Florida Power & Light Co.; George C. Kinsman, vice president.
Philadelphia Electric Co.; R. G. Rincliffe, chairman of the board.
Afternoon (2 p.m.) :
Westinghouse Electric Corp.; Charles H. Weaver, vice president.
General Electric Co.; James F. Young, general manager, Atomic Products Division.
Allis-Chalmers Manufacturing Co.; Henry C. Nickel, general manager, Atomic Energy Division.
General Dynamics Corp., General Atomic Division; Samuel J. Farmer, vice president and general counsel.
Martin-Marietta Corp.; Malcolm A. MacIntyre, vice president.
Babcock & Wilcox Co.; R. H. Harrison, vice president, Atomic Energy Division.
United Nuclear Corp.; Richard D. Bokum, II, president.

Thursday, June 24, 1965

Morning (10 a.m.) :
National Coal Association; Brice O'Brien, general counsel.
National Coal Policy Conference; Joseph E. Moody, president.
Public Service Co. of Colorado; Robert T. Person, president.
Adolph J. Ackerman, consulting engineer, Madison, Wis.

APPENDIX 3

Background Statement Submitted by AEC on Reactor Licensing Procedures and Reactor Safety, June 18, 1965

PROCEDURES IN LICENSING NUCLEAR REACTORS

Protection of health and safety is the primary goal of the Atomic Energy Commission's regulatory program. Under this program, the licensed uses of radioactive materials and the construction and operation of licensed nuclear facilities, of which reactors are one type, are regulated by AEC. State and local officials are kept informed of AEC licensing actions taken in connection with a power reactor project.

The following is a general summary of the main steps in the licensing of a nuclear power reactor.

Selection of a Reactor Site.—Factors considered by the Commission in judging the safety of proposed sites for power reactors include dimensions and characteristics of the site under the operator's control; population density in the area surrounding the proposed site, and the uses which are made in this area, such as industrial, farming, or residential; and the seismology, meteorology, geology, and hydrology of the area. Other factors considered are the characteristics of the proposed reactor, including maximum power level, use of the facility, and the safeguards engineered into the plant either to prevent or to limit the consequences of accidents; and the extent to which the design of the reactor incorporates unique or unusual features which may have a significant bearing on the probability or consequences of an accident.

Before formally filing an application for construction and operation of a power reactor, a prospective applicant may discuss possible sites for the reactor with the Commission's regulatory staff and with the AEC Advisory Committee on Reactor Safeguards, a committee composed of scientists and engineers who are eminently qualified in the various fields related to reactor technology. The ACRS advises the Commission on safety aspects of reactors. In this way an applicant can receive additional guidance as to the acceptability of a site and the information which must be included in the application for a license to construct and operate a reactor.

Application for a Construction Permit.—Once a company has decided it wants to build a power reactor at a particular site, it must file an application with the Commission for a permit to begin construction. Such things as site exploration, site excavation, procurement or manufacture of components, and construction of nonnuclear facilities may be done without an AEC construction permit.

Along with the application, the company files a preliminary safeguards report. This report sets out in as much detail as is then possible the technical aspects of the proposed reactor, as well as comprehensive data on the proposed site. The report discusses conceivable accidents which might occur and the safeguards which will be provided to prevent accidents, or if they should occur, to prevent overexposure of the public and employees to radiation.

The safeguards report is carefully studied by the regulatory staff. Copies are sent to the Commission's Advisory Committee on Reactor Safeguards, as well as to State and local officials, and are placed in AEC's Public Document Room. A public announcement of the receipt of an application is issued by AEC and a notice is published in the Federal Register. Copies of all correspondence and filings relating to the application are placed in the public records of the Commission.

The Atomic Energy Act includes provisions establishing the Advisory Committee on Reactor Safeguards as a statutory committee, requiring certain of its safety reports be made public, and requiring that public hearings be held on certain reactor license applications.

Review and Safety Evaluation.—The application is reviewed by technical experts of the Commission's regulatory staff. This staff is headed by the Director of Regulation, who reports directly to the Commission. The thorough technical review of the application includes consideration of all the radiation safety aspects of the proposed reactor, as well as the applicant's technical and financial qualifications. The regulatory staff supplements this study of the hazards summary report with conferences with the technical staff of the applicant, and may ask for further information if this is required in the safety determination which must be made.

The data submitted must provide the necessary information to permit evaluation of the adequacy of the proposed site for a reactor of the power level and type planned. Even though complete design details are usually not available at the time of the application for a construction permit, the data submitted must provide reasonable assurance that a reactor of the type and power level proposed can be constructed and operated at the selected site without endangering the health and safety of the public, including plant employees.

ACRS safety evaluation.—Before completing its review the regulatory staff analyzes the safety aspects of the proposed power reactor and prepares a summary of this analysis for the Advisory Committee on Reactor Safeguards, which has already received the applicant's preliminary safeguards report. Particular problems which may exist are identified for consideration by ACRS. Representatives of the applicant and members of the regulatory staff usually meet with the ACRS to deal with questions that arise during the Committee's review of the reactor. When it has reached a conclusion as to safety aspects of the proposed reactor, the ACRS reports its views to the Commission. This report is made public.

Hearing on construction permit.—The next step in the regulatory process is the scheduling of a public hearing to consider issuance of a construction permit for the reactor. The public is given 30 days' notice of the hearing date, through a notice published in the Federal Register. In addition, a public announcement is issued by AEC.

Approximately 20 days in advance of the public hearing, an analysis of the safety aspects of the proposed reactor, prepared by the regulatory staff, is made available to the public. This analysis takes into account the recommendations and advice of the ACRS. Copies of this analysis are furnished to newspapers in the area which surrounds the proposed site of the reactor.

The public hearing is conducted either by an atomic safety and licensing board, or by a hearing examiner. An atomic safety and licensing board is composed of two persons who are technically qualified and one person who is qualified to conduct administrative proceedings.

The application, any amendments to the application which may have been filed, and any other pertinent documents are submitted for the record. Testimony is presented both by the applicant and the AEC regulatory staff on the safety aspects of the reactor and on the applicant's technical and financial qualifications to construct the reactor. In addition, the Commission's rules of practice permit persons whose interests may be affected by the proceeding to intervene as parties. Persons who wish only to make a statement of their views concerning the project may be permitted to make "limited appearances."

The proceedings are conducted informally, consistent with legal requirements and fairness to all parties.

Final action on construction permit.—The licensing board or hearing examiner considers the evidence which has been presented, together with any briefs which may have been filed, and issues a decision. These decisions are subject to review by the full Commission upon its own motion or upon filing of a petition for review which the Commission accepts. In the absence of Commission review, the decision becomes effective on a specified date.

If authorized by the decision, a construction permit is issued. The permit for a power reactor may be provisional in that it takes into account the fact that complete technical data being developed by the applicant will be required later to complete the safety analysis. The permit must include a finding, however, that AEC is satisfied it has enough information to provide reasonable assurance that a facility of the type and size proposed can be constructed and operated safely at the proposed location.

The Commission, as a matter of practice, informally reviews proposed construction permits and operating licenses in cases where no hearing is held.

Operating license.—As construction proceeds on the reactor, it is inspected periodically by representatives of the Commission's Division of Compliance to assure that the requirements of the construction permit are met.

Eventually, the applicant submits the remainder of the required information, including plans for operation and procedures for coping with emergency situations, and pertinent details on the final design of the reactor itself—such as containment design, design of the nuclear core, and waste disposal systems. Once again the regulatory staff makes a detailed review of the information on the reactor and presents a summary of its views to the Advisory Committee on Reactor Safeguards. The report subsequently developed containing advice by the ACRS to the Commission is made public.

When the Advisory Committee on Reactor Safeguards and the AEC regulatory staff have completed their preoperational safety reviews, the Commission in its discretion may issue an operating license (after the required safety determination has been made) or it may schedule a public hearing to consider issuance of the license. In the event no hearing is scheduled, a 30-day public notice is published stating that in the absence of a timely petition to intervene, and request for a hearing, the license will be issued. Before final action on the license, the regulatory staff's analysis of the safety aspects is made available to the public.

If a public hearing is held, the decision of the licensing board or hearing examiner is subject to Commission review.

If the decision is favorable, an operating license is issued to the applicant. This license may be provisional for an initial period of operation, at the end of which time a review is made to determine conditions for the full-term license (not more than 40 years).

Power reactors are brought up to full power gradually. In some cases, a stepwise approach to full power operation is required by the license, and an evaluation of operations is made by AEC before each new step in power increase is begun. Persons who operate a power reactor must be licensed by the Commission. They must pass an AEC examination which includes an operating test and a written examination on their knowledge of specific details of the facility and the procedures used in its operation.

Continuing Review.—AEC inspection and review of power reactors does not stop when the operating license is issued. The reactors are inspected periodically by representatives of the Commission's Division of Compliance to make certain operations are being conducted in accordance with terms of the license.

Thus, reactors are subject to detailed review by technical experts before construction is permitted, before operation is permitted and during the entire period of their operation. In the event an unsafe condition is discovered after operation begins, the Commission has authority to order the licensee to shut down the reactor and take any safety measures which may be necessary. It should be emphasized, however, that the outstanding safety record of the atomic energy industry has been achieved because persons who deal with atomic energy respect the potential hazards and exercise great care in the handling and use of atomic materials.

THE REGULATORY STAFF'S TECHNICAL REVIEW

The goal of the regulatory staff's technical analysis and safety evaluation of nuclear reactor proposals is to assure that adequate provisions have been made in their siting, design, construction, and operation so that neither normal operation nor accidents will pose any significant risk to the health and safety of the employees or the public.

Of overriding importance in this review is the determination of the adequacy of two general types of safeguards to (1) prevent the occurrence of any credible accident, and (2) in the event that such an accident should somehow occur, to prevent overexposure of the public and employees to radiation.

The site as well as the principal features of the plant and its operation come under scrutiny by the staff in arriving at such assurance. Factors considered in judging the safety of proposed sites include dimensions and characteristics of the site under the operator's control; population density in the area surrounding the proposed site, and the uses which are made of this area, such as industrial, farming or residential; and the seismology, meteorology, geology and hydrology of the area. Utilization is made of the advice of recognized authorities in the pertinent fields of the project's environment, including Federal agencies such as the U.S. Geological Survey and the U.S. Weather Bureau.

The old adage that "an ounce of prevention is worth a pound of cure" is particularly applicable to the overall safety problem of nuclear powerplant operation. First attention is therefore given by the designer, the applicant, and the regulatory staff to those facets of reactor design which are essenial to stable operation within limits known from experimental and experience information to be adequate to protect the integrity of the nuclear fuel and primary coolant system. The nuclear limits are established for a particular core by a complicated nuclear design procedure, and guaranteed during operation by nuclear control instrumentation with accompanying "scram" devices set well below the points at which fuel damage will occur. Limitations on the pressure, temperature, and flow of the primary system coolant are established from engineering considerations, and are guaranteed by comparable "stop" devices set with ample margin to protect the integrity of both the fuel and the primary coolant system. Administrative limitations on operating procedures must be adequate to preclude the likelihood of operational errors that might conceivably defeat the automatic protective devices.

While accident prevention is the cornerstone both of safety and of the economics of nuclear power generation, it is nevertheless necessary to make provisions for limiting the consequences of any accidents that may occur, despite the precautions taken to prevent them. Such accidents will be due primarily to component malfunction or materials failure of a type that cannot usually be predicted. Accident consequence-limiting devices are an important part of every nuclear facility design, and the regulatory staff takes a careful engineering look at the adequacy of this feature in design proposals.

First and foremost is the emergency cooling system which is designed to prevent core meltdown in the event of a major rupture in the primary cooling system that would interrupt the normal coolant flow. The probable reliability of emergency cooling systems over the life of the plant, and methods of periodic checking of their operability come in for close scrutiny by the staff.

If the emergency cooling system works as planned, no significant release of fission products from the core should occur, even with a major rupture in the primary coolant system. But this cannot be taken for granted, and provisions must therefore be made to contain any fission products that may be released from the core in the event of an accident involving both a major rupture of the primary system and the failure or partial malfunction of the emergency cooling devices. There are several different current designs of containment structures,

all of which must be evaluated by the staff with respect to their adequacy to accommodate with suitable margins of safety the pressure and energy releases resulting from a major break in the primary system, and to hold the leakage of fission products outside the containment to acceptable limits as determined by resident population patterns around the facility. The criteria used in the evaluation are those set forth in part 100 of the Commission's regulations.

Where needed to prevent overpressurization of the containment or to lower the iodine content of the containment atmosphere to meet off-site exposure requirements, two additional engineered safeguards have been proposed by license applicants and must be evaluated by the staff. One of these is a series of air recirculation fans equipped with recirculating coolant which removes the heat to the outside of the containment structures. Where iodine is a problem, these fans are equipped with particulate filters. Another engineered safeguard is a containment spray system with built-in heat exchanger which serves both to cool the containment air and to wash out some of the iodine. In the pressure suppression type of containment, primary system steam and also iodine are trapped in a pool of water.

In its evaluation of the containment and other engineered safeguards, the regulatory staff concerns itself with such things as pressure capability, leak tightness and means of verification, functioning of air recirculation, filtration and spray systems under accident conditions, and the reliability of emergency power to operate all essential equipment in the event of an accident which might incapacitate normal sources of power.

The disposal to the environment of radioactive wastes generated in the facility operation is limited by provisions set forth in part 20 of the Commission's regulations. Nevertheless, the regulatory staff evaluates the proposed equipment and methods of meeting these requirements. Since waste processing storage and monitoring are usually conducted outside the reactor containment, the staff also makes an evaluation of the consequences of accidental releases of waste effluents.

COMPLIANCE INSPECTION

When a construction permit is issued, the inspection program of the division of compliance begins, and this surveillance continues throughout the lifetime of the plant.

During the construction phase, the compliance program is directed primarily toward the gathering and reporting of information to substantiate an eventual finding that the facility has been constructed in accordance with the construction permit, and that the preoperational tests demonstrate that the facility and its component system will perform as described in the license application. In the course of gathering this information, inspectors (1) examine the details of construction; (2) ascertain whether the applicant and his contractors maintain an adequate program of inspection of the fabrication of crucial components; (3) examine the plans for, and results of preoperational tests of components and systems, and witness important tests; (4) review the status of the applicant's proposed detailed operating and administrative procedures; and (5) review the applicant's training program and the overall competence of the operating and technical staff. The review of personnel training and competence is later supplemented by the examination of candidates for operator licenses by the division of reactor licensing.

After the initial operating license is issued, the efforts of the division of compliance are directed toward verifying that the facility is being operated in accordance with the terms of the license and AEC rules and regulations, and that no undue hazards exist. Onsite inspections are conducted at frequencies dependent upon the relative hazard potential of the particular facility and the type of operations currently being carried on. Inspections are quite frequent for complex facilities during initial operational testing, and much less frequent during routine operation of standard reactors by experienced personnel. During all inspections, the primary sources of information are personal observation by the inspectors, discussion with operating personnel, and review of operating logs and records. Important aspects of the inspection program include:

(1) Observation of all phases of operation of the facility.
(2) Review of operation and administrative records,
(3) Study of maintenance plans and performances.
(4) Investigation of unusual occurrences at the facility,

(5) Evaluation of the adequacy of operating and emergency procedures, and

(6) General review of organization and assignments of responsibility, and an overall assessment of management's views on safety.

In the course of the inspection program, close contact is maintained with responsible levels of licensee management to assure that they are aware of any deficiencies discovered, and to ascertain that adequate corrective measures are undertaken. Appropriate informal and formal enforcement programs are available for use as needed.

THE OPERATIONAL SAFETY RECORD OF NUCLEAR REACTORS

In considering the extension of liability protection afforded by the Price-Anderson legislation, it is appropriate to review the safety experience accumulated in the operation of nuclear reactors and the present outlook.

In summary, the number of reactors built and operated has increased sharply since 1957, the greatly expanded operating experience has been accumulated with an outstanding record of safety, and belief in the extremely low likelihood of publicly hazardous accidents can be held with even greater confidence today than could be supported in 1957.

Reactors built and operated

As of June 1965 a total of 281 reactors has been constructed and operated in the United States.[1] Representing a wide variety of types and sizes, these reactors were built for many different functions, are located at diverse types of sites, and have been operated by widely dissimilar organizations.

In size, these reactors ranged from zero power level to some of several thousand megawatts thermal. Types included pressurized and boiling water, organic, gas cooled, sodium cooled, pressure tube, heavy water moderated, superheat and others. Their functions or purposes have included production (of fissile material), propulsion (of mobile vehicles, namely, martime vessels), power (i.e., electric), experimental, research, testing, and training.

Reactors have been located as far apart as the two poles, almost literally, and at many different places in between; in submarines, in surface ships, at remote military bases, at the isolated National Reactor Testing Station in Idaho, on college campuses, in an airplane, in cities, at remote sites in the country, in a satellite.

The 98-power, production, and propulsion reactors have been operated for a cumulative total of almost 500 reactor years. The remaining 183 experimental, test, research, and training reactors have attained a cumulative total of almost 1,000 operating years.

Thus, a cumulative total of almost 1,500 reactor years of operation has been logged by 281 reactors, collectively. The earliest power reactor, Shippingport, which began operation in 1957, has contributed 8-reactor years. Nautilus, the oldest nuclear-propelled vessel, has accumulated 11 reactor years of operation. The Oak Ridge Graphite Reactor, at the time of its shutdown in 1963, had a longer span in operational status than any other reactor, 20 years.

It is significant to the discussion below that this record includes the experience for all types of reactors operated under widely diverse conditions, for different purposes, and during those "early days" when each reactor operation was a venture into an unknown area, as well the experience in more recent days when reactor technology and practice have become more firmly established.

In considering this 1,500 reactor years of operating experience with these machines, which possess a well recognized potential for hazard to people, and with a large percentage of the effort devoted to pioneering exploration into a new technology, it is of crucial interest to inquire about abnormalities in operation, accidents occurring and the general safety record experienced. An outstandingly favorable response can be given to this inquiry, as discussed below. However, it would be contrary to all human experience to expect that all mishaps could be eliminated from the operation of nuclear reactors. As in any complex opera-

[1] Critical facilities, of which 83 cells have been constructed and operated, are not included in this total, though in some of them the loading goes above "critical," and neutron chain reaction does become self-sustaining. In some cases a facility is used both as a critical and as a reactor facility; its principal use determines the category. For example, the Godiva facility is listed as a critical facility, though at times it can be considered a reactor.

tion, it is not possible to do this. But, as the record of abnormalities in reactor operation is discussed, it should be kept in mind that the basic concept of protection of the public from the potential hazards arising from nuclear reactors is comprised of a twofold tandem approach:

1. There is a major, concerted and continuing effort to reduce to the lowest possible levels the likelihood of abnormalities and mishaps of all magnitudes.
2. There is a deliberate inclusion of protective safeguard systems with the intention that no hazard would occur to the public even if all sorts of imaginable mishaps should occur.

To the present, the latter objective has been fully accomplished. No reactor accident in the United States has caused injury or even interference with the normal activities of any member of the public.

Reactor incident experience

In any complex machinery it is inevitable that structural failures, instrument malfunctions, operator errors and other mishaps will occur, despite the most careful design and rigid schedules of maintenance and administrative control. Such has been the experience with reactor facilities, as with all others. At every reactor facility, a record of operating abnormalities accumulates over a period of time. A complete tabulation for all reactors, should one be compiled, would undoubtedly include thousands of such incidents. Most such abnormalities result in no harmful effects, no injury to people, no damage to the facility. However, in a typical facility some mishaps would lead to reactor shutdown and in a very small percentage of the events some minor damages might be involved. A few events have occurred which would merit an "accident" label.

The fact that many abnormalities have been experienced gives rise to considerable reassurance that the margins of safety surely must be large for this number of mishaps to have resulted in as few events, as noted below, and in no events of magnitude sufficient to have caused damage to the public.

Among the abnormal events in reactor systems are a few incipient failures which, had complete failure or conceivable extensions of the situations occurred, could have resulted in serious accidents—some perhaps more serious than any yet experienced. Even then, however, it is extremely unlikely that all safeguard barriers would have been breached or that any harm to the public would have resulted. As examples, in three reactors, two or three of the stud bolts on the head closure of the main pressure vessel or at crucial locations within the structural core supports were badly cracked or broken. In another reactor two main control rod shafts were found to be cracked from stress corrosion. In two reactors significant cracks were found in the piping of the main primary coolant system.

Some of the more serious events which have occurred in reactors resulted in substantial damage to the facility, exposure of personnel above part 20 limits or unintended major elevation in power (without damage to the facility or overexposure of people). These incidents, all of which have been previously described in published material when consequences of significance were involved, have in no instance caused hazard beyond the site boundaries. A review of reactor operating records reveals that some 25 such events have occurred in the 281 reactors built and operated in the United States.[2]

The only fatalities from abnormal events in reactor operation occurred in 1961, when the 3 operators of a small experimental reactor at NRTS were killed; 9 operators in 3 separate reactor incidents received exposures in the range from 2 to 20 r; and in 13 events substantial damage was done to the reactor fuel. Among the principal causes[3] of these 25 events are the following: blocked coolant flow channel, improper manipulation of control rods, instrument failures or inadequacy, interaction of experiments with reactor behavior, exploratory operation in known hazardous modes of reactor behavior, and erroneous calculation of rod startup patterns.

The large majority of these events have occurred in experimental, test, and flexible reactor facilities. Very few such events have occurred in large reactors designed for extended operation for power or other purposes.

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[2] Incidents of this type in critical facilities and in fuel processing systems are not included in this tabulation. Also events in radioisotope handling around a reactor, in fuel handling outside of reactors, and nonnuclear incidents in nonnuclear auxiliary systems are not included.

[3] In some cases more than one factor "caused" the accident. In these cases, what appears to be the principal cause is listed.

Consequences of accidents thus far have been much less severe than might have been expected from the accident conditions and circumstances.

Nothing approaching an abnormality of "maximum credible accident" magnitude has thus far occurred, except possibly for the experimental SL–1 reactor, which damage occurred in the range of what may have been estimated as the maximum credible accident for this small reactor.

Thus, the overall accident experience record must be considered extremely favorable. Only 25 accidents have occurred in 281 assorted reactors of all kinds, operated for a cumulative total of almost 1,500 reactor years. No member of the general public has received overexposure to radiation from reactor accidents. No accident has caused interference with normal activities of the general public.

Nevertheless, these damaging incidents have occurred, in some cases more extensive consequences could be visualized under somewhat different conditions, and there can be no firm assurance that more serious accidents will not occur. Further, it must be recognized that 1,500 total reactor years of operation, including 500 reactor years for central station power reactors, do not constitute a very extensive basis for predicting long-term expectancy of major (publicly hazardous) reactor accidents. No such accident has occurred; but no central station power reactor has operated longer than 8 years. The patterns of maintenance schedules and component failures for the latter portion of reactor life cycles have not yet evolved, and the full scope of reactor technology has not yet been fully unfolded.

On the whole, however, the cumulative record of reactor operations and safety experience gives increasing confidence that the probability of catastrophic accidents and the likelihood of substantial damages to public health and safety is extremely low, particularly for large, steadily operated power reactors.

Several additional factors also produce greatly increased confidence in the safety of nuclear powerplants, and support the belief that the probability of publicly hazardous accidents is indeed small.

PROGRESS IN REACTOR SAFETY RESEARCH

The extensive reactor research programs, which currently are being supported to the extent of many millions of dollars annually for efforts directly committed to exploration of reactor safety, have greatly expanded understanding of basic reactor characteristics and behavior. In many areas of reactor technology, our basic knowledge has been substantially increased during the last 8 years since operation of central station nuclear powerplants began:

1. Through power excursion experiments (SPERT, BORAX, etc.), knowledge of the dynamic behavior of reactors in reactivity transients has been increased.

2. The inherent coefficients and parameters which lead to automatic termination of reactivity excursions in water reactors with low enrichment oxide cores are much better understood.

3. Through observation of planned experiments and analysis of a few unplanned incidents, knowledge has been increased on factors affecting potential reactions between water and various metals commonly used in core construction.

4. Through extensive small-scale experiments, currently being expanded into experiments utilizing large scale equipment, knowledge has been increased on factors affecting potential fractional release of fission products from damaged reactor fuel.

5. Our understanding of radiation embrittlement of structural components of reactors has been extended somewhat and, more importantly, a massive, long-range program is beginning to yield a necessarily slow, but valuable accumulation of data on this phenomenon. Factors affecting radiation embrittlement and its reversibility are being systematically explored.

6. Energy releases in potential reactor accidents, the subsequent pressure and temperature transients, and design of structures to accommodate these have been explored. For example, engineering experiments on scale models have demonstrated that with properly designed containment buildings, "upper limit" energy releases even in fast reactors will not result in breach of the containment by ejection of top shield plug, or other potential missiles. In thermal reactors this is not considered to be a problem.

Much new knowledge about reactor behavior and reliability has also been gained in the successful design and operation of successive "generations" of reactors, particularly the water type, and by experimental variation of compo-

nents and operating modes in such reactors. Much credit must be given to manufacturers and owners for the contribution to basic understanding of reactors, and hence to reactor safety, which has emerged from this work:

1. The stability, controllability and predictability of behavior of certain types of reactors have been amply demonstrated.
2. The technology of controlling and predicting power distribution in reactors has been greatly advanced.
3. Knowledge of burned ratios, safe limits on heat fluxes and hence of factors affecting safety margins in thermal design has been clarified.
4. Technology for achieving efficiency in fuel loading and fuel cycles, made possible by predictability in reactor characteristics and behavior through flux flattening, power density control, burnable poisons, chemical shims, etc., has been greatly advanced with accompanying implications for safety of reactors.
5. The technology of fuel element fabrication, quality control, etc., leading to extended life expectancy, has also given greater confidence in safety.

These increases in the understanding of reactor technology have provided a more substantial basis for designing reactors with confidence in the predictability of their safety and performance. Given further extension of our unfolding knowledge about reactor behavior and the reliability of its components, the remaining problems arising from inadequate experience and uncompleted explorations will be resolved. For example, ways will be found to cope with our presently incomplete understanding of the radiation embrittlement problem, and with our inability to make periodic inspections of reactor internals for incipient failure.

THE DEVELOPMENT OF ENGINEERED SAFEGUARDS

When the Commission's guide on the selection of sites for power reactors was published in 1961, the principle was established that, if adequate and dependable engineering safeguards were included in the design of the reactor, there could be some reduction in distance requirements that otherwise would be necessary. A strong incentive was thereby placed before the reactor manufacturers and owners to develop improved safeguard systems in order to gain approval of less isolated reactor sites. Consequently, many new and fruitful ideas on reactor safeguard systems have been generated, and great strides have been made in improving the effectiveness and reliability of such systems.

In safeguards directed toward the prevention of reactor accidents, much general progress and some specific advancements have been made. For convenience, an "accident prevention safeguard" can be defined as any device or system intended to prevent some mishap—a breakdown of machinery, component failure or malfunction, operator error, etc.—from escalation into, say, a significant release of fission products from the reactor fuel. Examples of accident prevention safeguards are:

1. A system for rapid automatic rod insertion or reactor "scram" is provided to prevent an inadvertent reactivity insertion from causing a major power excursion and fuel meltdown.
2. An emergency cooling system is provided to prevent a failure of the primary coolant system from causing fuel overheating and meltdown.
3. A poison injection system, to assist in emergency shutdown.
4. Independent source(s) of main station power, in case the primary source of power should fail.
5. A high pressure core spray system to cool the fuel, to be used in case coolant recirculation lines are inoperative.

Substantial progress in the prevention of accidents has also been made through development of more definitive standards, codes, and specifications for the design and construction of reactor pressure vessels, the valves and piping of the primary system, and other vital reactor components.

Perhaps even more obvious advances have been made in safeguard systems directed toward minimizing the hazardous consequences of a major accident, should one occur. No substantial hazards to the public could arise from accidents in a reactor unless significant portions of its radioactivity inventory should escape into the environment. Therefore, in conformity with the definition of accidents given above, "consequences-limiting" safeguards would have as their central purpose the prevention of fission product release to the environment which might have accidently escaped from the fuel.

Among such safeguards are the following:

1. Improved sources of auxiliary power to keep essential equipment in operation in case of failure of normal and emergency power supplies.
2. Spray-washdown systems to quench steam, reduce air temperature, and wash down fission products in the containment in case of accidents.
3. Filter systems to collect fission products by internal recirculation of building atmosphere.
4. Containment buildings of high strength and low leakage. A number of improved new containment concepts have been evolved, such as:
   (*a*) Double-containment-with-pumpback, and extra shielding outside.
   (*b*) Dry well containment with vapor suppression.
   (*c*) Double vapor suppression.

Such safeguard systems are now being incorporated into the reactor facilities under construction today. They provide a basis for increased confidence in the level of protection against potential accidents in the operation of nuclear reactors. When such systems have been proven out by accumulated experience with responses to periodic tests, performance under simulated accident conditions, and revisions made in design as may be necessary to satisfy capability and testability requirements, an even firmer basis will have been laid for confidence in the ability of such systems to prevent hazards to the public from any foreseeable accidents. Very great strides have already been made toward this end.

In summary, a number of factors contribute to the basis for our confidence and belief that the probability for catastrophic accidents in nuclear reactors in the United States is extremely low—even lower than our estimate in 1957—of the "remote" probability of such an event.

APPENDIX 4

STATEMENT OF WILLIAM D. MANLY, CHAIRMAN, ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, JUNE 22, 1965; RELATED CORRESPONDENCE

STATUS OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

The Advisory Committee on Reactor Safeguards was last requested to appear before you at the time of your hearings in April 1962. A number of changes in membership of the Committee have occurred since then, as can be seen from the membership list that is attached as appendix A. One of our finest and most valued members, Dr. Charles Williams, passed away last year. Since 1962, Dr. John Howe, Dr. John Geyer, and Mr. Kenneth Osborn resigned from the committee because of the pressures of other duties. Dr. William Ergen and Dr. David Hall found themselves unable to accept reappointment at the ends of their terms. Dr. Franklin Gifford returned to the committee after a period of absence. The new members since April 1962 are Mr. William Manly, Dr. David Okrent, Mr. N. J. Palladino, Mr. Harold Etherington, Dr. Carroll Zabel, and Dr. Stephen Hanauer. Mr. Manly is currently chairman of the Committee, and Dr. Okrent is vice chairman. Mr. Manly is a well-known metallurgist, formerly of Oak Ridge, and at present director of technology of the Satellite Division of the Union Carbide Corp. Dr. Okrent is a member of the director's staff of the Argonne National Laboratory, where he pioneered in fast reactor physics. Mr. Palladino is a nuclear engineer, with a background in mechanical engineering; he is head of the department of nuclear engineering at the Pennsylvania State University, and is especially well known for early contributions to the naval reactors program. Mr. Etherington, who has now retired from his former position as general manager, Nuclear Division of Allis-Chalmers Manufacturing Co., has been contributing strongly to the field of nuclear energy since Manhattan project days. Dr. Zabel is a reactor and nuclear physicist who was formerly alternate division leader of the Reactor Development Division at Los Alamos; he is now on the staff of the University of Houston. Dr. Hanauer is a well-known specialist in nuclear instrumentation, formerly of the Oak Ridge National Laboratory and now professor of nuclear engineering at the University of Tennessee.

I have gone in some detail into the changes in membership because I want to show that the balance of the Committee has been retained in the essential ways, even though some individuals have been replaced. There is still a representation of the various disciplines upon which reactor safety is believed to

depend. The viewpoints of the research laboratories of the Commission, of the universities, and of industry continue to be present. It has been possible to profit simultaneously from the continuity provided by members of long standing, and the fresh approaches of new members.

A major strength of the committee continues to be in the independence of its members and its ability to attract the services of recognized authorities in the various aspects of reactor design and operation.

To bring you up to date on the state of the Committee and its workload, we have surveyed the actions taken in fiscal year 1965, about to end. The more important actions are given in appendix B and appendix C, which are, respectively, data on Committee and subcommittee meetings held and a list of the reports that the Committee issued, during the time in question. In addition to attending the 40 subcommittee meetings, ACRS members were present at 17 meetings held under sponsorship of the director of regulation. These meetings were called to explore with applicants various aspects of their proposals, to review features of the regulatory system, etc. There has been no marked change in the number of ACRS meetings, which is largely controlled by the number of new projects, and by important innovations associated with them. There has been an increasing workload in the ACRS technical staff, who abstract and summarize applicable information from the various operating reports, research and development reports, proposed plant changes, etc. This increase, which has required the addition of another technical member of the ACRS staff, reflects the growing number of reactors in operation.

NATURE OF ACRS REVIEW

The Committee now reviews proposals for construction, operation, and significant modification of all power, test, and research reactors with power levels above 10 megawatts. It also considers other specific matters on which the Commission asks for advice. In these reviews, assurance is sought that a defense in depth will exist that will cause the probability of any injury to the public to be negligible.

The defense in depth can be expressed in several ways. The committee believes that it must be convinced, first, that accidents potentially hazardous to the public have at most only a remote probability of occurring, and second, that their consequences if they did take place would not result in public injury.

The committee believes that the primary protection of the public must rest in a combination of sound engineering, reliable construction, and conservative operation. These must incorporate into the plant and its operation a variety of features to assure that no significant uncontrolled release of fission products can be expected. To this end, the committee looks for assurance of an extraordinarily high degree of reliability of controls, instrumentation, primary system components, such as pipes, valves, pumps, and the reactor vessel itself. The possible existence of peculiar damage mechanisms is looked for, and if any are found to have appreciable probability, they must be remedied.

It is recognized that regardless of the nature of the accident imagined, the public would be completely protected if all or most of the fission products of the reactor remained in the fuel, the fuel cladding, or in the primary system envelope. In a real sense, these are the primary physical barriers to injury to the public. The committee thus believes it necessary that emergency cooling devices be incorporated to maintain integrity of the fuel and its cladding under all circumstances when cooling might conceivably be lost. Many emergency control or "scram" circuits are also provided to prevent fuel failures from excessive power, power oscillations, etc.

So far, the nuclear reactor industry has had an enviable record. No nuclear reactor in this country has had an accident that even threatened to harm the public. This speaks well of the positive attitude toward safety that is now almost second nature to reactor designers and operators, and to the success of the regulatory review process. This excellent history is still too short, and, in fact, could never be long enough, to assure that the chance of accidents posing hazards will be absolutely zero. Therefore, because of the ultimate fallibility of men and mechanisms, another independent barrier to protect the public is required. It is necessary that there be consequence-limiting features of the reactor plant, that serve to reduce the effects to the public of even the worst accident considered credible, to a level where no detectable injury would ensue. These features of the plant are the so-called containment structure, and other related safeguards that

are incorporated to trap fission products or to reduce pressures that would cause execssive fission product leak rates subsequent to unlikely accidents.

The present mode of operation is still that described to you in testimony of earlier years. That is, at each major step of the licensing process an ACRS subcommittee reviews all documents and analyses in considerable detail, and meets with the applicant to discuss possible problem areas, ask questions that have arisen, etc. The subcommittee reports to the full committee its tentative views of the proposal, with a list of items it believes to warrant further attention by the committee. The committee also receives a report from the regulatory staff, which brings attention to new and novel features of the plant design. The application is then considered by the full committee at a meeting at which the applicant appears to present his proposal and to answer such questions as may remain outstanding. At this meeting, the committee reviews in depth the points on which the safety of the reactor seems to depend most. It then issues its reports to the Chairman of the Commission. I believe that this entire review process is remarkably thorough in depth and breadth, as the safety of the public demands that it be. Although the documents submitted by the applicants to support their proposals are very voluminous indeed, I doubt that many words in these documents are left unread by some member of the ACRS, and most are read by several.

As stated before, the committee believes that in recommending approval of a proposal, it must first have decided that an accident releasing significant radioactivity is very improbable, and second, that the public is protected from effects of an accident of even very large size. Feature that guard against the occurrence of conceivable accidents and that protect against the consequences of such accidents are regarded as equally necessary.

In considering if it can reach these conclusions, the committee considers only the technical features of the reactor system and the capability of the operating staff.

ENGINEERED SAFEGUARDS

The site guides published several years ago as 10 CFR 100 made allowance for incorporating engineered safeguards of the consequence-limiting kind into reactor plants. However, no example of the relief to be gained by adding such safeguards was given in this document, aside from that from containment buildings. It was left for experience and the maturing of engineering judgment to establish how reliable various kinds of safeguards could be expected to be.

At the request of the Commission, the committee has recently reviewed the use of various kinds of safeguards. A report of the conclusions was issued in November 1964. Examples of the findings are that properly designed pressure suppression systems and building spray systems are regarded as effective means of reducing containment building pressures after unlikely large accidents, and that certain benefits can be gained from the use of air-cleaning systems. On the other hand, certain containment or confinement systems are not considered adequate for populated areas, especially those that would only be useful if the accident imagined, first, produced a pulse of pressure, and fission products were evolved later. The report concluded, "* * * That the including of properly engineered safeguards in reactor plants can permit the reduction of distances required for protection of the public, and that engineered safeguards of selected type should make feasible the siting of power reactors of many locations not otherwise considered as suitable."

The views expressed in this report are those that had already been guiding the committee in consideration of individual proposals that had come before it. Evolution of these views continues as more is learned from experience and from relevant research. The committee believes that it must proceed cautiously in assigning credit for engineered safeguards.

An example of the need for caution is the recent British finding that in some cases the radioactive iodine released by melting of fuel reacts with the environment to produce organic compounds, that may not be removed easily by air-cleaning systems. This has justified the committee's reluctance to recognize very high efficiencies of iodine adsorption systems such as beds of activated charcoal.

The engineering of reactor safety has been a process of evolution. Much has been accomplished; more remains to be done. The larger power reactors now under construction or described in current license applications represent a large step in this process of evolution. However, considerable further improvements in safety are required before large power reactors may be located on sites close to population centers. None of the large power reactor facilities now under construction or described in current license applications is considered suitable for location in metropolitan areas. To put the matter in a different way, the devices and safeguards that prevent all accidents, large or small, must be made even more reliable than they are now, and the consequences-limiting safeguards must be made even more foolproof. The questions to be settled are complex ones whose resolution would depend on the nature and details of each proposal. It also appears that novel reactor systems and reactors that have considerably higher power levels than previous ones should not be operated in population centers.

I should like to comment briefly on the need for testing of the engineered safeguards as they are built into a nuclear plant. The committee believes that the designs of certain safeguard systems are adequately based on sound engineering principles supported by materials acceptance tests; others require developmental and proof testing. In any case, provisions for regular and careful testing are required where deterioration may be expected.

THE MAXIMUM CREDIBLE ACCIDENT

You have asked that we comment on how experience to date may have affected the hypothesis of the "maximum credible accident." As I have indicated earlier, this hypothesis recognizes that the best made machines can fail to perform as planned and the most capable people can err. In order to assure safety of the public in either case, the committee believes that nuclear plants must be capable of enduring even very severe accidents without injury to the public.

The maximum credible accident that has been classically assumed to be characteristic of water reactors is the result of an instantaneous double-ended break of the largest pipe in the primary system, with subsequent loss of cooling to the fuel and large-scale fuel melting. For other kinds of reactors, other kinds of accidents have been regarded as the "maximum credible." A point that has not been widely realized is that the "maximum credible" accident considered in any given case only represents a class of conceivable accidents of approximately the same severity. It is not particularly the sudden pipe rupture that is regarded as credible; it is the sudden loss of primary coolant. At this time, components such as bolted valve cover plates and pump casings are considered to be less reliable than are simple runs of pipe. As Admiral Rickover recently pointed out, even brackets and reinforcing of primary system components are depended on for primary coolant system integrity, and improper design or fabrication of these has been found in at least one case. It should be added that a nuclear excursion, though highly unlikely, could cause a rupture of the primary system through high pressure or impulsive forces.

A great deal has been learned about how to design nuclear reactors and their safeguards since the hypothesis of the maximum credible accident was first used. Two items should be mentioned especially. The proper design of control and safety instrumentation is now better understood. Better testing and surveillance programs are now used to avoid problems of defects in materials and components. The consensus of the committee is that the credibility of a large reactor accident with resultant damage to the public is no greater today than several years ago, and it is probably lower now.

To reach a point where these very large accidents are no longer considered credible and the defense-in-depth view no longer necessary, one would almost have to rule out the possibility of primary system failure altogether. This would be difficult. However, we would certainly be willing to review designs and hear arguments to this end.

50-891—65——17

APPENDIX A

MEMBERSHIP OF ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, JUNE 22, 1965

Chairman: Mr. W. D. Manly, Director of Technology, Stellite Division, Union Carbide Corp., New York, N.Y.
Vice Chairman: Dr. David Okrent, Physicist, Argonne National Laboratory, Argonne, Ill.
Mr. Harold Etherington, Consultant, Jupiter, Fla.
Dr. Franklin A. Gifford, Director, Atmospheric Turbulence & Diffusion Laboratory, U.S. Weather Bureau, Oak Ridge, Tenn.
Dr. Stephen H. Hanauer, Professor of Nuclear Engineering, University of Tennessee, Knoxville, Tenn.
Dr. Herbert J. C. Kouts, Reactor Physics Division, Brookhaven National Laboratory, Upton, Long Island, N.Y.
Dr. Henry W. Newson, Professor of Physics, Duke University, Durham, N.C.
Mr. Nunzio J. Palladino, Professor and Head, Department of Nuclear Engineering, the Pennsylvania State University, University Park, Pa.
Mr. Donald A. Rogers, Consultant, Morristown, N.J.
Dr. Leslie Silverman, Professor of Engineering in Environmental Hygiene and Director of Radiological Hygiene Program, Harvard University, Boston, Mass.
Mr. Reuel C. Stratton, Consulting Engineer, Hartford, Conn.
Dr. Theos J. Thompson, Professor of Nuclear Engineering and Director, MIT Nuclear Reactor, Massachusetts Institute of Technology, Cambridge, Mass.
Dr. Carroll W. Zabel, Associate Professor, Physics Department, University of Houston, Houston, Tex.

Staff members

Dr. Dick Duffey, Technical Secretary, Professor of Nuclear Engineering, University of Maryland, College Park, Md.
R. F. Fraley, Executive Secretary, U.S. Atomic Energy Commission, Washington, D.C.
R. H. Wilcox, Assistant to Executive Secretary, U.S. Atomic Energy Commission, Washington, D.C.
M. C. Gaske, Staff Assistant, U.S. Atomic Energy Commission, Washington, D.C.

APPENDIX B

LISTING OF ACRS COMMITTEE MEETINGS AND SUBCOMMITTEE MEETINGS DURING FISCAL YEAR 1965

Dr. H. J. Kouts—Chairman calendar year 1964
Mr. W. D. Manly—Chairman, calendar year 1965

I. ACRS committee meetings

Dates	*Location*
July 9–11, 1964	Brookhaven National Laboratory, Upton, Long Island, N.Y.
Aug. 24–26, 1964	Washington, D.C.
Oct. 7–10, 1964	Do.
Nov. 12–14, 1964	Do.
Dec. 10–12, 1964	Do.
Jan. 14–16, 1965	Do.
Feb. 6, 1965	Do.
Mar. 26–27, 1965	Do.
May 13–15, 1965	Do.
June 18–19, 1965	Do.

II. ACRS subcommittee meetings

Date	Project subject	Location
July 8, 1964	Western New York Nuclear Research Center	Upton, Long Island, N.Y.
Aug. 7, 1964	Oyster Creek Nuclear Power Plant, Unit No. 1	Washington, D.C.
Do	Engineered Safeguards	Do.
Aug. 10, 1964	Reactor Safety Research	Do.
Aug. 17, 1964	Savannah River Reactor	Do.
Sept. 24, 1964	Hanford N-Reactor	Do.
Sept. 25, 1964	Enrico Fermi Atomic Power Plant	Do.
Sept. 28, 1964	Seismic Design Criteria	Do.
Oct. 1, 1964	Peach Bottom Atomic Power Station	Do.
Oct. 23, 1964	Reactor Safety Research	Do.
Oct. 26, 1964	Savannah River Reactor	Do.
Oct. 28, 1964	Enrico Fermi Atomic Power Plant	Do.
Oct. 29, 1964	Shippingport Atomic Power Station	Shippingport, Pa
Nov. 6, 1964	Hanford Production Reactors	Washington, D.C.
Nov. 23, 1964	Naval Reactors	West Milton, N.Y
Dec. 4, 1964	ESADA-Vallecitos Experimental Superheat Reactor	Pleasanton, Calif.
Dec. 15, 1964	Molten Salt Reactor Experiment	Oak Ridge, Tenn.
Jan. 7, 1965	ANL Fast Reactor Test Facility	Washington, D.C.
Jan. 8, 1965	Savannah River Reactors	Do.
Jan. 14, 1965	Southwest Experimental Fast Oxide Reactor	Do.
Feb. 5, 1965	Elk River Reactor	Elk River, Minn.
Feb. 19, 1965	SEFOR	Fayetteville, Ark.
Mar. 4, 1965	do	Washington, D.C.
Mar. 5, 1965	Seismic Design Criteria	Do.
Mar. 19, 1965	ANL Fast Reactor Test Facility	Do.
Mar. 20, 1965	Reactor Siting	Do.
Apr. 22, 1965	Engineered Safeguards	Do.
Apr. 23–24, 1965	Reactor Pressure Vessels	Do.
May 4, 1965	Saxton Reactor	Do.
May 6, 1965	S5G Prototype Plant	NRTS, Idaho
May 7–8, 1965	Hanford Reactors	Richland, Wash.
May 11, 1965	BONUS Power Station	Washington, D.C.
May 12, 1965	Pathfinder Atomic Power Plant	Do.
May 26, 1965	Reactor Safety Research	Do.
June 1, 1965	Nuclear Fuels Services, Inc	Springville, N.Y.
June 5, 1965	Reactor Design and Operating Criteria	Washington, D.C.
June 16, 1965	ORNL High Flux Isotope Reactor	Do.
June 17, 1965	Experimental Beryllium Oxide Reactor	Do.
June 25, 1965*	Experimental Gas Cooled Reactor	Oak Ridge, Tenn.
June 29–30, 1965*	PRWRA Power Reactor and BONUS Reactor	San Juan/Ponci/Pt. Higuera, P.R.

*Scheduled.

APPENDIX C

LISTING OF ACRS REPORTS DURING FISCAL YEAR 1965

Specific projects

Project:	Date
Malibu Nuclear Power Plant, Unit No. 1	July 15, 1964
Hanford, Wahluke Slope	July 15, 1964
Radiation Effects Reactor	July 15, 1964
Brookhaven High Flux Beam Research Reactor	July 16, 1964
LOFT Facility	Aug. 28, 1964
Oyster Creek Nuclear Power Plant	Aug. 28, 1964
ESADA Vallecitos Experimental Superheat Reactor	Oct. 15, 1964
Hanford N-Reactor	Oct. 15, 1964
NASA Plum Brook Reactor Facility	Oct. 15, 1964
Nine Mile Point Nuclear Station	Oct. 15, 1964
Bodega Bay Atomic Park, Unit No. 1	Oct. 20, 1964
Carolinas Virgin Tub Reactor	Nov. 18, 1964
Enrico Fermi Atomic Power Plant	Nov. 18, 1964
Hanford N-Reactor	Nov. 18, 1964
Hanford K-Reactors	Nov. 18, 1964
Peach Bottom Atomic Power Station	Nov. 18, 1964
Savannah River, High Flux Demonstration	Nov. 18, 1964
S3G Prototype Reactor Plant	Dec. 16, 1964
Shippingport Pressurized Water Reactor	Dec. 16, 1964
Savannah River Reactor	Jan. 25, 1965
Malibu Nuclear Plant, Unit No. 1	Jan. 25, 1965
N.S. *Savannah*	Jan. 25, 1965
Elk River Reactor	Mar. 17, 1965
Humboldt Bay Power Plant, Unit No. 3	Mar. 17, 1965
Molten Salt Reactor Experiment	Mar. 17, 1965
N.S. *Savannah*	Mar. 17, 1965
S5G Prototype Reactor Plant	May 20, 1965
Hanford N-Reactor	May 20, 1965
Carolinas Virginia Tube Reactor	May 20, 1965
Pathfinder Atomic Power Plant	May 20, 1965
Southwest Experimental Fast Oxide Reactor	May 20, 1965
Consolidated Edison Indian Point Reactor	May 20, 1965
Miscellaneous:	
Engineered Safeguards	Nov. 18, 1964
Naval Operating Procedures	Dec. 16, 1964
Hazards of Production Reactors	Mar. 13, 1965
Seismic Design Considerations of Nuclear Reactor Plants	Mar. 31, 1965

(Additional correspondence on Mr. Manly's statement follows:)

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D.C., July 1, 1965.

Mr. WILLIAM D. MANLY,
Chairman, Advisory Committee on Reactor Safeguards,
U.S. Atomic Energy Commission,
Washington, D.C.

DEAR MR. MANLY: In connection with the Joint Committee's hearings last week on H.R. 8496 and S. 2042 to amend and extend the Price-Anderson legislation, the Advisory Committee on Reactor Safeguards submitted testimony dated June 22, 1965, which is being accepted for the hearing record. In connection with this testimony we would appreciate your response to the attached questions.

Your cooperation is appreciated.

Sincerely yours,

JOHN T. CONWAY, *Executive Director.*

QUESTIONS FOR ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

1. How does the ACRS deal with general problems which arise in areas where your membership may lack specific expertise (e.g., geology, seismology, etc.)?

2. On page 2 of your testimony, you state that the ARCS reviews proposals for "significant modification of all power, test, and research reactors above 10 megawatts."

(*a*) Who determines and how is it determined whether the modification is "significant?"

(*b*) Do you ever "second guess" the AEC's regulatory staff on this?

3. On page 4 you stress that you review "only the technical features of the reactor system and the capability of the operating staff."

What do you exclude, if anything, other than the financial qualifications of the applicant?

4. What is your view concerning the possibility of a "maximum conceivable accident?—a catastrophic accident—in a large power reactor? Does our 10 years of design and operating experience in any way affect the earlier assessments made at the time Price-Anderson indemnity legislation was enacted?

5. Do you foresee a need for a full-time ACRS as the number of applications for nuclear facilities substantially increases?

6. Are your safety reports to the AEC diluted to the lowest common demoninator among the dozen or so ACRS members? Do you encourage minority reports?

7. On page 5 of your statement you say that "considerable further improvements in safety are required before large power reactors may be located on sites close to population centers."

Can you give us some idea of the kind of safety improvements that are required?

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS,
U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., July 28, 1965.

Mr. JOHN T. CONWAY,
Executive Director,
Joint Committee on Atomic Energy,
Congress of the United States,

DEAR MR. CONWAY: In your letter of July 1, 1965, you asked several questions related to the written testimony that we provided at the Joint Committee's recent hearings on amending and extending the Price-Anderson legislation. The answers to these questions are supplied in the attachment to this letter.

If you have further questions, or wish additional information on the specific matters commented on herein, we should, of course, be pleased to be of assistance.

Sincerely yours,

W. D. MANLY, *Chairman.*

ACRS RESPONSE TO JCAE QUESTIONS

Question 1

How does the ACRS deal with special problems which arise in areas where your membership may lack specific expertise (e.g., geology, seismology, etc.)?

Answer. The range of interests and expertness of the ACRS membership is quite broad, and it is constant policy to assure that the fields of science and engineering on which safety of nuclear reactors generally depends are represented on the Committee. Of course, specific reactor proposals at times do present questions in areas where the Committee may need additional experience and background. In these cases, the Committee commonly uses consultants who are recognized as expert in the fields concerned. This has in fact been the practice where questions of seismology and protection against earthquakes have arisen. The Committee also receives the advice given to the Director of Regulation by his consultants. With reference to the specific field of geology cited in the question, it should be noted that the late Dr. Charles Williams, who was a member of this Committee, earned his graduate degree in this area.

Question 2

On page 2 of your testimony, you state that the ACRS reviews proposals for "significant modification of all power, test, and research reactors above 10 megawatts."

A. Who determines and how is it determined whether the modification is "significant"?

B. Do you ever "second guess' the AEC's regulatory staff on this?

Answer.—Licensees are required by Federal regulations (10 C.F.R. 50.59) to obtain AEC authorization for any "proposed change, test, or experiment (that) involves a change in the technical specifications or an unreviewed safety question." Copies of all such proposals are sent to the Committee by the AEC.

The working relationship between the ACRS and the AEC's regulatory staff is such that on these matters the ACRS reviews any question which either the Committee or the Director of Regulation considers to be significant enough to warrant ACRS review.

A portion of each ACRS meeting is set aside for discussion with the regulatory staff of changes, tests, or experiments which will require Commission action. At this time, the Committee sometimes expresses a wish to review proposals that the Director of Regulation had at first believed not to need full Committee attention. When this happens, additional information is developed and if necessary a full Committee review is made. This procedure is also used when warranted for unusual projects of less than 10 megawatts of power.

In the last analysis, the Committee itself makes its own judgment on which modifications it believes to be significant from the aspect of safety.

Question 3

On page 4 you stress that you review "only the technical features of the reactor system and the capability of the operating staff. What do you exclude, if anything, other than the financial qualifications of the applicants?

Answer.—The Committee excludes from consideration all matters that do not bear on the determination of safety. Examples of matters that are not considered are the financial or any similar need for the reactor, esthetic questions, public relations, and zoning and related land-use questions.

Question 4

What is your view concerning the possibility of a "maximum conceivable" accident—a catastrophic accident—in a large power reactor? Does our 10 years of design and operating experience in any way affect the earlier assessments made at the time Price-Anderson indemnity legislation was enacted?

Answer.—The maximum conceivable accident would be one involving catastrophic damage to the reactor, with release from the fuel and the primary system envelope of the maximum possible amount of fission products, and accompanied by the failure of safeguard systems such as containment to limit the consequences. In the case of a large power reactor, these consequences would be serious. The safety reviews conducted by the ACRS seek in part to establish if an accident with such effects is credible. If it were credible in any given case, the Committee would regard the reactor plant in question as unacceptable.

In the past 10 years, much has been learned about physical mechanisms that could in principle contribute toward reactor accidents, and the methods of design and construction that help to keep the probability of these accidents very small. Most often, this information has not justified relaxing the conservative attitudes that previously had been assumed where the knowledge was lacking or inadequate.

The probability of a "maximum conceivable accident" depends on two factors. These are the probability that a failure occurs that could lead to large consequences, and the probability that features of the plant intended to reduce any consequences to the public also fail. In the balance, the probability of initiation of a severe accident is not believed to be much different from the very low value it was thought to be 10 years ago. There has, however, been development of methods of reducing the consequences of these improbable severe accidents, to levels that would not be catastrophic. The developments lead the Committee to believe that the posibility of a catastrophic accident of the "maximum conceivable" variety is even less now.

Question 5

Do you foresee a need for a full-time ACRS as the number of applications for nuclear facilities substantially increases?

Answer.—This is a complex question, having various facets.

An increasing number of applications for nuclear facilities is expected in the coming years. However, power reactors are becoming more standardized in design, reducing the need for detailed information of some features.

Certainly, a full-time ACRS should be able to spend more time on each project than is possible under the present system. This procedure would not always be advantageous, however. The information and ideas that Committee members bring to the review of applications from their regular activities in and outside of the nuclear industry are invaluable to the ACRS function. Members of a part-time Committee are in a good position to remain technically sophisticated and current to their fields of specialization. Many persons highly qualified for membership on the Committee would not be available for a full-time ACRS. The ACRS believes, therefore, that a part-time ACRS can best serve the purposes for which the Committee was established.

Question 6

Are your safety reports to the AEC diluted to the lowest common denominator among the dozen or so ACRS members? Do you encourage minority reports?

Answer.—ACRS reports to the AEC are not diluted to the lowest common denominator among ACRS members. Where members believe strongly that the Committee position is too restrictive or not restrictive enough, they are free to dissent in a minority report. Beyond thorough discussion of the technical basis for the dissent, no attempt is made to discourage minority reports. However, no effort is made to encourage them either.

Question 7

On page 5 of your statement you say that "considerable further improvements in safety are required before large power reactors may be located on sites close to population centers." Can you give us some idea of the kind of safety improvements that are required?

Answer.—The Committee believes that placing large nuclear reactors closer to population centers will require further improvement in methods of design and construction, that would reduce even more the probability of accidents, large and small. In addition, consequences limiting safeguards must be made even more reliable than at present.

Where people are nearby, small accidents become more important. The design and construction should then be such as to reduce the probability of such conceivable malfunctions and to reduce the crediable consequences.

The Committee does not wish to discourage new applications for reactor construction, but only to point out that stricter conditions may be necessary for more urban sites. The Committee believes that these questions would be dealt with best by continuing the practice of reviewing individual reactor proposals.

APPENDIX 5

SPEECH BY CHAIRMAN HOLIFIELD BEFORE ATOMIC INDUSTRIAL FORUM–AMERICAN NUCLEAR SOCIETY CONFERENCE, NOVEMBER 30, 1964

A YEAR OF DECISION: THE STEP BEYOND COMPETITIVE NUCLEAR POWER

Introduction

Once again I welcome the opportunity to address a joint meeting of the Atomic Industrial Forum and the American Nuclear Society.

Four years have elapsed and significant events have occurred since our last meeting in 1960 here in San Francisco. The selection of San Francisco for this annual meeting twice within such a short period of time indicates, I believe, the excellent judgment of your two organizations and the fact that this fine city justly deserves its reputation for hospitality and greatness. This city has also shown its good judgment in electing as its Mayor my former colleague in the House, the Honorable John F. Shelley.

I am also pleased at the prospect of participating in tomorrow's panel as a cospeaker with my good friend, Dr. Glenn Seaborg—a distinguished educator, a world-renown scientists, a famous Californian, and the Chairman of the Atomic Energy Commission.

Notwithstanding recent criticism of the Commission-form, as compared with single-administrator guidance, I believe there is room for both types of administration in our Government.

In my view, Dr. Seaborg and his associates in the AEC are proving the value of the Commission-form of organization. The AEC has performed with distinction under his guidance in its three major areas of responsibility—in operating a huge research and development program; in administering a vast industrial enterprise and in carrying out its vital quasi-judicial function as regulator of a growing industry.

I was honored to be the principal speaker at your banquet in 1960 when I discussed "Nuclear Frontiers in the 1960's." I am pleased at the additional honor you have bestowed on me with this invitation to make the opening address of the 1964 annual joint conference.

As a charter member of the Joint Committee on Atomic Energy, I have been closely associated with your industry and with nuclear science for nearly 20 years. Many of you in this audience, during these two decades of revolutionary advances in knowledge, science, and technology, have been of great help to me. You have served me as advisers. You have helped me—a layman—to better understand some of the basic facts of the complex scientific world. To you I owe the debt which every student owes his many teachers—a debt that can be paid in only one way: by using the knowledge received for the betterment of one's fellow man; by adding to that knowledge through one's own experience and studies; and finally by passing on that knowledge to those who may follow.

Eighteen years ago when the Atomic Energy Commission and the Joint Committee were first established we had little experience to guide us. As I mentioned last year during a panel discussion at your joint meeting, "We * * * felt our way in the darkness; we * * * experimented * * * we created avenues to progress. * * *"

By 1954 when the McMahon Act was materially amended, our knowledge had increased significantly but we were still relatively ignorant.

There were people, a decade ago who were very unrealistic about the problems and difficulties involved in developing a viable nuclear power industry. There were those who asserted that industry alone could do the job and that Government assistance was unnecessary. I strongly believed then—as did the majority of the Joint Committee—that a cooperative venture between Government and industry was essential. And the events of the past decade have proven the accuracy of this judgment.

Today, one decade after the passage of the Atomic Energy Act of 1954, we can point with pride to our accomplishments. We have accumulated a storehouse of important knowledge, although we still have much to learn. We have demonstrated that atomic power is technically feasible and we are on the verge of proving that power from the atom is economically competitive.

In order to get some perspective on the magnitude of this achievement, we need only look back to a 1949 article by the then Chairman of the Atomic Energy Commission, Mr. Lilienthal, in Collier's magazine. He voiced this fond hope:

"Within 20 years, if we set our minds and hearts to it, we may get used to the idea of getting power and heat from within the atom. * * *"

We still have 5 years within which to fulfill Mr. Lilienthal's hope, but I submit that we have already accomplished the objective—we are already used to the idea of getting power and heat from the atom. We have converted Mr. Lilienthal's hope into reality.

I could go on talking about the past. I could recite the fact that we have 2½ million kilowatts of nuclear power in operation or under construction in the United States today, and that over 50 nuclear powered naval vessels—submarines and surface ships—sail the world's oceans guaranteeing the security of the free world. I could cite our great strides in the industrial and medical uses of isotopes and in the field of food irradiation.

It is comforting and reassuring to look back at past accomplishments. But this evening my subject is the future—not what we have already accomplished, but what remains to be done.

I will talk for the most part about our civilian nuclear power program and the critical decisions which must be made in that program within the coming year. But I will also discuss several other important areas which will require attention by the Joint Committee during the next session of Congress.

Recent developments in nuclear power

During the past year we have witnessed some remarkable developments in civilian nuclear power. Two electric utilities announced plans for large central station nuclear power plants which, their proponents claim, will require no direct Governmental assistance to make them economically competitive. Whether these plants fulfill their competitive promise remains to be demonstrated—we must see and evaluate them in operation.

However, the argument over whether nuclear power is competitive today is not really relevant to those who must plan for tomorrow. The plain fact is that we are so close to competitive nuclear power that the time has clearly arrived for a determination of what the next step will be. This is the task to which the Joint Committee will address itself next year.

Underlying my approach to this task are two fundamental tenets of belief about nuclear power:

First, as I have stated before, nuclear power will be competitive in the near future—a tremendous achievement in and of itself.

Second, I believe that a significant task remains ahead—we must perfect the means to use our nuclear fuel resources more efficiently.

The 1962 report to the President: A three-phase program for nuclear power

Two years ago the AEC completed an excellent, comprehensive report on a long-range nuclear power program for the United States. Two aspects of that report stand out in my mind. First, our requirement for electric energy appears to be doubling evey decade. Second, even with the most optimistic estimates of our fossil fuel reserves we must supplement our present energy resources if we are to maintain the growth of our complex industrial society.

The Atomic Energy Commission's report, as you know, concluded that nuclear power was essential to meet America's vital growing need for energy. The AEC's report called for a three-phased attack on the problem of supplementing our energy resources through the use of nuclear power.

We can say tonight that for all intents and purposes the first phase has been successfully completed. Nuclear power reactors can be safely and reliably operated and their economic feasibility will be proven. The AEC's report to the President recommended, as the next step, a program of Government assistance for the development of so-called advanced converter reactors.

It is clear that our ultimate objective is the high-gain breeder reactor—a reactor that will produce as much fuel as it needs for its own use and in addition, fuel for other reactors. It is equally clear that if we had the assurance of developing these reactors in the near future, there would be no need for the interim step of advanced converters.

The next step in nuclear power: Alternatives

However, as the AEC's report to the President points out there may be an extended period of time before we reach the true breeder. In the interim we must conserve our present low-cost nuclear fuels while still meeting the requirements of a rapidly expanding nuclear power market.

We have several alternatives. We could, of course, "put all our eggs in one basket" and plunge ahead into the development of the breeder reactor while leaving it to private industry to meet growing nuclear power demands. The danger is obvious. If there should be an extended delay due to technical difficulties in developing the breeder technology, we could find that all of our known domestic sources of economic uranium will be exhausted before the breeder objective is achieved.

Alternatively we could perhaps take the radical step of discouraging the growth of nuclear power until we have successfully developed the breeder. The peril here is that much of the scientific and engineering advancements that come from the design and construction and operation of nuclear plants will be lost.

Finally, we can continue the proven formula of cooperation between industry and Government and use it to take the next sequential step—the development of advanced converters. We can markedly increase the available nuclear fuel supply while profiting from the technical improvements that come from design-

ing and constructing new plants. And this entire program can be carried out as we move toward the ultimate objective of the breeder reactor.

Let me say that the final alternative appears to me to be the best approach and I hope and believe that my opinion will be shared by the administration and by my colleagues in the Congress.

The advanced converter program

As you know two advanced converter projects have been recently proposed. After meeting with the Joint Committee last September, the AEC announced that it intended to support the construction of a high-temperature, gas-cooled reactor and a seed-blanket reactor in the fiscal year 1966 construction program.

I strongly support the objectives of both of these projects. Each will require significant research and development but each holds great promise.

In the seed-blanket reactor we may be able to demonstrate breeding in a completely light water system—a technology in which we already have vast experience.

The high-temperature, gas-cooled concept may provide significantly improved economics in the nuclear fuel cycle.

And perhaps most importantly, both concepts could introduce a vast untapped resource—thorium—into the national energy picture.

The objectives of both projects are important and worthwhile—they merit careful and thoughtful consideration, as do alternative concepts aimed at similar objectives such as the spectral shift reactor and the sodium graphite reactor.

A factor of great importance in the consideration of these and other prototype reactor plant proposals will be the amount of non-Federal contribution to the capital cost of the project.

With these factors in mind I hope that both the seed-blanket and high-temperature gas-cooled projects will be submitted to the Congress early next year for evaluation. In an open forum where every enlightened interest can be represented, we will be able to analyze these projects in detail to verify whether they are, indeed, the next best step in the development of civilian nuclear power.

Water desalination

I also hope that in the next year we will see an accelerated program for the desalting of water for domestic and industrial uses. We note with approval the strong interest of President Johnson in this program. Nuclear power may be of special value here. The Commission has recommended the development of a natural uranium heavy water reactor as being particularly suitable for this purpose.

I believe it is extremely important that the Government support efforts leading to the economic production of fresh water and that we explore the possibility of using several competing nuclear reactor systems, as well as other energy sources for this purpose. No promising method of producing fresh water should be overlooked.

Highlights in a year of decision

Let me recap then the highlights of a year of decision as we take the next step in the nuclear power program:

First, our vision should be steadfastly directed toward our ultimate objective—the breeder reactor which holds the promise of a virtually inexhaustible source of energy.

Second, in the interim we must take steps necessary to extend both our energy resources and our technology while moving toward the breeder objective.

Third, we must vigorously explore the possibility of using the energy of the atom for the production of fresh water.

Our task in the year ahead will be to work out a sound program leading to the attainment of these goals. We will have to provide for the proper role of the Government and industry in these next important stages.

In order to arrive at good sound decisions which are in the public interest we will need an open and frank dialog within Government and between Government and industry. We need your help. We need your viewpoint. And we plan to invite representatives of the nuclear industry as well as others to present their views during our consideration of the program.

Other issues facing the Joint Committee

Let me turn to a few related—and perhaps unrelated—matters. In addition to the major policy decisions in the field of civilian nuclear power which will face the Joint Committee during the upcoming Congress, there are a number of other important matters which will affect you as citizens of the atomic energy community—and perhaps more importantly as citizens of the Nation and the world.

Price-Anderson

Of direct importance in connection with the atomic energy program will be the question of whether to extend the Price-Anderson Indemnity Act which expires in August 1967. It is clear that utilities and others planning future reactor construction must have assurances with respect to future liability coverage in order to plan soundly.

I think we would all agree that adequate liability insurance is essential in order to insure the construction of additional large-scale reactors. It is equally apparent that adequate private insurance will not be available within the near future. Some form of governmental indemnity will be required in order to cover the as yet uncertain risk which the private insurance market cannot at this time accept.

I submit, however, that as a result of our experience in nuclear power over the past decade, some change in Price-Anderson coverage is required. One of our purposes in writing the Price-Anderson Act of 1957 was to permit the insurance industry to obtain some experience in the nuclear power field with the objective in mind of eventually bringing nuclear power into the ordinary course of the insurance business and eliminating the Government's role.

It is clear that the private insurance market simply is not ready to provide full liability coverage for the nuclear industry today and that, in the public interest, governmental indemnity will still be required. However, based on the knowledge we have obtained since 1957 and our very fine safety record, the insurance industry should be capable of increasing its coverage with a corresponding reduction in the Government's responsibility.

I believe, for instance, that it should be possible for the insurance industry to increase the insurance coverage from $60 million to say $100 million. Accordingly, a bill will be introduced early in the next session of the Congress to extend the Price-Anderson indemnity provisions from 1967 to 1977 with the indemnity coverage being lowered in an amount equal to the increased private insurance capacity.

I believe that this is a sound step on the road toward normalizing the role of insurance in the nuclear power business. Ultimately, I would hope that we could completely dispense with the need for governmental indemnity and rely entirely upon the private insurance market.

Private ownership

A second matter of vital importance to the atomic energy community is the implementation of the private ownership legislation.

Last year's enactment of the private ownership legislation was a landmark for the atomic energy program. It was clear evidence of the fact that nuclear power had moved into a new, more mature stage.

We were keenly aware when we reported the legislation that it would have a profound effect on the legal and economic structure of the industry. Now, as we begin to implement the private ownership law, it becomes extremely important that industry and Government carefully examine each pioneering step.

The private ownership legislation was drafted with clear and firm guidelines for the Atomic Energy Commission. Yet we also allowed the Commission a large measure of discretion in implementing the new law. Congress wanted the Joint Committee to review the exercise of this discretion. It will be up to us to determine that the policies of the Congress receive full expression and that the needs of the industry are clearly recognized.

Very soon after the 89th Congress convenes, I expect that the Atomic Energy Commission will submit several important matters to the Joint Committee for review.

Among the first items to be sent to the Hill will be the guarantee purchase price for bred plutonium and U^{233}, and the period of the guarantee for the latter. We will want to review the basis for the Commission's determinations on these matters and their relationship to the nuclear fuel cycle.

The Commission will also submit its criteria for charges for uranium enrichment services and the terms and conditions under which these services will be offered. We intend to examine in detail the Commission's criteria for extending uranium enrichment services and their possible impact on the domestic and foreign nuclear power programs. We also intend to give careful consideration to any proposed policy on the importation of foreign uranium for toll enrichment.

Finally, the Committee will give careful consideration to the proposed standard contracts developed by the Commission for the sale of special nuclear material and for toll enrichment services.

These are just a few of the many important items which we will be looking at early in the next session of the Congress.

We all have a responsibility in helping to assure the success of the private ownership law. It is not perfect legislation—it was not chipped in marble—and we need the cooperation of people in Government and industry to assure that the legislation is properly implemented. We will be looking forward to your objective, informed comments when we consider the implementation of private ownership legislation next year.

International safeguards

Next I would like to touch on a matter which bridges your interest as citizens of the atomic energy community and citizens of the Nation and the world.

In recent months there has been growing concern over the possible diversion of fissionable material from peaceful to military purposes. One newspaper this month carried an editorial questioning our program of making fissionable material available to other nations for peaceful purposes. This editorial also questioned the effectiveness of the International Atomic Energy Agency and suggested that we set up a new agency to supervise the international use of fissionable material and to prevent its diversion to military purposes.

When President Eisenhower first announced the atoms for peace program in 1953, I called attention to the inherent danger involved unless adequate safeguards were incorporated to prevent the program from being used as a vehicle for obtaining nuclear bomb material. Since that time, I have repeatedly warned of the danger. I am glad that others not so closely associated with the atomic energy program are now becoming aware of the problem.

I submit, however, that the solution is not to create a new agency. Instead, we must do all within our power to strengthen the IAEA. That Agency already has a status in international law and the legal mechanism for implementing international safeguards.

The Joint Committee on Atomic Energy has, for the past decade continually advocated that fissionable material not be transferred to other nations without adequate safeguards, including the right of onsite inspection. We have urged the assignment of this responsibility to the International Atomic Energy Agency.

As tanigble evidence of our support for this position you may recall that the Joint Committee refused to support the construction of the Tarapur Reactor in India until the Indian Government agreed to IAEA inspection.

In the coming Congress we will continue to stress the importance of safeguards inspection through IAEA. It will continue to be our policy that as individual bilateral agreements come up for renewal, they include provisions for inspection by the International Agency. We intend to encourage provisions for inspection by the International Agency. We intend to encourage the executive branch to insist on a similar policy on the part of our allies who sell nuclear materials and equipment across international lines.

Finally let me say that this policy applies not only to individual bilaterals with other nations, but also to groups of nations to whom we furnish nuclear equipment and materials for civilian purposes. Here, also, we should insist on safeguards inspection in cooperation with IAEA.

Of course, we want to assure tha the International Agency has the technical capability to properly perform its inspection function. This will require that good, competent personnel are assigned as inspectors. For our own part, we much encourage competent Americans to work for the Agency. This is the policy of the administration and I hope that we can encourage technicians and other experienced personnel in our nuclear industry to seek employment with the International Agency to help it fulfill its important responsibilities to the world community.

By way of conclusion, gentlemen, I have tried to analyze the pertinent and most immediate challenges which face the Atomic Energy Commission, the Joint Committee on Atomic Energy, and the atomic industry. I trust the analysis will be accepted as a fair and reasonable appraisal of our problems and our opportunities. Let us continue to move forward together toward important accomplishments in the uses of the atom.

APPENDIX 6

EXTENSION OF THE PRICE-ANDERSON INDEMNIFICATION SYSTEM: REPORT OF THE PRICE-ANDERSON STUDY GROUP, ATOMIC INDUSTRIAL FORUM, MAY 1965

PRICE-ANDERSON STUDY GROUP

Chairman: Walter A. Hamilton, United Nuclear Corp.
Secretary: Gerald Charnoff, Atomic Industrial Forum, Inc.
Richard H. Butler, the Travelers Indemnity Co.
Louis E. Charnley, Jr., Reid & Priest.
Philip A. Crane, Jr., Pacific Gas & Electric Co.
Arthur Gehr, Isham, Lincoln & Beale Co.
Robert S. Gruhn, North American Aviation, Inc.
Townsend Gunn, Metals & Controls, Inc.
Kenneth C. Hall, General Electric Co.
E. F. Kurtz, Metals & Controls, Inc.
Beavis Longstreth, Debevoise, Plimpton, Lyons & Gates.
R. R. MacKay, Philadelphia Electric Co.
James H. Merritt, Liberty Mutual Insurance Co.
Albert M. Pitcher, Jr., Westinghouse Electric Co.
W. G. Robertson, Combustion Engineering, Inc.
Ashley St. Clair, American Mutual Alliance.
L. F. Senger, Aetna Casualty & Surety Co.
D. Roy Shoults, General Electric Co.
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DeRoy C. Thomas, Hartford Insurance Group.
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Michael S. Zarin, Port of New York Authority.

Within 3 years after enactment of the Atomic Energy Act of 1954—which was designed to encourage private participation in the development of commercial, peaceful uses of nuclear energy—the Congress found that the problem of possible liability in connection with the operation of reactors was "a major deterrent" to industrial participation in the program. In response to this finding and to provide a sound basis for compensating the public in the unlikely event of a substantial nuclear accident, Congress enacted the Price-Anderson Act of 1957—an amendment to the Atomic Energy Act of 1954.

The Price-Anderson Act directed the Atomic Energy Commission to require reactor licensees to maintain certain standards of financial responsibility to be evidenced by private insurance or other forms of security, and to execute indemnification agreements with the AEC. The level of financial responsibility to be maintained by the licensee—$60 million for each large reactor—and the supplemental governmental indemnification of $500 million provide up to $560 million to cover public liability claims resulting from any nuclear incident. The Price-Anderson Act also provides for an aggregate limitation of liability per nuclear incident which is coextensive with the sum of the required underlying financial responsibility and the governmental indemnification. The Congress recognized, however, that in the unlikely event of an incident causing damage in excess of this limitation the Government's obligation could be extended. It said that the $500 million indemnification "could be subject to upward revision by the

Congress in the event of any one particular incident in which, after further congressional study, the Congress felt more appropriations would be in order." [1] The act provides similar protection for activities carried out by AEC contractors without a requirement for underlying insurance.

To assure timely review, the Price-Anderson Act is limited to licensed and contractual activities under prior to August 2, 1967. Unless the act is extended, reactors and contractual activities authorized after August 1, 1967 will not be covered by the financial protection system established in the act.

The Price-Anderson Study Group was appointed by the board of directors of the Atomic Industrial Forum in 1963 and asked to review the Price-Anderson program. The study group has examined the desirability of an extension of the Price-Anderson program to nuclear facilities constructed after August 1, 1967 and the issues involved in such an extension. This report has been prepared by the study group for the board of directors and for distribution to all Forum member organizations.

I. RECOMMENDATIONS OF THE ATOMIC ENERGY COMMISSION

Earlier this month, the AEC submitted to the Joint Committee on Atomic Energy a definitive study of the Price-Anderson Act, the Commission's administration of that act, and the international aspects of nuclear liability and idemnity. In that study the AEC concluded that:

(1) The Price-Anderson Act should be extended for a second period of 10 years;

(2) There is no compelling and immediate need to amend the Price-Anderson Act other than to extend it for a period beyond August 1, 1967; and

(3) There are a number of related issues as to which further consideration by industry and Government appears to be desirable. These include (i) the appropriateness of a legislated standard of liability for incidents covered by the Price-Anderson Act, (ii) the adequacy of the applicable statutes of limitation, (iii) the desirability of an increase in the the available private nuclear energy liability insurance, and (iv) the adequacy of financial protection for common carriers and bridge, tunnel, and toll road authorities.

For the reasons set forth below, the study group is in general agreement with these conclusions.

II. EXTENSION BEYOND 1967

The experience accumulated since 1957 in the construction and operation of power reactors and the scientific, technical, and safety studies associated with such operation are convincing evidence that the operation of power reactors is consonant with the public health, safety, and welfare. In 1957, the AEC predicted that "the chances that major accidents might occur are exceedingly small." No onsite accident causing offsite damage or harm has occurred in the American power reactor program. Since 1957, additional research and experience have increased the understanding of the ways in which nuclear power plants can be constructed and operated so as to assure the full protection of the public. We believe that confidence in the safety of nuclear power reactors is shared by the nuclear industry and by the Government's nuclear safety experts.

Nevertheless, the study group agrees with the AEC that the Price-Anderson Act should be extended to activities understaken after August 1, 1967, for a number of reasons. Although there has been continuous improvement in nuclear safeguards, it is recognized that the "impossible" still might happen. This apprehension, no doubt, is stronger in the minds and emotions of the general public. To assuage this concern, which exists despite the unblemished experience of the American power reactor program, is not less in the public interest than is the development of the economic benefit which peaceful nuclear uses, and especially nuclear power, represent.

The Price-Anderson system has been an important factor in the increasing confidence needed for the growth of the nuclear industry which has occurred during the last 8 years. It is now expected that the installed nuclear capacity in the United States in 1980 will reach 60,000–90,000 electrical megawatts. The termination or substantial modification of the Price-Anderson Act could introduce a measure of uncertainty in the acceptance of nuclear power plants and in industry's confidence in its future.

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[1] H. Rept. 435, 85th Cong., 1st sess., p. 21.

Failure to extend the Price-Anderson Act might substantially affect the composition of the nuclear industry as well as its growth potential. The companies which have participated in the industry, even the large ones, might be apprehensive about persevering without the assurances provided in the Price-Anderson Act. Extension of the Price-Anderson program beyond August 1, 1967, could encourage broader business participation in the nuclear program.

The Government of the United States and American industry have cooperatively labored to develop adequate nuclear indemnification systems in other parts of the world. These efforts have resulted in national legislation in a number of foreign countries and three international conventions, which are likely to come into effect during the next year or two, covering land-based nuclear facilities. These legislative developments and conventions, when placed in effect, will provide important assistance to American manufacturers who do business abroad. The nonrenewal of the Price-Anderson Act would not only embarrass the governmental and private efforts in this area; it would be inconsistent with the interests of the United States in protecting its domestic manufacturers against unwarranted claims in foreign courts.

Another reason for extending the Price-Anderson Act arises out of the Commission's use of the Price-Anderson Act for its own contractor-operated activities. There is a need for continued public protection against risks of substantial nuclear incidents involved in the AEC contract programs. These programs, which also have been conducted with an excellent safety record, often involve advanced sceintific concepts with their attendant hazards. Any change in the ground rules for participation as a contractor or a subcontractor in the Commission's programs could have an unsettling effect on the participants. This could slow the AEC program and make it more difficult for the Commission to obtain the services of highly competent business organizations in the attainment of Government objectives. It would be anomalous, however, to extend the act only to cover contractor activities in view of the similarity of the activities that are undertaken by both AEC contractors and licensees.

For these reasons, the study group concurs in the AEC recommendation that the Price-Anderson Act should be extended for a second period of 10 years.

In arriving at this conclusion, we have also examined the following questions:

(*a*) Is the Price-Anderson Act an excessive subsidy to the nuclear industry?

(*b*) Should the limitation of liability be removed?

(*c*) Is it inconsistent to support the extension of the Price-Anderson Act and to seek to locate nuclear power plants in urban areas?

The subsidy question

The Price-Anderson program is a real subsidy in the sense that it has been of assistance to the growth of the industry. It is only a potential subsidy, however, since an outlay of public funds would be required only in the unlikely event of a nuclear incident causing damage exceeding the required amount of financial protection.

The private contribution to the system of protection of the public is by no means inconsiderable. The private insurers and their principal insureds—the electric utilities—assume the primary risk because the first $60 million of damage would be compensated by the private insurance maintained by the utilities. Nuclear power plants have, therefore, absorbed substantial nuclear liability costs. For example, each of the three reactor licensees who now maintain the maximum available insurance, i.e., $60 million, pay an average annual nuclear energy liability insurance premium of $211,500. Subject to anticipated adjustments (see p. 11), Price-Anderson covered licensees have paid a total of approximately $4,600,000 in premiums to NELIA and MAELU for nuclear energy liability insurance since the inception of the Price-Anderson Act through 1964 to provide for the required amount of financial protection.

The limitation of liability

The Price-Anderson Act establishes an aggregate limitation of liability for a nuclear incident equal to the sum of the required financial protection ($60 million in cases of large reactors) and the governmental indemnification of $500 million. As already noted, the Congress has recognized that this indemnification amount might have to be increased should a very large accident occur. The Congress clearly related the limitation of liability to the limitation on the Government's indemnification obligation, and deemed it prudent to avoid any open-ended ob-

ligation. Because of the very large, and probably more than adequate sum available from the combined insurance and indemnification, that Congress did all that was appropriate in determining that, if damages exceed that sum, more appropriations might be made, but only after further congressional study. The absence of claims involving the governmental indemnification of licensees supports the conclusion that there is no public policy reason for eliminating the present limitations on the Government's indemnity obligation and on the aggregate liability of the persons liable.

If the limitation of liability were removed, it might provide additional protection to the public to the extent of the assets of the corporation or individual held liable for the nuclear incident. Whether this would add any substantial protection to the injured public will depend in each case upon the identity of the person held liable. In the larger sense, however, the removal of this integral feature of the Price-Anderson system would not be consistent with the public interest in protecting the viability of American corporate organizations. Thus, if the Congress elects to remove the limitation of liability, it should also remove the limitation on the indemnification obligation.

Removal of the limitation of liability would also be an unfortunate precedent which might be adopted in foreign nuclear liability systems where the governmental indemnification obligations are not as large as that of the U.S. Government under the Price-Anderson Act. This could result in substantial exposure of American suppliers to claims in foreign courts.

Another consideration with regard to whether the limitation of liability should be removed is whether it should be removed for both contractor activities and licensee activities. For some time, there has been increasing advocacy in this country that the Government should be responsible for damages resulting from activities "ordered" by the Government.[2] It would surely be inconsistent with this development to expose Government contractors to claims in excess of the Government's indemnification commitments.

The inconsistency issue

Rapidly accumulating experience with, and confidence in, nuclear power plant operation, together with the important economic and logistic advantages, have encouraged some electric utilities and reactor manufacturers to consider locating such plants in or near urban areas. We have considered the contention that such plans are inconsistent with the extension of the Price-Anderson Act.

In our view, this proposition fails to take into account the prime purpose of the Price-Anderson Act—assurance of financial protection for the public in connection with undertakings held to be in the public interest.

The issue of whether it is now appropriate to locate nuclear power plants in or near populated areas should be decided on the basis of technical judgment, experience, and an evaluation of the public benefit to be derived from any such installation. Consideration of this issue should be separate and distinct from the issue of the desirability of some system of financial protection for the public. There is no inconsistency between locating nuclear plants in urban areas and having a system of financial protection which contributes to public reassurance and acceptance.

The constant and continuing effort to reduce the risk of a nuclear incident and the concomitant increase in confidence in the safety of nuclear plants, which will ultimately permit the installation of nuclear power plants in populated areas, in the final analysis, should lead to a reduction in the cost of insurance and indemnification but not necessarily to their elimination.

III. MODIFICATION OF THE PRICE-ANDERSON SYSTEM

The AEC report and the study group's independent inquiries have identified a number of issues which require additional consideration to determine whether they represent meaningful policy questions and whether there are possible legislative—either Federal or State—solutions to such issues. The discussion below reflects the current views of the study group on each of the major issues. It is apparent that it is not necessary to reach conclusions with regard to any of these questions prior to extension of the Price-Anderson Act. Indeed, if the act is not extended the discussion below will be of academic interest only:

1. *The adequacy of State tort law and the assurance of financial protection for the public under the Price-Anderson Act.*—In enacting the Price-Anderson Act,

[2] See Report on Contract Policies and Procedure for Research and Development by the Select Committee on Government Research of the House of Representatives, Dec. 30, 1964.

the Congress deliberately refrained from modifying or superseding the substantive law of torts which would apply to claims based upon nuclear incidents. The Price-Anderson Act interferes with State law only in that it establishes (i) a limitation of liability per nuclear incident (the sum of the required amount of financial protection and the Government's $500 million indemnification obligation) and (ii) a system of prorating the available funds if the damages exceed the limitation of liability.

The AEC report notes that some persons have suggested an amendment to the Atomic Energy Act of 1954 to provide that nuclear facility operators covered by Price-Anderson indemnification agreements shall be liable without proof of fault for personal injury or property damage caused by nuclear incidents. The AEC report identifies the arguments for and against this proposal, which involves the creation of a new Federal tort, and it outlines alternative schemes for achieving the same result. These arguments range from the familiar Federal versus State questions to the desirability of certainty that the operators will be held liable without proof of fault being established by the plaintiffs. According to the AEC report, "It is generally believed that in the event of a large scale nuclear incident absolute liability would be applied against the operator of a nuclear facility by the courts on one ground or another." Nevertheless, there is some concern that such a result might not be reached until after protracted and costly litigation.

The study group believes that the AEC report very usefully focuses public attention on this issue and the conflicting policy questions presented by it. This report and two studies—one by Professor Thomas J. O'Toole, of the Georgetown University Law Center, on the problems in processing radiation injury cases including the determination of causal relationships between radiation exposures and radiation induced diseases and a second by Professor Edward J. Bloustein, of the New York University School of Law, on the adequacy of the State statutes of limitations applicable to nuclear injury claims—which have been undertaken under the sponsorship of the AEC [3] should aid in evaluating whether the current tort laws in the several States provide adequate assurance that the public will receive prompt compensation for harm caused by a Price-Anderson covered nuclear incident. The Georgetown study is scheduled to be completed by the end of June 1965 and the NYU study should be completed during the summer. When these studies are completed, it is our recommendation that the Federal and State Government agencies in cooperation with the nuclear and insurance industries and the interested bar associations consider the extent, if any, to which the public protection afforded under the Price-Anderson Act might be frustrated by prevailing State tort laws. Based on such a review, remedial legislation on either the Federal or State level or on both levels may be appropriate.

2. *The amount of available nuclear energy liability insurance.*—Under the Price-Anderson Act, reactors with a capacity of 100,000 electrical kilowatts or more must maintain financial protection equal to the maximum amount of available private nuclear energy liability insurance. Although such financial protection may be in the form of "private insurance, private contractual indemnities, self-insurance, other proof of financial responsibility, or a combination of such measures," all current reactor licensees are maintaining the required amount of financial protection by purchasing nuclear energy liability insurance from the Nuclear Energy Liability Insurance Association (NELIA) and the Mutual Atomic Energy Liabilities Underwriters (MAELU). The two insurance pools have combined to make available up to $60 million per nuclear facility. The $60 million capacity is now being purchased by only three power reactor licensees, Commonwealth Edison Co. (Dresden); Consolidated Edison Co. (Indian Point); and Yankee Atomic Electric Co. (Yankee). Based on announced commitments, the following companies, beginning in the year indicated, will be required to maintain financial protection in the amount of $60 million:

(i) Connecticut Yankee Atomic Power Co---------- (1967)
(ii) Jersey Central Power & Light Co---------- (1967)
(iii) Niagara Mohawk Power Corp---------- (1967)
(iv) Southern California Edison Co.-San Diego Gas & Electric Co.---------- (1967)
(v) Los Angeles Department of Water Power---------- (1968)
(vi) Commonwealth Edison Co. (Dresden II)---------- (1969)

[3] The NYU study is being cosponsored by the AEC, the Council of State Governments, and the Committee on Atomic Energy of the Association of the Bar of the City of New York.

The nuclear energy liability insurance offered by NELIA and MAELU in the United States is subject to an industry credit rating plan under which approximately 70 percent of the premiums received are held in a reserve fund. This reserve fund is immediately available to pay claims. To the extent the reserve fund is not used to pay claims, ratable returns are to be made to policyholders each year after a waiting period of 10 years. The first returns are scheduled for 1967.

The AEC report declares that the Commission is seeking to determine whether the present $60 million capacity can be increased. In December 1964, Congressman Chet Holifield, addressing a joint meeting of the Atomic Industrial Forum and the American Nuclear Society, urged the insurance companies to seek increases in this capacity.

The study group understands that the insurance pools expect to increase their combined capacity to $70–$75 million as of January 1, 1966. This increase in insurance capacity for the short term will increase the very high concentration of risk which is still based on a small number of policies and hence on a relatively low-premium volume. However, over the longer run, if the prospects for nuclear power are realized, this imbalance of risk versus premium volume should be gradually eliminated. It should be noted, however, that some doubt has been expressed by some members of the study group about the need or necessity for any such increase.

3. *Protection against nuclear incidents in the course of transportation of nuclear materials.*—The study group has followed closely the nuclear liability and indemnity issues involved in the transportation of radioactive materials. These issues are summarized in the AEC report. They have been discussed at hearings before the Joint Committee and at meetings with the AEC. They have also been given attention in the course of negotiations involving the transportation of spent fuel to the Nuclear Fuel Services Inc.'s chemical reprocessing plant in upstate New York.

The problems identified by the bridge, tunnel, port, and toll road authorities and certain eastern railroads appear to stem from the nuclear exclusion clauses now included in all conventional liability and fire and property insurance forms. The exclusion clauses were designed by the insurance industry to channel virtually all nuclear exposures to the insurance policies offered by NELIA and MAELU and the nuclear energy property insurance pools, NEPIA and MAERP. The insurers' intention is to limit their total nuclear obligations to the aggregate capacities of the pools.

As the AEC report observes, the insurance industry acting through the pools has responded affirmatively to the objections raised by the transportation agencies. The pools have made available to the agencies certain modified forms of coverage and policy interpretations which have resolved, in part, the agencies' problems. In addition, the Commission's interpretations of the Price-Anderson Act concerning the coverage of liability under the Federal Employer's Liability Act and the scope of the "onsite" exclusion when applied to incidents in the course of transportation as well as the AEC offer to certify Price-Anderson covered shipments should considerably alleviate the transport problems.

Nevertheless, the transportation agencies are not satisfied that their exposure to claims for "public liability" and to possibly uninsured damage to their own facilities with consequent loss of revenues is covered by the Price-Anderson system. The details of their concern are set forth in the AEC report in appendix I, annexes N and O. Some of these problems can undoubtedly be resolved in private negotiations between shippers and carriers, e.g., the issue of liability for loss of or damage to the nuclear material, and others perhaps, can be resolved by modification of the policy provisions, e.g., the 2-year cancellation provisions. If there are remaining problems perhaps legislation will be required. This is not certain nor apparent at the current time. In the final analysis, the policy question, posed by the "problems" cited by the transportation agencies, is whether, because of their service to the nuclear industry, they should be granted specific legislative protection as distinguished from the financial assurances now provided other members of the public under the Price-Anderson Act. This issue deserves very deliberate consideration. The study group believes that a serious and intensive effort by shippers, carriers and other transport agencies, and insurers with the encouragement of the AEC should resolve the basic transportation insurance problems.

CONCLUSION

Consideration and enactment of legislation extending the Price-Anderson Act during the current session of Congress is timely and desirable. Electric utilities are already considering the installation of powerplants in the period following August 1, 1967. Extension this year will eliminate any uncertainties with regard to the applicability of the Price-Anderson Act during that period. It will assure the public that it will continue to be protected, it will strongly encourage private companies to design, build, and operate nuclear powerplants, and it will demonstrate that the Congress continues to encourage the development of nuclear energy for peaceful purposes.

APPENDIX 7

APPENDIXES TO STATEMENT BY ADOLPH J. ACKERMAN ON EXTENSION OF THE PRICE-ANDERSON ACT—June 22–24, 1965

APPENDIX A

Paper for the Hydroelectric Power Session, American Power Conference, Wednesday, April 28, 1965, 2 p.m., Crystal Room, Sherman House, Chicago, Ill.

ATOMIC POWERPLANTS—WHAT'S WRONG WITH THEM?

Atomic and Hydroelectric Power Engineering in Perspective and a Review of Some Fallacies in Atomic Power

(Adolph J. Ackerman, Consulting Engineer, Madison, Wis.)

What qualifies a consulting engineer with a background in the hydroelectric field to undertake an analysis of the atomic power program? This is a valid question calling for a brief review of the experiences, disciplines, and responsibilities in hydroelectric engineering, as presented in appendix A.

ATOMIC POWER IN RELATION TO THE U.S. POWER INDUSTRY

In the United States there are at present only 11 public utility atomic power plants in operation with capacities exceeding 20 electric megawatts. As a matter of fact, there are only 3 power reactors with capacities exceeding 80 mw, and none of these exceed 200 mw.

Atomic power plant	*Capacity*[1] *net electric megawatts*
1. Dresden	200
2. Yankee Atomic	175
3. Indian Point (excluding 85-mw oil-fired superheat)	170
4. Hallam	75
5. Big Rock Point	72
6. Shippingport	60
7. Pathfinder	62
8. Humboldt Bay	50
9. Elk River	20
10. Peach Bottom	40
Total	924

[1] This list does not include the Enrico Fermi plant because it has a permit to operate only for test purposes up to 1 thermal mw (equivalent to 0.3 mw).

The total capacity of these 10 plants amounts to less than 1,000 mw. If we were to include smaller reactors (less than 20 mw) the total would come to about 1,000 mw. Atomic power plants thus provide less than ½ percent of the U.S. total installed electric capacity of about 230,000 mw (fig. 1).

Last year (1964), electric energy production from atomic power amounted to about 3.7 billion kw.-hr., or less than ½ percent of the total U.S. production of 974 billion kw.-hr. (fig. 2).

Reliability of atomic powerplants

The electric power industry has achieved its notable record of service because it has always maintained the principle that power generating units must be available on demand. Under this principle the first hydroelectric projects, built prior to the advent of interconnected systems, were developed with a generating capacity corresponding only to the firm or constantly available streamflow. Among power engineers this needs no amplification.

To assess the reliability of atomic power, the records of six plants have been reviewed. Information has been assembled from technical papers, trade journals, the press, and official Government publications. These records speak for themselves regarding the lack of reliability in reactors at this embryonic stage of the art.

SUMMARY OF ADVERSE EXPERIENCES IN VARIOUS PLANTS

Dresden Atomic Power Plant.—A 200 electric mw boiling-water reactor, owned by Commonwealth Edison Co. and located 50 miles southwest of Chicago. The following diary summarizes the more important operating difficulties:

1954: Commonwealth Edison and seven other companies started the project.

October 1959: Reactor went critical.

October 1960: Connected to the transmission network for commercial service.

November 15, 1960: Shutdown. Cracking of eight stainless steel control rod drives found due to stress corrosion.

June 1, 1961: Reactor back on line after 6½ months shutdown.

October 2, 1961: Shutdown for inspection, as required by AEC.

December 6, 1961: Reactor back on line after 2 months shutdown.

January 1 to October 31, 1962: Brief period of good capacity factor operation with nine outages totaling 556 hours (23 days).

November 7, 1962: Shutdown for partial refueling, inspection, and plant modifications.

March 9, 1963: Operation resumed after 4 months shutdown.

April 1963: Shutdown for 1 to 2 weeks.

December 1963: Capacity factor for 1963—54 percent.

April 12, 1964: Shutdown for refueling and testing.

June 9, 1964: Operation resumed after 2 months shutdown.

November 22, 1964: The board chairman of Commonwealth Edison Co. surprisingly stated: "Dresden is more reliable than any other machine we have." The press reported that Dresden has a shutdown time of about 5 weeks per year for refueling compared with an average 3-week shutdown for coal-fired generating units (Chicago Tribune).

Yankee Atomic Power Plant.—A 175 electric mw pressurized-water reactor, constructed at Rowe, Mass., by the Yankee Atomic Electric Co.

March 1955: Yankee submitted proposal to AEC.

November 1957: Construction permit granted.

August 1960: Reactor went critical.

July 1961: Plant connected to transmission network for commercial service.

January 15 to May 18, 1962: Stretchout operation, with plant capacity decreasing from 152 mw to 80 mw.

May 19, 1962: Shutdown for refueling. Later the plant superintendent wrote: "In refueling, we scrapped about $750,000 of core parts, damaged the plant considerably with silver contamination and accumulated 2 months of downtime that should not have been. Some 30 extra outside people were employed over our own staff and these people were partly necessary to share the radiation workload caused by radioactive silver."

June 11, 1962: Full page newspaper ads by reactor manufacturer announced that Yankee plant had won the "coveted Edison Award."

September 21, 1962: Plant back on line, after 4 months shutdown.

January to March, 1963: Tests were run with boric acid injection and ammonia, but "There does not seem to be a simple and consistent conclusion to the reactivity gains and losses experienced.* * * We found the control rod picture gloomy * * * no sure-fire no-problem choice."

May 16 to September 2, 1963: Stretchout operation, with capacity gradually decreasing by 44 percent from 170 to 95 megawatts.

September 2, 1963: Shut down for second refueling. New set of 22 control rods installed; necessary modifications made.

November 15, 1963: Operation resumed after 2½ months' shutdown.

April to August 1964: Stretchout period with capacity falling 46 percent from 185 to 100 megawatts.

August 2, 1964: Shut down for refueling.

September 6, 1964: Reactor back on line after 5-week shutdown.

September 1964: Paper at Geneva (Third U.N. Conference) referred to the "high degree of reliability" exhibited by Yankee reactor.

At the end of 1963 a brochure, "The Yankee Story," described various awards from the Edison Electric Institute, the AEC, the International Film Festival, and the ASCE. "In addition to these major awards, the Yankee project has been the recipient of national publicity, has been cited on the floors of the U.S. House of Representatives and Senate, and by a number of State and Federal commissions and officials." (There was no mention of the adverse experiences.)

Indian Point atomic powerplant.—A 255 electric megawatts plant constructed 35 miles north of Times Square, New York, by the Consolidated Edison Co. About two-thirds of the capacity is provided by the reactor, the balance by oil-fired superheaters.

March 26, 1962: Provisional operating license granted by AEC.

March to May 1962: Fuel loading delayed for on-site mechanical modifications.

August 2, 1962: Initial criticality.

November to December 1962: Outage of 6 weeks to correct piping deficiencies limiting power output to 50 percent of design value.

April 1963: Plant on line, after 8 months of test operation.

June 1963: Outage of 2 weeks for modifications.

August to September 1963: Outage of 6 weeks "for work inside the containment vessel to which access is not permitted while the reactor is critical."

October 1963: Outage of 5 weeks for work inside containment vessel.

November 1963: Outage of 2 weeks to repair steam line.

January 30, 1964: Shut down for inspection of fuel elements and installing new stainless steel liner in concrete canal.

June 25, 1964: Operation resumed after 5 months' shutdown.

Mid-August 1964: Resumed full power (off full power for total of 6½ months).

September 25, 1964: Shut down to correct leaks in boiler tubes and in primary coolant pump. Outage of 7 weeks expected.

Hallam atomic powerplant.—An AEC-owned 75-electric-megawatt sodium graphite reactor operated by the Consumers Public Power District (CPPD) of Nebraska. By agreement, the turbine was to begin power operating in April 1960 on a conventional steam boiler, and at the end 1961 on the reactor.

September 1957: AEC and CPPD reached agreement; AEC to pay $50 million of $66 million estimated total cost.

April 1961: Conventional portion of plant began operation (1 year behind schedule).

January 19, 1962: Reactor went critical.

February 1963: Reactor shut down for 1 month.

Mid-March 1963: Shut down for checks and equipment modifications.

End May 1963: Operation resumed after 2½ months' outage. Atomic power now being supplied to transmission lines (1½ years behind schedule).

Early June 1963: Shut down for about 1 month for repairs.

July 16, 1963: Full power attained—77 electric megawatts.

Early August 1963: Shut down for 2 months for work on control rod thimbles and fuel elements.

Mid-October 1963: Shut down for 1½ weeks for repairs.

Mid-February 1964: Shut down for 1 week for testing.

End April 1964: Shut down for 1 week of repairs.

May 18, 1964: Shutdown for testing, repair, and modifications.

August 1964: Back on power after 3 months outage.

September 27, 1964: Reactor shutdown for an expected 4–5 months for repairs. Three moderator elements had failed in September and five earlier in the year.

Fall 1964: AEC turned down proposal to build a new sodium graphite reactor as part of the advanced converter program.

Elk River Atomic Powerplant.—A 22 electric mw. boiling-water reactor constructed near Elk River, Minn., by the AEC and operated by the Rural Cooperative Power Association (RCPA).

September 1957: AEC received proposal for research, development, and reactor construction. Schedule called for operation by June 1959.

March 1958: The President OF RCPA announced breakdown of negotiations with reactor manufacturer and discussions with a second manufacturer. Also ordering of a coal-burning boiler to produce power until the reactor was ready.

June 1958: Construction started.

December 1960: Criticality delayed by difficulties in core fabrication and cracks in reactor vessel nozzles. (Pittman of AEC later testified: "The objective was to try to build a cheap commercial type reactor. * * * I think one of the things we have found is that standard commercial techniques probably aren't adequate for reactors.")

June 1961: Construction phase completed. Subsequently cladding defects discovered in reactor pressure vessel led to a lengthy investigation program, causing delay from June 1961 to April 1962.

April 1962: Problems with water and steam flow prevented attainment of full power. Investigations and modifications caused additional delay.

November 1962: Initial criticality.

January 1963: Initial nuclear testing program completed. Changes were made in the steam separating components above the core.

April 1963: Charles A. Robinson, staff engineer and staff counsel, National Rural Electric Cooperative Association, testified before the Congressional Joint Committee on Atomic Energy (JCAE): "The Elk River * * * reactor was due to begin operation in the spring of 1961. It has been barely critical for a short time, and is now shut down. It now looks as though it will not be started up until this summer, perhaps August 1963. It was delayed so long that a conventional boiler had to be acquired and put into use.

"We feel, Mr. Chairman, that this means that nuclear generation can only be used to the extent that immediately available reserve capacity is available. * * *"

May 31, 1963: Power testing program began.

August 24, 1963: The first reactor-produced steam was used to generate electricity.

October–December 1963: Shutdown for 3 months to evaluate reactor problems, including radioactivity in stack gases, surges in piping system, and heat flux irregularities.

April to June 1964: Shutdown for 3 months.

November 1964: Shutdown for 1 month for inspection of control rods.

November 1964: RCPA testified at JCAE hearings that it was "planning to install a 150-megawatt thermal unit jointly with Northern Minnesota Power Association. * * * With the low cost lignite fuel. * * * energy will be available to RCPA for less than half the cost of energy produced by the Elk River No. 3 unit." RCPA claimed its excess costs due to its contract with AEC on the reactor would amount to $607,000 and claimed compensation from the AEC.

Enrico Fermi atomic powerplant.—A fast-neutron sodium-cooled breeder reactor constructed at Lagoona Beach, about 30 miles east of Detroit, by the Power Reactor Development Co. (PRDC) to explore breeder technology. Of the six powerplants here reviewed, this is the only one not producing commercial electricity. However, it is included because of the great promises claimed for breeder reactors. (Only selected events are summarized here.)

March 1955: Detroit Edison and associates proposed that it design, build, and operate an experimental, fast-neutron breeder reactor, capacity 150 electric mw., construction to require 2 years with production of steam in 5 years.

August 1955: AEC accepted proposal of new company, PRDC, to build reactor. Detroit Edison was to build a 150-mw. turbine generator plant and buy steam from PRDC.

August 1956: AEC issued provisional construction permit. Major construction began, with completion date set for December 15, 1959.

January 1957: Litigation against PRDC regarding public hazard was started and lasted 4½ years.

December 1960: Detroit Edison reported that atomic powerplant was "nearing completion." The 150-mw. steam turbine generator had been operated and synchronized using two temporary boilers.

June 1961: PRDC reported that the graphite shielding around the reactor vessel had failed in a high temperature test. "Installation of the replacement shield material is most difficult and time consuming."

July 1961: Tests and inspection of 1 (of 3) steam generator revealed 49 leaking tubes with stress corrosion cracks, and 71 tubes cracked.

October 1961: Malfunction of handling mechanisms damaged parts in reactor vessel. All repair operations were first simulated in a mockup assembly. Repairs required 2,000 man-hours of work in bulky protective suits within an argon atmosphere "under extremely trying conditions."

Summer 1962: Almost all of the graphite shielding in the primary shield tank was replaced, at a labor and material cost of $2,500,000.

December 1962: A leak in a tube in No. 1 steam generator caused a sodium-water reaction. Safety devices prevented a serious accident. Inspection revealed vibration as the cause of the damage. Tube bundle was replaced by unit of new design.

May 10, 1962: AEC issued an operating license authorizing operation of plant up to power level of 1 thermal mw. (about 0.3 electric mw.).

July 12, 1962: Start of fuel loading.

August 23, 1962: Reactor went critical.

End 1963: Fuel capability rated down to 30 electric mw., 35-percent load factor (8 hours/day) until May 1968. This will allow an improved core to be designed and fabricated before reactor runs out of fuel.

April 1964: Detroit Edison announced it would install a 150-mw. oil-fired steam boiler by the spring of 1966 "to help out when the reactor is being used for research." (The turbine generator had been ready since December 1960.)

End 1964: Physics tests, at less than 1 thermal mw., were continued (more than 8 years after beginning of construction).

1962 hearings: Admiral Rickover testified: "None of the reactors now being considered as having a major role in the atomic power program for the next 10 years or more are breeders. * * * I believe * * * a breeder—even if practical—is a very long way off."

Litigation over Enrico Fermi plant's safety

Locating this large first-of-a-kind reactor in a populous area led to a challenge in the courts on the question of public safety. In August 1956, after the AEC had issued a provisional construction permit despite an adverse report by the AEC Advisory Committee on Reactor Safeguards (ACRS), labor unions intervened and protested this permit, claiming that the Enrico Fermi powerplant would imperil, life, health, and property. After hearings and a "final decision" reaffirming the permit, by the AEC, then a reversal in the U.S. Court of Appeals, the case was appealed to the U.S. Supreme Court in November 1960. In June 1961, the Court handed down a decision stating that construction of the plant could not harm the public. The question of operating safety was deferred by the Court and left open for a future challenge.

Revisions in cost and capacity of Enrico Fermi

The downward revisions in reactor capacity and the increases in the cost of the Enrico Fermi reactor and associated equipment[1] have been reported as follows:

Date of announcement	Estimated reactor costs including R. & D.[1]	Estimated effective plant capacity (electric)
1957	$45,000,000	150 mw.
End 1960	67,000,000	100 mw.
End 1961	77,000,000	Do.
End 1962	80,000,000	65.9 mw.
End 1963	86,000,000	30 mw. (until 1968).

[1] Not including an estimated $4.5 million in AEC research assistance plus $5 million in waiver of AEC fuel charges.

[1] Including steam generating facilities, but excluding the turbine generator and associated equipment owned by Detroit Edison, estimated at $17 million.

Costs and performance data of atomic power plants

Costs reported to date and performance data for the eight producing central station atomic power plants (excluding the experimental Shippingport plant) are tabulated below:

Plant	Capacity 1964 gross electric mega-watts	Original cost estimate	Actual cost	AEC direct contri-bution	Capacity factors				
					1960	1961	1962	1963	1964
		Million dollars	*Million dollars*	*Million dollars*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Dresden	210	45	45		22	33	73	54	56
Yankee	185	40	50	9	25	76	55	69	78
Indian Point	275	55	134				28	38	26
Big Rock Point	75	34	37	6				35	36
Hallam	81.8	67	84	63				20	15
Humboldt Bay	52	20	26					78	77
Elk River	22	13	18	16				1	31
Enrico Fermi	*65.9	62	109	8					

*Test operating at 1 th mw in 1964.

Summary of adverse experiences

The preceding chronologies of adverse experiences help to explain the reasons for some of the astounding increases in project costs and the low capacity factors. By comparison, it should be noted that the total forced and scheduled outage rate is about 2½ percent for hydro units and about 10 percent for fossil-fueled units.

In presenting this information, it is not intended to infer that the plant designers are incompetent. On the contrary, it is acknowledged that difficulties are to be expected in the development of any new technology, that the special difficulties in this field are formidable, and that mistakes are part of the road to knowledge. These histories are presented simply to show that, at the present embryonic stage of development, an atomic power plant does not measure up to the reliability demanded for public utility service. The records demonstrate delays caused by safety problems, by manufacturing, assembly, and construction problems, by unforeseen operational failures, and by complicated and costly repair jobs. Finally, uncertainties in plant performance and overruns in cost estimates indicate the absurdity of attempting to predict nuclear power costs with any degree of reliability.[2]

ECONOMICS: MISLEADING CLAIMS OF COMPETITIVENESS

In 1958 the AEC defined the objectives of its civilian power program. One of these was to "reduce the cost of nuclear power to levels competitive with fossil fuels in high energy cost areas of this country within 10 years." In 1962 the Commission apparently acknowledged the inconsistency in defining subsidized atomic power as "competitive," and restated its objective: "* * * to make it possible by 1968 for utility owners in high energy cost areas to elect, on the basis of economic considerations, to build large nuclear plants rather than conventional plants."

To induce utilities to "elect * * * to build large nuclear plants" the AEC has offered a variety of direct and indirect subsidies. Direct subsidies include:

1. Direct contributions to reactor construction costs.
2. Research and development support.
3. Five-year waiver of lease charges on fuel.

[2] In view of this record of performance of atomic power plants, it is difficult to accept the economic analysis published in February 1964 by Jersey Central Power Co. for its proposed Oyster Creek atomic plant. Its conclusion that an atomic plant would be cheaper than a coal-burning plant at the same site was based on an assumed atomic plant capacity factor over the first 15 years of 88 percent.

Indirect subsidies include:

4. Low guaranteed charge for reprocessing irradiated fuel.
5. High guaranteed buy-back prices for the byproduct plutonium.
6. Undefined costs in waste disposal.
7. Government indemnity to cover third party liability claims in the event of major reactor accidents.

The AEC also owns and operates some power demonstration reactors and has contracted to sell the steam to publicly owned cooperative utilities.

By mid-1963 the cost of Government research and development for nuclear reactors was about $3,416 million, of which $900 to $1,200 million was estimated to be related to civilian applications. At the same time, private utility plant costs, research and development amounted to about $520 million, or roughly one-half of the Government contribution.

The new "yardstick" fallacy

Without referring to these large Federal expenditures, a spokesman for the investor-owned electric utilities recently described the atomic power program in glowing terms:

> "There is good reason to believe that the sums invested by electric companies in nuclear research and development are already being repaid, in many cases, by the spirited competition of fossil fuel producers and the transportation industry." [3]

Such an assertion calls for closer scrutiny. We would do well to remind ourselves here of the repeated protests during the past decades by the investor-owned utilities against the "unfair competition" from the tax-free and low-interest financed public power systems. Now the coal and oil producers and the transportation industry are being confronted with similar "unfair competition" from subsidized atomic power. Is it fair for utility executives to protest the competition from "the short yardstick of public power" while at the same time applying similar measures against their own suppliers?

It may be argued by some executives that the subsidies or the losses on one or two atomic powerplants help to show a favorable balance sheet for the major part of their systems because of reductions in coal and transportation costs. But if this contributes to the destruction of a fair balance sheet for two of our basic industries, how can such spokesmen claim to be serving the public interest?

Importance attached to continuing subsidies

In February 1964 the Jersey Central Power & Light Co. announced its decision to construct its 600 mw boiling water atomic power station at Oyster Creek "based on economic considerations," and declared that "no Government financial assistance is *being sought* in connection with the construction or operation of the station." [Emphasis added.]

Some months later President Johnson announced an "economic breakthrough" in atomic power costs, and soon thereafter AEC Chairman Seaborg declared in Geneva that "* * * nuclear power is now in a position to offer competition for an appreciable share of the new steam-electric capacity * * * in the decade or so ahead." Following this, a host of similar statements emanated from industry participants.

However, when a proposal was advanced to phase out subsidies as provided in the Atomic Energy Act,[4] steps were immediately taken toward amending the act and retaining the current policies on subsidies. During the same year, the AEC authorized two 463 electric mw reactors of the pressurized water type, the Haddam Neck and Malibu plants, each with subsidies of more than $13 million. It should be noted that it is becoming increasingly difficult to define such terms as "competitive" and "freedom from subsidies."

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[3] Walker Cisler, "Energy and the Future," Mechanical Engineering, March 1965.

[4] Sec. 102 of the act calls for a written finding by the AEC when a given type of reactor has achieved a status of "practical value for industrial or commercial purposes." Such a finding would put an end to direct subsidies. "Indirect" subsidies presumably would be continued.

THE UNRESOLVED PROBLEM OF PUBLIC SAFETY

In atomic power circles, the word "Safety" has become as troublesome as the plague.[5] Nevertheless, the public interest demands that certain facts be identified and faced squarely:

1. The first atomic powerplants built in this country fail to meet the traditional standards of engineering responsibility.[6] Instead of adopting a modern practice from hydroelectric designs and locating an atomic powerplant deep underground, the general pattern of design for conventional steamplants was adapted to this new source of energy. However, it was found, eventually, that this type of design was uninsurable by traditional standards in public utility management.

2. The potential destruction, in the event of a serious accident, was found to be incomparably greater than from any other type of industrial plant. As outlined in an official report on a typical plant, property damage from an accidental failure of a reactor (or from sabotage), and from the release of radioactive material, could reach several billion dollars, with deaths in the thousands and radiation injuries in the tens of thousands.

3. When the insurance companies were confronted with this new risk of unprecedented magnitude, they eventually offered a maximum of $60 million in third-party liability insurance on the type of design then proposed. But this was recognized to be only a small fraction of the potential property damage.

4. At that stage a few individuals who were most aggressive in promoting atomic power embarked on a course which must be regarded as a major tragedy in the history of corporate responsibility. Instead of promoting greater safety by sound engineering design and location of atomic power plants, with whatever increase in cost this might entail, they promoted a terrifying idea. This consisted of getting the U.S. Congress to enact legislation under which, in effect, the survivors of a disaster could collect damages from the American taxpayers. This was provided in 1957 by the Price-Anderson amendment, known as the Atomic Energy Indemnity Act.

5. Promoting atomic power under the unprecedented insurance subsidy in the Indemnity Act has reduced the compulsion to adopt safer engineering standards, because the greater cost would interfere with the "commercial feasibility," and with the objective of developing "competitive" atomic power. However, such cost-cutting must be regarded as irresponsible cornercutting on public safety.

6. The current trend is to locate reactors at ground level, in or near populous areas, and designed for the criterion of "the maximum credible accident." But, a responsible AEC official has declared, "We do not really know the amount of energy released in a maximum credible accident." Furthermore, there is a basic fallacy in this concept; the serious accidents in the past have been caused by a combination of circumstances previously considered incredible.

7. In some quarters it is claimed that adequate safety can be provided through "automation" and the use of more mechanical safeguards. However, it is now recognized that in matters of safety the human and administrative factors are more important than mechanical reliability.[7] Unfortunately, human error cannot be eliminated.

8. The relatively few failures to date have been cited as proof that the public need have no fear of atomic plants. However, as Dr. Abel Wolman has pointed out, "there is no reason to suppose that the power reactor industry, unlike other industries, will be immune from major accidents"; the record "rests on too brief a period of experience to warrant any assurance that

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[5] In October 1963, a spokesman of the atomic power industry declared: "It is my suggestion that we in the industry drop the word 'safety' from the titles of dissertations, brochures, and press releases * * *."

[6] Adolph J. Ackerman, "Atomic Power, a Failure in Engineering Responsibility," Transactions, American Society of Civil Engineers, New York. Vol. 128, 1963, pt. V, p. 17.

[7] This has already been demonstrated in the Windscale, BONUS, and SL–1 reactor accidents. (In the latter case, where three men were killed, it was reported that the emergency cooling systems to prevent core meltdown and the poison emergency shutdown were both rendered completely useless by the violent movement of the reactor vessel which sheared all connecting lines.)

this state of affairs will continue." In comparison with the vast experience with fossil-fuel powerplants, the experience to date with atomic powerplants is insignificant.

Public safety by propaganda

Some spokesmen in the atomic power industry have advocated a continuous flow of propaganda on the theme that nuclear reactors pose no peril. From typical speeches:

"It should be clear to all here that we must expand and add force to our efforts to make the public feel secure with atomic plants in their midst."

* * * * * * *

"One of the most important factors in maintaining nuclear power's new momentum is to create in the public's mind confidence that our physicists understand all the problems. * * *"

* * * * * * *

"I believe we have reached a point in the demonstrated safety of nuclear power to say 'nuclear power is safe, period.' "

And in the 1963 Congressional Hearings[8] Dr. W. E. Johnson (Gen. Mgr., Atomic Power Division, Westinghouse Electric Corp.) declared:

"I think if you do a reasonable job of public relations you can place a reactor any place it is needed."

Representative Westland (member, Joint Committee on Atomic Energy) replied:

"I quite agree. I think your public relations work is important in this area. The people of Los Angeles or New York City *can be persuaded* that the location of one of these plants in that area can be safe." [Emphasis added.]

The propaganda thrust in promoting atomic power

Although representing only one-half percent of the country's installed electric capacity, atomic power is being given a disproportionate amount of space in technical and popular publications. To bless this field of endeavor with special recognition, the AEC occasionally even singles out nuclear scientists for special dispensations of the taxpayers' money.

A new type of high-pressure selling in the form of manufacturers' brochures, magazine articles, technical editorials, full page press advertisements, pronouncements by some Government officials and by a few ecstatic utility company executives—these seem designed to give the public the impression that atomic power has "arrived" as a safe, reliable, and economical source of power. Such a concerted barrage of atomic power propaganda and undignified "hucksterism" adds up to a consistent pattern of presenting a false face of success and of suppressing bad news of failures. It is high time that the facts are exposed in an impartial manner.

New promotional efforts to extend the Indemnity Act

If the spokesmen in the atomic power industry had the courage of their convictions on safety, they should now be prepared to assume full responsibility for their plants through their usual commercial insurance underwriters—and without the benefit of the Indemnity Act. But this is not the case. The act was originally passed for a limited period of 10 years; it is due to expire in 1967. However, a massive promotional program has already been launched for extending this act. But who is there to speak for the public?

Representative Holifield's concern for public safety was well stated in 1959 when he explained his opposition to the Indemnity Act:

"I felt that a great deal more attention should be paid to the location of reactor sites than to trying to compensate for a lack of attention, you might say, by promising to pay people, or the remaining relatives of those who have been killed, $500 million."

Promotional efforts by reactor manufacturers and some Government officials to extend the Indemnity Act bring to mind a notable statement made by Adm. Hyman Rickover on a similar issue:

"Technology is in the hands of organizations that oppose any legislation that would prevent them from using it as they please * * * run by a special category of career men, * * * the pure administrators. To them, the deci-

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[8] Development Growth and State of the Atomic Power Industry, 1963, Apr. 2, 3, 4, and 5, 1963. JCAE Congressional hearings. Pt. 2, p. 494.

sive consideration is the good of the organization. * * * So great is their power and influence that normally the interest of these organizations in continuing harmful but profitable practices outweighs the interests of the sovereign people in getting protective laws enacted and enforced. * * * At times, only a catastrophe causing a public outcry will get action.[9]

Cancellation of three atomic powerplants

It is reassuring to note that during the past year several important signs have appeared which reflect not only greater public concern, but also new standards of corporate responsibility and industrial statesmanship. During the past 18 months the plans for three major atomic powerplants have been canceled. This seems to indicate that the growing record of adverse experiences is forcing some utility managements to take a more realistic look at atomic power.

1. *Ravenswood.*—In December 1962, Consolidated Edison applied to the AEC for a construction permit for a 1 million kw. atomic powerplant to be located at its Ravenswood site in Queens, New York City. Not only was this a giant step in capacity ahead of any nuclear reactor then operating, but the site was in the center of a densely populated urban area. The proposal precipitated opposition from many citizens; it also brought the city council of New York to considering a zoning ordinance which would have outlawed the construction of such a reactor within its city limits.

At this stage the writer brought his studies of the deficiencies in current atomic power engineering to the attention of one of the company's trustees. This was followed by a personal conference on January 6, 1964, and the company announced the cancellation of the project on the same day. Undoubtedly there were other factors in the company's decision, such as the disappointing performance of its Indian Point atomic powerplant. The New York Times reported the cancellation of Ravenswood on January 7 and stated:

"If Con Ed had succeeded in putting its plans through, it would have set off a wave of nuclear construction throughout the world."

The next day a major project proposed for Japan was canceled.

2. *Bodega Bay.*—In the summer of 1961, Pacific Gas & Electric Co. announced its intention to build a 325 elec mw atomic powerplant at the Bodega Bay site, about 1,000 feet from the notorious San Andreas earthquake fault, and 50 miles north of San Francisco. This soon became a controversial issue and a competent group of citizens organized an effective protest. In a petition filed in May, 1963, with the Public Utilities Commission of California, this group cited the writer's amicus curiae brief in the U.S. Supreme Court (315 and 454, 1960) on the issue of engineering responsibility.

In Sept. 1963, J. P. Eaton of the U.S. Geological Survey reported:

"The site is not an adequately safe location for a nuclear powerplant. * * * Acceptance of Bodega Head as a safe reactor site will establish a precedent that will make it exceedingly difficult to reject any proposed future site on the grounds of extreme earthquake risk."

On October 20, 1964, the AEC's Advisory Committee on Reactor Safeguards approved the Bodega Bay Project, but on October 27 the report of the AEC's Division of Reactor Licensing was released stating that "Bodega Head is not a suitable location."

Unfortunately, throughout this period the company continued to expend some $4 million on preliminary work. In late October 1964 it completed the excavation for the reactor, a 140-foot-diameter hole cut into the rock to a depth of 73 feet. But in the bottom appeared clear evidence of a secondary earthquake fault. Thereupon the company's president announced the cancellation of this project on October 30, 1964.

3. *Rochester Gas & Electric Co.*—In September 1964, the AEC approved Rochester Gas & Electric Co.'s proposal for a 260,000 kw atomic powerplant of an advanced type (high temperature gas-cooled graphite moderated reactor) to be located on the south shore of Lake Ontario, 20 miles east of Rochester, N.Y. The manufacturer selected for this reactor was then building a smaller one of this type (40,000 kw) for the Peach Bottom plant in Pennsylvania.

In October 1964 the writer had a personal conference with one of the directors of the power company and reviewed some of the controversial issues, the problems of engineering and corporate responsibility, and the basic question of public safety. It was reassuring to find that at the top management level there

[9] Addressing the Publishers Lunch Club, New York, Jan. 7, 1965. (New York Times, Jan. 8, 1965.)

was a strong sense of public service and a firm determination to refrain from doing anything that would jeopardize the position of the company or that might create an undue public hazard. It was also apparent that some of the important matters under discussion had not previously come to this director's attention.

On February 12, 1965, the utility company suddenly announced cancellation of its plans for the new reactor. A brief press release stated that "one of the major reasons for the breakdown in negotiations was the unwillingness of General Dynamics Corp. to provide assurances that the proposed nuclear plant would be available to supply power to our customers by the fall of 1972, and we cannot gamble when our customer's welfare is at stake."

The problem of engineering and corporate responsibility

Some of the current practices in the American atomic power program help to identify the peril to our freedom as envisaged in the inscription on Chicago's Museum of Science and Industry: "Without engineering, freedom could bring you a happier but not an easier life; without freedom, dictators could use engineering to enslave you."

The new technology of atomic power was born out of the wartime "wedding" of nuclear scientists and Government officials who have created a new type of centralist authority. This, in turn, is stifling the development of the requisite disciplines and ethical standards among professional engineers whost first duty is to protect the public health and safety. The new "authority by scientists" is an "authority by experimenters." Dr. Edward Teller has explained that "the most common activity in which a scientist is engaged is to make mistakes, recognize them, and correct them."

By contrast, the engineer is trained not to make mistakes; one serious mistake can ruin his career. The public has great confidence in the engineering profession and in public utility management. But this confidence is currently being exploited by irresponsible propaganda and by a system of monetary indemnity which is displacing engineering and managerial responsibilities. It would be a major tragedy for our free enterprise system if such a debased policy were to be perpetuated. Fortunately, where there is freedom to communicate the truth, the cancellations cited above have demonstrated that, particularly at the directorate level and among responsible professional men, both the traditional respect for the public interest as well as high ethical standards still prevail.

SUMMARY

1. Although early predictions and expectations regarding atomic power have failed to materialize, the public is being subjected to a barrage of rosy propaganda by reactor manufacturers, by a few utility executives and by the AEC.

2. The propaganda tends to give the false impression that atomic power has "arrived," and that it is as safe, reliable and economic as coal or oil-fired steampower, or hydropower. The fact is that it comprises less than half a percent of the country's installed electric capacity.

3. Although the promoters of atomic power claim that reactors may be safely located in populous areas, they apparently lack the skill and courage to construct reactors on their own responsibility and without the protection of the Federal Indemnity Act.

4. "Safety by propaganda" is being encouraged in some quarters as a substitute for responsible engineered safety.

5. While claiming that atomic power is "economic" and "competitive," its promoters oppose curtailment of the several direct and indirect Federal subsidies.

6. Although the propaganda stresses atomic power's reliability, experiences to date disprove such claims. The majority of atomic powerplants fail to measure up to good utility standards. Conventional steam boilers have been installed at two plants to function as "substitutes" for ailing reactors.

7. Cancellations of the Ravenswood reactor (in the heart of New York City) and of the Bodega Bay reactor (near an earthquake fault), fortunately, have thwarted an effort to prove that "You can put a reactor anywhere." And the experiences at Enrico Fermi, when related to the original promises, have produced a major tragedy for all concerned.

8. Rochester Gas & Electric's cancellation has illuminated the basic defect in the reactor manufacturing industry which is afraid to assume the traditional responsibilities of guaranteeing the performance and reliability of its product.

This abandonment of responsibility violates a fundamental principle of free enterprise.

9. Allowing the Federal Indemnity Act to lapse in 1967 would help to restore a general sense of responsibility among manufacturers. It would also help to establish responsible and safe engineering practices, and the development of moderately sized atomic powerplants so located and safe that the insurance companies could insure them. Finally, it would remove a subsidy which is now seriously distorting atomic power economics.

10. Greater freedom for independent professional engineers to design safe atomic powerplants, under their ethical commitment of serving "the public interest above all others," would contribute to developing this new technology so that the electric utility industry could maintain its traditional standards of responsibiliy and of superior public service.

APPENDIX "A"

THE DISCIPLINES IN HYDROELECTRIC ENGINEERING

1. *Scope of Engineering Design.*—Every hydroelectric project poses a unique problem involving a broad field of technologies. For example, predictions of flood and low flows lie in the field of meteorology and hydrology; project layout or arrangement involve topography and geology; dam and powerhouse foundations and tunnel design depend on soil and rock mechanics; the design of the dam and powerhouse and water passages are determined by hydraulic and structural analysis; mechanical and electrical engineering are involved in the selection of generating plant and electrical system. Construction engineering skills identify special problems of river handling, logistics of materials, machines, manpower and supervision, and the general feasibility of successful execution of the project.

2. *Judgment.*—Because of the uncertainties inherent in weather extremes and flood flows, and in nonhomogeneous natural materials such as soil and rock, the engineer is called upon to apply a unique type of judgment. This demands examining all possible hazards and weaknesses in his project. It also demands an adequate knowledge of law, concessions, utility regulation, and of construction financing, revenues, and repayment of borrowed money. This type of engineering analysis and judgment is essential to the conception of a project which is both economic and safe.

3. *Economics.*—Historically in the United States hydroelectric and thermal power have grown up more or less concurrently. Thermal powerplants, because of the relative uniformity in their general pattern of design, have provided a standard yardstick for the cost of power. A hydroelectric project had to compare favorably, in an economic analysis, with a fossil-fuel alternative before its construction could be justified. With fossil-fuel technology constantly improving, this has demanded that the consulting engineer keep himself adequately informed on the competitive and alternative energy sources.

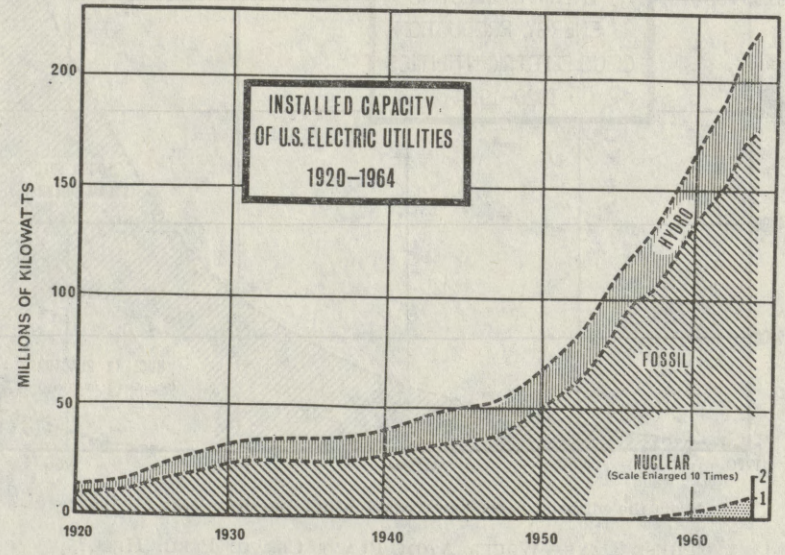
4. *Responsibility for Safety.*—The experienced consulting engineer has an overriding responsibility for public safety and has been disciplined against cutting corners to achieve low costs. He knows that one serious accident, such as the failure of a dam or its foundation, can do great damage to life and property. And because the company owning such a project has traditionally borne full financial liability for public damage, the engineer has a double responsibility to product a safe project. One major failure can ruin his career.

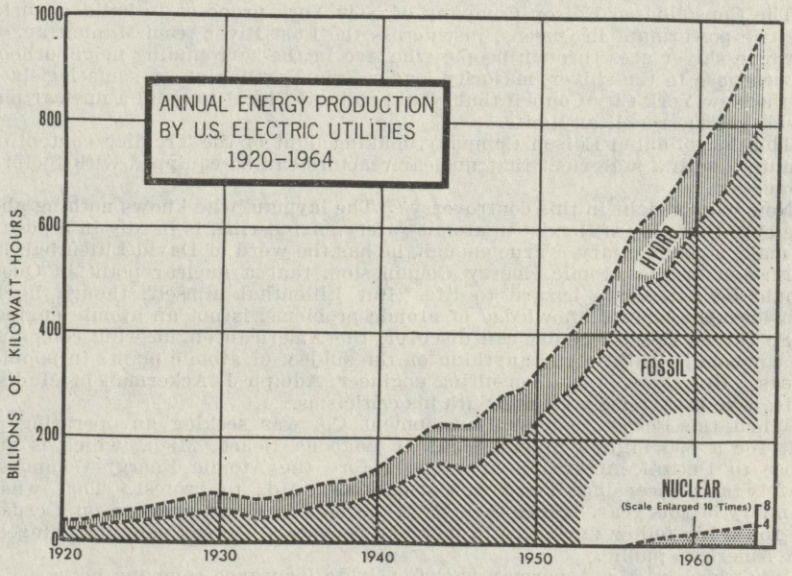
This brief perspective points up the type of qualifications required for a broad spectrum of interrelated responsibilities.

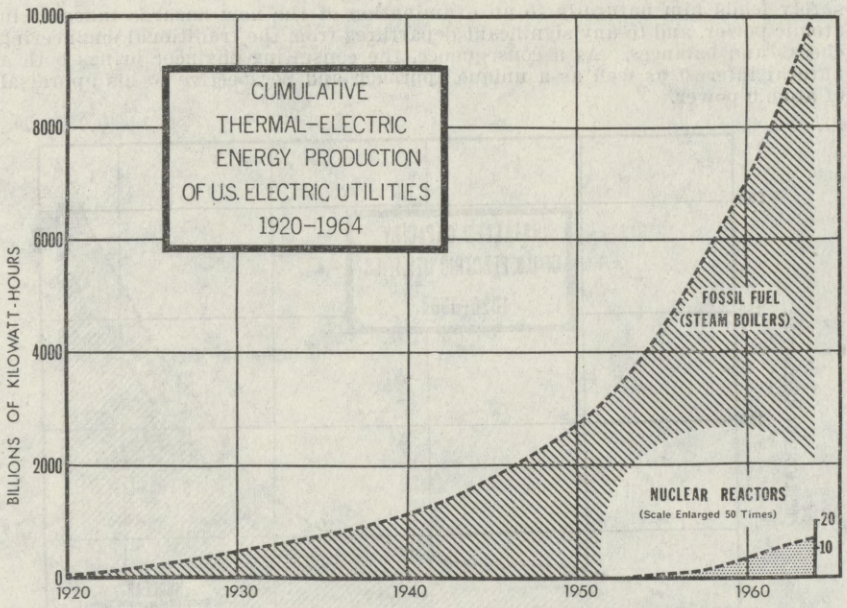
5. *Learning from failures.*—A sobering influence on the consulting engineer is the history of new developments in this field, and the record of failures, particularly of dams. Despite the best efforts of competent engineers, serious failures have occurred, sometimes at tragic cost. At the same time, such failures have produced lessons which have advanced the science and art of hydroelectric engineering. Out of this background has grown a sharp consciousness that man is not infallible in his judgments, that he cannot foresee all the hazards and exigencies that may prevail, that human operators can and do make mistakes, and that no project can with certainty be declared foolproof. Through such experiences a consulting engineer develops his self-disciplines for economic and safe engineering.

This sense of responsibility also compels him to acquire an understanding of the new energy resource of atomic power. His constant concern for public

safety leads him naturally to an examination of the new hazards inherent in atomic power, and to any significant departures from the traditional engineering checks and balances. As a consequence, the consulting engineer brings both a natural interest as well as a unique approach and perspective to his appraisal of atomic power.







[From the editorial page, New York Journal-American, May 21, 1963]

THESE DAYS—WOULD ATOM PLANT CREATE PERIL HERE?

(By John Chamberlain)

The Consolidated Edison Company of New York proposes to build a nuclear electric powerplant in Queens, just across the East River from Manhattan, and a vague shiver goes through people who live in the surrounding neighborhoods. In response to the shiver, majority leader Eric Treulich offers some legislation in the New York City Council that would make it illegal to build a nuclear plant inside the metropolitan limits.

The Consolidated Edison Company, making light of the Treulich contentions, counters with a statement that nuclear reactors can be equipped with foolproof protection.

Now who is right in this controversy? The layman, who knows nothing about the bugs that may still exist in atomic safety engineering, is hardly in a position to make a commentary. True enough, he has the word of David Lilienthal, first chairman of the Atomic Energy Commission, that a nuclear plant in Queens would be a possible hazard to life. But Lilienthal himself, though he has considerable general knowledge of atomic problems, is not an atomic engineer.

So far as this columnist can discover, the American engineering community as a whole is loath to say anything on the subject of atomic plants in populous areas. But there is one consulting engineer, Adolph J. Ackerman of Madison, Wis., who is extremely voluble with his criticisms.

When the Power Reactor Development Co. was seeking an operating permit for a $90 million atomic plant at Lagoona Beach, Mich., which is quite close to Detroit, Ackerman appeared before the Atomic Energy Commission Safety and Licensing Board in Germantown, Md., to protest. That was in January of this year. Since then Mr. Ackerman has been carrying on a crusade to rouse his fellow engineers to what he considers a great potential danger to the American public.

What bothers Mr. Ackerman is that private insurance company actuaries are not willing to quote risk figures on atomic energy plants. This, says Mr. Ackerman, means that we have "determination of safety by Government edict," which is not the same thing as a judgment by informed actuarial procedures.

Inasmuch as private insurance companies refuse to write full protection against atomic catastrophe, the liability has been shifted to the Government under the

Price-Anderson Indemnity Act of 1957. This is an example, says Mr. Ackerman, of "establishing the principle of indemnifying the survivors of a disaster rather than preventing the introduction of a major peril."

To bolster his point Mr. Ackerman quotes a fellow engineer, Thaddeus Merriman, as saying:

"The engineer's duty does not lie only in saving a maximum of his client's money. It demands absolutely that the public be afforded a maximum of safety. If a client is unwilling or unable to pay for that maximum then he should not have his project. And what is true in the case of a private client is just as importantly true when the engineer acts for public authority—he must still protect the public."

Being a layman in these matters, this columnist has no right to offer a pro or con judgment of Mr. Ackerman's qualifications. Mr. Ackerman may know more, or he may know less, than the engineer advisers of the Lagoona Beach atomic project in Michigan or the experts of the Consolidated Edison Co. of New York. But Mr. Ackerman has had sufficient standing in his own profession to get his articles accepted by American Engineer, which is the publication of the National Society of Professional Engineers.

A graduate of the University of Wisconsin, Mr. Ackerman has directed the design and construction of hydroelectric projects in Brazil. He notes that the Swiss are building an atomic powerplant in a remote underground cavern, which he takes to be a vindication of his own ideas about the potential menace of atomic plants above ground in metropolitan areas.

What particularly rings a bell with this columnist is Mr. Ackerman's contention that even if a mechanically foolproof atomic reactor can be devised, there is still a danger of disaster through sabotage. In the cold war climate that is a real consideration.

So let's have more open hearings on the subject of atomic generators in populous areas. Since the public has to vote on what the experts propose, it is only fair to let every expert have his say where he can be heard.

APPENDIX B

THE POSITION OF THE ENGINEER IN ATOMIC POWER DEVELOPMENT

The professional engineer has an ethical commitment to serve the public interest above all others. But this tradition is being destroyed by debased planning techniques in which special interests and centralized administrative controls are displacing individual responsibility and the freedom to dissent.

During the past 20 years since atomic bombs heralded the new atomic age there has been little change from the bewilderment that burst upon human consciousness on those fateful days of 1945. Vast, almost mythical forces, locked in the nucleus of the atom since the beginning of time, had been unleashed as a new tool of war.

After the war, official Government policy in the new science and technology of atomic energy was defined in the Atomic Energy Act of 1946. Because of its military importance, atomic energy technology and all associated materials and applications became subject to Government secrecy and monopoly. Although the restrictions were released somewhat by an amendment in 1954, allowing private enterprise to participate in some of the applications of atomic energy, by and large the new technology has remained subject to the complete control of the Atomic Energy Commission.

Some of the basic issues under consideration before this distinguished Committee, although they here concern specific parties or specific industries, are of deep concern—now and for all future time—to professional engineers. In April 1961 I attempted to identify the engineering responsibilities in the application of this new science in an amicus curiae brief filed in the Supreme Court of the United States in the *PRDC* cases Nos. 315 and 454 then pending before the Court. Subsequently I published that brief, along with a short history of atomic power, under the title "Atomic Power, a Failure in Engineering Responsibility." This paper is now part of the permanent record of the American Society of Civil Engineers in its "Transactions of 1963," volume 128, part V. It drew exceptionally generous approval and commendation from engineering colleagues not only in this country but also from abroad. A brief summary of their comments was published in the professional magazine American Engineer of July 1963.

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New problems in professional responsibility

The individual engineer has a traditional responsibility of presenting truthful information on both successes and failures in his work, and to protest against efforts to misuse his services. Unfortunately, the field of atomic power is suffering from lack of interest and concern on the part of most engineers, and from lack of responsible engineering leadership. Furthermore, it is clouded by a variety of publications, many of which are misleading or purely propaganda.

An effort was made as far back as 1955 to formulate a declaration on professional responsibility which might serve as a guide for engineers working in this new science. This was undertaken by the engineers joint council and I served on the EJC atomic energy panel as the official representative of the American Society of Civil Engineers. Unfortunately, the majority of this panel chose to place commercial objectives ahead of public safety.

In this respect the EJC panel departed from one of the most fundamental disciplines of the engineering profession, and particularly of the civil engineering branch of the profession, whose members are committed to "place service before profit, the honor and standing of the profession before personal advantage, and the public welfare above all other considerations."

This principle, as applied to a specific problem, has been defined for us by the former chief engineer of the board of water supply for the city of New York, Thaddeus Merriman, in these words: "The engineer's duty does not lie only in saving a maximum of his client's money. It demands absolutely that the public be afforded a maximum of safety. If the client is unwilling or unable to pay for that maximum then he should not have his project. And what is true in the case of a private client is just as importantly true when the engineer acts for public authority—he must still protect the public—no one else can perform that function."

This sense of responsibility of engineers, and particularly of independent consulting engineers, together with the confidence of the public in the engineering profession, comprises a rich heritage which stands as the primary bulwark for the protection of the public in the application of sicence and technology. This confidence must be maintained and merited in the future as an essential feature of a free society. The public has a right to expect absolute intellectual honesty and the individual engineer carries this responsibility in his conscience. Herbert Hoover has stated most precisely that: "Technology without intellectual honesty will not work."

More recently a highly respected leader in the field of atomic energy (Adm. Hyman Rickover) has identified the ethical commitment of a responsibile engineer in these terms:

"Since engineering is a profession which affects the material basis of everyone's life, there is almost always an unconsulted third party involved in any contract between the engineer and those who employ him, and that is the country, the people as a whole. These, too, are the engineer's clients, albeit involuntarily. Engineering ethics ought, therefore, to safeguard those interests most carefully. Knowing more than the public about the effects his work will have, the engineer ought to consider himself an officer of the court and keep the general interest always in mind.

"Service ceases to be professional if it has in any way been dictated by the client or employer. Professional independence is not a special privilege, but rather an inner necessity for the true professional man and a safeguard for his employers and the general public. Without it he negates everything that makes him a professional person and he becomes at best a routine technician or a hired hand, at worst, a hack."

Using engineering to enslave you

This same principle has been carved over the entrance to the Museum of Science and Industry in Chicago in these words: "Without engineering, freedom could bring you a happier but not an easier life. Without freedom dictators could use engineering to enslave you."

The "dictators" are those in authority who deprive the engineer of his ethical duty to serve the public interest above all others, and of his freedom to dissent. Such "dictation"leads to debased engineering planning through the simple device of abandoning ethics in engineering and in law. By silently conforming to such authoritarian control, the engineering and legal professions are participating in the destruction of human freedom. (Civil Engineering, ASCE, July 1964.)

It is a regrettable fact that at very few hearings before congressional

committees do responsible and well-informed engineers, or responsible leaders in engineering education, demonstrate the requisite initiative to offer voluntary testimony within their competence. Obviously, the great majority of such men are busy and preoccupied with other matters. Many of them are not even aware that important issues such as the present one are open for voluntary discussion. But there is also another factor: Within the profession there exist a variety of obstacles to the publication of controversial matters or to the recording of criticisms and adverse experiences or professional opinions.

The scientific revolution

In the current scientific revolution—the most violent ordeal in the history of the world—the quality of engineering planning will help to decide "for generations whether all mankind and the whole world is to become free, or whether, in the struggle civilization as we know it is to become completely destroyed or completely changed. It is our fate to live upon that turning point in history." (Whittaker Chambers)

We are confronted today with a matter of extreme importance in the development of civilization. In place of individual moral responsibility we are substituting the dogma of a debilitating collectivism. Eventually this can engulf all the professions and reduce their members to mere technicians and puppets of unscrupulous bureaucrats. In this situation the engineering profession occupies a critically important position, because the bureaucracy would be helpless without the supporting knowledge and skills of the engineer.

This critical position of the engineering profession was identified some 33 years ago by Felix S. Cohen, as quoted in a congressional committee report: "A socialist revolution in this country will succeed only if our guilds, chief among them the engineering societies, have within them a coherent socialist voice."

The dangers in the present-day type of global planning through long-range scientific and technological commitments has been identified by Dr. Jeffrey Dobbs of London as a new political movement—"the manipulation of natural resources in the interests of centralized power." He stated: "Planning implies control. * * * As history has repeatedly shown, the ultimate evil of centralized planning is that it is the stealing of choices. The government committee of the experts, by systematically depriving people of the opportunity of making their own choices, trespasses on freedom's domain step by step."

In 1929 the late Chief Justice of England, Lord Hewart of Bury, wrote a remarkable books, "The New Despotism," in which he identified the step-by-step methods by which the rule of law can be destroyed through the exploitation of professional disciplines in engineering and in law. After outlining the technique in considerable detail, he warned: "Nothing could well be more unfortunate than that a change of so fundamental a character should be brought about piecemeal, by subterranean methods, which might escape general observation until the mischief has been carried to completion."

The duty to dissent

As far back as 100 years ago a noted scientist, James Clerk Maxwell, declared: "Such indeed is the respect paid to science that the most absurd opinions may become current provided they are expressed in language the sound of which recalls some well-known scientific phrase. If society is thus prepared to receive all kinds of scientific doctrines, it is our part to provide for the diffusion and cultivation not only of true scientific principles but of a spirit of sound criticism."

Obviously, there are times when it is imperative for an engineer to face up to a major issue where the public interest is at stake. The freedom to dissent is basic to all progress.

APPENDIX C

THE ATOMIC ENERGY ACT OF 1954 AND AMENDMENTS

When it was found that the design for one of the first atomic powerplants was so lacking in evidence of engineered safety as to make the proposed plant uninsurable, a tragic mistake occurred. Instead of choosing a new location and redesigning the plant for greater safety, Congress was approached in 1956 by a handful of people with the proposition that if a disaster were to occur some day from their handiwork, the taxpayers should indemnify the survivors.

The legislative history of the Atomic Energy Act of 1954 shows that Congress favored an active industrial program of participation in the development of atomic power. This act introduced a number of modifications in former policy

to stimulate more active participation by private industry. But the responsibility for the general development of atomic power was not turned over to industry. Following enactment of this act, there have been a number of amendments, some of them relatively minor and others of considerable importance.

In January 1955, the Atomic Energy Commission announced its demonstration reactor program in which it offered to underwrite a part of the cost of certain atomic power projects. This program was further expanded in 1957 when the AEC invited proposals from private utility groups to design, construct, and operate atomic power plants. During the following 5 years the AEC issued licenses to nine private utility groups for the construction of atomic powerplants ranging in capacity from a small one of 17,000 kilowatts to the largest one of 150,000 kilowatts. Licenses were also granted to four public power groups for powerplants ranging in size from 10,000 kilowatts to 75,000 kilowatts. For both groups the AEC committed itself to the payment of substantial subsidies.

Industry initiative under the act of 1954

Under the act of 1954 one group of power companies formed the Power Reactor Development Co. (PRDC) which proposed to develop an atomic powerplant containing a breeder reactor for the generation of steam. In January 1956, the company applied to the AEC for a construction permit. But in June the AEC's Advisory Committee on Reactor Safeguards (ACRS) reported: "The proposed PRDC reactor represents a greater step beyond the existing state of knowledge of the art than any other reactor of comparable power level which has been proposed by an industrial group. * * * The Committee believes there is insufficient information available at this time to give assurance that the PRDC reactor can be operated at this site without public hazard."

Despite this adverse report the Atomic Energy Commission issued a provisional construction permit in August 1956. Since then, construction of the plant has been substantially completed and it is now known as the Enrico Fermi Atomic Power Plant. The site, on the shores of Lake Erie, is about 35 miles from the center of Detroit and about 30 miles from the center of Toledo, Ohio. Important municipal and industrial water intakes lie within 30 miles of the site.

The Brookhaven report

In July 1956, shortly after the release of the adverse report, the Joint Committee on Atomic Energy requested the AEC to undertake a study of the magnitude of the peril to the public in the event of an accidental failure of a large atomic powerplant. The resulting report, "Theoretical Possibilities and Consequences of Major Accidents in Large Nuclear Power Plants," was published in March 1957 and is generally known as the Brookhaven report. Some of the site conditions assumed for this study corresponded to the setting for the Detroit reactor.

The results of these studies indicated that, depending on local conditions, the property damage alone could range between $2,300 million and $4 billion and possibly higher. Damage to health and life could be on the order of 43,000 injuries and 3,400 fatalities without taking into account the probability of harmful long-term effects on several hundred thousands of people. The financial liability for human casualties was not evaluated and is, obviously, beyond comprehension.

Possible alternatives

There are, of course, various alternatives available with respect to site selection and underground construction to minimize the potential damage in the event of a reactor failure. The traditional practice has been to rely on the free interplay of professional engineering and corporate responsibilities to produce an optimum solution of design and site selection for a new powerplant. However, instead of relying on such practices for this atomic powerplant, a proposal was advanced which must be regarded as a great historical tragedy, particularly as it relates to exploitation of public confidence in the engineering profession and in corporate management.

In the face of an adverse report from the ACRS, plus the terrifying possibilities of disaster, plus the fact that construction of a plant at this site would violate the most elementary standards of engineering responsibility, plus the fact that the company was unable to obtain full liability insurance as carried on its conventional steamplants, plus the fact that construction work had barely proceeded beyond the groundbreaking stage, the company was persuaded to retain the site and to proceed with its planned construction program.

The Price-Anderson Amendment or Indemnity Act

Concurrently, a few individuals who were most aggressive in promoting atomic power embarked on a course which must be regarded as an amazing departure from traditional corporate responsibility. Instead of promoting greater safety by sound engineering design and location of atomic power plants with whatever increase in cost this might entail, they promoted a terrifying idea. This consisted of getting the U.S. Congress to enact legislation under which, in effect, the survivors of a disaster could collect damages from the American taxpayers. This was provided in 1957 by the Price-Anderson amendment, known as the Atomic Energy Indemnity Act.

The history of this legislation is truly a remarkable story. Committee hearings were held in March 1957. In retrospect one cannot help but be amazed by the kind of arguments advanced by some of the manufacturers of reactors: "I think we must develop a reactor suitable for export to undeveloped nations. * * * There are tremendous reasons why we must have a very great stature internationally in atomic energy. It does not matter whether it is reasonable or not. The whole world expects us to. * * * I think we must move fast even though the economic motivations may not always be perfect. * * * The danger of catastrophies beyond our imagination still exists; however, we sincerely believe that it is in the national interest to provide additional financial protection to the public against any such catastrophies, no matter how remote."

The several congressional hearings culminated in the recommendation of the Joint Committee that the Atomic Energy Act of 1954 be amended "* * * to protect the public by providing governmental indemnity and granting limitations of liability for persons in the atomic energy program * * *."

The Price-Anderson Act, among other things, provided that in addition to the relatively small amount of insurance obtainable from private sources, up to $60 million per reactor, the Government would indemnify the reactor operators for claims up to $500 million. If a reactor accident should cause damage beyond this amount the way was left open for further congressional consideration.

It should be noted that this act did not provide compensation for damage to the public resulting from an accident in an atomic plant under Government ownership. Under the Federal Torts Claims Act of 1946, it is generally felt that the Government is not liable unless fault is proved—a most difficult assignment. Compensation of victims would be subject to the discretion of Congress.

Opposition by Congressman Holifield

Following the March hearings, the indemnity bills were reported to Congress on May 9, 1957. Only one member of the Joint Committee, Representative Holifield of California, dissented and submitted separate views in opposition to the bill. Some of the reasons stated by Mr. Holifield in support of his position are truly notable and are reproduced here:

"The main argument in support of the bill is contradictory and self-defeating.

"On the one hand it is said that the private insurance companies cannot or will not offer protection against such large but unknown risks.

"On the other hand we are assured that the chances of atomic accidents are so negligible and so remote that the Federal Government probably will never be called upon to discharge the enormous financial commitment that would be thrust upon it by this indemnification program.

"Large new reactors are planned for construction at Lagoona Beach, Mich., and Dresden, Ill. These are the first of their kind. No history of experience exists to afford accurate predictions of safety factors. Why should the Congress be persuaded to believe that these will be accident-free operations when the pooled resources of 139 insurance companies offer only a fraction of the dollar protection demanded from the Government? The insurance companies say that the risks are unknown, the fear of insolvency as the result of a major atomic accident constrains them to offer in combination not more than $50 million coverage for one 'nuclear incident.' I am sure that the insurance companies are using good business judgment and proved experience. Why should the Congress be asked to do otherwise? Why should the Congress be asked to afford 10 times the protection offered by the private insurance companies? * * *

"Until private insurance companies are willing to cover the risks incident to this type of atomic industrial development, there is a grave question as to the wisdom of constructing these large scale unproven power reactors near centers of population * * *.

"Until we can prove by the history of experience in the operation of the new and unproven power reactors (which are now planned) that they are safe mechanisms, we should insist they be located safe distances from populated centers. Congress cannot evade its responsibility for protecting human lives by authorizing huge dollar payments."

Legislative action

The legislative action on the Atomic Energy Indemnity Act began on July 1, 1957, in the House of Representatives. After the various speakers had stated their position in support of the act, Mr. Holifield rose to present his views in opposition. It is interesting to review the record of attendance and the efforts to maintain a quorum during the debate on this important legislation. Mr. Holifield restated his position on the floor of the House in words which, in retrospect, must be regarded as reflecting exceptional sincerity and statesmanship.

"* * * Until you can have assurance that these reactors are safe, they should be put in isolated positions and not next to these great cities. That is the point I am making.

"I am making the point that you cannot put these reactors—as the large insurance companies themselves say, we do not know what the reason is—you cannot put them near the cities and take up the human-life risk and try to cover it up with $500 million Government liability. That is my whole point. I do not want to stop this reactor business. I want them to keep on making them. I want the Government to build them and I want private industry to build them but I know what happens in the case of the Lagoona Beach reactor [Enrico Fermi]—the reactor which the * * * Safeguard Committee said was not safe, and the Atomic Energy Commission gave a construction permit on it anyway. When questioned last week, the top man of that Reactor Safeguard Committee said, 'We are of the same opinion. This thing should not be built until it is safe.' Yet they are going ahead and building it.

"I admit the Atomic Energy Commission says, 'We are not going to let them start operating until we are sure it is safe.' But how can I know and how can I be sure the Atomic Energy Commission will not, just as it did recently, overrule the committee and let them go ahead and operate this reactor near the city of Detroit, with the consequent risk of killing 100,000 people?

"If this bill were not passed the PRDC would not build a reactor close to the city of Detroit. It would go out to an isolated place. * * * I say that until they can tell you there is not going to be a blow-up you Members of Congress are taking upon your shoulders the personal responsibility for writing an indemnity bill that will give these people the coverage they want financially and you will have upon your hearts and upon your minds and upon your souls the responsibility in case there is a blow-up in this field."

When a quorum was finally mobilized the bill was passed without a rollcall or recorded vote. Senate action was even shorter. A speech prepared for the occasion by the sponsoring Senator Anderson was not delivered but merely inserted in the Congressional Record and a majority of the Senate passed the bill on August 16 without any record vote being taken. It was forwarded to the President on August 22 for his signature, which he affixed on September 2.

APPENDIX D

RESPONSIBILITY OF THE INSURANCE INDUSTRY

When the word "peril" is mentioned, either to life or property, or the word "responsibility" for damages or human injury, the first thought is of insurance. The insurance industry's record of service is best identified by the public confidence it has earned. That confidence is currently being exploited under the Indemnity Act.

It is difficult to point to any self-disciplining segment of our economy which has had a greater influence on public health and safety from a variety of perils than the insurance industry. The many individual companies, with managements of superior competence and directors with a high regard for the public interest, represent a service which is based on the inevitablity of accidents, of human error, of conflagrations, of natural perils, and of disasters of various types.

These companies have achieved a unique record in evaluating such perils and in establishing actuarial procedures and judgments under which insurance protection can be purchased by great numbers of people at a moderate cost, but

with a total income of sufficient magnitude to permit payments of compensation, as agreed upon, to the limited number of people who each year are the victims of such perils. The continuing success of this industry depends, as in the past, on an expert diagnosis of each accident and failure in order to determine its cause—and the lessons to be learned from it.

This process of learning from failures is also the foundation of all successful engineering. The importance of this probably can best be identified by reviewing the development of high pressure and high temperature steam boilers for powerplants. There is a remarkable parallel between this historical background and what is needed for the successful developments in the new technology of atomic power.

The moderating influence of the insurance industry

A notable example of insurance control and engineering for public safety is to be found in the development of high pressure steam boilers. The valid objective of operating at greater efficiency with higher pressures and temperatures has been slowly developed during the past 50 years:

Typical year	Maximum temperature (degrees F.)	Maximum pressure (lbs. per sq. inch)
1916	650	350
1930	750	1,250
1963	1,200	5,000

The step-by-step advances to constantly higher pressures were achieved through a remarkable system of cooperation between mechanical engineers, boiler manufacturers, and insurance underwriters. As new metalurgy and welding techniques, along with more effective inspection and testing were developed from year to year, the cumulative record of safe performance of the thousands of boilers throughout the country gave the insurance underwriters a continuing basis for writing 100 percent insurance coverage. This progress was achieved by maintaining a clear identity of professional and corporate responsibilities. Whenever a boiler did explode, the owners had the benefit of immediate response from their insurance companies to look after the victims and to analyze the cause of the failure; the resulting information was applied to improvements in design on future boilers.

In terms of electric power production from steam boilers the total experience of the electric utility companies during the past 50 years adds up to an astronomical number of kilowatt hours. In the course of this experience the insurance companies have developed the requisite manpower of highly trained experts in all fields. However, despite all the best attention to hundreds of details of design and manufacture, boiler explosions are still possible, and occur, on occasion. The fact that these are extremely rare is a measure of the remarkable self-discipline and intellectual honesty on the part of all engaged in this field. All power companies carry boiler insurance and third party liability insurance to meet the full claims of those who may suffer injury.

Even with this remarkable record there has been some evidence in recent years of moving ahead too rapidly into still larger boilers or still higher pressures. At a recent conference of powerplant experts it was reported that "in recent years the rapid extrapolation of designs with respect to size and the economic need for burning more varieties of fuel have been manifested in an increase in the number of incidents wherein great damage, with resulting high cost repairs, have occurred."

It must be remembered that all of this progress and self-discipline has grown up without the benefit of a central control agency to pass on all questions of safety, and without the benefit of any third party liability insurance relying on the public treasury. It is of utmost importance that this same type of development be permitted to occur in the design, fabrication, and operation of atomic reactors under the same sense of responsibility and professional disciplines as has been developed for high pressure boilers.

Revolutionary changes in insurance procedures

Following enactment of the Atomic Energy Indemnity Act the insurance industry began a reappraisal of the effect this legislation ultimately could have on the financial stability of the various insurance companies. Under the prevailing contracts with their clients, a major disaster at an atomic plant could destroy life and property to such an extent that a massive payout of insurance coverage could readily lead to bankruptcy.

An indication of what this was leading to appeared in April 1960 when Lloyds of London and the British Insurance Association began to insert a clause in all British insurance policies excluding injury or damage caused by radiation from nuclear fuel or waste, and added such a clause to existing policies as they came up for renewal.

In the United States this concept has now reached the stage where all insurance policies on property, for example, such as homeowners insurance policies, carry in the fine print a special nuclear exclusion clause which states: "This policy does not insure against loss by nuclear reaction or nuclear radiation or radioactive contamination, all whether controlled or uncontrolled, or due to any act or condition incident to any of the foregoing, whether such loss be direct or indirect, proximate or remote, or be in whole or in part caused by, contributed to, or aggravated by any of the perils insured against by this policy. * * *"

It is doubtful that many people even read, let alone understand, the implications of this exclusion clause.

The insurance industry and the indemnity act

The traditional sense of responsibility in the insurance industry was reflected by the official spokesman of 118 companies in the 1956 JCAE hearings on the Indemnity Act: "We have heard estimates of catastrophe potential under the worst possible circumstances running not merely into millions or tens of millions but into hundreds of millions and billions of dollars. * * * Even if insurance could be found there is serious question whether the amount of damage to persons and property would be worth the possible benefits accruing from atomic development."

Evidently the insurance companies were unsuccessful in their traditional role of first insisting on safer designs, capacities, and locations of atomic power plants to make them fully insurable. A year later the same companies, apparently under commercial pressures, adopted a rationalization to justify their participation in the atomic power program under the Indemnity Act. In the 1957 hearings, the same spokesman declared: "After working with our customers for a year, I think we are pretty well convinced that in the public interest and to further the program of the peaceful development of atomic energy, some such legislation is necessary. Whether the hazards involved are actually so great as people fear or not seems immaterial. The fact is that our customers, the manufacturers of equipment for the atomic industry, are vitally interested and desire such legislation."

Appendix E

Displacement of the Responsibility and Disciplines of Private Industry

In the new technology of atomic power the Indemnity Act is displacing corporate responsibility in the areas of public safety and industrial accidents. Vital lines of communication between various levels of responsibility are breaking down under the impact of misleading information and propaganda.

Traditionally, the course of industrial development has been governed by the "Rule of Law," under which industry was held responsible and liable for damage which its activities inflicted on the public. Such responsibility imposed a natural discipline on industrial development.

In sharp reversal of this Rule of Law, the Atomic Energy Indemnity Act has set aside the traditional responsibility of industry for protecting the public in the field of reactor development, and has shifted the corresponding obligations to the Government.

This form of subsidy and increased bureaucratic control was clearly identified by Representative Holifield in May 1957: "There is a curious paradox in the position of private atomic industry, which demands that the Government withdraw from atomic activities and at the same time asks for Government subsidies. The paradox is that as a condition of granting the subsidies, the Atomic Energy Commission is taking over upon itself more and more discretionary power and

assuming new instruments of control. By legislation of the kind proposed here, the Congress would spawn not only subsidies to private industry, but new forms of bureaucratic control which, in the end, would defeat the very objectives sought by industry."

Abuse of the profit motive

It is a unique spectacle now to observe a few business interests appearing before this committee with the primary objective of shifting a major part of a tremendous liability to the taxpayers in the event of an accident that may have occurred due to a failure in their own performance. In my judgment, this violates the most elementary principles of corporate responsibility.

In recent years, this deficiency in corporate responsibility has resulted in reactor manufacturers entering the construction contract field with so-called "turn-key contracts" for the design and construction of atomic powerplants. Under this arrangement, an engineering firm is invited to participate as a submissive subcontractor who obviously is in no position to assume the total engineering responsibility for the successful and safe performance of the powerplant or to advise against its construction because of its peril to the public. This disruption of traditional lines of responsibility and self-discipline is understood by very few. However, it does simplify the process of making more money out of the contract.

Safety by propaganda

This situation is further aggravated by false claims of "competitive" atomic power and efforts to suppress references to the great variety of subsidies in present-day atomic power production. The real tragedy is the effort by some companies to allay the public's fear through over-optimistic advertisements and by a campaign of "safety by propaganda."

Unfortunately, the manufacturers and utilities active in atomic power, along with the professional engineering societies, have failed to establish adequate lines of communication and publication. As a consequence, it is extremely difficult to assemble reliable information, particularly on deficiencies and failures, from which the most important lessons may be learned. Granted that a variety of agencies, both Government and private, are engaged in publishing and disseminating technical articles and descriptive material on various atomic powerplants, considerable work is required to condense the information into a meaningful record of experiences for developing judgment at the engineering, administrative or political level. (See app. A.)

On the other hand, there is a tremendous amount of promotional literature available full of glowing claims of achievements, or potentialities for the future, which very often exceeds the bounds of responsible advertising, let alone responsible professional journalism. All of this has served to create a general misconception in the minds of the public and others who are engaged in developing opinion or making decisions.

There is, of course, no disgrace connected with an experiment of research venture failing to meet expectations. In fact, such initiative deserves high commendation, especially when tremendous sums of private money are involved. Unfortunately, however, the image of the atomic power program as a research venture was not permitted to emerge. Instead, there has been a regrettable trend towards "covering up" technical and financial failures by withholding information of general interest.

Responsibilities of the board of directors

In recent years there has been a significant breakdown in communication between various levels of corporate responsibility. At the planning level for a new atomic powerplant there is often a lack of understanding of the corporate responsibilities carried by the board of directors in relationship to the public and to the company's customers.

At the board level, the individual directors are confronted with the necessity of accepting the representations made by the planning staff and the nuclear experts. Some directors are unaware that atomic powerplants are not insurable under the traditional standards of corporate responsibility. Furthermore, they have not taken the time to study the question of corporate ethics under the Federal indemnity plan.

With the erosion of the traditional sense of responsibility under the Indemnity Act, the utility companies are losing three lines of protection which have traditionally applied in the field of industrial development:

1. The standards of corporate responsibility of the board of directors which would not allow the public to be exposed to undue peril, and particularly to one that is uninsurable.
2. The advice of insurance counselors who would not permit the creation of an undue peril involving a potential loss beyond the insurer's ability to pay.
3. The counsel, similar to legal or financial counsel, of independent consulting engineers with the requisite competence, who in former years had the courage and ability to advise a board of directors against embarking on a project contrary to the public's and the company's best interest.

APPENDIX F

HOW SAFE IS A REACTOR?

In terms of engineering history, atomic power engineering is in the embryonic stage. The development process, in terms of failures and lessons to be learned therefrom, has barely begun. For current projects false design criteria are being developed around the concept of "credible accidents."

The problem of safe design of reactors has been examined by Dr. C. Rogers McCullough, the former chairman of the AEC's Advisory Committee on Reactor Safeguards. In 1956 his committee advised against the construction of the atomic powerplant near Detroit, and in his book "Safety Aspects of Nuclear Reactors" he presented the following notable analysis:

"* * * of course absolute safety is not possible and what is really meant in connection with reactor hazards is the minimization of hazards until one has an acceptable calculated risk.

"The operation of nuclear reactors appears safe and it is in fact deceptively safe. * * * We have been exceedingly lucky so far that nobody has as yet been killed by a runaway reactor. It is not possible to count on indefinite continuation of such good luck. * * *

"With all the inherent safeguards that can be put into a reactor, there is still no foolproof system. Any system can be defeated by a great enough fool. The real danger occurs when a false sense of security causes a relaxation of caution (Dr. Teller). * * *

"Substantial moral and ethical problems are involved in connection with reactor hazards * * * for off-site people * * * who have no knowledge or interest in the operation of the reactor. It seems that prevention of danger to their person or damage to their property is a mandatory moral obligation in the operation of a reactor. This problem is more severe than in the case of dangerous chemical or explosives plants, because the radioactivity contained in a reactor can constitute a hazard to a wide area if it escapes from a machine and becomes dispersed. * * *

"* * * The potential ability of a reactor to run away may make it possible for this radioactive material to escape to the surrounding areas. The hazard is crudely analogous to conducting both explosive and virulent poison production under the same roof.

"An outstanding characteristic of nuclear reactors is their potential ability to achieve extremely high power levels in a short time if adequate control of the machine is lost. A typical nuclear runaway accident may start and be over in times appreciably less than a second. * * *

"* * * In the event of a reactor accident, there will probably result a release of radioactive material from the reactor * * * Finally, radioactive materials can escape from the reactor site altogether. Fission products may be carried in the wind and spread over adjacent populated areas and constitute an acute hazard. Radioactive materials may escape into the ground and be carried by the percolating ground water to adjacent rivers or other water supplies * * * it is desirable to have the prevailing wind flow from the reactor to uninhabited areas. It is also desirable to have the reactor site not be located on a main watershed. From the point of view of the hazard alone, it is of course desirable to have the reactor site far from populous or vital industrial areas. * * *

"Perhaps it is important again to emphasize the degree of public hazard that might follow a reactor accident. Assuming that good luck prevails and no one is killed, it may nevertheless be necessary to evacuate a large city, to abandon a major watershed, and very probably it would be necessary to make the reactor site itself a forbidden area for some years to come.

"* * * We believe that useful electric power in large quantities can be generated by nuclear reactors. It is our concern that rapid progress shall be made, but that enough caution shall be observed that no catastrophic event will delay the fruition of reactor development."

Court action on a question of safety

In August 1956, after public release of the adverse report of the Safeguards Committee on the Detroit reactor, representatives of organized labor filed a petition requesting the AEC to order suspension of the construction permit because the reactor would create hazards which would imperil lives, health, and property. Hearings were held in 1957 and the AEC's opinion and final decision was handed down on May 26, 1959, with the conclusion that the construction permit should be continued.

This decision was appealed to the U.S. Court of Appeals which decided in favor of the protest group on June 10, 1960, and ordered the construction work shut down.

In November 1960, a further appeal was carried to the U.S. Supreme Court but, unfortunately, this Court did not examine the question of operating safety. It reversed the court of appeals and chose to limit its decision to the legality of the construction permit, and to isolate it from the further procedures of applying for an operating permit. The protesting group was advised that it had the privilege of returning for a judicial review after a normal operating license had been granted. However, to date no such license has been issued.

This is a further demonstration of the confusion and tremendous loss in investment that can take place when there is no clear-cut corporate responsibility in complete charge of a new venture. The confusion was identified with exceptional clarity in the minority opinion of the U.S. Supreme Court, which declared: "This legislative history makes clear that the time when the issue of 'safety' must be resolved is before the Commission issues a construction permit. The construction given the act by the Commission (and today approved) is, with all deference, a lighthearted approach to the most awesome, the most deadly, the most dangerous process that man has ever conceived."

Lessons from failures

History has repeatedly shown that most major accidents have resulted from a combination of circumstances previously considered incredible. For example, on May 17, 1959, most of the Manhattan area of New York was blacked out by a major failure in the underground electrical distribution circuits. The only explanation subsequently developed was that this failure was caused by "* * * the happenstance of a group of feeder failures serving a single area at a particular time. This was entirely unforeseeable. * * *"

A great variety of operating difficulties and failures of control and other equipment have occurred in the various atomic powerplants constructed to date. These have recently been summarized in a paper which I presented at the American Power Conference in Chicago on April 28, 1965, under the title "Atomic Power Plants—What's Wrong With Them?" (app. A).

A further failure occurred on February 5, 1965, in the Indian Point, N.Y., reactor when a control rod jammed in the open position because of a small foreign metal object that had fallen into one of the control rod mechanisms. The official report on this failure described the great loss of time and unusual difficulties encountered in finally discovering the cause of this failure and declared: "It is incredible that more than one control rod could stick in this manner."

A reduced compulsion for safe engineering

During the 8 years since enactment of the Atomic Energy Indemnity Act there has been a growing pressure to reduce costs at the expense of sound engineering practice. The argument is repeatedly advanced that greater cost of safety features would interfere with the "commercial feasibility" and with the objective of developing "competitive" atomic power. However, such cost cutting must be regarded as irresponsible corner cutting on public safety.

The current trend is to locate reactors at ground level in or near populous areas, and to design them for the criterion of "the maximum credible accident." But there is a basic fallacy in this concept. The possibility of an accident or disaster is ever present, and the worst disaster has been the most incredible. Generally, out of a painstaking investigation of a disaster a complex chain of "incredible" circumstances has emerged to explain the cause.

Modern history records numerous disasters in engineering and technology, with tragic loss of life, such as the sinking of the "unsinkable" *Titanic*, the conflagration in the "fireproof" Iroquois theater, the explosion of gas in the new school of New London, Tex., the collision of two large passenger airplanes over the vast expanse of the Grand Canyon region—many others could be cited. In every case there was a great loss of life and property. And in every case the odds against the occurrence were undoubtedly considered to be fantastically large. Nonetheless, they did occur and there is no reason to believe that others will not occur in the future.

Management's responsibility

It is a terrifying picture to see responsible managements in the electric utilities and in the manufacturing industries claiming that the requisite competence already exists, along with all of the expert knowledge and experience, to build reactors of the same capacity as has been developed only in recent years for steam powerplants. The experience in atomic power represents only an extremely small fraction of 1 percent of the cumulative power production from the traditional types of steam powerplants. When we consider, on top of this, the horrible consequences and destruction from the release of fission products in the event of a major failure of an atomic power reactor, it leaves one speechless.

APPENDIX 8

NATIONAL COAL ASSOCIATION LETTER AND PAMPHLET, "WHAT'S THE PRICE OF PRICE-ANDERSON?" JUNE 2, 1965

NATIONAL COAL ASSOCIATION,
Washington, D.C., June 2, 1965.

Hon. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
U.S. House of Representatives,
Washington, D.C.

DEAR CONGRESSMAN HOLIFIELD: As chairman of the Joint Committee on Atomic Energy you are aware that your committee will hold hearings during the week of June 21 on proposals to extend the Price-Anderson Act for another 10 years. You are also aware of the overriding importance of this proposal.

Members of Congress who are not members of the Joint Committee do not have the same opportunity to keep abreast of the issues involved in atomic energy legislation. We are therefore writing to each of them, explaining the importance of this legislation and our views with respect thereto.

For your information, we are enclosing a copy of the letter and pamphlet we are sending to those Members of Congress.

Sincerely,

STEPHEN F. DUNN, *President.*

NATIONAL COAL ASSOCIATION,
Washington, D.C., June 2, 1965.

DEAR ———: The Joint Committee on Atomic Energy has announced that it will hold hearings during the week of June 21 on proposals to extend the Price-Anderson Act for another 10 years.

The extension of the Price-Anderson Act is one of the most important legislative proposals to come before Congress in this session. We believe it warrants your careful scrutiny.

This act is frequently represented as granting financial protection to the public because through it the Government makes available $500 million insurance to cover atomic powerplant operations. The truth is, however, that the act contains another provision—a very important provision—which eliminates liability for damages in excess of the insurance so provided. It thus requires the members of the public to subsidize these plants by forcing them to become involuntary self-insurers without compensation.

We believe the time has come to apply the ordinary rules of law to atomic powerplants. If additional insurance is considered necessary for the protection of the public, the Government should provide such insurance, at comparable commercial rates, and let the atomic plant operator buy as much insurance as

he deems proper. Above the amount of insurance so purchased, the ordinary rules of law should apply—the public should not be required to subsidize the operation of these plants through loss of the right to recover damages.

The attached pamphlet explains in detail the provisions of the Price-Anderson Act and the reasons why we believe it should not be continued. We urge you to study it carefully, in order that you will be well informed when you are asked to vote on the extension of this act.

Sincerely,

STEPHEN F. DUNN, *President.*

Enclosure.

WHAT'S THE PRICE OF PRICE-ANDERSON?

WHERE DOES ATOMIC POWER STAND TODAY?

Within the last few years atomic power has started to come into its own as a substantial source of electricity. Thirteen atomic powerplants already have been completed. When operated at capacity, these plants will generate about 1 million kilowatts of electricity. Five more plants are under construction; when completed, they will add another 1.7 million kilowatts of capacity.

These 2.7 million kilowatts of atomic electric generating capacity will represent about 6.6 percent of the electric utilities' total capacity, according to Federal Power Commission estimates. Still other utilities are considering "going atomic" when the time comes to build new generating stations to meet the increasing demands for electric energy.

Thus the atom is rapidly becoming another important source of fuel for electric power generation.

The electric utilities are the bituminous coal industry's biggest customers. Coal competes for its share of this market without Government assistance—in the spirit of free competition that is the heart of the American economic system.

But atomic power has arrived in the marketplace by way of the U.S. Treasury, reaching its present stage of development under a Government-sponsored program which has cost more than $1 billion in the last 10 years. The U.S. Atomic Energy Commission has paid millions of dollars in direct subsidies to atomic powerplant designers and builders, as well as to electric utilities operating atomic powerplants.

And that's not all. Laws governing the atomic energy program have provided many indirect subsidies for utilities owning and operating the plants.

WHAT'S THE HURRY?

Back in the 1950's it was argued that Federal subsidies were necessary to interest the utilities in developing atomic power. It was contended that sometime in the distant future atomic power would be needed to supplement the Nation's conventional fuel resources.

Leaders of the coal, oil, and natural gas industries did not oppose Government-financed atomic power research, even though the Nation had—and still has—enough conventional fuel to last for many generations. In fact, reports of the U.S. Geological Survey show reserves of coal alone which would last hundreds and hundreds of years at present production rates.

However, now that atomic power has been nursed from an abstract concept to a competitor for coal's biggest market, the coal industry contends there is no reason to continue the Government subsidies which put the atom where it is today. And there is no need for multimillion-dollar "crash" programs to develop newer and more sophisticated atomic powerplants. These will come along through private initiative as the need for them develops.

Even some of the original supporters of subsidies now recognize that the Government should not be underwriting one side in a business competition. Various direct and indirect Federal subsidies recently have been eliminated, at least for the most common types of atomic plants. But other subsidies remain, giving atomic powerplants a built-in competitive advantage over conventional generating plants. One of these is the Price-Anderson Act of 1957.

WHAT IS "PRICE-ANDERSON"?

In 1957, Congress passed the Price-Anderson Act to give the public some financial protection against the consequences of a "nuclear incident" involving any atomic reactor licensed by the Atomic Energy Commission. This protection

takes the form of public liability insurance bought by the licensed operator, plus an indemnification agreement between the operator and AEC.

The law says the operator of any atomic plant capable of generating more than 100,000 kilowatts of electricity—a medium-sized plant—must buy the "maximum amount" of liability insurance available from private sources. So far, the liability insurance industry will not sell more than $60 million worth of coverage per plant.

The law then guarantees that the Government will indemnify the operator for the next $500 million in liability.

Thus, the combined insurance-indemnification protection for each atomic powerplant is $560 million.

The operator pays the annual premium on the $60 million liability insurance policy. This premium varies according to the size of the plant, the population density in the area around the plant, and other factors; for a 500,000-kilowatt plant, it would be about $200,000 a year.

Under the Government agreement to pay for the next $500 million in liability, the operator pays a fee to AEC based on the thermal (heat) rating of the plant; for a 500,000-kilowatt plant, this would be about $50,000 a year.

There is an additional provision in the law—a key provision—a provision which has not been called to the attention of the public and which is not understood by the public.

The Price-Anderson Act also puts a ceiling on the "aggregate liability for a single nuclear incident." The law says this "shall not exceed the sum of $500 million together with the amount of financial protection required of the licensee." In other words, the "aggregate liability"—total liability—is limited to $560 million.

Beyond this limit, no one may be held liable for damages, and the Price-Anderson Act makes this clear. It says if "the public liability from a single nuclear incident will probably exceed the limit of liability" ($560 million), the appropriate Federal district court would apportion the $560 million among all the claimants in relation to the amount of each claim. Thus, if the total damages from "a single nuclear incident" were $840 million, each claimant would get $2 for each $3 in damages.

Careful scutiny reveals the effect of this provision: The public is required, by law, to subsidize atomic powerplants through involuntary self-insurance, without compensation, for the amount of damages in excess of an arbitrary amount.

WHAT'S THE DIFFERENCE?

Ordinarily, the claimant could file suit against the corporate assets of the utility operator and/or the manufacturer for the remaining one-third of his losses. But not against the operator or manufacturer of an atomic powerplant.

The Price-Anderson Act shields the operator's assets—and the manufacturer's assets as well—from claims arising out of a "nuclear incident." The law not only limits "aggregate liability" to $560 million, but says there may be taken from this sum "the reasonable costs of investigating and settling claims and defending suits for damage."

The subsidies involved in the Price-Anderson insurance-indemnification program are important considerations for utilities deciding whether to use atomic power or conventional fuels in their next big generating plants. There is no subsidy in the premium on the $60 million in private liability insurance, but the rest of the Price-Anderson program involves subsidies of significant value. They give atomic power stations an inherent economic advantage over plants fired by coal, oil, or gas.

The fee for Government indemnification is little more than a token payment for a half-billion dollars worth of financial protection. Added to the insurance premium, it means that for about $250,000 a year the operator of a 500,000-kilowatt atomic powerplant buys complete financial immunity from liability for any "nuclear incident."

Complete financial immunity from the consequences of an atomic powerplant "incident" is clearly granted under the Price-Anderson Act. The law says, in substance, that the public has no recourse for damages in excess of the $560 million coverage for "a single nuclear incident."

The operating utility, therefore, does not risk a nickel of its corporate assets by "going atomic." The same is true of the manufacturer of the atomic powerplant.

No such refuge from financial responsibility is available to operators of conventional powerplants—or to private citizens for that matter. The motorist, for example, may be held liable for damages caused by his automobile in an accident. He may (and in many States he must) buy liability insurance, but if damages exceed the face value of his policy he can still be held liable for damages not covered by his insurance. The courts can seize his assets—even his home—to satisfy the claims.

But the operating utility does not risk its corporate assets to damage claims by "going atomic." The Price-Anderson Act exempts the operator from this responsibility. It also exempts the atomic plant manufacturer.

This is the "price" of Price-Anderson: That the public is required to subsidize atomic plants through involuntary self-insurance, without compensation, for damage in excess of an arbitrary amount.

WHAT SHOULD CONGRESS DO?

The Atomic Energy Commission, the manufacturers of atomic powerplants, and the utilities say atomic powerplants are safe. It follows that the subsidies in the Price-Anderson Act are unnecessary. They should be discontinued.

The coal industry believes Congress should immediately repeal the limitation of liability (i.e., the no recourse provision) in the Price-Anderson Act. This would restore to citizens their ordinary legal right to full compensation for damages.

Congress also should end the $500 million indemnity protection now granted to atomic powerplant operators for a token fee. If Congress feels, however, that the public should have additional insurance protection, beyond the amount available through private sources, the law should be amended to provide Government insurance at comparable commercial rates.

The Government—the Atomic Energy Commission—logically could charge $500 to $1,000 as the annual premium for each $1 million in insurance purchased by an atomic powerplant operator. The range is comparable to the premium the liability insurance industry would charge if it were willing to insure atomic plants for more than the present maximum of $60 million.

With a reasonable annual premium such as this, the Government could afford to sell the utilities as much liability insurance as they are willing to carry. And the total amount of protection available would not be limited to the $500 million in Government indemnification provided in the law.

The coal industry believes the subsidies should be taken out of the Price-Anderson Act to restore—

The ordinary legal rights of the public to full compensation for damages.

The right of the coal industry to compete on equitable terms for its share of the electric utility fuel market.

APPENDIX 9

APPENDIXES TO STATEMENT BY ASHLEY ST. CLAIR ON H.R. 8496 AND S. 2042, DELIVERED JUNE 24, 1965

AMERICAN MUTUAL REINSURANCE CO.,
Chicago, Ill., February 8, 1965.

Re Mutual Atomic Energy Reinsurance Pool.

DEAR ———: I am pleased to enclose your copy of the recent Report and Recommendations of the Underwriting Committee of the Mutual Atomic Energy Reinsurance Pool.

The report is encouraging. We appear to be on the threshold of a breakthrough in the nuclear power industry. Influential members of Congress are looking toward a reduction in the amount of Government indemnity and its eventual replacement by private insurance in the nuclear field. Although our premium volume has not been large, we have been operating in the black.

It is evident, however, that the growth of the nuclear power industry over the next 15 years will require corresponding increases in the capacity of the Mutual Atomic Energy Reinsurance Pool. How well our industry responds may also have an important effect on other phases of our business where Government programs are being sponsored to take the place of private insurance.

You will note that the underwriting committee recommends a 50-percent increase in the capacity of the pool effective January 1, 1966, and periodic increases thereafter as the projected expansion of the nuclear power industry materializes.

The capacity recommended for 1966 could of course be achieved if all participants were to increase their participations 50 percent. This should be a first consideration.

Some participants, including members of the Underwriting Committee, have committed themselves much more heavily than others during the formative years of the pool. One of the most difficult problems facing the committee, and indeed all of our participants, has been that of finding some reasonable measure by which they may determine an equitable subscription on a long term or continuing basis.

The 1966 objective would also be reached if each participant were to subscribe to the extent of 1½ percent of current surplus. Such a standard might provide a guide for the further expansions of pool capacity, as we may assume a continuing increase in the resources of mutual companies. Participations in excess of the amounts suggested above will of course be most welcome and may prove increasingly attractive with the growth of the pool's business.

Prompt action on the Underwriting Committee's recommendation is needed. The Joint Committee on Atomic Energy plans to hold hearings in early March of this year on a bill extending the Price-Anderson Act. The Joint Committee has requested us to advise it as soon as possible of our expected capacity as of January 1, 1966, and to give the most accurate estimates we can of our future capacity based on the projected expansion of the nuclear power industry. Repreresentatives of the Underwriting Committee will be expected to testify at the hearing.

Will you please let me have by March 1, 1965, your best estimate of your participation effective January 1, 1966. It will also be most helpful to the Underwriting Committee in estimating future capacity if you will indicate whether your company will consider 1½ percent of surplus, or some reasonable percentage of surplus, as a guide to determining its future participation, assuming that a substantial majority of the other participants are willing to do the same.

Very truly yours,

ROY H. HEYEN, *President.*

MUTUAL ATOMIC ENERGY REINSURANCE POOL

Report to Participants and Recommendations for Increased Capacity by the Underwriting Committee February 1, 1965

BACKGROUND

The Mutual Atomic Energy Reinsurance Pool was formed in 1956 to afford mutual insurance companies a facility for participating effectively in the growth of the nuclear industry and to counteract a tendency to turn to the Government for the solution of large and difficult insurance problems.

The pool operates in two areas. With respect to third party liability it reinsures the nuclear energy hazard only. With respect to property damage to nuclear facilities the pool provides reinsurance against all risks, including the nuclear hazard. The present capacity of the pool is about $17,300,000, of which 58 percent has been allocated by the Underwriting Committee to third party liability and 42 percent to physical damage reinsurance.

After several months of study, including consultations with members of the Joint Committee on Atomic Energy of the Congress, the Atomic Energy Commission and its staff, representatives of the corresponding stock pools, NELIA and NEPIA, and with representatives of the nuclear industry, the Underwriting Committee of the pool has concluded that an immediate increase in the capacity of the pool is required and that regular increases will be required over the next decade, if the objective of the pool are to be realized in the future.

Specific recommendations will be made with respect to each phase of the pool's operations following a more detailed discussion of the factors involved.

SECTION A—THIRD PARTY LIABILITY

I. *Present capacity of the insurance industry.*—Third party liability insurance for nuclear risks in the United States is afforded through the stock pool, NELIA, and Mutual Atomic Energy Liability Underwriters (MAELU), the underwriting facility of MAERP.

The present capacities of NELIA and MAELU are $46½ million and $13½ million, respectively—or a total of $60 million. This amount has been determined by the Atomic Energy Commission to be the maximum amount of insurance available to meet the financial protection requirements of the Price-Anderson Act. Under automatic reinsurance agreements MAERP has a 22.5-percent quota share interest in each nuclear risk written by either NELIA or MAELU in the United States. For convenience all of the exhibits in this section of the report are based on the combined experience of NELIA and MAELU.

Because third party liability insurance against the nuclear energy hazard is so closely geared to the Price-Anderson Act, a brief summary of its provisions will be helpful for the purpose of interpreting the past results and future potential of the nuclear pools.

II. *The Price-Anderson Act.*—The Price-Anderson Act was cosponsored by Congressman Price and Senator Anderson of the Joint Committee on Atomic Energy. These gentlemen are still senior and active members of the Committee.

The act was passed in 1957 to encourage the growth of a privately owned nuclear industry and to protect the public against the consequences of a highly remote, but possible nuclear catastrophe. To accomplish these objectives the act provides for $500 million of Government indemnity and a limitation of liability to that amount plus the amount of any underlying layer of financial protection from private sources which may be required.

Speaking rather generally, the indemnity and limitation of liability apply only with respect to activities with a subtantial risk of a nuclear incident, whether carried on by the Atomic Energy Commission's contractors or by its licensees The amount of financial protection is largely within the discretion of the AEC, with one notable exception: All privately owned and licensed facilities designed for producing substantial amounts of electricity and having a rated capacity of 100 megawatts (electrical) or more must maintain financial protection equal to the maximum amount of private insurance available. The AEC has to date required no financial protection for its contractors and rather nominal amounts for all licensees other than those engaged in the generating of electrical power.

III. *Experience to date.*—All third party liability insurance written by NELIA and MAELU in the United States is subject to an industry credit rating plan under which approximately 70 percent of the standard premiums are held in a reserve fund. The reserve fund is immediately available to pay losses; but if the reserve fund is not so used, ratable returns are made to policyholders each year after a waiting period of 10 years. The first returns will be due in 1967.

Exhibit I shows the growth of annual premiums and the reserve fund from 1957 through 1965. Exhibit II shows the 1965 distribution of risks and premiums by type of risk.

EXHIBIT I.—*Summary of standard premiums and reserve premiums*

[Years 1957–63—Final; years 1964–65—Tentative]

Year	Standard premium	Reserve premium
1957	$70,142.02	$47,706.83
1958	357,465.01	243,479.51
1959	714,686.79	492,224.76
1960	1,167,233.36	813,860.42
1961	1,496,976.77	1,048,178.02
1962	1,734,817.24	1,216,888.50
1963	2,048,180.48	1,450,162.28
1964	2,105,500.44	1,487,372.89
1965	2,200,000.00	1,554,129.50
Total	11,895,002.11	8,354,002.71

EXHIBIT II.—*1965 policy and premium distributions by type of risk*

Type of risk	Number of policies	Estimated premium
Indemnified nuclear facilities:		
(1) Maximum financial protection required	3	$624,500
(2) Reduced financial protection required	12	445,000
(3) Nonprofit educational institutions	29	85,000
Nonindemnified nuclear facilities	85	383,500
Suppliers and transporters	200	662,000
Total	329	2,200,000

All of the indemnified nuclear facilities in subcategory (1) above and the largest premium producers in subcategory (2) provide power for electrical generating stations. The exhibit indicates that the future development of nuclear powered generating capacity of the electric utilities will have a major effect on the growth of the nuclear pools.

IV. *Estimated growth of the nuclear electrical generating capacity in the United States 1965–80.*—In November of 1962 the Atomic Energy Commission submitted a report to the President on "Civilian Nuclear Power" which contained forecasts of nuclear power growth through the year 2000. These forecasts have not been formally updated by the Commission, but the best estimates available from the staff of the Commission as of July 1964 are projected, together with those of the original report, in the following exhibit.

EXHIBIT III.—*Electrical utility nuclear generating capacity*

[Megawatts installed]

Year end	1962 report to President	1964 staff estimate
1965	1,350	1,900
1970	5,000	6,000
1975	16,000	20,000–35,000
1980	40,000	60,000–90,000

The Federal Power Commission's survey released on December 13, 1964, is within the range of the staff estimate. The FPC estimates that 525,000 megawatts of installed capacity will be needed by the U.S. electrical utility industry by 1980. It expects 13 percent of this capacity, or about 70,000 megawatts to be furnished by nuclear plants.

V. *Estimated growth of NELIA and MAELU.*—Exhibit IV shows the estimated growth of NELIA and MAELU over the period 1965–75, based on the assumption that the nuclear power utility generating capacity will grow in accordance with the AEC's predictions. The figures assume that the present rating plans of the pools and the present financial protection requirements of the Price-Anderson Act, which include a maximum of $60 million per nuclear facility, will prevail throughout the period. The reserve fund estimates assume a continuation of the virtually loss-free experience of the pools and are adjusted to allow for returns under the industry credit rating plan.

EXHIBIT IV.—*Estimated premiums and reserve fund growth*

Year	Annual premiums	Premiums [1]	Reserve fund [1]
1965	$2,200,000	$12,000,000	$8,350,000
1970	4,300,000	30,000,000	20,000,000
1975	9,500,000	68,000,000	40,000,000

[1] Cumulative from 1957.

VI. *Immediate and long-range demands for increased capacity.*—The previous exhibits show clearly that the growth of the nuclear pool depends to a large extent upon the growth of the nuclear power industry. The Price-Anderson Act, which has been a major factor in the expansion of that industry, will expire on August 1, 1967. The consensus of the Joint Committee on Atomic Energy, the Atomic Energy Commission, and the nuclear industry is that the act should be extended for another 10 years and that congressional action should be taken promptly. The governing committee of NELIA and the underwriting committee of MAERP concur in this view. Opposition is expected from the fossil fuel industry on the ground that the indemnity provisions are a subsidy. An important consideration in the extension of Price-Anderson will undoubtedly be the amount of private insurance available as underlying financial protection and the amount of supplementary government indemnity required to meet the original objectives of the act.

Congressman Holifield, the chairman of the Joint Committee on Atomic Energy has already publicly stated that legislation will be introduced early in the 1965 session of Congress extending Price-Anderson for another 10 years, but that the indemnity coverage would be reduced by an amount equal to the increased private insurance coverage available. Moreover, Mr. Holifield has indicated that although the private insurance market cannot provide full liability coverage for the nuclear industry at this time, he feels that it should be able to increase the basic coverage from a maximum of $60 million to about $100 million. In commenting on this proposal, Mr. Holifield said: "Ultimately, I would hope that we could completely dispense with the need for governmental indemnity and rely entirely upon the private insurance market."

The underwriting committee's position has always been that while there is no objection to Government indemnity where private insurance cannot or is unwilling to perform, the Government should not intrude into areas where insurers can afford normal insurance services at reasonable cost. The attitude of Mr. Holifield is entirely consistent with the underwriting committee position and is believed to be shared by other senior members of the Joint Committee on Atomic Energy. Standing as it does in marked contrast to the advocacy in some quarters for large-scale takeovers by the Government of private insurance functions, Mr. Holifield's attitude presents private insurers with an immediate and continuing challenge to increase capacity for third party nuclear liability insurance.

In studying Mr. Holifield's proposal, the underwriting committee notes that there are now only three reactors in operation which would require the additional capacity. Premium rates can be expected to reach the minimum at or before the $60 million level. The increase in capacity would initially involve a very high concentration of risk at low premium volume. Prospects over the long run are better, as the economics of the electrical generating utilities are such that larger generating stations are favored. Conventional plants are reaching the 1,000-megawatt stage. Nuclear units of over 600-megawatt capacity are being designed and nuclear design studies indicate that 1,000 megawatt nuclear units are feasible, although none is actually under construction. All new nuclear powerplants will undoubtedly exceed the 100-megawatt level specified in the Price-Anderson Act as requiring the maximum amount of private insurance available.

Because of the number and the nature of the assumptions that must be made, it is somewhat hazardous to predict the ultimate spread of risk and the additional premiums to be expected from a $40 million increase in capacity. If we assume 600 megawatts as the average size of nuclear powerplants over the next 15 years, the data from exhibit III indicate that the following number of nuclear powerplants may be expected:

Basis

Year	1962 report to President	1964 staff estimate
1970	8	10
1975	27	33–58
1980	67	100–150

On the basis of current rating plans the additional premiums in 1975 would range from about $1.1 to $2.3 million and from about $2.7 to $6 million in 1980, depending on whether the most conservative or the most optimistic estimate of nuclear power growth is used. About 70 percent of this premium would go into the reserve fund.

Before making a specific recommendation with respect to increases in third party liability insurance capacity, the underwriting committee feels it advisable to review the competing demands for increased capacity with respect to the property damage phase of the pool's operations.

SECTION B—PROPERTY DAMAGE

Insurance for property damage for nuclear risks in the United States is afforded through the stock pool, NEPIA, and through mutual companies reinsure by MAERP.

The present capacities of NEPIA and MAERP are about $50 million and $10 million, respectively—or a total of about $60 million for any one risk. Under automatic reinsurance arrangements MAERP has a 15.2-percent quota share interest in each nuclear risk written by NEPIA or by a participant in MAERP.

The Price-Anderson Act does not afford indemnity to licensees with respect to property damage to their nuclear facilities. The property damage pools constitute the only major primary source of property damage protection, although excess capacity above the amounts offered by the pools has been obtained in specific instances. The property damage coverage is all-risk in nature. Rates are not subject to an industry credit rating plan.

The latest available combined figures (November 1964) show the following cumulative results for NEPIA and MAERP since 1957: Earned premiums $8 million, incurred losses $1,800,000 and expense $1,400,000, leaving an underwriting gain of slightly more than $4,400,000. There have been 73 incidents reported at insured property, of which 35 have resulted in losses.

The annual premium for 1964 is estimated at approximately $2,500,000. A number of large reactors with an insurable value of $90 to $110 million are scheduled for start up in the near future. The following information concerning estimated size and startup time has been furnished by the Atomic Industrial Forum:

Reactor	Size (megawatts electrical)	Scheduled start-up
Southern California Edison	395	1967
Connecticut Yankee	490	1967
Jersey Central Power & Light	540	1967
Niagara Mohawk Power Corp	525	1967
Los Angeles Department of Water Power	490	1968

As soon as these large reactors are built the annual premium is anticipated to be about $5 million. This may be reduced somewhat as insureds take advantage of the wider range of deductibles which has just been agreed upon by the property groups. Although extensions in this area are always difficult, it is anticipated that property damage premium will more than double by 1970 and will double again by 1975 to reach a total of close to $10 million annually by that time.

On the basis of the foregoing estimates of scheduled startup time and insurable values a combined property damage capacity of about $100 million will be needed by 1967. If the forecasts are correct that future nuclear powerplants will approach or reach the 1,000 megawatt stage, the insurable values of plant and fuel inventories will be substantially higher. The underwriting committee believes that MAERP should be prepared to accept at least its present proportion of the capacity which will be required.

RECOMMENDATIONS OF THE UNDERWRITING COMMITTEE

Third party liability.—The underwriting committee does not believe that a very satisfactory spread of risk will develop with respect to increased capacity until toward the middle or end of the period 1965–75. A factor which must be kept in mind in this connection is that if a nuclear catastrophe were to involve a third party loss in excess of $60 million, the loss would almost certainly be superimposed upon a total property damage loss to the nuclear facility itself insured under the property damage phase of the pool's operations.

The underwriting committee does not feel it can recommend an increase at this time to the full $40 million suggested by Mr. Holifield. It believes this objective should be attained over the next decade and recommends an increase of 25 percent for 1966 with periodic increases thereafter as the projected growth of the nuclear industry and the reserve fund is realized. The recommended increase in MAERP's capacity for 1966 amounts to $3,375,000.

Property damage.—The underwriting committee feels that there is a need to expand the total stock-mutual capacity from the present $60 million to $100 million by 1967 at the latest. If the mutual insurers are to maintain their current proportion of the total capacity required, MAERP must raise slightly more than $6 million. Although this capacity will be on a standby basis during 1966, it should be raised simultaneously with the third party liability capacity, as the participating agreements contemplate an undivided subscription to both phases of the pool's operations.

Summary.—The underwriting committee recommends a total increase of 50 percent in the capacity of MAERP as of January 1, 1966. With an anticipated increased participation from foreign reinsurers, this should enable MAELU to afford a 25-percent increase in its third party liability coverage and should enable MAERP to maintain its present percentage of a combined stock-mutual physical damage capacity of $100 million.

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

AMERICAN MUTUAL LIABILITY INSURANCE COMPANY, Wakefield, Massachusetts
EMPLOYERS MUTUAL LIABILITY INSURANCE COMPANY OF WISCONSIN, Wausau, Wisconsin
HARDWARE MUTUAL CASUALTY COMPANY, Stevens Point, Wisconsin
LIBERTY MUTUAL INSURANCE COMPANY, Boston, Massachusetts
LUMBERMENS MUTUAL CASUALTY COMPANY, Chicago, Illinois
MICHIGAN MUTUAL LIABILITY COMPANY, Detroit, Michigan

NUCLEAR ENERGY LIABILITY POLICY

(FACILITY FORM)

SPECIMEN

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

919 North Michigan Avenue, Chicago 11, Illinois

Nuclear Energy Liability Policy No. **MF—**_____
(Facility Form)

DECLARATIONS

Item 1. Named Insured_____

Address_____
(No. Street Town or City State)

Item 2. Policy Period: Beginning at 12:01 A.M. on the_____day of_____, 19____, and continuing through the effective date of the cancelation or termination of this policy, standard time at the address of the named insured as stated herein.

Item 3. Description of the Facility:

Location_____

Type_____

The Operator of the facility is_____

Item 4. The limit of the companies' liability is $_____ subject to all the terms of this policy having reference thereto.

Item 5. Advance Premium $_____

Item 6. These declarations and the schedules forming a part hereof give a complete description of the facility, insofar as it relates to the nuclear energy hazard, except as noted_____

Date of Issue_____ Countersigned by_____
Authorized Representative

Nuclear Energy Liability Policy (Facility Form) 2/1/57 (Second Revision)

NUCLEAR ENERGY LIABILITY POLICY

(FACILITY FORM)

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

AMERICAN MUTUAL LIABILITY INSURANCE COMPANY, Wakefield, Massachusetts
EMPLOYERS MUTUAL LIABILITY INSURANCE COMPANY OF WISCONSIN, Wausau, Wisconsin
HARDWARE MUTUAL CASUALTY COMPANY, Stevens Point, Wisconsin
LIBERTY MUTUAL INSURANCE COMPANY, Boston, Massachusetts
LUMBERMENS MUTUAL CASUALTY COMPANY, Chicago, Illinois
MICHIGAN MUTUAL LIABILITY COMPANY, Detroit, Michigan

The undersigned members of Mutual Atomic Energy Liability Underwriters, hereinafter called the "companies," each for itself, severally and not jointly, and in the respective proportions hereinafter set forth, agree with the insured, named in the declarations made a part hereof, in consideration of the premium and in reliance upon the statements in the declarations and subject to the limit of liability, exclusions, conditions and other terms of this policy:

INSURING AGREEMENTS

I **Coverage A — BODILY INJURY AND PROPERTY DAMAGE LIABILITY** To pay on behalf of the insured:

(1) all sums which the insured shall become legally obligated to pay as damages because of bodily injury or property damage caused by the nuclear energy hazard, and the companies shall defend any suit against the insured alleging such bodily injury or property damage and seeking damages which are payable under the terms of this policy; but the companies may make such investigation, negotiation and settlement of any claim or suit as they deem expedient;

(2) costs taxed against the insured in any such suit and interest on any judgment therein;

(3) premiums on appeal bonds and on bonds to release attachments in any such suit, but without obligation to apply for or furnish such bonds;

(4) reasonable expenses, other than loss of earnings, incurred by the insured at the companies' request.

Coverage B — DAMAGE TO PROPERTY OF AN INSURED AWAY FROM THE FACILITY With respect to property damage caused by the nuclear energy hazard to property of an insured which is away from the facility, to pay to such insured those sums which such insured would have been legally obligated to pay as damages therefor, had such property belonged to another.

Coverage C — SUBROGATION — OFFSITE EMPLOYEES With respect to bodily injury sustained by any employee of an insured and caused by the nuclear energy hazard, to pay to the workmen's compensation carrier of such insured all sums which such carrier would have been entitled to recover and retain as damages from another person or organization, had such person or organization alone been legally responsible for such bodily injury, by reason of the rights acquired by subrogation by the payment of the benefits required of such carrier under the applicable workmen's compensation or occupational disease law. An employer who is a duly qualified self-insurer under such law shall be deemed to be a workmen's compensation carrier within the meaning of this coverage. This Coverage C does not apply to bodily injury sustained by any person who is employed at and in connection with the facility.

This Coverage C shall not constitute workmen's compensation insurance as required under the laws of any state.

II **DEFINITION OF INSURED** The unqualified word "insured" includes (a) the named insured and (b) any other person or organization with respect to his legal responsibility for damages because of bodily injury or property damage caused by the nuclear energy hazard.

Subdivision (b) above does not include as an insured the United States of America or any of its agencies.

Subject to Condition 3 and the other provisions of this policy, the insurance applies separately to each insured against whom claim is made or suit is brought.

III **DEFINITIONS** Wherever used in this policy:

"bodily injury" means bodily injury, sickness or disease, including death resulting therefrom, sustained by any person;

"property damage" means physical injury to or destruction or radioactive contamination of property, and loss of use of property so injured, destroyed or contaminated, and loss of use of property while evacuated or withdrawn from use because possibly so contaminated or because of imminent danger of such contamination;

"nuclear material" means source material, special nuclear material or byproduct material;

"source material," "special nuclear material," and **"byproduct material"** have the meanings given them in the Atomic Energy Act of 1954, or in any law amendatory thereof;

"spent fuel" means any fuel element or fuel component, solid or liquid, which has been used or exposed to radiation in any nuclear reactor;

"waste" means any waste material (1) containing byproduct material and (2) resulting from the operation by any person or organization of any nuclear facility included within the definition of nuclear facility under paragraph (1) or (2) thereof;

"the facility" means the facility described in the declarations and includes the location designated in Item 3 of the declarations and all property and operations at such location;

"nuclear facility" means "the facility" as defined in any Nuclear Energy Liability Policy (Facility Form) issued by the companies or by Nuclear Energy Liability Insurance Association. The term "nuclear facility" also means

(1) any nuclear reactor,

(2) any equipment or device designed or used for (a) separating the isotopes of uranium or plutonium, (b) processing or utilizing spent fuel, or (c) handling, processing or packaging waste,

(3) any equipment or device used for the processing, fabricating or alloying of special nuclear material if at any time the total amount of such material in the custody of the insured at the premises where such equipment or device is located consists of or contains more than 25 grams of plutonium or uranium 233 or any combination thereof, or more than 250 grams of uranium 235,

(4) any structure, basin, excavation, premises or place prepared or used for the storage or disposal of waste,

and includes the site on which any of the foregoing is located, all operations conducted on such site and all premises used for such operations;

"indemnified nuclear facility" means

(1) "the facility" as defined in any Nuclear Energy Liability Policy (Facility Form) issued by the companies or by Nuclear Energy Liability Insurance Association, or

(2) any other nuclear facility,

if financial protection is required pursuant to the Atomic Energy

Act of 1954, or any law amendatory thereof, with respect to any activities or operations conducted thereat;

"nuclear reactor" means any apparatus designed or used to sustain nuclear fission in a self-supporting chain reaction or to contain a critical mass of fissionable material;

"nuclear energy hazard" means the radioactive, toxic, explosive or other hazardous properties of nuclear material, but only if

(1) the nuclear material is at the facility or has been discharged or dispersed therefrom without intent to relinquish possession or custody thereof to any person or organization, or

(2) the nuclear material is in an insured shipment which is (a) in the course of transportation, including handling and temporary storage incidental thereto, within the territorial limits of the United States of America, its territories or possessions, Puerto Rico or the Canal Zone and (b) away from any other nuclear facility;

"insured shipment" means a shipment of source material, special nuclear material, spent fuel or waste, herein called "material," (1) to the facility from a nuclear facility owned by the United States of America, but only if the transportation of the material is not by predetermination to be interrupted by the removal of the material from a transporting conveyance for any purpose other than the continuation of its transportation, or (2) from the facility to any other location except an indemnified nuclear facility, but only until the material is removed from a transporting conveyance for any purpose other than the continuation of its transportation.

IV **APPLICATION OF POLICY** This policy applies only to bodily injury or property damage (1) which is caused during the policy period by the nuclear energy hazard and (2) which is discovered and for which written claim is made against the insured, not later than two years after the end of the policy period.

EXCLUSIONS

This policy does not apply:

(a) to any obligation for which the insured or any carrier as his insurer may be held liable under any workmen's compensation, unemployment compensation or disability benefits law, or under any similar law;

(b) except with respect to liability of another assumed by the insured under contract, to bodily injury to any employee of the insured arising out of and in the course of his employment by the insured; but this exclusion does not apply to bodily injury to any person who is not employed at and in connection with the facility if the insured has complied with the requirements of the applicable workmen's compensation or occupational disease law respecting the securing of compensation benefits thereunder to his employees;

(c) to liability assumed by the insured under contract, other than an assumption in a contract with another of the liability of any person or organization which would be imposed by law on such person or organization in the absence of an express assumption of liability;

(d) to bodily injury or property damage due to the manufacturing, handling or use at the location designated in Item 3 of the declarations, in time of peace or war, of any nuclear weapon or other instrument of war utilizing special nuclear material or byproduct material;

(e) to bodily injury or property damage due to war, whether or not declared, civil war, insurrection, rebellion or revolution, or to any act or condition incident to any of the foregoing;

(f) to property damage to any property at the location designated in Item 3 of the declarations, other than aircraft, watercraft or vehicles licensed for highway use, provided such aircraft, watercraft or vehicles are not used in connection with the operation of the facility;

(g) to property damage to nuclear material in the course of transportation to or from the facility including handling or storage incidental thereto;

(h) under Coverage B, to property damage due to neglect of the insured to use all reasonable means to save and preserve the property after knowledge of the occurrence resulting in such property damage.

CONDITIONS

1 **PREMIUM** The named insured shall pay the companies the advance premium stated in the declarations, for the period from the effective date of this policy through December 31 following. Thereafter, at the beginning of each calendar year while this policy is in force, the named insured shall pay the advance premium for such year to the companies. The advance premium for each calendar year shall be stated in a written notice given by the companies to the named insured as soon as practicable prior to or after the beginning of such year.

Such advance premiums are estimated premiums only. As soon as practicable after each December 31 and after the termination of this policy, the earned premium for the preceding premium period shall be computed in accordance with the companies' rules, rates, rating plans, premiums and minimum premiums applicable to this insurance. If the earned premium thus computed for any premium period exceeds the advance premium previously paid for such period, the named insured shall pay the excess to the companies; if less, the companies shall return to the named insured the unearned portion paid by such insured.

The named insured shall maintain records of the information necessary for premium computation and shall send copies of such records to the companies as directed, at the end of each calendar year, at the end of the policy period and at such other times during the policy period as the companies may direct.

2 **INSPECTION; SUSPENSION** The companies shall be permitted to inspect the facility and to examine the insured's books and records at any time, as far as they relate to the subject matter of this insurance.

If a representative of the companies discovers a condition which he believes to be unduly dangerous with respect to the nuclear energy hazard, a representative of the companies may request that such condition be corrected without delay. In the event of noncompliance with such request, a representative of the companies may, by notice to the named insured, to any other person or organization considered by the companies to be responsible for the continuance of such dangerous condition, and to the United States Atomic Energy Commission, suspend the insurance with respect to the named insured and such other person or organization effective 12:00 midnight of the next business day of such Commission following the date that such Commission receives such notice. The period of such suspension shall terminate as of the time stated in a written notice from the companies to the named insured and to each such person or organization that such condition has been corrected.

3 **LIMIT OF LIABILITY; TERMINATION OF POLICY UPON EXHAUSTION OF LIMIT** Regardless of the number of persons and organizations who are insureds under this policy, and regardless of the number of claims made and suits brought against any or all insureds because of one or more occurrences resulting in bodily injury or property damage caused during the policy period by the nuclear energy hazard, the limit of the companies' liability stated in the declarations is the total liability of the companies for their obligations under this policy and the expenses incurred by the companies in connection with such obligations, including

(a) payments in settlement of claims and in satisfaction of judgments against the insureds for damages because of bodily injury or property damage, payments made under parts (2), (3) and (4) of Coverage A and payments made in settlement of claims under Coverages B and C;

(b) payments for expenses incurred in the investigation, negotiation, settlement and defense of any claim or suit, including, but not limited to, the cost of such services by salaried employees of the companies, fees and expenses of independent adjusters, attorneys' fees and disbursements, expenses for expert testimony, inspection and appraisal of property, examination, X-ray or autopsy or medical expenses of any kind;

(c) payments for expenses incurred by the companies in investigating an occurrence resulting in bodily injury or property damage or in minimizing its effects.

Each payment made by the companies in discharge of their obligations under this policy or for expenses incurred in connection with such obligations shall reduce by the amount of such payment the limit of the companies' liability under this policy.

If, during the policy period or subsequent thereto, the total of such payments made by the companies shall exhaust the limit of the companies' liability under this policy, all liability and obligations of the companies under this policy shall thereupon terminate and shall be conclusively presumed to have been discharged. This policy, if not theretofore canceled, shall thereupon automatically terminate.

Regardless of the number of years this policy shall continue in force and the number of premiums which shall be payable or paid, the limit of the companies' liability stated in the declarations shall not be cumulative from year to year.

4 **LIMITATION OF LIABILITY; COMMON OCCURRENCE** Any occurrence or series of occurrences resulting in bodily injury or property damage arising out of the radioactive, toxic, explosive or other hazardous properties of

(a) nuclear material discharged or dispersed from the facility over a period of days, weeks, months or longer and also arising out of such properties of other nuclear material so discharged or dispersed from one or more other nuclear facilities insured by the companies under a Nuclear Energy Liability Policy (Facility Form), or

(b) source material, special nuclear material, spent fuel or waste in the course of transportation for which insurance is afforded under this policy and also arising out of such properties of other source material, special nuclear material, spent fuel or waste in the course of transportation for which insurance is afforded under one or more other Nuclear Energy Liability Policies (Facility Form) issued by the companies,

shall be deemed to be a common occurrence resulting in bodily injury or property damage caused by the nuclear energy hazard.

With respect to such bodily injury and property damage (1) the total aggregate liability of the companies under all Nuclear Energy Liability Policies (Facility Form), including this policy, applicable to such common occurrence shall be the sum of the limits of liability of all such policies, the limit of liability of each such policy being as determined by Condition 3 thereof, but in no event shall such total aggregate liability of the companies exceed $13,500,000; (2) the total liability of the companies under this policy shall not exceed that proportion of the total aggregate liability of the companies, as stated in clause (1) above, which (a) the limit of liability of this policy, as determined by Condition 3, bears to (b) the sum of the limits of liability of all such policies issued by the companies, the limit of liability of each such policy being as determined by Condition 3, thereof.

The provisions of this condition shall not operate to increase the limit of the companies' liability under this policy.

5 **NOTICE OF OCCURRENCE, CLAIM OR SUIT** In the event of bodily injury or property damage to which this policy applies or of an occurrence which may give rise to claims therefor, written notice containing particulars sufficient to identify the insured and also reasonably obtainable information with respect to the time, place and circumstances thereof, and the names and addresses of the injured and of available witnesses, shall be given by or for the insured to Mutual Atomic Energy Liability Underwriters or the companies as soon as practicable. If claim is made or suit is brought against the insured, he shall immediately forward to Mutual Atomic Energy Liability Underwriters or the companies every demand, notice, summons or other process received by him or his representative.

6 **ASSISTANCE AND COOPERATION OF THE INSURED** The insured shall cooperate with the companies and, upon the companies' request, attend hearings and trials and assist in making settlements, securing and giving evidence, obtaining the attendance of witnesses and in the conduct of any legal proceedings in connection with the subject matter of this insurance. The insured shall not, except at his own cost, make any payment, assume any obligation or incur any expense.

7 **ACTION AGAINST COMPANIES — Coverages A and C** No action shall lie against the companies or any of them unless, as a condition precedent thereto, the insured shall have fully complied with all the terms of this policy, nor until the amount of the insured's obligation to pay shall have been finally determined either by judgment against the insured after actual trial or by written agreement of the insured, the claimant and the companies.

Any person or organization or the legal representative thereof who has secured such judgment or written agreement shall thereafter be entitled to recover under this policy to the extent of the insurance afforded by this policy. No person or organization shall have any right under this policy to join the companies or any of them as parties to any action against the insured to determine the insured's liability, nor shall the companies or any of them be impleaded by the insured or his legal representative. Bankruptcy or insolvency of the insured or of the insured's estate shall not relieve the companies of any of their obligations hereunder.

ACTION AGAINST COMPANIES — Coverage B No suit or action on this policy for the recovery of any claim for property damage to which Coverage B applies shall be sustainable in any court of law or equity unless all the requirements of this policy shall have been complied with and unless commenced within two years after the occurrence resulting in such property damage. 8

INSURED'S DUTIES WHEN LOSS OCCURS — Coverage B In the event of property damage to which Coverage B applies, the insured shall furnish a complete inventory of the property damage claimed, showing in detail the amount thereof. Within ninety-one days after the occurrence resulting in such property damage, unless such time is extended in writing by the companies, the insured shall render to the companies a proof of loss, signed and sworn to by the insured, stating the knowledge and belief of the insured as to the following: identification of such occurrence; the interest of the insured in the property destroyed or damaged, and the amount of each item of property damage claimed; all encumbrances on such property; and all other contracts of insurance, whether valid or not, covering any of such property. The insured shall include in the proof of loss a copy of all descriptions and schedules in all policies. Upon the companies' request, the insured shall furnish verified plans and specifications of any such property. The insured, as often as may be reasonably required, shall exhibit to any person designated by the companies any of such property, and submit to examinations under oath by any person named by the companies and subscribe the same; and, as often as may be reasonably required, shall produce for examination all books of account, records, bills, invoices and other vouchers, or certified copies thereof if originals be lost, at such reasonable time and place as may be designated by the companies or their representatives, and shall permit extracts and copies thereof to be made. 9

APPRAISAL — Coverage B In case the insured and the companies shall fail to agree as to the amount of property damage, then, on the written demand of either, each shall select a competent and disinterested appraiser and notify the other of the appraiser selected within twenty days of such demand. The appraisers shall first select a competent and disinterested umpire and, failing for fifteen days to agree upon such umpire, then, on request of the insured or the companies, such umpire shall be selected by a judge of a court of record in the state in which the property is located. The appraisers shall then appraise each item of property damage and, failing to agree, shall submit their differences only to the umpire. An award in writing, so itemized, of any two when filed with the companies shall determine the amount of property damage. Each appraiser shall be paid by the party selecting him and the expenses of the appraisal and umpire shall be paid by the parties equally. The companies shall not be held to have waived any of their rights by any act relating to appraisal. 10

SUBROGATION In the event of any payment under this policy, the companies shall be subrogated to all the insured's rights of recovery therefor against any person or organization, and the insured shall execute and deliver instruments and papers and do whatever else is necessary to secure such rights. Prior to knowledge of bodily injury or property damage caused by the nuclear energy hazard the insured may waive in writing any right of recovery against any person or organization, but after such knowledge the insured shall not waive or otherwise prejudice any such right of recovery. 11

The companies hereby waive any rights of subrogation acquired against the United States of America or any of its agencies by reason of any payment under this policy.

The companies do not relinquish, by the foregoing provisions, any right to restitution from the insured out of any recoveries made by the insured on account of a loss covered by this policy of any amounts to which the companies would be entitled had such provisions, or any of them, not been included in this policy.

OTHER INSURANCE If the insurance afforded by this policy for loss or expense is concurrent with insurance afforded for such loss or expense by a Nuclear Energy Liability Policy (Facility Form) issued to the named insured by Nuclear Energy Liability Insurance Association, hereinafter called "concurrent insurance," the companies 12

shall not be liable under this policy for a greater proportion of such loss or expense than the limit of liability stated in the declarations of this policy bears to the sum of such limit and the limit of liability stated in the declarations of such concurrent policy.

If the insured has other valid and collectible insurance (other than such concurrent insurance or any other nuclear energy liability insurance issued by the companies or Nuclear Energy Liability Insurance Association to any person or organization) applicable to loss or expense covered by this policy, the insurance afforded by this policy shall be excess insurance over such other insurance; provided, with respect to any person who is not employed at and in connection with the facility, such insurance as is afforded by this policy for bodily injury to an employee of the insured arising out of and in the course of his employment shall be primary insurance under such other insurance.

13 **CHANGES** Notice to any agent or knowledge possessed by any agent or by any other person shall not effect a waiver or a change in any part of this policy or estop the companies from asserting any right under the terms of this policy; nor shall the terms of this policy be waived or changed, except by endorsement issued to form a part of this policy executed by Mutual Atomic Energy Liability Underwriters on behalf of the companies.

14 **ASSIGNMENT** Assignment of interest by the named insured shall not bind the companies until their consent is endorsed hereon; if, however, the named insured shall die or be declared bankrupt or insolvent, this policy shall cover such insured's legal representative, receiver or trustee as an insured under this policy, but only with respect to his liability as such, and then only provided written notice of his appointment as legal representative, receiver or trustee is given to the companies within ten days after such appointment.

15 **CANCELATION** This policy may be canceled by the named insured by mailing to the companies and the United States Atomic Energy Commission written notice stating when, not less than thirty days thereafter, such cancelation shall be effective. This policy may be canceled by the companies by mailing to the named insured at the address shown in this policy and to the United States Atomic Energy Commission written notice stating when, not less than ninety days thereafter, such cancelation shall be effective; provided in the event of non-payment of premium or if the operator of the facility, as designated in the declarations, is replaced by another person or organization, this policy may be canceled by the companies by mailing to the named insured at the address shown in this policy and to the United States Atomic Energy Commission written notice stating when, not less than thirty days thereafter, such cancelation shall be effective. The mailing of notice as aforesaid shall be sufficient proof of notice. The effective date and hour of cancelation stated in the notice shall become the end of the policy period. Delivery of such written notice either by the named insured or by the companies shall be equivalent to mailing.

Upon termination or cancelation of this policy, other than as of the end of December 31 in any year, the earned premium for the period this policy has been in force since the preceding December 31 shall be computed in accordance with the following provisions:

(a) if this policy is terminated, pursuant to Condition 5, by reason of the exhaustion of the limit of the companies' liability, all premium theretofore paid or payable shall be fully earned;

(b) if the named insured cancels, the earned premium for such period shall be computed in accordance with the customary annual short rate table and procedure, provided if the named insured cancels after knowledge of bodily injury or property damage caused by the nuclear energy hazard, all premiums theretofore paid or payable shall be fully earned;

(c) if the companies cancel, the earned premium for such period shall be computed pro rata.

Premium adjustment, if any, may be made either at the time cancelation is effected or as soon as practicable after cancelation becomes effective, but payment or tender of unearned premium is not a condition of cancelation.

COMPANY REPRESENTATION 16

(a) Any notice, sworn statement or proof of loss which may be required by the provisions of this policy may be given to any one of the companies, and such notice, statement or proof of loss so given shall be valid and binding as to all companies.

(b) In any action or suit against the companies, service of process may be made on any one of them, and such service shall be deemed valid and binding service on all companies.

(c) Mutual Atomic Energy Liability Underwriters is the agent of the companies with respect to all matters pertaining to this insurance. All notices or other communications required by this policy to be given to the companies may be given to such agent, at its office at 919 North Michigan Avenue, Chicago 11, Illinois with the same force and effect as if given directly to the companies. Any requests, demands or agreements made by such agent shall be deemed to have been made directly by the companies.

AUTHORIZATION OF NAMED INSURED Except with respect to compliance with the obligations imposed on the insured by Conditions 5, 6, 7, 8, 9, 10 and 11 of this policy, the named insured is authorized to act for every other insured in all matters pertaining to this insurance. 17

CHANGES IN SUBSCRIBING COMPANIES AND IN THEIR PROPORTIONATE LIABILITY By acceptance of this policy the named insured agrees that the members of Mutual Atomic Energy Liability Underwriters liable under this policy, and the proportionate liability of each such member, may change from year to year. Any such change shall be stated in an endorsement entitled "Changes in Subscribing Companies and in Their Proportionate Liability" issued to form a part of this policy, duly executed on behalf of the companies subscribing such endorsement and mailed or delivered to the named insured, and the named insured further agrees that regardless of such changes: 18

(1) each company subscribing this policy upon its issuance shall be liable only for its stated proportion of any obligation assumed or expense incurred under this policy because of bodily injury or property damage caused, during the period from the effective date of this policy to the effective date of the first such endorsement, by the nuclear energy hazard;

(2) this policy shall remain continuously in effect from the effective date stated in the declarations until terminated in accordance with Condition 3 or Condition 15;

(3) neither the liability of any company nor the limit of liability stated in the declarations shall be cumulative from year to year.

DECLARATIONS By acceptance of this policy the named insured agrees that the statements in the declarations are the agreements and representations of the named insured, that this policy is issued in reliance upon the truth of such representations and that this policy embodies all agreements between the named insured and the companies or any of their agents relating to this insurance. 19

MUTUAL POLICY CONDITION This policy is nonassessable. The named insured is a member of each of the companies and shall participate, to the extent and upon the conditions fixed and determined by its board of directors in accordance with the provisions of law, in the distribution of dividends so fixed and determined. 20

IN WITNESS WHEREOF, each of the subscribing companies has caused this policy to be executed by it, attested on its behalf by an officer of Mutual Atomic Energy Liability Underwriters and duly countersigned on the declarations page by an authorized representative.

SUBSCRIBING COMPANIES	PROPORTION OF 100%
(1) American Mutual Liability Insurance Company	.....%
..... Secretary ..... President	
(2) Employers Mutual Liability Insurance Company of Wisconsin	.....%
..... Secretary ..... President	
(3) Hardware Mutual Casualty Company	.....%
..... Secretary ..... President	
(4) Liberty Mutual Insurance Company	.....%
..... Secretary ..... President	
(5) Lumbermens Mutual Casualty Company	.....%
..... Secretary ..... President	
(6) Michigan Mutual Liability Company	.....%
..... Secretary ..... President	
	100 %

ATTEST:

By.....
MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

NUCLEAR ENERGY LIABILITY POLICY

No. MF-.....

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

AMERICAN MUTUAL LIABILITY INSURANCE COMPANY
Wakefield, Massachusetts

EMPLOYERS MUTUAL LIABILITY INSURANCE COMPANY OF WISCONSIN
Wausau, Wisconsin

HARDWARE MUTUAL CASUALTY COMPANY
Stevens Point, Wisconsin

LIBERTY MUTUAL INSURANCE COMPANY
Boston, Massachusetts

LUMBERMENS MUTUAL CASUALTY COMPANY
Chicago, Illinois

MICHIGAN MUTUAL LIABILITY COMPANY
Detroit, Michigan

The named insured is hereby notified that by virtue of this policy he is a member of each of the companies and is entitled to vote either in person or by proxy at any and all meetings of each of the companies.

The annual meetings of each of the companies are held at the time and place stated herein.

This policy is nonassessable.

NOTICE OF ANNUAL MEETINGS

The annual meetings of AMERICAN MUTUAL LIABILITY INSURANCE COMPANY are held at its home office in Wakefield, Massachusetts, on the third Wednesday of March in each year, at eleven o'clock in the morning.

The annual meetings of EMPLOYERS MUTUAL LIABILITY INSURANCE COMPANY OF WISCONSIN are held at its home office in Wausau, Wisconsin, on the third Friday of February in each year, at ten o'clock in the morning.

The annual meetings of HARDWARE MUTUAL CASUALTY COMPANY are held at its home office in Stevens Point, Wisconsin, on the third Wednesday of April in each year, at nine o'clock in the morning.

The annual meetings of LIBERTY MUTUAL INSURANCE COMPANY are held at its home office in Boston, Massachusetts, on the second Wednesday of April in each year, at eleven o'clock in the morning.

The annual meetings of LUMBERMENS MUTUAL CASUALTY COMPANY are held at its home office in Chicago, Illinois, on the third Tuesday of May in each year, at eleven o'clock in the morning.

The annual meetings of MICHIGAN MUTUAL LIABILITY COMPANY are held at its home office in Detroit, Michigan, on the last Thursday of March in each year at 10:30 o'clock in the morning.

NUCLEAR ENERGY LIABILITY INSURANCE

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

Amendment of Transportation Coverage
(Indemnified Nuclear Facility)

It is agreed that the definition of "insured shipment" in Insuring Agreement III is amended to read:

"insured shipment" means a shipment of source material, special nuclear material, spent fuel or waste, herein called "material," (1) to the facility from any location except an indemnified nuclear facility, but only if the transportation of the material is not by predetermination to be interrupted by removal of the material from a transporting conveyance for any purpose other than the continuation of its transportation, or (2) from the facility to any other location, but only until the material is removed from a transporting conveyance for any purpose other than the continuation of its transportation.

Effective Date of this Endorsement _____ To form a part of Policy No. _____

Issue to _____

Date of Issue _____

For the Subscribing Companies

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

By _____

Endorsement No. _____

Countersigned by _____
AUTHORIZED REPRESENTATIVE

NE-1

NUCLEAR ENERGY LIABILITY INSURANCE

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

AMENDATORY ENDORSEMENT
NUCLEAR ENERGY LIABILITY POLICY (FACILITY FORM)

It is agreed that:

I. The first sentence of the definition of nuclear facility is amended to read:

"nuclear facility" means "the facility" as defined in any Nuclear Energy Liability Policy (Facility Form) issued by Mutual Atomic Energy Liability Underwriters or by Nuclear Energy Liability Insurance Association;

II. The definition of "indemnified nuclear facility" is replaced by the following:

"indemnified nuclear facility" means

(1) "the facility" as defined in any Nuclear Energy Liability Policy (Facility Form) issued by Mutual Atomic Energy Liability Underwriters or by Nuclear Energy Liability Insurance Association, or

(2) any other nuclear facility,

if financial protection is required pursuant to the Atomic Energy Act of 1954, or any law amendatory thereof, with respect to any activities or operations conducted thereat;

III. Condition 4 is replaced by the following:

LIMITATION OF LIABILITY: COMMON OCCURRENCE Any occurrence or series of occurrences resulting in bodily injury or property damage arising out of the radioactive, toxic, explosive or other hazardous properties of

(a) nuclear material discharged or dispersed from the facility over a period of days, weeks, months or longer and also arising out of such properties of other nuclear material so discharged or dispersed from one or more other nuclear facilities insured under any Nuclear Energy Liability Policy (Facility Form) issued by Mutual Atomic Energy Liability Underwriters, or

(b) source material, special nuclear material, spent fuel or waste in the course of transportation for which insurance is afforded under this policy and also arising out of such properties of other source material, special nuclear material, spent fuel or waste in the course of transportation for which insurance is afforded under one or more other Nuclear Energy Liability Policies (Facility Form) issued by Mutual Atomic Energy Liability Underwriters,

shall be deemed to be a common occurrence resulting in bodily injury or property damage caused by the nuclear energy hazard.

With respect to such bodily injury and property damage (1) the total aggregate liability of the members of Mutual Atomic Energy Liability Underwriters under all Nuclear Energy Liability Policies (Facility Form), including this policy, applicable to such common occurrence shall be the sum of the limits of liability of all such policies, the limit of liability of each such policy being as determined by Condition 3 thereof, but in no event shall such total aggregate liability of such members exceed $13,500,000; (2) the total liability of the companies under this policy shall not exceed that proportion of the total aggregate liability of the members of Mutual Atomic Energy Liability Underwriters, as stated in clause (1) above, which (a) the limit of liability of this policy, as determined by Condition 3, bears to (b) the sum of the limits of liability of all such policies issued by such members, the limit of liability of each such policy being as determined by Condition 3 thereof.

The provisions of this condition shall not operate to increase the limit of the companies' liability under this policy.

IV. The second paragraph of Condition 12 "Other Insurance" is amended to read:

"If the insured has other valid and collectible insurance (other than such concurrent insurance or any other nuclear energy liability insurance issued by Mutual Atomic Energy Liability Underwriters or Nuclear Energy Liability Insurance Association to any person or organization) applicable to loss or expense covered by this policy, the insurance afforded by this policy shall be excess insurance over such other insurance; provided, with respect to any person who is not employed at and in connection with the facility, such insurance as is afforded by this policy for bodily injury to an employee of the insured arising out of and in the course of his employment shall be primary insurance under such other insurance."

Effective Date of this Endorsement _____ To form a part of Policy No. _____

Issued to _____

Date of Issue _____

For the Subscribing Companies

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

By _____

Endorsement No. _____ Countersigned by _____

AUTHORIZED REPRESENTATIVE

50-891 O—65——21

NUCLEAR ENERGY LIABILITY INSURANCE

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

INDUSTRY CREDIT RATING PLAN

PREMIUM ENDORSEMENT

It is agreed that Condition 1 of the policy is replaced by the following:

CONDITION 1. PREMIUM

(1) Definitions: With reference to the premium for this policy:

"advance premium", for any calendar year, is the estimated standard premium for that calendar year;

"standard premium", for any calendar year, is the premium for that calendar year computed in accordance with the companies' rules, rates, rating plans (other than the Industry Credit Rating Plan), premiums and minimum premiums applicable to this insurance;

"reserve premium" means that portion of the standard premium paid to the companies and specifically allocated under the Industry Credit Rating Plan for incurred losses. The amount of the "reserve premium" for this policy for any calendar year during which this policy is in force is the amount designated as such in the Standard Premium Endorsement for that calendar year;

"industry reserve premium", for any calendar year, is the sum of the reserve premiums for that calendar year for all Nuclear Energy Liability Policies issued by Nuclear Energy Liability Insurance Association and Mutual Atomic Energy Liability Underwriters and subject to the Industry Credit Rating Plan;

"policy refund ratio", for any calendar year, is the ratio of the named insured's reserve premium for that calendar year to the industry reserve premium for that calendar year;

"incurred losses" means the sum of:

(1) all losses and expenses paid by Nuclear Energy Liability Insurance Association and Mutual Atomic Energy Liability Underwriters, and

(2) all reserves for unpaid losses and Expenses as estimated by Nuclear Energy Liability Insurance Association and Mutual Atomic Energy Liability Underwriters

INDUSTRY CREDIT RATING PLAN

PREMIUM ENDORSEMENT (Cont.)

because of obligations assumed and the expenses incurred in connection with such obligations by members of Nuclear Energy Liability Insurance Association and Mutual Atomic Energy Liability Underwriters under all Nuclear Energy Liability Policies issued by Nuclear Energy Liability Insurance Association and Mutual Atomic Energy Liability Underwriters and subject to the Industry Credit Rating Plan;

"reserve for refunds", at the end of any calendar year, is the amount by which (1) the sum of all industry reserve premiums for the period from January 1, 1957 through the end of such calendar year exceeds (2) the total for the same period of (a) all incurred losses, valued as of the next following July 1, and (b) all reserve premium refunds made under the Industry Credit Rating Plan by members of Nuclear Energy Liability Insurance Association and Mutual Atomic Energy Liability Underwriters;

"industry reserve premium refund", for any calendar year, is determined by multiplying the reserve for refunds at the end of the ninth calendar thereafter by the ratio of the industry reserve premium for the calendar year for which the premium refund is being determined to the sum of such amount and the total industry reserve premiums for the next nine calendar years thereafter, provided that the industry reserve premium refund for any calendar year shall in no event be greater than the industry reserve premium for such calendar year.

(2) Payment of Advance and Standard Premiums. The named insured shall pay the companies the advance premium stated in the declarations, for the period from the effective date of this policy through December 31 following. Thereafter, at the beginning of each calendar year while this policy is in force, the named insured shall pay the advance premium for such year to the companies. The advance premium for each calendar year shall be stated in the Advance Premium Endorsement for such calendar year issued to the named insured as soon as practicable prior to or after the beginning of such year.

As soon as practicable after each December 31 and after the termination of this policy, the standard premium for the preceding calendar year shall be finally determined and stated in the Standard Premium Endorsement for that calendar year. If the standard premium so determined exceeds the advance premium previously paid for such calendar year, the named insured shall pay the excess to the companies; if less, the companies shall return to the named insured the excess portion paid by such insured.

The named insured shall maintain records of the information necessary for premium computation and shall send copies of such records to the companies as directed, at the end of each calendar year, at the end of the policy period and at such other times during the policy period as the companies may direct.

INDUSTRY CREDIT RATING PLAN
PREMIUM ENDORSEMENT (Cont.)

(3) Use of Reserve Premiums. All reserve premiums paid or payable for this policy may be used by the members of Mutual Atomic Energy Liability Underwriters to discharge their obligations with respect to incurred losses whether such losses are incurred under this policy or under any other policy issued by Nuclear Energy Liability Insurance Association or Mutual Atomic Energy Liability Underwriters.

(4) Reserve Premium Refunds. A portion of the reserve premium for this policy for the first calendar year of any group of ten consecutive calendar years shall be returnable to the named insured provided there is a reserve for refunds at the end of the tenth calendar year.

(5) Computation of Reserve Premium Refunds. The reserve premium refund due the named insured for any calendar year shall be determined by multiplying any industry reserve premium refund for such calendar year by the policy refund ratio for such calendar year. The reserve premium refund for any calendar year shall be finally determined as soon as practicable after July 1 of the tenth calendar year thereafter.

(6) Final Premium. The final premium for this policy shall be the sum of the standard premiums for each calendar year, or portion thereof, during which this policy remains in force less the sum of all refunds of reserve premiums due the named insured under the provisions of this Condition 1.

(7) Reserve Premium Refund Agreement. Each member of Mutual Atomic Energy Liability Underwriters subscribing this policy for any calendar year, or portion thereof, thereby agrees for itself, severally and not jointly, and in the respective proportion of its liability assumed under this policy for that calendar year, to return to the named insured that portion of any reserve premium refund due the named insured for that calendar year, determined in accordance with the provisions of this Condition 1.

Effective Date of this Endorsement _____ To form a part of Policy No. _____

Issued to _____

Date of Issue _____

For the Subscribing Companies

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

By _____

Endorsement No. _____ Countersigned by _____
AUTHORIZED REPRESENTATIVE

NUCLEAR ENERGY LIABILITY INSURANCE

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

Address of Mutual Atomic Energy Liability Underwriters Endorsement

It is agreed that the address of the Mutual Atomic Energy Liability Underwriters appearing on the declarations and in the "Company Representation" condition of the policy is amended to read:

"One East Wacker Drive, Chicago, Illinois 60601"

Effective Date of this Endorsement _____ To form a part of Policy No. _____

Issued to _____

Date of Issue _____

For the Subscribing Companies

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS

By _____

Endorsement No. _____ Countersigned by _____

AUTHORIZED REPRESENTATIVE

APPENDIX 10

STATEMENT OF BOSTON EDISON CO. ON H.R. 8496 AND S. 2042

My name is Victor H. Kazanjian. I am the assistant general counsel of Boston Edison Co. of Boston, Mass.

We at Boston Edison Co. sincerely appreciate the opportunity to present our views to this honorable committee on a matter which influences the path of our future development. We wish to record our position in favor of legislation extending the provisions of section 170 of the Atomic Energy Act of 1954, the Price-Anderson provisions, which by their terms will expire on July 1, 1967.

Boston Edison Co. is a large urban electric company which generates, transmits, distributes, and sells electricity to nearly one-half million customers in a territory consisting of 40 cities and towns containing a population of more than one and a half million people. This territory is shown on a map attached to this statement as exhibit A and consists of 587 square miles.

The great bulk of the electricity being sold by Boston Edison Co. today is generated at our three large steam-electric generating plants located in Boston, Everett, and Weymouth, Mass. These three stations have a capability of 1.3 million kilowatts. We presently have under construction in Boston two large, fossil fuel, steam-electric generation units of advanced design. Although these two units will add a capability equivalent to about 60 percent of our present generating capacity, the need for further capacity continues to grow.

As this committee knows, New England lacks conventional fuel resources which are found in abundance in other regions of this Nation. Consequently, we explore each new technique for generating electricity with the hope of minimizing the effects of our distance from such resources. We have actively participated in the development of nuclear power in New England for the past 10 years. This is witnessed by the company's ownership of 9.5 percent of the common stock of Yankee Atomic Electric Co. at Rowe, Mass., and the ownership of 9.5 percent of the common stock of Connecticut Yankee Atomic Power Co. now under construction at Haddam, Conn. Moreover, we are presently evaluating the possibility of building a nuclear-fueled plant in our territory. In January 1965, the Atomic Energy Commission extended to us the courtesy of an informal conference, wherein we received many helpful suggestions and comments on our development of this project. Throughout the succeeding months we have continued our efforts in this regard with a view toward the expeditious conclusion of the study.

In the belief that the views of this company, in its present state of development and with its geographic circumstances, will be of assistance to this committee, we submit this statement.

In the release dated May 27, 1965, of the Joint Committee on Atomic Energy, Chairman Holifield and Vice Chairman Pastore identified five key policy questions to which the committee expects to address itself. Much has been written and spoken in response to the questions. Particularly notable are the recent reports of the Atomic Energy Commission and the Price-Anderson Study Group appointed by the Atomic Industrial Forum. To the first question, "Will there still be a need for Price-Anderson type legislation after August, 1967?" Boston Edison Co. replies emphatically, "yes". Our reasons are as follows:

The basic objectives of the Price-Anderson Act may be found in the provisions of the legislation itself, for in the Atomic Energy Act's section 2i, added by Price-Anderson, we find the clause, "In order to protect the public and encourage the development of the atomic energy industry * * *". It cannot be said that these two goals will be less worthy in 1967 than they were in 1957.

Public protection is an eternal goal. Its foundation in this technology lies, of course, in the science of reactor safety. The accomplishments in this field by the Joint Committee, the AEC, and other public agencies as well as the industrial and academic communities are remarkable. Today's knowledge of the requisite precautionary principles and their application have moved considerations of catastrophe out of the area of improbability to the verge of the impossible. As a result, atomic reactors exist today, occupying a frontier in a new world which promises benefit to all mankind through peaceful adaptation of the potential of the atom. From the outset it was apparent that despite the improbability of the occurrence of a "nuclear incident," the enormity of the theoretical consequences called for extraordinary measures of precaution and for extremes heretofore unnecessary in the conventional affairs of man where laws of probability lead to the assumption of ordinary risks.

Questions of liability and insurance participation are common adjuncts to any program of public protection. It is entirely consistent that as to such matters, too, new and extreme protective concepts are justifiable. The Price-Anderson Act completed the coverage of a total program of public protection. For a variety of reasons, not the least of which was the lack of available private funds, it was necessary to create a reserve for Federal indemnification.

We believe that the insurance and indemnification features of Price-Anderson will be as valid in 1967, in terms of a complete public protection program, as they were in 1957. The day may come when the administration of this feature of public protection, namely insurance sufficient to compensate for theoretical damage at feasible premium rates, will be entirely assumed by the private sector of our society. It has not yet arrived. It would be premature to allow Price-Anderson to expire.

Turning to the second avowed purpose of the Price-Anderson provisions, indeed of the Atomic Energy Act itself—namely, the encouragement of the use and development of atomic energy—we find ourselves no longer confronted with the theoretical but rather with very practical considerations. We believe that these considerations, in and of themselves, support the extension of the provisions of the act which could expire in 1967. They are as follows:

First, to encourage the development of atomic energy it is necessary to achieve public acceptance of its use and of facilities devoted to its use. We cannot expect that those unfamiliar with the sophisticated science will have blind confidence in their security. Thus the reassurances of the Federal Government are of prime importance. The willingness of the Government to make available substantial funds for indemnity purposes is an important manifestation of its confidence. Through the medium of Price-Anderson the Federal Government announces to the public that it gives more than voice to its confidence.

Second, the attitudes of stockholders and other investors in electric utilities and manufacturers of reactors and related equipment, as well as the attitudes of the financial community as a whole, are similarly important. Without their confidence, private development would be brought to a standstill. We believe that the existence of Price-Anderson bolsters this confidence, stimulates willingness to enter the field and to invest. As evidence of the interest of the financial community in the matter, we call attention to the fact that the bond mortgage indentures of both Yankee Atomic Electric Co. and Connecticut Yankee Atomic Power Co. contain covenants expressly incorporating Price-Anderson protective features. In our judgment, expiration of the law would adversely affect the attitudes of investors and, consequently, the availability and the cost of investment capital for the atomic energy industry.

Third, we further submit that the realities of economics must be heeded. Potential entry into the atomic energy field by utilities requires careful analysis of a variety of economic elements. Not the least of these are questions of liability, insurance costs, and cost of capital. Today, for most such utilities, the feasibility of a commitment to generation by atomic power still lies within a marginal area where the scales are tipped by small weights. We believe this general condition will persist beyond 1967. In these circumstances one cannot encourage development and use by adding costs to them. It is our belief that the expiration of Price-Anderson will add costs and adversely affect the economic justification of private endeavor in this field. Moreover, it is not desirable and often not possible to formulate firm programs for future development in an atmosphere of unpredictable and variable economic forces of consequence. The perpetuation of the provisions in question will bring about a degree of stability in economic conditions, which is essential to enable private industry to plan future activities.

It is for the foregoing reasons that we do emphatically answer in the affirmative the first of the key policy questions identified by Chairman Holifield and Vice Chairman Pastore.

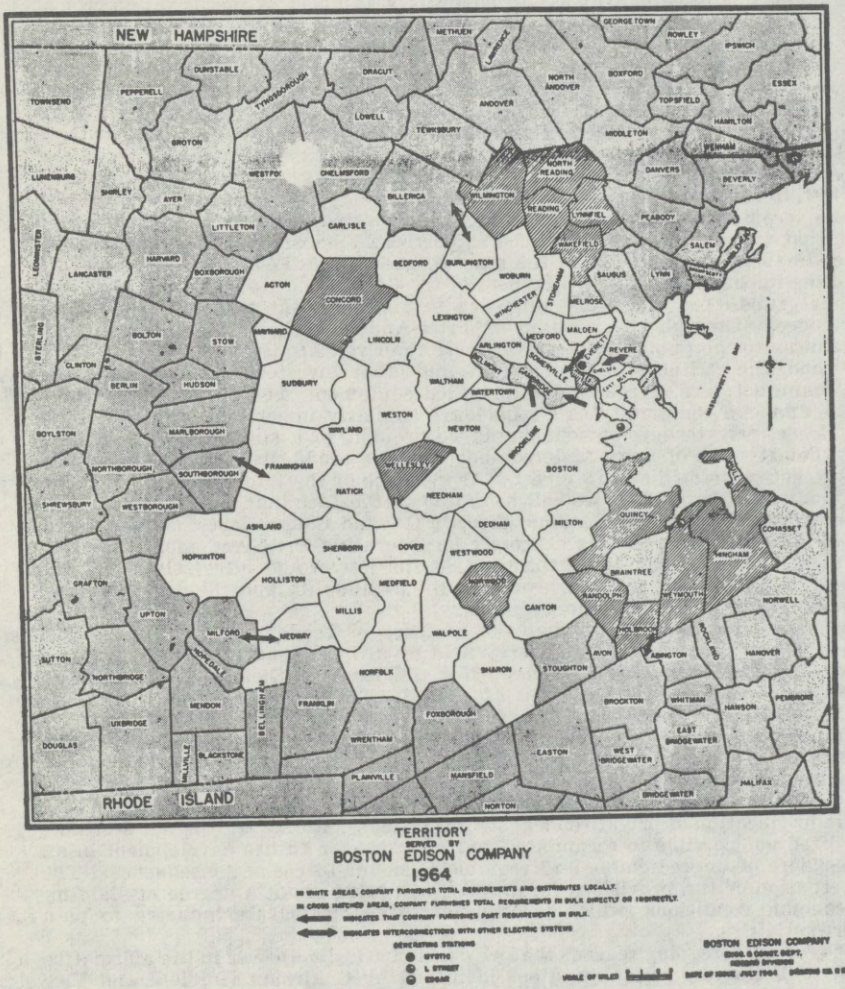
Turning to the other questions, we respond as follows:

Question 2 inquires as to the future availability of nuclear liability insurance. Representatives of the insurance industry will doubtless proffer authoritative response to this question and we therefore do not reply. As for the preferred period of extension of Price-Anderson (question 3) we recommend a further period of 10 years from 1967 as provided in H.R. 8496 and S. 2042. We cannot say with certainty that the various difficulties discussed above will have been resolved in less time. Question 4 elicits suggestions for revision in Price-Anderson legislation. At the present time we offer none. The present legislation seems

to be accomplishing its purposes well. We further believe, in response to question 5. that those purposes will not be adversely affected by those provisions of H.R. 8496 and S. 2042 which effect a reduction in the amount of Federal indemnity "by the amount that the financial protection required exceeds $60 million."

In fine and for the reasons stated above, we respectfully submit that the nascent atomic energy industry will not by 1967 have matured to the point where the Price-Anderson provisions in question are no longer necessary in the furtherance of the general policies of the Atomic Energy Act. We ask the Congress to extend Price-Anderson.

EXHIBIT A



APPENDIX 11

STATEMENT BY W. A. BOYLE, PRESIDENT, UNITED MINE WORKERS OF AMERICA, ON THE EXTENSION OF PRICE-ANDERSON ACT, JUNE 22, 1965

My name is W. A. Boyle. I am the President of the United Mine Workers of America. I appreciate the opportunity to present the views of the UMWA on the question of the extension of the Price-Anderson Act.

The United Mine Workers of America is unalterably opposed to the continuation of Price-Anderson subsidies. We believe that further subsidies granted

under this act will constitute a grave injustice to the rest of the energy industry. Further, it is our considered opinion that the "no recourse" provision of Price-Anderson is inimical to the public welfare.

To our minds the issue is simple and clearcut. Civilian nuclear power has, for too long a time, had recourse to the public treasury for subsidy of one type or another. The insurance subsidy granted under the Price-Anderson Act is but one example of the way in which nuclear power has been fostered.

The time has come to stop this type of unfair competition. We are told that the generation of electric energy from the atom is now competitive with conventional sources of energy. We are told that nuclear power has arrived and that the future is bright for atomic power and correspondingly somewhat gloomy for coal, oil, and natural gas.

If this is the case, there is no further need for continuation of the Government support for the nuclear industry. Our national policy should change and should bring the atom back into the mainstream of our economic life, to a place where it must compete for its place in society and where it must live by providing a desirable good or service to persons or industries willing to pay for them.

To date this has not been done. Until now the atom has held a special place in our national economy. It has enjoyed the almost unlimited support of the Federal Government in terms of both money and manpower. It has received over $1.5 billion of the Nation's tax dollars to bring it to its place in today's world.

The insurance indemnity granted under the provisions of Price-Anderson is a case in point.

We all know that the nuclear industry has had difficulty in securing an adequate amount of private insurance coverage. To fill this gap the Government has made available to a utility constructing a nuclear plant $500 million worth of liability insurance, at a rate which is ridiculously low. This indemnity is made possible to insure that there will be coverage available to any utility building an atomic plant.

There are two questions that we must raise at this point.

One, if the Federal Government wishes to grant insurance to the nuclear industry, why should it do so at a rate which is so low in comparison to what the same company would pay a private insurer? It would seem that in fairness to the other industries, any insurance plans offered by the Government should reflect a fair value and thus would not injure competition.

Unfortunately, the Atomic Energy Commission has not seen fit to do this and the insurance granted under Government auspices is a special privilege of the private utility owning and operating a nuclear plant.

To, if the private insurance companies are unwilling to risk insuring an electric utility plant, generating by nuclear power, there must be some question as to its safety. At the very least, there is not yet enough experience to justify an adequate level of private insurance. If this is the case, if there is the slightest doubt as to the reliability of nuclear plants, we question the wisdom of sponsoring, as AEC does, their proliferation. It would seem, even to the casual observer, that a wiser course would be a slow and gradual program with plants being constructed mainly for experience in isolated places for technical research and development.

We are not saying here that these plants are unsafe. We are suggesting, however, that no one knows exactly how safe they are. Therefore, wisdom would indicate a cautious course of action, rather than the present program of the Atomic Energy Commission to push ahead at all costs.

In recent months several notable citizens groups and private individuals have called attention to the danger of the atom. Such outcries have prevented the construction of atomic plants in New York and California. In all cases, however, the AEC has stated that nuclear plants are safe and that every precaution has been taken to prevent any type of accident.

We do not believe this to be a fact. We would suggest that a more cautious approach be taken to the subject of nuclear development. But, if the AEC really believes what it says, that is, if nuclear generation is safe and even competitive, then it would appear that they would be willing to sponsor the end of Price-Anderson and thus end a subsidy which is frankly designed to provide protection to an industry which cannot stand on its own feet and requires the support of Government.

It might be well at this point to discuss the urgency of the nuclear development. The entire nuclear program, including Price-Anderson, is predicated upon a supposed national need for such development. If such a need is not present, a thoroughgoing review of the entire program is very much in order.

There is one basis at present for the nuclear program. This basis is contained in the 1962 Report of the Atomic Energy Commission to the President. It stated simply that an imminent shortage of fossil fuels demands the prompt development of atomic energy.

This national crisis has been manufactured by the AEC to justify its existence. It is a new justification brought to light because the previous bases of the AEC have been demonstrated to be without foundation. This one also is without foundation for the following reasons, among others:

1. There are ample reserves of fossil fuels in this Nation for many decades. Indeed, there is coal for several hundred years at present recoverable rates and at present price structures. Further, research and development work well underway promises to make available additional large reserves of fossil fuels which were hitherto not economically recoverable.

2. The present technology in the nuclear field is extremely wasteful and does not in any sense expand the energy resources of the Nation to any significant degree. If anything, the present converter reactors are extremely inefficient and will consume much of the Nation's supplies of fissionable material in a short time.

3. The breeder reactor, the only real hope for expansion of energy resources is many years away and a great deal more work will have to be done before it becomes even technically feasible.

4. The disposal problems connected with nuclear power are extremely grave. Indeed, the problem of waste disposal of radioactive material is so serious that it must be solved if this Nation is not to have a problem of crisis proportions. It has been hidden by a variety of subterfuges for many years by the AEC, but the time for a permanent solution is fast approaching and concrete steps will have to be taken.

All of these factors bear upon the need for the extension of Price-Anderson and all of the other various subsidies granted to the nuclear industry. Such subsidies are given to encourage the unwarranted development of nuclear power, to allow the atom to escape the rigors of competition, to provide a false incentive for those who would foolishly place their reliance in the atom.

We believe that such subsidies should be stopped. We believe that governmental power should be directed toward the solution of the pressing safety problems connected with nuclear development and not the widespread construction of such plants, which will compound what is an already serious situation.

But the actual insurance subsidy granted to the atom is not the worst feature of the present Price-Anderson Act. In fact, if the insurance subsidy were all that was involved, we might excuse it as simply another example of bureaucratic manipulation. However, there is the so-called "no recourse" provision, which is a deliberate and knowing attempt to force the American people to bear the burdens which could come because of a nuclear accident. It is to this provision that we wish to direct your attention.

As we have mentioned previously, the Federal Government provides $500 million of indemnity insurance to any utility which builds an atomic plant. In addition, the utilities have been able to prevail upon the private insurance companies to provide another $60 million coverage. This means that every utility nuclear plant has a total coverage of $560 million.

However, it is obvious that a nuclear accident of any magnitude would cause damage far in excess of the amount provided by both Government and private sources. Estimates of such damage to property alone runs as high as $7 billion. This figure comes from a report made by the Atomic Energy Commission in 1957 and published under the title "Theoretical Possibilities and Consequences of Major Accidents in Large Nuclear Powerplants."

When we consider the desire of several of the electric utilities to construct plants in the center of population concentration, it is easy to accept the figure of $7 billion cited above. We must always remember that there are nuclear plants in Chicago, New York, Detroit, etc. There are several planned for the west coast and in other areas of the country with large numbers of people.

The basic question is then, who takes care of the damages which would result from an accident in excess of the $560 million? In other words, what happens to the claim of a person who has suffered a loss, perhaps his home or small business, in a nuclear accident, after the indemnity insurance has been exhausted? We

might also ask, who is responsible for the damages caused by an accident in a nuclear plant which the Government has encouraged and which a utility management has taken upon itself to construct?

The answer, according to the present law, is "Nobody." Under the Price-Anderson Act a person with a claim cannot collect anything after $700 million has been expended. In fact, included in the total can be charges for ascertaining whether or not the claims are valid.

We do not believe that this section of the law should be tolerated by Congress or the American people. We do not believe that any agency of government or private corporation should be allowed to escape the full responsibility for its actions.

Again, we come to a point where a value judgment must be made. Either nuclear power is safe or it is not. If it is, then there is no rational justification for the "no recourse" section of the law and it should be repealed forthwith. On the other hand, if there is some question about the safety of nuclear plants, then they should not be constructed on a commercial basis until all of the questions concerning safety have been satisfactorily resolved. To us there is no other alternative.

We are sure that the average American does not know the full impact of the Price-Anderson Act. We are sure that it is not common knowledge that a utility will not have to bear the full cost of a nuclear accident over and above the amount provided by insurance.

If these facts were generally known, the image of nuclear power would be quite tarnished and the electric utilities considering the construction of nuclear plants would find it difficult to sell the idea to the people living in their service areas.

In any event, we believe that there should not be any further extension of the "no recourse" provision of the Price-Anderson Act. The utilities and anybody else who want to build a commercial nuclear plant should be placed on notice that they will be fully responsible for any accident which occurs. We believe that any business manager who decides to endorse nuclear power should be willing to place the assets of his company behind that decision. If he will not, if he can not, then he should not be allowed to build a nuclear plant.

It is time to bring responsibility to the atomic industry. It is time to force those concerned with nuclear development to apply sound judgment, objective judgment, to the atom. For the atom can no longer be considered a toy of the scientists, a dream of the statesman. Rather, the atom is now a force in our competitive economy. It should be treated as such. It should be made to conform to the rules of the society, to the standards which we expect of any industry or groups of industries.

The atom has grown up. It is today competing, supposedly on an equal basis, with the fossile fuels. It has been hailed by so-called experts as the fuel of the future.

There are, however, problems connected with the development of nuclear power that have not been explored, or, if explored, have been pushed aside in the seemingly intensive drive to put atomic powerplants into every section of the Nation.

We do not believe that the national interest is being served in this manner. All facets of atomic development and all special privileges granted to the nuclear industry should come under the scrutiny of the Congress. This is so because the atom is a special creature of the Government and exists only because of vast expenditures of Government money and manpower. Therefore, it would appear that the final responsibility for the good which comes from the atom and the evil which also occurs because of nuclear development rests with the Government in general and with this committee in particular.

Therefore, on behalf of all coal miners, as well as all the people in this Nation who are threatened by the potential of a nuclear accident, we urge that the nuclear industry be made to conform to the standards of responsibility that are generally applicable in industry and that the special protection currently available to the nuclear industry through the Price-Anderson provisions of the law be promptly terminated.

APPENDIX 12

STATEMENT BY EARL EWALD, PRESIDENT, NORTHERN STATES POWER CO. ON EXTENSION OF THE PRICE-ANDERSON ACT, JUNE 16, 1965; RELATED CORRESPONDENCE

Northern States Power Co. is a Minnesota corporation engaged in the generation, transmission, and distribution of electricity in the States of Minnesota, North Dakota, South Dakota, and Wisconsin.

Northern States Power Co. owns and operates a 66,000-kilowatt atomic reactor (Pathfinder) in South Dakota, near Sioux Falls, under U.S. Atomic Energy Commission contract No. AT(11-1)-589.

The following statement is in support of the extension of the Price-Anderson indemnity legislation and is in the form of answers to the questions prepared by the Joint Congressional Committee.

Question. Is there a need to continue the Price-Anderson Act beyond 1967?

Answer. Yes. Congress originally found that Price-Anderson indemnity coverage was necessary to protect the public beyond available insurance in the event of an incident, however, remote. This necessity still exists. Industry also needs this protection to encourage the development of atomic energy for peaceful purposes and particularly to embark on the construction of the larger, more economical plants. There should be no obstacle, even though imaginary, to this kind of development. If anything dire occurred, no industry could cope with it financially.

Question. For how long a time should the act be extended?

Answer. We believe the coverage should be extended for 10 years. At the end of that period, experience would dictate the necessity for any further extension.

Question. Should the private insurance segment of the Price-Anderson system be increased?

Answer. We do not feel there should be any increase in the private insurance segment of the Price-Anderson system. The amount provided by private industry is now substantial and shows the desire for industry to do its part. Increasing the private insurance segment at present rates would be a deterrent to the development of atomic energy for peaceful purposes because of the high cost.

Question. Should the governmental indemnity be reduced to offset any increases in the private insurance capacity?

Answer. No. We believe the $500 million indemnity coverage provided under the Price-Anderson system should remain at that level even if additional coverage becomes available from commercial sources. The $500 million figure is, we believe, reasonable, although obviously not chosen on the basis of any experience factors. It would, therefore, appear to be rather academic to state that this is the correct amount of coverage and that it should be reduced by any additional amount made available in the commercial market.

Quetsion. What other changes in the Price-Anderson Act should be considered?

Answer. Price-Anderson indemnity is not a panacea for all problems, and it certainly is not perfect. However, it has been given a lot of thought and consideration, and it should be continually studied with a view toward making any necessary changes as may be dictated by experience.

(Related correspondence on this statement follows:)

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D.C., July 14, 1965.

MR. EARL EWALD,
President, Northern States Power Co.,
Minneapolis, Minn.

DEAR MR. EWALD: In connection with the Joint Committee's recent hearings on a proposed amendment and extension of the Price-Anderson Act, you submitted a statement for the record, dated June 16, 1965.

On page 2 of your statement you say:

"Question. Should the private insurance segment of the Price-Anderson system be increased?

"Answer. We do not feel there should be any increase in the private insurance segment of the Price-Anderson system. The amount provided by private industry is now substantial and shows the desire for industry to do its part. Increasing the private insurance segment at present rates would be a deterrent to the development of atomic energy for peaceful purposes because of the high cost.

"Question. Should the governmental indemnity be reduced to offset any increases in the private insurance capacity?

"Answer. No. We believe the $500 million indemnity coverage provided under the Price-Anderson system should remain at that level even if additional coverage becomes available from commercial sources. The $500 million figure is, we believe, reasonable, although obviously not chosen on the basis of any experience factors. It would, therefore, appear to be rather academic to state that this is the correct amount of coverage and that it should be reduced by any additional amount made available in the commercial market."

As you know, the Price-Anderson Act (in particular, section 170b of the Atomic Energy Act of 1954) currently requires that the operators of reactors with a capacity over 100,000 electrical kilowatts maintain the maximum amount of financial protection (e.g., nuclear liability insurance) available from private sources. During the hearings, representatives of the insurance industry testified that they anticipated the capacity of the nuclear liability insurance pools would be increased by about $14 million, to a total of $74 million, as of 1966.

H.R. 8496 and S. 2042, the bills currently before the committee to amend and extend the Price-Anderson Act, do not affect the above-mentioned requirement of the Price-Anderson Act. However, they do provide for a lowering of the governmental indemnity to the extent of any increase in the amount of nuclear liability insurance available from private sources. The witnesses at the hearings generally supported this principle.

In view of the foregoing and the possible uncertainty of the meaning of the quoted portion of your statement, it would be of assistance to the Joint Committee if you would elaborate on your statement. Specifically, the committee would appreciate learning whether or not you are in accord with the language of H.R. 8496 and S. 2042.

Sincerely yours,

CHET HOLIFIELD, *Chairman.*

NORTHERN STATES POWER CO.,
Minneapolis, Minn., July 21, 1965.

Hon. CHET HOLIFIELD,
Senate Office Building,
Washington, D.C.

DEAR MR. HOLIFIELD: This is in reply to your July 14 letter concerning the Joint Committee's consideration of extension of the Price-Anderson Act in which you asked for a clarification of our position as outlined in our statement dated June 16, 1965.

We feel that the extension of the Price-Anderson Act is vital to the continuation of the development of the atomic energy business. As outlined in our June 16 comments, we prefer that the extension be made without any increase in the private insurance component. We also feel that the $500 million blanket provided by Price-Anderson is an arbitrary figure which was established at a very high level to cover unknown and indeterminable risks. Because the figure is so large and so indeterminant, it seems illogical to make a minor adjustment in it at this time.

As I understand your question, you are asking whether we would support the passage of the present bills even though they do not conform with the preferences stated above. We consider that the extension of the major indemnity coverage is vital and of first importance. If it is essential that we accept the indicated increase of $14 million of private insurance and the adjustment of the blanket coverage in order to obtain the desired extension, we would do so.

I appreciate that there is a principle involved of demonstrating the willingness of private industry to progressively accept responsibility in this field. It is obvious to knowledgeable people, however, that the potential risks involved in power reactors were properly greatly exaggerated in the beginning when we knew so little about the possibilities. We are in a period of gaining experience after which the risks can be realistically reevaluated and there probably will be no problem. It would seem to me that we might just carry on until the test period has progressed. In other words the purchase of this additional insurance seems to be an unnecessary burden on this development at this time.

We appreciate having the opportunity to express these comments to your committee and we stand ready at any time to provide additional information if it is required.

Yours very truly,

EARL EWALD, *President.*

APPENDIX 13

STATEMENT BY ROBERT H. GERDES, CHAIRMAN OF THE BOARD, PACIFIC GAS & ELECTRIC CO., ON PRICE-ANDERSON EXTENSION, JUNE 23, 1965

The Joint Committee has before it the question of extending the provisions in the Atomic Energy Act for Federal indemnity. I would like briefly to review for the consideration of the Joint Committee the views of Pacific Gas & Electric Co. on this matter.

Since enactment in 1957, the Price-Anderson indemnification provisions of the Atomic Energy Act of 1954 have contributed to the progress of the nuclear power industry in this country by removing any hindrance to the industry's growth which might otherwise have arisen due to the reluctance of prospective reactor suppliers and operators to assume the risk of a large, uninsurable loss, however remote the prospect. These provisions will expire August 1, 1967, in accordance with their terms, unless sooner renewed by the Congress. It seems clear from the background of this legislation that the cutoff date was inserted, not on the assumption that these provisions would no longer be necessary by August 1, 1967, but rather to permit the Congress to assess the effectiveness of the provisions during the initial period of their application.

In our opinion the Price-Anderson indemnity legislation has performed well the functions it was intended to perform. We are also of the opinion that the original reasons for the enactment of this legislation are as valid today as they were in 1957 and, therefore, that this legislation should be extended for an additional substantial period, such as 10 years, in order that its beneficial influence on the growth of nuclear power may continue. We would urge that this extension be accomplished promptly in order that nuclear powerplants now in the initial planning stages may be designed and constructed with the assurance that the Price-Anderson indemnification provisions will be in effect when the plants are placed in operation.

It has been suggested that reactor licensees be required to furnish more private financial protection. We believe that insofar as practicable nuclear liability protection should be provided on a regular commercial basis. However, at the present time nuclear insurance rates appear to be disproportionately high for the risks insured, and we have been actively working to secure a reduction in them. We would favor an increase in the amount of private financial protection required only if it can be purchased at a reasonable cost. Therefore we do not believe that the proposed legislation should automatically require additional private financial protection as soon as it becomes available without regard to cost.

I appreciate this opportunity to express Pacific Gas & Electric Co.'s views because we regard nuclear energy as a most important future source of power for our system. Assuming favorable cost trends continue, we firmly believe that after 1970 many, if not most of the additions to our electric system will be nuclear.

APPENDIX 14

MATERIAL SUBMITTED BY GENERAL ELECTRIC CO. ON THE NUCLEAR SAFETY EXPERIENCE RECORD, JULY 9, 1965

GENERAL ELECTRIC CO.,
ATOMIC PRODUCTS DIVISION,
San Jose, Calif., July 9, 1965.

MR. LEONARD M. TROSTEN,
Staff Counsel, Joint Committee on Atomic Energy,
U.S. Capitol, Washington, D.C.

DEAR MR. TROSTEN: In the course of my testimony on June 23, Chairman Holifield asked that I supply further information relating to the nuclear safety experience record. Enclosed is a memorandum by L. H. McEwen, manager of nuclear safety engineering for General Electric's atomic power equipment department, responsive to this request.

In my testimony, I referred to the difficulty in developing a meaningful number for the operator years of experience; the enclosed memorandum from Mr. McEwen does not include such a number because the available records have not been compiled on this basis. As a crude approximation, if we consider that large reactors, those greater than 9 megawatts thermal, are typically operated round

the clock, a 50-man operating and maintenance crew would seem a reasonable estimate. For small reactors, which are more commonly operated day shift only, a staff of about five might be reasonable. With about 600-reactor-years experience with large U.S. plants, and 1,100-reactor-years experience with small U.S. machines, this experience log amounts to about 35,000 man-years or about 70 million man-hours. However, such figures are likely to be materially in error because of our arbitrary assignment of the number of personnel per reactor. Further study would be necessary before a reasonably precise number of this kind could be calculated.

Sincerely yours,

JAMES F. YOUNG.

Attachment.

SOME FACTS AND FIGURES ON THE NUCLEAR SAFETY RECORD (ANNOTATED)

L. H. McEwen, Manager, Nuclear Safety Engineering, Atomic Power Equipment Department, General Electric Company, San Jose, Calif.

The purpose of this memorandum is simply to present in highlight form some assorted facts and figures on the nuclear safety record.

INDUSTRIAL ACCIDENT FREQUENCY IS LOW IN NUCLEAR FACILITIES

That nuclear facilities can, are, and have been operated safely is evident from comparing the industrial injury frequency[1] of AEC contractors with those of other industries. The AEC contractors are consistently among the best, with a record about three times better than that of industry as a whole. For further information see table I.

RADIATION INJURIES ARE INDEED UNCOMMON

Among the total injuries sustained by AEC contractor employees, persons who are engaged in a wide variety of activities dealing with radiation, radiation injuries are very uncommon; for each 190 injuries of all sorts, only one involves radiation.[2] Thus, because of the AEC contractor injury rate (for injuries of all kinds) is one-third of that for industry as a whole, the chances that an AEC contractor employee will sustain a *radiation injury* is less than 1/500[3] that of an employee sustaining an *injury of any kind* in the average industry, or about 1/1000[4] of that of sustaining an *injury of any kind* if he were instead employed in wholesale or retail trade.

FATAL RADIATION ACCIDENTS ARE EXTREMELY RARE

Fatal accidents occur occasionally in all large industrial activities, and the atomic energy program is no exception, although, as you would expect, the incidence of fatal injuries in AEC establishments is well below that for industry as a whole, being about one-third as much.[2] Since organization of the AEC there have been 252[5] fatal accidents (through 1964) from all causes. Seven[5] have been from radiation, or about 2.8[6] percent of the total. Only three[7] of the seven have been associated with reactors.

WORKER RADIATION EXPOSURE HAS BEEN LOW

Another indicator of nuclear safety is the radiation exposure experience of AEC contractor personnel, where control programs have as their goal the limiting of exposures to less than 5 rem per year, although exposures of 12

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[1] This refers to frequency of disabling injuries *of all kinds* of such severity that the affected employee loses time from work. This statistics makes no distinction as to the severity of the injury, as measured by the amount of worktime lost by the individual affected. This latter effect is commonly measured by what is termed an accident severity rate: it turns out that, in general (but with some notable exceptions) industries with high injury *frequency rates* also have high injury *severity rates*.

[2] Data taken from Review of Nuclear Incidents, by Henri B. Smets; "Progress in Nuclear Energy," series X, vol. 3, pp. 89–165, 1962. Pergamon Press, New York.

[3] This is simply $1/3 \times 1/190$, or 1/570, and stated for convenience as "less than 1/500."

[4] See table I, which shows the accident rate for wholesale and retail trade as 11.09 injuries per million man-hours or 5.545 times that for AEC contractors. Thus $1/190 \times 1/5.545 = 1/1050$. This number is rounded to 1/1000 for simplicity of presentation.

[5] Data for years up to and including 1961 are taken from Smets, to which have been added figures taken from more recent AEC annual reports. This refers to the *AEC Contractor* total, plus one case (the recent Rhode Island criticality incident) representing the only radiation fatality known to the author to have occurred at an AEC licensed facility.

[6] $7/252 = .0278$, or about 2.8 percent.

[7] The SL–1 reactor accident resulted in 3 fatalities.

rem per year are also permissible under certain circumstances.[8] The latest available data (1962) [9] is as follows:

Rems exposure	Number of workers	Percent of workers
0–1	122,000	95.46
1–5	5,707	4.45
5–10	113	.088
10–12	0	0
12 and above	8	.006

The result, that 99.9 percent of all workers received doses less than 5 rem, is typical. For the past 5 years [10] this figure has averaged 99.6 percent.

POWER REACTOR WASTE RELEASES HAVE BEEN TRIVIAL

A high level of safety achievement in nuclear powerplants is also evident when one views the environmental aspects of controlled releases of radioactive waste products. It is perhaps enough to quote the recent report by Flora and Smith,[11] of the USAEC Division of Compliance, who made a study of licensed power reactor experience. They said: "During the years 1960–63, radioactivity released to the atmosphere by nuclear powerplants was only 0.13 percent of that permitted by the plant operating licenses. The maximum percentage of the permissible amount released by any plant during any of these years was 0.33. Data collected thus far in 1964 do not indicate any change in these trends."

THERE ARE LOTS OF REACTORS, YET SERIOUS INCIDENTS ARE VERY RARE

In a way, the most dramatic indication that nuclear reactors are and can be operated safely are the simple facts that there are now so many reactors and that the years roll by with serious occurrences being an extreme rarity. For example, so far as I know, there has yet to be one radiation accident [12] in a licensed U.S. power reactor.

There now exist about 290 [13] operable reactors of all kinds in the United States, 120 [13] being of output greater than 9 MWt.[14] It may seem astonishing, but there are now more naval reactors in service than the total number [15] of reactors in the United States just 10 years ago.

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[8] The rule in its entirety is somewhat involved, but its essence is that a worker may be exposed to whole body radiation of as much as 3 rems per quarter providing his accumulated exposure does not exceed 5 rems times his age in excess of 18 years. This is commonly administered by restricting an individual's exposure to less than 5 rem in any year. Because the average exposure of individual workers is generally much less than this, a reservoir of unused permissible exposure accumulates for most workers. Thus, if a person is exposed to, say, 10 rem in any quarter, it may or may not represent an exposure beyond permissible limits, depending on the reservoir of unused permissible exposure of the individual. In almost all cases it is not an exposure beyond permissible limits because the actual reservoirs tend to exceed 10 rem.

[9] Taken from the 1963 AEC annual report; figures are for 1962.

[10] From the 1963 AEC Annual Report; refers to the period 1958–62.

[11] Flora, J. W., and Smith, G. H., "Atmospheric Pollution From Nuclear Power Plants," a paper presented at the May 1964 Conference of the American Society of Civil Engineers, Salt Lake City, Utah.

[12] This is to be considered as an accident involving a lost-time injury caused by radiation. So far as is known to the author, those radiation injuries which have thus far occurred in the United States have occurred in nonlicensed facilities (such as AEC or military facilities) or in licensed nonreactor facilities such as fuel manufacturing plants (e.g., the Rhode Island Criticality accident).

[13] By hand count from Nuclear Reactors Built, Being Built, or Planned in the United States as of Dec. 31, 1964, TID–8200 (11th revision).

[14] See table II. This is taken as a breakpoint between reactors subject to damage from both reactivity and coolant loss accidents, and reactors subject only to damage from reactivity accidents. Reactors of less than 9 MWt output tend to be less susceptible to serious fuel overheating following coolant loss than larger machines. The choice of a 9 MWt breakpoint between classes is considered reasonable, although arbitrary, because margins against damage from coolant loss accidents naturally depend on details of individual designs.

[15] See table II.

The integrated experience for U.S. plants now amounts to about 600 [16] reactor-years for plants larger than 9 MWt, or 1700 [16] reactor-years for reactors of all kinds. So far as I know, throughout this experience no member of the general public has been exposed to more than established, permissible levels of radiation as a consequence of operation or mal-operation of a reactor.[17]

Moreover, this eminently favorable experience is increasing rapidly, having more than doubled [16] in the past 5 years alone.

On a worldwide basis the experience figures are also impressive.[18] Nuclear reactors now exist in 43 nations, 7 of which have more than 10 each. In the United Kingdom alone are no less than 19 large reactors in routine, round-the-clock electric power production service. It is very likely that there are more electric-power-producing-type reactors (about 70) in service in the world today than the total number of reactors of all kinds which existed in the entire world [19] when the Atomic Energy Act of 1954 was passed.

Summary data on the reactor experience log is provided in tables II through IV.

TABLE I.—*Examples of industrial injury frequencies; number of lost-time injuries per million man-hours*

Industry	*Frequency,*[1] *1960–62*
Communications	[2] 0.97
Electrical equipment	[2] 1.57
Aircraft manufacturing	[2] 1.63
Automobile	[2] 1.91
AEC contractors	[3] 2.0
Chemical	[4] 3.42
Electrical utilities	5.61
Glass	5.98
All industry	6.08
Pulp and paper	7.17
Iron and steel products	8.13
Agriculture	10.35
Wholesale and retail trade	11.09
Nonalcoholic beverages	16.24
Retail petroleum marketing	22.26
Aircraft maintenance	23.96
Municipal fire departments	24.22
Heavy construction	26.23
Highway construction	30.24
Municipal police departments	31.95
Logging	33.39
Beet sugar manufacture	35.58
Oil well drilling	38.24

[1] Taken from booklet published by the National Safety Council, entitled "Accident Rates, 1963 edition, which gives annual rates for 1962 and average rates 1960–62.

[2] These are the only industry-type categories listed in the National Safety Council booklet with accident frequency rates less than 2.0.

[3] Estimated on the basis of information published in AEC annual reports. This should not be taken as representing accident rates in facilities operated by private industry under AEC licenses; statistics for such operations are not available, and it is assumed that the data for AEC contractors is reasonably indicative of overall atomic industry experience, including operators of licensed facilities.

[4] This number, and all those following it, represent examples only of far more extensive data given in the National Safety Council booklet for industry-type categories and subcategories.

[16] See table III.

[17] This refers to reactors of all varieties in the United States, whether licensed or otherwise.

[18] See table IV.

[19] At the end of 1954, there were about 40 reactors in the United States. It seems doubtful that there were then as many as 30 others in the balance of the world.

TABLE II.—*Yearend inventory of U.S. reactors* [1]

Type reactor	1954	1959	1964
Non-Navy power type [2]	1	7	24
Naval reactors [3 4]	2	15	69
Production reactors [4]	10	13	12
Other reactors >9 mwt [5]	3	13	14
Between 1 and 9 mwt	6	20	27
Less than 1 mwt	9	47	74
Critical facilities [6]	9	41	71
Total	40	156	291

[1] By hand count from nuclear reactors built, being built, or planned in the United States as of Dec. 31, 1964, TID–8200 (11th rev.).
[2] All are of output greater than 9 mwt. This includes reactors which operate at the high temperatures typical of power reactors, but which are not equipped with power recovery apparatus. A good example is the PRTR at Hanorrd.
[3] Includes land-based prototypes.
[4] Power level assumed greater than 9 mwt.
[5] Includes some hard-to-classify types which operate infrequently, but at high power. Good examples are the SPERT reactors.
[6] This includes only those critical facilities which were operable at the end of 1964. That is, the figure for 1959 does not include critical facilities operable at the end of 1959, but which were dismantled before the end of 1964.

TABLE III.—*Yearend inventory of operating experience of U.S. reactors* [1]

Type Reactor	Reactor-years experience		
	1954	1959	1964
Non-Navy power type	0.5	20.5	102.5
Naval reactors	2	31.5	244.5
Production reactors	46	109.5	175
Other reactors >9 mwt	7.5	43.5	116
Between 1 and 9 mwt	29	88	211.5
Less than 1 mwt	62.5	179.5	491
Critical facilities [2]	16.5	121.5	401.5
Total	164	594	1,742

[1] Estimated from data in AEC Report TID–8200, Rev. 11. Subject to indeterminate error on the high side because the method of estimation assumes that operable reactors were operated throughout the period at operability.
[2] Erroneous on the low side. Available data list only those critical facilities operable at yearend. Does not include critical facilities built, operated, and then dismanteled before the end of 1964.

TABLE IV.—*Operable reactors in the world,*[1] *as of June 30, 1964*

Country	Number of reactors and critical all kinds	Number of electric power type facilities of	Number of Navy reactors [2]
United States	291	24	69
United Kingdom	51	19	----
U.S.S.R.	[3] 38	[3] 15	[4] ?
France	22	5	----
Germany	17	1	----
Japan	15	1	----
Italy	12	3	----
Canada	8	2	----
Holland	7	----	----
Belgium	6	1	----
Sweden	5	1	----
Switzerland	4	----	----
Argentina	3	----	----
Austria	3	----	----
Denmark	3	----	----
India	3	----	----
Norway	3	1	----
Poland	3	----	----
Spain	3	----	----
Yugoslavia	3	----	----
Australia	2	----	----
Brazil	2	----	----
21 others (each)	[5] 1	----	----
Total	525	[6] 73	[6] 69+

[1] United States data from AEC Report TID-8200, Rev. 11. Data from other nations is by hand count from a card file purchased from IAEA. Some cards give sketchy information on start-up dates. No cards are provided for military reactors (such as production and submarine reactors). Some estimates were necessary in projecting data on the cards to represent a June 30, 1964 cut-off date.

[2] This refers to reactors operating at high temperature whether or not equipped with power recovery gear, and does not include naval reactors.

[3] The data on the IAEA cards for U.S.S.R. reactors is not too definitive in all cases.

[4] The IAEA cards do not list any U.S.S.R. submarine reactors, although some may exist. The 3 reactors on the icebraker *Lenin* are included in other categories because it is not known to the author whether this ship is run by the Russian Navy or another government agency.

[5] The 21 other nations are as follows: Bulgaria, China (Taiwan), Colombia, Congo, Czechoslovakia, Finland, Greece, Hungary, Indonesia, Iran, Israel, South Korea, Philippines, Portugal, Rumania, South Africa, Thailand, Turkey, United Arab Republic, Venezuela, and Vietnam.

[6] This is to be taken as follows: Of the 525 reactors in the world, 73 are of the electric power producing type and 69 plus are Navy reactors.

APPENDIX 15

TEXT OF "MODEL NUCLEAR FACILITIES LIABILITY ACT"

MODEL NUCLEAR FACILITIES LIABILITY ACT

Reproduced below is the text of the "Model Nuclear Facilities Liability Act" as approved by the National Conference of Commissioners on Uniform State Laws and the American Bar Association.

SECTION 1. Definitions.—As used in this act—

(1) "Byproduct material" means any radioactive material (execpt special nuclear material) yielded in or made radioactive by exposure to radiation incident to the process of producing or utilizing special nuclear material;

(2) "Injury" means any harm to person or property for which damages may be recovered under the law of this State;

(3) "Nuclear facility" means:

(A) Any nuclear reactor;

(B) Any equipment or device designed or used for (1) separating the isotopes of uranium or plutonium, (2) processing or utilizing spent fuel, or (3) handling, processing, or packaging waste;

(C) Any equipment or device used for processing, fabricating, or alloying special nuclear material if at any time the total amount of the material at the site where the equipment or device is located consists

of or contains more than 25 grams of plutonium or uranium 233, or any combination thereof, or more than 250 grams of uranium 235;

(D) Any structure, basin, excavation, premise, or place prepared and used for the storage or disposal of waste, other than facilities utilized exclusively in connection with the transportation of the material; and

(E) The site on which any of the above is located;

(4) "Nuclear incident" means any occurance or series of occurrences:

(A) Causing, elsewhere than at the nuclear facility, bodily injury, sickness, disease, or death, or loss or damage to property, or loss of use of property, arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct material,

(B) Caused by any reason, other than an act of war,

(C) Occurring either at the nuclear facility or in the course of transportation of source, special nuclear, or byproduct material to or from the facility, and

(D) As to which an indemnification agreement exists between the U.S. Atomic Energy Commission and the operator in accordance with section 170 of the Atomic Energy Act of 1954, as amended, whether or not indemnification under the agreement may be necessary.

(5) "Nuclear reactor" means any apparatus designed or used to sustain nuclear fision in a self-supporting chain reaction or to contain a critical mass of special nuclear material:

(6) "Operator" means the person with whom the U.S. Atomic Energy Commission has executed an indemnification agreement in accordance with section 170 of the Atomic Energy Act of 1954, as amended;

(7) "Person" means (A) an individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, Government agency, a State or any political subdivision thereof, or a political entity within a State, a foreign government or nation or a political subdivision of any such government or nation, or other entity, and (B) a legal successor, representative, agent, or agency of the foregoing;

(8) "Source material" means (A) uranium, thorium, or any other material which has been determined by the U.S. Atomic Energy Commission to be source material, or (B) ores containing one or more of the foregoing materials, in any concentration as determined by regulation of the U.S Atomic Energy Commission;

(9) "Special nuclear material" means (A) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which [the U.S. Atomic Energy Commission] has determined to be special nuclear material; or (B) any material artificially enriched by any of the foregoing, but does not include source material;

(10) "Spent fuel" means any fuel element or fuel component, solid or liquid, which has been used or exposed to radiation in any nuclear reactor;

(11) "Waste" means any waste material (A) resulting from the operation of a nuclear facility and (B) containing byproduct material.

SEC. 2. LIABILITY; NUCLEAR FACILITIES.—The operator of a nuclear facility is liable, without proof of fault, for an injury arising out of or resulting from a nuclear incident, other than (1) an injury, compensable under a State or Federal workmen's compensation act, of any employee employed at the site of and in connection with the nuclear facility, or (2) an injury to the nuclear facility or to property located at the site of and used in connection with the nuclear facility.

SEC. 3. APPLICATION OF ACT.—This act applies to (1) an injury suffered in this State arising out of or resulting from a nuclear incident either within or without this State and (2) an injury suffered outside this State arising out of or resulting from a nuclear incident within this State.

SEC. 4. EXCLUSIVE LIABILITY.—If in any action an operator is liable without proof of fault under section 2 or a substantially similar statute, either in this State or by application of controlling law rules and if jurisdiction can be obtained over the operator in such an action, the operator is exclusively liable, and no action may be brought against any other person with respect to the injury.

SEC. 5. LIMITATIONS.—No action may be brought under this act more than 3 years after the person suffering or incurring the injury knows, or reasonably could have knowledge of, the cause of the injury or more than 10 years after

the date of the last occurrence to which the injury is attributed, whichever first occurs.

SEC. 6. EFFECT OF OTHER LAWS.—The provisions of this act do not affect, amend, or repeal (1) any other rule or provision of law governing immunity to suit, the conditions and effect of a waiver of immunity, or the effect of the purchase of insurance upon the insurer or the insured, (2) any other provisions of law governing liability for injuries not covered by this act, limiting the amount of recovery for injuries covered by this act, or governing the kinds of injuries for which damages may be awarded, or (3) unless otherwise provided by this act, any other provisions of law relating to the establishment and proof of legal liability.

SEC. 7. REPEAL.—The following acts and parts of acts are hereby repealed:

(a)

(b)

(c)

SEC. 8. TIME OF TAKING EFFECT.—This act shall take effect

APPENDIX 16

SUPPLEMENTAL STATEMENT OF ADOLPH J. ACKERMAN ON PROBLEMS IN ENGINEERING EDUCATION IN ATOMIC POWER (SUBMITTED BY LETTER OF JULY 1, 1965)

(Excerpts from article in American Engineer, January 1963, official publication of the National Society of Professional Engineers, Washington, D.C. Title: "Atomic Power Program Is Undermining Engineering Responsibility," by Adolph J. Ackerman, P.E.)

COMMUNICATING THIS EXPERIENCE TO THE PROFESSION

The professional experiences in this case were recorded in a paper by this writer entitled "Atomic Power, a Failure in Engineering Responsibility" which was published in the Journal of Professional Practice of the American Society of Civil Engineers, October 1961 (including the amicus curiae brief as submitted to the Supreme Court). The resulting discussions from various colleagues have demonstrated a careful study of this subject and a gratifying declaration of support for the principles which the engineering profession must continue to uphold. For example:

Engineer Albert S. Fry of Knoxville, Tenn., offered the following observation: "That the profession has not measured up to its obligations to the public is clearly brought out by the author. * * * Lawyers and the courts cannot be depended upon or expected to protect the public from the physical hazards of atomic powerplants. * * * Unfortunately few engineers are doing anything to change the situation. Too many are riding along, resting on the knowledge they brought with them from college."

Engineer Jacob Kaegi of Switzerland contributed an interesting drawing (fig. 1) showing the design and location of the first experimental atomic powerplant to be constructed in Switzerland within a cavern set deep in the rock. He noted: "The cavern structure is, for Switzerland in particular, also in the future of interest."

Engineer Alfred Ogram of Florida contributed a notable discussion in which he stated: "The arrival of this spectacular but insufficiently understood yet highly dangerous source of power brings with it the urgent need for a thorough reappraisal of the engineer's moral obligation if he is to retain professional status. * * * The time has come for some profound and professional soul-searching. * * * There is no alternative if we expect to rise to genuinely professional stature above the tangled morass of socio-political complexities and deceptions by which we now find ourselves bemired."

In publishing this experience the objective was to reach beyond the specific problems in the field of atomic power. Both the paper and the discussions have restated a number of fundamental principles and philosophies in engineering which must be reestablished within our profession before we can accept the kind of responsibilities in new technologies which the public has a right to expect of us.

Of equal importance is the education of the next generation of engineers in the basic professional disciplines and in the application of these principles to new technologies such as atomic power. An effort to explore this problem among our engineering educators is summarized in the following paragraphs.

GENERAL FAILURE AT THE EDUCATIONAL LEVEL

As has been previously stated, professional responsibility and self-discipline "to serve the public interest above all others" has failed to emerge as an effective influence in vital areas of new technology. The lack of attention to this situation by engineering educators is nothing short of alarming.

Engineering educators, particularly at the administrative level, have become overburdened with a multiplicity of current problems; this has left very little time for the study of new technologies and of their impact on professional disciplines in terms of public safety, sound economics, public credit, the rule of law, and the preservation of our form of government.

A number of engineering colleges are offering courses in specific subjects such as nucleonics, nuclear engineering, reactor design, control of reactors, and similar topics, and some universities confer degrees in "nuclear engineering." However, on the subject of basic engineering philosophy and responsibility in this new science, the available evidence points to a distressingly confused situation.

QUESTIONNAIRE SENT TO EDUCATORS

Following publication of the ASCE paper, letters were sent to 180 deans and department heads in civil engineering calling attention to the availability of this paper and inviting them to contribute a discussion. This approach was in keeping with the notable remark by Dean E. R. Agg: "Discussion is more than a privilege—it is a duty, to the society and to the profession as well." However, this letter drew only 18 acknowledgments.

In reviewing this situation with some educational leaders, we agreed that our profession is confronted with an issue which should be of deep concern to every member, no matter how busy he may be, but that it would be unfair to conclude that our educators are apathetic. This led to sending out a questionnaire which required very little time for response, to 94 deans of engineering and 92 heads of civil engineering departments.

The initial response was most gratifying, and a total of 50 questionnaires were returned within the first 10 days. Eventually questionnaires were returned from 44.7 percent of the deans, and 38 percent of the department heads. However, even such a high response cannot be considered satisfactory. The questionnaire required "time to think" and this is a commodity which is rapidly disappearing among our engineering educators. Furthermore, the subject of atomic power is of no real interest to the great majority of educators, particularly where a professor of nucleonics has been added to the faculty, who is directly concerned with that new specialty.

The accompanying table contains the questions as well as a summary of the replies. The conclusions to be drawn are of special interest:

1. A greater concern about the encroachment on professional responsibilities was indicated by the deans than by the department heads.
2. A substantial number of deans have become aware of the potential damage from a major accident in an atomic power reactor.
3. It is surprising to find the high percentage of educators who were not aware of the inability of the insurance industry (or legal restraints) to provide adequate liability insurance.
4. A reassuring number of educators were aware that the application of traditional engineering principles to the location of atomic powerplants could greatly reduce the hazard to public life and property.
5. The traditional disciplines of the civil engineering profession were clearly reflected in the replies from the C.E. department heads to questions 5a and 5b. However, the majority of the deans also supported the judgment of the C.E. department heads. (The greater number of contrary opinions which were recorded by the deans suggests that a number of them did not graduate in civil engineering.)
6. It is encouraging to find the substantial number of educators who recognize the need for early corrective measures in our present atomic power policy and Federal legislation.

ASCE Paper No. 1457 "Atomic Power, A Failure in Engineering Responsibility," describes how current policy in this new science is interfering with our traditional professional responsibility of protecting the public interest.

	REPLIES (All Figures in Per Cent)					
	Deans of Engineering			C. E. Dept. Heads		
	Yes	No		Yes	No	
1 Have you been concerned about this matter in the past?	63	37		50	50	
2 Have you read AEC reports on the magnitude of potential damage to life, health and property from a major accident in an atomic power reactor?	84	16		56	44	
3 Have you been aware that the insurance industry has refused to provide adequate liability insurance to the owners of atomic power plants in view of the great hazard involved?	47	53		30	70	
4 Are you aware that the application of traditional engineering principles to the location of atomic power plants could greatly reduce the hazard to public life and property?	92	8		87	13	
5 In 1957, Congress passed the Atomic Energy Indemnity Act which transferred practically all of the third party liability (normally carried by the insurance companies for the utility industry) to the taxpayers of the nation.						
(a) Do you believe that such legislation reflects sound policy justified by the desire to accelerate the development of atomic power?	34	37	No Opinion 29	18	53	No Opinion 29
(b) Do you consider such legislation to be in conflict with our professional responsibility to safeguard the public?	40	35	No Opinion 25	44	15	No Opinion 41
6 Two Supreme Court Justices have warned us of the "light-hearted approach to the most awesome, the most deadly, the most dangerous process that man has ever conceived." This new field of engineering and law is understood by very few specialists. An atomic power plant disaster would reveal that the engineering profession has not kept faith with the public's confidence in the profession. Do you consider this a matter calling for early corrective measures?	60	9	No Opinion 31	67	15	No Opinion 18

7. The first seven replies came from deans who were remarkably uniform in their judgment, indicating that they had given considerable thought and study to this subject in the past; they replied to the questionnaire without hesitation.

8. An astonishing response came from a dean who was serving as a consultant to the Federal Government in the field of atomic power and who declared that "under the circumstances it would be entirely inappropriate for me to comment as a dean of engineering" on the paper as published in the Journal of Professional Practice.

9. Another dean contributed the observation: "Few professional engineers are familiar with the problems in this new field. * * * I disagree with the action of Congress when it passed the Atomic Energy Indemnity Act. However, this appears to be a failure by Congress to protect the public and not a failure of the professional engineer." (This point was answered in the writer's ASCE paper by noting that professional engineers with special knowledge, either individually or through their professional societies, have a duty to inform and assist public officials when new policies are under consideration.)

10. The transfer of the heavy cost of third party indemnities to the taxpayers of the Nation was considered acceptable by a number of educators as a short-term subsidy to help develop this new source of power; however, "if it is to be permanent then it becomes another matter." This reasoning appeals to many people as a "compromise solution" but it does not answer the question: "How far can engineers go in compromising with public safety and how can such a compromise be discontinued?"

11. Perhaps the most astonishing response came from a dean of one of our highest ranking universities who declared: "The more I think about this matter the more I feel I am not qualified to make any comments." The reassuring feature of this response is that it reflects an intellectual honesty from which the determination is likely to emerge to acquire the requisite competence. (Incidentally, all the replies to the questionnaire reflected an intellectual honesty which is noteworthy.)

12. A notable summation from a distinguished educator reads: "I certainly do consider the matter of great importance as well as dangerous and justifying early corrective measures. The whole point involved to my mind is the fact that such corrective measures take a lot of time as well as effort and I hope that action is undertaken prior to a serious accident. Unfortunately, it seems to be the historical pattern that a serious crisis has to develop before the public becomes aroused."

CONCLUSIONS

1. In the field of atomic power there can be no return to the traditional concepts of individual professional and corporate responsibility, either in private or public power, until the "third party liability" act (the Price-Anderson Act) has been repealed. Whatever may be argued as having been the intent of Congress in the enactment of this legislation, it must be assumed that Congress expected the highest standards of professional engineering to be maintained for the health and safety of the public. It must be evident that any legislation which creates a conflict with the essentials of professional freedom, or which invites a relaxation of professional standards, can be rectified.

2. It behooves us to recall the testimony of one of our respected colleagues, Engineer Abel Wolman, before a congressional committee in 1958:

"It is only with research for criteria for radiation limits that one finds suggestions that it should be permissible to kill people to attain benefits to society. This has, undoubtedly, been in the minds of all criteria makers, but rarely has it reached the frank and stark pronouncements of recent years.

"Fear has been expressed that the establishment of too rigid criteria for the radiation activity may stifle progress because of excessive costs of attainment. One may view this fear with some cynicism in the light of the whole history of health and safety endeavor. This fear has always been expressed, but the historical realities consistently belie it. Criteria must rest upon health protection and not cost.

"The day of handbook rule for measuring the hazards of radiation is a long way off. In the meantime one acts upon limited knowledge. In such action the guiding principle must be the maximum protection of the people, not because of sentiment but because society demands it. An agreed acceptance of a number of consequent disabilities is not an appealing basis for the development, say, of nuclear power. Industry will do better than rest upon such an affront to man."

3. We are confronted here with an issue which is of overriding importance to the engineering profession in terms of its responsibilities to future generations. It is high time we face up to the hypocrisy of our assumptions, and that we express an angry and solemn warning against varieties of intellectual corruption. The abandonment of principle for expediency is an advanced symptom of the decay of popular institutions, and the plain fact is that the sickness of a self-governing society has become so acute we must either redeem it or perish.

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APPENDIX 17

STATEMENT BY J. HARRIS WARD, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, COMMONWEALTH EDISON CO., ON THE PRICE-ANDERSON ACT, MARCH 31, 1965

COMMONWEALTH EDISON CO.,
Chicago, Ill., June 24, 1965.

Hon. CHET HOLIFIELD,
Vice Chairman, Joint Committee on Atomic Energy,
Congress of the United States,
Washington, D.C.

DEAR MR. HOLIFIELD: Enclosed is a copy of the statement I made before the Joint Committee on Atomic Energy on March 31, 1965. I would appreciate it if you could have the statement incorporated into the public record of the hearings.

Thank you.

Sincerely,

J. HARRIS WARD, *Chairman.*

TESTIMONY OF MR. WARD BEFORE JOINT COMMITTEE ON ATOMIC ENERGY

My name is J. Harris Ward.

I am chairman and chief executive officer of Commonwealth Edison Co. Commonwealth is one of the Nation's largest electric utilities. It serves over 2 million customers in Chicago and the northern third of the State of Illinois.

Commonwealth entered the new world of atomic energy as soon as the door was opened by the Atomic Energy Act of 1954. At that time it organized the Nuclear Power Group with seven other investor-owned utilities. The activities of the Nuclear Power Group ultimately resulted in the construction, without any Government subsidy, of Commonwealth's first nuclear unit at Dresden Station. Dresden Unit No. 1 began commercial operation on August 1, 1960, and has since produced over 4 billion kilowatt-hours. With an electrical capability of 200,000 kilowatts, it is still the largest exclusively nuclear plant in commerical operation in the United States.

Although the first Dresden unit has become a Model T in this fast moving atomic age, it has convinced us of the safety and reliability of nuclear power plants. We manifested our continuing confidence in nuclear power by entering into a contract 2 months ago for the construction of Dresden Unit No. 2. An application for a construction license is now being prepared. Initially we will that the ultimate capability of the unit will be as high as 793,000 kilowatts. The new unit is scheduled for commercial service in February 1969.

When the Price-Anderson Act was first under consideration, Willis Gale, my predecessor as chairman of Commonwealth Edison Co., told this committee that we could not proceed with the first unit at Dresden unless a satisfactory solution to the insurance problem could be found. Price-Anderson provided such a solution by creating a comprehensive system for the protection of the public and the nuclear power industry. The existence of Price-Anderson was just as important to our decision to proceed with a second nuclear unit as it was for the first. I am sure that it was equally important in the recent purchases of large nuclear units by Connecticut Yankee, Jersey Central, Niagara Mohawk, the city of Los Angeles, and Southern California Edison. The extension of the legislation is essential if the remarkable progress in the peaceful use of atomic energy is to continue.

I don't have to tell this committee about the multiple safeguards surrounding the construction and operation of nuclear reactors. The committee is more familiar than I with the steps in the inspection and licensing procedure developed under the law to protect the public. I do know that our engineers have complete confidence in the safety of the reactor we operate now and the reactor we have just ordered, and I share that confidence. My colleague, Murray Joslin, who was the engineer in charge of our pioneering efforts in the nuclear energy field, expressed his personal confidence in nuclear power by telling me that if he had to sleep in a generating station, Dresden would clearly be his first choice.

No significant nuclear incident involving the public has developed from the peaceful use of atomic energy. Our own experience confirms the scientific view that such an incident is only a theoretical possibility. Yet this theoretical possibility exists and the risk of liability (even discounted by its remoteness) is of great magnitude. A practical means of protecting the public and the numerous interests involved in building and running atomic reactors must, therefore, be preserved.

The risk is not confined to large equipment manufacturers and large utilities. The risk of liability extends to everyone who makes a bolt or a nut or a gasket for use in an atomic installation, since without the present system even such a small supplier would be exposed to liability far out of proportion to the scope of his undertaking. Indeed, indemnity must also be available if the Government wishes to continue its present atomic energy activities through private contractors.

Under the present law and the regulations implementing it, the large power reactor operator must provide $60 million of privately purchased insurance or equivalent financial protection for the public. This insurance covers everyone participating in the supply, construction, or operation of the reactor. The premiums on this $60 million of insurance are high. While Commonwealth Edison Co. incurs no public liability costs at all for a kilowatt of conventional capacity, it pays an annual premium of more than a dollar per kilowatt for the public liability insurance for its Dresden Unit No. 1. Even after the second unit is installed at Dresden, we expect this public liability insurance on the station to cost more than 40 cents per kilowatt per year, a heavy special charge against nuclear kilowatts. If the $1 charge were to apply to all of our capacity, our power supply costs would increase by more than $7 million per year. Even using the 40-cent figure, the annual cost would be almost $3 million. The insurance industry states that it simply has not had the time to build up a backlog of premium reserves to cover the risks it has assumed. It is true that, if there are no claims paid by the insurers, they expect to refund about 75 percent of the premium. Each premium refund, however, will be made only 10 years after the premium has been paid. Even when this delayed refund occurs, the cost will have been very high.

Under Price-Anderson, all those with potential liability are indemnified against claims in excess of the insurance. This indemnification was necessary at the outset because coverage beyond the $60 million limit was simply not obtainable from private insurance resources. Establishing this overriding indemnity and the ceiling on total recoverable damages from a particular incident, simply recognized that reactor operators, whether they be public or private, whether the city of Los Angeles or Commonwealth Edison Co. is involved, can do no more than purchase the maximum amount of insurance available. Beyond that, protection against the extremely remote risk requires Government action.

Despite the favorable intervening experience, the situation today is no different than it was when Price-Anderson was first enacted. Civilian activity in the atomic field has gone on for just over 10 years; Price-Anderson has been on the books for only 8. Until there is substantially more experience, it is hard to see how any manufacturer, subcontractor, or reactor operator can expose its enterprise to the total bankruptcy which a nuclear incident might bring in the absence of an indemnification system. Certainly Commonwealth Edison Co. cannot afford to expose to substantially unlimited liability its more than 160,000 shareholders (including institutional shareholders representing millions of investors). Nor can it jeopardize its ability to serve its more than 2 million customers.

More is involved than the possible bankruptcy of any single utility, important as such an enterprise is. The public also needs realistic protection. The resources of any single business are obviously not adequate for the pro-

tection of the public at large from a hypothetical accident. The peaceful use of atomic energy has been fostered by the Government and its continuance is in the interest of the public, the ultimate beneficiary of abundant low-cost power. An integral part of the public interest is a system of protecting the public against a risk which, however remote, cannot be covered by private resources. If it is to be covered at all, the Government is the only possible source of protection.

The discussions of the indemnity extension have also raised a second question: Should the level of private insurance protection for large power reactors be higher than $60 million before the Government indemnity applies? There are a number of reasons why such an increase is not desirable.

First, as I have pointed out, the present level of premiums is already high because of lack of insurance experience with atomic energy, the relatively small number of purchasers, and the necessity for the insurance companies to build up a reasonable backlog of premium reserves. Should the required level of protection go still higher, it is not clear that the insurance industry could reduce premiums on the now-anticipated schedule with any assurance that such a reduction would be prudent.

Second, the $60 million maximum insurance coverage is now paid for by the reactor operator, but protects all segments of the industry from the smallest subcontractor to the largest reactor supplier. The normal method of insuring is to let each enterprise affected by a risk insure itself. However, so long as the insurance companies must pool a very large portion of their resources to protect reactors, it is unlikely that they will be able to provide separate coverage for other enterprises or classes of enterprises in the nuclear power business. Raising the maximum, therefore, is likely to delay the evolution of the normal insurance pattern in which each enterprise is able to purchase insurance for its own risks.

Third, there is another special characteristic in existing nuclear insurance, closely related to that just discussed and in part a product of the already very large size of the coverage offered. If one buys automobile liability insurance, the maximum amount of his insurance is available for each separate incident or accident in which he is involved. This is not true of nuclear insurance. The $60 million available to the operator of a large power reactor is reduced by the amount of any claims arising under the policy, so that only the reduced amount of insurance is available for protection against a second incident. Moreover, this reduction occurs even if the incident is far removed from the premises of the reactor operator and, indeed, is the result of some untoward happening entirely unrelated to reactor operation, such as an accident in the handling of atomic fuel by a reactor supplier, a carrier, or a subcontractor.

The seriousness of this departure from normal insurance coverage is underlined by an apparent ambiguity in the statute. It has been interpreted by the Atomic Energy Commission as requiring each operator of a large power reactor to maintain $60 million of insurance or substitute protection even if that amount of insurance is not available to it, but only to other operators. Thus, if there were an incident resulting from the handling of nuclear fuel on the way to the reactor site, the amount of insurance available to Commonwealth might be reduced by the amount of any damages paid. Then, unless the insurers consented to reinstatement, Commonwealth would have to restore protection up to the $60 million limit out of its own resources. While we do not regard this as an acceptable interpretation of the act, its inclusion in Commission regulations (at 10, Code of Federal Regulations, part 140—sec. 140.76) makes any raising of the limit a very serious matter. The higher the limit, the more difficult the restoration of protection becomes, and the more serious the economic risk of an investment in a nuclear plant.

For the reasons I have stated, we believe it essential to extend Price-Anderson for a considerable period, preferably 10 years. We also believe that an increase in the maximum amount of insurance available would serve to delay and hinder the attainment of the objective to which the Government, the nuclear power industry and the insurance companies have devoted themselves—the peaceful use of atomic energy under normal commercial conditions.

APPENDIX 18

LETTER FROM THE ASSOCIATION OF AMERICAN RAILROADS TRANSMITTING PROPOSED AMENDMENTS TO PRICE-ANDERSON ACT WITH SUPPORTING MEMORANDUM, JUNE 21, 1965

ASSOCIATION OF AMERICAN RAILROADS,
LAW DEPARTMENT,
Washington, D.C., June 21, 1965.

Hon. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
U.S. Capital, Washington, D.C.

DEAR MR. HOLIFIELD: Your notice of May 27, 1965, states that the Subcommittee on Legislation of the Joint Congressional Committee on Atomic Energy is holding hearings beginning tomorrow, June 22, on a proposed extension of the Price-Anderson Act. That press release indicates that the Joint Committee is interested in matters other than a mere extension of the Price-Anderson Act, among them what changes should be made in that legislation in the event there is an extension of a governmental indemnity program. As you know, the railroad industry is a very large transporter of radioactive materials. In view of the potential liability confronted by the railroads, it is our thought that the Price-Anderson Act should be amended in a number of respects so as to provide more adequate protection to the rail carriers. Accordingly, this is to submit for the consideration of your committee and the Subcommittee on Legislation a number of amendments to the Price-Anderson Act that we believe are completely justified.

The amendments to which I have referred are accompanied by a "Memorandum in Support of Proposed Amendments to Price-Anderson Act." I am handing you herewith 100 copies of the amendments and the memorandum in support thereof. It is my request that the amendments and the accompanying memorandum be made a part of the record in the hearings set for this week.

Very truly yours,

GERALD D. FINNEY, *General Attorney.*

MEMORANDUM IN SUPPORT OF PROPOSED AMENDMENTS TO PRICE-ANDERSON ACT

The transportation of radioactive materials presents the railroad industry with a liability potential of a magnitude that cannot accurately be measured at present levels of sicentific knowledge. The radioactive, toxic, explosive, and other properties of the materials to be transported contain unusual, unknown, or undefined hazards which, if loosed upon persons and property during the course of transportation, might well result in damage which would subject rail carriers to liability which would imperil their financial existence or, at the very least, remove all possibility of profitable carriage of these materials. Such liability might flow from any of a number of occurrences. In the case of a railroad accident resulting in loss of or damage to the materials, the carriers would be faced with the necessity of satisfying claims as to materials whose valuation is extremely high, and much greater than that of any commodity previously handled in rail transportation. Though admittedly remote, the possibility exists that such an accident might trigger a nuclear explosion, with easily envisioned personal injury and property damage consequences. Absent such explosion, the accident might result in injury to railroad employees and others from radiation exposure, damage to the property of the railroad and others through radioactive contamination, and loss of profits to the railroad because of the interdiction of its right-of-way. In the event the accident took place in the immediate vicinity of a water course associated with a municipal water supply, or if it involved pyrophoric materials that would cause the nuclear materials to be dispersed in the air, severe consequences might also occur many miles from the accident. Finally, even without an accident having occurred, the railroads might face serious problems of liability growing out of injuries resulting or claimed to have resulted from exposure to shipments of radioactive materials.

Rail carriers face these risks of liability without adequate methods of coping with them. They possess little expertise in the handling of radioactive materials, little or no control over the potential consequences of accidents, which might occur with or without negligence, and even less control over the potential injury to employees and others which might be caused by exposure to radiation. While specialized education and training of work forces might operate

to overcome these disabilities in some measure, such could be accomplished only at a prohibitive cost and by sacrificing labor efforts more properly expended on railroad operations. These costs would be in addition to those already necessarily incurred incident to compliance with the growing number of ICC, AEC, State, and municipal regulations governing the movement of radioactive materials.

Moreover, the rail carriers are very likely to be highly vulnerable to the demands of a work force and public made claim conscious as a result of the widespread publicity concerning the dangers of radioactive materials. This would be especially true in the case of claims against the railroad based upon injuries actually or purportedly resulting from radiation exposure, since science offers no definition at present of the threshold or scope of radiation injury. It is the consensus of informed opinion that, at present, tort law concepts are inadequate to deal with litigation which might arise in this area, and that the tendency would be to impose absolute liability upon the railroads where incidents occur during the course of transportation.

In view of the above, it is the position of the railroad industry that carriage of radioactive materials, if it is to be undertaken at all or at rate levels which are not prohibitively high, must be undertaken under an insurance and/or indemnity program which will place primary responsibilty for any liability upon insurance carriers and/or the Federal Government.

The bulk of the protection which rail carriers are presently afforded against these risks of liability is derived from NELIA facility form policies maintained by certain shippers and receivers of radioactive materials, and from indemnification agreements which exist between the AEC and certain of these shippers and receivers which are licensees and contractors of that agency. Direct insurance protection is available only under the NELIA supplier's and transporter's policy which covers liability to the amount of $60 million, and under conventional "catastrophe" insurance, containing no nuclear energy liability exclusion. Direct indemnification is available under the Price-Anderson Act, applicable only to shipments transported for the account of the AEC.

Two basic defects in the derivative protection scheme are evident. First, it is incumbent upon the rail carriers to establish and maintain costly procedures for determining, as to each shipment, whether or not the shipper or receiver thereof has in effect insurance and/or indemnity under which protection is available to the carriers. (This problem may be somewhat alleviated if the AEC adopts a procedure, now under consideration, whereby allevi- would furnish its certification that radioactive materials delivered to a carrier was covered by an indemnity agreement in accordance with the terms of the Price-Anderson Act.) Second, the requirements of the Atomic Energy Act are such that not all shippers and receivers are licensees or contractors of the AEC, and thus eligible for governmental indemnity. (The Department of Defense and its contractors are exempted from the licensing requirements of the act by sec. 2140 of 42 USCA.)

Further, there is no requirement that indemnification agreements, covering liability arising out of the transportation of radioactive materials, be executed between the AEC and all of its licensees and contractors. (This requirement exists only as to facility licensees, under secs. 2133 and 2143 of 42 USCA, and construction permittees, under sec. 2235. The Commission is given discreation as to extending indemnity to materials licensees, under secs. 2073, 2093, and 2111, and to its contractors, under sec. 2210(d), who are engaged in the construction or operation of a facility or in other activities involving the risk of liability for a substantial nuclear incident. At this time no materials licensees and all prime contractors have been indemnified. Finally, the Commission cannot extend indemnification to those contractors engaged in activities which the Commission deems not to involve the possibility of a substantial nuclear incident.) Finally, even if such agreements have been executed, it is not certain that the "financial protection" upon which such agreements may be based will be of the type which extends protection to the carriers (although all licensees who have been required to furnish financial protection have done so in the form of insurance policies, the act, in sec. 2210(d), provides for their types), and there exist instances in which the exemptions granted from the requirement of financial protection will operate to leave a gap in the carriers' coverage. (Reference is made to sec. 2210(k), which exempts nonprofit educational institutions from the requirement of financial protection and provides that indemnity will apply to all liability in excess of $250,000. Collaterally, it

is noted that indemnified Federal agencies and prime contractors of the AEC are not required to furnish financial protection, their indemnity applying from the first dollar of liability.) In the event that no financial protection or indemnity is maintained incident to Price-Anderson requirements, rail carriers are dependent upon such insurance as a shipper or receiver may maintain on its own behalf, and, if such is not applicable to liabilities which a carrier might incur, must rely upon the supplier's and transporter's policy and conventional insurance, both of which fall short of realistically protecting them.

If the railroads were to handle all nuclear materials as common carriers the following consequences would result:

(1) Even if it is ascertained that a shipper or receiver has in effect full insurance and indemnity protection applicable to the railroads, defects in the facility form policies and uncertainties as to the scope of the Price-Anderson indemnity operate to make doubtful the railroad's coverage for all risk of liability.

(2) The basic defect in the protection afforded railroads under facility form policies lies in the fact that it would be difficult, if not impossible, to relate any injury occurring as a result of exposure to radioactive materials, without accident, to a particular shipment, made at any particular time, in order to ascertain under which policy the railroads would claim. Even if the applicable policy could be ascertained, provisions therein would possibly operate to deny full coverage of personal injury and property damage liability. Under this policy, claims made more than 2 years after cancellation (which may be made at the insurer's option) will not be covered; it is not certain that FELA claims would be fully covered; the method of treatment of the loss of or damage to the nuclear material is ambiguous; certain liability which a railroad might assume under contract (as, for example, the interchange agreement) is excluded from coverage; no full coverage is available where liability arises out of the handling of nuclear weapons or other instruments of war "onsite," which possibly could be construed to mean "while in the course of transportation"; it is not clear whether or not a railroad would be protected in the situations where a claim is asserted against it and the statute of limitations is held not to be applicable, and where a claim asserted by a railroad against a third party is held to be barred by the statute of limitations; within the scope of the Price-Anderson Act as presently constituted coverage is not certain for losses for which a shipper or receiver is responsible, in the event such shipper or receiver is insolvent, or bankrupt; and the "act of war" exclusion therein is ambiguous, not making clear, for example, whether or not an isolated act of sabotage during peacetime would be covered. Coverage under the supplier's and transporter's policy, applicable only to bodily injury and property damage claims of third persons, is subject to the disabilities stated above, except with regard to FELA claims and liability arising out of the transportation of nuclear weapons or other instruments of war, as to both of which it is excluded.

Rail carriers have held numerous discussions with the i nsurance representatives, at which the above points have been raised. At the most recent meeting, held on April 2, 1965, the insurance representatives furnished us with a written memorandum indicating their positions on the above. Under date of April 29 a memorandum entitled "Transportation of Nuclear Material—Summary of NELIA–MAELU Position on Outstanding Issues," signed by the general manager of NELIA and the chairman, governing committee of MAELU, was sent to the railroads. As we read the memorandum the insurance pool position is as follows:

> The 2-year discovery period in the facility policy will not be extended. The insurance representatives will consider a request from the railroads that this period in the S & T policy be extended to 10 years upon payment of an additional premium. Such an extension is already in effect as to policies maintained by the bridge, tunnel, and toll road authorities.
>
> FELA claims are covered by the facility policy, but the policy will not be amended to specifically so provide. The insurance people are not willing to amend the S & T policy to include FELA coverage.
>
> Neither the facility nor the S & T policy will be amended to cover loss of or damage to nuclear material or property (including railroad property) located at a facility.
>
> Both policies would cover the liability assumed by a railroad under an interchange agreement.

The facility policy includes coverage for personal injury or property damage arising out of the transportation of nuclear weapons. The S & T policy provides the same coverage, except where the injury or damage arises out of an explosion of an atomic weapon.

The rail carriers' coverage would not be affected by the insolvency of a shipper or receiver or by any adverse interpretation placed on any statute of limitations.

Neither policy will be amended to more specifically define an "act of war."

The railroad industry feels that the negative views listed above indicate the unwillingness of the insurance representatives to furnish adequate protection for the railroads. It further feels that the positive statements can have little or no effect on the available coverage until translated into specific policy amendments.

The following uncertainties are present as to the scope of Price-Anderson indemnification derivatively available to the railroads: Such indemnification is provided only as to that portion of the public liability arising out of a nuclear incident which exceeds the level of the financial protection required to be maintained by the indemnitee. In the event that insurance coverage was denied by reason of any of the above defects in the facility form, a railroad would be called upon to pay the deficiency, and thus would be in the same position as where the indemnity was based upon no, or inapplicable, financial protection. The extent of coverage under Price-Anderson indemnification is made uncertain by the wording of section 2014(u). Herein it is stated that (1) claims under "* * * State or Federal workmen's compensation acts of employees of persons indemnified * * *" are excluded from coverage. It is not clear whether or not FELA claims are included within this exclusion. (The AEC's General Counsel, by letter dated November 19, 1964, rendered an opinion that the indemnity would cover FELA claims); and (2) "* * * claims for loss of or damage to or loss of use of property which is located at the site of and used in connection with the licensed activity where the nuclear incident occurs" are excluded. The wording of this exclusion is unclear when made applicable to an incident occurring during the course of rail transportation. (The General Counsel, by letters dated Apr. 4, 1962, and Apr. 16, 1965, has given his opinion that "onsite" property would, in this sense, include only the railway car, the cask containing the radioactive materials, and the materials themselves.)

In view of the above defects in the present insurance and indemnity protection, and of the fact that, as to insurance, repeated attempts to obtain more meaningful coverage have been unsuccessful, we are submitting proposed amendments to sections 2014(r), 2014(u), and 2210 of title 42, United States Code Annotated. These amendments are designed to remove the infirmities of a protection scheme which depends upon the character of the relationship between the parties involved in the movement of radioactive materials. They are intended to permit the railroads to secure protection directly by contract with the AEC covering all cases in which radioactive materials are transported. Specifically, section 2210, as amended, gives the AEC authority to enter into agreements of indemnification directly with rail carriers and provides for the conditioning of such agreements upon maintenance of such financial protection by the railroads as the Commission may determine appropriate. This section, further, is designed to eliminate the possible gap referred to above between insurance and indemnity protection, by providing for indemnity payments from the "ground up," in case the defects in the available insurance operate to deny coverage. Finally, this section provides for the extension of the Price-Anderson Act to August 1, 1977. Section 2014(r) includes transportation agencies within the definition of "persons indemnified." Section 2014(u) specifies that FELA claims shall not be excepted from the liability indemnified against, and clarifies the uncertainty as to what property is "onsite" when in the course of transportation, by confiing such to the rail car, the cask containing the radioactive materials, and the materials themselves.

Section 2210, title 42, United States Code Annotated, is amended by insertion of a new section entitled (d) (1) which reads as follows:

"The Commission is further authorized until August 1, 1977, to enter into agreements of indemnification with common or contract carriers by railroad, motor vehicle, water, or air involving activities under the risk of public liability for a nuclear incident occurring during the transportation of source, special nuclear, or byproduct material by railroad, motor vehicle, water, or air. In

such agreements of indemnification, the Commission may require the carrier to provide and maintain financial protection of such a type and in such amounts as the Commission shall determine to be appropriate to cover public liability arising out of or in connection with such transportation, and shall indemnify the persons indemnified against such claims above the amount of the financial protection required in the amount of $500 million, including the reasonable costs of investigating and settling claims and defending suits for damage in the aggregate for all persons indemnified in connection with such transportation activity and for each nuclear incident: *Provided*, That in the case of nuclear incidents occurring outside the United States the amount of the indemnity provided by the Commission shall not exceed $100 million: *Provided further*, That to the extent the financial protection obtained pursuant to such requirement does not cover the public liability arising out of a nuclear incident coming within the terms of an agreement for indemnification, the Commission shall indemnify the persons indemnified against such claims, provided that the total indemnification for such nuclear incident shall not exceed the above limits."

Section 2014(u), title 42, United States Code Annotated, is amended to read as follows:

"(u) The term 'public liability' means any legal liability arising out of or resulting from a nuclear incident, except: (i) claims under State or Federal workmen's compensation acts of employees of persons indemnified who are employed at the site of and in connection with the activity where the nuclear incident occurs: *Provided*, That 'public liability' shall include claims arising under the Federal Employers Liability Act (45 U.S.C. sec. 51 et seq.); (ii) claims arising out of an act of war; and (iii) whenever used in section 2210 (a), (c), and (k) of this title, claims for loss of, or damage to, or loss of use of property which is located at the site of and used in connection with the licensed activity where the nuclear incident occurs. 'Public liability' also includes damage to property of persons indemnified: *Provided*, That such property is covered under the terms of the financial protection required, except property which is located at the site of and used in connection with the activity where the nuclear incident occurs. When a nuclear incident occurs during the course of transportation of source, special nuclear, or byproduct material, the property which is located at the site of and used in connection with the activity where the nuclear incident occurs shall be limited to the particular rail car, motor vehicle, vessel, or aircraft on which said source, special nuclear, or byproduct material is being transported."

Section 2014(r), title 42, United States Code Annotated, is amended to read as follows:

"(r) The term 'person indemnified' means (1) with respect to a nuclear incident occurring within the United States and with respect to any nuclear incident in connection with the design, development, construction, operation, repair, maintenance, or use of the nuclear ship *Savannah*, the person with whom an indemnity agreement is executed and any other person who may be liable for public liability; or (2) with respect to any other nuclear incident occurring outside thhe United States, the person with whom an indemnity agreement is executed and any other person who may be liable for public liability by reason of his activities under any contract with the Commission or any project to which indemnification under the provision of section 2210(d) or section 2210(d)(1) of this title has been extended or under any subcontract, purchase order or other agreement, of any tier, under any such contract or project; or (3) with respect to nuclear incidents occurring either within or outside of the United States any person who may be liable by reason of the transportation of source, special nuclear, or byproduct material."

APPENDIX 19

Opinion of AEC General Counsel on Meaning of Term "The Transporting Vehicle," April 16, 1965

U.S. Atomic Energy Commission,
Washington, D.C., April 16, 1965.

Gerald D. Finney, Esq.,
General Attorney, Association of American Railroads, Transportation Building, Washington, D.C.

Dear Mr. Finney: Indemnity agreements into by the Commission with its licensees, pursuant to section 170 of the Atomic Energy Act of 1954, as amended, provide coverage, as specified therein, with respect to public liability arising out of certain nuclear incidents in the course of transportation. These agreements exclude from indemnity coverage damage to "the transporting vehicle, containers used in such transportation, and the radioactive material" (e.g. 10 CFR part 140, app. B, art. I, par. 6 and art. III, par. 2).

In recent discussions with the Commission's staff you have inquired as to the meaning of the term "the transporting vehicle" as it applies to rail transportation. In my opinion, the phrase "the transporting vehicle," as used in the indemnity agreements set forth in 10 CFR part 140, includes only the particular rail car on which "the radioactive material" is being transported. It does not include the locomotive or other cars on the same train.

Sincerely yours,

(Signed) Joseph F. Hennessey,
General Counsel.

APPENDIX 20

AEC Letter on Probability and Consequences of Major Reactor Accident, June 18, 1965

U.S. Atomic Energy Commission,
Washington, D.C., June 18, 1965.

Hon. Chet Holifield,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

Dear Mr. Holifield: In anticipation of the hearings on the extension of the Price-Anderson Act you asked us to consider whether experience since 1957 has suggested any alteration in certain basic assumptions that lay behind the concept and the form of financial protection provided by the act.

Specifically, you wanted us to consider whether operating experience, safety research, and engineered safeguards have led us to alter our estimate of the probability of a major reactor accident.

Secondly, you wanted to have us consider whether developments have led to any significant changes in the 1957 Brookhaven Report estimates of the theoretical consequences of a major reactor accident, under the worst hypothetical conditions, assuming all safeguards such as emergency cooling, fission product retention devices, containment, etc., should fail to function.

It was this combination of the remoteness of the likelihood of a major accident, but of the very large damage that could conceivably be involved, that led to the combination of financial protection by private insurance and Government indemnity provided by the act.

In answer to your first question, several factors contribute to a basis for our confident belief that the probability of catastrophe is exceedingly low, even lower that our estimate of the remote probability of such an event in 1957. In the period since 1957 there has been substantial increase in knowledge about reactors and their operational characteristics and many improvements in reactor safeguards have been made. The added years of operational experience with central station power reactors have been unblemished by any reactor accident that caused substantial damage to the facility or injury to any person. No accident in any reactor has caused interference with the public in any way. We cannot say, however, that the likelihood is nonexistent.

We want to emphasize that there is with nuclear reactors, as in many other enterprises, a vast difference between *potential hazards* and the practical likelihood (or experience) of *realized damages*. Assessment of the practical likelihood of realized damages must also take into account the multiple system of defenses provided to prevent the potential hazards.

Such defenses against the potential hazards of nuclear reactors permeate the basic design of every component and system, they are evident in the successive barriers against fission product release built into the accident-prevention and the consequences-limiting safeguards. The several independent safety reviews of every facility by reactor experts give assurance that no recognized route to danger has been left unprotected. A firm basis has been laid for the belief that the likelihood of major accidents is extremely low.

It would be useful of course to have reliable analyses of the probability of a major accident. Without question the probability is very low, but our efforts to define it have only served to convince us that there is as yet no valid basis on which to make meaningful calculations.

In answer to the second question, a restudy of the theoretical consequences of hypothetical accidents by our staff and that of Brookhaven has led us to fairly predictable conclusions. Reactors today are much larger than those in prospect in 1957, their fuel cycles are longer and their fission product inventories are larger. Therefore, assuming the same kind of hypothetical accidents as those in the 1957 study, the theoretically calculated damages would not be less and under some circumstances would be substantially more than the consequences reported in the earlier study.

In general, while more reliable knowledge and techniques available in 1965 improved the accuracy of prediction of effects of the hypethetical accidents, they had little effect on the size of the estimates of damage since the controlling factor is reactor fission product inventory. Details of the calculational techniques and values of important parameters of interest to the nuclear community wil be published as separate reports in the technical literature.

Thus, in our opinion, the answers to your two questions—that the likelihood of major accidents is still more remote, but the consequences could be greater—do not decrease but rather accentuate the need for Price-Anderson extension.

Cordially,

GLENN T. SEABORG, *Chairman.*

APPENDIX 21

TEXAS CITY DISASTER RELIEF ACT; EXCERPTS FROM HOUSE AND CONFERENCE COMMITTEE REPORTS; SUPPLEMENTAL REPORT BY SECRETARY OF ARMY

Public Law 84-378 (S. 1077)

AN ACT To provide for settlement of claims resulting from the disaster which occurred at Texas City, Texas, on April 16 and 17, 1947

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, The Congress recognizes and assumes the compassionate responsibility of the United States for the losses sustained by reason of the explosions and fires at Texas City, Texas, and hereby provides the procedure by which the amounts shall be determined and paid.

SEC. 2. The Secretary of the Army or such persons as he may designate shall investigate and settle claims against the United States for death, personal injury, and property losses proximately resulting from the disaster at Texas City, Texas, on April 16 and 17, 1947, commonly referred to as the Texas City disaster.

SEC. 3. (a) Claimants shall submit their claims in writing to the Secretary of the Army, under such rules as he prescribes, within one hundred eighty days after the enactment of this Act.

No claim shall be entertained by the Secretary of the Army unless it shall appear to his satisfaction that such claim was a part of a civil action filed against the United States in a United States district court prior to April 25, 1950, except that, for good cause, the Secretary may waive the limitation date of April 25, 1950, where it is shown that claimant, by reason of infancy, insanity, or other legal reason, was unable to bring such civil action.

(b) The Secretary of the Army shall promulgate and publish rules of procedure for handling the claims referred to in section 2 within sixty days after the date of enactment of this Act.

He shall determine and fix the amount of awards, if any, in each claim within twelve months from the date on which the claim was submitted.

Except as otherwise provided herein, the law of the State of Texas shall apply.

SEC. 4. Since it is the intention and purpose of this Act, and of the Congress, to relieve the claimants hereunder, the Secretary of the Army shall limit himself to the determination of—

(1) whether the losses sustained resulted from the explosions and fires at Texas City on April 16 and 17, 1947;

(2) the amounts to be allowed and paid pursuant to this Act; and

(3) the persons entitled to receive the same.

SEC. 5. (a) Claims for awards based on death shall be submitted only by duly authorized legal representatives. No claim under this subsection shall be approved by the Secretary of the Army in amount in excess of $25,000.

(b) No claims for personal injuries may be approved by the Secretary of the Army in amount in excess of $25,000.

(c) No claim for property losses may be approved by the Secretary of the Army in amount in excess of $25,000.

SEC. 6. (a) In determining the amounts to be awarded for death, personal injury, or property losses, the Secretary of the Army shall reduce any such amount by an amount equal to the total of insurance benefits (except life insurance benefits), or other payments or settlements of any nature, previously paid with respect to such death claims, personal injury, or property loss.

(b) Payments approved by the Secretary of the Army on death, personal injury, and property loss claims, shall not be subject to insurance subrogation claims in any respect.

(c) The Secretary of the Army shall not include in an award any amount for reimbursement to any insurance company or compensation insurance fund for loss payments made by such company or fund.

(d) Except as to the United States, no claim cognizable under this Act shall be assigned or transferred.

SEC. 7. The Secretary of the Treasury shall pay out of moneys in the Treasury not otherwise appropriated, the claims referred to in this Act in the amounts approved for payment by the Secretary of the Army.

SEC. 8. A payment made under the provisions of section 7 shall be in full settlement and discharge of all claims against the Government of the United States.

SEC. 9. The Secretary of the Army shall require assignment to the United States of any right of action against a third party arising from the death, personal injury, or property loss claim with respect to which settlement is made.

SEC. 10. The Secretary of the Army shall, twenty-four months after the date of enactment of this Act transmit to the Congress—

(a) a statement of each claim submitted to the Secretary of the Army in accordance with this Act which has not been settled by him, with supporting papers and a report of his findings of facts and recommendations; and

(b) a report of each claim settled by him and paid pursuant to this Act.

The reports shall contain a brief statement concerning the character and justice of each claim, the amount claimed, and the amount approved and paid.

SEC. 11. Attorney and agent fees shall be paid out of the awards hereunder. No attorney or agent on account of services rendered in connection with each claim shall receive in excess of 10 per centum of the amount paid, any contract to the contrary notwithstanding.

Whoever violates the provisions of this Act shall be fined a sum not to exceed $5,000.

SEC. 12. If any particular provision of this Act or the application thereof to any person or circumstance, is held invalid, the remainder of the Act shall not be affected thereby.

Approved August 12, 1955.

[H. Rept. No. 1305, 84th Cong., 1st sess.]

TEXAS CITY DISASTER

JULY 21, 1955.—Committed to the Committee on the Whole House on the State of the Union and ordered to be printed

Mr. LANE, from the Committee on the Judiciary, submitted the following

REPORT

[To accompany S. 1077]

* * * * * * *

PURPOSE

The purpose of this legislation is to recompense, to a limited extent, those persons or their survivors, who suffered death, personal injury, and property losses as a result of the explosions and fires at Texas City, Tex., on April 16 and 17, 1947, commonly referred to as the Texas City disaster.

PRELIMINARY STATEMENT

While denying any equitable or legal responsibility on the part of the U.S. Government, the committee nevertheless, in recognizing the enormity of the disaster, the great number of innocent victims who were either killed or injured thereby, and in remembering that the ammonium nitrate fertilizer shipment which exploded formed a part of and was in aid of this Government's foreign aid program feels that, for compassionate reasons, these persons who suffered losses should receive some help from the Federal Government to assist them in their losses.

Since, however, the Supreme Court of the United States has held that there is no legal liability on the part of the Federal Government for this disaster, the committee feels that all payments hereunder, since they are to be in the nature of a grant rather than in payment of a lawful obligation, should be limited to amounts not in excess of $20,000 for each death, personal injury, or property loss claim and it is so provided in the substituted bill.

INTRODUCTORY STATEMENT ON TEXAS CITY DISASTER

On April 16 and 17, 1947, a manmade disaster occurred in Texas City, Tex., of almost unbelievable proportions. Loaded bags of ammonium nitrate fertilizer stowed for overseas shipment in the holds of two ships at the docks in that city blew up. The shipment was destined for France as part of the U.S. Government's program of foreign aid to various war-ravaged and famine-stricken areas overseas. Over 570 persons perished in the disaster, and about 3,500 more suffered injuries. Damage to private properties ran into millions of dollars.

U.S. GOVERNMENT'S FOREIGN AID PROGRAM

Toward the end of the hostilitiles of World War II, it was recognized that an acute world food shortage existed. The problem of increasing the supply of food became an integral part of the U.S. occupation and administration of enemy territories. Secretary of War Patterson wrote that unless "the urgent requirements of Generals MacArthur and McNarney for the occupied areas" were met "in real volume, we anticipate * * * famine conditions." According to the Secretary's representative, "The occupying commanders in Germany, and Japan, and Southern Korea report * * * that the choice may be considered one of supplying additional food or additional troops to control the conquered peoples."

Quantities of food necessary to alleviate the problem were not in existence. Even if food had been available, shipping capacity to transport it could not be obtained. The use of fertilizer, therefore, to increase the production of foodstuffs in occupied areas presented an obvious means of avoiding widespread famine and unrest. A ton of fertilizer can produce 7 tons of food and it helps people in occupied areas, in permitting them to grow their own food, to help themselves. The securing of fertilizer for occupied areas was, therefore, a practical solution to a difficult problem.

Under its program of supplying fertilizer for occupied areas, the Government produced the material known as fertilizer grade ammonium nitrate (hereafter to as FGAN or fertilizer). FGAN as a fertilizer had been recognized for several years in agriculture. This was due to the fact that ammonium nitrate, the basic ingredient for FGAN, has a high free nitrogen content, an essential to plant growth. Furthermore, the Government had 15 surplus ordnance plants readily convertible for the manufacture of ammonium nitrate fertilizer. When it became clear that the Government could produce a satisfactory fertilizer and also utilize its surplus ammonium nitrate facilities, Secretary of War Patterson decided that the program should be undertaken. He "reported in substance this decision to the Cabinet" where it was "approved and the decision was to go ahead with this production."

Production of fertilizer

In May 1946, the Director of the Office of War Mobilization and Reconversion requested the War Department "as an emergency matter for national defense" to undertake the production of the fertilizer program "without delay, and to take whatever action is appropriate to expedite the attainment of maximum production." The surplus plants were released to the Secretary of War and the Army Chief of Ordnance was directed to carry the program into effect.

The Army entered into a number of cost-plus-fixed-fee contracts with private firms—to move into the ordnance plants and produce the fertilizer.

Purchase of fertilizer from private producers

When the plan to reactivate idle ordnance plants was first conceived, it was apparent that those plants would be unable to produce sufficient quantities of fertilizer to meet the early requirements of the program. The War Department, therefore, entered into agreements with commercial producers to purchase fertilizer from them and under a sell-back arrangement, it further agreed to return in kind the "borrowed" fertilizer to the producers out of future production of the ordnance plants.

Fertilizer which blew up at Texas City

The particular fertilizer which blew up at Texas City had been produced at three of he Army ordnance plants reactivated by the Government for the fertilizer program and pursuant to the sell-back arrangement was allotted to the Lion Oil Co., one of the commercial producers which had furnished fertilizer to the Government in 1946. Since the contract provided that Lion Oil Co. could designate a third-party recipient, Lion contracted for resale of the fertilizer with the French Supply Council, a French Government agency. The French Supply Council had earlier secured a governmental priority allocation, and, in pursuance thereof, the French shipping orders were turned over to the Army for execution.

The fertilizer, in accordance with contract requirements, was shipped by rail, under Government bills of lading, from ordnance plants in Nebraska and Iowa to the French Supply Council as consignee in Texas City. It was stored in shipside warehouses in Texas City.

EXPLOSIONS AT TEXAS CITY

By April 15, 1947, 1,850 tons of FGAN had been loaded on the steamship *Grancamp*, a French Liberty ship owned by the Republic of France, and 1,000 tons on the privately owned steamship *Highflyer*. The *Grandcamp* carried, in addition, a quantity of munitions originally consigned to Venezuela, but for undisclosed reasons not discharged there. The *Highflyer* also had an additional cargo of 2,000 tons of sulfur.

Dunnage, consisting of wooden boards and paper to protect the cargo, was laid on the floor of the holds. The bags of FGAN were packed one on top of the other in solid layers.

Loading of No. 4 hold of the *Grandcamp*, where the fire started, ceased at 5 p.m. on the afternoon of April 15, and its hatch was closed and remained battened down until 8 o'clock the following morning when longshoremen boarded the ship and started removing the hatch covers. At approximately 8:15 a.m. smoke was observed coming from hold No. 4 containing 880 tons of FGAN and, upon inspection, fire was discovered. Efforts to halt the fire were unavailing. The captain ordered all personnel off the ship. Meanwhile the hatches were covered and steam was introduced into the holds to smother the flames and put out the fire.

At 9:15 a.m. the fertilizer on the *Grandcamp* exploded with tremendous force. The explosion resulted in the spread of the fire to warehouses and other nearby structures and to the steamship *Highflyer* in a nearby slip. The fires continued all day and into the night. At approximately 1:10 a.m. on April 17 the FGAN in the *Highflyer detonated, completely demolishing that vessel and the* SS *Wilson B. Keene* which had been lying alongside. These explosions and resulting conflagrations virtually leveled the dock area in Texas City. In addition, approximately 1,000 residences, industrial plants, and other buildings were either totally destroyed or suffered major structural damage. Flying steel fragments and portions of the cargo of *Grandcamp*—including a 30-foot-long drill stem weighing over a ton—were found 2 miles distant. As noted earlier about 570 persons suffered violent death. More than 3,500 other people were injured and suffered either delayed death or mental and physical anguish attendant upon months of hospital confinement and medical care.

HISTORY OF COURT LITIGATION

After the disaster approximately 300 court actions were instituted against the United States in the names of some 8,500 claimants under the Federal Tort Claims Act for death, personal injury, and property damages arising out of the disaster. The suits were consolidated with the approval of the U.S. District Court for the Southern District of Texas under civil action No. 787, *Elizabeth Dalehite et al.* v. *United States* (1950). After a trial of the issues, the district court judge, sitting without a jury, found negligence on the part of the Government and rendered judgment in favor of the plaintiffs. The court, inter alia, found that the United States produced an inherently dangerous product and that it was negligent in manufacturing the fertilizer, in the manner in which it prepared the fertilizer for shipment and that "each shipment of such fertilizer was a dangerous public and private nuisance from the time it was manufactured."

On appeal, however, the Court of Appeals for the Fifth Circuit unanimously reversed (197 F. 2d 771) and the U.S. Supreme Court, by a divided court, affirmed the decision of the court of appeals (346 U.S. 15). The Supreme Court, through its majority decision, decided, as a matter of law, that the actions of the Government and its employees as found by the district court were performed in the exercise of a "discretionary function" and that the Federal Tort Claims Act exempted the Government from tort liability for errors made in the exercise of "discretionary functions." To put it another way, the Supreme Court held that even if the Government was negligent, it could not, because of the wording of the Tort Claims Act, be sued for its actions which resulted in the Texas City disaster. This is made clear from the following excerpts of its majority opinion:

"An analysis of section 2680(a), the exception with which we are concerned, emphasizes the congressional purpose to except the acts here charged as negligence from the authorization to sue (p. 32).

"Even assuming their correctness arguendo (the district court's findings of the Government's negligence) though, it is our judgment that they do not establish a case within the act. This is for the reason that as a matter of law the facts found cannot give the district court jurisdiction of the cause under the Tort Claims Act (p. 24)."

PRIOR LEGISLATION

After the Supreme Court's decision in the *Dalchite* case, supra, the House of Representatives adopted House Resolution 296, 83d Congress, sponsored by Congressman Clark Thompson of Texas, directing this committee to make an investigation and study of the merits of all claims against the United States arising out of that disaster. As a result of the investigation H.R. 9785 was introduced in the 83d Congress, which passed the House, compensating the claimants for death, personal injury, and property loss resulting from the disaster. The Senate thereafter acted upon and passed the same bill, but in a different form.

It was then late in the session, however, and since no conferees were appointed to try and resolve the differences between the Senate and the House versions of the bill, no further action was taken and the bill died at the end of the 83d Congress.

COMMITTEE'S ACTION ON PRESENT LEGISLATION AND REASONS THEREFOR

In the present Congress identical bills were introduced simultaneously in both the House and the Senate. Since the Senate bill, S. 1077, has passed that Chamber, the committee has laid aside the House bill and directed its attention to S. 1077.

The major differences between S. 1077 and this committee's amendment, which is in the nature of a substitute bill to S. 1077, are three: First, the Senate bill makes a finding of fact that the Federal Government is equitably responsible for the explosion at Texas City. The committee amendment denies any equitable or legal responsibility on the part of the U.S. Government for that disaster. In providing compensation for these people the committee amendment bases such relief on the theory that such payments are to be in the nature or disaster-relief benefits. Second, the Senate bill places jurisdiction in the Federal district courts of Texas to adjudicate and settle these claims, whereas the committee amendment authorizes the Secretary of the Army to settle the claims. Third, the Senate bill would compensate all claims for death, personal injury, and property damage without limitation in amount, whereas the committee amendment sets a maximum limitation of $20,000 for each type of claim.

It is true that when this committee and the House acted favorably upon this legislation in the 83d Congress it did so upon the ground that the Federal Government was wholly responsible for the explosions and the resulting catastrophe at Texas City, Tex. However, after extensive hearings this year in which representatives from the Department of Justice were heard in oral testimony for the first time, and after a reappraisal of the testimony not only of this Congress and of the 83d Congress, but also of the record in the Federal litigation in the *Dalehite case*, the committee is of the considered opinion that the Federal Government was in no way negligent or otherwise responsible for the explosions and fires which took place at Texas City.

As noted earlier both the Court of Appeals for the Fifth Circuit and the Supreme Court of the United States held that there was no legal liability on the part of the U.S. Government, because the actions of the Government in connection with this ammonium-nitrate fertilizer were performed in the exercise of a "discretionary function" within the meaning of the Federal Tort Claims Act. It was therefore unnecessary for either of these two courts to decide the further question of whether or not the Federal Government was negligent. It is not the purpose or intention of this report to go into a detailed analysis of all the testimony or to undertake to reargue the evidence of this disaster either on the law or the facts. It does deem it appropriate, however, to refer in brief, to the argument which has been urged that the appellate courts accepted and agreed with the district court's views that the Government was negligent. It is the opinion of this committee that neither the Supreme Court nor the judges of the court of appeals so acted. It was only necessary, in view of the grounds upon which their decisions were based, to accept the district court's findings for purposes of argument on appeal only.

A reading of the Supreme Court opinion certainly indicates serious reservations with respect to the district court's findings of negligence. In a footnote (346 U.S. p. 24) it expressed agreement with the characterization by the court of appeals that the district court's findings were "profuse, prolific, and sweeping" and stated that "no proper review could be exercised by taking the 'fact' findings of 'negligence' at face value." As a matter of fact, the Court expressly noted that the Government manufactured and shipped the fertilizer "for more than 3 years without even minor accidents," and, in addition, it pointed out that (346 U.S. 15):

"* * * The basic 'plan' * * * was drawn up in the light of prior experience by private enterprise and the TVA. In fact, it was as we have pointed out, based on the latter agency's engineering techniques, and specifically adopted the TVA process description and specifications" (pp. 38–39).

"The lack of participation by Government employees in the negligent conduct found by the district court is underlined by the following excerpts from the Supreme Court's opinion:

"As well, serious judgment was involved in the specification of the bag labels and bills of lading. The importance of this rests on the fact that it is the latest point in time and geography when the Government did anything directly related to the fire, for after bagging the FGAN was of course physically in the hands of various nongovernmental agents. * * * there was serious room for speculation that the most direct operative fact causing the immediate fire on the *Grandcamp* arose from errors that the French Council, longshoremen, or ship staff committed * * * *" (p. 41).

The opinion also stresses complete compliance with applicable regulations of the Interstate Commerce Commission in shipping the material:

"* * * The plan had been prepared in this regard by the transportation officer of the Director's Office. His decision in the matter was dictated by the ICC regulations. These did not provide for a specific classification for the material other than as fertilizer. Labeling it as anything but "oxidizing material" was not required—indeed was probably forbidden—and even this requirement was waived for bags of less than 200 pounds. To the extent, then, that the Army had a choice in the matter, its decision not to seek to list its FGAN in any other fashion was within the exception. The immunity of a decision as to labeling, in fact, is quite clearly shown by the fact that the ICC's regulations, for instance, could not be attacked * * * *" (pp. 41–42).

Similarly, with respect to the Coast Guard, the Supreme Court observed:

"The findings of negiligence on the part of the Coast Guard in failing to supervise the storage of the FGAN, and in fighting the fire after it started, were rejected by a majority of the court of appeals" (p. 42).

The majority opinion of the court of appeals also indicated that there was fundamental error in the district court's findings. While the court's decision rested upon the conclusion that the Federal Government is not liable because of the "discretionary function" exemption in the Tort Claims Act, a reading of the majority opinion makes it clear nevertheless that the court did not agree with the district court's basic findings that the fertilizer was an inherently dangerous explosive substance, the qualities of which the Government's employees were or should have been so aware of that the fertilizer program should not have been undertaken as it was. Contrary to the findings of the district court, this opinion stated that:

"In this case, it can hardly be argued that the dangers of explosion from FGAN were so well known prior to the disaster that judgment or discretion were not called into exercise as to whether it should be manufactured at all and under what safeguards and warnings it should be distributed. Even if some danger were recognized, the necessity of providing means of existence to the devastated areas might have called for the exercise of discretion as to whether to take a calculated risk."

The committee's amendment places jurisdiction in the Department of the Army to investigate and settle the claims hereunder. The committee considered placing jurisdiction in the Federal courts but it was thought, however, that the courts, with their present heavy calendars, could not properly process these claims without appointing masters, auditors, examiners, and other clerical personnel to hear and, for all practical purposes, adjudicate these claims. It was therefore felt that jurisdiction could well be placed in the Army, since that agency of Government has the facilities for and experience in processing claims against the U.S. Government. Precedent for such action is to be found in the Port Chicago, Calif., explosions where, through legislation, the Congress conferred expanded jurisdiction on the Secretary of the Navy to settle claims for property damage, death, and personal injury arising out of that disaster. (See Public Law 423, 78th Cong., and Public Law 637, 80th Cong.)

In placing a $20,000 limitation on the claims in his legislation the committee has done so, because of the fact that there is a lack of legal liability on the part of the Government and, too, because the committee views the grants of awards to be given hereunder as gifts in the nature of disaster relief, based on humanitarian principles. While this legislation cannot reach all of the claimants for all of their losses, the committee feels that it will at least help a substantial majority of those unfortunate people who suffered losses as a result of the disaster.

SUBROGATED CLAIMS

Neither the Senate bill nor this committee's amendment makes provision for subrogated insurance claims.

Of serious concern to the committee was the question of whether any part of the moneys distributed to claimants under its amendment could be thereafter subject to recoupment claims by insurance companies against the claimants, for reimbursement to the extent, at least, that the companies had previously paid the claimants under policies of insurance.

It is, of course, the intention of the committee that no moneys awarded under this act be paid over, under any circumstances, to subrogees. The awards are intended as gratuities, and the rights, hereunder, are not to be extended by implication, or by recourse to assignment or by the principles of subrogation.

Precedent for such action can be found in the act of 1874 when Congress by law (18 Stat. 245, 247, sec. 12) authorized payments to be made to persons who had suffered losses at the hand of the Confederate man-of-war, *Alabama*, and others but limited such disbursements, in the case of claimants who had been compensated by insurers, to the difference between the amount of such compensation and the true value of the loss sustained. When marine underwriters sued to recover a portion of the moneys thus disbursed, they were defeated in British courts on the ground that "title to the indemnity granted in particular terms out of a particular fund at the disposal of the United States by an act of Congress is not a title which can possibly result in law from the [insurance] contract itself. [If such right of recoupment existed, the British judges noted] it must exist by the combined effect of the contract between the insurer and the insured and the act of Congress. It cannot follow from the contract of insurance alone, without the act of Congress * * * . Whatever reviews of moral obligation may be entertained with regard to the act of Congress, * * * it is correctly described * * * as an act of pure gift from the American Government * * * . If once the right had vested to recover any such sum, of course an act of Congress could not take it away; but when Congress in express terms say, "We do not pay the money for the purpose of repaying or reducing the loss against which the insurance company has indemnified, but for another and different purpose," it effectually prevents the right arising * * * . In this case the act of Congress declares in very express terms, * * * that no compensation is to be given * * * on account of loss which has been * * * covered by insurance, and secondly that underwriters are not to receive any benefit from the funds distributed under the act * * * . It was an act of grace on their part to assign [this fund], and give it either to one or to the other of the losers by the acts of the *Alabama*, and * * * in giving it as they have done, they were attaching a condition to the gift, which condition was not only entirely within their power but which they might attach without violating any legal responsibility or moral obligation (*Burnand* v. *Rodocanachi* (1882) 7 Law Reports (App. Cas.) 333, 335–336, 341, 343; *Md. Casualty Co.* v. *Lincoln Bk. and Trust Co.* (1937) 18 F. Supp. 375; Col. L.R. (1928), 28:208)."

PROVISIONS OF THE COMMITTEE AMENDMENT (AN AMENDMENT IN THE NATURE OF A SUBSTITUTE BILL)

Generally the amendment would authorize the Secretary of the Army to investigate the claims to determine whether they resulted from the explosion and then to calculate the damages claimed to have been sustained by each claimant and decide who is entitled to receive the award, if any (secs. 2 and 4).

The total amount claimed either by or on behalf of persons who had suffered damages as a result of the explosion was roughly set at the time of the court litigation at $200 million. Experience as shown, however, especially with regard to disasters that amounts claimed against the Government are for the most part in excess of what Federal courts will finally allow. At the various hearings which were held on this legislation, lawyers representing several hundred claims testified that the total amount of all claims, including insurance subrogated claims, could more realistically be set at somewhere between $60 and $100 million. Since the committee amendment eliminates subrogated insurance claims (sec. 6) and puts a limitation of $20,000 on all other claims (sec. 5) it is felt that the total amount which the Government is likely to pay will be substantially less than the above-estimated figures.

Section 3 sets up procedures under which claimants shall submit their claims. It limits the claims to be entertained hereunder to those which were filed in the district courts under the Tort Claims Act. The committee wishes to state that in limiting the claims, generally, to those which have already been filed in the Federal courts, it is its intention that the Secretary of the Army should, where practicable, consider the claims in the manner in which they were originally filed. While it is the intention of the committee to authorize payment to those individuals, firms, companies, associations, and corporations, other than subrogees, the committee wishes to prevent the severing or the division of any claim by any claimants who may thereby seek to circumvent the $20,000 limitation provided for in the committee amendment for each claim. Claims should be entertained, where possible, in the manner and under the circumstances under which they were originally filed.

Sction 6 also provides that in determining the amounts to be awarded under this bill the Secretary of the Army shall reduce any award by an amount equal to the total of insurance benefits (except life insurance payments) and other payments previously received by the claimants with respect to such losses.

Section 7 provides that the Secretary of the Treasury shall pay, in full settlement, the claims approved by the Secretary of the Army. Section 8 would require that all such settlements be in full discharge of all claims against the United States. The Secretary would also be required to take an assignment to the United States of any right of action against third parties (sec. 9). Section 10 directs the Secretary of the Army to transmit to Congress each claim submitted to the Department of the Army which is not settled by him, with supporting papers, findings of facts, and recommendations thereon, as well as a report of each claim settled and paid in accordance with the committee amendment. Section 11 contains a standard provision relating to attorneys' fees and also contains a penal provision providing for a fine of not in excess of $5,000 for anyone who violates the provisions of this legislation. Section 12 contains a severability clause.

VIEWS OF GOVERNMENT DEPARTMENTS

There follows a report of the Department of the Army on the legislation as introduced. It may be well also to mention that while the Department of Justice is opposed to the legislation as introduced, representatives who testified at the hearings stated that the Attorney General would not be opposed to legislation which was in the nature of a disaster relief bill and which would omit subrogated insurance claims and place a reasonable monetary limitation on claims for death, personal injury, or property losses. It is felt that the committee amendments meet the objections of the Department of Justice and in fact are in accordance with its suggestions.

MAY 9, 1955.

Hon. EMANUEL CELLER,
Chairman, Committee on the Judiciary,
House of Representatives.

DEAR MR. CELLER: Reference is made to your letter of April 20, 1955, relative to the hearings on H.R. 4045, 84th Congress, a bill to provide for settlement of claims for damages resulting from the disaster which occurred at Texas City, Tex., on April 16 and 17, 1947, presently scheduled for May 11, 1955, before Subcommittee No. 2 of the Committee on the Judiciary, House of Representatives, and the advisability of having a representative present the views of the Department of the Army at such hearings.

The Secretary of Defense has been asked to report the views of the Department of Defense on the bill and has delegated the responsibility therefor to the Department of the Army. The Army report is in the process of being coordinated within the Department of Defense and will be presented to the committee prior to the hearings. Additionally, the Department of the Army, on behalf of the Department of Defense, submitted a very lengthy report on H.R. 8572, 83d Congress, a similar bill. That report sets out in detail the facts surrounding the events of April 16 and 17 at Texas City, and is set forth in full on pages 56 to 70 of the report of the Committee on the Judiciary, House of Representatives, to accompany H.R. 9785, 83d Congress. This report, together with that which will be

submitted to the committee on H.R. 4045, 84th Congress, elaborately explains the position of the Department of Defense on the bill, and it does not appear that any additional information of value to the committee would be presented by having a witness testify at the hearings.

Accordingly, in the absence of an indication that the committee desires the presence of a witness, the Department of the Army does not plan to present any testimony over and above the views reflected in the above-mentioned reports.

Sincerely yours,

ROBERT T. STEVENS,
Secretary of the Army.

[H. Rept. No. 1623, 84th Cong., 1st sess.]

TEXAS CITY DISASTER

AUGUST 2, 1955.—Ordered to be printed

Mr. CELLER, from the committee of conference, submitted the following

CONFERENCE REPORT

[To accompany S. 1077]

* * * * * * *

STATEMENT OF THE MANAGERS ON THE PART OF THE HOUSE

The managers on the part of the House at the conference on the disagreeing votes of the two Houses on the amendments of the Senate to the bill (S. 1077) to provide for settlement of claims for damages resulting from the disaster which occurred at Texas City, Tex., on April 16 and 17, 1947, submit the following statement in explanation of the effect of the action agreed upon and recommended in the accompanying conference report as to each of such amendments, namely:

An issue of major concern at the conference was the statement in the House amendment denying any equitable or legal responsibility on the part of the United States for the disaster at Texas City, Tex. The Senate bill had already made a finding of equitable responsibility. However, since the circuit court of appeals and the Supreme Court found it unnecessary to determine this question, the conferees decided not to determine it either but to state, simply, that because of the enormity of the disaster and the great number of people either injured or killed the Government recognizes compassionate responsibility toward the innocent victims of the disaster. It should be clearly understood, however, that in no way is this action on the part of the conferees to be interpreted as acknowledging legal responsibility or negligence on the part of the Government. It is the express desire of the managers on the part of the House that the instant legislation will finally dispose of all claims presented to the Congress on behalf of those who suffered loses at Texas City.

In order to set up a standard of measure to guide the Secretary of the Army in the processing of the claims hereunder, the conferees agreed to the amendment making the law of the State of Texas applicable to these claims. The law of Texas contains ample provision for governing the rights of survivors and of statutory beneficiaries who are authorized legal representatives.

The conferees also agreed to raise the amounts which individuals, associations, corporations, etc., might receive for death, personal injury, or property loss from $20,000 to $25,000. It is the intention of the conferees that section 1 of title I, United States Code, be used by the Secretary of the Army in construing such terms as "person," "insanity," etc.

There are several technical amendments which were agreed to in order to conform the provisions of the bill to the major changes mentioned above.

EMANUEL CELLER,
THOMAS J. LANE,
E. L. FORRESTER,
WILLIAM E. MILLER,
DEWITT S. HYDE,
Managers on the Part of the House.

[Excerpts from "Texas City Disaster Claims—Report Submitted Under Act of August 12, 1955" (Public Law 378, 84th Cong.; 69 Stat. 707)—85th Cong., 2d sess.—January 1958]

FOREWORD

Section 10 of the act of August 12, 1955 (Public Law 378, 84th Cong., 69 Stat. 707), requires the Secretary of the Army to transmit to the Congress a report containing a statement of each claim submitted as a result of the Texas City disaster of 1947 together with a statement concerning the character of the claim, the amount claimed, and the amount paid, and if not paid or if the claim was not recognized, the reasons therefor. This document comprises that report.

On April 16 and 17, 1947, a disaster occurred in Texas City, Tex., of almost unbelievable proportions. Loaded bags of ammonium nitrate fertilizer stored for overseas shipment in the holds of two ships at the docks in that city blew up. Over 570 persons perished in the disaster and about 3,500 more suffered injury. Damage to private property ran into millions of dollars.

The fertilizer which blew up at Texas City was destined for France as part of an allocation made by the Combined Food Board, an international organization which rationed fertilizer to the allied countries during and after the war.

As a result of the explosions at Texas City, a consolidated lawsuit comprising over 300 actions for death, personal injury, and property damages were instituted against the United States in the names of some 8,500 claimants under the Federal Tort Claims Act. After some 5 years of litigation in Federal courts, the Supreme Court of the United States handed down a decision holding that these claims were not covered by the Federal Tort Claims Act, and therefore that the United States was not legally liable. (*U.S.* v. *Dalehite*, 346 U.S. 15.)

After the Supreme Court's decision the claimants turned to Congress for relief. Representative Clark Thompson sponsored House Resolution 296 of the 83d Congress, directing the Committee on the Judiciary to make investigations and studies of the merits of the claims against the United States arising out of this disaster. A special subcommittee composed of Representatives Edgar A. Jonas, of Illinois; DeWitt S. Hyde, of Maryland, and Thomas J. Lane, of Massachusetts, conducted hearings at Galveston and Texas City, Tex., as well as in Washington, D.C. In addition, this committee had at its disposal the record of the trial court in the *Dalehite* case, consisting of 39 volumes and over 33,000 pages of testimony and exhibits. It also had the views of the Department of Justice and the Department of the Army.

As a result of its investigation, H.R. 9785 was introduced in the 83d Congress which passed the House, compensating the claimants for death, personal injury, and property loss resulting from the explosions. The Senate thereafter acted upon and passed the same bill, but in a different form. Because it was late in that session of the Congress, no conferees were appointed to resolve the differences between the Senate and the House versions of the bill, and it died at the end of the 83d Congress.

In the 84th Congress similar bills were introduced in both the House and the Senate. Since the Senate bill, S. 1077, passed the Senate Chamber first, the House laid aside the House bill and all action was directed to S. 1077. This bill, after favorable consideration by both Houses was approved by the President and became Public Law 378 of the 84th Congress.

The purpose of the legislation was to recompense, to a limited extent, those persons or their survivors, who suffered death, personal injury, and property losses as a result of the explosions and fires at Texas City. While denying any equitable or legal responsibility on the part of the U.S. Government, the Congress nevertheless, in recognizing the enormity of the disaster, the great number of innocent victims who were either killed or injured thereby, and in remembering that the ammonium nitrate fertilizer shipment which exploded was in aid of the international agreement for worldwide fertilizer allocation, felt that for compassionate reasons those persons who suffered losses should receive some help from the Federal Government to assist them in those losses. Since the Supreme Court had held that there was no legal liability on the part of the Federal Government for the disaster, all payments were in the nature of a grant rather than in payment of a lawful obligation. Payments were limited, therefore, to amounts not in excess of $25,000 for each death, personal injury, or property loss claim that was submitted.

Total claims against the U.S. Government as filed in the court action in the *Dalehite* case amounted to some $200 million. The total amount paid in settlement was approximately $16,100,000.

There follows a detailed report submitted by the Department of the Army as required by the Texas City Disaster Claims Act, of all claims settled and unsettled. The committee wishes publicly to recognize the tremendous task which the Army performed so well in connection with the settlement of these claims. This performance is of impressive significance when it is realized that the work was accomplished within the short period of 24 months.

EMANUEL CELLER, *Chairman.*

TEXAS CITY DISASTER CLAIMS

HISTORY

1. BACKGROUND EVENTS

On April 16 and 17, 1947, in the port of Texas City, Tex., two ships loaded with general cargo including bagged ammonium nitrate fertilizer destined for overseas shipment, exploded with tremendous force. The explosions and subsequent fires either destroyed or structurally damaged approximately 1,000 buildings. Some 570 persons died, about 3,500 others were injured, and damage to property was great.

During the 3 years following the disaster, almost 300 court actions for death, personal injury, and property damage were instituted against the United States in the names of some 8,500 claimants under the Federal Tort Claims Act (title 28, United States Code). With the approval of the U.S. District Court for the Southern District of Texas the suits were consolidated into one civil action (*Dalehite et al.* v. *United States of America*, C.A. 787, U.S.D.C., S.D. Tex., (1950)). On May 4, 1950, the court rendered judgment for the plaintiffs. On appeal, the U.S. Court of Appeals for the Fifth Circuit, on June 10, 1952, reversed the district court (*In re Texas City Disaster Litigation*, 197 F. 2d 771 (5th Cir. 1952)). The Supreme Court of the United States affirmed the decision of the court of appeals on June 8, 1953 (*Dalehite et al.* v. *U.S.*, 346 U.S. 15 (1953)).

The plaintiffs then turned to the Congress for relief. After several bills had been introduced in successive sessions, there was enacted the act of August 12, 1955 (Public Law 378, 84th Cong.; 69 Stat. 707), by which the Congress recognized and assumed compassionate responsibility for the losses sustained. Congress designated the Army as the agency to investigate and settle claims under the act of August 12, 1955, supra.

2. DELEGATION OF AUTHORITY

On September 8, 1955, the Secretary of the Army designated the Chief, Claims Division, Office of the Judge Advocate General, and all officers of the Judge Advocate General's Corps assigned to the Claims Division, to investigate, determine, and settle claims under the act. He authorized the Chief of the Claims Division to limit the settlement authority of his officers.

The act required that the Secretary of the Army promulgate and publish rules of procedure for handling the claims within 60 days. Army Regulations 25–150, for this purpose, were published on September 29, 1955.

3. ESTABLISHMENT AND STAFFING OF ADMINISTRATIVE AND TECHNICAL OFFICES

The Claims Division, located at Fort Holabird, Md., although fully equipped and experienced in the consideration and settlement of claims presented under the numerous permanent statutes which it administered, had no investigative facilities. A field office to receive an investigative claims was therefore established in October 1955 in Galveston, Tex., near Texas City. Simultaneously, a Texas City claims branch was set up in the Claims Division at Fort Holabird to process and settle the investigated claims.

On October 20, 1955, the Claims Division was authorized an additional 11 officers and 18 civilian employees at Fort Holabird and 40 officers and 25 civilian employees at Galveston, Tex. Experienced claims officers, all of whom were lawyers and members of the Judge Advocate General's Corps, were obtained to fill the key positions. A group of 25 newly commissioned first lieutenants of the Judge Advocate General's Corps, who were about to complete their studies at the Judge Advocate General's School in Charlottesville, Va., were made avail-

able to conduct the investigations and prepare the necessary reports and legal opinions. A special 1-week course was conducted for these officers at the school in October 1955. Five GS–13 and two GS–12, mature, experienced, and capable, civilian attorney-advisers were employed in the Texas City claims branch, at Fort Holabird, to examine and review the investigated claims, apply the applicable law to the facts and recommend either that a specific award be paid or that no award be paid. Two GS–13 and one GS–12 attorney-advisers were employed for duty in the field office and clerical personnel for that office were also recruited locally in Galveston.

A consideration of the types of claims expected to be submitted, in the light of the fact that about 9 years had elapsed since the disaster, led to the conclusion that personal-injury claimants should be examined by competent physicians to determine the nature and extent of their alleged injuries, health, and disability. On March 5, 1956, at the request of the Judge Advocate General, the Surgeon General of the Army established a medical unit for this purpose at the John Sealy Hospital in Galveston. It consisted of four Medical Corps officers, two Army Nurse Corps officers, and one Medical Service Corps officer. Five clerical employees were provided by the Field Office Claims Division.

The medical unit operated from March to June 1956. Its prompt, full, accurate, and unequivocal evaluation of injuries aided substantially in the just settlement of personal-injury claims.

4. INTERDEPARTMENTAL COORDINATION AND ASSISTANCE

Since it was recognized that the task of conducting adequate investigations would be extremely difficult, due to the lapse of time since the disaster, the Department of Justice was requested to, and did, make available all of its litigation and correspondence files relating to the Texas City disaster, including reports of the Federal Bureau of Investigation concerning claims which had been made the subject of civil actions against the United States. Since the investigations had been conducted within a relatively short time after the disaster when most witnesses were available for interview, medical and hospital records were current, damaged property could be viewed, and local records relating to the damage could be examined, these reports were very valuable in verifying the statements of claimants and witnesses.

The act required the Secretary of the Treasury to pay Texas City claims out of moneys in the Treasury not otherwise appropriated. Following consultation between representatives of the Army and the Department of the Treasury, a simplified procedure for effecting payment was devised. Certain officers of the Texas City Claims Branch were appointed as bonded certifying officers authorized to forward vouchers covering approved claims through the Fort Holabird Finance Office directly to the Department of the Treasury for payment. This procedure, avoiding the necessity that vouchers be accompanied by supporting documents, permitted claimants to receive their awards within 2 to 3 weeks after receipt of properly executed settlement agreements in the Claims Division.

It having early become apparent that some provisions of the act would require authoritative interpretation before the rights of the individual claimants could be determined, the Comptroller General of the United States was requested to rule formally on six such questions. His opinion, agreeing for the most part with the interpretations recommended by The Judge Advocate General, was rendered on April 23, 1956 (35 Comp. Gen. 572 (1956)). All other problems were resolved by research in the Claims Division, Office of The Judge Advocate General, until it became apparent toward the end of the program that certain infant claimants residing in France would not, for reasons of French law, be able to present settlement agreements properly executed by guardians before August 12, 1957, which had been considered the final legal date for certification of vouchers. The Judge Advocate General asked the Comptroller General to rule that vouchers might be certified after August 12, 1957, and the Comptroller General agreed (Ms. Comp. Gen. 131995, June 5, 1957).

5. OPERATION OF THE FIELD OFFICE IN GALVESTON

The field office in Galveston was a military unit under the direct supervision of the Chief, Claims Division, at Fort Holabird. It was divided into an Administrative Branch, an Investigations Branch, and a Legal Branch.

Due to the nature of the claims and the fact that most claimants were represented by counsel, the investigations were initially conducted to a great extent by examination of the Department of Justice files and by correspondence with claimants and their attorneys. The bulk of the evidence required for the settlement of most of the claims began pouring into the field office during June 1956. After receipt of evidence received in this way, an investigating officer, after examining the documents, completed the investigation by personal inspection of damaged property and personal interview of claimants and witnesses.

Since the act required that certain previously paid benefits be deducted from awards, it was necessary to ascertain the amounts paid for disaster losses by various companies and certain business and governmental agencies. Valuable information as to this and other matters was obtained from records of the Social Security Administration, the Texas Industrial Accident Board, the Texas Firemen's Pension Commission, the Veterans' Administration, the Federal Railroad Retirement Board, the American Red Cross, and the Texas City Disaster Relief Committee.

The accumulation of evidence that an alleged death was a proximate result of the disaster was normally routine, as the Department of Justice files usually contained eyewitness statements placing the alleged decedent in the immediate vicinity of the blast area at a time immediately preceding the first explosions. Also accessible for this purpose were lists prepared by local officials and historians containing the names of persons identified as dead or reported missing. Official determinations of death by the Social Security Administration, the Veterans' Administration, the Railroad Retirement Board, the Texas Industrial Accident Board, or other Federal or State agencies, were also usually available.

It was uniformly required that personal injury claims of all kinds be supported by available medical and hospital records showing the nature, extent, and treatment of the injury. Medical expenses were proper items of damage, but very few claims included this item, as such expenses usually had been paid in full either by the American Red Cross, the Texas City Disaster Relief Committee, or a workmen's compensation insurance company.

A claimant for damage to or destruction of real property had either to have held legal or equitable title at the time of the disaster, or to have acquired title to the claim by operation of law since the disaster. To verify the necessary facts, arrangements were made for access to the title records of a Galveston title company. Title questions normally were resolved on the basis of skeleton abstracts prepared from this source, although claimants were afforded full opportunity to supplement or rebut where indicated. Insurance company adjustment records were available in many cases to establish that the damage to the property had resulted from the disaster and the extent of such damage. Consideration was also given to the age of the property, its location in relation to the site of the blasts, its condition and value of the property before and after the disaster, and other factors. Most investigations of claims for damage to property included personal inspection by investigators who conducted interviews of claimants and witnesses, and personally viewed the scene of the alleged damage.

OPERATION OF THE TEXAS CITY CLAIMS BRANCH, CLAIMS DIVISION

The Texas City Claims Branch in the Claims Division at Fort Holabird was divided into a General Section and an Adjudication Section which was responsible for the actual settlement of the claims.

During late 1955, before any considerable number of claims had been presented, the Branch conducted extensive research into Federal and Texas law and the legislative history of the act of August 12, 1955, supra, and prepared numerous opinions on legal problems. The Branch also prepared a detailed damages guide for the determination and calculation of awards in specific types of cases which was used with only slight modification throughout the program. A significant part of the damages guide was a survey of Texas tort cases, prepared by the Branch in collaboration with the Field Office, to arrive at an average of judgments rendered in Texas in cases such as those involving the death of a minor child which are not ordinarily susceptible of calculation.

Based on the anticipated number of claims, and the grade and experience of available officer personnel in the Texas City Claims Branch, the Chief, Claims Division, established a graduated scale of sub-delegated settlement authority, ranging from $5,000 to the maximum statutory amount of $75,000 for a claim involving death, personal injury, and property loss.

The sole statutory guide for assessing damages under the act were the words: "Except as otherwise provided herein, the law of the State of Texas shall apply." Careful study of the applicable Texas damages law indicated that although some general rules had been enunciated by various courts, the ultimate question of the amount of damages remained a jury question, and that in some cases the verdicts did not appear to be entirely consistent with the law. Jury awards in Texas displayed wide variations in amount for cases of the same general nature and did not provide a workable rule for settling uniformly and equitably the large number of claims presented by claimants who for the most part lived near each other.

To achieve maximum uniformity, consistent with accurate application of the law to the particular facts, but in a manner which would dispose of the claims expeditiously, it was decided that individual officer approving authorities acting within specific monetary limits would review the claims files and determine the awards in accordance with the damages guide previously prepared in the Texas City Claims Branch. Problems requiring consultation among approving authorities were discussed and settled in meetings held by the Branch Chief and attended by other approving authorities.

The general policy in determining damages was to effect liberal awards in keeping with the law of Texas and the compassionate purpose of the relief act. In doubtful or borderline questions, the benefit of the doubt was accorded to the claimant. In formulating adjudication policies, favorable consideration was always given to the course of action which would most substantially benefit the claimant. In this manner, the amounts paid to the victims of the disaster closely approximated the sums they would have received as a result of a jury trial.

In most death claims involving a surviving wife and children, the amount of damages sustained was found to be in excess of $25,000, the maximum statutory amount payable for death. Therefore, the majority of these claims were settled for $25,000.

Awards in payment of personal-injury claims varied greatly, as determined by the nature and permanence of the injuries. However, claimants who sustained serious injuries resulting in a high percentage of permanent physical disability uniformly received the maximum award for personal injury, $25,000, and actual damages were materially higher in many cases.

Even though many industrial-property claims were for very large sums, all of the tendered awards for $25,000 were accepted by the claimants. Property damage in general was not claimed in large amounts, and the awards seldom exceeded $3,000 for damages to a dwelling and its contents.

7. FISCAL

A sum of $200,000 was made available for administrative costs of the project for fiscal year 1956. The operating expenses of the Texas City Claims Branch were approximately $90,000 and the operating expenses of the field office in Galveston totaled approximately $130,000. The total cost of both offices for the duration of the program was therefore about $220,000. These costs included the pay of all civilian personnel, travel expenses, including that required for investigations, inspections and conferences, supplies and equipment including office furnishings, electrical equipment, office machines, rent of office space in Galveston, and miscellaneous items such as transportation of equipment. It also included all costs of the medical unit from the Office of the Surgeon General, including rent of space at the John Sealy Hospital. It did not of course, include the pay and allowances of military personnel.

It was originally estimated that as much as $68 million might be required for the payment of claims. The total dollar amount of claims submitted was $65,903,649.66. An open allotment of $28 million was made available for their payment, with $40 million additional to be allotted, if required. To May 31, 1957, the total amount paid in settlement of the claims was $16,096,095.85.

8. CONCLUSION

The act required that claimants submit their claims within 180 days after its effective date, and that the award, if any, on each claim be determined and fixed within 12 months from the date on which the claim was filed. As most of the claims were submitted within the last few days before the deadline date, the Army had only 1 year to investigate and settle all of them. Although persons familiar with the magnitude and complexity of the undertaking freely prophesied

that it could not be accomplished within such a short period, in fact, all the awards were determined within the year and most of the additional personnel procured for the program were released or reassigned before February 1957. The field office, which for several months had consisted of one officer and one stenographer, was closed on June 30, 1957. The residual functions of the Texas City Claims Branch at Fort Holabird will be carried on as an additional duty by personnel of the Claims Division who are principally engaged in administering the several permanent statutes administered by that office.

APPENDIX 22

AEC COMMENTS ON H.R. 8496 AND S. 2042, JUNE 17, 1965

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., June 17, 1965.

MR. JOHN T. CONWAY,
Executive Director, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. CONWAY: This is in reply to your request for the Commission's comments on H.R. 8496 and S. 2042, identical bills [t]o amend section 170 of the Atomic Energy Act of 1954, as amended.

The bills would extend the authority of the Commission under the provisions of the Price-Anderson Act to indemnify licensees and contractors against public liability claims arising out of a nuclear incident for an additional period of 10 years from August 1, 1967, until August 1, 1977. The bills also would reduce the amount of indemnity for each nuclear incident by the amount that the financial protection required of the licensee or contractor shall exceed $60 million, and they would limit the aggregate liability for a single nuclear incident of persons indemnified to a maximum of $560 million.

The Commission is in full accord with these bills.

The House and Senate reports on the bills which were enacted in 1957 as the Price-Anderson amendments expressed the hope that enough experience would be gained during a 10-year period so that the problems of reactor safety would be to a great extent solved. Substantial experience has been gained in the operation of nuclear reactors since 1957, and the safety record has been excellent. Although, as expected, there has not been a catastrophic nuclear accident, the theoretical possibility of such an accident cannot yet be excluded. Thus, one of the two principal objectives of the indemnity provisions of the Price-Anderson Act continues to be a vital reason for the extension of those provisions; namely, to assure the availability of funds to satisfy public liability claims in the unlikely event of a catastrophic nuclear incident.

While the Price-Anderson amendments have achieved their other principal objective, removing the deterrent to atomic industrial activity, it is clear that the need for Price-Anderson indemnity legislation to remove the deterrent to industrial participation in atomic energy activities still exists. A demonstration of this need was the request made at the last session of the Congress for the amendment of subsections 17 c and k of the Price-Anderson Act, to make clear that the act applies to facilities for which a construction permit will have been issued before August 1, 1967, regardless of when the license to operate may be issued. The amendment was enacted on August 1, 1964.

The extraordinary potential financial risks to which many Commission contractors were subject in the early periods of the atomic energy program still exist. Despite the remoteness of the probability of a substantial nuclear incident in the performance of the Commissions contractual activities, the need continues for Government-supplied financial protection for Commission contractors under risk of liability for such activities. The extension by the Commission of financial protection to contractors through any existing mechanism other than Price-Anderson indemnification would provide less protection to the industry and the public.

The extension of the Commissions indemnification authority for the NS *Savannah* also is needed for reasons analogous to those set forth above, as well as for the additional reason that the existence of Price-Anderson indemnification has been and will continue to be an essential factor in the acceptance of the NS *Savannah* into foreign ports.

50-891—65——24

The Commission believes that legislation to extend the Commissions authority should be enacted in the present session of the Congress because of the long leadtimes required by utilities in planning and programing the construction of power reactors. The assurance of continued availability of Price-Anderson indemnity after 1967 would be an important factor during the next 2 years for those utilities who may be considering nuclear power.

The provisions of the bills which relate to reduction of the amount of indemnity and to limitation of the aggregate liability of persons indemnified would appear to be appropriate for consideration by Congress at this time, since the nuclear energy liability insurance pools are undertaking to increase the maximum limits of nuclear energy liability insurance which they can make available as financial protection to licensed operators of nuclear facilities. Of course, the availability of this additional insurance in no way obviates the need for extension of Price-Anderson indemnification, but it does open the way for the possibility of a gradual reduction in the amount of Government indemnification which needs to be made available.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the administration's program.

Cordially,

GLENN T. SEABORG, *Chairman.*

APPENDIX 23

LETTERS FROM MR. ROLLA D. CAMPBELL, DATED JUNE 22, 1965

HUNTINGTON, W. VA., *June 22, 1965.*

Hon. A. WILLIS ROBERTSON,
Senate Office Building,
Washington, D.C.

DEAR WILLIS: As you may already know, the Subcommittee on Legislation of the Joint Committee on Atomic Energy is conducting hearings at the present time on S. 2042 and H.R. 8496, which are identical bills to extend the Price-Anderson Act for a 10-year period beyond the current August 1, 1967, expiration date.

The Price-Anderson Act furnished $500 million Government indemnity for each atomic powerplant, to apply when damages from such a plant exceed the $60 million commercial insurance currently available to such plants. Further, the law limits the liability of everyone involved to this $560 million total, with the result that where damages exceed $560 million the injured persons will have no recourse for such excess.

This act has been justified on the grounds that it furnishes protection to the public. But there is no effective appropriation to pay damages. I do not understand how it furnishes any protection to the public that would not be available if the present act were allowed to expire, since the Congress would be required to legislate and it might or might not do so.

First, even as to the $500 million Government indemnity, the continuation of the ace constitutes no "protection" to the public. If a catastrophe occurs, congressional action will still be required, whether the Price-Anderson Act is extended or not, because an appropriation of the necessary money will be necessary.

Second, I think it is quite clear that the provision granting financial immunity to manufacturers and operators of atomic powerplants actually takes away from the protection of the public, in two ways: It shields assets of the manufacturers and operators from financial responsibility, and in some cases these assets are substantially in excess of $560 million. Far more important, however, is the fact that it removes the incentive to spend extra money for extra safety. The AEC's vigilance in regulation should be given the aid and assistance of the economic incentive to spend whatever is necessary for safety, and this incentive arises primarily out of financial responsibility for damages caused by negligence.

In the past it has been claimed by some individauls that the damaged public will probably be given Government financial awards over and above the $560 million in the event of a catastrophe. The Congress has made no such commitment. Will such determination by Congress, if it should be made, be facilitated by the existence of the Price-Anderson Act? I do not see how. It seems to me that Congress will be hindered in its determination by the provision of the law saying that the operator or manufacturer cannot be forced to pay for any part of the damages beyond insurance funds available.

In summary, won't the public be better protected by the expiration of the Price-Anderson Act than by its extension? And is there any sound policy reason for the taxpayers of this country to assume, by act of the Congress, financial burdens and risks which the atomic industry itself should, in all fairness, assume and bear?

I hope you will do what you can to see that the foregoing questions are called to the attention of your colleagues and are given careful scrutiny by the Members of Congress when they consider extension of the Price-Anderson Act.

Sincerely,

ROLLA D. CAMPBELL.

HUNTINGTON, W. VA., *June 22, 1965.*

Hon. FRANK CARLSON,
Senate Office Building,
Washington, D.C.

DEAR FRANK: The Subcommittee on Legislation of the Joint Committee on Atomic Energy is currently holding hearings on S. 2042 and H.R. 8496, which would extend the Price-Anderson Act for 10 years. This act currently provides, for the lifetime of an atomic plant which receives a permit prior to August 1, 1967, the following treatment:

(1) The Government, for a nominal fee, will grant $500 million indemnity over and above the amount of commercial insurance which is available (at the present time, $60 million).

(2) If an atomic power plant causes a catastrophe, there will be no liability on the part of the operator of the plant or the manufacturer of the plant. The recoverable damages will be limited to the $60 million commercial insurance plus the $500 million Government indemnity, and the public will not be entitled to payment for the balance of the damages unless Congress at that time sees fit to pass a special law granting compensation out of Government funds.

The so-called "Brookhaven Report," prepared in 1957 under AEC auspices, indicated that the maximum possible damage from a relatively small powerplant could amount to as much as $7 billion, but the chance of such a catastrophe occurring was thought at that time to be remote. Much larger plants are being built today, so the $7 billion figure could easily be exceeded.

In the light of the foregoing, I think the atomic power industry and the Atomic Energy Commission should be forced to answer the following questions:

(A) If these atomic powerplants are as safe as the public has been led to believe, why does the atomic power industry need this peculiar legislation for self-protection?

(B) If these atomic power plants are not as safe as the public has been led to believe, why should their construction and operation be permitted unless confined to areas where they are so isolated they can't hurt the public? Why can't we wait until experience removes the need for special finanical protection before we build these plants on a widespread scale? Isn't the United States blessed with sufficient conventional fuel reserves to permit us to proceed in a cautious manner?

(C) Why, in any event, should the public be forced to bear a share of the loss caused by an explosion at an atomic plant built and operated by corporations which are not insolvent?

I hope you will do what you can to bring this matter to the attention of your colleagues, because I think this legislation deserves the careful scrutiny of every Member of Congress.

Sincerely,

ROLLA D. CAMPBELL.

APPENDIX 24

TELEGRAM FROM UNITED MINE WORKERS OF AMERICA, ZAP, N. DAK., JUNE 22, 1965

ZAP, N. DAK., *June 22, 1965.*

Hon. MILTON R. YOUNG,
Senate Office Building, Washington, D.C.:

We are opposed to the special privileges and subsidies granted under the Price-Anderson Act and urge you to oppose same at hearing June 22.

UNITED MINE WORKERS OF AMERICA LOCAL 8880,
W. E. POTRATZ, *Recording Secretary.*

APPENDIX 25

AEC Letter on Conflicts of Laws, July 1, 1965

U.S. Atomic Energy Commission,
Washington, D.C., July 1, 1965.

Mr. John T. Conway,
Executive Director, Joint Committee on Atomic Energy,
Congress of the United States.

Dear Mr. Conway: During the hearing on H.R. 8495 and S. 2042 on June 22, 1965, before the Subcommittee on Legislation, a discussion took place between Representative Hosmer and myself on the subject of conflict of laws. After reviewing the transcript of the hearing, I thought some additional comments might be appropriate to clarify the record.

One of the questions by Representative Hosmer related to the law applicable to a situation in which a person in State A shoots a man in State B. The "Restatement of the Law, Conflict of Laws" (1934) would apply the law of State B to determine whether a legal injury was sustained, since this is where the last event necessary to make the actor liable for the alleged tort took place.

There has been some departure from this rather rigid principle as illustrated by the 1964 tentative draft of the "Restatement Second, Conflict of Laws":

"§ 379a. Personal Injuries.—In an action for a personal injury, the local law of the State where this injury accurred determines the rights and liabilities of the parties, unless some other State has a more significant relationship with the occurrence and the parties as to the particular issues involved, in which event the local law of the latter State will govern."

The Supreme Court in *Richards* v. *United States*, 369 U.S. 1, 11–12 (1962) described the state of the law as follows:

"The general conflict-of-laws rule, followed by a vast majority of the States, is to apply the law of the place of injury to the substantive rights of the parties * * *. Recently there has been a tendency on the part of some States to depart from the general conflicts rule in order to take into account the interests of the State having significant contact with the parties to the litigation."

The rules relating to statutes of limitations prevent maintenance of a tort action which is barred by the forum's statute of limitations even though the action is not barred in the State where the cause of action arose. The related rule which allows maintenance of an action barred in the State where the cause of action arose, but allowed under the statute of limitations of the forum, has been altered by the "borrowing" statutes of many States, which generally prevent the maintenance of a tort action barred by the statute of limitations at the place where the cause of action arose.

Although there is some division of opinion in the courts, the better view appears to be that questions pertaining to the measurement of damages are matters of substance, to be determined by the law which governs the other substantive issues of the case. Whether this will be the law of the State in which the tortious action occurred or the one in which the injury takes place will depend upon the choice of law made under the principles discussed earlier in this letter. Some forums apply their own law on measurement of damages, particularly if the forum has other substantial contacts with the case.

As Professor Cavers observed in the course of his testimony, the law in this are is in a state of flux. It would be difficult to predict with any degree of assurance the result that would be reached in any particular jurisdiction or group of jurisdictions.

Thank you for this opportunity to correct the record.

Sincerely yours,

Joseph F. Hennessey,
General Counsel.

APPENDIX 26

COMMENTS OF CHAMBER OF COMMERCE OF THE UNITED STATES ON H.R. 8496 AND S. 2042, JULY 2, 1965

CHAMBER OF COMMERCE OF THE UNITED STATES,
Washington, D.C., July 2, 1965.

Hon. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
U.S. Capitol, Washington, D.C.

DEAR MR. CHAIRMAN: The Chamber of Commerce of the United States joins other representatives of the nuclear industry, utility groups, and the insurance industry in urging passage of legislation to extend the effectiveness of the Price-Anderson Act for an additional 10 years. Such legislation should provide that the amount which Government may indemnify private manufacturers, operators, and others engaged in nuclear activity, for their liability to third parties resulting from an atomic facility incident, will be decreased to the extent that the amount of private insurance available is increased.

The identical bills, H.R. 8496 and S. 2042, introduced by Congressman Price and Senator Anderson provide for continuing indemnity protection and afford the insurance industry the opportunity to participate to the fullest extent consistent with sound insurance management principles.

National chamber committees concerned with increased private development of nuclear energy and with increased coverage of risks by private insurance will continue to study implementation and administration of the Price-Anderson Act and will be pleased to submit recommendations to the Joint Committee, as well as the Atomic Energy Commission, as more experience is gained under the provisions of section 170 of the Atomic Energy Act.

We request that this letter be included in the record of hearings on H.R. 8496–S. 2042.

Sincerely,

THERON J. RICE,
Legislative Action General Manager.

APPENDIX 27

LETTER FROM FRED EISSLER ON EXTENSION OF PRICE-ANDERSON ACT, JUNE 19, 1965

SANTA BARBARA, CALIF., *June 19, 1695.*

Hon. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
House Office Building, Washington, D.C.

DEAR CHAIRMAN HOLIFIELD: The Federal subsidy of the atomic energy industry to the extent of providing insurance at a nominal charge under the provisions of the Price-Anderson Act should be discontinued.

Such a subsidy gives unfair competitive advantage to nuclear power over other sources of energy. The act also should be terminated because of the provision of a liability limit of half a billion dollars when a nuclear accident could cause considerably more damage.

Nuclear utilities should be required to pay their own way by obtaining insurance on the regular basis assumed by any other industry. If it is necessary for the Federal Government to be the insurer, the utilities should pay regular commercial premiums.

Cordially yours,

FRED EISSLER.

Kindly include these comments with the hearing record on the Price-Anderson Act.

APPENDIX 28

LETTER FROM SHIPBUILDERS COUNCIL OF AMERICA ON H.R. 8496 AND S. 2042, JUNE 25, 1965

SHIPBUILDERS COUNCIL OF AMERICA,
Washington, D.C., June 25, 1965.

Hon. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: The Shipbuilders Council of America, whose membership includes the principal shipyards and allied suppliers engaged in the construction and equipping of nuclear-powered submarines and other vessels for the Government, endorses the bills H.R. 8496 and S. 2042 pending before the Joint Committee. We urge enactment of the proposed 10-year extension of the Atomic Energy Act of 1954 as a most important step to keep U.S. industry in the forefront of this field.

We would appreciate inclusion of this letter in the record of hearings.

Sincerely,

EDWIN M. HOOD, *President.*

APPENDIX 29

LETTER FROM DR. EMERSON JONES, SPECIAL CONSULTANT TO THE GENERAL MANAGER, CONSUMERS PUBLIC POWER DISTRICT, ON EXTENSION OF THE PRICE-ANDERSON ACT, JUNE 16, 1965

TECHNICAL MANAGEMENT, INC.,
Lincoln, Nebr., June 16, 1965.

Representative CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
Washington, D.C.

DEAR MR. HOLIFIELD: I would like to convey Consumers' thoughts on the revision being considered for the Price-Anderson Act as well as the extension of its applicability. As you know, Consumers has been intensely interested in the insurance problems of the nuclear industry with our background dating to 1955. As a result of the specialized insurance problems in connection with Hallam, we had an excellent opportunity to become familiar with the insurance industry's problems as we attempted to convey our requirements to the insurance industry.

I believe the Price-Anderson Act has had as great an influence on the promotion of the nuclear industry as any other single element. To be sure, this act complements protection obtained from the insurance industry even though that protection did not particularly resemble services the insurance industry would normally be expected to provide. The specialized requirements of the nuclear industry do not permit the payment of premiums by the many to pay the losses of the few, but rather has reversed the normal concept of insurance so that a few pay (in fact in any given area one pays) a premium to be used for the reimbursement of losses for the many.

Even with the most optimistic number of plants being projected for the future, it will be many years before the nuclear industry will approach the conditions basic to a sound insurance industry. It is therefore extremely doubtful that the conditions which motivated the original passage of the act are at all different from those that now exist. It would appear that there is broad agreement that the Price-Anderson Act is a prerequisite to continued growth of the industry. There appears to be no logical reason to expand the upper limits of protection beyond that currently provided by the insurance industry and the Price-Anderson Act ($560 million). As the insurance industry becomes capable of assuming responsibility for increased levels of protection, the amount available through Price-Anderson should be reduced correspondingly. In this way, the insurance facet of the nuclear industry will be permitted to follow the practice of reducing dependence on Federal support, as has been so successfully demonstrated in such areas as fuel fabrication, chemical reprocessing, fixed-price construction, etc.

We therefore urge that the Price-Anderson Act be extended for 10 years with a reduction in Federal coverage corresponding to the increase in capability of insurance industry beyond those limits currently available.

Sincerely,

EMERSON JONES,
Special Consultant to the General Manager,
Consumers Public Power District.

APPENDIX 30

LETTER FROM NATIONAL ASSOCIATION OF MANUFACTURERS ON EXTENSION OF THE PRICE-ANDERSON ACT, JUNE 23, 1965

NATIONAL ASSOCIATION OF MANUFACTURERS,
New York, N.Y., June 23, 1965.

Hon. CHET HOLIFIELD,
Chairman, Joint Commitee on Atomic Energy,
Congress of the United States,
Washington, D.C.

DEAR REPRESENTATIVE HOLIFIELD: The National Association of Manufacturers supported the Price-Anderson Indemnification Act of 1957 in the belief that it would provide encouragement to private enterprise in the development of the peaceful uses of nuclear energy. Because of our conviction that this system of indemnification has been an active force in the record of developments achieved, we are submitting this letter in support of the extension of the act.

Fortunately, no incidents have occurred to create a claim for indemnification, and it is our earnest hope that with increased operational experience and risk-reducing innovations, no such incident will occur. Nevertheless, it is clearly the prudent course to maintain a system of financial protection for our citizens.

Many countries abroad have followed the lead of our Government in establishing similar indemnification systems. A number of foreign nations have already enacted appropriate legislation; others are giving it consideration. Under these circumstances, a withdrawal of indemnification by our Government at this juncture not only might be interpreted as a surrender of U.S. leadership, but would inevitably lessen protection for American manufacturers building and operating nuclear facilities in foreign countries.

We therefore support legislation to extend the effective period of the Price-Anderson Act so that future growth of the nuclear industry and its benefits to society may continue to expand and flourish.

We appreciate this opportunity to present our views concerning the extension of of the Price-Anderson Act.

Sincerely yours,

ROY B. SNAPP,
Chairman, Nuclear Energy Committee.

APPENDIX 31

LETTER FROM LONG ISLAND LIGHTING CO. ON EXTENSION OF THE PRICE-ANDERSON ACT, JUNE 17, 1965

LONG ISLAND LIGHTING CO.,
Mineola, N.Y., June 17, 1965.

Hon. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
Washington, D.C.

DEAR MR. CHAIRMAN: I would like to submit for the record in the hearings being held by your committee on the question of the revision and extension of the Price-Anderson Indemnity Act the following statement on behalf of Long Island Lighting Co., a public utility serving over 2 million people on Long Island, N.Y.

As you are aware, the Price-Anderson indemnification provisions of the Atomic Energy Act of 1954 will expire on August 1, 1967. Unless this legislation is continued beyond that date, a company securing a construction permit for the building of a nuclear generating facility subsequent to August 1, 1967, will be unable to provide to the public the necessary assurances of financial protection against the contingency of a nuclear incident connected with its proposed plant. On behalf of my company, which is also a member of the Power Reactor Development Co. group, and other joint atomic research groups, I strongly urge upon your committee an early and favorable consideration of the necessity for renewal and extension of the existing Price-Anderson indemnification program.

At its annual meeting this year, the Long Island Lighting Co. announced plans to construct locally a large atomic energy powerplant to be ready to serve the consumers of Long Island, N.Y., in the early 1970's. Although the design features, location and construction timetable for the proposed facility

are only now in the early planning stages, our decisions are being based upon, as nearly as possible, the predictable economics and liabilities related to such a venture. One important factor bearing upon our decisions is the public liability protection policy afforded the atomic industry by the Price-Anderson amendments. That this company, as well as others who may be contemplating construction of nuclear plants, may continue to rely upon the Price-Anderson indemnification program is surely within the public interest as reflected in the Atomic Energy Commission policy of promoting the wider use of atomic power for peaceful purposes.

In its February 15, 1965, study and review of the Price-Anderson Indemnity Act, the Atomic Energy Commission concluded and recommended that the Government indemnity provision should be extended for a second period of 10 years, to August 1, 1977. The Long Island Lighting Co. agrees with this position and supports the well-reasoned conclusion of the AEC that a Government indemnity program is needed as a supplement to the maximum available private insurance in order to protect both the public and industry against the contingency of a major nuclear incident, however remote.

It is expected that the private insurance groups now serving the atomic industry will soon review, and perhaps extend, their existing public liability coverage. Even if this is done, however, the lack of actuarial experience in nuclear plant operations still requires that additional insurance coverage for public protection and acceptance be provided without undue burden on the industry.

In view of the foregoing, it is the position of this company that we have an obligation to our investors and to the public to make sure that we are able to provide the necessary indemnification assurances related to the construction and operation of nuclear facilities. Such assurances can best be provided by a continuation of the Price-Anderson Indemnity Act, a program that, having already contributed much to the accelerated development of new atomic industry, will assure the future expansion of nuclear-powered generating capacity.

Very truly yours,

ERROL W. DOEBLER,
Chairman of the Board.

APPENDIX 32

LETTER FROM GENERAL PUBLIC UTILITIES CORP. ON EXTENSION OF THE PRICE-ANDERSON ACT, JUNE 21, 1965

GENERAL PUBLIC UTILITIES CORP.,
AND SUBSIDIARY ELECTIC POWER COMPANIES,
New York, N.Y., June 21, 1965.

HON. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
Washington, D.C.

MY DEAR MR. HOLIFIELD: This letter is in response to the Joint Committee's invitation for comment on proposals to extend the Price-Anderson law for an additional period of 10 years.

Last year, in connection with the Oyster Creek project, I had occasion to testify before the Joint Committee in favor of a clarifying amendment to the law to assure Price-Anderson coverage for reactors obtaining construction permits prior to the current expiration date of August 1, 1967, although an operating license might not be issued until after that date. The reasons which prompted us to urge this clarifying legislation were summarized in my testimony as follows:

"The Price-Anderson law was enacted in 1957 after 2 years of intensive work and study by Government and private agencies and after 2 years of extensive public hearings by this committee. There was general agreement among those knowledgable about nuclear reactors that the likelihood of a major nuclear incident was extremely remote. Nevertheless, there was also general agreement by both Government and industry that a Government indemnity program was needed on top of the maximum available private insurance to protect both the public and the industry against the contingency of a nuclear incident, however remote. Since 1957 there has been no change in official Government policy with respect to indemnity. Nor has there been any official

change, or to the best of our knowledge any formal reappraisal, of the technical judgments on which that Government policy was based.

"Thus, whatever legal ambiguities may exist in the Price-Anderson law, the underlying policy is perfectly clear. The Atomic Energy Commission, the Congress, and the atomic industry in general concluded that nuclear powerplants ought not to be built without Government indemnity protection to supplement private insurance. We feel that we have an obligation to our investors and to the public to make sure that we are able to provide that protection."

It is my understanding that, within the past several months, there has been a reexamination of the technical aspects of this matter under the auspices of the Atomic Energy Commission, but I do not know what conclusions have been reached by those participating in the study. For our part, the safety experience of commercial nuclear power reactors since 1957 has certainly reinforced our convictions and those of the entire industry that reactors can be safely built and operated. Added knowledge about reactor materials and behavior and new improvements in engineered safeguards have also helped contribute to industry's confidence in the safety of nuclear power. The possibility of a catastrophe nuclear incident would appear even more remote today than it did in 1957 and it appeared most unlikely even at that time. But resolution of the policy issue of whether nuclear experience and developments have yet reached the point where reactor safety experts can dismiss major nuclear incidents as too incredible to warrant provision of financial protection against their occurrence depends in important technical areas on the expertise and technical judgment of the Government's experts and advisers. If, despite the progress which has been made in recent years in nuclear safety technology, there is as yet no consensus among responsible Government officials and equipment designers that the possibility of a nuclear catastrophe—no matter how remote—can prudently be ignored, extension of the Price-Anderson law is clearly indispensable.

Under the wise policies developed by your committee and implemented by the Commission over the past two decades, nuclear energy has traversed the long and difficult path from a purely military secret to an economically competitive fuel. At this stage, our Nation cannot tolerate, without lasting damage to our industrial position, policies which would now preclude realization on the achievements made in the development of means of employing nuclear energy in commercial applications. Yet, this would be the inevitable consequence if, on the one hand, the Government's safety experts and advisers conclude that insurance and indemnity protection against the possibility of a major nuclear incident is required and, on the other hand, the private insurance industry has not reached the position where it can assume this responsibility.

We earnestly hope that the day will soon come when Government safety experts and advisers will conclude that there is no possibility—no matter how remote—of a catastrophic nuclear incident from power reactors of well-developed types and, therefore, no need for the Price-Anderson law as applied to such reactors. Until that day comes, we believe that extension of the Price-Anderson law, which has not only played an essential role in the progress of nuclear energy in our own country for a decade but has also provided a stimulus for legislation in other nations, is essential.

Very truly yours,

A. F. TEGEN, *President.*

APPENDIX 33

BIBLIOGRAPHY ON ATOMIC ENERGY INDEMNITY LEGISLATION, JUNE 21, 1965

THE LIBRARY OF CONGRESS,
LEGISLATIVE REFERENCE SERVICE,
Washington, D.C., June 21, 1965.

To: Joint Committee on Atomic Energy.
(Attention Mr. Conway).
From: American Law Division.
Subject: Bibliography on atomic energy indemnity legislation.

This will refer to your request of June 4, 1965, for a bibliography of published material pertaining to atomic energy indemnity legislation. We are enclosing a bibliography which contains publications specifically relating to the subject as well as publications broad enough to touch on the subject matter, though not specific enough to be indexed thereunder.

The bibliography is organized as follows: Part I contains titles of printed articles on atomic energy indemnity legislation appearing in legal periodicals; part II contains such articles appearing in general periodicals; part III, hearings and reports on this subject; part IV, committee prints; part V, publications of Government agencies; part VI, treaties, texts, etc. The bibliography is chronological within parts.

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GROVER S. WILLIAMS,
IRA KIRSCHBAUM,
Legislative Attorneys.

APPENDIX 34

SUMMARY OF NELIA–MAELU POSITION ON OUTSTANDING ISSUES RELATIVE TO TRANSPORTABILITY OF NUCLEAR MATERIAL, APRIL 29, 1965

NUCLEAR ENERGY LIABILITY INSURANCE ASSOCIATION,
New York, N.Y., May 24, 1965.

Re transportation of nuclear material—Summary of NELIA–MAELU position on outstanding issues.

Mr. JOHN T. CONWAY,
Executive Director, Joint Committee on Atomic Energy,
Congress of the United States,
Washington, D.C.:

On behalf of the governing committee of NELIA and MAELU, I am enclosing for the information of the members of the Joint Committee on Atomic Energy the text of the NELIA–MAELU memorandum, captioned as above. If you have any questions, please do not hesitate to contact this office. Best regards.

Yours very truly,

F. X. BOYLAN, *General Manager.*

TRANSPORTATION OF NUCLEAR MATERIAL—SUMMARY OF NELIA–MAELU POSITION ON OUTSTANDING ISSUES

1. Coverage under NELIA–MAELU policies for claims under the Federal Employers Liability Act (FELA)

The railroads have expressed some doubts about whether FELA claims are covered under NELIA–MAELU policies. The NELIA–MAELU position is that such claims are not covered under their nuclear energy liability policy (suppliers and transporters form), but that such claims are covered under their nuclear energy liability policy (facility form) except with respect to employees employed at and in connection with the facility as defined in the policy.

NELIA and MAELU do not consider the Federal Employers Liability Act as a workmen's compensation, unemployment compensation, or disability benefit law, or similar law, within the meaning of those terms as used in exclusion (a) of the facility form. With respect to exclusion (b) of the facility form, the pools consider that the exception to the exclusion operates in those cases where there is no applicable workmen's compensation or disability benefits law applicable to the injury to the employee. As a result, the FELA liability of a railroad which becomes an insured under a facility form policy by reasons of the omnibus provisions is covered except with respect to employees employed at and in connection with the facility as defined in the policy. The possibility of a railroad employee subject to FELA being employed at and in connection with any facility seems to be most remote. Certainly an employee who is merely engaged in the usual course of the railroad's business as a common carrier transporting nuclear material would not be regarded as an employee employed "at and in connection with the facility."

It would, of course, be necessary to establish that the carrier was entitled to coverage under a facility form policy applicable to an "insured shipment" of nuclear material. The railroads have pointed out that it might be difficult in some instances to establish in advance that a particular shipment is an "insured shipment." This is the principal reason why consideration was given to the possibility of extending the coverage afforded under a supplier's and transporter's policy to be purchased by the railroads to include coverage for nuclear FELA liability. NELIA and MAELU are reluctant to write such coverage because it is our understanding that it is available in the conventional market. However, the eastern railroads have advanced the following as some of the reasons why

they consider S. & T. form coverage in this area preferable to that which is now afforded in the conventional market:

(*a*) Higher limits of liability would be available under a pool program;

(*b*) Any deductible which may be required by the pools would not necessarily be related to the industry's third-party liability experience in nonnuclear areas;

(*c*) Defense procedures long established by the railroads for nonnuclear FELA liabilities are not deemed satisfactory for possible nuclear FELA claims;

(*d*) Elimination of disputes concerning application of the pool or conventional market insurance which could arise in the event it becomes difficult to determine the time and place of the injury;

(*e*) a separable premium for the nuclear phase of FELA that can be readily incorporated into the traffic rate for the transportation of nuclear material by rail.

There does not seem to be a great demand for such coverage among the Nation's railroads generally. In fact, to the best of our knowledge, the conventional market has not declined a single request for FELA coverage including the nuclear hazard. Notwithstanding the foregoing, representatives of the pools have agreed to reopen the question if a sufficient number of railroads throughout the Nation specifically request this coverage. To date, no such requests have been received.

2. Two-year discovery period

NELIA–MAELU policies are continuous. As long as they remain in effect there is no requirement that loss be discovered within any limited period of time. If the policies should be terminated, loss must then be discovered not later than 2 years after the end of the policy period.

The railroads have indicated that NELIA and MAELU retain the option to cancel at any time. Pool representatives have publicly asserted and reaffirmed their long-established position against arbitrary cancellation of NELIA–MAELU policies. This would be an open invitation to Government intervention in insurable areas, an invitation the pools will not willingly extend.

It is also noted that in the event an insured wishes to cancel his coverage it is possible that some arrangement could be developed at that time whereby, for reduced premium, the policy could be continued in effect solely for delayed action cases arising from past occurrences, while coverage ceases for future occurrences. Such an arrangement could be patterned after our present procedure for continuation of coverage under facility form policies following discontinuance of nuclear activities.

3. Damage to railroad property

We understand that the railroads are interested in a radioactive contamination coverage which would apply to railroad property anywhere on the system. Such a coverage is primarily of a type written by the property damage pools. We should like to point out, however, that NELIA and MAELU policies will cover under many circumstances the radioactive contamination of a railroad's property arising out of the transportation of nuclear material over its system.

We assume that in the event of a transportation incident it will be possible to show that some person or organization, whether it be the shipper, the supplier of the container, a connecting carrier or someone having some contact with the nuclear material, is legally liable for damage to the railroad's property. Both the facility form and the suppliers and transporters form extend the coverage of the policies to any such person or organization (other than the United States) with respect to his liability for such damage. In addition the facility form, under coverage B, would extend the coverage to the railroad for damage to its own property caused solely by its own fault.

Both policies contain provisions the effect of which would be to exclude coverage for damage to the railroad's property if it were at the site of any nuclear facility. NELIA and MAELU have not, however, adopted the so-called "floating site" concept of the AEC, which as we understand it, extends the site of the facility to include the transporting conveyance on which the nuclear materials associated with the facility are temporarily located for the purpose of transportation.

4. Miscellaneous

In a memorandum supporting the proposed legislation submitted to the AEC on November 10, 1964, by the Association of American Railroads over the signature of Gerald D. Finney, general attorney, certain statements are made concerning the limitations of the NELIA–MAELU coverage which deserve some clarification.

(*a*) *Damage to nuclear material.*—The memorandum points out that the coverage does not apply to loss of or damage to the nuclear material being transported. While we agree that exclusion (g) of the facility form and the S. & T. form denies coverage as respects property damage to nuclear material in the course of transportation, it should be noted that nuclear property insurers have made this coverage available to carriers for many years.

(*b*) *Interchange agreements.*—The memorandum suggests that the liability assumed under an interchange agreement is excluded under the facility form and the S. & T. form. Because of the protection which would be afforded under the omnibus insured provisions of these policies and the broad contractual coverage available under the facility form and the S. & T. form, we do not understand the railroads' problem in this area. However, we would be willing to discuss this matter with the railroads in order to make sure there is a complete meeting of minds on this subject.

(*c*) *Weapons of war.*—The memorandum states that no coverage is available where liability arises out of the handling of nuclear weapons or other instruments of war "on site", which possibly could be construed to mean "while in the course of transportation."

As far as the facility form is concerned, the question of coverage for atomic weapons is largely academic at this time, as NELIA and MAELU have not issued this policy to any facility engaged in manufacturing, handling, or using atomic weapons. The present facility form is not intended to cover either the manufacture or the transportation of atomic weapons. Were we in the future to issue a policy to such a facility, suitable amendment of the weapons exclusion would be required.

The suppliers and transporters form, however, does extend certain coverage for the transportation of nuclear weapons. We believe our recent amendment to the "weapons" exclusion of that policy, which is explained in the attached memorandum, should clarify our position with respect to the transportation of nuclear weapons.

(*d*) *Statute of limitations and insolvency.*—The memorandum indicates concern about NELIA–MAELU coverage in cases where (1) the railroad is an insured and the statute of limitations which would normally bar a claim against it is held to be inapplicable on the grounds of public policy, (2) the railroad is an insured initially liable to the injured person but with a valid claim over against a third party which, conversely, is held to be barred by a statute of limitations, or possibly not recoverable by reason of the bankruptcy or insolvency of the third party, or (3) where the railroad is the injured party and the MELIA or MAELU insured legally liable for the loss is bankrupt or insolvent.

We believe that these concerns are without foundation. There are no provisions in the NELIA–MAELU policies for a disclaimer of coverage to an insured because the statute of limitations has been held not to protect him against his liability to the injured party or because his right of action against a negligent third party is barred by reason of a statute of limitations or the bankruptcy of the third party. As to insureds who may become bankrupt or insolvent, the policies contain a specific statement that bankruptcy or insolvency of the insured shall not relieve the companies of any of their obligations under the policies (condition 7).

(*e*) *Acts of sabotage.*—The memorandum asserts that the "act of war" exclusion in the NELIA–MAELU policies is ambiguous, not making clear, for example, whether or not an isolated act of sabotage during peacetime would be covered.

NELIA–MAELU representatives have stated on many occasions in the past, and we wish to confirm in this memorandum, that our so-called war exclusion would not operate to deny coverage where it is established that the event which gives rise to the liability is an isolated, spontaneous act of sabotage, not directly related to a widespread uprising within this country. We note that the definition of "public liability" in the Atomic Energy Act has a similar exception for acts of war, and expect that our exclusion will be harmoniously construed with the act.

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SUMMARY

We believe that the combination of coverage available to carriers under facility form policies issued to operators of nuclear facilities, under S. & T. form policies issued in the name of the carriers, coupled with the protection available to such carriers under policies issued by nuclear property insurers (damage to nuclear material) and by the conventional market (FELA, transportation of commercial radioisotopes, etc.) indicates that there is presently in existence a very comprehensive scope of insurance protection as respects the transportation of nuclear material.

NUCLEAR ENERGY LIABILITY INSURANCE ASSOCIATION,
By FRANCIS X. BOYLAN, *General Manager.*

MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS,
By JAMES H. MERRITT, *Chairman, Governing Committee.*

APPENDIX 35

ARTICLE BY ASHLEY ST. CLAIR ON LIABILITY FOR NUCLEAR INCIDENTS, INSURANCE COUNSEL JOURNAL, JANUARY 1965

INSURANCE COUNSEL JOURNAL,
January 1965.

SHOULD FOREIGN OR DOMESTIC LAW GOVERN LIABILITY FOR DAMAGES FROM NUCLEAR INCIDENTS IN THE UNITED STATES?*

(By Ashley St. Clair, Needham, Mass.)

Merely to exist man must have land, water, and air. To live in comfort he must have energy at his command. The history of man, from the stone age to today, is little more than the story of his learning how to use the sources of energy available to him, animals, wind, falling water, fossil fuels, and now the energy locked in the atom. Today's complex society, with its ever-increasing demands for energy, depends almost wholly on waterpower and fossil fuels: coal, oil, and natural gas. The amount of available waterpower cannot be increased. Our supply of fossil fuels, although vast, will be exhausted in a few generations. It follows that our society, if it is to maintain and increase its productivity, must find and develop new sources of energy. Nuclear energy promises to fill that need and indeed may give mankind a virtually inexhaustible source of energy.[1]

The atom will not have the versatility of fossil fuels, which heat our homes, drive our automobiles and diesels, propel our airplanes and put our rockets into space and also give us many useful byproducts. For the near future, the next two or three generations, it appears likely the use of nuclear fission for producing large amounts of energy will be restricted to electric powerplants, ship propulsion, and possibly space heating. The Federal Power Commission and the Atomic Energy Commission estimate that by 1980 there will be 100 to 120 large nuclear power reactors in operation in the United States as against less than 10 today.[2] By the end of this century it is likely that more than half of the electric used in this country will come from nuclear powerplants.

It behooves us as lawyers to look to making the law applicable to this new but growing industry. This paper, therefore, will discuss some proposals which have been made about the legal principles which should be applicable to liability for damages resulting from a nuclear incident. Before we consider these proposals, it would be well to review briefly the events of the past 20 years, and to assess and analyze the present situation.

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*An address made at the annual meeting of the American Bar Association in New York on Aug. 13, 1964.

[1] For a discussion of the energy problem and the place of nuclear energy in future energy needs of the United States, see "Civilian Nuclear Power—A Report to the President, 1962, U.S. Atomic Energy Commission," hereinafter cited as "Civilian Nuclear Power."

[2] Source: Commissioner Raney of the Atomic Energy Commission in a conversation with the author and others on May 19, 1964.

The explosion of the atomic bombs in August 1945 ushered in the atomic age as it drew the curtain on the Second World War. The large number of killed and injured, as well as the widespread destruction of property, shocked the world. For the next year the United States pondered what to do with this force, the secret of which we were the sole possessor. The result was the Atomic Energy Act of 1946,[3] based on a declaration of policy that "* * * subject at all time to the paramount objective of assuring the common defense and security, the development and utilization of atomic energy shall, so far as practicable, be directed toward improving the public welfare, increasing the standard of living, strengthening free competition in private enterprise, and promoting world peace."

Under the 1946 act, nuclear energy remained a Government monopoly. Only the Government could own or possess fissionable material or a plant capable of producing such material. The primary emphasis was on weapon development and production. Private use of nuclear materials was limited to radioisotopes used in industry, medicine, or research. In the early fifties pressure for greater participation of private enterprise in the atomic energy program and for the use of atomic energy for the production of electric power brought about the enactment of the Atomic Energy Act of 1954.[4]

Under the 1954 act a private person may own a utilization or production facility, and under license from the Commission may have possession of and use fissionable material. In other words, a private person can own and operate a nuclear reactor for the production of electric power, for research, for medical therapy, or for any other lawful purpose.

The philosophy of the 1954 act was to encourage a greater participation of private enterprise in the nuclear energy program. This approach was expected to speed progress in the nuclear arts. It also was expected to generate a broader distribution of the benefits to be derived from nuclear energy.

However, private enterprise proved reluctant to earmark the huge sums required to finance such ventures. The cost and availability of insurance protection was uncertain. Although it was generally recognized that the possibility of a nuclear catastrophe was remote, if not nonexistent, many concerns hesitated to risk their assets on ventures with a doubtful financial return. Sound management of a business concern does not allow for a sizable nuclear investment if the speculative aspect of the venture carries even the remote risk of crushing liabilities that might imperil either surplus or net worth.

To meet this situation two measures, one by private enterprise, the other by Government, were taken. First, the property and casualty insurers, stock and mutual, marshaled a capicity of $123 million for nuclear risks. Of this amount, $63 million was assigned to property insurance for nuclear plants, and $60 million to liability insurance.[5] Coverages up to these amounts have been available since early 1957. Second, in the late summer of 1957 Congress passed and the President signed the Price-Anderson Act[6] amending the Atomic Energy Act of 1954. Under Price-Anderson the private reactor licensee and any other licensee of the Atomic Energy Commission whose operations, in the opinion of the Commission, carry the risk of a substantial nuclear incident must furnish financial protection in an amount specified by the Commission, which may be as much as $60 million the total amount of nuclear energy liability insurance to be available from private sources. Above the required financial protection, the licensee and any other person liable for a nuclear incident are indemnified, under an agreement between the Commission and the licensee, against liability up to $500 million.

The Price-Anderson Act also authorizes the Commission to enter into agreements of indemnification with its contractors who are either building or operating production or utilization facilities or engaging in other operations which carry the risk of a substantial nuclear incident. The act limits the liability of all persons indemnified for a single nuclear incident to $500 million plus the

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[3] Public Law 585, 79th Cong., 60 Stat. 755–775.

[4] Public Law 703, 83d Cong., 68 Stat. 919, as amended. 42 U.S.C., secs. 2011–2281 (1958), as amended, 42 U.S.C., secs. 2014–2252 (supp. IV, 1963) hereinafter cited as AEA.

[5] Property insurance on nuclear facilities is available through two organizations, Nuclear Energy Property Insurance Association (NEPIA), a stock company group, and Mutual Atomic Energy Reinsurance Pool (MAERP). Liability insurance is written by the Nuclear Energy Liability Insurance Association (NELIA), a stock company group, and the Mutual Atomic Energy Liability Underwriters (MAELU).

[6] Public Law 85–256, 85 Cong.; 71 Stat. 576 (1957), as amended, 42 U.S.C., secs. 2014, 2210.

amount of financial protection required. Both the financial protection (insurance) and the indemnity apply to nuclear incidents occurring within the United States and causing injury within or without the United States. Subsequent to 1957, Price-Anderson was amended to include any nuclear liability arising out of the operation of the nuclear ship *Savannah* and to authorize the Atomic Energy Commission to agree to indemnify its contractors up to $100 million against liability because of nuclear incidents outside of the United States. In short, in the 10 years since passage of the 1954 act, the United States has erected a comprehensive system of protection against nuclear hazards, a system which gives claimants a pool of at least $500 million out of which to satisfy their just claims and which protects utilities and other entrepreneurs against crushing losses.

The authority of the Atomic Energy Commission, under Price-Anderson, to enter into agreements of indemnity with its licensees and contractors expires on August 1, 1967. The question of whether that authority should be extended and, if so, on what terms, is under study by the Joint Committee on Atomic Energy, the Atomic Energy Commission, and interested private organizations. Tied in with that problem is the question of whether the United States should adhere to one or more of the several international conventions dealing with protection against nuclear hazards, none as yet in effect.[7]

Each of these conventions requires a private person operating a nuclear facility to provide for financial protection and provides for a limit of liability. Under each treaty the financial protection required and the allowable limit of liability is much less than the corresponding figure under Price-Anderson. Further, each convention provides that the operator is absolutely and solely liable for a nuclear incident at his installation; that he have no recourse against any other person except by contract; that exoneration is limited to certain specified circumstances, as war, insurrection, or a grave natural disaster; and that with minor exceptions the facility from which fissionable material is shipped is liable for an incident occurring in the course of transportation. Each convention prescribes a specific period of limitation for nuclear injury. The usual clause requires that an action be brought within 3 years after the claimant knows or ought to know the nature of his injury and who caused it, but not more than 10 years after the incident causing the injury. Of these conventions, one, commonly termed the Brussels convention, applies only to nuclear ships; the other conventions, only to land-based facilities. The United States was a party to the negotiation and drafting of each of the conventions. Note again that none of the conventions is yet in effect.

Six foreign countries have enacted laws dealing with financial protection against nuclear risks; the United Kingdom, the Federal Republic of Germany, Sweden, Switzerland, Belgium, and Japan. Each of these nations is signatory to one or more of the conventions, but has not ratified any convention. Because of the wide variations in each case between the statute and the conventions, ratification of any of the conventions will require revision of the financial protection statute to bring the two into agreement. This is particularly true of the United States. When Price-Anderson was enacted in 1957, Congress deliberately left to State law the determination of liability for nuclear incident occurring at a land-based reactor in the United States.[8] Further, Price-Anderson and the conventions differ widely in other important respects, e.g., definition of nuclear injury and of operations subject to financial protection requirements.

In the United States our problem is whether merely to extend for another 10 years authority of the Atomic Energy Commission to enter into agreements of indemnity with its contractors and licensees or whether to rewrite Price-

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[7] These conventions are (1) the Convention on Third Party Liability in the Field of Nuclear Energy of the Organization for Economic Cooperation and Development (OECD) (the Paris convention); (2) the International Convention on civil Liability for Nuclear Damage, sponsored by the International Atomic Energy Agency (IAEA) (the Vienna convention; and (3) the Convention on Liability of Opreators of Nuclear Ships, sponsored by the International Maritime Committee and adopted by the Diplomatic Conference on Maritime Law, Brussels, May 1962, but as yet unsigned. Another, sponsored by the Inter-American Nuclear Energy Commission is in course of preparation. For a discussion of Price-Anderson and the international conventions, see Cavers, "Improving Financial Protection of the Public Against the Hazards of Nuclear Power," Harvard Law Review, vol. 77, No. 4, February 1964, hereinafter cited as "Cavers."

[8] Joint Committee on Atomic Energy, Rept. 435, May 9, 1947, p. 9.

Anderson to bring it into line with the conventions, including the nuclear ship conventions. The latter course, urged upon us by some distinguished scholars, if adopted, would require extensive revision of the present indemnity and insurance programs. The prospect to some is alluring, but before we commit ourselves, let us consider carefully where the path will lead us and if we wish to proceed to that particular destination.

It is well to discuss at this point the place and effect of international conventions in our system of jurisprudence, and to take a look at atomic energy's place in today's economy and where it is going to be 10 or 20 years from now. We will then be better able to decide whether we wish to turn over to the treatymaking power of the Federal Government the making of the law applicable to liability for nuclear incidents occurring within and the effect of which are confined to the United States.

An international convention is nothing more or less than a treaty to which more than two nations adhere. Article VI of the Constitution of the United States provides that "* * * all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land, and the judges in every state shall be bound thereby, anything in the constitution or laws of any state to the contrary notwithstanding." Decisions of the U.S. Supreme Court have, with respect to our Federal system of government, settled the nature of treaties and their effect on Federal and State law. "Treaties" are contracts between independent nations.[9] No express provision of the Constitution limits the treatymaking power and, though that power does not extend so far as to authorize what the Constitution forbids, it does include all proper subjects of negotiation between our Government and other nations.[10] A treaty is subject to such acts as Congress may pass for its enforcement, modification, or repeal.[11] A treaty supersedes a prior inconsistent act of Congress and an act of Congress supersedes a prior inconsistent treaty.[12] State law, constitution, or statute, if it impairs or is inconsistent with the policy or provisions of a treaty, must yield to the treaty, and this is true whether the treaty became effective before or after the State law.[13]

In short, as long as it remains in force, a treaty to which the United States is a party is paramount to State law. The United States, by unilateral action, can change a treaty commitment only by act of Congress approved by the President or passed over his veto. Our Government is understandably reluctant to so alter a treaty, particularly one with a friendly nation. It follows that only matters in which other nations have a legitimate interest are the subject of treaties or international conventions. Purely domestic matters are left to the domestic law of each nation.

A treaty between two nations usually deals with relations between the contracting parties and involves questions such as a common boundary or waterway, and commerce and trade. Such a treaty may also deal with the rights of citizens of each national while resident or traveling in the territory of the other. International conventions, or compacts as they are sometimes called, deal with questions of common interest to the contracting parties or their citizens. Aside from those questions of transcendent importance because they involve the peace of the world, proper subjects for conventions include navigation of the oceans, passage through international waterways such as the Suez or Panama Canals, and similar matters of wide concern. On a smaller scale a number of nations, faced with a common problem, may adopt a convention to deal with it. The OECD convention represents an acceptable application of the treaty principle to the nuclear energy third party liability field. While the convention has not yet been ratified by any country, it is the long-range hope that all nations of Western Europe, along with Greece and Turkey, will signify their adherence. Because of their geographic proximity a nuclear incident in one Western European country could cause sizable nuclear damage in another country. Therefore, rules fixing liability and providing for the payment of damages are proper subjects for a compact among the affected nations.

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[9] *United States* v. *Arredondo*, 31 U.S. 691; L. Ed. 547; 6 Pet. 691 (1832).

[10] *Asakury* v. *City of Seattle*, 44 S. Ct. 515; 265 U.S. 332; 68 L. Ed. 1041 (1924), reversing 210 P. 30, 122 Wash. 81 (1922).

[11] *Edge* v. *Robertson*, 5 S. Ct. 247; 112 U.S. 580; 28 L. Ed. 798 (1884).

[12] *The Cherokee Tobacco*, 78 U.S. 616; 11 Wall. 616; 20 L. Ed. 227 (1870); *Whitney* v. *Robertson*, 124 U.S. 190, 8 S. Ct. 456, 31 L. Ed. 386 (1888); *Horner* v. *United States*, 143 U.S. 570, 12 S. Ct. 522, 36 L. Ed. 266 (1892); *Fong Yue Ting* v. *United States*, 149 U.S. 698, 13 S. Ct. 1016, 27 L. Ed. 905 (1893).

[13] *Nielsen* v. *Johnson*, 48 S. Ct. 600, 277 U.S. 583, 72 L. Ed. 999 (1929); *United States* v. *Pink*, 62 S. Ct. 552, 315 U.S. 203, 86 L. Ed. 796 (1942). See also 89 A.L.R. 345.

At the present time nuclear power supplies an insignificant amount of the energy needed by our modern civilization. Most, in fact almost all, our energy needs are met by fossil fuels, the supply of which will be exhausted in a few generations unless another economical source of energy is or becomes available. The need for another source of energy is critical because the fossil fuels—coal, oil, and gas—have certain unique properties which make them irreplaceable for certain purposes, at least with our present technical knowledge. They heat our homes, drive our cars, propel our airplanes and, because of their complex molecular structure, give us certain byproducts of great utility in our economy. For these reasons it is imperative, if we are to conserve our supply of fossil fuels, to find another source of energy for electric power, space heating, ship propulsion, and other purposes. The only substitute in sight for fossil fuels is nuclear energy—the energy in the world's supply of uranium and, theoretically, thorium. That energy is practically limitless, but it is not there for the taking, as is the energy in fossil fuels. On the contrary, much research and development on certain types of reactors, as well as operating experience with such reactors, will be necessary to utilize to the fullest this source of energy and make it available at a cost competitive with fossil fuel. For that program the efforts of Government, the utility industry, and the nuclear manufacturing industry will be necessary.[14] The Atomic Energy Commission has described this task in the following language:

"Its [nuclear energy] benefits will actually be realized, however, only if it can be made economically attractive.

"To surmount the economic hurdle is the most immediate program goal. Unfortunately the reactors that can do so can extract only about 1 percent of the energy potentially available in our reserves of nuclear materials. To utilize the rest, which must be done if nuclear energy is to be of lasting usefulness, requires the development to an economic status of more advanced and difficult reactors. This will be a rigorous and expensive task." [15]

Since the above statement in the Commission's report to the President in 1962, substantial progress has been made. Nuclear electric power from the latest types of reactors is competitive in cost with power from fossil fuels in several areas of the United States. This development will make possible, at reasonable cost, the research and experimental work which must be done to develop the kinds of reactors capable of making the best use of the energy in our supplies of uranium and thorium. In short, for some time to come, every large reactor should have a twofold purpose—first to produce power or heat and second to increase our knowledge of nuclear technology. Nevertheless, we can safely prophesy that by 1980 a substantial portion of the electric power used in this and other advanced countries will be furnished by nuclear reactors, that there will then be many more nuclear merchant ships and that nuclear energy will fill other energy needs of our society, as for desalinization of water. It follows that by 1980 private enterprise, utilities, and manufacturers, in the nuclear energy field should be self-supporting and should stand on their own feet.

If private industry is to stand on its own feet, it must say "goodby" to Government indemnity, as well as to Government subsidy. Already the Atomic Energy Commission and the Joint Committee on Atomic Energy are planning for the day when Government indemnity will be a thing of the past. It may well be that if the authority of the Atomic Energy Commission to enter into agreements of indemnity with its contractors and licensees is extended to August 1, 1977, say, there will be no further extension. After that date the private sector of the nuclear industry will be on its own. If the above analysis is accurate, and such appears to be the shape of things to come, any proposal that the United States adhere to the several nuclear conventions, or at least adopt their philosophy by appropriate provisions in the legislation extending Price-Anderson, must be carefully examined. We are dealing with an infant industry, the development of which to its full potential will be of great benefit and should be encouraged. It follows that the legal principles under which the industry will operate for generations should be just and do equity to everyone concerned.

Ever since the founding of our Republic, the rights of a person injured in the United States through the act of another, except for cases under maritime law

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[14] For a comprehensive discussion of the present status and future of nuclear power, see "Civilian Nuclear Power."

[15] Ibid., p. 5.

or the Federal Employees Liability Act, have been determined by the law of the State where the wrong was committed, in almost every case the State where the injury was sustained. This system has worked well and, in particular, has contributed to the development of the law. Farseeing judges, like Cardozo of New York, have had an influence far beyond the borders of their States. The Federal system makes possible experimentation. A State, by statute or judicial decision can adopt a novel doctrine. If it works well, other States can so follow suit; if it fails, little harm has been done. Adherence by the United States to the nuclear conventions for land-based reactors or the incorporation into the extension of Price-Anderson of the principles on which the conventions are based would transfer from the States to the Federal Government jurisdiction over the law applicable to injuries caused by nuclear installations, fuel fabricators and processors, as well as reactor operators. Do we wish to make such a drastic change in our system of jurisprudence?

Those who favor Federal jurisdiction base their case on the possibility which some of them seek to make seem like a probability, that a nuclear incident will cause widespread death, injury, and property damage. The proponents argue that in such event it would be impossible to determine the cause of the incident and therefore whether anyone was legally liable, with the result that the victims might go uncompensated. Only Federal action, they claim, will avert this danger. However, they do not confine their remedy to the evil they are seeking to cure. On the contrary, under their proposals, the operator of a nuclear installation will be liable for nuclear damage by reason of an incident at or in connection with his facility, no matter how caused or how trivial. Moreover, except by contract, he will have no recourse against the person actually causing the nuclear damage, no matter how aggravated the latter's conduct. Finally, the Paris, as well as the Vienna Convention, makes these rules applicable to fuel fabrication and processing, operations which the Atomic Energy Commission does not think sufficiently hazardous to require financial protection under Price-Anderson. These proposals, if adopted, will impose a heavy burden on a young industry. They would require the operator, usually the owner, of a nuclear installation to carry the entire risk of loss, except for damage to or at the installation, from a nuclear incident at or in connection with the facility. At the present time, with the operator's insurance and Price-Anderson indemnity including as an insured and indemnitee the manufacturer who supplies a defective part or the contractor who fails to follow specification in building a reactor, the owner of the nuclear facility is bearing that risk. He is, however, not happy about it. In fact, he is quite unhappy. If and when Government indemnity is no longer available, and that time may not be far distant, he will wish to buy a single-interest liability policy under which he is the only insured. Builders and suppliers of nuclear equipment will then have to carry the risk of loss from their own negligence and to buy their own liability insurance, as they do when they build conventional power or chemical plants or sell equipment to be used in hazardous operations. Under such a setup, common to most lines of business, the losses arising out of the use of nuclear energy would be borne by the persons responsible. Careful thought should be given to the question of whether the use of nuclear energy is actually so hazardous or the properties of nuclear materials so unique that the equitable rule, of almost universal application, that he whose fault causes injury must pay for it, must be abandoned.

In two others respects the approach used in the nuclear conventions and now advocated for any legislation extending Price-Anderson seems poorly suited to conditions here in the United States. In foreign countries most nuclear installations are publicly owned. In the United States we have nuclear facilities owned by the Federal Government, by the States and their municipal subdivisions, by public and private educational institutions, and finally, by private enterprise. Some of the publicly owned facilities are operated by public employees, others by private contractors. It appears likely that the number of privately owned facilities will increase substantially in the years to come, particularly the number of large reactors to produce electric power. Second, our installations range from very large reactors to produce power or plutonium down to the very small reactors operated by educational institutions, most of which are so small that by no stretch of the imagination can it be conceived that any of them could cause a nuclear disaster. From the standpoint of our own welfare in the United States, is it necessary, or even advisable, to treat every one of these diverse situations in the same manner?

I hold no brief for Government immunity to tort liability—rather the contrary. It is advisable that the law with respect to the liability of the operators of nuclear facilities be the same, whether the facilities are privately or publicly owned. It likewise should not be forgotten that our government, particularly the Federal, are constantly engaged in other activities which cause injury to persons and property. As to the Federal Government, the remedy given by the Federal Tort Claims Act[16] is alleged to be inadequate[17] as are the remedies given by most State laws enacted in derogation of governmental immunity to tort liability. Is the operation of a reactor so dangerous and the properties of nuclear materials so unique as to make it necessary to make our Federal and State governments absolutely liable for any injury resulting from such operation or due to such properties? Should the Federal Government, by treaty or act of Congress, override provisions of State constitutions and statutes giving their publicly supported educational institutions immunity from tort liability? Before one answers these questions in the affirmative, he should recall that our governments, particularly the Federal Government, are engaged in many hazardous activities. If the operation by a Federal agency of a nuclear facility may cause injuries for which the victims are without redress, the same injustice can occur from nonnuclear activities. The remedy is an appropriatee amendment, applicable to all Federal activities, of the Federal Tort Claims Act, not the one-bite approach which is being urged upon us. The same is, of course, true with regard to each State law. With respect to all of its activities, the liability of a government for the acts of its officers, employees, and agents should be as broad as the liability of its citizens. In a modern democratic society the State should not hide behind the discredited maxim "the king can do no wrong."

The question boils down to a determination of a legal system of criteria for assessing nuclear energy liability—be the liability that of the sovereign or the citizen. Are these legal standards to be determined by international law conventions, by Federal law, or by State or local law? This is a far-reaching question, the answer to which should not be lightly given. The question may be divided into two parts—one applicable to reactors used for ship propulsion, and the other to land-based reactors located in the United States.

Atomic energy has an assured future in the field of ship propulsion. More than 100 nuclear-powered vessels are afloat. All these except the merchant ship *Savannah* and the icebreaker *Lenin* are warships. Most of them fly the flag of the United States or of Russia. The number of nuclear-powered ships, including merchant ships, will increase. It is desirable, even necessary, that the maritime law respecting nuclear ships be uniform throughout the world. That uniformity can be achieved only by a nuclear convention to which all maritime nations adhere. In the field of maritime law, international conventions have long played an essential role. Moreover, there is in existence the machinery for drafting and securing the adoption of suitable maritime conventions and of amending conventions which do not work well in all respects. Under this procedure, a nuclear ship convention drafted by the Comite Maritime International[18] was adopted by a diplomatic conference held in Brussels in 1962 and is now open for signature.[19] However, it now appears doubtful that the convention will become effective in the near future. The two principal nuclear maritime powers, Russia and the United States, oppose it because it is applicable to nuclear warships. The merits of that objection to the convention are beyond the scope of this paper. It is enough to say that it is to be hoped that an acceptable ship convention, one to which the United States will adhere, will become effective in the near future. Without a convention, there will be few if any privately owned nuclear ships and the NS *Savannah* may remain indefinitely the only nuclear merchant ship. If we

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[16] 28 U.S.C. §§ 2671–80 (1958) as amended.

[17] See Cavers, p. 660; Rosenthal, "Catastrophic Accidents in Government Programs," Legislative Drafting Research Fund of Columbia University (1963), pp. 38–41.

[18] The Comite Maritime International, an association of representatives of the martime law associations of the leading maritime nations, at its 24th conference in 1959, first prepared a draft convention on the liability of operators of nuclear ships. After further consideration, not necessary to detail here, the Belgian Government and the International Atomic Energy Agency convened an ad hoc diplomatic conference which met in Brussels and approved the final draft of a nuclear ship convention. This is in accordance with the procedure which has developed many maritime conventions now in force.

[19] For an analysis of and comments on the convention see "Report of the 1962 Brussels Convention on the Liability of Operators of Nuclear Ships" by the Committee on Atomic Energy of the Association of the Bar of the City of New York—Reports of Committees of the Association of the Bar Concerned With Federal Legislation, vol. 2, Bulletin No. 3, October 1963.

are to realize the potential of nuclear ship propulsion, shipowners, reactor builders, shippers, and port authorities the world over must have the certainty of protection against nuclear damage which can be afforded only under an international convention applicable alike to publicly and privately owned ships.

Within the United States we have land-based reactors owned and operated by the Federal Government, owned by that Government and operated by its contractors, owned and operated by State and privately supported educational institutions, and, last, owned and operated by private industry. These range in size from large power to small research or test reactors. With one exception,[20] all of these reactors are so far from our national borders as to make it unlikely, if not impossible, that a nuclear incident at one of them will cause damage outside of the United States. In other words, a nuclear incident will raise questions to be settled between nationals of the United States. We have as potential defendants in such a situation, the United States, several of our States, public and private educational institutions, and, finally, private persons, contractors, manufacturers, and power companies. The potential claimants range from hundreds of persons insured in body or property by a nuclear disaster, a remote possibility, to the truckman whose trailer is contaminated as a result of his careless handling of a container of nuclear materials, an incident which will occur occasionally. To deal with claims resulting from nuclear incidents, it is urged first that the United States adhere to one or more of the nuclear conventions above described or that Congress if and when it passes legislation extending the power of the Atomic Energy Commission to enter into agreements of indemnity with its contractors and licensees, include provisions making a nuclear incident at or in connection with a nuclear facility (to be defined in the law) a Federal tort, the operator of the facility to be absolutely liable to those injured, without recourse, except by contract, against any other person. The law would specify any grounds of eroneration from liability, as an act of war, and periods of limitation. Other possible provisions will occur to you.[21]

It is submitted that it is unwise, at this early stage in the development of the nuclear arts, to incorporate into our law, by treaty or statute, provisions assigned to deal with an event which will probably never occur but which may well discourage instead of foster the development of nuclear energy for peaceful purposes. A treaty is not a suitable instrument by which to fix the rights of U.S. nationals as among themselves on account of occurrences within the United States. Ordinarily a treaty is not permanent; it may expire within a stated time, with or without a provision for automatic extension. The other parties, one by one, may denounce the treaty. On the other hand, a treaty is inflexible. The United States, by unilateral action, can change a treaty only by act of Congress, approved by the President or passed over his veto. Our Government is understandably reluctant so to change a treaty. Finally, and perhaps most important, it is impossible so to draft a compact among a number of nations as to satisfy every nation. Everyone must make some concessions, justified when dealing with relations between the parties, but unjustified and unnecessary when only the internal law of one or more of the parties is concerned. This is particularly true of the United States, whose institutions and laws differ radically from those of most other countries. In short, the United States should not congeal its laws with respect to liability for damage from domestic nuclear incidents by incorporating them into treaties with other nations.

Congress when considering the proposal to extend the authority of the Atomic Energy Commission to enter into contracts of indemnity, should consider carefully the overall situation. So far as the United States is concerned, the Federal Government owns and operates every nuclear ship flying the American flag. Only one, the NS *Savannah*, has complete Price-Anderson protection. The Government also owns many land-based reactors and other facilities, some Government and some contractor operated. A number of reactors and other facilities are privately owned and operated. A few are operated by State-supported universities. These installations range in size from large Government complexes, like those at Oak Ridge, Hanford, and Savannah River, down to the small university reactors which carry little, if any, catastrophe hazard. Operations in the private sector, particularly in the power reactor field, are expected to increase substantially in the next 10 years.

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[20] Enrico Fermi atomic plant at Laguna Beach, Mich.

[21] For some arguments used in favor of these proposals, see Cavers, pp. 672–685.

It is hoped that during that time progress will be made in nuclear ship propulsion, particularly for merchant ships. Whatever policy Congress follows, in acting on the proposal to extend for another period of years the authority of the Atomic Energy Commission to enter into agreements of indemnity, must further two objectives; first, protection of the public; second, advancement of a new industry necessary to the future economic well-being of the United States and the world by protecting operators against crushing liabilities. The argument that government indemnity is necessary for persons operating reactors and certain other nuclear installations is based on the theoretical possibility that a major incident at such a facility might release to the environment large quantities of radioactive material, which, given certain weather conditions, would not be dispersed but rather deposited on the land and buildings within a few miles of the facility thereby causing widespread injury to persons and property. The actual possibility of such an occurrence is so remote as to be almost, if not quite, incredible. It is beyond the scope of this paper—as well as beyond the writer's ability—to discuss the technical questions on which the actual possibility of a nuclear disaster turns. However, the following recent statement by Mr. Harold L. Price, Director of Regulation, Atomic Energy Commission, is at least reassuring:

"The safety experience of the atomic energy industry has been outstanding. This experience has demonstrated that atomic energy activities can and are being carried out without jeopardy either to the employees or to the general public; and that by appropriate care in the planning and execution of atomic energy activities the potential hazards can be kept from materializing into dangerous conditions. This gratifying experience is attributable to the care and skill exercised by the individuals and organizations in the atomic energy industry as well as to the effectiveness of the Commission's regulatory and other safety programs.

"There is a unique element in the Commission's regulatory program which is an important part of prelicensing safety reviews. Each applicant who wishes to operate a nuclear facility is required to analyze his facility and the proposed operations for various possible mechanisms or circumstances by which severe accidents might theoretically occur. He is then required to demonstrate that by the design of his facility and the procedures for its operation appropriate safeguards will exist to prevent the occurrence of such accidents. In addition, the applicant is required to assume that the worst of these accidents (the so-called maximum credible accident) occurs despite the preventive safeguards, and then to demonstrate that he has incorporated sufficient consequence limiting safeguards in his facility so that the public outside the plant will not be endangered." [22]

It is also worthy of mention that in the 8 years the nuclear energy liability insurance pools,[23] which insure every privately owned reactor in the United States, as well as fuel fabricators and other facilities, have been in operation, they have not received a single bodily injury claim and only one minor property damage claim, which has been settled, in the almost 20 years of Atomic Energy Commission operations, there has not been a single instance of release offsite of appreciable quantities of radioactive materials. In the same period there have been four major ammonium nitrate explosions [24] and at least one major liquefied petroleum gas explosion.[25] The Atomic Energy Commission in its 1964 report to the Joint Committee on Atomic Energy on operations under Price-Anderson reported that it had received no claims under its indemnity agreements with licensees and that a suit had been brought against one of its contractors to recover damages for the death of one of the three servicemen killed in the SL–1 incident at National Reactor Testing Station on January 3, 1961.[26] The contractor is protected by its indemnity contract with the Commission and the Department of Justice is defending the suit. Those familiar with the January 3, 1961, incident at National Reactor Testing Station will

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[22] "Theoretical Possibilities and Consequences of Major Accidents in U^{233} and Pu^{239} Fuel Fabrication and Radioisotope Processing Plants," Guthrie and Nichols, Oak River National Laboratory, April 1964, p. vi.

[23] Nuclear Energy Liability Insurance Association (NELIA), a stock company organization, has a capacity of $46,500,000; Mutual Atomic Energy Liability Underwriters (MAELU), a capacity of $13,500,000.

[24] 1947 Texas City, Tex.; 1947, Brest, France; 1960, Traskwood; 1961, Norton.

[25] 1944, Cleveland, Ohio.

[26] U.S. Atomic Energy Commission, report to Joint Committee on Atomic Energy on operations under sec. 170 of the Atomic Energy Act of 1954, as amended.

recall that in spite of the breaching of the reactor shell and the severity of the excursion, there was no offsite release of fission products. The nuclear safety record in the United States, public and private, is remarkable and bears out the statement that the possibility of a nuclear disaster is indeed remote.

Several other matters deserve brief mention. In 1959 Congress passed Public Law 86–373 [27] authorizing the Atomic Energy Commission to turn over to any State, provided that State met certain requirements, authority to regulate within the State the use of byproduct and source materials, and small quantities of fissionable material. Second, the Commission recommended and Congress has enacted a law amending the Atomic Energy Act to authorize private persons to own special nuclear material, title to all of which has hitherto been in the Government.[28] Finally, it appears likely that the authority of the Commission to enter into agreements of indemnity with its contractors and licensees will be extended only for a limited period, probably 10 years from August 1, 1967, and at the end of that period will not be again extended, particularly if advances in the next 10 years in nuclear safety make impossible a nuclear disaster as feared in 1957. These developments and others indicate, even establish, that informed thinking, public and private, is that today the use of atomic energy is not unduly hazardous and should not be subject to unusual restrictions or burdens.

The present Price-Anderson program is peculiarly suited to the United States and, it is submitted, should be continued for another period of years beyond 1967. First, it protects any person liable for a nuclear incident, from the facility operator to the airplane pilot who crashes on the reactor. In the words of Mr. Harold L. Price,[29] it "removes the deterrent to industrial participation in atomic energy." It protects foreign as well as domestic contractors and suppliers. More important, it makes certain that any person injured by the operation of a privately owned reactor will have a fund available out of which to collect his claim if it be just. In the event of a nuclear disaster claimants will have a fund of at least $500 million out of which to satisfy their just claims. On this score, I agree with those distinguished authorities on tort law who have said that the courts will hold liable in every case the operator of a facility causing offsite radiation damage, should the nuclear insurance pools elect to contest the question of liability in such a case.[30] In particular, the executive branch of the Federal Government should not foist on the nuclear industry principles of law not only foreign to American jurisprudence, but contrary to the equitable principle, followed in all of our States, that he who does wrong shall pay for it, that he whose debt is paid by another shall make restitution. Finally, the case for Federal law in the field of liability for nuclear damage is weak. Its proponents argue that without appropriate Federal legislation victims of a nuclear disaster, the possibility of which is so remote as to be almost, if not quite, incredible, may not be able to recover damages. The record shows that there are industries whose disaster potential exceeds that of the atomic industry.[31] In fact, when the reader starts on an automobile trip he faces the possibility that by negligent collision with a vehicle carrying flammable liquid he may set off a conflagration of explosion which will cause millions of dollars of damage, far beyond his ability to pay. We live in a dangerous society. The fact that the use of nuclear energy presents novel hazards is not of itself sound reason to make a drastic change in our system of jurisprudence, a change applicable only in a limited area. The broad question, which should be squarely faced and some day must be decided, is whether our Federal system of jurisprudence, with broad authority, especially in the field of tort law, left to the States, is a suitable instrument for solving equitably the problems which our industrial and technological society presents and which will increase in complexity as the years go by.

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[27] 73 Stat. 688, sec. 1, now sec. 274 of Atomic Energy Act of 1954, as amended.
[28] Public Law. 88–489, 88th Cong.
[29] "Theoretical Possibilities and Consequences of Major Accidents * * *," p. vi.
[30] See Cavers, p. 667.
[31] E.g., ammonium nitrate and liquified petroleum gas. There are probably others.

APPENDIX 36

H.R. 9762, JULY 12, 1965, AND ACCOMPANYING STATEMENT; AEC COMMENTS ON BILL, AUGUST 26, 1965

[H.R. 9762, 89th Cong., 1st sess.]

A BILL To amend the Atomic Energy Act of 1954 to promote the public health and safety

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the first sentence of subsection 170 e. of the Atomic Energy Act of 1954, as amended, is stricken out and the following sentences are inserted in lieu thereof: "The aggregate liability for a single nuclear incident of Atomic Energy Commission contractors indemnified, including the reasonable costs of investigating and settling claims and defending suits for damage, shall not exceed the sum of $500,000,000 together with the amount of financial protection required of the contractor: *Provided, however*, That such aggregate liability shall in no event exceed the sum of $560,000,000: *Provided further*, That with respect to any nuclear incident occurring outside of the United States to which an agreement of indemnification entered into under the provisions of subsection 170 d. is applicable, such aggregate liability shall not exceed the amount of $100,000,000 together with the amount of financial protection required of the contractor. The aggregate liability for a single nuclear incident of licensees indemnified, including the reasonable costs of investigating and settling claims and defending suits for damage, shall not exceed the sum of $600,000,000 together with the amount of financial protection required of the licensee: *Provided, however*, That such aggregate liability shall in no event exceed the sum of $660,000,000."

[From the Congressional Record, July 12, 1965, pp. 15824–15825]

Mr. FARBSTEIN. Mr. Speaker, I have today introduced a bill, to amend the Atomic Energy Act of 1954 to promote the public health and safety.

As the law now stands, the manufacturers and operators of atomic powerplants are given complete freedom from financial responsibility for any damage that might result from a nuclear accident. This freedom from liability is conferred by subsection (e) of section 170 of the Atomic Energy Act, which provides in substance that the aggregate indemnity of all persons involved in the construction and operation of an atomic powerplant shall not exceed the amount of commercial insurance available plus the $500 million indemnity furnished by the Government.

We are told that the chances of an atomic powerplant catastrophe occurring are very remote, yet the possibility exists. In fact, the atomic energy industry told the Joint Committee in hearings on Price-Anderson extension June 22 through June 24 that few if any powerplants would be built if the manufacturers and operators were financially responsible for all damages in excess of $560 million.

I have no desire to stop the progress of atomic power, which no doubt someday will offer some real benefits to the people of this great Nation. Neither do I desire to slow that progress. On behalf of my constituents, however, and on behalf of the public throughout the country, I do desire to do everything that can be done to see that the utmost care is exercised on the part of everyone involved to see that no atomic catastrophe ever occurs.

To that end, my bill would in substance provide the same treatment that present law provides, except that utilities and manufacturers of atomic powerplants would be subject to ordinary rules of law to the extent of $100 million over and above the $560 million made available by the insurance industry and the Government. They would not be responsible for damages in excess of $660 million, whereas present law provides they are not responsible for damages in excess of $560 million. In short, my bill would make licensees financially responsible for damages resulting from their actions, to the extent of $100 million, but this liability would not apply unless the total damage exceeds the $560 million made available through insurance and Government indemnity.

My bill does not change the provisions of the law with respect to contractors for the Atomic Energy Commission. Since Government funds are being used for the work such contractors are doing, there is no economic incentive for the contractors to cut corners on the cost of safety or take unnecessary risks. It

therefore appears there is no need to make them financially responsible for the results of their actions.

In my opinion, Mr. Speaker, the bill I have introduced would not be an unreasonable burden on the atomic power industry and would not constitute a roadblock to the growth of the industry. The industry feels quite confident these plants will operate safely, but they fear to accept the responsibility for all of the damages which might occur in the unlikely event of a catastrophe because the amount of such damages could, conceivably, far exceed the assets of the largest company. My bill would not require them to assume such unlimited responsibility. It would limit their liability to $100 million.

Mr. Speaker, I have every reason to believe that the Joint Committee on Atomic Energy Commission is doing everything humanly possible to see that atomic powerplants are constructed and operated with the utmost care. I believe that the same thing can be said of the manufacturers and operators of atomic powerplants. But we have an obligation to our constituents to see that this extreme care continues. If atomic power grows as rapidly as now forecast by the Atomic Energy Commission, we will have more than 100 large plants in operation within the next 15 years. Unfortunately, the old saw still holds true—"familiarity breeds contempt," This is true even with respect to extremely dangerous instrumentalities. This bill is designed to keep them careful.

In the push for low-cost power, there is inherent a desire to save costs by placing atomic powerplants near the center of power consumption and by reducing the cost of safety devices. I feel certain no utility would bow to such economic pressures at this stage of the development of atomic power. I do fear, however, that there may be a tendency to become complacent as the years go by, and I think the public is entitled to the protection which is inherent in some degree of financial responsibility for negligence.

In March of this year, testifying before the Joint Committee on Atomic Energy, Admiral Rickover pointed out that great care results in increased costs. In discussing plans for the seed-and-blanket reactor, the admiral pointed out that his experience indicated some reluctance on the part of competitive enterprises to go to the expense necessary to be absolutely certain that every piece of atomic equipment is perfect. He quite properly pointed out to the committee that he had never hesitated to exercise the utmost care regardless of the cost involved. On behalf of my constituents, I want the manufacturers of atomic powerplants and the utilities to feel the same way, even after the passage of the years has offered temptation to be complacent.

Mr. Speaker, the law as it stands provides protection for the manufacturers and operators of atomic powerplants, and it provide a limited amount of financial compensation for damages to the public. I am far more concerned with the prevention of damage to the public than I am with paying for it after it occurs. I believe my bill will be of material assistance in seeing that a catastrophe never occurs.

ATOMIC ENERGY COMMISSION,
Washington, D.C., August 26, 1965.

Mr. JOHN T. CONWAY,
Executive Director, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. CONWAY: I am pleased to respond to your request for our views on H.R. 9762, a bill to amend the Atomic Energy Act of 1954 to promote the public health and safety. We understand informally from Mr. Trosten, staff counsel, that the reference in the third line of the bill to "subsection 170 c" should be "subsection 170 e."

The bill would amend subsection 170 e of the act to provide that the limit of liability of an indemnified licensee for a single nuclear incident would be $600 million (rather than $500 million, as is presently provided by the act), together with the amount of financial protection. The bill would establish that the maximum aggregate liability would not exceed $600 million. Since the bill would not affect the financial protection requirements and would not increase the amount of governmental indemnification ($500 million), it would place upon "licensees indemnified" the risk of liability for $100 million in excess of the combined amount of financial protection available and the governmental indemnification.

A perhaps unintended result of the manner in which the bill is drafted is the elimination of any statutory limitation of liability for a domestic nuclear incident except with respect to "Atomic Energy Commission contractors indemnified" and "licensees indemnified." Thus, out of the large class of persons potentially liable only the person with whom the indemnity agreement is executed would be afforded a statutory limit on liability. As you know, Price-Anderson indemnification and the present limitation of liability provisions extend to "persons indemnified," which term includes not only the contractors or licensees who are parties to indemnity agreements but any other person who may be liable for public liability. There are in the atomic energy program numerous companies, small and large, which supply parts and services to a licensed reactor or to Commissioned-owned facilities. Imposing the risk of unlimited liability on such companies would, of course, present a severe deterrent to their participation in the atomic energy industry.

While the bill would not expose private companies engaged in the atomic energy industry as "licensees indemnified" to the risk of unlimited liability, it would expose them to an uninsurable risk in the amount of $100 million. Moreover, these licensees, through their insurance pools, assume the risk of public liability in the amount of the underlying financial protection; they obtain insurance coverage at premium rates which are not insignificant.

In adopting the present limit on total liability, Congress was not unmindful of the extremely improbable, but theoretical possibility, of a reactor accident causing damages in excess of the limit on liability and funds made available by the Price-Anderson Act. This limit was incorporated in the law, not to deprive the public of protection, but in order to give the Congress the opportunity to act in light of the circumstances of the particular situation if such a catastrophe should occur. The report of the Joint Committee (S. Rept. 296, 85th Cong., 1st sess., 1957, p. 21) on the bill which became the Price-Anderson law makes it very clear that the "* * * limit could be subject to upward revision by the Congress in the event of any one particular incident in which, after further congressional study, the Congress felt more appropriations would be in order."

This measure would, I believe, impose a serious deterrent to the growth of the atomic energy industry. It was a similar deterrent in 1957—risk of excessive liability—which the original Price-Anderson Act was enacted to alleviate. The additional protection which the bill would appear to afford injured third parties by virtue of the increase in the limitation of liability, may well be more theoretical than real. Except in the case of a few companies, the ability of any organization to respond in damages in amounts approaching $100 million after experiencing a disastrous nuclear incident is conjectural.

For these reasons we are opposed to the enactment of H.R. 9762.

The Bureau of the Budget has informed us that there is no objection to the transmission of these views from the standpoint of the President's program.

Cordially,

GLENN T. SEABORG, *Chairman.*

APPENDIX 37

STATEMENT OF CHICAGO BRIDGE & IRON CO. ON EXTENSION OF THE PRICE-ANDERSON ACT, JUNE 14, 1965

CHICAGO BRIDGE & IRON CO.,
Oak Brook, Ill., June 14, 1965.

Re proposed extension of the Price-Anderson Indemnification Act.

Mr. CHET HOLIFIELD,
Joint Committee on Atomic Energy,
U.S. Capitol, Washington, D.C.

DEAR MR. HOLIFIELD: Chicago Bridge & Iron Co. has a vital interest in the development of peaceful nuclear energy, and has followed the progress of the Price-Anderson Indemnification Act with interest from its inception. Chicago Bridge conceived, designed, and built in 1954 the first large-scale nuclear containment vessel, a 225-foot diameter steel sphere at West Milton, N.Y. A containment vessel is the ultimate safety device in a nuclear power station, intended

to contain all radioactive materials that may be released if all other safety systems fail and a nuclear excursion takes place. After passage of the Price-Anderson Act, Chicago Bridge built nuclear containment vessels for the following major private projects in the United States:

Dresden, Ill.: Commonwealth Edison Co.;
Lagoona Beach, Mich.: Enrico Fermi Plant Power Reactor Development Co.;
Indian Point, N.Y.: Consolidated Edison Co.;
Elk River, Minn.: Rural Cooperative Power Association;
Charlevoix, Mich.: Consumers Power Co.;
Peach Bottom, Pa.: Philadelphia Electric Co.; and
La Crosse, Wis.: Dairyland Power Cooperative,

not to mention containment vessels for research reactors for the AEC, its contractors, educational institutions, and private industry.

Thus far so containment vessel has been subjected to an accidental nuclear excursion. It may be of interest to note, however, that Chicago Bridge built the steel housing in which the SL–1 reactor was housed at the National Reactor Test Station. That reactor was involved in an excursion which resulted in the loss of three lives a few years ago. The steel housing was not intended to serve as a containment vessel, but nevertheless, after the incident, information released by the Atomic Energy Commission indicated that the housing did serve as a reasonably effective containment vessel.

Chicago Bridge does not establish design criteria for containment vessels; that is done by the designer of the nuclear system. Chicago Bridge does translate the design criteria into a containment vessel design and builds a containment vessel capable of withstanding specified pressures at specified temperatures under other assumed conditions. In the event of a rupture of the containment vessel during a nuclear incident, the potential liability of Chicago Bridge would be apparent.

In our view, extension of the Price-Anderson indemnity legislation to cover facilities built after August 1967 is urgently required. The following points appear to support this view, namely:

1. The Price-Anderson Indemnification Act was originally enacted only after extensive hearings had been concluded. These hearings demonstrated the need for such legislation. We know of no events that have occurred since those hearings that would alter the basic conclusions reached then. Indeed, since that time there has been one serious nuclear incident, the SL–1 excursion, and we think that it is significant to note that that incident took place when the reactor was shut down and, in addition, the reactor was a low power reactor. Although a substantial number of power reactors have been placed in service by privately owned power companies and other reactors have been placed into service by publicly owned or governmental agencies without catastrophic incident, we believe that the number of installations that are in operation is not sufficiently large to give any statistical assurance as to the probability of continued safe operation.

2. Private free enterprise should be encouraged to take its rightful place in the development of atomic energy facilities, and indemnification legislation of the type under consideration is required in order to persuade private industry to continue to participate in the development of atomic energy. The original Price-Anderson hearings demonstrated the unwillingness of private industry to assume the enormous risks, then largely uninsurable, that attended the peacetime development of atomic energy, and we doubt that private industry has changed its mind since that time.

We believe that the extension should be for a reasonably long period of time beacause of the length of time required for planning, designing, financing, and building a nuclear powerplant. We believe that private industry should have a stable view of the risks it is assuming in order to make its long-range plans in this area.

The Price-Anderson legislation is a subsidy, and we generally oppose subsidies, but in this area a subsidy seems necessary until the insurance industry is able to develop a greater capacity. We should therefore encourage the development of additional private nuclear liability insurance capacity so as to place upon the owner of a nuclear facility the financial burden of providing the greatest amount of insurance that is available. On the other hand, we are reluctant to recom-

mend a reduction in the maximum amount of indemnity to reflect any increases in insurance that becomes available. We believe that the $500 million indemnification figure was originally and still is an arbitrary figure that bears no exact relationship to a predictable maximum liability exposure. In fact, at the original Price-Anderson hearings there was expert testimony to the effect that the maximum liability might be as much as $2 billion, while other testimony set the maximum exposure at a figure below $500 million. The indemnification is primarily a provision for the general welfare of the people who happen to be in the vicinity of a nuclear power installation. For these reasons, we believe that the indemnification amount should be retained at $500 million even though the amount of available underlying insurance may be increased.

We know of no changes in the Price-Anderson Act that are urgently needed, although we recognize that suggestions have been made for changes that merit your committee's careful consideration. Some of these suggestions are somewhat controversial. In the meantime, however, we believe that prompt action should be taken to extend the Price-Anderson legislation in its present form so as to give to the private power industry the assurance that after August 1967 indemnification will still be available. This assurance appears to be necessary for the power industry to make its long term plans.

We are proud to have participated in the development of the atomic energy industry from the early days of linear accelerators in the 1930's, through the wartime period of its "forced draft" development and on into the peacetime period in which nuclear energy has been converted from a horrible instrument of war into an effective instrument of peace. We believe that this conversion has been largely attributable to the wise guidance that has been given to the program by the Joint Committee, and that all members of the Joint Committee who have served since the late Senator McMahon first called it to order have demonstrated an exceptional devotion to their tasks. We are confident that your committee in its present deliberations will follow the high traditions of the past.

Very truly yours,

By H. J. CLARKE, *President.*

APPENDIX 38

STATEMENT OF SAN DIEGO GAS & ELECTRIC CO. ON EXTENSION OF THE PRICE-ANDERSON ACT, JUNE 17, 1965

SAN DIEGO GAS & ELECTRIC CO.,
San Diego, Calif., June 17, 1965.

Re Price-Anderson Act extension.

Hon. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
House Office Building, Washington, D.C.

DEAR CONGRESSMAN HOLIFIELD: It is our understanding that hearings are scheduled on June 22, 23, and 24, 1965, on the extension of the Price-Anderson Act. We are submitting for your consideration the statement attached to this letter and request that it be included in the record of the hearings.

Very truly yours,

JOSEPH F. SINNOTT, *President.*

STATEMENT BY SAN DIEGO GAS & ELECTRIC CO. IN SUPPORT OF THE EXTENSION OF PRICE-ANDERSON INDEMNITY LEGISLATION

San Diego Gas & Electric Co. supports and urges the Joint Committee on Atomic Energy to recommend the adoption of S. 2042 and H.R. 8496, referred to as the Price-Anderson Act legislation, for the extension of the provisions of the act.

The Price-Anderson Act is one of the key factors which aided in making the United States a world leader in the peaceful use of the atom. Without this far-sighted, far-reaching legislation, it would have been impossible to provide the necessary protection for the public and for industry. Without adequate insurance protection, neither private nor public segments of the industry could have moved beyond the laboratory.

We stand now on the threshold of even greater accomplishments in the field of nuclear development. The Price-Anderson Act is as important today as when first enacted. Therefore, as a matter of great national interest, it is urged that this most essential legislation be extended for another period of 10 years.

The public benefits which have accrued and which will continue to accrue by reason of the Price-Anderson Act are of extreme importance. These benefits are not limited to the nuclear power plants which have been developed or are in the process of being developed. The benefits reach into every field of science. Research and development have produced advances which would not have been realized had the act not opened the way to proceed.

To achieve the desired goal, our Government and the private sector of the industry must be called upon to accelerate their activities in the development of nuclear energy. As we move into the next phase with breeder reactors, with higher temperatures and higher pressures, the public interest requires, even demands, that the protection afforded through the Price-Anderson Act be fully effective. Without this protection, it would appear impossible to move forward the technology and new reactor installations at the necessary rate of speed.

Currently, private insurance is available up to a limit of $60 million. We believe our confidence in the private insurance companies is well placed. We furthre believe that, with a few more years of experience, considerable changes can be brought about in both the amounts of private insurance available and the premium rates which will apply.

Attention is directed to the number of reactors now in operation, those under construction, and those on the drawing boards. Within the space of the next 10 years, or less, our knowledge of all related matters will be vastly greater than it is today. Our ability to design and operate reactors in 1975 will greatly exceed our present knowledge, recognizing fully the great capabilities already attained. Likewise, the ability of the private insurance companies adequately to provide for the industry's insurance needs will also be infinitely greater than it is at this time.

We submit, therefore, that the Price-Anderson Act should be extended in its present form. Amendments or modifications at this time appear to be premature, ill-advised, and threaten to delay progress in the art of nuclear applications. This does not imply that changes should not be considered in the future. Changes, if any, however, should be developed only after additional experience affords sufficient knowledge to formulate intelligently the necessary changes.

With respect to the future changes which may be applied to the Price-Anderson Act, we would offer the following suggestion. Appoint a high-level ad hoc committee to be activated in the spring of 1970. This committee would be made up of representatives from Government, the utilities, the manufacturers, and the insurance companies. With the factual information which will be available by that date, this committee should be able to prepare any necessary amendments to this law. In the intervening period, committee members would accumulate information and background material to be utilized in their work. Recognized agencies and individuals could direct information and suggestions to the committee, thus affording each interested group a means whereby their views would be given serious consideration.

Lastly, we cannot foresee the time when the Price-Anderson Act, or its successor, will no longer be needed. The answer must be left to the future. However, our joint responsibility seems clear. We must, in the public interest, do everything possible to perfect the peaceful use of the atom, and we must protect the public through the coverage provided by the act. At the same time, we must reduce the cost of insurance and, if possible, the amount required. This requires time in addition to all of the dedicated effort being applied.

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APPENDIX 39

ARTICLE BY DAVID F. CAVERS ON STRICT LIABILITY, HARVARD LAW REVIEW, FEBRUARY 1964

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IMPROVING FINANCIAL PROTECTION OF THE PUBLIC AGAINST THE HAZARDS OF NUCLEAR POWER

David F. Cavers *

In order to provide financial protection for the public and industry against the remote contingency of a disastrous nuclear accident occurring in the use of nuclear power reactors, the Price-Anderson amendment to the Atomic Energy Act has required reactor licensees to provide public liability insurance (or its equivalent) in amounts up to sixty million dollars and over this has placed an umbrella of governmental indemnity with broad coverage and half-billion dollar liability limits. To bring this protection scheme into play the act requires liability under state law. Professor Cavers argues that federal statutory provision for strict liability would be preferable, given the uncertainty and delays of recovery under some states' laws. He then considers the international protection provided by various pending conventions for nuclear indemnity, and advocates United States membership in and adaptation to these conventions.

NEARLY a decade has gone by since passage of the Atomic Energy Act of 1954 [1] opened the door to the use by private industry of nuclear fission as an energy source for the generation of electric power. In that period, the industries engaged in developing this new resource have passed through cycles of optimism and pessimism. Today, with good reason, the cycle is swinging optimistically upward. At least in high-fuel-cost areas in the United States, the goal of "competitive power" now appears within reach.[2] Evidencing this confidence are the plans of the electric power industry for very large power reactors in New England, California, New Jersey and New York (including the controversial proposal to build a huge 1,000 megawatt plant in the Borough of Queens).[3] Unless some unanticipated difficulty

* Fessenden Professor of Law, Harvard Law School. B.S. in Econ., Pennsylvania, 1923; LL.B., Harvard, 1926.

[1] 68 Stat. 919, as amended, 42 U.S.C. §§ 2011–281 (1958), as amended, 42 U.S.C. §§ 2014–252 (Supp. IV, 1963) [hereinafter cited as AEA].

[2] See AEC, CIVILIAN NUCLEAR POWER — A REPORT TO THE PRESIDENT 31–34 (1962); Nucleonics, Jan. 1963, p. 19.

[3] For reactor construction plans, see *Hearings Before the Joint Committee on Atomic Energy on Development, Growth, and State of the Atomic Energy Industry*, 88th Cong., 1st Sess. 138, 189 (1963). For a popular report on the New

turns the curve of expectations downward, it seems probable that, over the next decade, nuclear power reactors will be multiplying both in this country and abroad [4] and, as marine propulsion units, on the high seas as well.[5]

For the lawyer, the problems these trends pose relate chiefly to measures for the protection of health and safety and to the consequences of failures in this protection. The genie we are now harnessing to peaceful labors is still a terrible one. A combination of great scientific knowledge, high technological skill, large capital expenditures, and ceaseless vigilance is needed to assure the safety of the reactors and to protect the people and property that would be endangered if a "nuclear incident" were to break the reactor's "containment" and release radioactive gases and particles into the atmosphere. This need will persist [6] even though the industry's admirable safety record continues.[7]

A part of the lawyer's concern with the safety problems that nuclear facilities present relates to their licensing, an administrative process in which the Atomic Energy Commission seeks to assure the safety of reactor design, passing on an application first for a construction permit to authorize the building of a reactor and later for a license to permit its operation.[8] However, this

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York proposal, see Hunt, *Atomic Question for the City*, N.Y. Times, Oct. 6, 1963, § 6 (Magazine), p. 46.

[4] For reports on foreign developments, see EUROPEAN NUCLEAR ENERGY AGENCY, OECD, FIFTH REPORT ON THE ACTIVITIES OF THE AGENCY 51–58 (1963); *Soviet Power and Research Reactors*, Forum Memo, Oct. 1963, p. 23.

[5] For a rosy view of maritime prospects by the designers of the first nuclear merchant ship, *N.S. Savannah*, see Nucleonics, June 1963, p. 26.

[6] For an illuminating discussion by the AEC Deputy Director of Regulation of reactor safety development, see Beck, *Engineering Out the Distance Factor*, AEC Release No. S-28-63, Sept. 25, 1963.

[7] For a comprehensive report on "nuclear incidents" (as accidents involving nuclear injuries are termed), see Smets, *Review of Nuclear Incidents*, in PROGRESS IN NUCLEAR ENERGY, 3 LAW AND ADMINISTRATION 89 (Weinstein ed. 1962), demonstrating the marked superiority in safety over industry of atomic plants in the United States and the United Kingdom.

[8] The licensing procedure gave rise to one major case, won by the applicant and the AEC. Power Reactor Dev. Co. v. International Union of Elec. Workers, 367 U.S. 396 (1961). Following a critical report, STAFF OF JOINT COMMITTEE ON ATOMIC ENERGY, 87TH CONG., 1ST SESS., IMPROVING THE AEC REGULATORY PROCESS (Jt. Comm. Print 1961), Congress has authorized greater flexibility in AEC licensing procedures, including the use of technically qualified boards, AEA §§ 182.b., 189.a., 191, 76 Stat. 409 (1962), 42 U.S.C. §§ 2232(b), 2239(a), 2241 (Supp. IV, 1963). The difficulties of adapting the administrative process to nuclear safety determinations are discussed in Cavers, *Administrative Decision-making in Nuclear Facilities Licensing*, 110 U. PA. L. REV. 330 (1962).

article will relate to another responsibility of the lawyer: the provision of financial protection against the risk of a nuclear incident.

The financial protection problem is producing institutions, national and international, that are unique to the field of nuclear energy. The nascent atomic industries having sought assurance that they would not be bankrupted in the remote but not inconceivable contingency of a nuclear incident causing damage claims in the hundreds of millions, perhaps billions, of dollars,[9] the United States Congress enacted the Price-Anderson Act[10] in 1957, amending the Atomic Energy Act. The act required that each reactor licensee[11] furnish assurance of financial protection (*i.e.*, the ability to respond in damages for public liability by insurance or adequately secured self-insurance) in amounts set by the AEC and also enter into an agreement with the AEC for a half-billion dollar indemnity against public liability. Indemnity agreements with AEC contractors covering "activities under the risk of public liability for a substantial nuclear incident" were also authorized. The act fixed the aggregate liability (including costs) for a single nuclear incident within the United States at the amount of financial protection required of the licensee plus the government indemnity (the maximum for the two now being $560,000,000).

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[9] See a report submitted by the AEC to the JCAE in March 1957 entitled "Theoretical Possibilities and Consequences of Major Accidents in Large Nuclear Power Plants," 1 CCH ATOMIC ENERGY L. REP. ¶ 4031 (1957). The report resolved all uncertainties by adopting pessimistic values. On this basis, to quote the letter of transmittal,

> the theoretical estimates indicated that personal damage might range from a lower limit of none injured or killed to an upper limit, in the worst case, of about 3400 killed and about 43,000 injured. Theoretical property damages ranged from a lower limit of about one half million dollars to an upper limit in the worst case of about seven billion dollars. . . . In the large majority of theoretical reactor accidents considered, the total assumed losses would not exceed a few hundred million dollars.

Id. at 9061 (paragraphing omitted). The report itself began with the flat statement: "The probability of occurrence of publicly hazardous accidents in nuclear power plants is exceedingly low." *Id.* at 9062.

[10] 71 Stat. 576 (1957) (codified as amended in scattered sections of 42 U.S.C.), as amended, 42 U.S.C. §§ 2014, 2210 (Supp. IV, 1963).

[11] This statement is one of many oversimplifications of the act which space considerations dictate. Financial protection is mandatory not only for reactor licensees but for any other "utilization or production facility" required to be licensed under § 103 or § 104. AEA § 170.a., 42 U.S.C. § 2210(a) (1958). The same section also authorizes the AEC to require financial protection of materials licensees. Thus far the AEC has considered such licensees protected by available private insurance and has not exercised its authority.

The AEC has thus far limited the required insurance and indemnity coverage to public liability arising out of incidents at nuclear reactors and in the transportation of "special nuclear materials" [12] and the highly radioactive spent fuels to and from reactors. The liability covered is not limited to that of the reactor licensee (who, in accordance with international practice, I shall hereafter term the "operator" [13]). Instead, the coverage extends to any person who may be held to public liability for a nuclear incident — including the aviator who crashes his plane into a reactor, to use a hypothetical case popular in the hearings. Finally, though the protection does not cover the reactor itself or persons and property at its site, an extraordinary scheme permits off-site property owned by a "person indemnified" (*i.e.*, anyone liable) to be covered if liability would have existed had the property belonged to another person.[14]

The Price-Anderson Act "removed a roadblock" to the development of nuclear power, as was commonly said in the hearings before the Joint Committee on Atomic Energy (JCAE).[15] The casualty insurance industry had anticipated the act's passage by organizing two pools (one of stock companies, NELIA, and one of mutuals, MAELU) which together are prepared to write as much as $60,000,000 in liability insurance.[16] An indemnity agreement has been devised which dovetails almost perfectly into the AEC-approved insurance policy.[17] Annual hearings before the JCAE and a series of statutory amendments, including the extension of protection to the *N.S. Savannah* [18] and to govern-

[12] The term applies to plutonium and uranium enriched in U-233 and U-235. See AEA § 11.t., 42 U.S.C. § 2014(y) (1958).

[13] The act uses "operators" to refer to individuals who manipulate the controls. AEA § 11.m., 42 U.S.C. § 2014(p) (1958).

[14] See AEA § 11.u., 75 Stat. 476 (1961), 42 U.S.C. § 2014(u) (Supp. IV, 1963); 10 C.F.R. § 140.75, app. A, coverage B (1963); 10 C.F.R. § 140.76, app. B, art. III, para. 2 (1963).

[15] See, *e.g.*, H.R. Rep. No. 435, 85th Cong., 1st Sess. 1 (1957).

[16] NELIA (Nuclear Energy Liability Insurance Associates), the stock company group, is prepared to write $47,000,000; MAELU (Mutual Atomic Energy Liability Underwriters), $13,000,000. Reinsurers are drawn from many nations. Previously, the largest single casualty policy is believed to have been for $25,000,000.

[17] 10 C.F.R. pt. 140 (1963) contains the form of the approved policy as Appendix A and several forms of indemnity agreements.

[18] AEA § 170.*l.*, 72 Stat. 525, 42 U.S.C. § 2210(*l*) (1958). The indemnity is for the full amount. For this coverage, "nuclear incident" now includes "any such occurrence outside of the United States." AEA § 11.*o.*, 76 Stat. 410 (1962), 42 U.S.C. § 2014(*o*) (Supp. IV, 1963).

ment contractors for nuclear incidents overseas (limited to $100,000,000),[19] have kept the protection scheme responsive to opportunities and difficulties that have been revealed by experience.

Thanks to this process, only one major shortcoming remains: the protection accorded the exposed public is uncertain. Though sufficient in some states, the applicable laws render it doubtful in others. Moreover, the same legal defects that jeopardize the public's protection are the main obstable to our entry into one or more of the international conventions providing financial protection that have been negotiated in recent years.

The source of the trouble lies in nothing recondite: simply the fact that the Congress has left the question of liability in tort, on which the whole inverted pyramid of obligations rests, to the law of the state or states in which nuclear harm was sustained. This body of case law was not designed to meet the needs of a governmental scheme of financial protection against the distinctive hazards of nuclear energy. Its most serious deficiency exists in any state where the reactor operator's liability appears to depend on proof of negligence, proof that could well be impossible to provide. If, through failure to prove fault where that is required or through the interposition of defenses where it is not, no person could be held legally liable for a nuclear incident, then none of the hundreds of millions of dollars that the Price-Anderson Act has provided would be available to compensate the injured public.

Some may contend that I am parading imaginary horribles. They will declare that the risk of a serious nuclear incident is exceedingly remote, and with this I fully agree. But is this risk now so remote that the electric power and nuclear equipment industries are ready to forgo the government's half-billion dollar indemnity shield, with its accompanying limitation of aggregate liability, and put their own assets at stake instead? If the risk has not yet become that remote — and I am sure it has not —

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[19] AEA §§ 11.*o*., 170.d., 76 Stat. 410 (1962), 42 U.S.C. §§ 2014(*o*), 2210(d) (Supp. IV, 1963). Previously, the AEC had entered into indemnity contracts with its contractors both here and abroad under its general contracting power, but these undertakings were subject to the availability of funds. The problems of financial protection to government contractors everywhere against catastrophic damage, nuclear and nonnuclear, is the subject of a current study. See LEGISLATIVE DRAFTING RESEARCH FUND, COLUMBIA UNIVERSITY, FINANCIAL PROTECTION AGAINST RISKS OF MAJOR HARM IN GOVERNMENT PROGRAMS (Prelim. Rep., March 1963).

then it is not too remote to justify full financial protection to the public, at least within the prescribed limitation.

Some may also say that I am assuming an unreal uncertainty in state law, that, in one way or another, the courts of any state sustaining a serious incident would find a way to hold the operator or one of its suppliers liable so that the injured parties could obtain the insurance and indemnity. I think this highly probable, but I also believe it even more probable that, in a number of states, this beneficent result would not be reached until after protracted, costly litigation. The public (which, it should be noted, has been stripped of the contractual protection of property insurance against nuclear risks [20]) should not have to go remediless for years while the uncertainties are being resolved. Such delays would also seriously harm all the industries involved and the long-term prospects for nuclear power, which must depend, at least at the start, on public sufferance.[21]

An alternative to dependence on the tort laws of the several states would be to impose a federal requirement of strict liability on the operator, with defenses not compatible with the scheme of public protection eliminated. The operator's liability would not have to be exclusive, as it is under the international conventions and most national laws abroad.[22] If the operator were strictly liable and fully indemnified, suits against suppliers would seldom, if ever, be brought.

The prospect for improvement in state laws is not encouraging. Strict liability of the operator (including — so far as legally feasible in a state law — the exclusive liability feature) was embodied in a proposed Uniform Nuclear Facilities Liability Act which came before the National Conference of Commissioners on Uniform State Laws in 1961. The Conference, in deference to opposition that appears to have been based on hostility to the concept of strict liability, relegated the proposed uniform act to the lesser status of a model act.[23] Commissioners are not com-

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[20] See p. 665 *infra*.

[21] The present public relations problems of the industry are surveyed in Nucleonics, Oct. 1963, p. 17.

[22] See p. 679 *infra*.

[23] For the text of the act, see NATIONAL CONFERENCE OF COMMISSIONERS ON UNIFORM STATE LAWS, HANDBOOK 228–33 (1961). One Commissioner is reported as remarking, "There is simply one basic issue that is involved, and that is whether there will be in statutory form absolute liability." *Id.* at 104.

mitted to press for the enactment of "model acts." [24] It is not surprising that the model act has been adopted by no states whatever.

The Price-Anderson Act itself was enacted for a term of ten years. A decision as to its renewal should soon be reached; plans for expanding nuclear power require a long lead time. Since there is every reason to expect its reenactment, reexamination of its terms is in order.[25] Unfortunately, the opposition to the proposed uniform act seems likely to be aligned against the provision of more complete public protection under the Price-Anderson Act. This would represent a dog-in-the-manger attitude by an array of important industries to which the act represents a large, if contingent, government subsidy.

I. The Question of Liability for Nuclear Incidents Under State Law

So far at least as the Price-Anderson hearings [26] disclose, the JCAE's relegation of the question of liability for nuclear incidents to state law does not appear to have sprung from a searching consideration of the federal alternative. Indeed, the JCAE showed little interest in the bases of liability, whatever the applicable law. These were described in a memorandum of law submitted to the JCAE by AEC General Counsel William Mitchell [27] and in an influential report prepared by Arthur W. Murphy and staff for the Legislative Drafting Research Fund of Columbia University.[28]

The most illuminating colloquy on the liability problem came in testimony by Mr. Murphy in the 1957 hearings [29] in which he expressed his confidence that the court of an incident state would

[24] That the compromise would result in nonenactment was predicted. *Id.* at 100.

[25] The AEC is conferring with industry representatives on the renewal problem, and a committee of the Atomic Industrial Forum, Inc., the association of the atomic industries, is also studying it.

[26] Hearings were first held on two bills before the JCAE in May 1956. See *Hearings Before the Joint Committee on Atomic Energy on Governmental Indemnity for Private Licensees and AEC Contractors Against Reactor Hazards*, 84th Cong., 2d Sess. (1956) [hereinafter cited as *1956 Hearings*]. Additional hearings were held in March 1957. *Hearings Before the Joint Committee on Atomic Energy on Governmental Indemnity and Reactor Safety*, 85th Cong., 1st Sess. (1957) [hereinafter cited as *1957 Hearings*].

[27] *1956 Hearings* 70–74.

[28] Murphy, Financial Protection Against Atomic Hazards 21–24 (1957). Portions of the study are reprinted in *1957 Hearings* 168–82.

[29] *1957 Hearings* 165–67.

find a way to impose strict liability, his main uncertainties relating to acts of God and the independent acts of third parties. This colloquy evidenced the overriding concern on the part of Representative W. Sterling Cole (earlier displayed by Senator Clinton Anderson) that no loophole in public protection result from the fact that the independent negligence of an uninsured person insulated the reactor operator from liability. The JCAE attacked this problem with the result already noted: there no longer can be an independent third person; by virtue of his own liability, he is a "person indemnified" under the act, the insurance policy, and the indemnity agreement.[30] It seems plain that the JCAE was satisfied that one or another of the persons causing the incident would be held liable if claims arising out of it were taken to the courts. But is such a supposition valid? What obstacles would plaintiffs without proof of negligence have to overcome? What defenses?

Before responding to those questions, I should perhaps set to one side claims against suppliers, contractors, and designers. Despite the surprising extension in recent years of the doctrine of implied warranty so as to impose, without proof of negligence, an essentially tort liability on suppliers of potentially dangerous commodities that cause injuries to persons with whom the suppliers are not in privity, the doctrine is only gradually spreading beyond the categories of foods and drugs and their consumers.[31] To extend it to the suppliers of machinery or machinery parts and to include among the persons protected by it people who had no contact with the product sold save as victims of its explosion would carry well beyond existing authority. One must assume therefore that the plaintiffs' case against suppliers, designers, and contractors would be based on negligence.

In subsection *B* of this section I shall consider certain defenses that would impair public protection even where a ground of liability without proof of fault is available against the operator.

A. Doctrinal Alternatives to Requiring Proof of Fault

Several doctrines exist that might be invoked to hold the reactor operator liable without proof of fault, and, as to each, I shall point out some sources of uncertainty as to its availability.

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[30] See p. 647 *supra.*

[31] This development is outlined in Prosser, *The Assault Upon the Citadel (Strict Liability to the Consumer)*, 69 YALE L.J. 1099 (1960).

1. The Doctrine of Rylands v. Fletcher.[32] — This doctrine, imposing liability without fault for injuries done by substances collected on, and escaping from the defendant's land, if the collection represents a "nonnatural use" of the land, has been accepted in some twenty jurisdictions (including California) and rejected in ten (including New York).[33] A "nonnatural use" is said to be equivalent to one which is "extraordinary," "exceptional," or "abnormal."[34] Today, perhaps, a nuclear reactor would be held a nonnatural use; but would this categorization persist after such reactors had become relatively common?[35] Also, English courts have not applied the doctrine when the companies to be held were operating under legislative authorization,[36] and some American authority supports this view.[37] This would relieve nearly all power reactors from liability under *Rylands* if the condition were held to extend to state franchises and federal licenses.

2. "Ultrahazardous Activity." — A second doctrinal basis for strict liability in nuclear incidents would be the "ultrahazardous activity" theory formulated by the American Law Institute in its

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[32] L.R. 3 H.L. 330 (1868).

[33] PROSSER, TORTS § 59, at 332–34 (2d ed. 1955) [hereinafter cited as PROSSER]. For an extended treatment of strict liability theories, see STASON, ESTEP & PIERCE, ATOMS AND THE LAW 635–724 (1959) [hereinafter cited as STASON].

[34] PROSSER § 59, at 329–30.

[35] Seavey finds the reactor situation to "fall squarely" within *Rylands v. Fletcher*, but expresses some doubt that all courts would apply strict liability. Seavey, *Torts and Atoms*, 46 CALIF. L. REV. 3, 9 (1958). Prosser however, feels that "it is not difficult to predict that there is no court which will refuse to apply . . . the principle of strict liability . . . ." PROSSER § 59, at 336. *Accord*, 2 HARPER & JAMES, TORTS § 14.6, at 812 (1956) [hereinafter cited as HARPER & JAMES]. The character of the first case might be critical: a dubious claim for leukemia might well inspire a different doctrine than a catastrophic incident.

[36] See, *e.g.*, Dunn v. Birmingham Canal Co., L.R. 8 Q.B. 42 (1872) (water escaping from authorized canal); Madras Ry. v. Zemindar of Carvetinagorum, L.R. 1 Indian App. 364 (1874) (public duty founded on custom to maintain water tanks).

[37] Though the doctrine is recognized in American treatises, see 2 HARPER & JAMES § 14.5, at 811–12; PROSSER § 60, at 343–44, the American cases chiefly involve the legislative power to "legalize a nuisance," *e.g.*, Bacon v. City of Boston, 154 Mass. 100, 28 N.E. 9 (1891), or the protection of a contractor employed by an immune municipality, *e.g.*, Nelson v. McKenzie-Hague Co., 192 Minn. 180, 256 N.W. 96 (1934). *Cf.* RESTATEMENT, TORTS § 521 (1938) (no strict liability for activity pursuant to "public duty" of public officer, employee, or common carrier). It has been suggested that statutory privileges are not likely to do more than preclude injunctive relief. STASON 710–11.

Restatement of Torts [38] in preference to the theory of *Rylands v. Fletcher* as a statement of American law. An ultrahazardous activity, for the harmful consequences of which the actor is liable without proof of negligence, is defined in section 520(a) of the *Restatement* as one not in "common usage" which "necessarily involves a risk of serious harm to the person, land or chattels of others which cannot be eliminated by the exercise of utmost care." This seems to me to fit the operation of nuclear reactors precisely, at least at this stage of the art, but its value in assuring the public that injured persons can hold operators liable without proof of fault is diminished by the fact that, after more than twenty years, this formulation has been accepted in only a few states.[39] And how long will reactors remain not in "common usage"? [40]

Moreover, Dean Prosser has criticized the concept as not reflecting American law [41] both in "its insistence on extreme danger and the impossibility of eliminating it with all possible care" and in its apparent failure to consider whether the locale of the activity causing the injuries was or was not appropriate in view of the hazards created. An opportunity to consider these factors would help in harmonizing the American doctrine with the English "nonnatural use" developed under *Rylands v. Fletcher*.[42]

Reducing stress on the extremity and intractability of the danger and emphasizing locality would, of course, give more play to judgment factors. Though doubtless wise in formulating a doctrine to cover a wide range of activities, this would augment uncertainty in the concept's application to atomic reactors. Can a reactor's operation be "abnormally dangerous" in a site duly approved by the AEC after an exhaustive investigation into the safety factors in that reactor's design for use at that site?

3. Trespass. — A reactor operator might be held liable to possessors of contaminated land on the theory that the deposition

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[38] §§ 519–24 (1938).

[39] It has been applied in California, Connecticut, Oregon, and Pennsylvania, impliedly approved but not applied in South Dakota, and rejected in Delaware and New Jersey, according to a survey in STASON 670–77.

[40] The concept is unclear. Does it mean "used by many people" or "commonly used for its purpose," *e.g.*, generating electricity? Operation of airplanes was first treated in cases and statutes as an ultrahazardous activity, but a contrary trend has appeared. See PROSSER § 61, at 345–46; 2 HARPER & JAMES § 14.13, at 851–55.

[41] PROSSER § 59, at 335.

[42] *Id.* at 331–38.

of radioactive particles on land constituted a trespass, not requiring proof of negligence. The closest analogue is furnished by cases of blasting where the casting of rocks and dirt on neighboring land has been held a trespass, even though the blasting was carefully conducted.[43] But it seems a far stretch to extend this somewhat dubious application of the trespass concept to an unintended, accidental release into the atmosphere of minute particles that air currents might carry a few feet or many miles before depositing. Moreover, it is becoming the prevailing view that intrusions on land are actionable, if not intentional, only when they are negligent or the result of extrahazardous activities.[44]

4. Nuisance. — A court might hold the reactor operator liable for the commission of a private nuisance, a concept as to which the doctrinal waters are peculiarly turgid.[45] Conceivably before, but more probably after, a less-than-catastrophic nuclear incident, a court might conclude that the reactor represented a use of land interfering unreasonably with the enjoyment by others of their lands. On the issue of unreasonableness, the court would consider such factors as the social value of the defendant's activity, the suitability of its location [46] and the practicality of preventing the interference. Absent continuing or recurrent interferences, a characteristic of most findings of nuisance, it seems hard to believe that a carefully-run reactor, located on a site approved by the AEC in its licensing proceeding, would be stigmatized as a nuisance. Indeed, would a court have constitutional power to do so by invoking state law? The regulation of reactor safety is said to have been preempted by the federal government.[47]

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[43] See *Id.* § 13, at 55. Blasting now tends to be treated as an ultrahazardous activity subject to strict liability. See 2 HARPER & JAMES § 14.6. Incidentally, crop-dusting cases do not rest on trespass. *Id.* § 28.27, at 1593.

[44] See RESTATEMENT, TORTS § 166 (1934); PROSSER § 13, at 54–56.

[45] *Compare* PROSSER § 70, at 391, *with* Seavey, *Nuisance: Contributory Negligence and Other Mysteries*, 65 HARV. L. REV. 984 (1952). See generally Freedman, *Nuisance, Ultrahazardous Activities, and the Atomic Reactor*, 30 TEMP. L.Q. 77 (1957).

[46] A location suitable when the reactor is built may become less so as the population grows in the surrounding area.

[47] See the analogous problem posed by a bill now pending in the New York City Council, providing that "It shall be unlawful to manufacture electricity using a nuclear reactor in the city." New York, N.Y., Proposed Amendment to Administrative Code § C 19–27–1 (1963). AEC Chairman Seaborg, in a letter to the Council, claimed the matter to be the "exclusive responsibility of the Federal Government." Forum Memo, July 1963, p. 9. Plainly the Atomic Energy Act has preempted responsibility for determining reactor safety, but does this require that a city be unable to protect its citizens from anxieties, even unfounded ones, so long,

Even if the reactor itself were not deemed a nuisance, its contamination of lands to the leeward by a single incident might be viewed as an actionable nuisance at the suit of the land owners. However, it is by no means clear that a court would so hold unless it were satisfied that the operator had been negligent or were willing to hold the activity ultrahazardous, thereby eliminating nuisance as an independent ground of liability.[48]

5. Res Ipsa Loquitur. — A possible source of liability without proof of negligence in nuclear incident cases is the doctrine of *res ipsa loquitur*, though liability would still be based on negligence. *Res ipsa loquitur* is usually applied in situations within the control of a defendant where an accident occurs in circumstances suggesting that, in the ordinary course of things, it would not have happened unless the defendant was negligent. The court will then permit the jury, without more evidence, to infer that such negligence was in fact the cause of the accident.[49] The defendant would, of course, introduce evidence to rebut the inference of negligence, but after a large nuclear incident a jury might be expected to resolve its doubts in favor of the plaintiff.

The uncertainties as to *res ipsa* as a substitute for strict liability have been underestimated. Would the judge — or the appellate court — permit it to be applied in a nuclear case? Pointing to its applicability is the argument that the record of successful operation shows that accidents do not happen to well-run reactors.[50] But clearly they could happen if the reactor were not well made; therefore, the inference that an accident is due to a defect seems, in the absence of evidence, at least as probable as the inference of negligent operation. Moreover, the fact that a reactor was not well made would be hard to attribute to the operator's negligence, unless the reactor operator is to be held to vicarious liability for

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at least, as ample areas remain for developing nuclear power elsewhere? See Cavers, *State Responsibility in the Regulation of Atomic Reactors*, 50 Ky. L.J. 29 (1961) (inadequate in presenting the case for the city); Statement of H. R. Searing, Chairman of the Board, Consolidated Edison Co. of N.Y.: "If large numbers of the public believe that a serious accident may occur, this attitude must be considered whether or not it is based upon actual knowledge of reactor operation." *1956 Hearings* 103.

[48] See Restatement, Torts § 166 (1934); *id.* § 822, comment *c* (1939).

[49] In some states, however, the inference creates a conclusive presumption unless the defendant presents evidence to meet it; in a few states, the burden of proof is shifted to the defendant. Prosser § 43, at 211–12.

[50] See Becker & Huard, *Tort Liability and the Atomic Energy Industry*, 44 Geo. L.J. 58, 67 (1955).

the negligence of all the firms constructing the reactor and its components. This would appear to go beyond existing law.[51] Moreover, a court might decline to permit any resort to *res ipsa*, holding that negligence is not a probable inference since, in the present state of the art, reactor risks cannot be eliminated by "the exercise of utmost care."

Plaintiffs seeking to use *res ipsa* to hold suppliers and designers liable without evidence of negligence would be in difficulty if they could not identify any particular component or aspect of the design as the cause of the incident, since suppliers and designers are scarcely to be held to collective liability.[52] However, even if a particular component were shown to have given way, the plaintiffs would still have trouble in invoking *res ipsa* to hold its maker liable. This is because of the so-called "exclusive control" rule which, while generally not applied rigidly to require that the defendant have been in exclusive control of the item at the time of the injury, does require that no one having control over the item in question after the defendant could reasonably be assumed to have affected its condition in ways relevant to the plaintiff's claim.[53] Such proof would not be easy to furnish. While, to be sure, the reactor and many of its parts are so located as not to be touched by the reactor staff, the way the reactor was operated could, in various situations, affect their condition adversely.

Where resort to *res ipsa* was crucial to the plaintiff's case, insurers might, in view of these uncertainties, reasonably resist its application, and only an appellate court could resolve the issue.

B. Some Defenses to Liability That Impair Public Protection

Whatever the basis of liability, note must be taken of certain defenses that an otherwise liable defendant might interpose.

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[51] In an analogous situation the prevailing view that a nonnegligent assembler is not liable for latent defects in components due to its supplier's negligence is criticized in 2 HARPER & JAMES § 28.28, at 1596. And see Boeing Airplane Co. v. Brown, 291 F.2d 310 (9th Cir. 1961), imposing liability.

[52] Compared with the much discussed use of *res ipsa* against a hospital owner and six staff members collectively, Ybarra v. Spangard, 25 Cal. 2d 486, 154 P.2d 687 (1944), collective liability for failure of some one of a series of subsequently destroyed components offers no chance for an individual supplier to exculpate itself by its own witnesses. However, loss distribution on insurance principles without regard to fault would remove any need to identify an individual source of harm. See 2 HARPER & JAMES § 19.7, at 1088–89.

[53] See *id.* at 1085–88; PROSSER § 42, at 204–06.

Though some are available only against particular plaintiffs, others would, if applicable, defeat all recoveries.

1. Statutes of Limitations. — The problem of limitations is serious because an overdose of radiation may cause no perceptible or significant injury at the time of exposure, but manifest its impact in such serious ailments as cancer and leukemia [54] perhaps as many as thirty years from the date of exposure.[55] Genetic injuries could appear even later. Nevertheless the prevailing rule in this country is that the statute runs from the time of initial wrongdoing, not from the time of discovery.[56] Since personal injury limitations tend to be relatively short, often two or three years, many potential claimants would be barred from recovery before they were even aware they had claims. The Price-Anderson Act, by not providing for special federal limitations, risks the application of this anachronistic and unjust rule wherever litigation based on nuclear injuries occurs in a state possessing it.[57] The act's provision [58] for the setting aside, in a limitation proceeding, of a part of the indemnity funds available "for possible latent injuries not discovered until a later time" would be well-nigh futile if the incident were in such a state.

This problem ought to be dealt with irrespective of the Price-Anderson Act, for it is sure to arise in the day-to-day use of radioactive isotopes in industries not subject to the act. A method of handling it, adopted for reactor claims by the ill-starred Model Nuclear Facilities Liability Act and widely employed abroad, is to have a double-barreled limitation:

> SECTION 5. [*Limitations.*] No action may be brought under this Act more than three years after the person suffering or incurring the injury knows, or reasonably could have knowledge of,

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[54] For a description of radiation injuries and problems involved in proving causation, see STASON 3–44, 360–532.

[55] Nuclear liability laws in the Federal Republic of Germany and the United Kingdom prescribe 30 years as the maximum limitation for nuclear injuries. See notes 121, 122 *infra*.

[56] Hutton, *Statute of Limitations and Radiation Injury*, 23 TENN. L. REV. 278 (1954).

[57] Claims under the AEC approved insurance policy must be brought within two years of its termination. See 10 C.F.R. § 140.75 app. A, IV(2) (1963). Suppose, two years after an incident has caused a policy's termination, claims not yet barred by state law are presented. Must the AEC indemnify the licensee for them? The agreement does not negative this. *Cf.* AEA § 170.c., 42 U.S.C. § 2210(c) (1958).

[58] AEA § 170.e., 76 Stat. 411 (1962), 42 U.S.C. § 2210(e) (Supp. IV, 1963).

the cause of the injury or more than ten years after the date of the last occurrence to which the injury is attributed, whichever first occurs.[59]

2. Exonerations. — Even if strict liability applies, the question arises what events should "exonerate" (a label commonly used abroad) the operator from liability. The independent unforeseeable act of a third party (the hypothetical aviator again) would exonerate under the laws of many states.[60] This gap in the public's financial protection is not wholly closed by the Price-Anderson solution of extending the insurance and indemnity to the third person. He may not be liable, or, if liable, his liability may have been abated by his death.[61] Also acts of God may exonerate a person subject to strict liability,[62] and, unlike the third person, God cannot be rendered liable. The defense of act of God, admitted in England under the *Rylands* doctrine,[63] has been justified, together with the third person's unforeseeable intervention, by reference to "general principles of causation": the act "breaks the chain of causation and the results are, therefore, not 'proximate' to the defendant's conduct." [64]

This comment is apt if only the allocation of risks as between two private persons is at stake, but surely speculation as to the foreseeability and proximity of injuries that would not have occurred but for the reactor is out of place when there exists a scheme of financial protection covering both public and industries, none of which will have to pay out personal funds to meet third-party claims. The proper range of exoneration ought to be determined as a part of the protection scheme, as it is in the international conventions and as it may appear to be in Price-Anderson's exception of "claims arising out of an act of war" in its definition of "public liability." [65] But this provision does not,

[59] NATIONAL CONFERENCE OF COMMISSIONERS ON UNIFORM STATE LAWS, HANDBOOK 232 (1961). *Quaere*, would an overdose of radiation producing actionable but trivial symptoms bar a claim for leukemia five years later?

[60] See 2 HARPER & JAMES § 14.5, at 809–11; PROSSER § 60, at 340–41. *Contra*, RESTATEMENT, TORTS § 522 (1938). Professor Seavey, in proposing a federal statute for nuclear incidents, would exclude this defense. Seavey, *supra* note 34, at 10.

[61] Some states still follow the common law rule of abatement at the tortfeasor's death. See Note, 63 COLUM. L. REV. 290 (1963).

[62] See authorities cited note 60 *supra*.

[63] Nichols v. Marsland, L.R. 10 Ex. 255 (1875).

[64] 2 HARPER & JAMES § 14.5, at 808.

[65] See AEA § 11.u., 75 Stat. 476 (1961), 42 U.S.C. § 2014(u) (Supp. IV, 1963).

even by implication, affect the scope of the exonerations that may cause a state to deny strict liability; Price-Anderson protection operates only when the state law has imposed liability.

3. Charitable and Government Immunities. — Of the various legal immunities from tort liability, the most consequential in this context is the immunity of nonprofit educational institutions, public and private, many of which are licensed to operate research reactors. An amendment [66] to Price-Anderson has taken care of the case of an immune state institution by accepting contractual liability for all claims above a total of $250,000 for which the institution would be liable if not a "State agency," although it fails to make clear how the $250,000 deductible is to be allocated among such claims. However, the public exposed to a nuclear incident in an immune private nonprofit institution would find the institution still immune, and would have to depend for its protection under the indemnity agreement for claims above $250,000 on the chance that one or more of the men at the reactor controls or a supplier or designer could be held negligent. To the extent that the immune operator carried liability insurance, injured persons might be able to claim as third-party beneficiaries of the insurance contract,[67] but this would not activate the indemnity agreement. Fortunately, in most states that grant an educational institution immunity, this immunity extends only to claims asserted by its "beneficiaries," and not to those of "strangers," [68] among whom would be persons living in the neighborhood.

Thus far, Massachusetts is not in this category.[69] If, for example, the Massachusetts Institute of Technology does not voluntarily waive its immunity, it will not, under Massachusetts law, be a "person legally liable" for a nuclear incident if one should occur in its reactor. If such an incident contaminated

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Oddly, the approved insurance policy extends this to exclude liability for "civil war, insurrection, rebellion, or revolution." 10 C.F.R. § 140.75, exclusion (e) (1963). Thus, if a fanatic band seeking independence for Puerto Rico blew up a reactor there, causing a serious nuclear incident, insurance would not be payable. *Quaere*, as to the indemnity? And would it be "from the ground up"?

[66] 72 Stat. 837 (1958), adding subsection k to AEA § 170, 42 U.S.C. § 2210(k) (1958).

[67] *But see* Enman v. Trustees of Boston Univ., 270 Mass. 299, 170 N.E. 43 (1930) (suit by stranger; carrying liability insurance does not alter institution's immunity).

[68] See 10 AM. JUR. *Charities* §§ 153–54 (1937); Annot., 25 A.L.R.2d 29, 90–96 (1952).

[69] See Foley v. Wesson Memorial Hosp., 246 Mass. 363, 141 N.E. 113 (1923).

MIT's many buildings in close proximity to its reactor (but not on its site), MIT would have the frustration of being denied the compensation for this damage which otherwise the AEC would be obligated to pay. If MIT's Cambridge neighbors could not find another person liable for the incident, they too would go uncompensated.[70]

4. Defenses Under the Federal Tort Claims Act. — Another immunity question deserves attention: does the Federal Tort Claims Act (FTCA) [71] permit recoveries against the Government based on strict liability when that is the state standard? The Atomic Energy Act requires the licensing of agencies of the United States Government (other than the AEC and, for military purposes, the Department of Defense) if they seek to construct reactors. The AEC has relieved these agencies of the need to provide financial protection themselves, but they are subject to Price-Anderson and required to enter into the indemnity agreement. A federal agency such as the National Aeronautics and Space Administration (now constructing a test reactor) could be held liable in a suit under the FTCA in case of a nuclear incident, but only if the activity were held not to be "discretionary" [72] and perhaps only if the agency were shown to have been negligent. Authority on the question of recovery under the FTCA on the basis of strict liability is divided.[73] This flaw in the public's protection could, however, easily be cured by the AEC without statutory change. The AEC has power under Price-Anderson to "re-

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[70] However, they might recover if their claims were covered by an insurance policy for $250,000 not conditioned on liability. A waiver of immunity by MIT would seem to protect both MIT and its neighbors.

[71] 28 U.S.C. §§ 2671–80 (1958).

[72] 28 U.S.C. § 2680(a) (1958). If no negligence in executing the activity were shown, claims would have to be grounded simply on the fact that the reactor had been licensed for operation at its site, the result presumably of "discretionary acts." Professor Peck argues that the imposition of strict liability would not challenge the propriety of the official "discretionary" decision, but would serve simply as a loss-distributing action. See Peck, *Absolute Liability and the Federal Tort Claims Act*, 9 STAN. L. REV. 433, 452–53 (1957). Certainly this would seem true of indemnified, licensed reactors. Professor Jaffe's support of the discretionary exception rests mainly on the difficulty of challenging such propriety, especially when negligence is at issue. Jaffe, *Suits Against Governments and Officers: Damage Actions*, 77 HARV. L. REV. 209, 235–38 (1963).

[73] In Dalehite v. United States, 346 U.S. 15 (1953), the Supreme Court, in a dictum, rejected strict liability in FTCA actions, and this view has been followed in several lower court cases. See 2 HARPER & JAMES § 14.14, at 858. Though several commentators accepted the dictum, see Peck, *supra* note 72, at 434 n.8, it has been persuasively criticized by Professor Peck.

quire, as a further condition of issuing a license, that an applicant waive any immunity from public liability conferred by Federal or State law." [74] Such a waiver ought to be required in the AEC's indemnity regulations governing federal agencies.

Reactors operated for the AEC or the Department of Defense (DOD) are excluded from the act's protective scheme. Neither the indemnity agreement nor the limitation on liability would apply if the United States could be held liable under the FTCA. However, the Price-Anderson indemnity is available to AEC contractors, including those operating AEC reactors and those engaged in joint AEC-DOD projects. Presumably, the AEC could require the contractor to accept liability without proof of fault and to waive specified defenses.

5. Defenses Available to Government Contractors. — A number of courts have refused to hold contractors liable who, without negligence, engage in operations otherwise constituting actionable nuisances or other legal harms if those harms were caused in performing contracts with governmental bodies either enjoying immunity in tort for the damage or obligated to pay just compensation on the ground that the harm constituted a taking.[75] The AEC has entered into indemnity agreements with the contractors operating its reactors, but, if the United States is not liable for damage they cause without proof of negligence, could nonnegligent AEC contractors be held? In states that allow nonnegligent contractors to get under the umbrella of governmental immunity, the Price-Anderson machinery could be set in motion only by finding a negligent individual.

The problem was made concrete in 1961 by AEC's "Project Gnome," an underground explosion to test certain peaceful potentialities of nuclear energy. The explosion's site in New Mexico was a few miles distant from seven potash mines. Despite AEC precautions, the owners feared damage to their mines. Though the AEC had indemnified the contractor (the University of California) and though the Supreme Court of New Mexico had ruled underground blasting subject to strict liability,[76] there was a

[74] AEA § 170.a., 42 U.S.C. § 2210(a) (1958).

[75] *E.g.*, Yearsley v. W. A. Ross Constr. Co., 309 U.S. 18 (1940); Nelson v. McKenzie-Hague Co., 192 Minn. 180, 256 N.W. 96 (1934); Valley Forge Gardens, Inc. v. James D. Morrissey, Inc., 385 Pa. 477, 123 A.2d 888 (1956). *But see* Scranton v. L. G. DeFelice & Son, 137 Conn. 580, 79 A.2d 600 (1951); Berg v. Reaction Motors Div., 37 N.J. 396, 181 A.2d 487 (1962).

[76] Thigpen v. Skousen & Hise, 64 N.M. 290, 327 P.2d 802 (1958). The con-

chance that the FTCA's discretionary and strict liability exclusions, the governmental contract, or the AEC Test Manager's control over the contractor's employees might afford it defenses that could defeat recovery by the mineowners. Since a bill to amend the Price-Anderson Act had previously been blocked by the opposition of the Department of Justice to holding the United States to strict liability,[77] an alternative route was found: an amendment was enacted imposing liability on an indemnified contractor for injuries caused by underground nuclear detonations and providing that "no immunity or defense founded on the Federal, State, or municipal character of the contractor or of the work to be performed under the contract shall be effective to bar such liability." [78]

I have every sympathy with the potash mineowners' intolerance of their legal uncertainties, but, of course, the problem is much broader than their plight. Not only potash mineowners but the rest of the public as well are entitled to have the loopholes in their financial protection closed.

6. Defenses Based on the Plaintiff's Conduct. — Various defenses against tort claims are predicated on the plaintiff's conduct, contributory negligence and assumption of risk being the main examples. If a nuclear incident injured the persons or property of substantial numbers of the public, relatively few cases would be disposed of on the basis of an individual plaintiff's conduct. Therefore, a national scheme of financial protection for the public has little need for uniform rules governing the legal effect of such conduct. The problem might properly be left to the law of the incident state.

C. Questions as to the Measure of Damages

In general, rules governing damages might also be left to state law. With two principal exceptions, the advantage of having uniform rules of damages for nuclear incidents throughout the nation does not seem great.[79] There is also some value in preserving the

text of the issue is described in *Hearings on Operations Under the Indemnity Provisions of the Atomic Energy Act of 1954 Before a Subcommittee of the Joint Committee on Atomic Energy*, 87th Cong., 1st Sess. 19–23, 29–32 (1961) [hereinafter cited as *1961 Hearings*]. The University had waived immunity, but the waiver's validity might have been challenged.

[77] For text of the Department's letter, see *1961 Hearings* 42.

[78] AEA § 170.d., 75 Stat. 479 (1961), 42 U.S.C. § 2210(d) (Supp. IV, 1963).

[79] The federal statute for nuclear incidents Professor Seavey proposes would deny recovery for pain and suffering. Seavey, *supra* note 35, at 11.

same standards of recovery for a nuclear incident in a given state as apply to other personal injury claims arising there.

The first situation where a state measure of damages seems inappropriate is, happily, a very unlikely one: a nuclear incident involving claims above the $500,000,000-plus ceiling on liability arising in two or more states with different measures of damages. Since the claims exceed the common fund for claimants from both states, it must be apportioned. Suppose the measure in State *X* is more liberal to claimants than the measure in State *Y* (one of the fourteen states limiting recovery for wrongful death). In such a case, a common measure of damages would protect State *Y* wrongful death claimants from having their recoveries scaled down in order to free funds for State *X* claimants who, even after scaling, were getting recoveries several times as large.

The second situation relates to punitive or exemplary damages. All but four states permit their recovery, though a few more restrict their amount. Punitive damages may be recovered in negligence cases when the conduct of the defendant or (in many states) his employee has been so reckless as to verge on the willful.[80] Perhaps cutting corners by deliberate disregard of an important atomic safety rule would meet this criterion.[81] Suppose such conduct had caused distressing injuries to ten plaintiffs. Should an outraged jury be allowed to award them a total of, say, $600,000, with punitive damages of $30,000,000? (Readers of news reports of the *Butts* case will note my example's verisimilitude.) Insofar as punitive damages are designed to inflict condign discipline on the defendant rather than assuage the plaintiff's feelings, the award of insurance company and government funds would scarcely advance that objective, while making financial protection more costly. On the other hand, if courts were to follow the rule announced in a recent federal decision construing, on public policy grounds, a casualty insurance policy not to cover punitive damages,[82] a serious gap would be opened in the financial protection

[80] Though authority is divided, many jurisdictions permit punitive damages against a corporation held on the basis of *respondeat superior*. Morris, *Punitive Damages in Tort Cases*, 44 HARV. L. REV. 1173, 1201 (1931).

[81] In an analogous recent case, a pilot's apparently deliberate refusal to obey a control tower instruction to stay 500 feet above cloud cover was held "willful misconduct," freeing plaintiff's claim from the Warsaw Convention's ceiling on liability. Berner v. British Commonwealth Pac. Airlines, Ltd., 219 F. Supp. 289 (S.D.N.Y. 1963); *accord*, American Airlines, Inc. v. Ulen, 186 F.2d 529 (D.C. Cir. 1949).

[82] Northwestern Nat'l Cas. Co. v. McNulty, 307 F.2d 432 (5th Cir. 1962). Note

afforded an operator or other person liable, one which, *ex hypothesi*, could not be insured against. To avoid this, recovery of punitive damages should be denied in all nuclear cases, except perhaps a case against a wrongdoing individual, who, as to these damages, should not be protected by the operator's insurance or indemnity. Incidentally, the FTCA does not allow the recovery of punitive damages.[83]

II. The Case for Strict Liability

Sometimes opponents of strict liability for reactor operators plaintively ask, "Why should atomic energy be singled out for strict liability? Isn't it just another new hazard of our industrial society?" Especially while the Price-Anderson Act is on the books the answer is, "No." Considerations of fairness supporting strict liability of operators are reinforced by considerations of practicality redounding to the benefit of all the protected industries and the Government as well. In this section, I shall note the benefits to the public, the industries, and the Government, together with some speculation as to the reasons for such opposition to strict liability as there may be.

A. The Fairness of a Strict Liability Rule

The strongest justification for holding the operator to strict liability as a part of the Price-Anderson scheme assuring it financial protection is the sheer fairness of such a rule. I know of no area in our law of torts in which the case for strict liability is as strong. It was advocated five years ago by an eminent scholar of the law of torts, Warren Seavey, who, in urging federal legislation to this end, added, "I am no friend of strict liability . . . as applied to activities in general." [84] The operator of a nuclear reactor has exposed large numbers of people to a risk, however remote, of personal injury and property damage by locating a reactor within contaminating range of their homes, shops, and factories, though safe alternative ways exist to supply their needs for electric power. As Harper and James observe, "The problem,

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that now the right to punitive damages on nuclear claims is a matter of state law while the coverage of the AEC-approved policy would seem a matter of federal law.

[83] 28 U.S.C. § 2674 (1958).

[84] Seavey, *supra* note 35, at 8.

basically, may be regarded as one of allocating a . . . loss in such a manner as to entail the least hardship upon any individual and thus to preserve the social and economic resources of the community." [85]

The people thus exposed to loss cannot be expected to protect themselves by accident insurance against the financial hazard of a highly improbable nuclear incident. Few people insure against the risk of accident from the many other hazards of urban life. Workmen's compensation probably would not cover employees in businesses within the danger zone from an injury so completely dissociated from their employment.[86] Life insurance, sickness insurance, and medical care plans would help temper the losses, but the law has not denied those who have allocated a part of their earnings for these purposes the financial protection of tort liability when they are hurt.

One might suppose that the major financial hazard, property damage — including loss of use — could be protected against by resort to first-party property insurance. However, the hazard is vastly greater than the property insurers can be expected to bear,[87] and they have obtained permission from the state regulatory authorities to exclude nuclear losses from their policy coverage. As a result, however, property owners have had to substitute the chance of recovery on tort claims for the certainty of the contract liability of property insurers. This action has led one group, the American Bridge, Tunnel, and Turnpike Association, to make repeated protests to the JCAE, demands (unsuccessful) for protective legislation, and refusals in some instances to permit radioactive products on their facilities.[88]

Given the national interest in removing financial hazards as a

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[85] 2 HARPER & JAMES § 14.1, at 787.

[86] Injuries from tornadoes and hurricanes ordinarily are not compensable, see 1 LARSON, WORKMEN'S COMPENSATION § 8.20 (1952). Injuries from fallout seem analogous, unless perhaps the place of employment were peculiarly exposed. See *id.* §§ 8.00–.12. Compensation would not preclude third-party tort claims.

[87] On the predicament of the property insurers if they did not exclude nuclear risks, see Testimony of Ambrose Kelly, General Counsel, Associated Factory Mutual Fire Insurance Companies, *1957 Hearings* 224.

[88] If toll roads refuse radioactive products, these must be sent through more thickly settled areas. For extended discussions of this and other aspects of the problem, see *1961 Hearings* 85–120; *Hearings on Indemnity and Reactor Safety Before a Subcommittee of the Joint Committee on Atomic Energy*, 87th Cong., 2d Sess. 101–59 (1962) [hereinafter cited as *1962 Hearings*]. Efforts to work out special insurance policies had achieved only a partial appeasement by 1962. *Id.* at 137–39.

roadblock to nuclear power, a fair and effective distribution of the risk would result from holding the operator to strict liability, with a narrowly limited range of defenses. The operator would not risk a dollar of its own in liability, and its insurance premiums are an allowable expense to cover which its electric rates would be increased if necessary. Its protection against the risk of nuclear harm to its own off-site property would be improved. Designers, suppliers, and contractors would be protected, without insurance cost, against third-party liability save for damage to the reactor; as to this they should be able to bargain with the operator for contractual protection.[89] The government indemnity (a responsibility of the nation's taxpayers) would cover most of the risk over and above the insurance coverage; and the ceiling on aggregate liability transfers whatever risk remains to the exposed population. Nowhere in the various areas where strict liability is established is there a superior degree of protection available to the persons liable.

B. Disadvantages of Negligence Liability to the Potentially Liable Industries

The specter of a nuclear incident that led to Price-Anderson was one in which there would be multitudes of claimants, perhaps spread over several states. Some of their personal injury claims would be latent, manifesting themselves over a period of years. If liability rested on negligence and the operator's negligence was plain, the great majority of claimants would doubtless sue the operator rather than suppliers. If, however, in a state that seemed to base liability on negligence, evidence of the operator's negligence was slim or nonexistent, or if the operator had a defense peculiarly available to it, then a great witch hunt would begin for other defendants who might be held liable, since, we have seen, the discovery of a single one would suffice to engage the entire Price-Anderson protective system.

Though the defense would rest in the hands of counsel for the insurance pools — and the Department of Justice, if the aggre-

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[89] Damage to the reactor and property at the site can be covered by property insurance, though perhaps not fully in the case of the largest reactors. The Nuclear Energy Property Insurance Association (which has a counterpart among mutual companies) has revised its policy to include a waiver of any right of subrogation "against any party furnishing services, materials, parts, or equipment" for covered property. NEPIA Policy 38 ed., NIRB, Feb. 15, 1962.

gate of claims promised to exceed the licensee's insurance [90] — the burden of defense on the personnel of the various defendants would not be light. Moreover, in a doubtful case the insurance pools' temptation not to settle but to carry the case to the state supreme court would be strong, particularly since, if the claims, once established, were to exceed the policy limit, the insurers' battle would be cost-free, their costs of defense being included in computing the policy limit.[91] If the insurers insisted on litigating, they would force their captive, the licensee electric utility, to join in resisting the demands of its injured customers, since it would be contractually obligated to cooperate.[92] This apparently obdurate refusal by an electric utility to make reparation (without cost to itself) for the injuries that it had caused its customers would create peculiarly unenviable public relations.

Moreover, if proof of negligence were necessary, counsel for plaintiffs would have to be fertile in directing incriminating suspicions against others; the intensely radioactive remains of a defunct reactor are hard to examine. Their experts would be prying into the reactor's design, into every major component which could conceivably be suspected of failure, and into the performance of the contractors who erected the plant.[93] Speculation and trade gossip would injure where no case could be made.

Probably the insurers would, as we have seen, ultimately lose in the courts, though their resistance might induce more favorable settlements than would a prompt capitulation. However, even if they were to win the battle, they would lose the war. Strict liability would be firmly implanted in the law thereafter, by statute if not by judicial decision, and the federal government might feel compelled to undertake the indemnification of operators "from the ground up." [94]

The United States has an important, if unappreciated, stake in a clear rule holding the licensee to strict liability. The serious

[90] AEA § 170.h., 42 U.S.C. § 2210(h) (1958).

[91] See 10 C.F.R. § 140.75 Conditions 3(6) (1963).

[92] See *id.* Conditions 6.

[93] The rule that acceptance of a building insulates the contractor and suppliers from third-party liability for negligence has been shaken by Moran v. Pittsburgh-Des Moines Steel Co., 166 F.2d 908 (3d Cir. 1948), and Foley v. Pittsburgh-Des Moines Co., 363 Pa. 1, 68 A.2d 517 (1949). The insulation of architects and product designers from such liability also seems to be wearing thin. For a discussion of both problems, see STASON 731–32, 772–78.

[94] A serious incident exhausting insurance coverage might induce the insurance industry to abandon the field — if the field itself did not disappear for some years.

setback that a substantial nuclear incident would cause to the nation's costly nuclear power program would be greatly magnified if, instead of promptly settling and paying up claims for actual damage, the insurance pools denied legal liability and forced the claimants into protracted litigation. Dissatisfaction would be accentuated if the Government itself took the same position.[95] Moreover, a government victory in the courts would lead the disappointed litigants to turn to the Congress for relief, as they did after the Supreme Court crushed the hopes of the victims of the Texas City disaster.[96]

Litigants driven to hunt out suppliers and designers as possible defendants would create a confused, complicated pattern of litigation, even if the volume of claims did not compel limitation proceedings.[97] With responsibility for defense divided between insurers and Government (the several defendants' own counsel being alert to preserve their respective clients' good names) and with cases in a number of state and federal courts, the prospect of chaos is a real one. In contrast, a rule holding the operator to strict and, preferably, exclusive liability represents a promising way to produce orderly litigation, hopefully in a single action.

C. Some Disadvantages Commonly Attributed to Strict Liability

1. Higher Insurance Premiums. — Perhaps the most obvious argument against strict liability in the nuclear field is that it would raise insurance premiums. By contrast, if proof of negligence were required, the insurers could charge the power industry lower premiums, and thereby help to equalize the position of nuclear power vis-à-vis its conventionally fueled rivals whose insurance costs are quite modest.

This argument, tenuous on its face, grows even less persuasive as one notes how reactor premiums have been fixed. Having no

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[95] Note that the Government could not force a contrary position on the insurers. Its control over litigation where its indemnity may be involved, see note 90 *supra*, is designed not to compel settlements by the insurers but to prevent improvident ones.

[96] Dalehite v. United States, 346 U.S. 15 (1953), barred about 300 claimants from recovering under the FTCA. Eight years after the explosion the Texas City Disaster Relief Act was passed, 69 Stat. 707 (1955), as amended, 73 Stat. 706 (1959), granting relief but limiting awards for personal injury, death and property damage to $25,000 in each category.

[97] The serious procedural problems caused by a major incident and the various procedural devices that might be resorted to are considered in STASON 605–33.

actuarial basis for ratemaking and hoping never to acquire one, the insuring pools set premiums at levels that they trusted would prove substantially too high and provided for refunds on an annual basis beginning at the end of ten calendar years. The plan for determining the reserve for refunding after losses and expenses of operation, recently outlined in amendments to the policy, is too complex for description here.[98] Important for the purpose at hand is the fact that it is computed on an industrywide basis. Hence any savings from basing liability on negligence would be spread over all the insured operators and not accrue to a particular operator which had fended off an attack based on strict liability. Thus the benefit of such a saving to the particular reactor involved, and to any other reactor, would not be very great —certainly not great enough to enhance significantly its competitive position. Note, too, that the premiums are fixed on a nationwide basis; [99] hence they do not reflect differences in the relevant state liability laws. This uniformity seems prudent in view of the widespread doubt that any existing requirement of proof of negligence would survive a nuclear incident.

2. Imaginary Radiation Injuries. — In one situation industry opposition to strict liability is more understandable. If today's reasonable hopes are realized, there will be no big reactor incidents whatever, and so the industry would never enjoy the practical advantages of strict liability. Nonetheless, there will probably be some litigation inspired by reactor operation. Any reactor will emit radioactive gases from its stack. The quantity that may safely be emitted is governed by federal regulation,[100] fixed in the light of much scientific study. Occasionally, perhaps, more of these gases will be emitted than the standard specifies, but excessive emissions are not likely to continue over any consequential period of time. Yet this source of radioactivity may well induce some victims of cancer and especially leukemia in the vicinity to charge that their ailments were caused by the reactor's operation. If causation could be proved, then, under a doctrine of strict liability, the plaintiff's case would be won, whereas it would be

[98] For its terms, see 3 CCH ATOMIC ENERGY L. REP. ¶ 15113, at 20809-2–20809-3 (1963).

[99] For "tentative" insurance rates for some of the first reactors, see *1957 Hearings* 120–21. The "provisional" annual premium for the 180-mwe Commonwealth Edison reactor in Dresden, Ill., was set at $250,000; for the 134-mwe Yankee Atomic Reactor in Rowe, Mass., $130,000.

[100] See 10 C.F.R. § 20, app. B (1963).

exceedingly hard to prove the operator's negligence or even to invoke *res ipsa*. Even though the plaintiff's case on causation would almost certainly be exceedingly fragile, the existence of a second weakness — little or no evidence of negligence — would, of course, aid the insurers in refusing settlement and, if need be, in defeating the plaintiff in court.

I am sympathetic to a nuclear power producer's desire not to become a target for claims by everyone who suffers from cancer to the leeward of its reactor. However, causation is the true legal issue in such cases.[101] This must be faced up to and won; otherwise not merely the power industry but all industries using radiation will probably be plagued by unfounded claims. The public's just claim to the protection of the strict liability rule should not be sacrificed to improve the tactical position of the power industry and its insurers in fighting off some ill-founded individual claims in the future.

3. Opposition to Strict Liability "in Principle." — Informal comment by informed persons convinces me that the basic ground of resistance to strict liability for reactors is the simple fact that the insurance and other industries involved do not like strict liability. Therefore, wherever strict liability rears its head it must be opposed "in principle," that is, without too much inquiry into the justice of its claim to be applied in the particular situation. Even conventional electric utilities have various operations exposing the public to danger, and, in some of these, an argument can be made for strict liability. Naturally, the application of the doctrine to any phase of their operations seems to weaken their opposition to it elsewhere. Supplying companies are not directly threatened by a shift to strict liability for reactors, but the steady growth of the implied warranty, with the resulting extension of strict liability, may be a cause for concern on their part. The risk of accelerating this extension may well seem more real to a supplier than the hypothetical risk of being drawn into some future reactor case.

These attitudes are understandable; they are not defensible. I grant that a utility or manufacturer's opposition to strict liability for nuclear incidents may help it to win a quite different fight, perhaps one more important to it. This does not justify the atomic industries, with full protection against off-site third-party liability assured them by the Price-Anderson Act, in seeking to

[101] For a thorough consideration of the causation problem, see STASON 421–532.

deny to the public as complete a degree of financial protection as can be provided by the act within its ceiling on aggregate liability.

4. The Fear of Encouraging Carelessness. — From the standpoint not of industry self-interest but of public protection, there remain certain other arguments against strict liability and Price-Anderson protection. Thus, some seem to entertain the notion that a person who must act at his peril under a rule of strict liability has less reason to be careful than a person who has a chance to escape liability by showing that he was not negligent. This I find patently fallacious. But does the Price-Anderson scheme, by relieving atomic industries of all loss from third-party liability, remove a sanction needed to coerce the exercise of care? The answer does not turn on the nature of the basis of liability but on the effect of complete financial protection against third-party risks.

An affirmative answer would, if valid, prove much more than the unwisdom of Price-Anderson: wherever liability insurance is written for amounts large enough to cover all the liabilities actually risked, the same fear would exist; yet certainly the availability of such coverage must be a commonplace today. Moreover, the Price-Anderson Act itself does not remove all financial risk from the operator and its suppliers. At stake for the operator is its large investment which, for a big reactor, may exceed the property insurance available. In any event, it would require years to replace the reactor — doubtless over much opposition. A careless supplier is shielded from liability for damage to the reactor not by the Price-Anderson Act but by the property insurers' willingness to waive subrogation and the operator's readiness not to insist on warranties and even to enter into hold-harmless contracts with its suppliers.

If this danger were real, it should be dealt with not by depriving the public of full protection but by provisions preserving recourse by the operator against grossly negligent suppliers, as some foreign critics of the international conventions have argued, and recourse by the Government against the grossly negligent operator.[102] However, not only would this tactic discourage par-

[102] Such recourse is provided for in Euratom's Supplemental Convention to the Paris Convention, art. 5, 2 AMERICAN SOC'Y OF INTERNATIONAL LAW, INTERNATIONAL LEGAL MATERIALS, CURRENT DOCUMENTS 685 (1963) [hereinafter cited as CURRENT DOCUMENTS]. It worries American reactor suppliers who may operate a reactor in trial runs. With reason we fear such terms as "gross negligence" and "reckless" more than European lawyers fear similar concepts such as *"dol."*

ticipation in the atomic industries, but it may also underestimate the pressures which the need to preserve a good reputation exerts upon firms in those industries. If these pressures do not induce a supplier to use painstaking care,[103] the remote risk of future legal liability is not likely to.

III. Methods To Obtain National Rules Improving the Public's Financial Protection

Few of the existing defects in the public's financial protection against nuclear risks can be cured administratively. To render public protection more complete, legislative change is called for. The question how it should be brought about suggests at least two answers.

A. The Creation of a New Federal Tort

The clear-cut way to handle the problem would be for Congress to provide a federal cause of action against indemnified operators. Strict liability could be specified, so that the plaintiffs need only prove that their personal injuries or property damage had been caused by the defendant's reactor or by radiation escaping from materials in transport for which the defendant operator was responsible. The statute could prescribe the grounds of exoneration and also specify periods of limitation. It could require waiver by private institutions of immunity under state law and could afford claimants against state educational institutions the benefit of the indemnity on a contractual basis, as is now done. The statute could either prescribe the legal effects of the conduct of plaintiffs and the measure of damages or leave these matters to the law of the incident state.

Under such a statute should the liability of the reactor operator be exclusive? Most nations abroad have answered this question affirmatively.[104] To have only a single defendant in litigation that may involve a large number of plaintiffs would be advantageous. Ordinarily these plaintiffs would be concentrated in a single court, ideally a federal court. The exceptional cases involving out-of-state plaintiffs suing in their home states could be

[103] The recurrent complaints by Admiral Rickover of American industry's low standards of performance, recently echoed by NASA, suggest that the problem of meeting the needs of the new technologies for precision will not be solved by changing liability rules or forbidding insurance.

[104] See p. 679 *infra*.

transferred to the federal court in the district where the incident took place. Concession of liability would be normal under a strict liability statute. Damage claims of claimants injured in another district could be heard by masters there who would report to the court having jurisdiction over the incident.

Conceivably trial by jury would not be requisite. The federal act would create a new cause of action in place of any cause existing under state law. It would be designed to allocate, and, if need be, to ration, insurance and government indemnity funds to the victims of a nuclear incident without cost to the nominal defendant, the operator. The operator could doubtless be viewed as waiving the right to jury trial in applying for a license and in securing the financial protection provided by the statute. However, the claimants present a harder case. As beneficiaries of the plan, they would gain far greater assurance of compensation than the state laws could have given. If the proceeding were administrative, the jury would seem no more requisite than in workmen's compensation statutes.[105] Yet the form of an action at law against the operator would make the workmen's compensation analogy less persuasive. Note, however, that the plaintiff's chief assurance of compensation would rest on the Government making its resources available. If the Government thus could be viewed as the real party in interest in Price-Anderson cases, this might obviate the need for a jury since the seventh amendment does not require a jury in actions to which the Government consents — and, indeed, the FTCA provides none.[106]

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[105] Workmen's compensation laws, even when nonelective, have withstood attack as denying jury trial. See, *e.g.*, State *ex rel.* Davis-Smith Co. v. Clausen, 65 Wash. 156, 117 Pac. 1101 (1911) (leading case). As the Supreme Court observed of the law there upheld, "As between employer and employee, the act abolishes all right of recovery in ordinary cases, and therefore leaves nothing to be tried by jury." Mountain Timber Co. v. Washington, 243 U.S. 219, 235 (1917). The *quid pro quo* of a certain, speedy remedy, invoked in upholding a state compensation law against due process attack, New York Cent. R.R. v. White, 243 U.S. 188, 201 (1917), would be present here.

[106] See 28 U.S.C § 2402 (1958). The seventh amendment was first held inapplicable to suits against the United States in McElrath v. United States, 102 U.S. 426 (1880). As a means of reducing the volume of jury trials after a major incident the tactic of separating the insurer's liability from the Government's and permitting direct suit against the latter where claims exceeded the insurance (or other protection) is superficially appealing but impracticable. In order to separate claims against one from those against the other, conceivably a reasonable, reliable nondollar test of "a major incident," *e.g.*, one in terms of radiation, could be devised. If this test identified such an incident, then *all* claims could be brought

After a major incident the procedural problems of adjudicating thousands of claims for hundreds of millions of dollars would be far harder than one might infer from the lack of provision for them in the Price-Anderson Act when limitation proceedings are not required. Moreover, the act's provisions for those proceedings leave many questions unanswered.[107] To cope with the problem of multiplicity of suits, it has been suggested that Congress authorize an original bill consolidating actions in the federal court in the district of the incident, with process running throughout the nation and power to enjoin suits elsewhere.[108] Hopefully, this recourse to the equity suit would strengthen the case against a mandatory jury trial.

A proposal for a new federal cause of action might be opposed on familiar states' rights grounds.[109] However, since the federal cause would depend on the continued existence of the federal licensing and indemnity scheme of the Price-Anderson Act, the case, as a precedent, would rest on narrow grounds. Moreover, for some the federal cause would have the virtue of providing the benefits of strict liability without adding another example of the doctrine to the law books of any state.

B. The Waiver of State Laws Restricting Liability

A more cautious way to improve the public's financial protection would be to expand a device already used for a limited purpose in the Price-Anderson Act: the AEC's power to require a waiver of immunity as a condition of obtaining a license.[110] The act might be amended to condition a license on the applicant's agreement not to invoke state law to defeat recovery by injured persons in circumstances where full financial protection to the public required recovery.

Rather than attempt to note the matters that the applicant's

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against the Government, the insurers reimbursing it up to the amount of their policies.

[107] For a thorough inquiry into their shortcomings, see STASON 605–32, examining the whole range of devices to consolidate actions.

[108] *Id.* at 626. The authors recognize that this puts in question the right to trial by jury. They refer to Jacobs v. Ringling Bros.-Barnum & Bailey Combined Shows, Inc., 141 Conn. 86, 103 A.2d 805 (1954) (consent equity receivership successful in handling the many Hartford circus fire claims). For the procedures there used (including arbitration), see Note, 60 YALE L.J. 1417 (1951).

[109] Its constitutionality will be briefly discussed p. 676 *infra*.

[110] AEA § 170.a., 42 U.S.C. § 2210(a) (1958).

agreement might cover, I have boldly undertaken to draft a statutory provision specifying them. Despite its probable defects, this draft may prove an expeditious way by which to present some complex ideas. The draft follows:

"With respect to any action for personal injury or property damage to which an applicant's financial protection and indemnity agreement with the Commission would apply, the Commission shall require, as a further condition of issuing a license, that

"(1) the applicant waive any immunity from liability in tort conferred by federal law and, if the applicant is a private, nonprofit educational institution, any immunity from liability in tort conferred by state law;

"(2) the applicant agree that, if the plaintiff in such an action alleges that he has suffered personal injury or property damage caused by a nuclear incident occurring in, or in connection with, the applicant's licensed facility, the applicant will not, by pleading, motion, or otherwise, contest the plaintiff's claim on the ground that the plaintiff has failed to plead, offer to prove, or prove a wrongful or negligent act or omission to act by or on behalf of the applicant as the cause of the injury or damage complained of;

"(3) the applicant agree that, if not more than ten years shall have elapsed from the date of the last incident to which the plaintiff attributes the personal injury complained of and not more than three years shall have elapsed from the first date on which the plaintiff knew, or reasonably could have knowledge of, the cause of that injury, the applicant will not plead or otherwise offer as a defense any statute of limitations applicable to the plaintiff's cause of action; and

"(4) the applicant agree that, apart from a defense based on an applicable statute of limitations, which shall be subject to the preceding paragraph, or a defense based on the conduct of the plaintiff, the applicant will not plead or otherwise offer as a defense exonerating him from liability to the plaintiff for personal injury or property damage caused by a nuclear incident occurring in or in connection with the applicant's licensed facility any fact other than that the claim arose out of an act of war."

Such an amendment to the Price-Anderson Act would subject the operator to strict liability without relieving his suppliers and other parties from liability, but, as was noted above, given such a provision, they would seldom be sued and would in any event

share the operator's financial protection and the government indemnity. A more apt period of limitations would apply to the operator; it could not take shelter either behind possible immunities (except an immunity as a state educational institution) [111] or behind possible exonerating defenses other than the plaintiff's conduct (left to state law) and the one defense recognized in Price-Anderson, an act of war. The state measure of damages would still apply.

The amendment would not purport to change the cause of action against the licensee from a state to a federal cause, although, analytically, this may seem its effect. If the cause were changed, then, of course, the federal courts' jurisdiction would not depend on diversity of citizenship though they would still draw on state law to cover matters for which no federal rules were specified. Absent further provisions, trial by jury would remain available.

C. The Question of Constitutionality

Whichever method of change were adopted, the familiar question would be raised: has the federal government the constitutional power so to legislate? To take a short cut, I would respond that, if the Price-Anderson Act is constitutional as it stands, so too is either form of the proposed amendment to it. The act is not simply an exercise of the federal spending power: it conditions the right of an otherwise qualified person to receive a reactor license and to engage in the licensed activities. It also forbids plaintiffs with state judgments against an operator from satisfying these out of the property of the judgment debtor or its insurers to the extent that the claims of all plaintiffs exceed, or seem likely to exceed, the aggregate liability it prescribes. The act must rest on much the same contentions as are relied on to sustain the constitutionality of all the regulatory aspects of the Atomic Energy Act. I shall not repeat them here.[112]

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[111] State educational institutions now preserve their immunity (often protected by state constitutions), but if total claims exceed $250,000 the federal indemnity provides contractual coverage for the excess. See p. 659 *supra*. Presumably an immune noneducational state agency would have to waive immunity to get a license. My draft bypasses this problem; it should be reexamined if either route to improved financial protection were to be chosen.

[112] The federal powers invoked to sustain the Atomic Energy Act's constitutionality may be inferred from the congressional "findings," AEA § 2, 42 U.S.C. § 2012 (1958): to provide for the common defense and security and to regulate

Once the constitutionality of the present Price-Anderson Act is accepted, either form of the proposed amendments to it is easy to defend. They merely improve its implementation by giving greater assurance (1) that the operator's financial protection and the government indemnity will actually achieve their objective of protecting the exposed public as well as the participating industries, within the ceiling set on aggregate liability, and (2) that these arrangements will not be rendered ineffective by the injured party's inability to prove negligence or by state defenses or immunities that are incompatible with the federal plan of public protection.

IV. The Provision of Financial Protection Against Nuclear Risk Abroad

Previous references to international conventions and national laws designed to cope with the financial hazards of nuclear power abroad relate to a body of law [113] that has a significant bearing on executive and legislative decisions the United States must soon be making. It reflects considered judgments reached by the responsible experts of many governments who approached the financial protection problem with our example before them and, in the case of the conventions, with the aid of United States experts.[114] We must decide whether we wish to become a party to one or more of the conventions and, if so, on what terms. Before reaching these questions, I shall summarize those features of the conventions and national laws that are most germane to the problem under discussion.

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interstate and foreign commerce. For a discussion antedating the act's passage, see Estep, *Federal Control of Health and Safety Standards in Peacetime Private Atomic Energy Activities*, 52 Mich. L. Rev. 333 (1954). The Price-Anderson Act gave as its purposes "to protect the public and to encourage the development of the atomic energy industry, in the interest of the general welfare and of the common defense and security." AEA § 2.i., 42 U.S.C. § 2012(i) (1958). The limitation of liability is sometimes predicated on the bankruptcy power. This strains the bankruptcy concept; the limitation is part of a plan to preserve a defendant's assets intact from claims, not to distribute these in full or partial satisfaction.

[113] For an excellent collection of essays discussing it and collecting the national laws (except the Belgian and Japanese) and the Paris Convention, see Progress in Nuclear Energy, 3 Law and Administration (Weinstein ed. 1962) [hereinafter cited as Progress In Nuclear Energy]. For a detailed comparative analysis, see Note, 13 Stan. L. Rev. 865 (1961).

[114] The United States was a party to the IAEA and Brussels negotiating conferences. American advisers aided in drafting the Paris Convention.

A. The Conventions and National Laws

There are four international conventions dealing with financial protection, none as yet in effect: The Convention on Third Party Liability in the Field of Nuclear Energy of the Organization for Economic Cooperation and Development (OECD) (known as the Paris Convention), which sixteen European nations have signed; [115] the Convention Supplementary to the Paris Convention of 29 July 1960,[116] which the six Euratom states and seven other parties to the Paris Convention have also signed; [117] the International Convention on Civil Liability for Nuclear Damage, signed by five nations and sponsored by the International Atomic Energy Agency (IAEA), a body of 80 nations, including the communist states; [118] and the Brussels Convention on Liability of Operators of Nuclear Ships, sponsored by the International Maritime Committee (IMC) and adopted by the Diplomatic Conference on Maritime Law, Brussels, May 25, 1962, but as yet unsigned.[119] Finally a fifth convention, sponsored by the Inter-American Nuclear Energy Commission (IANEC), is still in the drafting process.[120] Probably it will resemble the others, but I shall not discuss it here.

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[115] For the text, see 55 AM. J. INT'L L. 1082 (1961) and PROGRESS IN NUCLEAR ENERGY 351–74 (including *Exposé des Motifs*). Signatories are Austria, Belgium, Denmark, France, Germany, Greece, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, and the United Kingdom. The Paris Convention was sponsored by OECD's predecessor, the Organization for European Economic Cooperation (OEEC), and so it may sometimes be indexed under the latter name. The United States belongs to OECD.

[116] For the text, see 2 CURRENT DOCUMENTS 685.

[117] Signatories are as listed in note 115 *supra*, excluding Greece, Portugal, and Turkey.

[118] The IAEA grew out of President Eisenhower's "Atoms for Peace" proposal. For a brief account of its creation and structure, see Cavers, *International Cooperation in the Peaceful Uses of Atomic Energy*, 12 VAND. L. REV. 17, 26–31 (1958). For more detail, see Bechhoefer & Stein, *Atoms for Peace: The New International Atomic Energy Agency*, 55 MICH. L. REV. 747 (1957).

For the IAEA Convention text, see IAEA Document CN–12/46 (May 20, 1963), reprinted in 2 CURRENT DOCUMENTS 727. Signatories are China, Colombia, Lebanon, the Philippines, and Yugoslavia.

[119] For its text, see 57 AM. J. INT'L L. 268 (1963). For an earlier draft by the Conference of the *Comité Maritime International* at Rijeka, Yugoslavia, in September 1959, see PROGRESS IN NUCLEAR ENERGY 321–25.

[120] IANEC was created by the Organization of American States in 1959. For its statute, see PAN AMERICAN UNION, NUCLEAR ENERGY LEGISLATION IN THE AMERICAN STATES 103–09 (1961). Mr. Wm. Mitchell, former AEC General Counsel, is consultant to IANEC in this matter.

Six foreign nations have passed laws dealing specifically with financial protection against nuclear risk: the United Kingdom,[121] the Federal Republic of Germany,[122] Sweden,[123] Switzerland,[124] Belgium,[125] and Japan.[126] The first four nations later signed the Paris Convention. Belgium passed its law after becoming a signatory, apparently as a temporary expedient to serve until the Paris Convention goes into force.

All four conventions follow the broad pattern of Price-Anderson, requiring financial protection against public liability of facility operators (if nongovernmental), limiting aggregate liability, and, under some conventions, supplementing the operator's financial protection with a government indemnity. The national laws tend also to follow this pattern, though less faithfully. The similarities among these conventions and laws extend also to their departures from Price-Anderson. Their pattern does away with many of the difficulties that I have noted in our system. Its main features are the following: (1) Strict liability is imposed for nuclear incidents.[127] (2) The facility operator is the only person liable, and the operator has no noncontractual rights of recourse against third persons (except against an individual intentionally causing an incident).[128] (3) Grounds of exoneration are limited to certain specified circumstances, *e.g.*, war, insurrection, "grave natural disaster of an exceptional character."[129]

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[121] Nuclear Installations (Licensing and Insurance) Act, 1959, 7 & 8 Eliz. 2 c. 46 (1959), reprinted with regulations in PROGRESS IN NUCLEAR ENERGY 451–65.

[122] Act of Dec. 23, 1959, translated in PROGRESS IN NUCLEAR ENERGY 409–27.

[123] Act of June 3, 1960, translated in PROGRESS IN NUCLEAR ENERGY 473–76. (Unless renewed, the act was to expire Dec. 31, 1963.)

[124] Act of Dec. 23, 1959, translated in PROGRESS IN NUCLEAR ENERGY 434–45.

[125] Law of July 27, 1962, reprinted in PIÉRARD, RESPONSABILITÉ CIVILE: ENERGIE ATOMIQUE ET DROIT COMPARÉ 237–40 (1963). (This work also reprints in French all the national laws and all but the Brussels Convention.)

[126] Law No. 147 of 1961 and Law No. 148 of 1961, translated in pamphlet, Atomic Energy Commission of Japan, Nuclear Liability Laws of Japan (1961).

[127] The Belgian law, which preserves the basis for liability in the Civil Code § 1384, has recently been sharply criticized by a Belgian author. PIÉRARD, *op. cit. supra* note 125, at 242–45, 248–49.

[128] Under the Paris Convention, Austria, Germany, and Greece were permitted to reserve the right to hold other persons liable while bringing them under their respective financial protection plans. Paris Convention, annex I. In Germany the operator alone is strictly liable; the other countries' laws are not yet passed.

[129] National legislation may eliminate these exceptions entirely under the Paris Convention, art. 9, and may eliminate the quoted clause under the IAEA Convention, art. IV(3).

(4) The nuclear facility from which fissionable material is shipped is liable for incidents occurring during its transportation, except for shipments from outside the contracting (or enacting) state or where an authorized arrangement with the carrier has been made. (5) Special periods of limitation are prescribed for radiation injuries, ranging from ten to thirty years from the exposure complained of, absent prior knowledge of the injury and its cause, and from two or three years after such knowledge has or should have been obtained.[130] (6) The conventions place exclusive jurisdiction in the courts of the state where the incident occurred, except the Brussels Convention, which offers a choice between the licensing state and (save for nuclear warships) the state in which the incident occurred.

The chief defect in these schemes is the low level of financial protection that most provide. A report of these levels must distinguish in some cases between the financial protection required of the operator and the total amount available for the public. Therefore the various plans must be reported separately.

The Paris Convention, article 7, sets the norm for both the limit of liability and the required protection at $15,000,000, but permits contracting states to increase this amount or reduce it to as low as $5,000,000. The Supplemental Convention, article 3, requires the states having reactors to provide total protection up to $70,000,000, and an additional $50,000,000 is made available, if needed, from a pool to which all signatory states must contribute pursuant to a formula based on each state's GNP and its reactor capacity.[131] The IAEA Convention, like the Paris Convention, sets a minimum of $5,000,000 in article V for both the limit of liability and the required protection. The Brussels Convention, article III, sets the limit of liability and state-guaranteed protection at 1,500,000,000 francs of a prescribed gold content (approximately $110,000,000) but leaves to the state licens-

[130] Unless national law provides otherwise, a complaint brought within the period of limitations (ten years) may be amended before final judgment to cover any subsequently appearing aggravations of damage. Paris Convention, art. 8(d); IAEA Convention, art. VI(4). Many non-common-law nations permit a person having a final judgment for an injury to sue for an injury arising later from the same cause.

[131] Half of what a nation must pay depends on that proportion of half the pool's total liability which the nation's GNP bears to the aggregate GNP of all subscribing nations for the previous year; the other half depends on that proportion of half the total liability which its installed reactor capacity in thermal megawatts bears to the pool's total capacity. Supplementary Convention, art. 12.

ing a nuclear ship the power to determine which proportion of this total its operator must provide.

The same practice is followed by Germany, which sets protection, and limits liability, at the high level of $125,000,000, the operator's share being determined administratively. For the three following countries, the amount specified is the financial protection provided by the operator, the provision of higher sums resting in parliamentary discretion: United Kingdom, $14,000,000; Sweden, $5,000,000; Switzerland, $8,000,000. In Belgium, insurance or guaranties are to be provided against injuries due to negligence or other fault up to $10,000,000, and the amount of the national government's obligation is unlimited. In Japan, the operator must provide up to $14,000,000 (determined administratively), and its liability is not limited, though the government promises its aid in meeting higher claims.

The discrepancies between the statutes and the conventions are almost certainly too wide to be bridged by acceptable reservations. The Supplementary Convention sets a much higher level of liability than do any of the national schemes save that of Germany. Revision of national laws will have to accompany ratifications, doubtless one reason for delay in the latter process. Moreover, studies under OECD auspices are examining the measures that may be necessary to permit the same nation to join both the Paris and the IAEA Conventions.

The IAEA and IANEC Conventions (if, as seems probable, the latter also sets financial protection as low as $5,000,000) should inspire pooling arrangements by groups of neighboring nations so as to spread the added burden of risk which adequate public protection would entail. Without adequate levels of financial protection, damage sustained across national lines is likely to result in the prosecution of international claims.[132]

The Paris and IAEA Conventions create the risk that the convention might be terminated, leaving operators and suppliers

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[132] Whether the conventions would preclude international claims is not clear. For the negative view of one active in their drafting, see Könz, *The 1962 Brussels Convention on the Liability of Operators of Nuclear Ships*, 57 Am. J. Int'l L. 100, 105–06 (1963). He terms "declaratory" annex II to the Paris Convention reserving "any recourse which might be available to" a contracting party "under international law." *Id.* at 106 n.28. See also Arangio-Ruiz, *Some Preliminary Reflections on the International Responsibility of States for Nuclear Damage*, in Progress in Nuclear Energy 228; Hardy, *International Protection Against Nuclear Risks*, 10 Int'l & Comp. L.Q. 739 (1961).

subject to continuing nuclear risks yet deprived of financial protection. Each runs for ten years. A state may then withdraw if it has given the requisite twelve-months notice. The next period runs for five years with a like notice provision.[133] Termination would not release obligations due to prior incidents,[134] but the conventions do provide a hazard as to subsequent incidents not existing under the Price-Anderson Act. The latter's protection lasts the life of the reactor license (ordinarily 40 years) [135] even though the act, if allowed to expire in 1967, would protect no subsequently licensed reactor. Article XIX of the Brussels Convention requires protection to run for 25 years from a ship's licensing, regardless of termination, a period presumably outlasting most nuclear vessels.

B. Should the United States Join the Conventions?

The conventions and our present "national law" — the Price-Anderson Act and all the state laws on which it relies — differ too widely to allow us to rely on the latter to carry out our treaty obligations, even with reservations to plaster over the more egregious incompatibilities. Without resort to one of the schemes discussed below, designed to permit the co-existence of the conventions and the Price-Anderson Act, we should have to bring the act into harmony with the basic pattern of the conventions and then, for such minor discrepancies as remain, tender reservations.[136] For such harmonization, either of the approaches to improving our domestic scheme of financial protection advanced above would, I believe, suffice. But one may still ask: assuming that we had thus improved our law, what added benefits would we gain from joining in the Paris, the IAEA, or, if it follows their pattern, the IANEC Convention?

[133] Paris Convention, art. 22; IAEA Convention, art. XXV. The Supplementary Convention, art. 23, essentially follows the former. The IAEA Convention, art. XXVI, permits one-third of the parties to call a revision conference at the end of five years. Within a year after the first revision conference, any state may denounce the convention, effective one year later.

[134] The IAEA Convention, art. XX, and the Supplementary Convention, art. 23, so provide. The same rule ought to be derived by implication from the Paris Convention.

[135] See AEA § 170.a., 42 U.S.C. § 2210(a) (1958). As to the term of reactor licenses, see 10 C.F.R. §§ 50.51, 140.77 art. VII (1963).

[136] Changes needed to bring the Price-Anderson Act into conformity with one convention are canvassed in Feinberg & Munro, The International Atomic Energy Agency's Draft International Convention, March 1963 (unpublished thesis in Harvard Law School Library) (based on 1961 draft of IAEA Convention).

Perhaps the main benefit would lie in the probability that our becoming a party would accelerate the rate at which other nations would do so — and the failure as yet to ratify the conventions already signed shows that some acceleration is in order. As this occurred, not only would exposed publics gain protection, but the signatory states would represent more secure markets for our nuclear exporters — a trade that in twenty years might be measured in billions of dollars.[137] Our nuclear exporters might well decline to provide reactors and reactor fuel and equipment to nations that have not provided financial protection.[138] Indeed, concern for such protection has led to the rather extraordinary provision appearing in the basic agreement for cooperation between the United States and Euratom; there Euratom undertook to "seek to develop and to secure the adoption, by the earliest practicable date, of suitable measures which will provide adequate financial protection against third party liability."[139] Furthermore, widespread membership in financial protection conventions would reduce the number of forums in which, after a nuclear incident, an American exporter to a contracting state would be exposed to claims above the incident state's ceiling on liability.[140] A limitation set at $5,000,000 might leave many disappointed claimants. Rather than wait for relief funds, many of these might look for suppliers subject to suit in countries where no convention had closed the door to such actions (the United States included), and there attack the ceiling on liability as contrary to the forum's public policy.[141] Moreover, as a party to a convention, we could exert a constructive influence for the formation of groups to pool resources to supplement those of the individual states and

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[137] See AEC, CIVILIAN NUCLEAR POWER — A REPORT TO THE PRESIDENT 24 (1962).

[138] The reactor at Mol, Belgium, was completed by Westinghouse in March, 1961, but fuel loading was withheld until the indemnification law was enacted. See Forum Memo, Oct. 1962, p. 25.

[139] Agreement for Cooperation with the European Atomic Energy Community (Euratom) Concerning Peaceful Uses of Atomic Energy, Nov. 8, 1958, [1959] 1 U.S.T. & O.I.A. 75, 81, T.I.A.S. No. 4173.

[140] For risks of legal liability confronting American nuclear exporters, see HARVARD LAW SCHOOL, INTERNATIONAL PROBLEMS OF FINANCIAL PROTECTION AGAINST NUCLEAR RISK (Eichholz, director; Atomic Industrial Forum, Inc. 1959); Murphy, *Third Party Liability of Suppliers in International Nuclear Transactions*, in PROGRESS IN NUCLEAR ENERGY 166.

[141] *Cf.* Kilberg v. Northeast Airlines, Inc., 9 N.Y.2d 34, 172 N.E.2d 526, 211 N.Y.S.2d 133 (1961), held constitutional in Pearson v. Northeast Airlines, Inc., 309 F.2d 553 (2d Cir. 1962), *cert. denied*, 372 U.S. 912 (1963).

so raise the level of protection beyond the point of vulnerability to attack.

At the very least, the case for becoming a party to the Brussels Convention is plain. Not only is it free from some defects of the other conventions, but also it covers activities in which American nationals and corporations will be engaged that now enjoy only limited Price-Anderson protection (nuclear incidents in our territorial waters, contractors supplying reactors for government-owned nuclear ships, and the special case of the *N.S. Savannah*).[142] If nuclear propulsion realizes its promise, an international convention governing liability will be essential. However, instead of exerting leadership toward this goal, we have become bed-fellows of the communist bloc, joining it in a refusal to sign because the convention covers warships.[143] Article XXIV of the convention requires at least one nation licensing nuclear ships to ratify before the convention can come into force, and today only the United States and the USSR have such ships.

Our obduracy is not due to lack of safeguards in the convention; rather we suffer from a not uncommon form of legal hypochondria: a fear emanating from the Department of the Navy that, by becoming a party to the convention, "we will have a wedge which will permit the argument that warships and merchant ships should be considered together in the future for other regulations and for safety features and for inspection."[144] The convention's terms do not require this result either directly or by implication.[145] In the spirit of inconsistent pleading, the Navy

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[142] Nuclear incidents in our territorial waters would seem "in the United States" and so under Price-Anderson. See AEA § 11.*o*., 42 U.S.C. § 2014(*o*) (Supp. IV, 1963). Suppliers of reactors for, say, nuclear submarines would be covered by the 1962 amendment to AEA § 170.d., 76 Stat. 410 (1962), 42 U.S.C. § 2210(d) (Supp. IV, 1963). The *N.S. Savannah* was brought under Price-Anderson by § 170.*l*., 72 Stat. 525, 42 U.S.C. § 2210(*l*) (1958). We have negotiated several bilateral agreements permitting the *N.S. Savannah* to visit the other party's ports. The $500,000,000 indemnity they provide is nearly five times that which the Brussels Convention would impose. See, *e.g.*, Agreement With the Federal Republic of Germany, Nov. 29, 1962, T.I.A.S. No. 5223; Agreement With the Royal Hellenic Government, April 23 & 24, 1962, [1962] 2 U.S.T. & O.I.A. 1379, T.I.A.S. No. 5099.

[143] See Könz, *supra* note 132, at 108–09.

[144] Remarks of Capt. H. Ost, Maritime Law Ass'n of the U.S., Doc. No. 461, at 4933 (Feb. 1963).

[145] The convention, art. X(1), allows the claimant to sue in either the licensing state or the state of nuclear damage but in art. X(3) forbids the arrest, attach-

spokesman also notes that the Government may now be sued for injuries done by warships under the Public Vessels Act.[146] The result of our position is a stalemate: the nonnuclear maritime states refuse to accept the convention as long as the nuclear states refuse to permit most of their nuclear-propelled vessels to come under it.[147]

The termination problem under the Paris and IAEA Conventions creates a business risk for an American exporter to a contracting state. Our becoming a party to either convention would not, of course, increase this risk. Indeed, that action would increase the influence we could exert to induce the continuance of a convention we had signed or at least to assure adequate continuing protection for suppliers already exposed. Though real, the termination problem is therefore not a good reason for refusing to sign either convention.

C. Schemes To Allow Price-Anderson To Coexist With the Conventions

Persons who view pessimistically the prospect that Congress will improve Price-Anderson protection sufficiently to bring it into harmony with the conventions have suggested two schemes whereby the United States could sign one or more of the conventions while preserving the Price-Anderson Act in its present form,

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ment, or seizure of warships and denies jurisdiction "in respect of warships" to "the courts of any foreign State." A draftsman's note to the Rijeka draft negatived any intention "to authorise or require the inspection of military vessels or auxiliaries." See Maritime Law Ass'n of the U.S., Doc. No. 434, at 4479 (Oct. 1959). Prying into military secrets might well accompany negligence suits against suppliers of naval reactors or components. These the convention would preclude.

[146] 43 Stat. 1112 (1925), 46 U.S.C. § 781–89 (1958). See Remarks of Capt. H. Ost, *supra* note 144, at 4934. However, the act's waiver of immunity is subject to "all exemptions and all limitations to liability accorded by law to the owners . . . of vessels." This would seem to include the Limitation of Liability Act, 9 Stat. 635 (1851), as amended, 46 U.S.C. § 183 (1958), which limits liability to the value of the vessel involved and her freight then pending. See Dankmeyer, Nuclear Warships and the Brussels Convention, May 1963, at 5–13 (unpublished thesis in Harvard Law School Library).

For a more revealing clue to the Navy's position, see testimony by Neil Naiden, AEC General Counsel, who, after noting opposition by the State and Defense Departments, added, "There is a certain admiral who has points of view on this question." *1962 Hearings* 46.

[147] They argue that nuclear vessels create a risk for nonnuclear vessels since, in a collision, the latter might have to share liability for nuclear damage. See Maritime Law Ass'n of the U.S., Doc. No. 461, at 4929–32 (Feb. 1963), Doc. No. 459, at 4889–90, 4896 (Oct. 1962).

using an apt reservation to embody whichever scheme was adopted.

The first scheme would make application of the Price-Anderson Act mandatory for claims for nuclear injury to American citizens and their property. However, an alien would have an option to claim either under the convention or under Price-Anderson. A reservation of the right thus to discriminate against our own citizens is thought likely to be accepted by the other signatories.[148] But, in case of an incident in which alien nationals and corporations could collect in full without prolonged litigation while recovery for Americans was delayed or even denied in whole or in part, the reaction of the American citizenry to the discrimination would be conspicuously less favorable. Furthermore the two bases for claims would complicate the task of providing insurance to cover both.

A second scheme combines the defects which have been asserted by the critics of each basis of financial protection: it would require all claimants to proceed under the convention until its protection was exhausted and then shift to Price-Anderson. The opponents of strict liability, who fear fabricated personal injury suits, would see the doctrine applied to every incident, however small. Yet the low level of financial protection under the convention would prevent its strict liability rule from doing away with the uncertainties of public protection under Price-Anderson whenever a really big incident made them especially serious. Should claims exceed the convention's ceiling when the availability of Price-Anderson protection was open to doubt, intolerable procedural tangles would arise. Who would be entitled to enjoy the solid but limited protection of the convention: the first to bring actions under it or all claimants, *pro tanto*, if Price-Anderson protection were denied? On what basis could insurers settle? Of course, their policies would have to embrace both schemes.

Abstention from both the Paris and the IAEA conventions

[148] The Paris Convention, art. 14, the IAEA Convention, art. XIII, and the Brussels Convention, art. XII(3), all require that the respective conventions (and, under the first two, the national laws) be applied without discrimination "based upon nationality, domicile, or residence." However, the Paris Convention in art. 15(b) permits departure from this and other provisions of the convention in the application of public funds to compensate damage in excess of its $5,000,000 minimum. Except for a minor contingency, *id.* art. 2(a), the Supplementary Convention, art. 3(e), withdraws this permission as to the funds covered by it, though apparently this is not understood to preclude discriminatory aid to nationals outside the conventions' coverage.

would seem preferable to subjecting industry and Government to such a hybrid. Moreover, both schemes are advanced, not on the ground that they are meritorious, but on the supposition that the Price-Anderson Act, adopted a little over five years ago for an avowedly experimental ten-year period, has already become politically untouchable. Surely our institutional arteries do not harden that quickly!

V. Conclusion

To provide for the distribution of the risk of loss which the remote chance of a nuclear catastrophe creates, Congress and the AEC have pioneered the unprecedented arrangements for financial protection with which this article has been concerned. Now that the renewal of the law basic to those arrangements, the Price-Anderson Act, is under consideration, an opportunity is provided for a revision of its terms.[149]

The principal aim of the revision should be the removal of the legal uncertainties that, under the laws of many states, now becloud the availability of the half-billion-dollar federal indemnity that the act provides. The protection which that indemnity is designed to afford may depend on the questionable ability of the persons sustaining bodily injury or property damage in a nuclear incident not only to prove that it was due to someone's negligence but also to avoid the various defenses that state law and the Federal Tort Claims Act would sometimes create.

The improvement of the Price-Anderson Act through the adoption of a federal standard of strict liability, preferably channeled to the operator, and by the elimination of certain inappropriate defenses would at once increase public protection and remove from nuclear industries the menace of large-scale, harassing, and protracted litigation. At the same time, it would facilitate the joinder of the United States in one or more of the new international conventions governing nuclear liability and so give impe-

[149] Some political tacticians of the atomic industries are reported to think this an inopportune time for revision. They warn that opponents of atomic power, especially in the politically potent coal industry, might use efforts to strengthen Price-Anderson as an occasion for an attack designed to destroy or impair it. They prefer simply an extension on an "as is" basis for another decade. This pessimism would be more convincing if it radiated from sources more clearly in favor of improving the act.

tus to the world-wide development of plans for financial protection against nuclear hazards.

In the development of these plans for financial protection, both here and abroad, the protected industries, through their counsel, have been astute to minimize the legal uncertainties incident to novel legal devices, and properly so. But a similar vigilance is owing to that other beneficiary of the Government's protection: the exposed public. As Representative Cole asked in the Price-Anderson Bill hearings: "Can we in good conscience allow a situation to exist where the public can be damaged and yet the public cannot recover damages?" [150]

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[150] *1957 Hearings* 34.

APPENDIX 40

OPINION OF AEC GENERAL COUNSEL ON CONSTITUTIONALITY OF "NO RECOURSE" PROVISIONS OF PRICE-ANDERSON ACT; RELATED CORRESPONDENCE

JULY 2, 1965.

JOSEPH F. HENNESSEY, Esq.,
General Counsel, Atomic Energy Commission,
Washington, D.C.

DEAR MR. HENNESSEY: During the hearing on June 22, 1965, concerning the bills (H.R. 8496 and S. 2042) to amend and extend the Price-Anderson Act, Chairman Holifield asked for your comment on a question raised by the National Coal Association concerning the constitutionality of the limitation of liability provisions of that act. These provisions are contained in section 170 e. of the Atomc Energy Act of 1954, as amended. In response to the chairman, you answered to the effect that in your opinion this section of the Atomic Energy Act of 1954, as amended, is constitutional.

In accordance with Chairman Holifield's request, we would appreciate your furnishing to the committee your formal opinion on the constitutionality of section 170 e. of the Atomic Energy Act of 1954, as amended, together with a memorandum setting forth the reasons for your opinion. Please address your opinion not only to the existing language of section 170 e. of the Atomic Energy Act of 1954, as amended, but also to the language of this section as it would be amended by H.R. 8496 and S. 2042. In addition, as requested by Mr. Hosmer, please include in your memorandum a statement of any authorities or arguments which could be cited in support of the contention that this section of the act is not constitutional.

A similar letter is being sent to the Attorney General. We would appreciate as early a response as possible to this letter in order that the committee's hearing record may be completed.

Sincerely yours,

JOHN T. CONWAY, *Executive Director.*

ATOMIC ENERGY COMMISSION,
Washington, D.C., August 20, 1965.

Mr. JOHN T. CONWAY,
Executive Director, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. CONWAY: In accordance with Chairman Holifield's request of June 22, during the hearings on H.R. 8496 and S. 2042, and in response to your letter of July 2, 1965, I am pleased to furnish the Joint Committee with my opinion as to the constitutionality of section 170 e. of the Atomic Energy Act of 1954, as amended.

On the basis of the precedents cited in, and the rationale of, the attached legal memorandum, I am of the opinion that the provisions of section 170 e. of the Atomic Energy Act of 1954, as amended, including the limitation of liability established thereby, are constitutional. On the same basis, it is likewise my opinion that the provisions of section 170 e., as it would be amended by H.R. 8496 and S. 2042, would be constitutional.

Sincerely yours,

JOSEPH F. HENNESSEY, *General Counsel.*

CONSTITUTIONALITY OF SECTION 170 e. OF THE ATOMIC ENERGY ACT OF 1954: LIMITATION OF LIABILITY

INTRODUCTION

Public Law 85–256, known as the Price-Anderson Act, amended the Atomic Energy Act of 1954 (Public Law 83–703), as amended, by providing for a system of private insurance and Government indemnification to cover public liability claims in the event of a nuclear incident involving certain materials and facilities.

In general, the Commission is authorized (in some circumstances, required) by Price-Anderson to execute agreements of indemnification with certain licensees

and contractors for public liability for a nuclear incident in the amount of $500 million in excess of the insurance (or other financial protection), if any, required to be maintained; indemnification extends to the person with whom the agreement is executed, and to any other person legally liable. Corresponding to this limitation on the Government's indemnity undertaking is a limitation on the aggregate liability of the person or persons liable; the limitation appears in section 170 e. of the act, as follows:

"e. The aggregate liability for a single nuclear incident of persons indemnified, including the reasonable costs of investigating and settling claims and defending suits for damage, shall not exceed the sum of $500,000,000 together with the amount of financial protection required of the licensee or contractor."

The remainder of section 170 e. contains provisions for implementing the limitation of liability, as follows:

"e. *Provided, however,* That with respect to any nuclear incident occurring outside of the United States to which an agreement of indemnification entered into under the provisions of subsection 170 d. is applicable, such aggregate liability shall not exceed the amoutn of $100,000,000 together with the amount of financial protection required of the contractor.

"The Commission or any person indemnified may apply to the appropriate district court of the United States having venue in bankruptcy matters over the location of the nuclear incident, except that in the case of nuclear incidents occurring outside the United States, the Commission or any person indemnified may apply to the United States District Court for the District of Columbia, and upon a showing that the public liability from a single nuclear incident will probably exceed the limit of liability imposed by this section, shall be entitled to such orders as may be appropriate for enforcement of the provisions of this section, including an order limiting the liability of the persons indemnified, orders staying the payment of claims and the execution of court judgments, orders apportioning the payments to be made to claimants, orders permitting partial payments to be made before final determination of the total claims, and an order setting aside a part of the funds available for possible latent injuries not discovered until a later time."

Assuming for the moment that the limitation itself is within the province of Congress to legislate, then so also are these related provisions; they are "necessary and proper"[1] to the achievement of a permitted object: limitation of liability.

Accordingly, the remainder of this memorandum is confined to consideration of the constitutionality of the limitation of liability per se under section 170e of the act.

Questions considered

Two questions must be considered in assessing the constitutionality of limitation of liability. First, has the Congress power, under the Constitution, to legislate with respect to the object sought to be achieved? Second, may the Congress exercise that power in the manner proposed, in the light of constitutional limitations?[2]

Attention will be given to these questions in turn, but first, a collateral question may be considered.

Tenth amendment

That Price-Anderson may limit liability founded in State law, and thus may operate in a field where the States have traditionally acted is acknowledged. To state this fact is not, however, to admit a valid constitutional objection on the ground that Price-Anderson thus infringes the powers reserved to the States by the 10th amendment.[3] A conclusion that the 10th amendment has been infringed must be premised on a conclusion that the Congress is devoid of power to achieve the legislative object sought.[4] A

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[1] Constitution, art. I, sec. 8, cl. 18:
"Let the end be legitimate, let it be within the scope of the Constitution, and all means which are appropriate, which are plainly adapted to that end, which are not prohibited, but consist with the letter and spirit of the Constitution, are constitutional." (*McCulloch* v. *Maryland*, 4 Wheat. 316, 420).

[2] *McCulloch* v. *Maryland*, 4 Wheat. 316.

[3] "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people."

[4] *U.S.* v. *Darby*, 312 U.S. 100.

10th amendment objection is automatically rejected when the relevant congressional power has been upheld.[5]

POWERS OF CONGRESS

Hence, we now turn to an examination of the power of the Congress to provide for limitation of the liability of persons indemnified[6] under the Price-Anderson Act.

The commerce clause

The power of Congress "* * * To regulate Commerce with foreign Nations, and among the several States * * *"[7] is the paramount authority for Price-Anderson limitation of liability. The relevance of the commerce power to atomic energy facilities is recognized in section 2 f. of the act:

"f. The necessity for protection against possible interstate damage occurring from the operation of facilities for the production or utilization of source or special nuclear material places the operation of those facilities in interstate commerce for the purposes of this Act."

The scope and nature of the commerce power were delineated by Chief Justice Marshall in *Gibbons* v. *Ogden*:[8]

"We are now arrived at the inquiry—What is this power? It is the power to regulate; that is, to prescribe the rule by which commerce is to be governed. This power, like all others vested in Congress, is complete in itself, may be exercised to its utmost extent, and acknowledges no limitations, other than are prescribed in the Constitution. * * * If, as has always been understood, the sovereignty of Congress, though limited to specified objects, is plenary as to those objects, the power over commerce with foreign nations, and among the several States, is vested in Congress as absolutely as it would be in a single government, having in its constitution the same restrictions on the exercise of the power as are found in the Constitution of the United States. * * *"[9]

The power to "regulate" interstate commerce is the power not only to restrain or prohibit, but to promote, foster, and protect that commerce.[10]

The relation to interstate commerce of a nuclear incident of such magnitude that limitation of liability would apply may be viewed in terms of (*a*) the disruption of interstate commerce, (*b*) the physical movement across State boundaries of radiation and radioactive particles released by the incident, and (*c*) the interstate movement of materials to and products from the facility in which the incident arose.

(*a*) *Disruption.*—The disruptive impact on interstate commerce of a nuclear incident causing damages in excess of $500 million may be postulated.[11] Action by the Congress to ameliorate economic disruption of interstate commerce has frequently been upheld. For example, it was on the ground that strife between employers and employees had a disruptive effect on interstate commerce that the National Labor Relations Act of 1935 was upheld in *Labor Board* v. *Jones and Laughlin*.[12]

(*b*) *Physical effects.*—Particles and radiation released by a nuclear incident may be expected to cross State boundaries. This interstate movement brings the instrumentality causing the release within the power of Congress to regulate interstate commerce.[13] Speaking of the Radio Act of 1927, the Court, in *Fisher's Blend Station* v. *Tax Commission*,[14] said:

"Appellant is thus engaged in the business of transmitting advertising programs from its stations in Washington to those persons in other States who 'listen in' through the use of receiving sets. In all essentials its procedure does not differ from that employed in sending telegraph or telephone messages across

[5] "Our conclusion is unaffected by the 10th amendment. * * * The amendment states but a truism that all is retained which has not been surrendered" (312 U.S. 100, 123).

[6] Generally, a person indemnified is the person with whom an indemnity agreement is executed and any other person who may be legally liable for a nuclear incident in connection with the indemnified activity. See Atomic Energy Act of 1954, sec. 11 r.

[7] Art. I, sec. 8, clause 3.

[8] 9 Wheat. 1.

[9] 9 Wheat. 1, 196–197.

[10] *The Daniel Ball*, 10 Wall 557; *Second Employers' Liability Cases*, 223 U.S. 1.

[11] Limitation of liability, of course, would not, and could not, be a judicable issue until invoked on a showing that damages will probably exceed the limit of liability.

[12] 301 U.S. 1. See also *Labor Board* v. *Fainblatt*, 306 U.S. 501.

[13] *Gibbons* v. *Ogden*, 9 Wheat. 1, 217.

[14] 297 U.S. 650.

State lines, which is interstate commerce (*Western Union Tel. Co.* v. *Speight*, 254 U.S. 17 (1920); *New Jersey Tel. Co.* v. *Tax Board*, 280 U.S. 338 (1930); *Cooney* v. *Mountain States Tel. Co*, 294 U.S. 384 (1935), *Pacific Tel. Co.* v. *Tax Comm'n.*, 297 U.S. 403 (1936)). In each, transmission is effected by means of energy manifestations produced at the point of reception in one State which are generated and controlled at the sending point in another. Whether the transmission is effected by the aid of wires, or through a perhaps less well understood medium, 'the ether,' is immaterial, in the light of those practical considerations which have dictated the conclusion that the transmission of information interstate is a form of 'intercourse,' which is commerce." [15]

(c) *Movement of materials to and products from.*—The lawmaking power of Congress over interstate commerce may be invoked with respect to activities whose relation to interstate commerce is primarily the flow of materials to and/or products from the situs of the activity. Thus the application of the Sherman Antitrust Act of 1890 to certain "local" activities in restraint of competition was upheld in *Swift and Co.* v. *United States* [16] on this "current of commerce" rationale.

In a recent case dealing with the constitutionality of the public accommodations provisions of the Civil Rights Act of 1964,[17] as applied to a restaurant, the interstate movement of food to be served was held sufficient to bring the proscribed activities within the scope of the commerce power.[18]

The movement of fuel material for reactors in interstate commerce is analogous; material is transported from mine to refinery to processing plant to gaseous diffusion plant to fabrication plant to the reactor. Moreover, power reactors produce electrical energy which moves in interstate commerce.

All these factors establish a nexus to interstate commerce sufficient to justify promotion and protection of that commerce through limitation of liability.

Limitation of liability under the commerce power

The statute [19] providing for the limitation of shipowner's liability was upheld [20] as an appropriate exercise of the commerce power in the case of *Providence and NY. SS. Co.* v. *Hill Mfg. Co.*[21] Mr. Justice Bradley, speaking for the Court, said:

"We have no doubt that Congress had power to pass the law. It is not only a maritime regulation in its character, but it is clearly within the scope of the power given to Congress 'to regulate commerce.'" [22]

With reference to the power of Congress to alter the maritime law as it existed when the Constitution was adopted, the Court went on to quote from an earlier decision, in *The Lottawana*,[23] as follows:

"Congress undoubtedly has authority under the commercial power, if no other, to introduce such changes as are likely to be needed."

Thus, in *The Lottawana*, the Court based the alteration in U.S. maritime law effected by the Limitation of Liability Act on the power of the Congress to regulate commerce. In subsequent cases (*Bulter* v. *Boston and Savannah SS Co.*[24]; *Ex Parte Garnett* [25]) the Court rules that the power of Congress to enact limitation of liability in the maritime field went beyond the scope of the commerce power as it was then viewed—in effect, that the power of Congress to legislate under article I of the Constitution was as broad as the maritime jurisdiction of the judiciary under article III. In the case of *Southern Pacific co.* v. *Jensen* [26] the Court explained how the earlier decisions were to be rationalized in terms of specific provisions of the Constitution: Since the judicial power extends to all cases of maritime and admiralty jurisdiction, and since the Congress has the power under article I, section 8, to make all laws necessary and proper to carry out both its own powers and those of the other departments,

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[15] 297 U.S. 650, 654–655.
[16] 196 U.S. 375. See also *Labor Board* v. *Fainblatt*, 306 U.S. 601.
[17] 78 Stat. 241.
[18] *Katzenbach* v. *McClung*, — U.S. —, 13 L. ed., 2d 290.
[19] Act of Mar. 3, 1851, 9 Stat. 635, "An act to limit the liability of shipowners, and for other purposes."
[20] As a step in the "ratio decisis."
[21] 109 U.S. 578.
[22] 109 U.S. 578, 589.
[23] 21 Wall 558.
[24] 130 U.S. 527.
[25] 141 U.S. 12.
[26] 244 U.S. 205, a decision frequently criticized for other reasons. See, e.g., *Helvering* v. *Griffiths*, 318 U.S. 371 at 399–400.

not only the commerce power, but also the implied "maritime" powers support legislation of this sort. In *Crowell* v. *Benson*[27] the Court upheld the Longshoremen's and Harbor Workers' Compensation Act[28] (which limits liability in accordance with a schedule of benefits) on the power of Congress to modify the maritime law, which power is based, in part, as we have seen, on the commerce power.

Cases in which various antidepression measures were struck down as beyond the reach of the commerce power and/or within the scope of powers reserved to the states by the 10th amendment[29] seem inapposite here. In *U.S.* v. *Butler*,[30] the Agricultural Adjustment Act of 1933 was held unconstitutional as an attempt to regulate production—a measure prohibited to the United States by the 10th amendment. Similarly, in *Carter* v. *Carter Coal Co.*,[31] the Bituminous Coal Conservation Act of 1935 was held unconstitutional as invading the reserved powers of the States over conditions of employment in productive industry. Earlier, in *Schechter Corp.* v. *U.S.*,[32] the National Industrial Recovery Act of 1933 (as applied in the "Live Poultry Code") had been struck down as an attempt to regulate *intra*state commerce and on the ground of improper delegation of legislative functions. All of these cases reflect the judicial thinking with regard to Federal power under the commerce clause epitomized by *Hammer* v. *Dagenhart*.[33] The *Hammer* case was overruled in *U.S.* v. *Darby*[34] which adopted Chief Justice Marshall's broad reading of interstate commerce in *Gibbons* v. *Ogden*[35] and of the "necessary and proper" clause in *McCulloch* v. *Maryland*.[36] Suffice it to say that the *Darby* case has been followed in this regard, while *Butler*, *Carter*, and *Schechter* have not.

Conclusion.—Limitation of liability for a nuclear incident is within the scope of the power of the Congress to regulate interstate commerce as defined by the Supreme Court.[37]

Other powers

Although the commerce clause provides ample authority for the section 170 e. limitation of liability, brief mention ought to be made of the war powers and the bankruptcy clause.

The war power(s).[38]—A number of powers relating to the national defense are vested in Congress by the Constitution;[39] the complex of these powers, perhaps with the inherent powers which are the necessary incidents of sovereignty[40] make up the war powers. As is the case with the commerce power, the necessary and proper clause gives broad scope to the war power.[41]

The Court has upheld the exercise of these powers in time of peace as necessary to preparation and readiness for war. In *Ashwander* v. *Tennessee Valley Authority*,[42] the construction and operation of the Wilson Dam and the associated hydroelectric plants, pursuant to the National Defense Act of June 3, 1916,[43] was sustained, the Court stating:

"While the district court found that there is no intention to use the nitrate plants or the hydroelectric units installed at the Wilson Dam for the production of war materials in time of peace, 'the maintenance of said properties in operating condition and the assurance of an abundant supply of electric energy in the event of war, constitute national defense assets.' This finding has ample support." [44]

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[27] 285 U.S. 22.
[28] 44 Stat. 1424.
[29] See text at note 3 supra.
[30] 297 U.S. 1.
[31] 298 U.S. 238.
[32] 295 U.S. 495.
[33] 247 U.S. 251.
[34] 312 U.S. 100.
[35] 9 Wheat. 1.
[36] 4 Wheat. 316.
[37] The exercise of this or any other power must, of course, be "reasonable." See text following note 72.
[38] As to the singular or plural, compare *Home Building and Loan Ass'n* v. *Blaisdell*, 290 U.S. 398, with *Lichter* v. *United States*, 334 U.S. 742.
[39] E.g., Constitution, art. I, sec. 8, "To lay and collect Taxes * * * to * * * provide for the common Defense * * * To declare war * * * To raise and support Armies * * * To provide and maintain a Navy."
[40] *United States* v. *Curtiss-Wright Export Corp.*, 299 U.S. 304.
[41] *Lichter* v. *United States*, 334 U.S. 742.
[42] 297 U.S. 288.
[43] 39 Stat. 166, 215.
[44] 297 U.S. 288, 327–328. The reliance of the Court on the commerce power as well as the war powers is to be noted.

It has been pointed out, contra, that civilian reactor-produced plutonium will probably never be needed for use in our Government's nuclear weapons.[45] Still, the potential wartime use of various materials and of electric energy produced by reactors, and the potential need for even the smallest research reactor in military research and development during a war effort, recognized in the Atomic Energy Act of 1954, as amended, continue.[46] These needs justify the protection, through limitation of liability, of defense capability from potential economic ruin.

Bankruptcy.—Historically, the bankruptcy law was concerned with the protection of creditors by providing for a pro rata distribution of a debtor's assets, insufficient to meet all claims, among his creditors. As developed in the United States by the Congress under the bankruptcy clause[47] an increasing solicitude for the debtor became apparent[48] and measures primarily for the protection of debtors have been upheld.[49] The power of Congress to forestall insolvency, for example, through reorganization, has likewise been upheld.[50] The limitation of liability in section 170 e. properly calls for application of the expertise of courts having competence in bankruptcy.[51] Moreover, some reliance may be placed on this power to sustain the limitation of liability inasmuch as two accepted objectives of the bankruptcy power are present: (*a*) the prevention of insolvency; and (*b*) the protection of "creditors" through the assurance that at least a pro rata share of claims will be paid.

Federal property

One of the powers specifically relied on to support the act as a whole, and the subsequently enacted Price-Anderson provisions, was the power of Congress to impose conditions on the use of the property of the United States.[52] Since, however, mandatory Government ownership of special nuclear material was abolished in 1964,[53] and ample constitutional authority for the limitation of liability is found in the provisions already discussed, it is unnecessary to consider that power here.

"Other" persons indemnified

Since the limitation of liability applies not only to the organization operating a nuclear facility with whom the agreement is executed, but also to anyone else legally liable, a question might be raised as to the relevance of the commerce and war powers to the latter class of persons. It should be noted that in most cases, persons in this class would be organizations in the nuclear industry who supply components, design or fabrication services, etc., and hence frequently within the purview of the commerce and war powers. As to others (such as the mythical aviator who crashes into a reactor),[54] the teaching of *Wickard* v. *Filburn*[55] is pertinent. The lesson of that case is that hardship or absence of direct applicability of a power in a particular instance does not vitiate the constitutionality of a statute in that application as long as the statute is not "arbitrary" and operates equally on the members of the affected class. In the act challenged in *Wickard* v. *Filburn*, Congress had decided to regulate agricultural production, not only

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[45] See, e.g., statement of Representative Secrest, 111 Congressional Record 142 (daily edition, Aug. 4, 1965).

[46] E.g.:

"SEC. 108. WAR OF NATIONAL EMERGENCY.—Whenever the Congress declares that a state of war or national emergency exists, the Commission is authorized to suspend any licenses granted under this Act if in its judgment such action is necessary to the common defense and security. The Commission is authorized during such period, if the Commission finds it necessary to the common defense and security, to order the recapture of any special nuclear material or to order the operation of any facility licensed under section 103 or 104, and is authorized to order the entry into any plant or facility in order to recapture such material, or to operate such facility. Just compensation shall be paid for any damages caused by the recapture of any special nuclear material or by the operation of any such facility.

[47] Constitution, art. I, sec. 8, cl. 4.

[48] Compare the Bankruptcy Act of 1800 with those of 1841 and 1867.

[49] See the discussion in *Continental Illinois Bank and Trust Co.* v. *Chicago, R.I.P.R. Co.*, 294 U.S. 648, 671.

[50] Ibid.

[51] Speaking of the power to tax, the Court pointed out in *U.S.* v. *Butler* (297 U.S. 1) that a constitutional power may be used to carry out the purpose for which it was intended, or to carry into operation another power granted by the Constitution (but not to carry out a purpose not within the scope of the Constitution).

[52] See e.g., *Ashwander* v. *TVA*, 297 U.S. 288; *Ivanhoe Irrigation District* v. *McCracken*, 357 U.S. 275. Constitution, art. IV, sec. 3, cl. 2.

[53] 78 Stat. 602.

[54] Referred to, e.g., in the Joint Committee Report on Price-Anderson, S. Rept. 296, 85th Cong., 1st sess. (1957).

[55] 317 U.S. 111.

that which is intended for commerce, but also that wholly for consumption on the producer's farm.[56] Here, Congress has decided to protect the public and promote the nuclear industry through indemnification and limitation of liability. The decision that indemnification should be extended to anyone liable in order to assure compensation to the injured required the sacrifice of the relatively small contribution that a private person could make to compensation in favor of the increased certainty that more claims would be paid more fully and more promptly. The same decision was made with reference to the upper limit which the Congress was willing to commit in advance—once the ceiling on indemnity and the corresponding limit of liability are reached, the relatively small contribution which private persons could make is not thought worth the chaotic situation which would result from leaving claimants to attempt to collect from the resources of such persons. The Congress expected rather to take such additional measures as might be appropriate in light of the situation at the time. Thus the report of the Joint Committee on Atomic Energy (JCAE report)[57] to accompany the bills which became the Price-Anderson Act, stated, with reference to the limit on indemnity:

"[the] limit would be subject to upward revision by the Congress in the event of any one particular incident in which, after further congressional study, the Congress felt more appropriations would be in order." [58]

Further, with reference to the corresponding limit of liability, the JCAE report noted:

"Subsection e. limits the liability of the persons indemnified for each nuclear incident to $500 million, together with the amount of financial protection required. Of course, Congress can change this act at any time after any particular incident. The Joint Committee wanted to be sure that any changes in the act would be considered by it in the light of the particular incident." [59]

Restrictions on the Exercise of the Powers of Congress

The limitation of liability does not fall within the "powers" denied to Congress by article I, section 9, of the Constitution. Moreover, as has been shown,[60] the 10th amendment is not a restriction on the exercise of a power once such exercise has been shown to be within a power granted by the Constitution. Thus the question of limitations on the exercise of power by Congress is here confined to the "due process" clause of amendment V.[61]

A number of cases have considered the question of limitation of liability under amendment V and under the generally equivalent[62] "due process" and "equal protection" provisions of amendment XIV.[63] Such limitations have been universally upheld.[64]

Due process challenges.—Limitation of employer's liability to a prescribed schedule of benefits is a basic feature of workmen's compensation laws. The history of litigation challenging the New York law on 14th amendment grounds will illuminate the evolution of judicial thinking regarding limitation of liability. In *Ives* v. *South Buffalo Ry. Co.*,[65] the highest court of New York held that the 1910 workmen's compensation law[66] was invalid as in conflict with the State constitution and with the 14th amendment. The court focused primarily on absolute liability, but noted with approval a statement from the legislative history questioning the constitutionality of limiting the employee's right to recovery. Subsequently, the State constitution was amended to explicitly sanction a work-

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[56] Agricultural Adjustment Act of 1938, as amended (1941), 52 Stat. 31.

[57] Reprinted in "Selected Materials on Atomic Energy Indemnity Legislation," Subcommittee on Legislation of the Joint Committee on Atomic Energy, 89th Cong., 1st sess., June 1965, p. 96 et seq. (reprint).

[58] Reprint, p. 116.

[59] Reprint, p. 117.

[60] See text at notes 4 and 5, supra.

[61] "No person shall * * * be deprived of life, liberty, or property, without due process of law * * *."

[62] It is sometimes said that "equal protection" goes further than "due process" (*Truax* v. *Corrigan*, 257 U.S. 312; *Detroit Bank* v. *U.S.*, 317 U.S. 329). However, the Court has also said, with reference to racial segregation in District of Columbia schools, "it would be unthinkable that the same Constitution would impose a lesser duty on the Federal Government" (*Bolling* v. *Sharpe*, 347 U.S. 497).

[63] No State shall * * * deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws."

[64] See infra.

[65] 201 N.Y. 271, 94 N.E. 431.

[66] (New York) Laws 1910, ch. 674.

men's compensation measure; a new statute was enacted[67] and in *Matter of Jensen* v. *Southern Pacific Co.*[68] the holding in *Ives* was explained away. Still another challenge was brought in *New York Central R.R. Co.* v. *White*,[69] wherein the New York courts sustained validity following *Jensen*. The *White* case reached the U.S. Supreme Court where the constitutional attack was on the ground, inter alia, "that the employee's rights are interfered with, in that he is prevented from having compensation for injuries arising from the employer's fault commensurate with the damages actually sustained, and is limited to the measure of compensation prescribed by the act."

The Court held that "no person has a vested interest in any rule of law entitling him to insist that it shall remain unchanged for his benefit. * * * [It] perhaps may be doubted whether the state could abolish all rights of action on the one hand, or all defenses on the other, without setting up something adequate in their stead. No such question is here presented, and we intimate no opinion upon it. The statute under consideration sets aside one body of rules only to establish another system in its place. If the employee is no longer able to recover as much as before in case of being injured through the employer's negligence, he is entitled to moderate compensation in all cases of injury, and has a certain and speedy remedy without the difficulty and expense of establishing negligence or proving the amount of the damages. * * * We have said enough to demonstrate that, in such an adjustment, the particular rules of the common law affecting the subject matter are not placed by the 14th amendment beyond the reach of the lawmaking power of the State * * *."[70]

Under Price-Anderson, governmental indemnity is substituted for theoretically unlimited recovery, and in this way more complete recovery is made more certain; thus, the holding in *White* seems applicable here.

The decision in *White* was followed by the Supreme Court in *Crowell* v. *Benson*,[71] where the constitutionality of the Longshoremen's and Harbor Workers' Compensation Act[72] was sustained.

"The propriety of providing by Federal statute for compensation of employees in [maritime cases] has been expressly recognized by this court, and within its sphere the statute was designed to accomplish the same general purpose as the workmen's compensation laws of the States. In defining substantive rights, the act provides for recovery in the absence of fault, classifies disabilities resulting from injuries, fixes the range of compensation in case of disability or death, and designates the classes of beneficiaries. In view of Federal power to alter and revise the maritime law, there appears to be no room for objection on constitutional grounds to the creation of these rights, unless it be found in the due process clause of the fifth amendment. But it cannot be said that either the classification of the statute or the extent of the compensation provided are unreasonable. * * *

"* * * considerations are applicable to the substantive provisions of this legislation * * * similar to those which this Court has found sufficient to sustain workmen's compensation laws of the States against objections under the due process clause of the 14th amendment (*New York C.R. Co.* v. *White* 243 U.S. 188 [other citations omitted])."[73]

As is clear from the foregoing, the authority of Congress to legislate with respect to matters over which its power is acknowledged is subject nevertheless to due process limitations of "reasonableness."

It seems clear that the section 170 e. limitation of liability, at a figure of at least $500 million, with rovisions for apportionment of claims and the like, would be viewed by the courts as entirely "reasonable," in light of the decisions in such cases as *Crowell* and *White*.

The due process argument against limitation of liability has in later cases received short shrift. For example, in *Indemnity Ins. Co. of North America* v. *Pan American Airways*,[74] Judge Rifkind dismissed an assertion that the Warsaw

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[67] Laws 1913, ch. 816; Laws 1914, ch. 41.
[68] 215 N.Y. 514; 109 N.E. 600. Reversed on other grounds (application of State law to a maritime tort), 244 U.S. 205.
[69] 169 App. Div. 903; 216 N.Y. 653; 243 U.S. 188.
[70] 243 U.S. 188, 198–202.
[71] 285 U.S. 22.
[72] 44 Stat. 1424.
[73] 285 U.S. 22, 39–42.
[74] 58 F. Supp. 338.

Convention's [75] limitation on liability constituted a deprivation of property without due process in the following words:

"The argument that the treaty is invalid because it deprives plaintiff of its property without due process is rejected. Statutes for the limitation of liability are no novelty." [76]

CONCLUSION

The commerce, war, and bankruptcy powers, read with the "necessary and proper" clause, severally and collectively sustain the power of the Congress to limit the liability of "persons indemnified" as provided in section 170 e. of the Atomic Energy Act of 1954, as amended. Moreover, the limitation does not infringe the 10th amendment nor offend the "reasonableness" requirements of the "due process" clause of the 5th amendment.

The same conclusion, for the reasons herein discussed, would be applicable to the proposed amendment to Price-Anderson (H.R. 8496, S. 2042, which, in general, would establish a ceiling on indemnity and limitation of liability at an aggregate of $560 million) should the Congress decide to enact this measure as appropriate to accomplishing the purposes of indemnification and limitation of liability.

APPENDIX 41

OPINION OF ATTORNEY GENERAL ON CONSTITUTIONALITY OF "NO RECOURSE" PROVISIONS OF PRICE-ANDERSON ACT; RELATED CORRESPONDENCE

JULY 2, 1965.

Hon. NICHOLAS DEB. KATZENBACH,
The Attorney General,
Department of Justice, Washington, D.C.

DEAR MR. ATTORNEY GENERAL: During a hearing on June 22, 1965, concerning two identical bills (H.R. 8496 and S. 2042) to amend the so-called Price-Anderson Act, I asked for the comments of the General Counsel of the Atomic Energy Commission concerning a question raised by the National Coal Association about the constitutionality of section 170 e. of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2210(e)).

The AEC's General Counsel responded to the effect that, in his opinon, this section of the act is constitutional. The Joint Committee has requested the AEC's General Counsel to furnish us with a formal opinion and memorandum confirming this testimony during the hearing.

In view of the significance of this question I would also appreciate your furnishing the committee with your opinion concerning the constitutionality of section 170 e. of the Atomic Energy Act of 1954, as amended, together with a memorandum in support of your opinion for inclusion in the record of the committee's hearings on these bills. Please address your opinion not only to the existing language of section 170 e. of the act, but also to the language of this section as it would be amended by H.R. 8496 and S. 2042, copies of which are enclosed.

We would appreciate as early a response as possible to this request in order that the committee's hearing record may be completed.

Sincerely yours,

CHET HOLIFIELD, *Chairman.*

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[75] Convention for the Unification of Certain Rules Relating to International Transportation by Air, with additional protocol. Warsaw 1929. Entered into force for the United States, Oct. 29, 1934, with reservation (49 Stat. 3000; TS 876).

[76] 58 F. Supp. 338, 340, citing, inter alia, *Providence and NY SS Co.* v. *Hill Mfg. Co.*, note 21 supra. To similar effect is the decision in *Murray* v. *NY Central R Co.*, 287 F. 2d 152, where a due process challenge of the Shipowner's Limitation of Liability Act (note 19 supra) was dismissed.

DEPARTMENT OF JUSTICE,
OFFICE OF THE DEPUTY ATTORNEY GENERAL,
Washington, D.C., August 24, 1965.

HON. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States,
Washington, D.C.

DEAR MR. CHAIRMAN: This is in response to your request for the opinion of the Attorney General concerning the constitutionality of section 170 e. of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2210(e)), and the proposed amendment of that section as provided in H.R. 8496 and S. 2042.

I am enclosing a memorandum which has been prepared in the Department concerning the constitutionality of section 170 e. of the act and the proposed amendment thereof. Although the memorandum does not, of course, constitute an "opinion" there would appear to be little question that the section and the proposed amendment are within the constitutional authority of the Congress. It is hoped that this memorandum will be of assistance to your committee.

Sincerely,

RAMSEY CLARK,
Deputy Attorney General.

MEMORANDUM RE CONSTITUTIONALITY OF SECTION 170 e. OF THE ATOMIC ENERGY ACT OF 1954

Two bills now pending before the Joint Committee on Atomic Energy, H.R. 8496 and S. 2042, would amend section 170 of the Atomic Energy Act of 1954, as added September 2, 1957, 71 Stat. 576, and amended, 42 U.S.C. 2110. In the hearings on these bills, the constitutionality of the proposed amendments to section 170 e. and of section 170 e. itself has been questioned.

Section 170 of the Atomic Energy Act provides for the indemnification of and limitation of liability of licensees and permittees of the Atomic Energy Commission. Each license or permit issued for the commercial transfer, production, possession, use, import or export of atomic utilization or production facilities, for medical or other research utilization of atomic facilities, or for construction or modification of atomic production or utilization facilities, must require that the licensee or permittee maintain financial protection to cover public liability claims. Similar requirements may be made of those acquiring or distributing source material, special nuclear material or nuclear byproducts. The Atomic Energy Commission determines the amount of financial protection required.

In addition the Atomic Energy Commission must agree to indemnify all licensees and permittees of whom it requires financial protection, with respect to licenses issued between August 30, 1954 and August 1, 1967. The indemnity extends to public liability arising from nuclear incidents which is in excess of the level of private financial protection required. However, the aggregate indemnity for all persons indemnified may not exceed $500 million for any single nuclear incident. Further, the Commission is authorized to indemnify its own contractors up to $500 million for incidents occurring in the United States and up to $100 million for incidents occurring outside the United States.

Section 170 e. provides that the aggregate liability for any single nuclear incident for all persons indemnified (including reasonable costs of investigating and settling claims and defending damage actions) shall not exceed $500 million plus the amount of private financial protection required. For incidents occurring outside the United States, however, the aggregate liability is limited to $100 million plus the required private financial protection. If it appears that the public liability arising from any nuclear incident is going to exceed the limitations imposed by this section, the Commission or any person indemnified may apply to the district court having bankruptcy venue over the location of the incident for an order limiting liability, staying payment of claims or judgments, permitting partial payments of claims, setting aside part of the funds for possible latent injury claims, or similar appropriate relief. If the incident occurs outside the United States, venue is in the U.S. District Court for the District of Columbia.

The amendments to section 170 e. proposed by H.R. 8496 and S. 2042 would insert a new proviso limiting the total aggregate liability, including both insurance and indemnity, to $560 million.

It has been suggested that Federal legislation limiting the tort liability of corporate or other persons engaged in the field of atomic energy and, consequently, limiting the recovery of persons injury by a nuclear incident, exceeds the constitutional authority of Congress. This memorandum concludes, however, that in the area of atomic energy Congress may, in the interest of developing maximum utilization of nuclear resources, limit the public liability of those engaged in this industry. Further, Congress may limit not only the liability covered by Federal indemnity, but may also limit the aggregate liability covered by Federal indemnity and private financial protection. In summary, section 170 e. of the Atomic Energy Act is constitutional and the amendments proposed by H.R. 8496 and S. 2042 are likewise constitutional.

BACKGROUND OF SECTION 170

The original Atomic Energy Act (act of Aug. 1, 1946, 60 Stat. 755), vested complete control of the entire field in the Federal Government. At that time the chief use of nuclear energy was military, and national security and defense required strict Federal control. By 1954, however, the peaceful uses of atomic energy were also being emphasized and the Atomic Energy Act was revised to provide for increased private participation in nuclear development (act of Aug. 30, 1954, 68 Stat. 921). However, private industry appeared somewhat reluctant to enter the field and it was brought to the attention of the Joint Committee on Atomic Energy that one of the reasons for this reluctance was the difficulty of insuring against liability arising out of nuclear accidents. (See S. Rept. 296, 85th Cong., 1st sess. (1957).)

In 1956 the Joint Committee conducted hearings on proposals for governmental indemnity against reactor hazards in private industry. Witnesses for the AEC testified that the safety record in atomic energy facilities had been good but that industry representatives had indicated reluctance to enter the field until some liability insurance could be arranged (hearings before the Joint Committee on Atomic Energy, "Governmental Indemnity," p. 68 (1956)). A memorandum from the General Counsel of AEC pointed out that in the event of an accident or "nuclear incident" various theories of public liability might be applied in the different States, such as strict liability, an application of the doctrine of res ipsa loquitur or an extension of liability to manufacturers or suppliers and this uncertainty as to the determination of liability created further insurance problems (hearings, pp. 70–74).

Witnesses from various public utilities and electronics industries emphasized that the inability to obtain comprehensive liability insurance would retard full-scale efforts by many companies to enter the field and they urged some form of governmental protection against the possibility of enormous damage claims. They pointed out the high damage claims based on a single incident could exceed the entire assets of a company and could bankrupt it (hearings, pp. 103, 109, 141, 182). Representatives of the insurance industry explained that in a field as new as atomic energy they were not equipped to calculate the risks or to offer coverage which would protect against the incalculable claims which could arise from a single major accident.

Various forms of Government protection were suggested: Government insurance, reinsurance, indemnity, and limitation of liability. Several witnesses expressed doubt as to the constitutionality of a Federal limitation on public liability (hearings, pp. 43, 190). However, the Special Committee on Atomic Energy of the Association of the Bar of the City of New York submitted a supplemental memorandum expressing the view that the constitutional validity of a limitation of liability could be supported by findings that the likelihood of exceeding a $500 million limitation is remote, that limited Federal indemnity plus limited private liability would serve the public better than no indemnity and unlimited liability, and that the $500 million should not be interpreted as an absolute limit beyond which Congress would never be willing to go (hearings, p. 328).

At the request of the the Joint Committee, the Legislative Reference Service of the Library of Congress and the counsel for the Pennsylvania Power & Light Co. submitted memorandums on the constitutionality of limiting liability. Both concluded that such a limitation would be constitutional. The Library of Congress memorandum pointed out that when Congress assumes an obligation that is moral rather than legal it may impose limitations. Further, it concluded that

Congress could limit the liability of others in carrying out one of its enumerated powers and cited as an example the limitation of shipowner's liability (46 U.S.C. 183) under the commerce clause. It suggested that a limitation of liability in the event of nuclear accident might be justified under the bankruptcy clause (art. I, sec. 8, clause 4), since a major disaster could wipe out an entire company (hearings, pp. 406–407).

The memorandum of Pennsylvania Power & Light Co. pointed out that the Atomic Energy Act itself rests on the defense power, the commerce power, and the power to regulate the use of Government property (production facilities and special nuclear material). In the exercise of these powers, Congress may adopt measures which limit or affect private rights as long as such measures are reasonably related to the objectives they are designed to serve. Thus, shipowner's liability has been limited to encourage private capital to enter the industry and homesteads have been exempted from liability for certain debts in order to promote development of public lands. The memorandum concluded that Congress could limit liability of private industry in order to promote increased development and utilization of nuclear energy (hearings, pp. 386–390).

There was no congressional action on the indemnity and limitation of liability provisions in the 84th Congress. Hearings were held on this same subject in the 85th Congress, but there was little discussion of the constitutionality of a limitation of liability (hearings before the Joint Committee on Atomic Energy, "Governmental Indemnity and Reactor Safety" (1957)). Thereafter, a bill to provide both indemnity and limitation of liability was reported. Senate Report 296, 85th Congress, 1st session, recites the constitutional bases of the bill as the power to provide for the national defense and security, the responsibility to supervise and protect the use of special nuclear materials to which the Government retains title, and the power to provide a uniform rule of bankruptcy. It explains that the determination of liability in the event of a nuclear incident would be left to the States, but if it appeared that insurance and indemnity were not adequate to cover all claims, a Federal court would take jurisdiction in order to prorate the available amount equitably. The so-called Price-Anderson Act became law on September 2, 1957, and it added section 170 to the Atomic Energy Act.

THE CONSTITUTIONAL BASES OF SECTION 170 e.

The second section of the Atomic Energy Act (42 U.S.C. 2012) recites certain congressional findings which indicate the constitutional bases of the entire act. It refers to providing for the common defense and security, protecting the public health and safety, regulating interstate and foreign commerce, protecting against interstate damage occurring from the operation of nuclear materials, and promoting the general welfare. In the exercise of these powers, Congress undertook to regulate the entire field of atomic energy from its inception. This absolute Government monopoly was unique in American law, but the circumstances surrounding the development and utilization of nuclear energy were also unique. The importance to national security of controlling the use of nuclear energy resulted in provisions which vested the ownership of almost all production facilities in the Federal Government (42 U.S.C. 2061(a)), retained title to all special nuclear materials (42 U.S.C. 2072), and imposed strict control over the ownership, possession, and transfer of source materials and byproduct materials (42 U.S.C. 2092, 2111).

It was not until August 26, 1964, that private ownership of special nuclear materials was permitted (Public Law 88–489, 78 Stat. 602). That statute repealed 42 U.S.C. 2072 and deleted the congressional findings that Government ownership of such materials was necessary to national security and public safety (42 U.S.C. 2012 (b), (h)).

Apparently few have questioned the constitutionality of the Atomic Energy Act itself. In *Pauling* v. *McElroy* (164 F. Supp. 390 (D.C.D.C. 1958), aff'd 278 F. 2d 252 (C.A.D.C. 1960), cert. denied, 364 U.S. 835 (1960)), the court indicated that the defense power alone would provide ample constitutional basis for that act. Nor would there appear to be any doubt that the processing and utilization of nuclear material is so involved in interstate and foreign commerce as to justify Federal regulation of the industry on this basis.

The question raised in the present hearings is not whether the Atomic Energy Act is constitutional but whether section 170 e. of that act, limiting

the liability of private industry, is constitutional. In effect, the issue may be stated as follows: Is the limitation of liability of private industry engaged in nuclear development and utilization *necessary and proper* to the unquestioned authority to regulate atomic energy?

When section 170 e. was enacted in 1957, various constitutional bases were cited as justifying the limitation of liability:

1. The necessity of protecting the public against interstate damage occurring from the operation of facilities (42 U.S.C. 2012(f));

2. The necessity of protecting the public and encouraging the development of atomic energy in order to promote the general welfare and the national defense and security (42 U.S.C. 2012(i));

3. The responsibility of protecting the public from damages resulting from the use of Federal property—special nuclear material (S. Rept. 296, 85th Cong., 1st sess.); and

4. The authority to provide a uniform rule of bankruptcy (S. Rept. 296, 85th Cong., 1st sess.).

Since the enactment of Public Law 88–489, title to special nuclear material need no longer be vested in the Government, and thus protection of the public from hazards resulting from the use of Federal property may no longer justify section 170 e. It has also been suggested that the consideration of national defense and security which justified section 170 e. in 1957 may no longer be valid today (transcript of hearings on H.R. 8496 and S. 2042, p. 258).

Before considering whether the limitation of liability in section 170 e. is a necessary and proper exercise of the defense power, the commerce power, and/or the bankruptcy power of Congress, it is appropriate to point out that section 170 e. is an act of Congress, approved by the President. Congress was aware that doubts had been expressed as to its constitutionality and, in enacting it, Congress expressed its judgment that the section was constitutional. Similarly, in approving the act, it must be assumed that the President was also satisfied that it was constitutional. From these facts alone, section 170 e. is entitled to a presumption of constitutionality.

A. The exercise of the defense power

The Senate report on what is now section 170 e. indicated that the national defense and security required increased private development and utilization of nuclear energy and that full-scale entry of private industry into this field could not be assured unless private industry were protected from enormous private damage claims by Government indemnity and limitation of liability (S. Rept. 296, 85th Cong., 1st sess). Further, the Price-Anderson Act contained the following congressional findings:

"In order to protect the public and to encourage the development of the atomic energy industry, in the interest of the general welfare and of the common defense and security, the United States may make funds available for a portion of the damages suffered by the public from nuclear incidents, and may limit the liability of those persons liable for such losses" (sec. 1, 71 Stat. 576; 42 U.S.C. 2012(i)).

It has been suggested that the facts which justified this finding in 1957 no longer exist. However, Congress has not seen fit to withdraw or amend this finding, and thus it remains as an indication of the congressional judgment of the necessity for section 170 e. It is not the purpose of function of this memorandum to look behind the congressional finding. Congressional findings are not conclusive as to the facts recited and they may be examined in the light of changed circumstances. But they are entitled to great weight and are generally accepted unless clearly unfounded or irrational (*Communist Party* v. *Control Board*, 367 U.S. 1, 94–95 (1961); *Block* v. *Hirsh*, 256 U.S. 135, 154 (1921)). Absent a clear showing that the facts which justified the finding in 1957 no longer exist, it must be assumed that Congress has a rational basis for considering the continuing development of the atomic enregy industry to be necessary to the national defense.

The power of Congress to provide for the national defense and security is unquestioned. Having determined that private development of atomic energy is necessary and proper to this end, and having determined that a limitation of liability is necessary and proper to secure the private development of atomic energy, Congress has the constitutional authority to limit the liability of persons engaged in the atomic energy industry.

B. The exercise of the commerce power

The Senate report on the Price-Anderson Act places little emphasis on the interstate and foreign commerce aspects of the atomic energy industry. However, the Atomic Energy Act itself recognized that the processing and utilization of source, byproduct, and special nuclear material affect interstate and foreign commerce (42 U.S.C. 2012(c)) and it further recites:

"The necessity for protection against possible interstate damage occurring from the operation of facilities for the production or utilization of source or special nuclear material places the operation of those facilities in interstate commerce for the purposes of this Act" (42 U.S.C. 2012(f)).

Whatever changes may have occurred in the defense relation of the atomic energy industry since 1957, it is beyond question that the interstate aspects of the industry have not altered since 1954.

During the 1956 hearings on "Government Indemnity and Limitation of Liability," both the Legislative Reference Service of the Library of Congress and the Counsel for the Pennsylvania power & Light Co. pointed out that Congress has imposed a limitation on the liability of shipowners in order to promote this aspect of interstate and foreign commerce, and that this had been held a constitutional exercise of the commerce power. The provisions for limiting the liability of shipowners (46 U.S.C. 181 et seq.) date from 1851. They were designed to encourage the development and expansion of the American shipping industry and the Supreme Court has determined that protecting shipowners from financially crippling liability claims arising from marine catastrophes is a valid exercise of congressional authority under the Commerce Clause (*Providence & N.Y.S.S. Co.* v. *Hill Mfg. Co.*, 109 U.S. 578 (1883)).

While it may be argued that the limitation of shipowner's liability is not a direct precedent for limiting liability in the atomic energy industry, there are similarities which should be noted. A single marine disaster involving tremendous loss of life and property could give rise to liability claims of such staggering amounts that an entire shipping company could be wiped out by a single accident. Likewise, a major nuclear incident in an atomic reactor plant could result in claims exceeding the total assets of even an "industrial giant." Corporations and public utilities therefore might well be as reluctant to risk their existence by entering the atomic energy field, as shipowners might be to risk a marine disaster. Certainly it is reasonable for Congress to conclude that fostering the atomic energy industry today is as important as fostering the shipping industry was in 1851.

It might also be noted that, by accepting the Warsaw Convention on International Air Transportation (49 Stat. 3000), Congress agreed to a limitation of the liability of air carriers (art. 22, 49 Stat. 3019). Although this involved an exercise of the treaty power rather than the commerce power, there would appear to be no relevant difference in the applicable considerations of constitutional law.

It has been argued that by limiting liability for nuclear incidents Congress has deprived individuals of their rights to compensation and has infringed the power of the States to enforce their own rules of tort liability. Yet it is no longer open to question that in the exercise of its commerce power, Congress may supersede the laws of the States and may restrict the rights of private individuals (*United States* v. *Darby*, 312 U.S. 100 (1941); *Wickard* v. *Filburn*, 317 U.S. 111 (1942)).

The background of the Price-Anderson Act indicates that the limitation of liability was designed to serve two purposes: (1) to encourage the entrance of private industry into the atomic energy field, and (2) to protect the public by assuring equitable distribution of the available funds to meet all damage claims. As indicated above, the limitation of liability to encourage an industry was found to be a valid exercise of the commerce power with respect to the shipping industry. It is certainly arguable that the limitation of liability to protect the public from losses resulting from the operations of an interstate industry would also be a legitimate exercise of the commerce power.

There does not appear to be any legislative precedent under the commerce clause for limiting liability in order to insure that all claimants will receive at least partial payment of their claims. Legislation of this type is more directly related to the bankruptcy power. Nevertheless, interstate businesses have been regulated in countless ways in order to protect the public, and it is not unreasonable to assert that Congress may choose this means of protecting the public from personal and financial losses resulting from the operation of an

industry involved in interstate and foreign commerce. Indeed, it may be particularly appropriate to provide for the limitation and apportionment of funds to cover damage claims in the atomic energy industry, since the nature of nuclear energy increases the likelihood that injuries resulting from nuclear incidents would occur not only at the site of the incident but in neighboring States as well.

In summary, the atomic energy industry is clearly involved in interstate and foreign commerce and is, therefore, subject to congressional regulation and supervision. Having determined that a limitation of the liability of persons engaged in that industry for damages resulting from nuclear incidents is necessary and proper both to foster the industry and to protect the public, Congress has the constitutional authority, under the commerce clause, to provide a limitation of liability.

C. The exercise of the bankruptcy power

Article I, section 8, clause 4, of the Constitution provides that Congress shall have the power to provide "uniform Laws on the subject of Bankruptcies throughout the United States.' The Legislative Reference Service of the Library of Congress suggested in 1956 that this authority would justify the limitation of liability of persons engaged in the atomic energy industry, and Senate Report 296, 85th Congress, 1st session, recites this as one of the constitutional bases of section 170 e.

The general bankruptcy laws of the United States are published in title 11 of the United States Code. They are designed not only to protect the rights of creditors, but to protect debtors as well. For example, insolvent corporations may petition for reorganization (11 U.S.C. 530), insolvent railroads may petition for reorganization (11 U.S.C. 205), and insolvent wage earners may petition for an adjudication of bankruptcy (11 U.S.C. 1022). The Supreme Court has emphasized that the bankruptcy power is not limited to the protection of the creditor alone and that voluntary bankruptcy can be authorized for the debtor's benefit:

"The determination of the *status* of the honest and unfortunate debtor by his liberation from incumbrance on future exertion is a matter of public concern, and Congress has power to accomplish it throughout the United States by proceedings at the debtor's domicil." (*Hanover Nat'l Bank* v. *Moyses*, 186 U.S. 181, 192 (1902) ; *cf.*, *Louisville Joint Stock Land Bank* v. *Radford*, 295 U.S. 555, 588 (1935)).

Moreover, in an industry affected with the public interest, the congressional authority extends to measures which are designed to forestall actual bankruptcy (*Continental Ill. Nat's Bank & Trust Co.* v. *Chicago Rock Island & Pac. Ry.*, 294 U.S. 648 (1934)).

The 1956 hearings on "Government Indemnity and Limitation of Liability" indicate that the purpose of section 170 e. was to prevent the financial destruction of those involved in the atomic energy industry and to assure at least partial payment to all having damage claims arising from a nuclear incident. It was pointed out that damage claims might exceed the available liability insurance and might even exceed the corporate assets of persons liable for a nuclear incident. Thus, a single incident could result in bankruptcy. In addition, injuries resulting from a nuclear incident might not be immediately detectable, and one suffering from latent radiation injuries might be unable to obtain damages because earlier claims had consumed all insurance and assets.

Accordingly, section 170 e. provides that if it appears that damage claims will exceed both insurance and the indemnity afforded by the Government, a petition may be filed in the court having jurisdiction in bankruptcy to postpone payment of claims until the available funds can be equitably prorated among all claimants. While such a provision appears to be unique among bankruptcy laws, it is not so unrelated to the bankruptcy power as to be obviously unreasonable.

If Congress has determined that section 170 e. of the Atomic Energy Act is a necessary and proper exercise of the authority to provide a uniform rule of bankruptcy, then it would appear that such protection of both "debtor" and "creditor" is a constitutional exercise of that power.

D. Exercise of combined powers

This memorandum has indicated that section 170 e. of the Atomic Energy Act would be a constitutional exercise of the defense power, the commerce power, or the power to provide a uniform rule of bankruptcy. However, in enacting

that section, Congress did not rely on any single express power. Rather, it indicated that section 170 e. was enacted as an exercise of several powers enumerated in the Constitution. Certainly Congress is not obligated to select a single constitutional basis for legislation but may rely on a combination of powers in order to provide for the common defense and promote the general welfare. Since section 170 e. would be a constitutional exercise of any one of the three powers mentioned, it is likewise a constitutional exercise of the combined defense, commerce, and bankruptcy powers.

CONSTITUTION OF PROPOSED AMENDMENTS TO SECTION 170 e.

Both H.R. 8496 and S. 2042 would amend section 170 e. by adding the following proviso in the first sentence: "*Provided, however,* That such aggregate liability [*i.e.*, the aggregate liability for a single nuclear incident] shall in no event exceed the sum of $560,000,000."

The present aggregate liability under section 170 e. is $500 million plus the private financial protection required of the person indemnified. The effect of the proviso quoted above would be to limit the total aggregate liability, including both Federal indemnity and private financial protection, to $560 million.

Should Congress determine that such a total limitation is both necessary and appropriate to accomplish its purposes in limiting liability, there is little question that the limitation would be constitutional. The constitutional bases for the statutory limit of aggregate liability would be the same as the constitutional bases for section 170 e. If the present section is constitutional—and it seems clear that it is—the proposed amendment would be no less constitutional.

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