INDEMNITY AND REACTOR SAFETY

HEARINGS

BEFORE THE

SUBCOMMITTEE ON
RESEARCH, DEVELOPMENT, AND RADIATION

OF THE

JOINT COMMITTEE ON ATOMIC ENERGY
CONGRESS OF THE UNITED STATES

EIGHTY-SEVENTH CONGRESS

SECOND SESSION

ON

INDEMNITY AND REACTOR SAFETY

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INDEMNITY AND REACTOR SAFETY

TUESDAY, APRIL 10, 1962

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON RESEARCH, DEVELOPMENT, AND
RADIATION, JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D.C.

The subcommittee met at 2 p.m., pursuant to notice, in room AE–1, the Capitol, Hon. Melvin Price (chairman of the subcommittee) presiding.

Present: Representatives Price, Holifield, Van Zandt, and Hosmer.

Also present: James T. Ramey, executive director; David R. Toll, staff counsel; Edward J. Bauser, and Jack R. Newman, professional staff members.

Representative PRICE. The committee will be in order.

The Subcommittee on Research, Development, and Radiation of the Joint Committee on Atomic Energy begins public hearings today on operations under the indemnity provisions of the Atomic Energy Act. Each year, since the passage of the indemnity amendments in 1957, the committee has held hearings on this program, and on related safety questions, including the activities of the Advisory Committee on Reactor Safeguards, which was established as a statutory committee by the amendments.

In the course of these hearings, we shall receive brief testimony from the AEC on its annual report to the Joint Committee. In addition, the Commission has made some very recent decisions concerning the proposed extension of Price-Anderson indemnity to contractors whose sole risk is products liability proposals to require underlying financial protection in the contractor program, and revised site criteria. Testimony will therefore be included on these late developments.

We also expect to receive testimony on H.R. 9244 and H.R. 10775, bills to extend Price-Anderson indemnity protection to contractors engaged in activities outside the United States.

Finally, we shall give further attention to insurance and indemnity problems arising out of the transportation of radioactive materials across toll roads, tunnels, and bridges.

We also look forward to receiving the report of the ACRS and to discussing some current reactor safety problems with special emphasis on the reactor site criteria recently published by the AEC.

These annual hearings may seem dull and perhaps unnecessary to some observers. But the Joint Committee has found that these hearings, as well as others, serve a very salutary purpose. Each year, in late March and early April, the Commission seems to be galvanized into a flurry of action in the liability and indemnity field and on

reactor site criteria. Decisions come forth that would otherwise lie dormant or slowly percolate the rest of the year. It seems that the best way to get action approved at the Commission level is for the Joint Committee to schedule a hearing.

Our first witness this afternoon is Commissioner Olson.

Will you proceed, please?

STATEMENT OF LOREN K. OLSON, COMMISSIONER, AEC; ACCOMPANIED BY HAROLD PRICE, DIRECTOR OF REGULATION; ROBERT LOWENSTEIN, DIRECTOR, DIVISION OF LICENSING AND REGULATION; JOSEPH HENNESSEY, ASSOCIATE GENERAL COUNSEL; NEIL NAIDEN, GENERAL COUNSEL; DR. ROBERT KAYE, CHIEF, TRAFFIC MANAGEMENT SECTION, DIVISION OF CONSTRUCTION; MYRON KRATZER, DEPUTY DIRECTOR, DIVISION OF INTERNATIONAL AFFAIRS; DR. CLIFFORD BECK, DEPUTY DIRECTOR, DIVISION OF REGULATION

Mr. OLSON. Thank you, Mr. Chairman. It is an ill wind that blows no good and if we seasonally get a chance to look at these regulations, I think that is helpful, too.

With me today are Mr. Price, the Director of Regulation, Dr. Beck, Deputy Director of Regulation, Mr. Lowenstein, Director, Division of Licensing and Regulation, Mr. Hennessey and Mr. Naiden from the Office of General Counsel, Mr. Kratzer, Division of International Affairs, and Mr. Kaye from the Division of Construction.

On March 30 the Commission submitted to the Joint Committee the annual report on administration of the indemnity program and operations of the Advisory Committee on Reactor Safeguards. Our statement today will summarize the principal points dealt with in the report and will also discuss briefly actions taken by the Commission on indemnity matters since the report was submitted.

The forms of indemnity agreement for licensees who are required to furnish proof of financial protection were made effective last July. On March 29, 1962, the Commission published amendments to its definitive indemnity regulations to prescribe the forms of indemnity agreements to be entered into with reactor licensees who are Federal agencies and nonprofit educational institutions. The amendments also implemented Public Law 87–206, which eliminates from indemnity coverage third-party liability for onsite property used in connection with the licensed activity.

With the publication of the amendments of March 29, the Commission completed its basic regulations for the administration of the program for indemnification of reactor licensees. As of March 31, 1962, 61 reactor licensees were indemnified under the program. These include 34 nonprofit educational institutions, 7 Federal agencies, and 20 private organizations.

During the year, the Commission also concluded its review of the question whether Price-Anderson indemnity should be extended to licensees of unirradiated enriched uranium. The Commission concluded that indemnity is not justified at the present time inasmuch as the consequences of a maximum credible accident do not appear to be

of such magnitude as to exceed the presently available insurance capacity of the private insurance industry.

In the area of contractor indemnification, the Commission has executed indemnity agreements with 59 contractors which cover all major AEC installations operated by AEC contractors who are eligible for indemnification.

The Commission has recently reconsidered its position with respect to affording Price-Anderson indemnification to its contractors and has made two significant revisions.

In the past, AEC has not required its contractors to provide underlying insurance against liability for nuclear accidents. This decision was based largely on AEC's estimate of the magnitude of the premiums that would be charged for nuclear insurance. Recent discussions with representatives of the NELIA–MAELU insurance groups have indicated that nuclear insurance will be made available on a retrospective rating basis at relatively low premiums.

Actually, it is a cost-plus-fee sort of arrangement.

Such an arrangement would make available to AEC the extensive claims administration capability of the NELIA–MAELU organization in the event of a nuclear accident at these AEC installations. This step is consistent with AEC's past practice in the insurance of contractors against liability for nonnuclear accidents.

Since the inception of AEC—and under the Manhattan project before that—the contractors operating major AEC installations have been insured against third-party liability on a retrospective rating plan basis. Insurance policies procured since the formation of the NELIA–MAELU groups, however, have excluded coverage for nuclear accidents. AEC has decided that it would be advantageous to authorize the procurement of nuclear liability insurance on a retrospective basis by those contractors operating AEC facilities who do not presently have insurance coverage against nuclear liability.

The second revision will increase the number of contractors who will be eligible for a Price-Anderson indemnity agreement. Up to now, Price-Anderson indemnification agreements have been made available only to those contractors who were engaged in the construction or operation of production or utilization facilities or in other activities involving the risk of occurrence of a substantial nuclear incident.

While the Price-Anderson Act permitted indemnity agreements with contractors whose only risk was one of liability for a substantial nuclear incident stemming from having supplied a faulty product, design, or service, this authority had not been exercised. Normally those contractors would be protected under the umbrella-type indemnity agreement covering the production or utilization facility in which their products or designs are incorporated.

In some cases, however, those contractors deliver products that do not find their way into an indemnified facility. For example, we have contractors whose products are incorporated into atomic weapons. We have other contractors who produce fuel elements which are used in naval submarines. These contractors are exposed to the risk of public liability for a substantial nuclear incident and, to the extent that they are not indemnified against that liability, they lack protection against the damages that would result from such an incident.

The Commission has now revised its position in order to fill that gap. Price-Anderson indemnification will now be made available to those AEC contractors whose only risk is one of products liability. The indemnification will take the form of either a Price-Anderson indemnity agreement or a contractual assurance that the contractor will be indemnified under the Price-Anderson indemnity agreement extended to another AEC contractor.

Representative PRICE. Mr. Olson, this would probably be a good place to ask a few questions before you get to the discussion of the bill in the next paragraph.

Mr. OLSON. Yes, sir.

Representative PRICE. On page 1 of your statement, concerning the indemnity agreement to be entered into with licensees who are nonprofit educational institutions, some persons have expressed concern over the first ban of $250,000 liability before the indemnity is available. Under the AEC agreement, if an accident occurs and a claim should total $1 million, and the educational institution claims immunity for the first $250,000, how will the AEC decide which claims to pay?

Mr. OLSON. Mr. Lowenstein. This is a pretty technical business.

Representative PRICE. We find it that way, too.

Mr. LOWENSTEIN. We have no answer to that question, Mr. Price.

Mr. OLSON. I guess it was not as nearly complicated as I thought.

Representative PRICE. Are the educational institutions and everybody else satisfied?

Mr. PRICE. A great many of them buy insurance for that $250,000. Some of the State institutions, I understand, can't buy insurance.

Representative PRICE. That was the reason for the amendment to the original bill. In fact, some States are precluded by their State constitutions from buying insurance.

Mr. PRICE. A few of them; that is right.

Mr. LOWENSTEIN. I think this is something that may depend on many factors. We don't have a solution. It may depend on State law. There may be a way of marshalling what is available and allocating it among claimants and there may be other ways of doing it. We hope the State would act to fill the gap of $250,000.

Representative PRICE. It is evident you have had no problem so far.

Mr. LOWENSTEIN. No problem so far.

Representative PRICE. The universities at the start were in a situation where they feared they would be cut completely out of research programs unless they had this amendment to the act. This is applicable entirely to research programs.

Mr. LOWENSTEIN. Yes, sir. I think it is a fair expectation, and we have been hoping, that in the event of such an incident, the State legislature would take appropriate action to fill that gap of $250,000.

Representative PRICE. They are given substantial protection but yet there is some sort of gap that still exists.

Mr. LOWENSTEIN. Yes, sir.

Representative PRICE. Some suppliers have claimed that the elimination of onsite property indemnity coverage last year has created a serious gap in insurance coverage. They argue that although the insurers have waived rights of subrogation against supplier, the reactor operator may elect to go directly against the supplier rather than use his insurance or alternatively the operator may not have

enough insurance to cover the full damages to his onsite property and thus he may sue the supplier.

Is this a real possibility? Does it pose a serious problem for the industry, and can suppliers obtain insurance to cover this liability?

Mr. LOWENSTEIN. As far as we can tell, sir, it has not presented a serious problem to the industry. We have found that suppliers can protect themselves by appropriate provisions in their contract with the reactor owner under which the reactor owner would waive a claim against the supplier. Finally, there are means by which contractually, the supplier under his contract could enter into an agreement with the operator of the reactor that property coverage would be obtained. The property insurance has a waiver of subrogation provision in it.

So far we don't see a problem there. Some people have referred to the possibility that suppliers who do not know that their product will be incorporated in a reactor will not be covered. On the other hand, the existence of a threat of liability in this type of situation seems to be remote. As far as we can tell, it is not a real problem.

Representative PRICE. Mr. Toll has a question on this point.

Mr. TOLL. Mr. Lowenstein, is there a problem for the subsupplier, below the level of the prime contractor who might be able to protect himself by an agreement with the operator? How about the suppliers at the next level down?

Mr. LOWENSTEIN. Again, I think, Mr. Toll, the suppliers at the next level down, if they know where their product is going, are in a position to protect themselves. If they don't know that their product is going into a nuclear reactor, obviously, they can't. But then for the very same reason their risk of liability for damage to the reactor would seem to be a remote risk.

Mr. TOLL. Some of the suppliers do seem to feel to the contrary.

Mr. LOWENSTEIN. Some of them have said so.

Mr. TOLL. Perhaps that will be developed tomorrow.

Mr. LOWENSTEIN. We are not aware of any situation where a supplier has not provided components because of this threat.

Representative PRICE. On page 2, Mr. Olson, in discussing the decision not to extend Price-Anderson indemnity to licensees of unirradiated enriched uranium—for example, fuel element manufacturers—you state that the consequences of a maximum credible accident would not appear to exceed available insurance capacity.

What, in terms of dollars of damage, are the estimated costs of the maximum credible accident to such licensees and such facilities?

Mr. OLSON. That will call for yet another expert. Dr. Beck.

Dr. BECK. Mr. Price, we have not made an exact calculation in dollars, but we have approached this problem from two different standpoints.

First, by looking at the theoretical possibilities of the magnitude of accidents that might occur from inadvertent accumulation of materials of various types, such as are normally handled, we have obtained estimations of the magnitude of energy release that might be expected and the geographical area within which damages might occur.

In that particular study we enlisted the help of an outside contractor. We mentioned this in the hearings last year as a study that was

in progress. This was the Convair Division of General Dynamics at Fort Worth, Tex., I believe.

Mr. TOLL. Dr. Beck, if you didn't reduce this to dollar values, how could you tell whether or not Price-Anderson coverage was necessary? Is the amount of insurance available limited to a definite dollar figure, $60 million?

Dr. BECK. Yes.

Mr. TOLL. You had to determine whether or not this type of facility might have an accident that would exceed that amount?

Dr. BECK. Yes. Let me first add one comment about the other part of our study, which was to look at those criticality accidents which have occurred, of which there have been more than a dozen, none of which have had serious consequences outside the immediate vicinity of the accident, and extrapolate these to the possible consequences of larger ones that might be visualized.

From this study, it appears that no one more than, say, a few hundred feet away, would be seriously affected by such accidents as would be likely to occur. The quantity of fission products that might be released, and their nature, lead us to believe that there would be substantially less total damage from any of these likely accidents than the $60 million available. So, we base our judgment on both the accidents which have occurred and on studies of the types that might occur and this is the conclusion we have reached.

Representative PRICE. In 1956, the Commission had Brookhaven National Laboratory make a study of the effects from a maximum credible accident of a power reactor. This was used to estimate amounts of insurance and indemnity needed. Have you updated that Brookhaven study in recent years?

Mr. PRICE. No, sir.

Mr. TOLL. Don't many people think that it was a little on the high side, perhaps?

Mr. PRICE. I suppose some people do. Some people at the time thought it was on the high side. I haven't heard too much demand for updating it. Maybe there has been.

Dr. BECK. The basic approach to that report, I think, was a sound one. I think most of the estimations made therein were somewhat on the conservative side. On the other hand, that study was on the estimation of damages from a 500-megawatt thermal reactor. We are now approaching the time when much larger reactors—double, in fact—are being considered. Though it may in some of its assumptions be somewhat conservative, I think the data contained there are still excellent guides to the general type of damages that might be experienced.

Representative PRICE. On page 3, Mr. Olson, in discussing underlying financial protection in the contractor program, you mention the possibility of a "retrospective rating plan."

What do you mean by retrospective rating?

Mr. OLSON. It is a sort of cost-plus arrangement whereby they get a fixed fee for providing the services and give us the benefits of their claim-adjusting service and we actually pay for the cost of whatever awards are made.

Representative PRICE. Is there an element of true insurance in this plan?

Mr. OLSON. Not exactly. It is more of a claims-adjusting service. It is of value to us. It probably should be identified as that, rather than a true insurance plan. There is a little element of risk in it, Mr. Lowenstein assures me.

Mr. TOLL. I think the insurance companies would not like it very much if you would call it something other than insurance. It might give them trouble with their State regulating authorities.

Representative HOSMER. This is really claim-adjustment insurance.

Mr. OLSON. They furnish the service. Perhaps Mr. Lowenstein could explain the element, or Mr. Hennessey.

Mr. HENNESSEY. Under this policy our contractor has an insurance policy with the insurance group. For that a fairly nominal fixed premium is charged annually. If there were an accident the organization of the insurance group would move in, investigate the claims, provide adjustment services, and actually pay the claims up to the amount of the insurance.

What we are thinking of is probably $1 million of underlying insurance. Beyond that amount, we would expect to make arrangements with the insurance group to provide adjustment services against the Price-Anderson indemnity obligation of the Government which falls on top of this underlying insurance.

We would reimburse our contractor or would reimburse the insurance company for all claims and judgments that it paid, plus the actual cost of defense of litigation.

Representative PRICE. How much will this cost the AEC?

Mr. HENNESSEY. We do not yet have a quotation from the groups on a completely retrospective rating plan basis.

Mr. OLSON. Do you know how much it costs us with respect to nonnuclear policies?

Mr. HENNESSEY. I would guess it would be something less than $5,000 a year.

Representative PRICE. You are talking about nonnuclear?

Mr. OLSON. It is essentially the same problem.

Representative PRICE. Do you have any estimate of what you think it would cost on the nuclear end?

Mr. HENNESSEY. We have no basis on the nuclear side, other than to know that we did receive a proposal which had an element of true insurance in it. The premium for some locations was as low as $2,500 a year.

Mr. OLSON. For how much insurance?

Mr. HENNESSEY. For a million dollars, of which the top $100,000 would have been true insurance.

Representative PRICE. Mr. Toll.

Mr. TOLL. Mr. Hennessey, at the bottom of page 2 of the Commissioner's statement it is stated that the insurance companies have indicated that it will be made available at a relatively low premium. You indicate that until recently you held up a decision on this because you were afraid that it was going to cost too much. Do you now know how much it is going to cost?

Mr. HENNESSEY. The initial decision, Mr. Toll, which the Commission made of not requiring underlying insurance was on an estimate of what $60 million of true nuclear coverage would have cost if we purchased insurance from the NELIA-MAELU group. At that time

the estimate was in the neighborhood of $10 million a year. This was complete commercial insurance protection up to $60 million for each Commission installation.

Mr. TOLL. I would think that before you make a commitment to go this route, that you would find out how much it was going to cost the Government.

Mr. OLSON. We have one proposal for a million dollar policy with $100,000 true insurance for $2,500, which is quite an improvement over $10 million premium that was proposed for a $60 million policy. I think this is sufficient to go ahead with negotiations to see what we can get from them. The Commission has authorized this as a matter of policy.

Any specific proposal will come back to us. It has not, as of this moment. I am unfamiliar with the details of any proposal other than what Mr. Hennessey has just given here.

Representative PRICE. Did you have any arrangement for claims service until the present time?

Mr. OLSON. In nonnuclear areas; yes, sir. Did we in nuclear areas?

Mr. HENNESSEY. We have one agreement with a group of independent adjustors under which we can call on them for service if there is an accident, and we would pay whatever the services were worth at the time. There is no premium or fixed charge for this really standby arrangement.

Representative PRICE. On page 4, Mr. Olson, you state that the Commission has revised its position to make Price-Anderson indemnity available to contractors whose only risk is products liability. In 1958, at the indemnity hearings, Mr. Diamond, the Acting General Counsel, stated—

> AEC did not deem it desirable to indemnify those contractors whose only risk is one of products liability.

What has occurred recently to change our position on this question?

Mr. OLSON. I think Mr. Hennessey will have to answer that.

Mr. HENNESSEY. I believe in that same hearing, Mr. Diamond testified that we had under consideration the possibility of extending the Price-Anderson protection to these contractors whose only risk is products liability. I don't know of any new events since that time that make the filling of this gap any more desirable than it was in 1958. But it is a gap in the coverage that is authorized by Price-Anderson which the Commission in its initial action implementing Price-Anderson did not take.

Representative PRICE. Are any additional contractors brought in under the Price-Anderson indemnity as a result of this change in policy? I knew your position at the last hearing but there were some differences. Have any additional contractors been brought under the provisions of the act as a result of what I might say appeared to be at least a change in policy.

Mr. HENNESSEY. There will be some. This is a very recent change in policy, Mr. Price. It will cover for one thing the numerous contractors of AEC who fabricate the cores for the nuclear submarines. Up until now they have not had the Price-Anderson coverage. And several of the weapons contractors would also get this protection.

Representative PRICE. To what extent will this change in policy increase the contingent liability of the Government under Price-Anderson? What is the total Government contingent liability now?

Mr. OLSON. This is a very large question, Mr. Chairman. I personally think it is a very small contingent liability, but I don't think anyone could give you a very concrete estimate of it. We think with our safety rules and procedures and the control over the licensees, the regulations imposed upon them, we think that it is very small.

The object of the Price-Anderson Act, I am sure, was twofold. Not only to protect the public but also to cover an uninsurable risk for industry. I am sure that one of the things in the back of the Congress mind in passing this legislation was to take care of this uninsurable area.

The potential, the likelihood of an accident was considered very remote but if there was one obviously the cost would be very large. I really don't think it is possible for anyone to be very specific about this contingent liability except that I feel that it relates to the type of management and regulation that is exercised upon the industry.

Mr. TOLL. Mr. Olson, if you could count up the number of licenses are contractors covered by this and multiply it by $500 million——

Mr. OLSON. Yes. That is very simple.

Mr. TOLL. That would be the total contingent liability.

Mr. OLSON. In figures, but I think that has to be very seriously qualified. I don't think anyone feels there is much risk. Of course, it is 120 times 500, half a billion or $60 billion potential contingent liability.

Mr. TOLL. How many new contractors will be brought into the program under this new extension?

Mr. HENNESSEY. You must figure one for each new submarine as it goes to sea. Beyond that I wouldn't expect more than three or four.

Mr. TOLL. Admittedly, the likelihood, as you say, is very, very small, but the total contingent liability figure is getting very large.

Mr. OLSON. That is right. On the other hand, this is something that I don't think the insurance industry could ever be expected to handle on its own with such a narrow base. They have only 20 who are buying insurance at the present time out of the 120 who are covered. It gives no base at all for the insurance.

Representative PRICE. Mr. Hosmer.

Representative HOSMER. I have difficulty in trying to adjust my thinking to the necessity for covering these contractors who produce weapons and nuclear reactors for naval ships. Let us assume that there is an incident. Let us take first the case of a naval vessel. The Government is going to be the one responsible, isn't it?

Mr. OLSON. This would be my view, but there are many who are afraid that the insulation of the U.S. Government would be pierced and that the injured party could go back to the supplier. This is a matter of legal theory.

Representative HOSMER. Let us take a reactor, as complicated a piece of machinery as it is, and take the SL–1 accident which we probably have not found out yet what caused it, and try to think of the difficulties of anyone pinpointing a particular company's product as responsibility for an incident, and we get into a real remote area, don't we?

Mr. OLSON. Suppose with respect to the SL–1, suppose you were the injured party and you hypothesized and it was a very dangerous design whereby one control rod moved a certain distance which could

cause it to go critical. It is possible that you could develop a case that might be the basis for liability upon the designer.

Representative HOSMER. Certainly, through the efforts of AEC you have been unable to find the cause of that and I doubt if some plaintiff's attorney would be able to persuade anybody in that regard.

Mr. OLSON. We have been urged by many segments of industry that they feel they are exposed in this area. They feel that there is a hazard. I think, from my standpoint, it seems to me that this is a rather remote risk that is very expensive to insure for which you cannot get an adequate insurance base, and it doesn't seem to me that this is an improper area for the Government to provide indemnity. This is a matter of personal opinion, to be sure.

Representative HOSMER. As a matter of fact, if we provide this insurance coverage it is going to be covered back into the cost of these items to the Government, and we are just going to have more taxpayers' money going into these purchases.

Mr. OLSON. I would think that this would be as logical a place as any for the Government to act as a self-insurer because I don't think there is enough of this insurance to put it on a true insurance basis at this time. I think that if our contractors had to buy insurance or self-insure, that they would have to set up very large reserves that we would have to pay for anyhow, that would be figured in.

I really believe that this is a proper instance for self-insurance on the part of the Government. The Government is purchasing, designing, and operating the submarines and the weapons and these other things. The likelihood is small but if there is an accident, it would be great and you can't get a very good insurance base.

Representative HOSMER. Let us take the present experience. We have had no trouble finding people who wanted to sell the Government nuclear reactors notwithstanding the absence of this protection. I think probably the situation will persist for a few years more, won't it?

Mr. OLSON. I think we have a broader responsibility than that, Mr. Hosmer, to cover this gamble. It may be that in the past they have not minded it, but many of them are becoming aware of this at the present time. I can't persuade myself that it is improper for the Government to give this type of indemnification.

Representative HOSMER. Suppose there is a naval nuclear reactor accident and some plaintiff's case is initiated, the burden of proof certainly does not shift from the plaintiff to some component manufacturer that was listed in the list of 15, 20, 30, or 100 defendants under those circumstances, would it?

Mr. OLSON. The burden of proof would not shift, that is correct. Suppose in the very example that you chose of the SL–1, you are the attorney for the injured party and your theory of the case is that it was a defective design. You institute suit against the designer. I think that you have at least a prima facie case where you might be able to argue and establish liability, remembering that these often come before juries.

Representative HOSMER. Let us explore this. Would the establishment of the occurrence of the accident and the damage to the plaintiff ipso facto shift the burden of proof to the designer in that case?

Mr. OLSON. No.

Representative HOSMER. Proof would have to be shown of negligence in design?

Mr. OLSON. Query about negligence, but you would have to establish responsibility for design. In a lot of area jurisdictions where the question of negligence varies as to what you have to do to establish responsibility. We have this doctrine of absolute liability for inherently dangerous products that is gaining a good deal of ground in the United States.

Representative HOSMER. That is what I am talking about. I think the burden might shift because the accident occurred.

Mr. OLSON. As a practical fact, I would be inclined to agree with you that there would be some jurisdictions where it would be fairly easy to establish a prima facie case of liability.

Representative HOSMER. Let us get into the protection of the weapons components manufacturers. That I find almost an impossibility to get myself into a plaintiff's case mood.

Mr. OLSON. I shared that reaction at the outset because I felt that no court would ever go behind the U.S. possession and responsibility for a weapon, but there are many lawyers, including the lawyers for many people involved in this business, who feel that there is some remote risk, and if there is a risk, I think that it would be better for the Government to assume it than to have it charged into the product.

Representative HOSMER. Let us get into that now. I assume we are talking about a weapon going off when it shouldn't or not going off when it should. Which are we talking about first?

Mr. OLSON. I think if it went off deliberately and the United States was responsible, I don't think there would be question then. I would assume it would have to be a malfunction case where it was not intended that they explode it as a deliberate act of the U.S. Government.

Representative HOSMER. At least we have a few hundred tons of TNT equivalent having dispersed the evidence. Wouldn't it be rather difficult to assess the component manufacturer's delinquency as the responsibility?

Mr. OLSON. I think that is very true, between the two of us, but I think as between juries sometimes these things do happen.

Representative HOSMER. We are dealing in an area of very highly classified security information by reason of which a plaintiff is necessarily denied information that would give him even a prima facie case against component manufacture, aren't we?

Mr. HENNESSEY. I think one thing is possible. If we recognize that the contractor who manufactured the weapon is truly liable and he has been negligent and his negligence, in our opinion, has caused the accident——

Representative HOSMER. You are talking about an instance where you have a manufacturer who is supposed to lay down a complete weapon. Do you have any such instances? You don't have that I know of.

Mr. HENNESSEY. What we had intended was to extend the indemnity agreement in most cases to the final assembler, the contractor who finally assembled the weapon.

Representative HOSMER. You are talking about contractors whose products are incorporated into atomic weapons. That sounds to me like the component manufacturers and not the assemblers. If I could see any reasonable possibility of a case here, I would not be arguing with you. But if there is not, I don't think the additional cost of this

kind of insurance should be factored into the cost of the weapons program.

Mr. OLSON. I think we should get one thing straight. By extending this to the contractor there is no insurance cost added to our product. There is this contingent liability added to the U.S. Government which we think is de minimus. There is no cost added to the product because there is no insurance burden by the contractor.

Representative HOSMER. There is some kind of premium.

Mr. OLSON. Not with respect to the contractors.

Representative HOSMER. The U.S. Government. It is under this procedure that you described that takes out some amount of insurance.

Mr. OLSON. The $2,500 or $5,000 premium on the retrospective rating basis.

Mr. HENNESSEY. I think one argument in favor of giving this indemnity to the contractors is that since the Government will be in possession presumably of the weapon at the time of the accident and very likely would not be held liable under the Federal Tort Claims Act under the discretionary function defense, there is every reason for a plaintiff's attorney to look elsewhere, and to look for the manufacturer or the assembler as a defendant.

Representative HOSMER. I can't possibly see how, even with a lantern in his hand looking around, he could possibly find any place to light after an explosion, assuming some hundreds of tons or kilotons or megatons.

Mr. OLSON. I think in fairness to you, Mr. Congressman, we have not answered your question as to how he would get the evidence to present his case.

Representative HOSMER. We have to know whether he could get evidence to present his case in order to find out whether we are actually dealing with a liability situation.

Mr. OLSON. I can only say that a number of the contractors feel that there is some likelihood of liability here.

Representative HOSMER. I know they always feel that way. They have a legal department that is always edging the board of directors, but whether or not it is reasonable or not, is something else. Isn't that right? We are trying to deal with what is reasonable. If you are going to go into that, too, let us get into the situation where we have one of these components in an antimissile warhead and somebody starts firing missiles at us and we shoot up there to get it and this part doesn't work so the enemy's missile comes in and does some damage, we end up winning the war but how about a plaintiff's lawsuit for damage done by the enemy missile because our antimissile warhead did not function?

We can get pretty far out in some of these.

Mr. OLSON. I assume in that case where it was fired deliberately for defense purposes that there would be much less problem.

Representative HOSMER. The enemy's bomb comes in and does damage to me. I run down to my lawyer and say, "Let us sue this company for not making a good component for that antimissile warhead."

Mr. OLSON. I had not contemplated that case because it would take a while to analyze it properly. The proposition of establishing jurisdictional liability or damage in that case would be more remote than we are talking about here.

Representative HOSMER. I kind of agree with you there but I think your first naval reactor situations are pretty remote, too. I would rather feel more solidly the necessity of this type of protection.

Mr. OLSON. I want to make it clear I agree with you. I think they are remote. However, if we think they are remote and there is very little likelihood of any liability on the part of the Government by extending this indemnity, I feel it is desirable to make the extension of the indemnity. It is going to cost the taxpayer so little to put to rest this particular question. With respect to the retrospective rating policy premium that you spoke of, we would not necessarily have that in every case. In this remote case of the weapons component manufacturer, we had not discussed the question of extending retrospective rating nuclear policies to many. So we would have a good deal of discretion in those to whom we saw fit to extend the retrospective rating type of policy. So I don't believe it would follow that in the case of each component manufacturer we would feel that he had to have the policy of insurance.

(Subsequent to the hearing the AEC submitted the following letter:)

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., April 17, 1962.

Hon. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. HOLIFIELD: As indicated by AEC testimony at the recent Joint Committee hearings on nuclear indemnity and reactor safety, the Commission has made revisions in its policies regarding indemnification of AEC's contractors.

In the past AEC policy has limited availability of Price-Anderson indemnification to those contractors who were engaged in the construction or operation of production or utilization facilities or in other activities involving the risk of occurrence of a substantial nuclear incident.

While the Price-Anderson Act permitted the indemnification of contractors whose only risk was one of liability for a substantial nuclear incident stemming from having supplied a faulty product, design, or service, this authority had not been exercised. Normally those contractors would be protected under the umbrella-type indemnity agreement covering the production or utilization facility in which their products or design are incorporated. In some cases, however, these contractors deliver products that do not find their way into an indemnified facility. For example, we have contractors whose products are incorporated into atomic weapons. We have other contractors who produce fuel elements which are used in naval submarines. These contractors are exposed to the risk of public liability for a substantial nuclear incident and, to the extent that they are not indemnified against that liability, the public may lack protection against the damages that would result from such an incident.

The Commission has now revised its policy in order to fill that gap. Price-Anderson indemnification will now be made available to those AEC contractors whose only risk is one of products liability. The indemnification will take the form of either a Price-Anderson indemnity agreement or a contractual assurance that the contractor will be indemnified under the Price-Anderson indemnity agreement extended to another AEC contractor.

With respect to nonnuclear risks for which insurance is not available, the Commission authorized, in connection with attempts to narrow otherwise broader outstanding indemnities of university contractors, indemnity coverage of losses or expenses subject to the following limitations: Any payments in excess of the obligational limits of the contract shall be subject to the availability of funds and shall not include: costs or expenses arising out of the bad faith or willful misconduct of designated managerial personnel; costs specifically set forth in the contract as being unallowable; and costs not allowable under the tests of allowability established in the contract.

Sincerely yours,

R. E. HOLLINGSWORTH,
Deputy General Manager.

83775—62——2

Representative PRICE. Would you proceed, Mr. Olson?

Mr. OLSON. Within the past few days, the Commission has submitted its comments to the Joint Committee on H.R. 10775. That bill, introduced by the chairman of this subcommittee, would amend the Price-Anderson Act to extend its indemnity protection to cover the liability of AEC contractors, subcontractors, and suppliers for nuclear incidents occurring outside the United States.

I would like to insert in the record at this point my letter containing the Commission's comments on the bill. I will summarize the Commission's position as stated in that letter.

Representative PRICE. Without objection, it will be received for the record.

(The letter referred to follows:)

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., April 6, 1962.

Hon. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. HOLIFIELD: At the request of Mr. Ramey, we are forwarding the following comments concerning H.R. 10775, a bill to amend the Atomic Energy Act of 1954, as amended, introduced by Congressman Price on March 15, 1962.

The general purpose of the bill is to make Price-Anderson Act indemnity coverage available in the AEC contractor program for nuclear incidents occurring outside the United States, with certain limitation.

The Atomic Energy Commission supports the objectives of the proposed amendments. With the introduction of nuclear energy into aerospace applications such as nuclear auxiliary power units and nuclear space propulsion, the Commission's contractors will be undergoing an expanding risk of liability for nuclear incidents that may occur outside the United States. The construction by the Commission of nuclear powerplants outside the United States, such as the plants in Antarctica, exposes the Commission contractors involved to risks of liability not now covered by the Price-Anderson Act. If the Commission furnishes reactor design or other technical data, or supplies reactor components of fuel elements, to foreign countries for use in reactor construction, the Commission contractors who engage in these activities may be held liable for a nuclear incident occurring in a foreign country and would not be protected by the statutory indemnity.

The Commission has recognized in such instances that its contractors are entitled to protection against this risk of foreign liability. Since an indemnity agreement entered into under the authority of the Price-Anderson Act would not cover liability for foreign incidents, the Commission has exercised its general contract authority in entering into agreements with those contractors indemnifying them against public liability for nuclear incidents occurring outside the United States. Due to statutory restrictions on the Commission's contract authority these indemnity agreements are normally made subject to the availability of appropriated funds to meet the indemnity commitment. The Commission recognizes that an indemnity agreement, so conditioned, affords less protection than a contractor may reasonably expect in the light of the magnitude of the risk of liability incurred. The proposed amendments would have the purpose of providing to these contractors the assurance of an unconditional indemnification against liability for foreign nuclear incidents arising out of or in connection with their contract activtes. The Commssion believes ts contractors should have this additional asssurance.

We have the following comments concerning the specific provisions of the proposed bill:

The proposed amended definition of "person indemnified" in subsection 11r of the act would include, with respect to a nuclear incident occurring outside the United States, any 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 provisions of section 170d has been extended, or under any subcontract, purchase order or other agreement, of any tier, under any such contract or project." The term "project," as so used, is understood to refer to the authority granted to the Commission by the third sentence of

subsection 170d of the act which provides: "The provisions of this subsection may be applicable to lump-sum as well as cost-type contracts and to contracts and projects financed in whole or in part by the Commission."

Under this authority, the Commission has entered into indemnity agreements only with AEC contractors, but has extended the coverage of the indemnity to specified contracts between the contractor and other Government agencies who are engaged in joint projects with the Commission to which the Commission makes a financial contribution. We would understand that the proposed amendment to subsection 11r would simply extend the coverage of such indemnity agreements to apply to nuclear incidents occurring outside the United States and that the extended coverage would apply only to the liability of a Commission contractor and any other person who may be liable by reason of his activities under any subcontract, purchase order or other agreement, of any tier, under a Commission contract or under a contract with another Government agency to which indemnity has been extended in the manner described above.

Section 3 of the bill would amend subsection 170(d) of the act by providing that, in the case of nuclear incidents occurring outside the United States, the amount of the Commission indemnity shall not exceed $100 million. While this amount is substantially less than the $500 million indemnity provided domestically, we consider it to be reasonable in view of the fact that $100 million is within the range of the maximum amount of indemnity presently provided or contemplated by any foreign government.

Section 4 of the bill would amend subsection 170(e) of the act by (1) providing that, with respect to a nuclear incident occurring outside of the United States, the aggregate liability of persons indemnified for a single nuclear incident shall not exceed the amount of $100 million together with the amount of financial protection that may be required of the contractor; and (2) by establishing the U.S. District Court for the District of Columbia as the court having venue as to all applications for limitation of liability on account of foreign nuclear incidents.

The Commission believes that the proposed limitation of $100 million is reasonable and necessary if the indemnity afforded is to limited to $100 million. The proposal is consistent with a fundamental principle of the Price-Anderson Act itself—that the liability of persons indemnified should not exceed the amount of indemnity provided by the Government. The amount of $100 million is within the range of the maximum limitation on liability adopted or contemplated by any foreign government. While we must recognize that this limitation on liability may not be recognized in a foreign jurisdiction which has adopted no legal limit of liability, it is the intention of the bill that persons indemnified would be fully protected by the limitation of liability in the courts of the United States in the event that an attempt were made to enforce in our courts foreign judgments in excess of the proposed legal limit on liability.

With respect to the amendment establishing venue in the U.S. District Court for the District of Columbia, your committee may wish to obtain the views of the Department of Justice. This amendment would have the incidental effect of requiring that applications for limitation of liability in connection with operation of the NS *Savannah* be filed in the District of Columbia rather than in the district court having venue in bankruptcy matters over the location of the principal place of business of the shipping company owning or operating the ship, as now provided by subsection 170(e).

The Commission believes that, in the interest of uniformity of application of the limitation of liability provisions as applied to liability for foreign nuclear incidents, it is desirable that the venue over all such proceedings be established in a single district court. Persons indemnified in connection with the *Savannah* activities would not seem to be seriously inconvenienced by a requirement that they seek relief in the district court for the District of Columbia.

Section 5 of the bill would provide that the terms "nuclear incident" and person indemnified," as used in existing indemnity agreements with Commission contractors would have the meaning provided by sections 1 and 2 of the bill. This provision was suggested by the Commission in our letter of July 8, 1961, commenting on the amendments to the Price-Anderson Act proposed by Mr. Clark Vogel. Our purpose at that time was to enable the providing of the extended indemnity coverage under existing Commission contracts without the necessity of amending the outstanding indemnity agreements. Under Mr. Price's bill, however, it will be necessary to amend the outstanding indemnity agreements in any event in order to reduce the amount of the indemnity against foreign liability to $100 million in accordance with the provisions of section 3 of the

bill. Under the circumstances, the Commission believes that it would be desirable to eliminate section 5 of the bill. If permitted to stand, it would have the effect of extending, at least temporarily, the $500 million indemnity coverage under existing contracts to liability for nuclear incidents occurring outside the United States—a result inconsistent with the purpose and provisions of the bill.

The Bureau of the Budget advises that, while there is no objection to the presentation of this report, it believes that coverage of the type contemplated by the bill should not extend beyond situations where nuclear facilities, products, or designs are owned or used by or for the United States. The Bureau of the Budget considers that further study is required to determine the necessity or desirability for providing the proposed indemnification outside the United States in other cases, where the United States would have no direct responsibility or control, for example where designs or components are made available to foreign governments.

Sincerely yours,

LOREN K. OLSON, *Commissioner.*

Mr. OLSON. The Commission supports the objectives of the bill. With the introduction of nuclear energy into aerospace applications, such as nuclear auxiliary power units and nuclear space propulsion, our contractors will be undergoing an expanding risk of liability for nuclear incidents that may occur outside the United States.

The construction by AEC of nuclear powerplants outside the United States, such as those in Antarctica, exposes contractors to risks of liability not now covered by the Price-Anderson Act. Contractors who provide design services to AEC or deliver reactors components or fuel elements to AEC may be held liable if their products are incorporated into a foreign reactor and cause a nuclear accident. They would not be protected under the statutory indemnity. The Commission believes that these contractors, and their subcontractors, suppliers, and carriers are entitled to protection against the risk of liability for nuclear incidents occurring outside the United States.

Section 3 of the bill would limit the amount of the AEC indemnity to $100 million in the case of liability for a foreign incident. We consider that amount reasonable in view of the fact that $100 million is within the range of the maximum amount of indemnity provided by any foreign government.

Section 4 of the bill would limit the aggregate liability for a foreign nuclear incident to $100 million together with the amount of financial protection that the contractor may be required to furnish. We consider the amount of the limitation reasonable, since it is within the range of the maximum limitation of liability adopted or contemplated by any foreign government. It is most desirable and consistent with a fundamental principal of the Price-Anderson Act that the liability of persons indemnified should not exceed the amount of indemnity provided by the Government.

While we recognize that this limitation of liability may not be applied in a foreign jurisdiction, it is the intention of the bill that persons indemnified would be fully protected in the courts of the United States in the event that an attempt were made to enforce in our courts foreign judgments in excess of the proposed legal limit of liability.

Section 5 of the bill would provide that the terms "nuclear incident" and "person indemnified," as used in existing indemnity agreements with AEC contractors would have the meaning provided in sections 1 and 2 of the bill. This section was also included in H.R. 9244, which was introduced last year, and in that bill had the purpose of enabling AEC to provide the extended indemnity coverage under existing AEC

contracts without the necessity of amending the outstanding indemnity agreements.

Under H.R. 10775, however, it will be necessary to amend the outstanding indemnity agreements in any event in order to reduce the amount of the indemnity against foreign liability to $100 million.

If section 5 were permitted to stand, it would have the effect of extending, at least temporarily, the $500 million indemnity coverage under existing contracts to liability for nuclear incidents occurring outside the United States, a result inconsistent with the purpose and provisions of the bill. Under the circumstances, the Commission believes that it would be desirable to eliminate section 5 of the bill.

The Bureau of the Budget has advised that, while there is no objection to the presentation of the Commission's views, as expressed in my letter, it believes that coverage of the type contemplated by the bill should not extend beyond situations where nuclear facilities, products, or designs are owned or used by or for the United States. The Bureau of the Budget considers that further study is required to determine the necessity or desirability for providing the proposed indemnification outside the United States in other cases, where the United States would have no direct responsibility or control, for example, where designs or components are made available to foreign governments.

Another indemnity matter of current interest is that pertaining to toll bridge, tunnel, highway, and port authorities.

As you may recall, during the indemnity hearings last year, representatives of the American Bridge, Tunnel, and Turnpike Association and other similar groups advised the joint committee of their apparent inability to obtain satisfactory first person property damage and loss of revenue insurance for their facilities, insurance which they believe is necessary to protect their properties against the risk of nuclear incidents occurring in the transport of radioactive materials over and through their facilities.

Their original position was that the scope and amount of coverage being offered was inadequate and that the premiums proposed were too high. It is now possible to state that these views may be modified for, until recently, there had been a lack of certainty with respect to the coverage being offered by the insurance industry and the procedures by which appropriate insurance could be acquired. It now appears that some of the misunderstandings on both sides have been cleared up.

A number of problems remain to be solved but both sides have expressed a willingness to tackle these problems promptly. Nonetheless, even if property insurance is made available on terms and conditions satisfactory to the authorities to cover property damage caused by radioactive materials in transit on or through their facilities, it is our understanding that this coverage will not solve their problem completely.

For example, we understand that the authorities feel that the $61.7 million presently available per risk for first party property damage is not adequate in amount for complete protection of their facilities.

While the authorities have also expressed a desire for first party property insurance against damages resulting from nuclear incidents off the site of the transportation facility, such as incidents at reactor sites, this is a separate question unrelated to the transportation problem.

On the liability side, the authorities have objected to the exclusion of the nuclear hazard—that is, all except hazards from commercial isotopes—from their general liability policy about 2 years ago.

While the insurance industry has offered a separate nuclear liability policy under which third party liability coverage may be obtained by the toll authorities in amounts up to $60 million, the authorities are not fully satisfied with its terms and conditions. For example, this policy, as other third-party liability policies in the nuclear field, has a 2-year limitation on the filing of claims after the end of the policy period.

As a result of a meeting we had on April 3, 1962, with representatives of both groups, during which the problems I have just referred to were discussed in detail, we are hopeful that the toll authorities' insurance problems will be solved by further negotiations between the insurance industry and the toll authorities.

These negotiations may not accommodate the desire of the authorities to obtain first-party property insurance in excess of the capacity available which, we understand to be, at present, $61.7 million.

Also, in the transportation area, representatives of the Traffic Executives Association—Eastern Railroads have raised a number of indemnity matters relating to rail shipments of radioactive materials by the Commission.

The Commission was put on notice by an authorized representative of the eastern railroads in a letter dated November 22, 1961, that various transportation agreements—section 22 quotations—specifying terms and conditions for transporting certain radioactive materials for AEC in the eastern part of the United States were to be canceled effective January 25, 1962—subsequently extended to September 30, 1962.

One effect of these agreements is to eliminate the necessity for individual negotiations on each shipment. In the event of cancellation of these agreements, it would then become necessary for the Commission to enter into individual agreements with the eastern railroads to arrange for transportation services and negotiate charges for each subsequent shipment now covered under the blanket documents.

In view of the potential impact of the eastern carriers' proposed action, representatives of the Commission have held meetings with representatives of the eastern railroads in an effort to define the problems and attempt to resolve them satisfactorily. Western and southern railroad representatives were also present but did not generally support the eastern carriers' viewpoint, nor were they proposing cancellation action of AEC agreements in their respective territories.

During the course of the meetings, the railroad representatives presented numerous questions as to the extent of coverage under Price-Anderson. In this connection, their questions touched on such points as the effect of differing State tort law on the scope of Price-Anderson protection; definitions of "on-site" and "off-site" in relation to property damage and workmen's compensation claims; the availability of of funds in the event of a nuclear incident in rail transportation; and the application of Price-Anderson indemnity to loss of use of right-of-way and loss of profits.

Considerable discussion was also had as to the availability of and procedures for obtaining radiological assistance in the event of a rail-

road accident involving radioactive materials; the adequacy of description of the material being shipped; the proper charges to be made for the transportation service; and the scope of Interstate Commerce Commission regulations concerning radioactive materials.

Subsequent to the meetings, the eastern carriers formally submitted a number of detailed questions to which AEC has responded. If the committee so desires, we will insert into the record a copy of this correspondence.

Representative PRICE. Without objection, it will be included in the record.

(The correspondence referred to follows:)

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., April 4, 1962.

Mr. O. E. SCHULTZ,
Traffic Executive Association—Eastern Railroads,
New York, N.Y.

DEAR MR. SCHULTZ: This is in response to your letter dated February 9, 1962, in which you raised a number of questions concerning transportation of radioactive materials.

As you know, there have been a number of recent meetings between representatives of the eastern railroads and AEC personnel with respect to these questions. In these meetings, the substantial protection available to rail carriers through AEC Price-Anderson agreements, and nuclear liability and property insurance policies, was explained in considerable detail. In addition, the safety and operating aspects of transportation of radioactive materials, as well as the scope of applicable Government regulations, were discussed at length.

Since the questions posed in part I of your letter involved legal interpretations of the Atomic Energy Act, I requested the views of the Commission's General Counsel on those matters. I am attaching a copy of his response as annex A. Answers to the questions presented in parts II through VII of your letter are also attached as annex B.

I hope that you will find this information helpful in the resolution of your problems. If we can be of further assistance, please feel free to get in touch with us.

Sincerely yours,

E. J. BLOCH
(For General Manager).

Attachments:
1. Annex A.
2. Annex B.

ANNEX A

U.S. GOVERNMENT MEMORANDUM

APRIL 4, 1962.

To: A. R. Luedecke, General Manager.
From: Neil D. Naiden, General Counsel.
Subject: Answers to questions posed by eastern railroads in February 9, 1962, letter on transportation of radioactive materials.

You have referred to me for my opinion the questions relative to the Price-Anderson Act presented in part I of a letter addressed to you by the Traffic Executive Association—Eastern Railroads, on February 9, 1962. This memorandum presents my views on those questions.

"I. Is it possible, within the scope of the Price-Anderson Act amendment to the Atomic Energy Act of 1954, for the eastern railroads to be completely protected and indemnified under all situations where claims may arise by reason of the radioactive character of the shipment?"

Answer. The Price-Anderson amendments to the Atomic Energy Act of 1954 limit the scope of the indemnity agreement AEC is authorized to make. Price-Anderson does not authorize AEC to indemnify eastern carriers in all situations where claims may arise by reason of the radioactive character of the shipments.

"1. Are we correct in assuming that the indemnity coverage applies to the transportation of radioactive materials only when such materials are being transported to or from (*a*) the location of a licensed reactor, (*b*) the contract

location of an indemnified Atomic Energy Commission contractor, or (*c*) Atomic Energy Commission shipments covered by the indemnity contract between the Atomic Energy Commission and the Traffic Executive Association—Eastern Railroads?"

Answer. At the present time, the Price-Anderson indemnity coverage applicable to rail carriers is as you describe it.

"2. Are we correct in assuming that the coverage outlined above is not the entire range of possible indemnity coverage under the Price-Anderson Act amendment?"

Answer. The only persons with whom Price-Anderson agreements have been executed are those licensees operating utilization facilities, and those contractors doing contract work involving the risk of occurrence of a substantial nuclear incident. Price-Anderson indemnity agreements could also be executed with production facility licensees when such facilities go into operation.

"3. Assuming that the material involved can create a risk of a substantial 'nuclear incident,' could the Atomic Energy Commission, under the Price-Anderson Act amendment, extend indemnification to materials licensees by requiring underlying insurance so that shipments of radioactive materials made to or from facilities of materials licensees could be covered?"

Answer. The Price-Anderson Act requires that faciity licensees have and maintain financial protection of such type and in such amounts as the Commission shall require to cover public liability claims. The act leaves to the Commission's discretion the extent to which indemnity coverage should be extended to other types of licensed activity involving the possession or use of special nuclear material, byproduct material, or source material. If a Price-Anderson agreement were executed with a materials licensee, transportation of radioactive material to or from the plant of the licensee would be covered by the indemnity. However, the Commission has decided not to extend indemnity to processors of unirradiated fuel elements (see AEC Public Announcement D–341, December 8, 1961).

"4. How does the Atomic Energy Commission interpret the phrase 'at the site of and in connection with activity where the nuclear incident occurs?' "

"5. Specifically with respect to the transportation of radioactive materials by railroad, how does the Atomic Energy Commission interpret this phrase in the event of a railroad accident?"

"6. Is 'site' of a nuclear incident limited to (*a*) the car, cask, and container, (*b*) railroad equipment and property that might be involved at the immediate location of the accident, (*c*) all property of the carrier that might be involved in radiation contamination, and (*d*) any other property of the carrier, wherever located?"

Answer. We understand your questions relate to the language of section 11 u. of the Atomic Energy Act of 1954, as amended by Public Law 87–206. This section reads:

"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; (ii) claims arising out of an act of war; and (iii) whenever used in subsections 170 a., c., and k., claims for loss of, 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."

In the event of a nuclear incident in the transportation of radioactive material by rail, which incident was covered by a Price-Anderson agreement, the terms of the applicable agreement would govern. The present standard form agreement with facility licensees furnishing proof of financial protection in the form of a nuclear energy liability policy states:

(10 CFR, sec. 140.76, app. B, art. I, par. 6.)

" 'Public liability' means any legal liability arising out of or resulting from a nuclear incident, except (1) claims under state or Federal Workmen's Compensation Acts of employees of persons indemnified who are employed (a) at the location *or, if the nuclear incident occurs in the course of transportation of the radioactive material, on the transporting vehicle*, and (b) in connection with the licensee's possession, use, or transfer of the radioactive material; (2) claims

arising out of an act of war; and (3) claims for loss of, or damage to, or loss of use of (a) property which is located at the location and used in connection with the licensee's possession, use, or transfer of the radioactive material, and (b) *if the nuclear incident occurs in the course of transportation of the radioactive material, the transporting vehicle, and containers used in such transportation and the radioactive material.*" [Emphasis supplied.]

(10 CFR sec. 140.76, app. B, art. III, pars. 1 and 2.)

"1. The Commission undertakes and agrees to indemnify and hold harmless the licensee and other persons indemnified, as their interest may appear from public liability.

"2. With respect to damage caused by a nuclear incident to property of any person legally liable for the nuclear incident, the Commission agrees to pay to such person those sums which such person would have been obligated to pay if such property had belonged to another; provided, that the obligation of the Commission under this paragraph 2 does not apply with respect to:

"(*a*) Property which is located at the location described in Item 4 of the Attachment or at the location described in Item 3 of the declarations attached to any nuclear energy liability insurance policy designated in Item 5 of the Attachment;

"(*b*) Property damage due to the neglect of the person indemnified to use all reasonable means to save and preserve the property after knowledge of a nuclear incident;

"(*c*) *If the nuclear incident occurs in the course of transportation of the radioactive material, the transporting vehicle and containers used in such transportation;*

"(*d*) *The radioactive material.*" [Emphasis supplied.]

The present standard form agreement with AEC contractors does not contain the same language as the licensee agreement. However, it is the Commission's intent that the standard licensee and contractor Price-Anderson agreements be similarly interpreted.

We assume question 6 concerns the "on-site" exception in the case of claims of a railroad for damage to its own property arising from a nuclear incident.

In response to this question, the licensee indemnity agreements contemplate that only the radioactive material, transporting vehicle, and container should be considered to be "property which is located at the site of and used in connection with the activity where the nuclear incident occurs." All other property, such as rights-of-way, stations, bridges, etc., is not, in our opinion, "on-site" property. The "on-site" exception, we believe, should be and would be construed narrowly by the courts.

"7. In the event of a railroad accident, would the traincrew involved in moving such shipment fall within the category of 'employees of persons indemnified who are employed at the site of and in connection with the activity where the nuclear incident occurs' under the following circumstances:

"(*a*) Where the car containing the shipment of radioactive materials is only one of a number of cars moving in ordinary train service;

"(*b*) Where the car containing the shipment of radioactive materials is the only car under load in the train, the other cars being limited to idlers or buffers or cars carrying personnel of the AEC or the shipper who are acting as couriers for the shipment and

"(*c*) Where the car carrying the shipment is one of several cars in the train containing radioactive material, including buffers and idlers and courier cars (but no cars of other freight)?"

"8. Assuming that no railroad accident is involved, would the train crew operating a train carrying radioactive materials be 'employees of persons indemnified who are employed at the site of and in connection with the activity where the nuclear incident occurs' if any of said crew in the ordinary course of their duties claimed to have incurred injury as a result of exposure to said shipment under the following conditions:

"(*a*) Where the car containing the shipment of radioactive materials is only one of a number of cars moving in ordinary train service;

"(*b*) Where the car containing the shipment of radioactive materials is the only car under load in the train, the other cars being limited to idlers or buffers or cars carrying personnel of the AEC or the shipper who are acting as couriers for the shipment and

"(*c*) Where the car carrying the shipment is one of several cars in the train containing radioactive material, including buffers and idlers and courier cars (but no cars of other freight)?"

Answer. If we assume that the interpretation of the "on-site" exception stated above is accepted as correct, then the only workmen's compensation claims excluded from indemnity coverage would be those of employees of persons indemnified whose duties involved performance of work on the railroad car transporting the radioactive material. For example, if the railroad were liable for legal liability arising out of or resulting from a nuclear incident, we do not envision that Price-Anderson indemnity would cover workmen's compensation claims of railroad employees whose duties involved performance of work on the railroad car transporting the radioactive material. (See S. Rept. No. 296, 85th Cong., 1st sess., to accompany S. 2051, May 9, 1957, p. 18).

It would also appear that neither the exact composition of the train, nor the fact that a nuclear incident occurred without an intervening "railroad accident," would be necessarily controlling with respect to the applicability of the "on-site" exception.

"9. Assuming the car carrying the radioactive material requires maintenance or repairs while under load, would employees of the carriers acting within the scope of their duties be 'employees of persons indemnified who are employed at the site of and in connection with the activity where the nuclear incident occurs.'

"(*a*) If the maintenance or repairs are conducted while the car is in the train and on the road;

"(*b*) If the car is set out of the train on the road;

"(*c*) If the car is serviced at a repair track maintained for the purpose of making such repairs and

"(*d*) If the car is in a shop maintained for the purpose of making such repairs?"

"10. Assuming there is a railroad accident involving a train carrying radioactive material, which requires emergency crews of the carriers to clear the wreck and restore the right-of-way to serviceable condition, would such emergency crews be 'employees of persons indemnified who are employed at the site of and in connection with the activity where the nuclear incident occurs?' "

Answer. In our answers to questions 7 and 8, we attempted to set forth the principles governing the determination of which employees would be considered "on-site." We think these same principles apply to the factual situations you have posed in questions 9 and 10. Train wreck crews and similar employees are probably not employed "on the transporting vehicle" and hence are not employed "on-site."

"11. What does the AEC deem to be 'an act of war' which would except claims from the application of the Price-Anderson Act amendment?'

"12. Specifically, would the AEC construe sabotage by a Cuban sympathizer of a car of irradiated spent fuel core elements moving in a train or standing in a yard, which resulted in a 'nuclear incident,' as being 'an act of war' which would exclude claims for injuries resulting from such incident from indemnity under the Price-Anderson Act amendment?"

Answer. The above-mentioned report discusses the "act of war" exception at some length, as well as the question of sabotage. On page 18, the report states:

"Any single act of sabotage would be covered by the indemnification provisions of the bill if it could not be proven to be an act of war."

Legal precedents applicable to this phrase as it appears in insurance policies would probably be relevant.

"13. Does the Atomic Energy Commission consider the Federal Employers Liability Act as falling within the definition of 'State or Federal Workmen's Compensation Acts' as that term is used in section 3u of the Price-Anderson Act amendment?"

"If so, please explain. (See *Wilkerson* v. *McCarthy*, 336 U.S. 53 at 66.)"

Answer. The case you have cited seems to have a bearing on the question you have raised, as does the above-mentioned report. We do not think it is appropriate for this agency to comment on the Federal Employers Liability Act.

"14. Are there any other exclusions from the right to indemnity under the Price-Anderson Act amendment other than those set forth in section 3u of that amendment?"

"If so, please explain."

Answer. The language of the entire Price-Anderson Act must be taken into consideration in determining whether indemnity coverage exsits; for example, the definition of "nuclear incident."

"15. Does the Atomic Energy Commission have authority under the present statutes to provide, by regulations or by contract, that, in the handling of shipments of radioactive materials for any person (the term 'any person' to include all persons having authority or right to ship radioactive materials) whether moving under commercial or Government bill of lading, an eastern railroad would be indemnified for—

"(*a*) injury to railroad employees and others caused by radiation exposure, with or without negligence;

"(*b*) damage to property, including the car, cask, or container and including property of the railroads and others, with or without negligence and

"(*c*) loss of profits to the railroad where its right-of-way may be interdicted;

"whether such loss, injury, or damage is caused by negligence of the railroad, negligence of third parties for which the railroad is not responsible or without negligence being present on the part of anyone involved?"

"16. If the AEC has such authority, how would an eastern railroad obtain such a right of indemnity?"

Answer. As we have pointed out above, the Commission possesses authority under the Atomic Energy Act of 1954 to enter into Price-Anderson agreements with its licensees, and with its contractors where there is involved a risk of public liability for a substantial nuclear incident. The Price-Anderson provisions of the Atomic Energy Act do not authorize agreements with persons who are neither contractors nor licensees of the AEC although as you know, Price-Anderson agreements protect all "persons indemnified," not just the person with whom the agreement is executed.

"17. If the AEC does not have such authority, would it be willing to seek an amendment to the Atomic Energy Act giving the Commission such authority?"

Answer. A number of different kinds of programs of indemnification were considered prior to the adoption of the Price-Anderson Act in 1957. One of these would have provided a complete system of Government insurance (H.R. 9701, 84th Cong., 2d sess.). This plan was rejected since its adoption would have left no room for private insurance carriers and would have involved the Government in the settlement of very small claims. It should be remembered that the Price-Anderson Act does not authorize AEC to enter into agreements indemnifying persons against all nuclear risks. Furthermore, the indemnity program is not a compensation program, but is a program under which commercial insurance and Govenment indemnity combine to indemnify persons against legal liability for the consequences of a nuclear incident.

The Price-Anderson idemnity authority is temporary in that it extends only to contracts and licenses executed by the Commission prior to August 1, 1967. The report on the Price-Anderson Act states, on page 9, that "During the 10-year period [prior to August 1967] 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." Therefore, it seems unlikely that the Commission would now propose an amendment so at variance with the intent of Congress, as expressed in the act.

"18. Since the Atomic Energy Commission has indemnified the railroads by contract with respect to all AEC shipments, would the Atomic Energy Commission be willing to give eastern railroads, by contract, the same indemnity with respect to shipments moving for the account of (a) a prime facility contractor of the AEC, (b) a material licensee of the AEC, (c) a licensed reactor operator of the AEC, (d) a materials supplier to the AEC, a prime facility contractor, a material licensee or a reactor operator and (e) departments of the Government other than the AEC?"

Answer. In our answers to other questions, we have emphasized that the Commission's authority to enter into an indemnity agreement is statutory, and that the extent and scope of indemnity which the act authorizes AEC to provide are determined by the statute. The act authorizes the Commission to enter into indemnity agreements with its licensees, and with its contractors where there is involved a risk of public liability for a substantial nuclear incident. Price-Anderson does not authorize the Commission to enter into indemnity agreements with persons who are neither prime contractors nor licensees of the AEC. Accordingly, the Commission is not authorized by the Price-Anderson Act to enter into the type of agreement you describe. However, Price-Anderson agreements of AEC contractors and licensees provide very extensive protection to the railroads.

The Price-Anderson policy of the Commission is based on the principle that any nuclear incident should be covered by only one indemnity agreement. The report (p. 17) states:

"Having the agreement run to the benefit of any other person who may be liable will parallel the policies which the insurance companies are planning to issue. They, too, will be entered into with the licensee or prime contractor and will run for the benefit of any other person who may be liable. This method of approach was suggested by the insurance companies since they did not want to have a pyramiding of insurance at a reactor. This pyramiding could result from having each of the designers, owners, contractors, and others interested in the reactor taking out separate policies of insurance."

If this policy were not followed, confusion would prevail if a nuclear incident did occur and was covered by numerous indemnity agreements, each with a different contractor. The law was written so as to preclude the necessity for countless agreements. As we have said, a single Price-Anderson agreement protects all "persons indemnified" from public liability arising out of a nuclear incident, not just the person with whom the agreement is executed. Only the agreement is conditioned by the necessity for a risk of occurrence of a substantial nuclear incident. Once an indemnity agreement has been executed, it covers all public liability arising out of the nuclear incident.

"19. If the AEC either lacks authority or is unwilling to make such a contract, how are the railroads to determine the currently effective derivative Price-Anderson Act indemnity available to them with respect to the several different classes of shippers?"

Answer. The Price-Anderson Act requires that its indemnity provisions apply with respect to all licensed production and utilization facilities. The Commission has entered into indemnity agreements with all of its prime contractors, including operating contractors, where the contract work involves the risk of occurrence of a substantial nuclear incident. Therefore, with respect to these two categories—licensed production and utilization facilities and AEC operating contractors—you may be assured that there will be an indemnity agreement in effect. Licensee indemnity agreements are available in the Commission's public document room, 1717 H Street NW., Washington 25, D.C.

The Commission's indemnity regulations (10 C.F.R. 140.9) state that the Commission will publish in the Federal Register with at least 15 days' advance notice, a notice of intent to enter into or amend a licensee indemnity agreement with provisions different from those in 10 C.F.R., part 140.

We recently furnished you a list of licensees and contractors with whom the Commission has executed indemnity agreements. If you wish, we will arrange it so that the list will periodically be brought up to date and sent to you.

If you need further information regarding indemnity coverage in a particular case, you can obtain it. Information as to any insurance which parties have in addition to the financial protection insurance required by the act, would have to be obtained from the parties.

"20. If the AEC should withdraw its indemnity to any of the above classes of shippers, how would the railroads receive notice of such withdrawal?"

Answer. With respect to licensed production and utilization facilities, Price-Anderson indemnity is mandatory. In the unlikely event that the Commission changes its indemnity policy with respect to contractors, the indemnity agreements can be modified only with the consent of the contractor—and then would have no retroactive effect. Any such action would be publicly announced.

"21. In respect to any of the above, does the AEC recognize any distinction in its responsibility whether the shipment moves under a Government or commercial bill of lading, and does the nature of the bill of lading have any consequence as to the right of the railroad to obtain indemnification for claims and losses resulting from a 'nuclear incident?'

"If so, please explain."

Answer. The type of bill of lading used has no consequence or effect on indemnity coverage which might otherwise be available pursuant to an indemnity agreement.

"22. Does the AEC recognize any distinction between 'nuclear incidents' occuring within the United States with respect to shipments originating and terminating in the United States as contrasted with shipments originating in a foreign country and moving to an AEC prime facility contractor in the United States? (Example: Shipments of irradiated spent fuel elements from Rowe, Mass., to Savannah River, S.C., as contrasted with the same class of shipments from Chalk River, Ontario, to Oak Ridge, Tenn.)

"If so, please explain."

Answer. The fact that a shipment originated outside of the United States has no bearing if a nuclear incident occurs within the United States and results in public liability of "persons indemnified."

ANNEX B

QUESTIONS AND ANSWERS—PARTS II THROUGH VII

"II. Would the AEC list specifically the commodities that should be included in the following classifications:

"1. All classes of material which involve risks of criticality under any conceivable conditions."

Answer: Radioactive materials which are fissionable are the only class that involves risk of criticality. They can be specifically identified as the three fissionable isotopes, namely U–235, U–233, and plutonium (primarily Pu–239), under present conceivable conditions.

"2. Assuming an accident, list all materials which could contaminate the right-of-way or equipment of the railroad to the extent that radiation injury could result to railroad personnel, passengers, or the general public that might in any way be involved, classified according to the following classifications: (a) Radioactive material constituting a single source of radiation from a solid metallic substance; (b) Radioactive material that is any other solid (including powders, etc.) insoluble in water; (c) Radioactive material that is any other solid soluble in water; (d) Radioactive material that is a liquid; (e) Radioactive material that is a gas, other than an inert gas; and (f) Radioactive material that is or could be toxic or otherwise constituting an etiological agent, in addition to being radioactive."

Answer: The list of materials which "could contaminate the right-of-way or equipment of the railroad to the extent that radiation injury could result" is a lengthy one. If one approaches this from the standpoint of reasonable probability and considers packaging to provide reasonable assurance that the material will not be released except under very severe accidents, it is accurate to conclude that the severity or seriousness of an accident is not increased under most circumstances by the presence of a radioactive shipment, provided the container is not breached. Shipments which do not exceed the quantity limit specified in ICC regulations are not likely to cause serious personal injury even if the container is breached.

A classification of radioactive materials, with consideration for the packaging, has been prepared by the International Atomic Energy Agency in Safety Series No. 6[1] and discussed in No. 7.[2] This classification was adopted by the Interagency Committee on the Transportation of Radioactive Materials in the United States and published in their "Draft Technical Standards." The information on toxicity classification and package limitations is found in the "Draft Technical Standards," pages 3 and 4, attached.

"3. Assuming an accident involving the most adverse conditions which would violate the integrity of the cask or container, what materials could contaminate the air or involve a fire hazard, classified as follows: (*a*) Radioactive materials which would dissipate without risk of radiation injury (such as inert gas) or which will not contaminate air to the point of producing radiation or toxic injury to persons that might be involved if the cask or material is subjected to a fire that might be created by collision with cars of alcohol, liquified petroleum gas, gasoline, powdered magnesium, and so forth; (*b*) radioactive

[1] International Atomic Energy Agency Safety Series No. 6 was prepared by two committees of international experts and was published by the IAEA in 1961. This document was used as the basis for the preparation of the "Discussion Draft of Technical Standards To Be Used as a Basis for Preparation of Regulations for the Safe Transport of Radioactive Materials" by the Interagency Committee on Transportation of Radioactive Materials. The membership of this latter committee includes representatives of the Atomic Energy Commission, Interstate Commerce Commission, U.S. Coast Guard, Federal Aviation Agency, Post Office Department, and Bureau of Explosives of the United States. The discussion draft referred to above is not a regulatory document. It attempts, however, to set forth the technical basis for transport safety regulations (by the agencies having jurisdiction on such matters) which can form the foundation for relatively uniform regulatory issuances of each of the various U.S. agencies regulating the transport of radioactive materials.

[2] An explanatory document, "Notes on Certain Aspects of the Regulations—Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 7," was also prepared by the IAEA and contains much of the technical basis for development of the IAEA Safety Series No. 6.

materials which are spontaneously combustible or which will sustain combustion once ignited or which will otherwise volatilize without the intervention of other material and contaminate the air to the extent necessary to produce radiation or toxic injury to persons that might be involved; (*c*) radioactive materials which are combustible or which will volatilize in a fire that might be created by collision with cars of alcohol, liquified petroleum gas, gasoline, powdered magnesium, and so forth, and which could result in radiation or toxic injury to persons that might be involved; and (*d*) radioactive materials which, if involved in a fire, should not be extinguished with water and other extinguishing material normally employed by fire departments."

Answer: Any radioactive material can contaminate the air if in gaseous or powder form or when burned. However, there will be varying degrees of hazard. For a discussion of the extent of the hazards and calculations pertaining to safe quantity limits, we refer you to pages 25 through 78, IAEA Safety Series No. 7.

Any material which is combustible in its nonradioactive form will be combustible in its radioactive form. Thus the alkali metals, sodium, potassium, lithium, and so forth, are highly combustible whether irradiated or not. In most cases, however, the actual amount of material involved in shipment (when in radioactive form) is so small as to not be a consideration. Radioactive isotopes of carbon and hydrogen can be incorporated in many organic compounds which are combustible. Some metals, i.e., plutonium, uranium, thorium, zirconium, and so forth, particularly in the form of small particles, are unpredictably combustible. Likewise any material which can be volatilized in its nonradioactive form can also be volatilized in its radioactive form.

Water should not be forbidden in fighting fires involving radioactive material except where it produces a serious chemical reaction, i.e., with alkali metals. Fire in itself is an undesirable situation and, if left unchecked, may result in serious consequences. The usual rule is to extinguish the fire as quickly and efficiently as possible using whatever materials are available. Reference should be made to "Living with Radiation," part 2, for further details of methods for coping with fires involving radioactive material.

"4. Radioactive materials which, assuming an accident that would violate the integrity of the cask or container, would be in sufficient volume and suitable characteristics to contaminate a municipal water supply or sewage system. (*a*) Are there any parameters that could reasonably be established as a maximum permissible amount of radiation per shipment, and, if such parameters were established, how large a water supply or sewage system would such a maximum shipment contaminate to the point of producing radiation injury or toxic effect to the users of such water supply or sewage system?"

Answer: Radioactive material in a chemical form which is soluble or dispersable in water would have suitable characteristics to contaminate a water supply or sewage system.

The maximum permissible concentration of radioactive material in water for continuous intake by an individual over a 50-year period ranges from 10^{-5} to 10^{-13} microcuries per milliliter of solution, depending on the radioisotope involved. The quantity necessary to cause contamination to this permissible level will depend on the size of the water supply, the form and amount of material involved, and characteristics (including filtration systems) of the water supply system. Reference is made to the International Atomic Energy Agency Safety Series No. 7, appendix III, which lists the maximum permissible concentrations for the various radioisotopes.

In regard to parameters for setting maximum amounts of radioactive materials in a single shipment, you are referred to the discussion beginning on page 25 in IAEA Safety Series No. 7. However, it is not intended that any arbitrary limit be established on the maximum size of a shipment.

"5. Is it possible to establish a parameter of radiation which, if continued for a normal 8-hour working day, could not produce radiation injury? (*a*) If this is possible, is it practical to prescribe such a parameter as the maximum permissible radiation for any shipment at any surface of the car or vehicle and to require a barrier to be erected around casks or containers moving in open equipment so that the radiation at the barrier will not exceed the established parameter? (*b*) Is there any reason why a boxcar should not be treated as a package or container which would fall within the present regulations limiting radiation to not to exceed 200 milliroentgens at any surface of such container? (*c*) In the light of the AEC's limitation on the general public radiation exposure to 500 milliroentgens per annum, is it economically reasonable for the railroads to impose a limit of permissible radiation at any point at any surface of a railroad

car to a rate of emission that would be substantially less than the 200 milliroentgens per hour presently specified at the surface of the cask or container? (*d*) If a lower limit is economically reasonable, what would be the lowest possible limit?"

Answer: In 10 CFR Part 20 "Standards for Protection Against Radiation," the Atomic Energy Commission has established limits on the exposure of persons to radiation. These limits are based upon standards recommended by the International Committee on Radiological Protection, the National Committee on Radiation Protection and Federal Radiation Council. We believe that individuals will not receive bodily injury from exposures within these levels.

Restrictions of the radiation levels at the surface of railroad cars should be examined on the basis of need rather than economy, it would seem to us. The general population dose depends on the three factors normally used to reduce radiation exposure (time, distance, and shielding), rather than only on the permissible radiation level at the surface of containers. As you know, in addition to the individual package limits (200 mr/hr at the surface and 10 mr/hr at one meter), there are also restrictions which limit the combined radiations from packages in a single railroad car to 40 radiation units. It is our belief, using information we have at hand from the past AEC shipments and other available data, that levels on the surface of containers and railroad cars are low and the resultant general population dose insignificant.

"III. Would the AEC be willing to supervise, direct, and finance the studies necessary to determine the type, kind, quantity, and so forth, of equipment that would be required to clean up any conceivable railroad wreck involving radioactive materials?

"1. If not, to whom should the railroads look for the technological and financial assistance required to engineer, construct, and maintain such pools of equipment?"

Answer: The AEC staff is considering a study such as you outline. We believe, however, that the railroads are in the best position to prepare a meaningful assessment of the severity or extent of damage resulting from a "conceivable railroad wreck." In addition to the railroads' existing capability, you may wish to obtain the services of a commercial consulting organization for technological assistance, many of which advertise their services in nuclear industry trade journals. However, as a preliminary measure, it is suggested that our respective technical staffs meet to discuss the overall problem and review current railroad emergency procedures with the view toward their applicability to accidents that may involve radioactive materials.

It is emphasized that in any accident situation where radioactive material is involved and radiological assistance is requested, the capability of the radiological assistance plan is available.

"IV. Would the Atomic Energy Commission, based upon its knowledge and experience, be willing to establish operating procedures similar to those promulgated by its Albuquerque, N. Mex., office for the movement of military shipments, which would be applicable to all classes of radioactive shipments which the Commission may deem to be capable of producing potential radiological injury to passengers, carrier employees or the public that might be in any way involved?

"1. Would the AEC be willing to modify the operating procedures presently promulgated by its Albuquerque, N. Mex., office so as to eliminate therefrom all provisions which require independent judgment by the railroads with respect to the safety of and risk to the public and protection of the shipment?"

Answer: The AEC has prepared various shipping instructions which are currently in use at several AEC field offices, but these are for use in connection with special shipments of radioactive materials. For routine shipments, applicable regulations are such that additional procedures are not considered necessary to protect public health and safety. Furthermore, we believe it is inappropriate for the AEC to specify procedures for handling non-Commission shipments during transport due to the fact that both the ICC and the Coast Guard, as well as the AEC, have jurisdiction in this area. We are hopeful that, in the near future, the three agencies involved will be able to establish such operating procedures.

If you wish to review AEC's procedures, they can be made available to you at Headquarters.

"V. Would the AEC be willing to amend its part 20 regulations similar to that contained in section 30.7 or 70.12 so as to specifically exclude common, contract, or private carriers from the application of these regulations?

"1. What, if any, regulations of the AEC are intended to be applicable to railroads in the movement of radioactive materials? Please specify with particularity."

Answer: The regulations in part 20 apply to all persons who receive, possess, use, or transfer byproduct material, source material or special nuclear material under a general or specific license issued by the Commission pursuant to the regulations in part 30, 40, or 70. (See 10 C.F.R. secs. 20.1 and 20.2.)

Common and contract carriers are exempt from licensing to the extent that they transport radioactive materials in the regular course of their business of carriage for others under parts 30, 40, and 70. Private carriers are not exempt from licensing under these parts and, as licensees, are subject to part 20.

Carriers which are not licensed are not subject to the regulations issued by the Commission with respect to source, special nuclear and byproduct materials.

"VI. In the event of an accident on a railroad which would result in the violation of the integrity of the cask or container of a shipment such as irradiated fuel elements, has the AEC established any maximum limits of radiation which persons assigned to meet the emergency of such an accident should reasonably be asked to absorb?

"1. If such limits have been established, please specify."

Answer: The AEC follows the policy enunciated by the Federal Radiation Council, "* * * there can be no single 'permissible' or 'acceptable' level of exposure, without regard to the reasons for permitting the exposure." We believe it is necessary in an emergency to make a judgment decision, balancing the effect of letting the emergency continue versus receiving a high radiation exposure in attempting to control the emergency.

"2. If no limits have been established, please furnish such limits."

Answer: For guidance on the effects of radiation, we refer you to table 2.1, Federal Radiation Council Report No. 1.

"VII. If the radioactive material involved in any shipment is deemed 'on site' of any nuclear incident, is it feasible for a railroad, in the light of the present NEPIA insurance rates, to protect itself against such claims that might arise from the unusually high value of some of such shipments except by released values by the shipper?"

Answer: We do not believe it is appropriate for AEC to comment on whether it is "feasible" for a railroad to protect itself from cargo claims in the absence of released values. However, as to the latter, the Commission will, as in the past, furnish information to the carriers to assist them in their preparation of a 20th section application for released ratings.

"1. If NEPIA insurance is deemed appropriate protection, what are the range of values of the following shipments: (*a*) cold rods; (*b*) irradiated spent fuel core elements; (*c*) fissile materials; (*d*) pyrophoric radioactive materials; and (*e*) isotopic materials?"

Answer: With respect to the question concerning values of certain radioactive materials, the Commission has published a value for natural uranium of $23.50 per kilogram of contained uranium, as uranium hexafluoride. A range of base charges for enriched uranium, as UF^6, is contained in the attached reprint from the Federal Register dated May 30, 1961. Base charges for plutonium were published in the Federal Register of November 30, 1960 (copy attached). Ranges of values for pyrophoric and isotopic materials may be found in the attached catalog and price list "Radioisotopes," published by Oak Ridge National Laboratory.

Attachments (with original letter only):

1. IAEA Safety Series No. 6.
2. IAEA Safety Series No. 7.
3. "Living With Radiation," part 2.
4. Federal Radiation Council Report No. 1.
5. Reprint from Federal Register, November 30, 1960.
6. Reprint from Federal Register, May 30, 1961.
7. Catalog and price list.
8. Discussion draft.

TRAFFIC EXECUTIVE ASSOCIATION—EASTERN RAILROADS,
New York, N.Y., February 9, 1962.

Mr. A. R. LUEDECKE,
General Manager, U.S. Atomic Energy Commission,
Washington, D.C.

DEAR MR. LUEDECKE: In connection with discussions which we have had with your Division of Construction, Office of the General Counsel, Division of Licensing and Regulation, Office of the Comptroller, and Office of Operational Safety, we are submitting herewith questions relating to the transportation of radioactive materials by the eastern railroads. As was developed in these conversations, there is a problem of claimed radiation exposure with claimed consequent injury to persons and property without any intervening accident. There is also a problem which would develop from accidents occurring during transportation, with resultant damage to the radioactive materials being transported, personal injury to employees and nonemployees from claimed radiation exposure, damage to property of the railroad and others and loss of profit to the railroad because its right-of-way may be interdicted because of a nuclear incident and these problems would result whether the accident was caused by railroad negligence, negligence of third parties for whose negligence the railroad is not responsible and in some instances where no negligence would be involved. We are also faced with the problems that arise from the tremendous value pertaining to some shipments of radioactive materials involved, such values running into the millions per shipment.

Since the eastern railroads can do little to control the potential consequences of an accident to a car carrying radioactive materials, and since they have even less control over potential injury to employees that may be caused by single radiation exposure or the accumulated toxic effect of multiple exposures and since some classes of these shipments can have a value well in excess of anything ever before handled by the railroads as common carriers, eastern railroads seek answers to the question set forth below in order to determine whether they may or should handle shipments of radioactive materials as private parties under special contracts or whether their liabilities in the handling of these classes of shipments can be minimized to the extent necessary to permit them to handle such shipments as common carriers. We also seek answers to these questions in order to determine the rates, operating procedures, routes, radiological assistance, and protective services which should be accorded individual shipments whether they are shipped by the AEC for the account of the AEC or for other shippers.

I. Is it possible, within the scope of the Price-Anderson Act amendment to the Atomic Energy Act of 1954, for the eastern railroads to be completely protected and indemnified under all situations where claims may arise by reason of the radioactive character of the shipments?

Discussion: The present indemnification for railroads under Price-Anderson Act, as we understand it, is limited.

1. Are we correct in assuming that the indemnity coverage applies to the transportation of radioactive materials only when such materials are being transported to or from (*a*) the location of a licensed reactor, (*b*) the contract location of an indemnified Atomic Energy Commission contractor or (*c*) Atomic Energy Commission shipments covered by the indemnity contract between the Atomic Energy Commission and the Traffic Executive Association—Eastern Railroads?

2. Are we correct in assuming that the coverage outlined above is not the entire range of possible indemnity coverage under the Price-Anderson Act amendment?

3. Assuming that the material involved can create a risk of a substantial "nuclear incident," could the Atomic Energy Commission, under the Price-Anderson Act amendment, extend indemnification to materials licensees by requiring underlying insurance so that shipments of radioactive materials made to or from facilities of materials licensees could be covered?

Even within the scope of indemnification provided, there seems to be some question as to whether damage to onsite property, which may include nuclear material, is or is not excluded from the indemnification offered to the railroads.

4. How does the Atomic Energy Commission interpret the phrase "at the site of and in connection with activity where the nuclear incident occurs?"

5. Specifically with respect to the transportation of radioactive materials by railroad, how does the Atomic Energy Commission interpret this phrase in the event of a railroad accident?

6. Is site of a nuclear incident limited to (*a*) the car, cask and container, (*b*) railroad equipment and property that might be involved at the immediate location of the accident, (*c*) all property of the carrier that might be involved in radiation contamination and (*d*) any other property of the carrier, wherever located?

7. In the event of a railroad accident, would the train crew involved in moving such shipment fall within the category of "employees of persons indemnified who are employed at the site of any in connection with the activity where the nuclear incident occurs" under the following circumstances:

(*a*) Where the car containing the shipment of radioactive materials is only one of a number of cars moving in ordinary train service;

(*b*) Where the car containing the shipment of radioactive materials is the only car under load in the train, the other cars being limited to idlers or buffers or cars carrying personnel of the AEC or the shipper who are acting as couriers for the shipment; and

(*c*) Where the car carrying the shipment is one of several cars in the train containing radioactive material, including buffers and idlers and courier cars (but no cars of other freight)?

8. Assuming that no railroad accident is involved, would the train crew operating a train carrying radioactive materials be "employees of persons indemnified who are employed at the site of and in connection with the activity where the nuclear incident occurs" if any of said crew in the ordinary course of their duties claimed to have incurred injury as a result of exposure to said shipment under the following conditions:

(*a*) Where the car containing the shipment of radioactive materials is only one of a number of cars moving in ordinary train service;

(*b*) Where the car containing the shipment of radioactive materials is the only car under load in the train, the other cars being limited to idlers or buffers or cars carrying personnel of the AEC or the shipper who are acting as couriers for the shipment; and

(*c*) Where the car carrying the shipment is one of several cars in the train containing radioactive material, including buffers and idlers and courier cars (but no cars of other freight)?

9. Assuming the car carrying the radioactive material requires maintenance or repairs while under load, would employees of the carriers acting within the scope of their duties be "employees of persons indemnified who are employed at the site of and in connection with the activity where the nuclear incident occurs"

(*a*) If the maintenance or repairs are conducted while the car is in the train and on the road;

(*b*) If the car is set out of the train on the road;

(*c*) If the car is serviced at a repair track maintained for the purpose of making such repairs; and

(*d*) If the car is in a shop maintained for the purpose of making such repairs?

10. Assuming there is a railroad accident involving a train carrying radioactive material, which requires emergency crews of the carriers to clear the wreck and restore the right-of-way to serviceable condition, would such emergency crews be "employees of persons indemnified who are employed at the site of and in connection with the activity where the nuclear incident occurs?"

11. What does the AEC deem to be "an act of war" which would except claims from the application of the Price-Anderson Act amendment?

12. Specifically, would the AEC construe sabotage by a Cuban sympathizer of a car of irradiated spent fuel core elements moving in a train or standing

in a yard, which resulted in a "nuclear incident," as being "an act of war" which would exclude claims for injuries resulting from such incident from indemnity under the Price-Anderson Act amendment?

13. Does the Atomic Energy Commission consider the Federal Employers Liability Act as falling within the definition of "State or Federal Workmen's Compensation Acts" as that term is used in Section 3u of the Price-Anderson Act amendment? If so, please explain. (See *Wilkerson* v. *McCarthy*, 336 U.S. 53 at 66.)

14. Are there any other exclusions from the right to idemnity under the Price-Anderson Act amendment other than those set forth in section 3u of that amendment? If so, please explain.

15. Does the Atomic Energy Commission have authority under the present statutes to provide, by regulations or by contract, that, in the handling of shipments of radioactive materials for any person (the term "any person" to include all persons having authority or right to ship radioactive materials) whether moving under commercial or Government bill of lading, an eastern railroad would be indemnified for

(*a*) injury to railroad employees and other caused by radiation exposure; with or without negligence;

(*b*) damage to property, including the car, cask, or container and including property of the railroads and others, with or without negligence; and

(*c*) loss of profits to the railroad where its right-of-way may be interdicted;

whether such loss, injury, or damage is caused by negligence of the railroad, negligence of third parties for which the railroad is not responsible or without negligence being present on the part of anyone involved?

16. If the AEC has such authority, how would an eastern railroad obtain such a right of indemnity?

17. If the AEC does not have such authority, would it be willing to seek an amendment to the Atomic Energy Act giving the Commission such authority?

18. Since the Atomic Energy Commission has indemnified the railroads by contract with respect to all AEC shipments, would the Atomic Energy Commission be willing to give eastern railroads, by contract, the same indemnity with respect to shipments moving for the account of (*a*) a prime facility contractor of the AEC, (*b*) a material licensee of the AEC, (*c*) a licensed reactor operator of the AEC, (*d*) a materials supplier to the AEC, a prime facility contractor, a material licensee or a reactor operator and (*e*) departments of the Government other than the AEC?

19. If the AEC either lacks authority or is unwilling to make such a contract, how are the railroads to determine the currently effective derivative Price-Anderson Act indemnity available to them with respect to the several different classes of shippers?

20. If the AEC should withdraw its indemnity to any of the above classes of shippers, how would the railroads receive notice of such withdrawal?

21. In respect to any of the above, does the AEC recognize any distinction in its responsibility whether the shipment moves under a Government or commercial bill of lading, and does the nature of the bill of lading have any consequence as to the right of the railroad to obtain indemnification for claims and losses resulting from a "nuclear incident?" If so, please explain.

22. Does the AEC recognize any distinction between "nuclear incidents" occurring within the United States with respect to shipments originating and terminating in the United States as contrasted with shipments originating in a foreign country and moving to an AEC prime facility contractor in the United States? (Example: Shipments of irradiated spent fuel elements from Rowe, Mass., to Savannah River, S.C., as contrasted with the same class of shipments from Chalk River, Ontario, to Oak Ridge, Tenn.) If so, please explain.

II. Would the AEC list specifically the commodities that should be included in the following classifications:

1. All classes of material which involve risk of criticality under any conceivable conditions.

2. Assuming an accident, list all materials which could contaminate the right-of-way or equipment of the railroad to the extent that radiation injury could result to railroad personnel, passengers, or the general public that might in any way be involved, classified according to the following classifications:

(*a*) Radioactive material constituting a single source of radiation from a solid metallic substance;

(*b*) Radioactive material that is any other solid (including powders, etc.) insoluble in water;

(*c*) Radioactive material that is any other solid soluble in water;

(*d*) Radioactive material that is a liquid;

(*e*) Radioactive material that is a gas, other than an inert gas; and

(*f*) Radioactive material that is or could be toxic or otherwise constituting an etiological agent, in addition to being radioactive.

3. Assuming an accident involving the most adverse conditions which would violate the integrity of the cask or container, what materials could contaminate the air or involve a fire hazard, classified as follows:

(*a*) Radioactive materials which would dissipate without risk of radiation injury (such as inert gas) or which will not contaminate air to the point of producing radiation or toxic injury to persons that might be involved if the cask or material is subjected to a fire that might be created by collision with cars of alcohol, liquefied petroleum gas, gasoline, powdered magnesium, etc.;

(*b*) Radioactive materials which are spontaneously combustible or which will sustain combustion once ignited or which will otherwise volatilize without the intervention of other material and contaminate the air to the extent necessary to produce radiation or toxic injury to persons that might be involved;

(*c*) Radioactive materials which are combustible or which will volatilize in a fire that might be created by a collision with cars of alcohol, liquefied petroleum gas, gasoline, powdered magnesium, etc., and which could result in radiation or toxic injury to persons that might be involved; and

(*d*) Radioactive materials which, if involved in a fire, should not be extinguished with water and other extinguishing material normally employed by fire departments.

4. Radioactive materials which, assuming an accident that would violate the integrity of the cask or container, would be in sufficient volume and suitable characteristics to contaminate a municipal water supply or sewage system.

(*a*) Are there any parameters that could reasonably be established as a maximum permissible amount of radiation per shipment, and, if such parameters were established, how large a water supply or sewage system would such a maximum shipment contaminate to the point of producing radiation injury or toxic effect to the users of such water or sewage system?

5. Is it possible to establish a parameter of radiation which, if continued for a normal 8-hour working day, could not produce radiation injury?

(*a*) If this is possible, is it practical to prescribe such a parameter as the maximum permissible radiation for any shipment at any surface of the car or vehicle and to require a barrier to be erected around casks or containers moving in open equipment so that the radiation at the barrier will not exceed the established parameter?

(*b*) Is there any reason why a boxcar should not be treated as a package or container which would fall within the present regulations limiting radiation to not to exceed 200 milliroentgens at any surface of such container?

(*c*) In the light of the AEC's limitation on the general public radiation exposure to 500 milliroentgens per annum, is it economically reasonable for the railroads to impose a limit of permissible radiation at any point at any surface of a railroad car to a rate of emission that would be substantially less than the 200 milliroentgens per hour presently specified at the surface of the cask or container?

(*d*) If a lower limit is economically reasonable, what would be the lowest possible limit?

III. Would the AEC be willing to supervise, direct, and finance the studies necessary to determine the type, kind, quantity, etc., of equipment that would be required to clean up any conceivable railroad wreck involving radioactive materials?

1. If not, to whom should the railroads look for the technological and financial assistance required to engineer, construct, and maintain such pools of equipment?

IV. Would the Atomic Energy Commission, based upon its knowledge and experience, be willing to establish operating procedures similar to those promulgated by its Albuquerque, N. Mex., office for the movement of military shipments, which would be applicable to all classes of radioactive shipments which the Commission may deem to be capable of producing potential radiological injury to passengers, carrier employees, or the public that might be in any way involved?

1. Would the AEC be willing to modify the operating procedures presently promulgated by its Albuquerque, N. Mex., office so as to eliminate therefrom all provisions which require independent judgment by the railroads with respect to the safety of and risk to the public and protection of the shipment?

V. Would the AEC be willing to amend its part 20 regulations similar to that contained in section 30.7 or 70.12 so as to specifically exclude common, contract, or private carriers from the application of these regulations?

1. What, if any, regulations of the AEC are intended to be applicable to railroads in the movement of radioactive materials? Please specify with particularity.

VI. In the event of an accident on a railroad which would result in the violation of the integrity of the cask or container of a shipment such as irradiated fuel elements, has the AEC established any maximum limits of radiation which persons assigned to meet the emergency of such an accident should reasonably be asked to absorb?

1. If such limits have been established, please specify.
2. If no limits have been established, please furnish such limits.

VII. If the radioactive material involved in any shipment is deemed "on site" of any nuclear incident, is it feasible for a railroad, in the light of the present NEPIA insurance rates, to protect itself against claims that might arise from the unusually high value of some of such shipments except by released values by the shipper?

1. If NEPIA insurance is deemed appropriate protection, what are the range of values of the following shipments:

(*a*) Cold rods;
(*b*) Irradiated spent fuel core elements;
(*c*) Fissile material;
(*d*) Pyrophoric radioactive materials; and
(*e*) Isotopic materials?

The Traffic Executive Association—Eastern Railroads has a meeting scheduled for March 13, 1962. It would be greatly appreciated if we could receive the answers to as many of these questions as possible by March 6 in order that your responses may be adequately presented to our association.

Thanking you for your courtesy, I remain,

Sincerely,

O. E. SCHULTZ, *Chairman.*

Representative HOSMER. Mr. Olson. I rather lost you on this eastern railroads matter. What is their complaint?

Mr. OLSON. I think I would like to ask Mr. Kaye to explain that. It is fairly complicated. It is a combination of the indemnity problem.

Representative HOSMER. You have certain blanket agreements until they are canceled?

Mr. OLSON. So-called section 22 agreements for shipments.

Representative HOSMER. That has to do with the rates?

Mr. OLSON. Yes, sir; rates, also.

Representative HOSMER. What do the agreements include respecting liability?

Mr. KAYE. Mr. Hosmer, I am Mr. Kaye, Chief, Traffic Management Branch, AEC. If I may answer the first question you asked with respect to these blanket agreements you were talking about, they offer to the Atomic Energy Commission a given level of rates for a specified commodity within a general area and generally apply to a repetitious movement. They also apply to a service or something else that is not necessarily economic in all instances.

The importance of these particular——

Representative HOSMER. Do they assume third-party liability risk if anybody gets hurt while that stuff is in transport?

Mr. KAYE. May I defer that to counsel, as far as the legal aspects of indemnification are concerned?

Mr. OLSON. You mean third-party liability arising out of a nuclear incident or standard third-party liability? They do assume the standard, of course.

Representative HOSMER. I am thinking about whatever they are unhappy about. I don't know what I am talking about because I don't know what they are unhappy about.

Mr. HENNESSEY. They do have a liability to the public for any damage caused by the radioactive nature of the material being carried to the extent that they are negligent in carrying it.

Representative HOSMER. They must be unhappy about this because they want to cancel the agreements; is that right?

Mr. KAYE. Yes, in part. Their interest in canceling these agreements, or holding them in abeyance as it has now developed, is to permit them to take a look-see at the structure of rates that they now have, thinking that there will be a tremendous increase in the volume of shipments of radioactive materials which, by virtue of this increased volume, will increase their hazard potential that much more.

They have made a statement to the effect that during the past 10 years or so shipments of radioactive materials were rather infrequent. This, they believe, has been an experimental period. Now the eastern railroads feel they have to brace themselves for a tremendous increase in such shipments. Therefore, they conclude that maybe the rate structure needs to be increased to accommodate potential hazards which up to now have not occurred but may occur in the future.

Representative HOSMER. In other words, they don't want to change the law. They just want a rate raise.

Mr. KAYE. In effect this could be the net result. There is quite a maze of activity that they are going through at the present time with this in mind, I am sure.

Representative HOSMER. This is one of your problems, but it is not necessarily a problem of this committee. You are just telling us about the problem.

Mr. OLSON. There was a Price-Anderson problem. They certainly did want and insisted upon the change in the definition of on-site property, and they got some concessions in this area, but it was intertwined with rates. There is no question about that in my mind.

Representative HOSMER. They got their own insurance?

Mr. KAYE. Yes.

Representative VAN ZANDT. Isn't it true that a bill is pending before the House Armed Services Committee which was introduced at the request of the Association of American Railroads that concerns this liability? That is, the problem they have with the public in the

event of an accident involving hot material. The jurisdiction, therefore, is with the House Armed Services Committee and not with this committee.

Mr. OLSON. With respect to defense products other than ours, Mr. Van Zandt.

Representative VAN ZANDT. That is right.

Mr. OLSON. There is a parallel, but the bill you are speaking of covers the DOD area. The railroads have a similar area with us. We have made a Price-Anderson arrangement with them which we thought had taken care of it, but the eastern railroads advised us of their intention to cancel their section 22 rate quotations. They had this problem particularly about the definition of on-site property. They wanted to be sure that on-site property was limited to the railroad car in which the stuff was being transported rather than the whole train or the roadbed, and so forth.

Representative VAN ZANDT. Would it be possible to expand the coverage of the Price-Anderson Act along the lines of these amendments to include DOD shipments, also?

Mr. OLSON. I missed the first part of your question.

Representative VAN ZANDT. I said, would it be possible to expand the coverage of the Price-Anderson Act to include the shipment of DOD items?

Mr. OLSON. I think there is a substantial parallel. I will ask Mr. Naiden to comment on that.

Mr. NAIDEN. You are talking about strictly DOD shipments and operations. Not without a change in the law. Did you suggest that we change the law?

Representative VAN ZANDT. Yes.

Mr. NAIDEN. Certainly it is possible if the Congress were to enact a change. We could then change our policy, too.

Mr. OLSON. I think you will find this DOD legislation has been pending for a number of years and why it has not gotten through, I don't know. There is a substantial parallel between what you have done in Price-Anderson and what DOD is seeking to do under the bill to which you referred.

Representative HOSMER. Just one other question about this vast increase of tonnage. Are they talking about peaceful items or what?

Mr. KAYE. As private industry, Mr. Hosmer, gets more and more into this picture the eastern railroads are speculating that these shipments are bound to increase. They have shown no evidence of how great nor when, but in anticipation of the advancement of the peaceful uses of the atom, they seem to foresee something which they are now girding themselves against.

Representative HOSMER. They don't think it is going to be more dangerous because of the greater volume of these items that are rolling on their rails, but because there is a greater volume there is more chance of something happening?

Mr. KAYE. This is one of the ways they have expressed it, yes. They also feel that shipments that were heretofore confined to the Atomic Energy Commission may, by virtue of increased industrial participation, get out of Commission channels, and may not be handled similarly. These are items of speculation. This is the other point I would add to the one which you suggested.

Representative HOSMER. Thank you.

Chairman HOLIFIELD. Mr. Newman has a question.

Mr. NEWMAN. Mr. Olson, have you made it clear to the railroads that it is the cask and the car which is the site? I thought that had been straightened out.

Mr. LOWENSTEIN. I think that has been cleared up. It is definitely stated in the correspondence which Mr. Olson put into the record a moment ago.

Mr. NEWMAN. Then there is no more confusion on that.

Mr. LOWENSTEIN. I believe not.

Chairman HOLIFIELD. You may proceed.

Mr. OLSON. With regard to foreign indemnity, the Commission continued to participate with other U.S. agencies, in the development of adequate international standards to govern civil liability for nuclear damage and in the encouragement of other governments in their efforts to provide adequate financial protection to the public, the operators of nuclear facilities, and the suppliers of nuclear equipment.

Two important developments of the year concerned the drafting of international nuclear liability conventions. In the first instance, representatives of the member states of Euratom agreed upon a draft convention to supplement the Paris OEEC Convention of July 1960 and invited other signatories of the latter to consider it. The primary purpose of the draft convention is to provide for governmental compensation, up to a limit of $120 million, for damage above the amount of private financial security maintained by the operator in accordance with the Paris OEEC Convention.

Second, in Brussels in April 1961, the Diplomatic Conference on Maritime Law drafted a convention regarding the civil liability of the operators of nuclear ships. A diplomatic conference for final drafting and signature of this convention is scheduled for May 1962.

Another important development was the enactment of national nuclear liability legislation in Japan.

Progress was also made in other areas of the international nuclear liability field. An intergovernmental committee convened by the International Atomic Energy Agency produced a revised version of a convention designed for worldwide applicability in respect to land-based facilities.

The Paris OEEC Convention was ratified by two countries and needs only three more ratifications to be made effective. Relevant national legislation was in preparation in France, the Netherlands, Austria, Spain, Norway, Denmark, Israel, South Africa, and Venezuela.

The Commission has again reviewed the availability of third-party liability protection with respect to its effect on current reactor projects which are underway overseas and which involve power or power demonstration reactors of U.S. design and manufacture. There are no cases in which the physical progress of these projects is being held up due to lack of suitable third-party liability protection in the other countries.

The final part of our statement concerns the operations of the Advisory Committee on Reactor Safeguards.

The committee held seven meetings between April 1, 1961, and February 28, 1962. In the course of its meetings, the committee reviewed and advised the Commission on the safety aspects of eight

reactor projects subject to licensing, six Commissioned-owned reactor projects subject to parallel hearing procedures, and 18 AEC and Department of Defense projects.

In addition to the specific projects reviewed, the committee also advised the Commission on a number of other safety matters. The most important of these was the site criteria approved by the Commission in late March for power and testing reactors. General criteria had been published for public comment in February 1961. They have been extensively revised, based on the evaluation of public comments received, consultation with the ACRS and further staff study.

The proposed criteria as published for public comment included an appendix which contained, by way of example, a calculation of distances for the exclusive area, low population zone and population center distance for a hypothetical reactor. Many of the objections which we received were based on a concern that the numerical values expressed in the appendix and the resulting environmental distances for the hypothetical reactor described represented a larger degree of inflexibility in the guides than we had intended.

In the site criteria which have now been approved for use, the appendix containing the example calculation has been deleted. However, the example calculation is being incorporated into a technical information document which is being published by the Commission. This document explains in considerable detail the assumptions used in the example calculation and the bases for those assumptions.

Other significant differences between the criteria as published last year for public comment and the criteria now approved by the Commission are:

1. Some editorial changes have been made to clarify the intent of the guides, particularly to emphasize their interim nature and to identify the criteria as being specific to the United States.

2. The material describing factors to be considered in evaluating sites has been reorganized to clarify the emphasis placed upon characteristics of the reactor design and the proposed operation.

3. The criteria now specifically state that they are directly applicable to stationary power and test reactors, thus eliminating any ambiguity about their application to mobile plants, which was never intended.

4. A section has been included to deal with the question of locating more than one reactor at a single site.

The revised criteria are in the form of guides which the Commission will use in the evaluation of proposed sites. Our purpose is to provide an objective basis for reactor siting to the extent that current reactor technology permits. Sufficient flexibility has been included in the guides, we believe, to allow due credit for engineered safety features.

Other subjects on which the ACRS advised the Commission included the suitability of sites proposed for major reactor facilities, the long-term effects of radiation on reactor pressure vessels, the mechanical design of reactor primary system components, the preparation of monographs on the safety aspects of reactor technology and meteorological conditions in southern California. In addition, the ACRS has established a subcommittee to review the Commission's nuclear safety research and development program.

The Committee's reports as well as the current status of all of the specific projects reviewed are summarized in the indemnity report submitted to the Joint Committee on March 30, 1962.

Chairman HOLIFIELD. We will go back to page 6 of your statement and pick up some questions there. Mr. Toll.

Mr. TOLL. H.R. 10775 provides indemnity and a limitation of liability set at $100 million. If this bill were enacted, would it have any effect on pending or existing foreign national legislation or international treaties?

For example, if Denmark adopts the proposed convention on land-based reactors which has a $5 million limit of liability and if Denmark were to pass the necessary enabling legislation to make that effective within its territory, how would this limit be affected by H.R. 10775 in the event of an accident at the Greenland reactor?

Mr. NAIDEN. The plaintiff is a Danish citizen?

Mr. TOLL. The plaintiff is presumably somebody in the area of the Greenland reactor. It probably would be a Danish citizen.

Mr. NAIDEN. The Price-Anderson amendment covers only legal liability. If there were no liability there would be no obligation to indemnify.

That is why I asked the question whether or not it would be a Danish citizen. I don't know if it were an American citizen that this would work out just that way.

Mr. TOLL. Assume he is able to establish liability in a court in his country under his judicial system. Then the question is, which limit would apply, the $5 million under his national legislation and under the treaty, or the $100 million made available under this legislation?

Mr. OLSON. I think it is very clear that the lowest limitation, that is, the one of IAEA would apply, because if that were adopted by Denmark in the example given, this would be the limit of liability. I suppose the lowest common denominator would prevail here.

Mr. TOLL. What if he were to sue in a U.S. court?

Mr. OLSON. I doubt if any of us have researched this question as to what would happen. I suppose the law of the place normally applies with respect to an accident. That is, the substantive law of the place and the objective law of the forum are usually the applicable laws, but I think this would require a great deal more research than we have done to try to answer that question right now.

Mr. TOLL. I think there is also a possibility that the limit of liability under the IAEA convention and under their implementing legislation might apply only to facilities licensed by that State.

Mr. OLSON. That is a possibility; yes, sir.

Mr. TOLL. And wouldn't apply to a force introduced by a space vehicle or by U.S.-owned reactor that might be there.

Mr. OLSON. If the liability stemmed from a component incorporated into a licensed facility, then you would have the question squarely.

Mr. NAIDEN. Mr. Toll, I would like to concede to you that if we ever get an OEEC convention, Euratom convention, the Maritime convention, and this Price-Anderson amendment, and we continue our present Price-Anderson law in effect, we could come on some situations which would be pretty difficult to be categorical about.

Mr. TOLL. In the event of an accident, there would be difficult situations, regardless of conventions or statutes.

Mr. NAIDEN. It is true. It is complicated without the conventions. If the conventions are enforced, we will be probably better off than if they are not. When you get beyond this it is pretty difficult to speculate about it. At least that is the way we feel.

Mr. TOLL. On page 7, concerning the AEC comments on H.R. 10775, contained in your letter of Mr. Holifield dated April 6, 1962. Were these formally considered at a Commission meeting and adopted by the Commission?

Mr. OLSON. This was taken up at one of our informal Commission sessions before it was sent to the Bureau of the Budget. We have two types of sessions, as you probably know. We have our Monday, Wednesday, and Friday informal sessions and our formal sessions. This was discussed at an informal session.

Mr. TOLL. Can you say this, therefore, represents the views of the Commission?

Mr. OLSON. Yes. It was sent up by me only because the Chairman was out of town on Friday night when this went up. I can assure you that it has his blessing.

Mr. TOLL. Also on page 7, the Bureau of the Budget has stated certain reservations about H.R. 10775, particularly insofar as it would extend to the situation where components or designs are supplied to a foreign government. Do you have any views on this question? Would it be possible to amend this bill or to administer it in such a way that it would apply only to facilities owned or used by or for the United States?

Mr. OLSON. It would certainly be very easy to amend the bill so that it would so provide. It was our considered judgment that it should extend to all three categories. It should be extended to the category where designs and components are made available to foreign governments because this is an area of risk for our American nuclear industry that is uninsurable. So it is our judgment that it should be extended.

Chairman HOLIFIELD. Would this be in the civilian field of reactors?

Mr. OLSON. It is only our contractors where our contractors develop the design and we gave it to a foreign government for design. The design would presumably be used by that foreign government in a civilian field, but it doesn't have relationship to the private commercial nuclear business, if that is what you have reference to.

It might be a situation where we furnished a foreign government with a design or a component, as I understand it. We, the U.S. Government, furnished it to another government. We purchased it from a contractor, as opposed to the contractor making a private sale. The latter case is not covered.

Mr. HENNESSEY. That is correct. This protection is limited to AEC contractors and people in the AEC contractor chain who turn over to the Government some product which the Government in turn passes on to a foreign country.

Mr. TOLL. Could this apply to the Euratom program? The AEC has some contracts with U.S. manufacturers. Could AEC furnish a design to a peaceful uses reactor in Europe that would be covered by this?

Mr. HENNESSEY. Only if it were done under the AEC contract and delivered under AEC direction as an action under that contract.

Mr. TOLL. Could this conceivably be part our our assistance under the Euratom cooperation?

Mr. HENNESSEY. I am not sufficiently familiar with the Euratom arrangement.

Mr. KRATZER. Myron Kratzer with the Division of International Affairs. We do routinely make available not only to Euratom, but to many other countries with whom we cooperate, a large amount of technical information which has been developed under Commission contract. We have no way of controlling its subsequent use. In other words, if the foreign government or one of its citizens wishes to employ that information in the construction of a reactor, it may get so employed. I have no competence for indicating to you whether that could give rise to a liability on the part of the contractor who developed the information.

Mr. TOLL. It would seem that this should be cleared up. This would certainly be extending the bill a long way beyond that stated in the AEC letter of April 6, which is primarily to take care of suppliers in the aerospace and defense programs. It should be possible to clarify whether this is going to extend to the Euratom program.

Mr. OLSON. It was my understanding that it would extend to all of our contractors and where we are doing research, such as for Euratom, and we are providing the results of that, conceivably you might have a defective design. But it is limited to those cases where we, the Government, contract, and the contractor has no control over what we do with his end product, whether it be design, service, or component.

Chairman HOLIFIELD. Yet, you are telling us that we would be responsible for a liability which might occur when he has relinquished control, let us say, of a fuel rod or vacuum pump or anything like that. It is his design which has been bought by a foreign government.

Mr. OLSON. Only when it is furnished by the AEC. I don't believe we furnish such components. We furnish some research and development under Euratom.

Chairman HOLIFIELD. Maybe design information on a reactor. For instance, if you wanted to send the design of the Shippingport reactor overseas and somebody wanted to make that overseas, would we have a liability in case something went wrong with it?

Mr. NAIDEN. It would depend from whom they got it.

Chairman HOLIFIELD. If they bought it from an American manufacturer.

Mr. NAIDEN. If they bought it from an American manufacturer, we would not be liable. We would be if the person wanting a design came to the Commission and said, will you please give us your prints out of your basement on which you stamped U.S. Atomic Energy Commission Property, and we said, yes, we could, and they take the prints and they build it, I believe this is the situation covered.

Mr. OLSON. If Westinghouse sold the Shippingport design to a Euratom country, they would not be covered. But if we, the Commission, gave it to them, Westinghouse would be covered by way of example. It is only where the U.S. Government is furnishing the material that the contractor is protected.

The contractors are worried about doing this work for us without any knowledge of where their end product such as the design, may go. If we furnished someone with a copy of the Shippingport design,

under this legislation the Commission would indemnify Westinghouse. There is merit to this in the sense that Westinghouse has no control over what we do with this design. They lose control of it when they furnish it to us.

Chairman HOLIFIELD. So do you when you finish it overseas. You also lose control as to the operation of the reactor.

Mr. OLSON. Yes, but as far as Westinghouse is concerned, they have absolutely no control and we can choose not to give it to someone or to sell it to someone. As a matter of fact, I don't know of any contemplation to do this. I think the example has gotten a little far afield.

Chairman HOLIFIELD. How about Euratom? Let us get to some of the aid we furnished to Euratom.

Mr. KRATZER. May I say that all of the information which we furnish both domestically and abroad, the unclassified technical information, is furnished with an express disclaimer printed on the face of it, that neither the Commission or any of its contractors or anyone acting on our behalf assumes any liability as the result of the communication of this information.

I can't speak authoritatively as to whether this, in fact, protects the originator of the information thoroughly from liability.

Mr. RAMEY. Didn't we change that so far as the law was concerned under your Euratom contracts?

Mr. KRATZER. Under the Euratom Cooperation Act, there is a provision that states that Euratom will hold the U.S. Atomic Energy Commission harmless from any liability. This presumably extends to contractors of the Atomic Energy people acting on our behalf. Again, I can't speak to the other.

Chairman HOLIFIELD. This law, if adopted, would clarify that point and extend it to the contractors?

Mr. KRATZER. I think it would indemnify the contractors if anybody were able to place any liability on them notwithstanding the provisions of the Euratom Cooperation Act.

Mr. OLSON. I don't think it would supersede it, Mr. Holifield, because there could be no liability if there had been a disclaimer accepted. Price-Anderson never created new liability. It only indemnified for existing liability. There is no liability in such a case. I think that his is a poor example of Euratom. I don't believe it intended to extend protection in this area at all.

Mr. Hennessey, I believe, is in the best position to comment on this.

Mr. HENNESSEY. A better example might possibly be if we sent fuel elements over to a foreign country to be irradiated as a test operation in a foreign reactor. Those fuel elements are manufactured by an AEC contractor. We deliver them to the foreign country and an accident is caused due to the faulty fabrication of those fuel elements. In that case, our contractor might be held liable, and as we interpret the pending bill, they would be protected.

Chairman HOLIFIELD. What is the situation on the Senn contract that is a direct contract with an American corporation?

Mr. OLSON. Yes, sir. This is not a contractor situation with us furnishing anything.

Chairman HOLIFIELD. What would this bill do for the people in this country that are doing any work on the Senn project?

Mr. OLSON. Nothing.

Mr. TOLL. Doesn't the Commission have some research and development contracts that are for the benefit of the Senn project? Isn't some of the money for the Euratom program for research and development directly for that reactor?

Mr. KRATZER. I think I can answer that question, Mr. Toll. We don't at the present time have any research and development contracts that are specifically related to the initial design of the Senn reactor. However, as you well know, it is the intent of the program to undertake research and development which can bring about improvements in the reactors that are built under the program or in similar reactors.

To the extent that research and development information of that type might be incorporated into improvements in the Senn reactor, it may be involved here.

Mr. OLSON. There are no designs or components being furnished to Senn?

Mr. KRATZER. No. We do not furnish reactor designs in detail. Neither do we furnish any components or fabricated fuel elements to these reactors abroad. When we furnish unclassified technical information, it is largely of a more generalized nature. We do not tell people how to design specific reactors. We give them basic engineering and technical information which may be incorporated into these designs.

Mr. OLSON. I think the short answer is that we are neither furnishing design or components to the Senn reactor. Therefore, this bill would have no application. It would extend nothing new to the Senn situation.

Chairman HOLIFIELD. But it would extend to the contractors indemnification on a case like Rover or Snap?

Mr. OLSON. Yes, sir.

Chairman HOLIFIELD. If we put up one of those, that would be a Government-owned project?

Mr. OLSON. Yes, Government-owned end product.

Chairman HOLIFIELD. If there was an abort on the missile and it would fall on the foreign country, then they could sue the United States, but they could not sue the contractor; that is, they could sue, but they couldn't pin the liability on him. He would have the Government standing between them.

Mr. OLSON. That is right; we would have an indemnity agreement with the contractor.

Chairman HOLIFIELD. Over and above his insurance or separate and apart?

Mr. OLSON. He wouldn't have any insurance.

Mr. HENNESSEY. Under this newly adopted policy there would be retrospective rating insurance.

Chairman HOLIFIELD. Will you explain the retrospective to me?

Mr. OLSON. The Rover contractor might, under this new policy be authorized to buy a million dollars worth of insurance of which some part would be true insurance and he would take the gamble on paying a certain amount of the claims over and above which we would pay the rest of them on a cost basis.

Mr. TOLL. I thought earlier testimony was that there would be no true insurance.

Mr. OLSON. Mr. Hennessey corrected me on that. There is a small element of true insurance. I think we better get this straight because I am mixed up. Mr. Hennessey?

Mr. HENNESSEY. I think the thing that caused the confusion was my earlier testimony about the proposal which we had received from the NELIA group and that did include an element of true insurance.

Mr. TOLL. A $100,000 band in the first million?

Mr. HENNESSEY. That is right, from $900,000 to the top million. What the Commission decided it would do was to negotiate completely retrospective insurance policies which would not have this $100,000 band.

Mr. TOLL. So there is no element of true insurance in the present proposal?

Mr. HENNESSEY. There is no element of true risk on the part of the insurers.

Mr. TOLL. The Government will pay for all claims, and they will also reimburse the insurance companies for their services in handling the claims?

Mr. HENNESSEY. The Government will reimburse all losses, all claims that are settled, all judgments that the insurer is responsible for.

Chairman HOLIFIELD. What incentive would there be for the insurance company to establish a liability of x amount in place of $2x$ amount if they are only going to get a service fee? Wouldn't they get a bigger service fee on a bigger payment? They take no responsibility. All they are doing is acting as a broker or agent to convey Government money to the aggrieved party on some kind of a fee or service basis. Does the fee depend on it being of a certain size? Evidently it does. If so, where is there any guardianship of public moneys on the part of a broker who stands to make more in his service fee the larger the payment?

Mr. HENNESSEY. I think the insurance companies would consider the face amount of the policy as being a factor in computation of premium. The million dollar figure that we mentioned was simply the amount that they proposed as an underlying insurance policy.

Representative HOSMER. What keeps them from settling these claims for more than they are worth to get a fee based on the amount of settlement?

Mr. HENNESSEY. AEC would have the right to approve settlements made by the insurer.

Representative HOSMER. You shouldn't have to set up your own claims outfit. That is what you are paying them for. You are not intending to pay them a percentage of what they settle for, are you?

Mr. HENNESSEY. It is a fixed amount annually, plus a percentage of the settlements actually made and approved by the Commission.

Representative HOSMER. That is a stupid way to pay them. You ought to pay them on a cost-plus basis, if anything at all. You are talking about an accident that you don't know how big it is and any of the circumstances about it. How in the world can you work out a percentage fee? We all know an insurance adjuster would rather not settle anything at all and he would slit his throat rather than give you a generous settlement. But still we would like to see some protection in there.

Mr. OLSON. I wonder if we could not submit a statement for the record. I was confident when this came up that it was a cost-plus-fixed-fee type of arrangement.

Representative HOSMER. I think it should be.

Chairman HOLIFIELD. If the Government is taking all the liability, I might timidly suggest that you might hire some experts on a day-by-day consultant basis to handle your business for you with a limitation on the number of days.

Representative PRICE. Why don't you submit a statement for the record?

Mr. OLSON. We would be glad to.

(The information requested follows:)

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., April 30, 1962.

HON. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. HOLIFIELD: In his testimony at the annual hearings on indemnity and reactor safety before the Subcommittee on Research, Development, and Radiation on April 10, 1962, Commissioner Olson reported that the Commission had decided that it would be advantageous to authorize the procurement of nuclear liability insurance on a retrospective basis by those contractors operating AEC facilities who do not presently have insurance coverage against nuclear liability. We agreed to submit this report to the Joint Committee clarifying certain features of retrospective insurance that were questioned in the course of the hearing.

Under the retrospective insurance arrangements which have been in effect insuring most of the Commission's operating contractors against nonnuclear hazards, the final premium is composed of the following increments:

(1) *Fixed charge.*—This is a fixed amount paid annually to the insurance company to defray all of its costs, except those of field adjusting services, allocated claims expense, and taxes. It included profit, if any. It does not compensate the insurer for, or have any relationship to, the losses actually incurred. As examples of the order of magnitude of this premium factor under current retrospective insurance policies, the fixed charge for $1 million insurance is $4,080 for the Westinghouse contract for operation of Bettis Laboratory and $3,414 for the Associated Universities contract for operation of the Brookhaven National Laboratory.

(2) *Converted losses.*—This item includes losses actually paid multiplied by a conversion factor which compensates the insurance company for the cost of its field adjusting services. It is common practice in the casualty insurance business to make the cost of field adjusting services a function of losses by the use of a conversion factor applied to losses. Although the loss adjusting expense is expressed as a percentage of loss, it is derived from cost experience figures. In other words, the cost of field adjusting services can be fairly accurately determined from each insurance company's cost figures and it is converted into a percentage of loss for simplicity, convenience, and economy.

(3) *Allocated claims expense.*—This is to reimburse the insurance company for its actual out-of-pocket special expenses in the employment of defense counsel, expert witnesses, and fees for medical examination to determine the physical condition of the claimant in cases which are litigated, or which appear to be headed for litigation.

(4) *Taxes.*—These taxes are assessed by the various States, based on the amount of the insurance company's premium, and are used for the purpose of maintaining State rating bureaus or other organizations controlling and supervising insurance companies within the State.

The only increment of those listed above in which there is any item of profit to the insurance company is in the fixed charge.

We believe that the following information will clarify the nature of the controls which operate to minimize the possibility of excessively liberal settlements of claims under a retrospective insurance plan.

The claims adjuster for an insurance company handling AEC contractor losses is the same adjuster who will handle all of the insurance company's business of a similar kind in the same territory. Insurance companies have long realized

that, due to honest mistakes and inadvertence, field claims adjusters might sometimes make overpayments if granted uncontrolled discretion. For this reason each field claims adjuster is supervised first by a branch office supervisor who in turn is supervised by a home office supervisor. Consequently, there are three places in the company's organization where each claim is reviewed and evaluated independently of any other review. In the case of medical bills, a similar type of review is made by company employees who are qualified (full-time doctors) to make such a review and evaluate the reasonableness of the charges. The same procedure is followed where legal expenses are incurred in the defense of litigation. Full-time company employees (lawyers) review legal expenses to determine the reasonableness of these expenses. These controls would be used under the planned retrospective insurance program.

Because of the extreme competitiveness of the business, no insurance company can afford to overpay claims. To attempt to settle in a liberal manner for one claimant and settle on a less liberal, but proper, basis for all other claimants within the same locality is not a reasonable position to take. For this reason, it is in the interest of the insurer to exercise the same prudence and zeal in the adjustment of claims under a retrospective policy as it does under the more conventional types of insurance.

The value of third-party liability claims is largely a matter of judgment and there can be reasonable differences even between competent claims adjusters. In settlements in this category, however, it is the policy of AEC to require the insurance company to secure prior approval from the contractor and AEC to settle any cases in excess of $10,000. In addition, under the proposed new program AEC would expect to control the determination as to liability of any person indemnified in the event of a nuclear incident.

In addition, AEC exercises the right of review of all losses for which it reimburses the insurance companies. While this is usually a spot-check review, the knowledge that this review is being continuously performed has the effect of insuring a close scrutiny of the settlement of claims against AEC contractors before reimbursement is sought.

We propose to enter into negotiations with the NELIA–MAELU groups and would expect to arrive at an arrangement under which our contractors could obtain on reasonable terms nuclear insurance coverage in the amount of $1 million each on a retrospective rating basis.

Sincerely yours,

DWIGHT INK, *General Manager.*

Representative PRICE. Mr. Olson, on page 9, in connection with the toll road problem, both toll people and insurers have indicated the need for comprehensive Federal regulations in the transportation area. Last year, in August, the committee received a letter from the Commission stating:

> The Inter-Agency Committee on Regulations for the Transportation of Radioactive Materials is presently drafting comprehensive revisions of existing Federal transportation regulations to more adequately deal with the problem of shipment of radioactive materials.

The letter went on to describe certain other actions, and made this conclusion:

> * * * that the Commission believes that regulation of transport of radioactive materials is seeing the study and attention required to assure a firm basis in safety.

It has been about 9 months since this letter. Is there a set of comprehensive regulations as of this moment?

Mr. OLSON. Yes, there is. However, we are talking about two different problems here, Mr. Price. I would like Mr. Lowenstein to amplify this.

Mr. LOWENSTEIN. I believe it was December 1961, Mr. Price, the Commission published a notice in the Federal Register requesting comment on draft technical standards which were developed through the Inter-Agency Committee. We have comments in on those. We

are now preparing model regulations both for the Federal agencies, plus model regulations which, through the Council of State Governments, we will recommend to the States.

Representative PRICE. Mr. Toll, would you make some comment on this toll road matter, because the committee asked you to attend a certain meeting.

Mr. TOLL. In spite of my name, I unfortunately don't own the roads, Mr. Chairman. Recently the Commission had a meeting of the toll road authorities and the insurers. Do you believe that these difficulties can be satisfactorily resolved by negotiations or will legislation be necessary?

Mr. PRICE. We think that most of the difficulties between the insurance industry and the toll roads can be ironed out by further negotiation. We don't have a position on the need for further legislation.

When I say we think most of these problems can be resolved by negotiation, there are one or two that probably can't. How significant they are to the toll authorities is probably something that they ought to testify on, but one of the things that they want is coverage for first-party protection; that is, damage to the toll facilities in excess of the amount of insurance available. That figure itself kind of fluctuates. It seems to be about $61.7 million, and I understand that it may be possible to increase that. Whether the amount will be big enough to satisfy this desire of the toll authorities and how strong the toll authorities feel about that excess amount is something that I suppose they could better answer. I understand they are going to be here tomorrow.

Representative PRICE. Yes, they are scheduled to testify at the hearing tomorrow.

Mr. PRICE. But so far as the problems as to the nature and interpretation of the insurance being offered to them, and possible modifications of the coverage, I think the discussions that we had with both groups indicated that there is a large area that negotiations between them ought to resolve.

Representative PRICE. Concerning the operators of nuclear ships, last year the U.S. delegation took the position that warships should be excluded from the convention. Why was this?

Mr. NAIDEN. I think it was essentially because Secretary McNamara and the Department of State came to this conclusion. I can't go behind that, Mr. Price. There is a certain admiral who has points of view on this question.

Representative PRICE. I can see why that would be a proper question for the Department of Defense rather than the Atomic Energy Commission. Would it not be to the advantage of the United States to have warships included and thus limit the potential liability of our nuclear submarines on a visit to foreign ports? This can be answered by the AEC, I would think.

Mr. NAIDEN. It would be an advantage from the point of view of limiting liability. There are certain other considerations that affect the final decision that the Government makes on this, Mr. Price. Warships are considered a part of the United States wherever they are and persons who desire to go aboard them are generally excluded. I am not an expert on this, either. Mr. Forman, of the Department of Defense, or someone of that sort is much better equipped to answer that or to discuss that.

Representative PRICE. Do you know what the views of our suppliers are to the Japanese nuclear liability legislation?

Mr. NAIDEN. Not as well as the gentleman from GE sitting about six rows back.

Representative PRICE. I think we will have them tomorrow.

Mr. NAIDEN. I don't think they are so enthusiastic about the recourse situation. Beyond that I don't believe I can comment.

Representative PRICE. In discussing the foreign activities, you mentioned a number of countries now considering or having an active nuclear liability legislation. Do most of these statutes provide for channeled, strict liability? Would such a uniform law be a good idea in the United States?

Mr. OLSON. I would like to have Mr. Naiden answer that question.

Mr. NAIDEN. I am taking a little poll.

Representative PRICE. To see who is best informed on this subject?

Mr. NAIDEN. I will be quite candid about it. I had a recollection that originally the Commission proposed absolute liability in this connection. Perhaps Mr. Ramey or Mr. Holifield or Mr. Toll or your recollection, Mr. Price, would be better than mine. It was before my time, so I must confess that I don't know.

Mr. TOLL. There were three bills, originally, but I don't think any of them provided for absolute liability on the part of the operator. I think some industry representatives were very much opposed to it at that time, but perhaps since, they have changed their view.

Mr. NAIDEN. I would give you my personal opinion. I don't think this question has ever been put to the Commission. If I were a plaintiff's lawyer, I should think absolute liability would be an excellent rule.

Mr. RAMEY. What is there to sue about then?

Mr. NAIDEN. Whether or not the person is injured.

Representative HOSMER. That is a pretty good answer for a plaintiff lawyer. That was not the answer to the question.

Mr. NAIDEN. It is a difficult question to answer. The rules of liability are the province of the States of the United States. There are 50 jurisdictions. I am not sure if I had an opinion it would be too persuasive.

Representative HOSMER. We won't press you further, then.

Mr. OLSON. There has been a general acceptance of certain principles of absolute liability, limitation of liability, channeling of claims and so forth. These have generally marked the IAEA efforts, the OEEC efforts, and the Maritime Convention efforts.

Representative PRICE. Mr. Olson, I think, in the interest of conserving time—we have to be on the House floor very shortly for a vote—I think the balance of the questions that we have directed toward your statement will be submitted to you and you can supply the answers for the record.

Mr. OLSON. All right, sir.

(See app. 4, p. 198.)

Representative PRICE. Thank you very much, Mr. Olson and gentlemen.

The next witness will be Dr. Frank Gifford, Chairman, Advisory Committee on Reactor Safety.

STATEMENT OF DR. FRANK GIFFORD, CHAIRMAN, ADVISORY COMMITTEE ON REACTOR SAFEGUARDS; ACCOMPANIED BY DR. T. J. THOMPSON, FORMER CHAIRMAN AND MEMBER OF ACRS

Representative PRICE. I understand you are accompanied by Dr. Thompson?

Dr. GIFFORD. Yes; we have Dr. Thompson and Mr. Graham. I am present Chairman of the Advisory Committee on Reactor Safeguards. At your request, I am appearing before you today to discuss the Committee's activities. Since I have not previously had this pleasure, I should mention to you by way of introduction that I have been a member of the ACRS since 1958 and have been engaged in research related to the meteorological aspects of reactor safety since 1951. Dr. Henry Newson, professor of physics at Duke University, who has been associated with the nuclear industry since its birth and is, I am sure, well known to you, is this year the Vice Chairman of the Committee; and in the ordinary course of events he will therefore be next year's Chairman.

Dr. Thompson will describe to you changes in the Committee's membership during 1961. To this I should add the name of our most recently appointed member, Dr. Herbert Kouts, of Brookhaven National Laboratory. Dr. Kouts is an expert in reactor physics. With Dr. Kouts on board, the Committee's membership now stands at a total of 13. This may be increased by one during the present year.

As predicted by Dr. Thompson in his report to you a year ago, several of our most senior members resigned for personal reasons at the expiration of their terms late last year. I am pleased to be able to report to you that, as a result of the new additions, the disciplinary balance and level of technical competence of the Committee remains high, and is in my opinion adequate to the difficult problems of reactor safety evaluation.

I would like to comment, first, on the present Committee workload and method of conducting its business and, second, on reactor site criteria.

The past several years have been characterized by a generally high Committee workload; more recently there has been a discernible decreasing trend. However, one needs to consider not only the new projects underway but also reviews required in the case of reactors already licensed which propose significant changes or modification in system design. With the first large power reactors coming on the line, and the new reactor projects under consideration, the Committee has had to develop a method that would permit it to follow closely a large number of projects which are at various stages of completion.

As you know, the Committee's answer to this problem has been the creation of a subcommittee system, under which each major reactor project is assigned to an ACRS subcommittee which reviews it in detail, with both the AEC staff and the applicant, and reports and discusses its views at the next meeting of the full Committee. This system seems to have succeeded remarkably well in dealing with the large workload although we would not claim that it is perfect in all respects. Not the least of the advantages of the subcommittee system is that it has tended to preserve, in the fact of increasing formalization, a clear and relatively flexible threeway channel—that is, applicant, AEC staff, ACRS—for the informal exchange of technical infor-

mation and opinion which the Committee believes is vital to a thorough and effective safety review.

As more reactor projects mature, both the ordinary expectation of changes that must occur in any large engineering enterprise, as well as the demands of nuclear power economy, naturally lead to the requirement for modifications in licensed power reactors. For example, second and later core loadings may be redesigned or cycled differently in order to optimize fuel utilization. Such modifications can have real safety implications and, as you are well aware, the problem for the ACRS is to provide a mechanism for adequate safety review that will not unduly burden the licensees.

The committee has established a procedure for dealing with such questions that works, briefly in the following way: Proposals for modifications, that is amendments to reactor operating licenses, are brought to the attention of the committee by the AEC staff. If these, in the judgment of the AEC staff, would in any way increase the hazard to the public, the committee makes a complete safety review and the Commission in accordance with its own regulations (10 CFR 50) notices the case for public hearing.

The large majority of such proposed amendments do not, of course fall obviously into this category. However, it is not always possible to judge whether even a comparatively minor design change in a reactor component will generate new safety problems.

Therefore, in addition to the AEC staff review, each amendment is scrutinized by the committee's own staff, the ACRS Chairman, and the appropriate subcommittee chairman. Any potential safety problems are identified and discussed with the full committee. Questions and suggestions for the treatment of the case that result from this review process are passed on to the AEC staff for resolution with the reactor operator, and this may again initiate, in a natural way, the three-way technical interchange that I described a moment ago in discussing our subcommittee system.

On rare occasions the full committee will elect to review and furnish advice to the Commission on an amendment not formally referred to it by the AEC staff for advice.

I have outlined to you these details of some of the committee's internal operations in order to emphasize the following point. The committee believes that the problem of determining reactor safety is essentially a technical problem; and as far as lies within its ability, the committee approaches the problem from a technical point of view. Our position is something like that of the old cattleman who, in response to a question asked by the eastern tenderfoot, as to whether there was a lawyer in town remarked, "Son, this town don't practice law; it practices facts." Of course, the number of facts involved is quite large; and as I have indicated, the nature of the reactor safety problems that assume importance is undergoing a continual process of change, being affected both by the stage of development of the reactor industry and the state of our knowledge of some of the uncertainties involved. Dr. Thompson will indicate some of these problems to you in more specific detail and discuss their safety implications. I merely wish to mention some of the techniques used, I feel rather successfully, by the committee in dealing with the evolutionary reactor safety problem.

I would like at this point to mention briefly other matters pertaining to the manner in which the ACRS conducts its day-to-day activities including its sources of technical information and the support and assistance which it receives from the staff of the Commission. These topics have been covered each year in the ACRS report to the Joint Committee but, as you are well aware, there is continual change in the details of operation for a variety of reasons. Some of these are similarity of some licensing cases, changes in AEC organization, and an ever-present desire on the part of the committee and the regulatory staff to streamline the review process but without compromise as to technical adequacy.

The ACRS is faced with a continuing problem of keeping abreast of the rapid expansion of nuclear technology. The committee, of course, needs all the technical information on which the safety judgment should be based. In addition to hazard summary reports provided by the applicants for license, we obtain technical information from the following sources. The Commission provides the ACRS with published progress reports on the SPERT program, fuel meltdown experiments, the results of other safety research programs, and topical reports of general interest. ACRS members attend and participate in meetings of professional societies, codes and standards committees, and conferences on reactor safety matters. Information is sometimes obtained by the use of consultants having a special competence in a matter under study by the committee.

I would like to particularly acknowledge the strong and close support given to the committee by experts from the national laboratories in this connection.

Several elements of the Commission staff furnish direct technical information during participation in meetings of the ACRS. Representatives of the Division of Compliance, during oral briefings on matters of interest, provide an important feedback of operational experience which the committee utilizes in its current and future reviews of reactor projects. Periodically the Division of Reactor Development arranges presentations for the full committee which summarize significant advances in reactor safety research.

The principal technical effort in support of ACRS review of cases is furnished by the staff of the Division of Licensing and Regulation. Representatives of this Division participate in meetings of ACRS subcommittees with the applicants for license. Prior to consideration of a project by the full ACRS the technical staff of the Division furnishes the committee with a summary of the project and an evaluation of its safety features.

At the time of the ACRS meeting, Division representatives are present in order to elaborate upon the evaluation if this is required.

As a final comment concerning information which is of assistance to the ACRS, it should be pointed out that the committee believes that information about reactor accidents or maloperation is an important means of providing insight on reactor safety problems. Prompt dissemination of information on accidents or "near misses" is important to review groups engaged in the safety evaluation of reactors and to the entire nuclear industry as well.

You have indicated that the subjects of reactor site criteria and of engineered safeguards are of surrent and particular interest; and I

would like to make a few remarks on the first of these; Dr. Thompson will have some comments on the second.

The very recent publication of the "Reactor Site Criteria Guides," 10 CFR 100, is a useful and positive development. The history of the steps leading up to the final guides was reviewed in our testimony before you last year. The subject, as you well know, has been under active consideration by both the ACRS and the AEC staff for several years.

The final version reflects the viewpoints of both groups, as well as the large body of comment received from U.S. industry, not to mention that from various foreign groups. The end product impresses me as a thoroughgoing, and on the whole remarkably successful attempt to rationalize a very large and extremely diverse body of opinions. The significant points involved from the ACRS' point of view can be summarized quite briefly.

Of primary importance, in my opinion, is the identification of these criteria as guides. From the beginning the ACRS has consistently advocated that published site criteria be in the form of flexible guides from which applications would be expected and encouraged to deviate, where engineering design and special siting considerations appear to merit such a step. It should always be remembered that reactor siting practice to date upon which the guides are stated to depend is based primarily on certain safety features incorporated into facility design, such as containment, emergency shutdown, and so on. It follows that improvements in the siting situation, in the form of relaxation of the various distance requirements that the guides establish, should be possible when additional safety features can be demonstrated. I believe that Dr. Thompson will elaborate on the subject of specific engineered safeguards.

The second noteworthy point concerns the use, in these guides, of certain radiation dosage limits whose function is to define certain critical distances from the reactor; the exclusion distance, low population zone, and population center distance.

In the guides, these radiation dosages are clearly identified as design reference values; it is not expected, and certainly in no sense identified as "permissible," that these doses would ever be delivered. These dosage values are proposed only "in the context that * * * accidents are very improbable indeed," to quote Dr. Thompson's words of last year.

You may be interested in table I, which contains an abbreviated summary of current reactor siting practice in the United States, England, and Canada. Table I shows in a general survey way how reactors having power levels between 200 and 1,000 megawatts thermal compare in these three nations in terms of exclusion area, controlled area, radii which have different population limitations and restrictions and populations within the controlled area.

In the case of England under the exclusion area column, it is not their practice to define an exclusion area, and similarly in the case of the United States we do not yet specify population density in our site guides specifically. So it is not entirely possible to compare the three on account of differences in definitions. But to the extent that you can make this comparison it is quite interesting to see from this table that there are not any gross differences in overall siting practice in the three nations.

This brings me to the question of the interpretation of the site guides and in particular the opinion of the committee in regard to the location of power reactors in or very near large population concentrations. This opinion has been, so to speak, tested in, for example, the Jamestown and the city of Los Angeles cases. I would like to point out that although both these projects represented very difficult siting problems, suitable sites were found, two at Jamestown and seven in Los Angeles County, that were approved by the ACRS. From the safety standpoint, the problem of locating a power reactor reasonably near its load center has certainly not proved to be insoluble.

A final point on site criteria, to which the committee attaches great importance, concerns the city distances. The site guides are formulated in terms of the dosage that an individual might receive. We have mentioned to you before, on several occasions, the importance which the ACRS attaches to the total population dosage that might arise from an accident; I am speaking of Dr. McCullough's man-rem concept. The city distance is in part an attempt to recognize and allow for the fact that the total population dosage, in the unlikely event of a reactor accident, must be held to a minimum.

For reasons which are well known to you, the ultimate effect of comparatively low levels of radiation delivered to large numbers of persons are not yet at all well understood. The ACRS believes that the man-rem concept is potentially a very powerful analytical tool in the study of total population dosages as related to reactor hazards. The AEC staff has assured us that it is in agreement with this belief, and that a thorough exploration of the man-rem concept is being undertaken.

(The table referred to, table I, follows:)

TABLE I.—*A comparison of some siting criteria*

	Reactor power (megawatts thermal)	Exclusion area (radius in miles)	Controlled area (radius in miles)		Population within controlled area
			To "low" population zone	To "population center"	
England	200–800	(?)	1.5		500
			2.1		1,000
			5.0		10,000
United States	200	0.21	2.2	4.5	
	600	.38	7.2	9.6	
	1,000	.53	10.0	13.3	
Canada	1,000	.5	2.4		50/km²
			5.0		100/km²

Dr. GIFFORD. Thank you.

Representative PRICE. Doctor, you are familiar, I am sure, with legislation pending before this committee which would remove the requirement for ACRS review of some changes which you mentioned in your discussion here on page 2, except where in situations a safety question is presented.

Do you consider such legislation helpful to the ACRS?

Dr. GIFFORD. I don't think that we are yet well enough able to judge the consequences, as I have said, even of comparatively small

changes as to the possible safety implications to be able to be very dogmatic on that point. We certainly don't want to consider the change in the thread of every nut and bolt on a reactor.

On the other hand, we don't want to be in the position of worrying whether certain substantive changes are being approved without scrutiny by the ACRS. So I think our opinion is that we would like to have the opportunity of reviewing all substantial changes in the way that we are proposing now, and very likely, I would answer your question by saying no, I don't think we would want to at the minute cut ourselves off.

Representative PRICE. Mr. Holifield?

Chairman HOLIFIELD. Dr. Gifford, have you been able to express an evaluative judgment on two things? One is the new type of so-called moat pressure suppression. There is a moat of water around the reactor as I understand it, and that would take part of the shock.

No. 2, underground placement of containment vessels and reactors.

Dr. GIFFORD. We have under review the Humboldt Bay project which, as you know, has been the major proponent of the pressure suppression system. We feel that it has been a major advance as far as engineering safeguard features are concerned in the sense that it provides an alternative to other containment.

We have some technical reservations about this simply on the grounds that it has not yet been completely proved in terms of operating experience, but it looks to us like a very favorable development and one which reflects the sort of thing that we, in general, would like to see, which is new ideas.

Chairman HOLIFIELD. In other words, your reservation is on the basis of lack of knowledge rather than criticism of the fundamental concept.

Dr. GIFFORD. Yes. We believe the fundamental concept is very attractive and shows great promise. We have not considered any underground placement of reactors yet. That is to say, apart from informal committee discussions. We are not aware of any specific plans and have received no information on this point.

We know that there are certain underground reactors in existence or being built; in Norway, and one built in a cavern near the Belgium-France border. In general, we are looking forward to receiving some information on this and would like to give the matter some thought and study. It seems the sort of thing that should be looked into.

Chairman HOLIFIELD. If substantial advance can be made in safeguards it would make a great deal of difference in the locating of these reactors in areas where otherwise they could not be located?

Dr. GIFFORD. This is our feeling; yes, sir.

Representative PRICE. Dr. Gifford, referring to your explanation of your subcommittee system, what are the advantages and disadvantages of this system?

Dr. GIFFORD. To us the advantage is that it permits us to deal with a large number of reactor projects. I might say at last count we had 41 subcommittees. It permits us to deal by this process with a tremendous amount of data without any individual on the committee being completely consumed by the avalanche, and yet with the assurance that each case is being scrutinized very carefully by a representative group of the committee.

Each subcommittee has on it someone that represents each of the committee disciplines. If a person has special competence in one particular problem area which is represented by a certain reactor or reactors then he particularly concerns himself with these cases. Essentially, that is the great advantage.

I hardly think that the disadvantages could be considered to outweigh this advantage. The chief disadvantage is that not every committee member reads every word of each of the reports that we have been receiving. I am sure you are familiar with the amount of technical information that is involved here.

Representative PRICE. Can you really get the full spectrum of scientific discipline when you operate under the subcommittee system?

Dr. GIFFORD. I think that we have, yes. I think if you would examine our subcommittee membership that we have been rather faithful to the proposition that each have the significant disciplines; that is, site on the one hand, reactor physics on the other hand, and reactor components, are represented to the degree that it appears to be necessary. Also, we have the advantage that if there is need for a special man on a subcommittee we can draw on other committee members as well as consultants to the committee to provide for supplementary information.

I should also mention that it is part and parcel of the subcommittee system that the subcommittee reports to the full committee, and the full committee has every opportunity and obligation to review each of the projects and ask questions of the subcommittee and discuss things quite fully.

Representative HOSMER. Mr. Chairman, at that point, I have heard comments from people from industry that when they get mixed up with you it is a lot easier just to go ahead—wen you raise this problem, that problem and so on down the line—rather than waste time arguing with you, just go ahead, build in extra features into the reactor so there is a lot of overdesign and a lot of extra stuff. They have to do that, otherwise by the time they got through with you it would be a decade or so before they got started.

Would you comment on that?

Dr. GIFFORD. Let me first and then Dr. Thompson will answer, too.

Yes, I would very much like to do that. I will say to you this: That the advisory committee is a group of rather dedicated and rather hardworking people who are not given to frivolous judgments. They, as much as anyone else in the reactor industry, as I understand it—and I am rather on the outside of it—are anxious to see the job gotten ahead with. Their particular interest is to see that this is done with safety.

I think when you balance the problems of safety against the problems of economics, there is always going to be a certain amount of conflict.

Representative HOSMER. I asked the question neither facetiously nor critically. It is a situation that has an element of truth in it, but probably it is a situation also that has no other solution.

Dr. GIFFORD. I would say that the comments you refer to the committee members are well aware of and certainly do everything they can to see that this does not in fact happen.

Representative PRICE. Would you comment on that, Dr. Thompson?

Dr. THOMPSON. If I may comment, I would like to point out that the committee is responsible for a good many safety developments which have occurred and which we occasionally get feedback on. Often, reactor technical personnel are in favor of these developments after they have tried them. I would point out that in its former guise the committee was basically responsible for the creation of the Idaho Falls testing station.

I have two hats. I am the director of the MIT nuclear reactor. I appeared before the committee once—before I was a member. The committee requested that I put in extra dampers in the MIT ventilation system. I must say in retrospect I have been thankful that they did. I found the original valves which I put in didn't work quite the way I thought they would. There was a real reason for what the committee did.

The committee is responsible for encouraging the use of water sprays in order to reduce air contamination and a good many other developments which have occurred. All of these are committee actions in a constructive and in a positive sense. It is clear that in some cases it may look a little difficult. If you, on the other hand, were sitting as a member of the committee and heard an applicant say that the control rods in his reactor were to be dropped back in only once as a total test, I think you yourself might be a little bit disturbed about what was happening and would yourself say, "We must do this a little bit better." This is a real problem—trying to establish a balance between what we realize are some difficult requirements and the need for these requirements.

Representative HOSMER. I think even the people who complain about it appreciate it.

Dr. THOMPSON. Yes, I think they do in many cases.

Dr. GIFFORD. Hopefully, I will say this, that we will never know the answer to your question. The aim and object of all we do is to avoid having concrete evidence that would bear on the answer of that question in the form of reactor accidents.

Chairman HOLIFIELD. I would like to ask this question. How do you stand on your backlog of cases? Are you up to date, and if so, how long does it take you to process these cases?

We have had some complaints that it takes too long to get action from you.

Dr. GIFFORD. Of course, I would have to review the history of our decisions to be able to tell you exactly about cases in which we may have been unable to render advice at substantially the same time when we received the presentation by the proposed licensee. My impression is that we are not substantially behind in terms of cases at the minute. That is the first point.

The second point is that very often the very fact that we do sometimes have to postpone rendering advice pending settling certain technical points—and this bears also on the question Mr. Hosmer asked—reflects real uncertainties and real problems. All I can say really, is that we try to clean them up as fast as we possibly can.

I am not aware that we are behind on any particular cases.

Chairman HOLIFIELD. Do you take 60 days, 90 days, 6 months, or a year on some of these cases? I am not criticizing. I am just inquir-

ing. It might be that you might say, if we had certain technical information we could make a decision and then it might take time to get that technical information.

Dr. GIFFORD. The ordinary course of events goes something like this. There are certain stages of development of a reactor project, as you know, at which the committee's advice is sought. The site selection stage, the construction permit stage, and the final licensing stage. These may be pegged over various points, perhaps 2 years apart, or maybe more.

The committee, however, tries to act within perhaps a month. And by act, I mean the committee receives certain written information through the AEC staff and then approximately a month after receipt of that information it would ordinarily expect to have a presentation by the applicant and then in the ordinary course of events it would expect to render some advice on the basis of that.

Chairman HOLIFIELD. This would not seem to be an inordinate amount of time.

Dr. THOMPSON. I would like to go a little out on the limb at this point. To the best of my knowledge the committee has never been responsible for the holdup of the startup of any single power reactor since the beginning.

I would point out that this is a long process. I agree with the previous statement in this regard. But it involves also the AEC staff, and a study of documents which often amount to some 6 or 8 inches of material. This is not something that you do in 1 or 2 days, particularly if it is a new type of reactor. Much of the committee work is done without writing letters. It is simply a matter of discussing problems and bringing out problems that the applicant has never thought of before, himself.

I would say that the function of the committee is first of all to insure that the applicant himself has thought through all of these problems. If he has not, then he has to go back and do some more work.

The second thing is that by asking questions in various areas we assure ourselves of his competence to carry out the job he has started, and then, third, we review all the technical documents. We act more or less like a faculty committee reviewing a candidate for the doctor's degree in some university.

Is he well-prepared? Does he know the answers? And are these answers good answers? It does take some time. I honestly do not believe we have ever held up a reactor project.

Chairman HOLIFIELD. As you know, this committee has been concerned with the importance of your work. That is why we made certain statutory changes. Of course, we are occasionally contacted by people who are dissatisfied because certain sites were not approved and things like that.

We have also felt—at least speaking for myself—that we should leave this up to your professional judgment. I would again want to say on the record that, in view of circumstances or events which have occurred, such as the SL–1 out at Idaho, and the recent event at Hanford, neither of which have we ever received any adequate explanation as to how it happened—of course, the Hanford event was just a few days ago and it is a little too early for that—when excursions

can occur and events can occur which are hazardous, and when we still can't really diagnose those events and say what caused them, to me it is a red flag of warning that we have to make haste slowly in this field.

I say that with no desire to hold back the advance of the art. In fact, my caution is along the line that in this particular instance if we do not exercise unusual care until we have the technical information to go a little bit faster, that just one or two mistakes could stop this complete development of this industry in the United States.

I would again encourage you to make haste, but make it slowly and carefully with due regard to safety of populations.

Dr. GIFFORD. Thank you, Mr. Holifield. I would say this is a very concise statement of the committee's own point of view on the subject. It certainly expresses what we think should be done.

Chairman HOLIFIELD. Some of these people say I can knock a half mill off my cost if I can get such and such a site. We cannot sacrifice the safety of the population just in order to achieve that half mill.

Representative PRICE. Mr. Toll.

Mr. TOLL. Dr. Gifford, your statement indicates that you don't have much confidence in the AEC hazards evaluation staff since you and the applicable subcommittee chairman have to review every proposed change. This seems very unnecessary and a cumbersome procedure in the case of minor changes.

Would you care to comment on that?

Dr. GIFFORD. I would say this, or rather two things.

First of all, we do have this confidence. This is, in fact, what permits us to deal with minor changes, or changes that are obviously minor, in a swift fashion.

The other part of it is that we have initiated this system of reviewing changes on the part of our committee staff and ourselves simply in order to speed things up. What we are doing is checking. I don't mean spot checking. We are checking systematically, but we are not reviewing in anything like the considerable detail that the staff does.

Mr. TOLL. This indicates you are unwilling to delegate responsibility to AEC staff for even the most minor, insignificant change to a reactor.

Dr. GIFFORD. No.

Mr. TOLL. You feel that some member of the committee has to look at every change that comes in, according to your statement.

Dr. GIFFORD. I would like to answer you, Mr. Toll, in this way. The experience of reactor safety review has been an evolutionary one. I have followed these matters although I have not been on the committee for all of the time of which I am speaking. In the past, the committee reviewed in great detail university research reactors, reactors of comparatively low power level. We no longer do that. This has been delegated to the staff as their complete responsibility. We believe that this is a good move and we would favor working in that direction as fast as we can.

In my discussion here, I was simply telling you what we are doing right at the minute because this spate of changes has just begun to arrive. It has been going on for some time. It is just beginning to achieve large proportions. We would expect that as time goes on less and less would be the subject of ACRS review.

Mr. TOLL. People who have studied this question, including the staff of the Joint Committee in its report of a year ago, have been anxious to get the ACRS out of the minor small stuff and keep them concentrating on big questions. In fact, this was the nub of the Commission's Vallecitos decision: That only if there is a significant safety hazard question presented, does the ACRS have to review the question. Yet you are still reviewing even minor details.

Dr. GIFFORD. The very context in which the AEC staff presents us with an amendment and tells us in their opinion if it is significant or not, really guides us as to the detail in which we review things. We don't always agree with the staff. In general, we are able to tell by the context of their submittals to us of these documents whether we do have a serious safety problem.

Dr. THOMPSON. I would like to point out that there are other possible problems here. First of all, the staff itself might feel that it would be helpful for us to look over the case. Because if there are objections or doubts on the part of the committee, they would like to know about them early.

In addition, as I have pointed out in my testimony, the staff has had considerable turnover in personnel and in many cases the ACRS technical memory on these cases is better than that of the staff because we may have more continuity on some cases.

Mr. TOLL. I would like to ask one question about the old cattleman who said, "Son, in this town we don't practice law, we practice facts." Is this really a fair analogy? Doesn't the ACRS repeatedly make the ultimate determination that "this reactor can be operated at the site proposed without undue risk to the public health and safety."

For example, the ACRS said this in its November 1, 1961, letter on the Peach Bottom site. Is this a factual determination or a legal conclusion?

Dr. GIFFORD. Of course, there are legal implications but on our part it is a determination which we believe to be factual. That is to say, it is based on the technical analysis of the available information, the advice from the applicant, from the AEC staff and consultants, and from whatever other sources we think we need to make the judgment. It represents what we believe to be a technical judgment.

I wouldn't want to speak to its legal implications. By making that remark I really had in mind characterizing the position of the committee relative to the body of information it receives.

Mr. TOLL. I see Commissioner Olson rising to his feet. The question of "an undue risk to the health and safety of the public" is in the province that lawyers usually think sounds like a legal conclusion.

Mr. OLSON. Since you have raised the question about the tough cowhand, I would like to say a word also lest some misapprehensions creep into the record because I don't believe that I could support the validity of the example. I am sure that Mr. Gifford and Mr. Thompson, both of them would disown, that there was an implication that they, too, didn't believe in a system of government by law rather than by men. I think this is an ill-chosen example, particularly because of the point you made of the paucity of facts in this evolving technology, especially at the outset. Maybe this is the analogy Frank meant. I understand in the TV shows the good man often comes close to being framed or hung. On TV he is saved just in the nick of time.

I wouldn't like to have that sort of system even by analogy in the ACRS.

Chairman HOLIFIELD. I cannot but come to the conclusion that the three lawyers on the staff and the lawyer on the Commission are in full agreement as to the inappropriateness of this illustration.

Mr. OLSON. Joining with you in that conclusion, Mr. Holifield——

Chairman HOLIFIELD. I don't think the fact that they are lawyers has anything to do with this.

Mr. OLSON. May I go on to say that outside of the example, I feel the ACRS deserves tremendous praise for the work they have done. They certainly are a dedicated group. They work hard over a mass of technical detail. They have devoted a lot of time to this work with complete dedication. We owe them a great deal. I personally am very pleased that the committee saw fit to make them a statutory body. I think they have made a very vital contribution in this area.

There is more to this example than meets the eye because this has been a point of difference between the lawyers and the scientists right along as to the codification of this evolving technology as it evolves. I happen to believe as a lawyer that we should strip off such criteria and standards as evolve, as the technology develops, and reduce them to writing, so that everybody knows what they are and everybody can be assured that they have received equal treatment under the rules.

But more than that, so that they can do advanced planning. With respect to the site criteria, for example, we have had difficulty in agreeing as to whether the criteria and standards should be published or not as a regulation. We have finally worked out a gentlemen's agreement with the ACRS that we would put them forward as guides because the ACRS, the technical people, feel that they may be too inflexible and they should be readily changeable. We have gone along with that in recognition that this is a new complex and evolving technology. But I still deplore the example.

Dr. GIFFORD. I wonder if I could speak just for a second to that. Like all examples, somewhat facetiously and possibly ill-chosen ones, I think this one is one that can be probably beat into the ground. I do believe there is another facet of it which I would like to mention. I think that the reactor safety aspect of atomic energy is a frontier business. We are working on the frontiers of knowledge.

Every time a power reactor goes on the line it is approved and then in the expectation of increasing the fuel utilization, perhaps, in the core or making some other economic gain, we are driven to essentially a frontier of reactor technology. I am saying, and intended by this example—poorly perhaps, or perhaps not so poorly chosen—that to the ACRS the problems that bedevil us the most are technical problems.

If we could answer those, I think we have ample assurance that the legal questions would be adequately taken care of by those who are better equipped than we to deal with them. This was the only point.

Representative HOSMER. I am not too satisfied with this frontier terminology.

Chairman HOLIFIELD. There are days when you just can't be right.

Dr. GIFFORD. As a meteorologist I would have to accept that.

Mr. RAMEY. The thing that we brought up last year that worries us a little bit in relation to this analysis is that you are saying that you

are emphasizing the technical aspects and, of course, you have and you should and we are all in favor of it. But your letters and your opinions and your advice to the Commission are phrased in the legal language of the statute, and the conclusion of the statute.

The thing that we suggested last year was that maybe you ought to present facts a little more and outline the technical basis of your advice. Your letters are quite brief and they don't give much of the flavor of the facts and your intuitions. They are sort of phrased as statutory conclusions that don't provide so much guidance.

Your meeting with the people—we sat in on one of your meetings—do help provide this advice and they do get it, but the public doesn't get this.

Dr. GIFFORD. I could only agree with what you say. It is a problem. I don't know that I personally know the answer to it. But I agree with your comment.

Mr. OLSON. Mr. Price, we have discussed this with the ACRS a number of times and asked them to give us more a factual and opinion basis behind this ultimate conclusion that they express, but I think this has evolved over a period of time. They felt that it might be disadvantageous to the parties to go into much detail in the letter of opinion.

We are satisfied, ourselves, that they go into all the factual detail. We have urged them, as I say, to put more detail in the letter, but they are troubled about expressing it in a letter.

I think it would be extremely difficult for them to get agreement on precisely how they would state this factual and opinion data which supports their ultimate conclusion. So there is a real problem to them.

Representative PRICE. Dr. Thompson?

Dr. THOMPSON. I alluded to this earlier. I can give you some examples of this. I think 10 days or 2 weeks ago the AEC issued permission for the Watertown Reactor Arsenal in Massachusetts to increase its stack height in order that the air which normally passes through the containment should come out with perhaps a slightly lower dosage to the general public.

This was not a basic safety problem in any sense in the first place. As a result of the use of the word "gas" by somebody, this became a major public relations problem and immediately the press and so on got into it. A group which was trying to be safer is now in grave jeopardy as to their general relations with the entire population surrounding them and all for no reason.

In many cases we try to resolve the major questions before the applicant ever completes his case. In fact, we have to do this in order that the situation is completely clear.

I might say, in passing that when we say that we believe that this reactor is safe, this is our own basic technical opinion and has nothing to do with the legality or nonlegality of the situation.

Representative PRICE. Thank you. Dr. Thompson, I understand that your statement is quite lengthy. As the old cattleman would say, It is a fact that the hour is getting late. So if you don't mind, I would appreciate it if you would return tomorrow and be the leadoff witness in the morning.

Dr. THOMPSON. All right, sir.

Representative PRICE. The committee will stand in recess until tomorrow morning at 10 o'clock.

(Subsequently, the subcommittee received the following letter from Dr. Gifford:)

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS,
U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C. May 4, 1962.

HON. MELVIN PRICE,
Chairman, Subcommittee on Research, Development, and Radiation, Joint Committee on Atomic Energy, Congress of the United States, Washington, D.C.

DEAR CONGRESSMAN PRICE: During our appearance before the Joint Committee on Atomic Energy, on April 10 and 11, Dr. Thompson and I were asked several questions about the speed with which the Advisory Committee on Reactor Safeguards deals with its cases. Our answer, given in general terms, was that the ACRS has no backlog of cases under review—that we ordinarily give our advice on a case well within 1 month after receiving the pertinent technical information in the form of hazards reports and AEC staff analyses. I realize that the general problem of scheduling safety reviews has become rather controversial within the nuclear reactor industry but feel that part of the problem arises because of a genuine misunderstanding of the ACRS's role in this process. It occurred to me that you might find it useful to have available a slightly more detailed summary of ACRS procedures than it seemed appropriate to present during our oral testimony.

The Atomic Energy Commission iormally provides the ACRS with hazards summary reports and related safety documents shortly after receiving them from an applicant. The timing on this varies considerably from case to case, but can be as much as 2 to 3 months or more in advance of the date when ACRS advice is given. The documentary information is then reviewed in parallel, by the AEC regulatory staff and the ACRS. As you know, there may be an ACRS subcommittee meeting, in which the AEC staff participates, during this period, although this is in no sense a mandatory part of our procedure. The staff reviews the case during the same period, and communicates its opinion to the ACRS in the form of a written staff analysis. Following this there is the presentation by the applicant during an ACRS meeting, after which a letter of advice is written.

From the ACRS's standpoint, the timing of the above stages of our safety review is controlled entirely by two internal arrangements that we have set up with the AEC staff; our 30-day, and 15-day rules. The 30-day rule states that in order for a case to be eligible for consideration at an ACRS meeting, the documentation submitted by the applicant (i.e., hazards summary report, etc.) must be received by the ACRS at least 30 days in advance of the date of the meeting. The 15-day rule states that the AEC staff analysis on a case must be received at least 15 days in advance of the meeting date. Since, as pointed out by Dr. Thompson in his testimony, the amount of hazards documentation in some cases is quite extensive, and in all cases is considerable, these ground rules were set up in order to try to provide Committee members with a reasonable period in which to digest the mass of technical information involved. I might point out, in passing, that the committee's interpretation of these "rules" has always been extremely liberal, and exceptions have freely and frequently been made in order to expedite hazards reviews.

The Committee ordinarily regards the AEC staff analysis as the final portion of the formal documentation that it receives on a case; receipt of this document normally signifies that the staff has finished its analysis and has taken a position, although this position often involves some questions or reservations. The staff analysis is desired some time prior to an ACRS meeting since it helps to focus Committee attention on those areas of design which are new or unusual, or incompletely developed.

If the ACRS has had a backlog of cases, and if this has acted as a bottleneck in the regulatory process, you can see that this would be apparent in the lengths of time that have elapsed between receipt by the Committee of the AEC staff reviews and the times when our letters of advice to the Commission were submitted. Since a letter of advice is ordinarily submitted within 3 or 4 days after the meeting date at which an applicant makes his presentation to the Committee, the 15-day rule would seem to require an elapsed time of roughly 20 days between receipt of the staff analysis and the Committee's letter of advice.

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Prompted by the Joint Committee's interest, we have tabulated this elapsed time, for the 66 Committee actions on 44 unclassified reactor projects actually considered by the ACRS during the calendar years 1960 and 1961. We find the following result:

Total number of actions, 1961 and 1962	66
Elapsed time:	*Percent*
1 week or less	23
2 weeks or less	36
3 weeks or less	91
1 month or less	98
More than 1 month (1 case)[1]	2

[1] In the case of review of core II of the pressurized water reactor (Shippingport) the Committee did not furnish advice until after a planned visit to the site by the full ACRS. It was our understanding in this instance that an elapsed time of 2 months would not cause any delay in project planning or fabrication.

In the above tabulation, "elapsed time" refers to the actual time between the receipt of the staff analyses by the ACRS, and the submittal of the ACRS letters of advice, as determined by the dates that are entered on these documents.

This tabulation obviously indicates that the Committee is acting promptly. In view of the fact that the ACRS waives its 15-day "rule" frequently, it is abundantly clear that the ACRS is making a genuine effort to expedite the safety review process, even to the point of breaking its own administrative rules when the urgency of cases makes this necessary.

There are various additional comments about this tabulation that could be made; as, for instance, the fact that three of these cases for which the elapsed time in fact exceeded 20 days actually represent a joint attempt by the Committee and the AEC Regulatory Staff further to streamline their safety review. These particular cases were a special group for which the staff made its analyses available quite early in order that Committee could consider whether a formal full-scale presentation at its next meeting could be omitted. In fact, this was found to be possible, and a considerable effort on the part of all concerned was thus avoided and the safety review of these cases considerably expedited. On occasion an ACRS review indicates that an applicant must examine or reexamine specific areas, such as design, operating procedures, or organization. In several instances of this kind an ACRS letter has not been written until the applicant has reappeared to clarify the points in question. We believe that this additional attention to design details has resulted in significant improvements in reactor safety.

I hope that you find these details of ACRS activities of interest, and thank you sincerely for the opportunity to communicate them to the Joint Committee.

Sincerely yours,

F. A. GIFFORD, Jr., *Chairman.*

(Whereupon, at 4:35 p.m., Tuesday, April 10, 1962, the hearing in the above-entitled matter was recessed, to be reconvened at 10 a.m. on the following day.)

INDEMNITY AND REACTOR SAFETY

WEDNESDAY, APRIL 11, 1962

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON RESEARCH, DEVELOPMENT, AND
RADIATION, JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D.C.

The subcommittee met, pursuant to recess, at 10 a.m., in room AE–1, the Capitol, Hon. Melvin Price (chairman of the subcommittee) presiding.

Present: Representatives Price and Holifield.

Also present: James T. Ramey, executive director; David R. Toll, staff counsel; Jack R. Newman, Edward J. Bauser, and George F. Murphy, Jr., professional staff members.

Chairman HOLIFIELD. The Subcommittee on Research, Development, and Radiation is continuing its public hearings on liability, indemnity, and reactor safety problems. Yesterday we received testimony from the AEC and from Dr. Gifford, Chairman of the ACRS. Today we will hear from Dr. Thompson, the immediate past Chairman of the ACRS, and then from representatives of the reactor industry, the insurance industry, and certain toll facilities.

Our first witness this morning is Dr. Thompson of the Advisory Committee on Reactor Safeguards.

Please proceed.

STATEMENT OF DR. THEOS J. THOMPSON, FORMER CHAIRMAN AND MEMBER OF ADVISORY COMMITTEE ON REACTOR SAFEGUARDS; ACCOMPANIED BY ATOMIC ENERGY COMMISSIONER LOREN K. OLSON; HAROLD L. PRICE, DIRECTOR, DIVISION OF LICENSING AND REGULATION, ATOMIC ENERGY COMMISSION; AND DR. FRANKLIN A. GIFFORD, JR., MEMBER, ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

Dr. THOMPSON. Thank you very much. I am pleased to appear in response to your request to discuss briefly the activities of the ACRS during my tenure as Chairman from January 1 to December 31, 1961.

If I may, I would like to paraphrase my prepared testimony in order to shorten the time somewhat, and to get on to a discussion of things that I think may be of interest in view of your questions yesterday.

Representative PRICE (presiding). I think that would be appropriate.

(The statement referred to follows:)

TESTIMONY OF DR. THEOS J. THOMPSON (CHAIRMAN OF THE ACRS DURING THE CALENDAR YEAR 1961), ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, USAEC

I am pleased to appear in response to your request to discuss briefly the activities of the ACRS during my tenure as Chairman from January 1 to December 31, 1961.

In June of last year, I outlined for you the Committee's activities during the early portion of that year. This year I shall review briefly the activities for the entire calendar year of 1961 and report on the present membership of the Committee. In addition I shall comment upon the Committee workload, a new safety-technical information program being sponsored by the Commission, and some aspects of engineered safety for reactors.

During 1961 the ACRS held nine meetings of the full Committee. One of these, a 1-day meeting in January, dealt solely with the problem of reactor site criteria. Subcommittees of the ACRS dealing with specific reactors or reactor problems met on 31 occasions. Often these subcommittee meetings were held at a reactor site. The use of the subcommittee system permits that a more thorough study be carried out and makes a more effective utilization of the Committee's time. Utilizing this system, the Committee as a whole has more time for the consideration of general problems affecting safety, the development of checklists, and study of guides and criteria, etc. Attached as appendix A is a list of all of the meetings of the full Committee and its subcommittees during calendar year 1961. Appendix B lists all meetings of the ACRS and its subcommittees for the calendar year 1962 through April 6 only. In appendix C, the subject and date of letters of advice written by the ACRS to the Commission during both periods are listed. It should be noted that appendixes B and C include subject matter which is the responsibility of our present Chairman, Dr. Gifford. At his suggestion, I have included this material in my tabulation.

The membership of the ACRS has changed more this year than in any other year in its statutory history. Four members of the initial statutory Committee whose terms expired were unable to accept reappointment. These were: Dr. Harvey Brooks; Dr. Willard P. Conner, Jr.; Dr. C. Rogers McCullough; and Dr. Abel Wolman. The names of these men are familiar to you and I am sure that you recognize, as do I, the important service they have rendered to the ACRS, to the Commission and to the country during their years on the Committee.

In the fall of 1961, the Commission appointed Dr. John C. Geyer and Dr. John P. Howe to 4-year terms on the ACRS. Dr. Geyer is an outstanding expert in the field of environmental sciences. He is currently chairman of the Department of Sanitary Engineering and Water Resources, the Johns Hopkins University. Dr. Howe brings to the Committee a broad experience in metallurgy and special problems associated with nuclear applications. Dr. Howe, professor of engineering, Department of Engineering Physics, at Cornell University, is in charge of the university's nuclear science and engineering program. The Committee is fortunate that men of this high caliber continue to believe in the importance of its work and are willing to devote long hours, often at considerable personal sacrifice, to its studies and deliberations.

COMMITTEE WORKLOAD

During the past calendar year, there was a noticeable reduction in the number of reactor problems considered by the Committee. I believe that there are at least three reasons for this. First, there has been in the past year or so a marked reduction in the rate of initiation of new reactor projects. Second, the Committee is beginning now to consider, if not the second generation, at least the much younger brothers of the first generation of large power reactors. Since they have, for the most part, the same characteristics, it is not necessary to consider in such detail these common characteristics. Third, since the technical groundwork for basic understanding of many common reactor safety problems has by now been laid down by past staff and Committee work and letters, many deliberations on minor problems are carried out completely by the regulatory staff.

Thus, the Committee is finding that it is better able to carry out its function of giving general advice without devoting such a large fraction of its time to

specific details. It should be pointed out, however, that real safety consists in attention to details and therefore the Committee must consider, as part of its work, those details which are important to safety. It is my belief that this changing nature of the Committee workload is a natural and gradual one requiring no formal action. By the time the rate of initiation of reactor projects again surges upward, as I am confident it will, unless fusion power achieves a breakthrough, the technology and experience of the past will have made the problems routine. The Committee can devote much of its time to general problems and new typs of reactors. There seems to be no foreseeable need to change the present responsibility of the Committee to review all power and test reactors over 10 megawatts.

LIAISON WITH THE COMMISSION

During the past year, the Commissioners have met with the Committee on a number of occasions to discuss reactor safety problems. These discussions have proved fruitful to the Committee in giving us a better understanding of some of the Commission's problems and in enabling us to discuss informally safety questions as soon as they arise. The Committee has greatly appreciated the time that the Commissioners have taken from their busy schedule to make this possible.

Our liaison with the staff of the Division of Licensing and Regulation has been very good. The recent loss of several competent keymen to other responsible jobs has made their work more difficult. The Committee knows that a sincere effort is being made to find top technical men to fill out the staff. The staffing problem remains a very difficult one, but not, of course, unique to this one group. I realize that I am saying nothing new when I say that methods must be found to make technical Government service more attractive to highly capable men.

PROJECT SIFTOR

You will note that appendix A lists several meetings of the ACRS Subcommittee on Standards and Criteria. The Committee as a whole has recognized for some time the need for a definitive guide to reactor technology as directly related to reactor safety. It has written advice to the Commission on this subject as early as 1959 urging that a program of study leading to safety criteria be initiated. On several occasions last summer a subcommittee on this subject met with representatives of the AEC staff to determine an outline and scope of work for an integrated series of nuclear safety monographs. During the fall of 1961, the Commission determined that this project should be carried out at once. Since this was to be a purely technical effort, it was deemed best to carry out the actual work outside of the Commission and the ACRS in order that there be no implication of an official safety policy.

Because I felt so strongly that this project was important to the logical development of reactor safety, I suggested my employer, MIT, as a possibility to carry out this assignment, if other suitable means were not available. The Commission accepted this suggestion. The financial arrangements are such that MIT will not profit from this contract. They are simply acting as a vehicle to enable this work to be carried on outside of the Commission-owned facilities.

MIT, under contract to the AEC, is charged with the responsibility of producing a series of integrated chapters on the various aspects of safety information for the technology of reactors (SIFTOR). The purpose of the series is to bring together in one place an authoritative treatment of the current technical state of all phases of reactor technology as related directly to reactor safety. The intent is not to write a textbook on each subject, nor to encroach on the current program of the AEC to prepare monographs on various technical subjects, but rather to present a well-organized collection of the best existing information and the best judgments on those aspects of each subject which relate directly to reactor safety. The project title, "SIFTOR," seems appropriate since that is exactly the project intent—to sift the existing information and collect the essence of its content in one place.

The treatment of each subject will be concise, distilling only the essence of each subject and citing references in the bibliography. The approach will be entirely technical and in no case will policy matters be dealt with. The goal will be to limit even the longest subject to less than 200 pages, and the average to about 100 pages. The total set will, even then, run to over 2,000 pages.

It is hoped that, by careful selection, a definitive, integrated set of chapters can be produced simultaneously so that the entire field of reactor technology as it relates to safety can be brought into sharp focus at one time. This

set should form a handbook on the state of the art and good practice in the field and, thus, serve to guide reactor designers, reactor operators, and safety groups in their evaluations. Areas requiring further research will be clearly pointed out by such a unified effort.

A list of the subjects to be covered includes: Reactor containment, fission product release from fuels, fission product leakage and retention within containments, radio-active wastes retention and disposal, fuel, materials, and metallurgy, core design, reactor kinetics, fluid flow, heat transfer, mechanical systems, instrumentation and control, chemical reactions, and criticality problems.

ENGINEERED SAFETY

The hearings carried out by the Joint Committee on June 12 through 15, 1961, on radiation safety and regulation contain several well-thought-out discussions of reactor safety. It does not seem to me worthwhile to restate many of these points since they are all valid and have been stated clearly already. We have been asked to discuss the problem of utilizing engineered safety as a replacement for exclusion distance around a power reactor. Dr. Gifford has covered the committee views in regard to part 100, the site criteria. I would like to confine myself to a few remarks in regard to reactors and their containment.

There are, in almost all reactor facilities, three barriers to the release of fission fragments—the fuel clad, the primary reactor coolant system, and the reactor containment. Stated simply, reactor safety consists in insuring the integrity of these three successive barriers. The reactor core is designed to be stable under all conditions; fuel burnout is guarded against; instrumentation is made failsafe—all in order to prevent fuel melting and release of fission products from the cladding. The reactor vessel is tested and examined carefully; the system is made of corrosion free materials; pumps are designed with low leakage—all in order to prevent rupture of the second barrier. Spray systems have been developed to wash down iodine; containments are designed to withstand relatively high pressures; leak rates are continuously checked—all to prevent leakage through the third barrier. A balanced design, construction, and operation program is dedicated to preserving all three of these barriers. If these can be preserved with absolute surety, would it not be possible to build reactors anywhere?

The answer is, of course, yes. But can this surety be achieved now completely? It would appear difficult and very costly to do so.

THE REACTOR CORE

Consider the first barrier. At present, the state of the art in determining the conditions under which fuel will melt (or burn out) is rather exotic. Graphs of data look like shotgun targets. The burnout heat flux values used under identical conditions vary from design group to design group. At the same time, the neutron flux density within reactor cores is being evened out (flux flattening) to increase the total power available from the core without the danger of melting fuel in the hottest part. Increasing the power capability from the same size reactor is the best way to improve the economics in many reactors. Here safety and economies tend to clash head on. The economic pressures are very great, as you know. We need better understanding of the fundamentals of burnout before we know how close we can approach the condition safely. Admittedly, the melting of a small number of rods should normally not be a safety problem if the condition is detected early. However, flux flattening may aggravate the problem since a larger fraction of the core will be melted at about the same power.

Since the problem is not well resolved, it is difficult to have a clear consicence about locating a large reactor now, with high pressure, flattened flux distributions, and running near the burnout conditions—as they must to be economic—in the center of a city. Of course, this discussion is based on instrumentation and controls which functions correctly always. The closer one operates to burnout, the less one can risk a failure.

In summary, we are still feeling our way cautiously in developing our faith in the reliability of power reactor cores. Every reactor that has been operated to date, unless it has had at least one almost exact prototype as is the case with submarine reactors, has demonstrated some small differences from expected behavior. Almost always these have not been important, but they seem to indicate that one should be very careful in locating a first of its kind (or size)

reactor in a place where engineered safety is used exclusively. Further experience will certainly lead to better understanding and the gradual replacement of distance by engineered safety.

As an aside it has occurred to me that there may be a "worst" nuclear accident for certain given types of reactors. For instance, the SL–1 accident could conceivably have been such an accident—one in which the control rod was withdrawn so far and so fast that a permanent void was created in the center of the core. Perhaps it never refilled, but boiled away at the edges until the water was gone without releasing any further large bursts of energy. Perhaps a greater or even faster withdrawal might have resulted in a less severe accident. Such a possibility is simply a conjecture on my part; but, if it is true and can be proved by tests, it might alleviate many of our worries concerning the welfare of the general public. As I pointed out before the Joint Committee last year, one should probably look upon the SL–1 accident as an industrial-type accident which would have had few serious consequences for the general public. Perhaps we are overly worried, but we need to find out conclusively first before we move more rapidly. Excursion tests of the type described would be expensive, but might be worth it.

THE PRIMARY SYSTEM

Safety progress in the primary system is being made continually. However, here too not everything is rosy. Welding cracks, lack of rigid enough standards, leaky valves, and other problems continue to bedevil reactor projects. Here, again, none of the problems are insurmountable. Yet we are still learning—and not fast enough to be absolutely certain of our engineering as yet. New codes now being prepared on piping and pressure vessels give promise of improvements. Experience with the operating reactors should iron out many of the small problems by the second or third generation.

CONTAINMENT

In this area, too, performance has not been quite what one might wish. Very few reactors are able to demonstrate the leak rates that they originally specified. Some can, and the rest are coming along, but the process is one in which more experience is needed.

Considerable progress has been made in the past year or so on means to remove from the contained volume any released fission products. The committee is in part responsible for the water spray systems installed at several reactors which have been shown to be effective in washing fission products out of the air. Some reactors are installing recirculating filters or absorbers and, even recently, a soap-bubble system. I believe that Dr. Silverman is scheduled to tell you more about this subject next week.

In the past few months several rather new containment schemes have been proposed. These include pressure suppression, double containment with pumping from the space between the shells into the inside section, and sequential release containments. In the first scheme, which has been demonstrated in a test and is being used in a project now near completion, the high pressure steam released from a primary system rupture is condensed by blowing it into a pool of water. Fission products remain behind in the small inner containment at low pressure. In the third system, the steam from a rupture is vented to the atmosphere and then the system is sealed up before fission products can be released. Both the first and (to some extent) the third completely depend upon the sequential release of steam and fission products. The second system has not been demonstrated as yet, but also appears promising. All of the proposed schemes can be placed underground.

Thus, you can see that there has recently been considerable progress in developing new methods to protect the third barrier. But time and experience are still required to see how well they work out.

SUMMARY

Recently the industry has been passing through a period of discouragement. I see no particular reason to be discouraged. In the midfifties many were overenthusiastic concerning economic nuclear power right away. The present mood is the inevitable reaction to this overenthusiasm. It does not seem to me that this is a time for gloom. A number of nuclear plants are behaving

admirably and are close to economic in their areas. The next generation of these same reactors with larger capabilities should achieve economic power.

Let us not lose our heads in a pellmell dash for economic power at the expense of safety. Rather, let us proceed cautiously, but firmly, to develop more experience and understanding, gradually replacing distance by engineering as it is solidly proved out. This country will be using nuclear power—either fission or fusion—in the not too distant future as its primary power source. It is still our most likely way to penetrate far outer space.

I hope that the Congress will continue to recognize, as they have in the past, the importance to the power future of this country of nuclear reactors and the need to proceed cautiously toward the goal of economic power without sacrificing safety. The Committee would like to caution against a too hasty replacement of distance by engineering safety.

APPENDIX A

LISTING OF ACRS COMMITTEE MEETINGS AND SUBCOMMITTEE MEETINGS

(NOTE.—Location of meeting was Washington, D.C., except as otherwise specified.)

Calendar year 1961

Dr. Theos J. Thompson, Chairman

Meetings of full ACRS:

January.
January (special).
March.
April.
May—Quincy and Cambridge, Mass.
July.
September.
October.
December.

Subcommittee meetings:

January 4: Consolidated Edison at Indian Point, N.Y.
January 11: Environmental subcommittee.
January 18: Enrico Fermi (PRDC) at Cambridge, Mass.
January 31: Consolidated Edison.
February 24: Dresden.
March 14: Dresden at San Jose, Calif.
March 14: Vallecitos experimental superheat reactor at San Jose, Calif.
March 15–16: Peach Bottom at La Jolla, Calif.
March 16–17: City of Los Angeles at Los Angeles, Calif.
March 17: Enrico Fermi (PRDC) at Idaho Falls, Idaho.
March 18: EBR–II at National Reactor Testing Station, Idaho.
April 20: City of Piqua at Piqua, Ohio.
April 25: Vallecitos experimental superheat reactor.
April 26: Naval reactors.
April 28: Yankee at Boston.
May 12: Standards and criteria at Cambridge, Mass.
June 2: Peach Bottom.
June 3: Standards and criteria.
June 12: Picatinny Arsenal at Picatinny, N.J.
June 22: Brookhaven high flux reactor at New York City.
June 23: Saxton at Saxton, Pa.
July 21: Standards and criteria.
August 4: Hallam at Hallam, Nebr.
October 3: Peach Bottom.
October 6: Savannah River at Savannah River plant.
October 6: Heavy water components testing reactor at Savannah River plant.
October 25: Naval reactors.
November 29: Site criteria.
November 30: Humboldt Bay at Humboldt Bay plant.
December 1: New production reactor at Hanford, Wash.
Dec. 20: Enrico Fermi (PRDC).

APPENDIX B

LISTING OF ACRS COMMITTEE MEETINGS AND SUBCOMMITTEE MEETINGS

(NOTE.—Location of meeting was Washington, D.C., except as otherwise specified.)

January 1, 1962, through April 6, 1962

Dr. Franklin A. Gifford, Jr., Chairman

Meeting of full ACRS:
- February.
- March.

Subcommittee meetings:
- January 8: Environmental subcommittee.
- February 26: Consumers of Michigan at Big Rock Point, Mich.
- March 14–15: City of Los Angeles at Los Angeles, Calif.

APPENDIX C

LISTING OF LETTERS OF ADVICE WRITTEN BY ACRS

Calendar year 1961

Dr. Theos J. Thompson, Chairman

Specific reactors:	
BORAX V	Sept. 11.
Brookhaven high flux reactor	July 8.
Consolidated Edison reactor	Mar. 4, Nov. 1.
Dresden Nuclear Power Station	Mar. 4, Apr. 8.
Elk River (RCPA)	Mar. 4, Aug. 3.
Experimental boiling water reactor	July 8.
Experimental breeder reactor (EBR–II)	Apr. 10.
Experimental organic cooled reactor	July 8.
Hallam nuclear power facility	Oct. 28.
Heavy water components test reactor	Nov. 1.
Improved cycle boiling water reactor (Dairyland)	Jan. 14. May 20.
Los Angeles, City of	Mar. 14, Sept. 11.
Low temperature process heat reactor	Sept. 9.
Molten salt reactor experiment	Sept. 11.
National Bureau of Standards reactor	Sept. 11.
Naval reactors program	May 20, July 8. Dec. 13.
Philadelphia Electric Co.—HTGCR Peach Bottom plant.	Nov. 1.
Picatinny Arsenal, Ordnance Corps	July 8.
Piqua nuclear power facility	May 20.
PM–1	July 8.
PM–2A	Dec. 13.
PM–3A	Sept. 11.
Prototype organic power reactor	Apr. 10.
Radiation effects reactor	Mar. 4.
Sandia reactor facility	Apr. 10.
Saxton Nuclear Experimental Corp	July 8.
Savannah River reactors	Jan. 14, Nov. 17. Nov. 17, Dec. 13. Dec. 13.
SM–1 (Fort Belvoir)	July 8.
Southern California Edison Co	Jan. 16.
Vallecitos experimental superheat reactor	May 20.
Westinghouse testing reactor	Mar. 4.
Yankee Atomic Electric Co	May 22.
Miscellaneous:	
Radiation damage to reactor pressure vessels	May 20.
Nuclear reactor system mechanical design (reactor safety).	Sept. 11.
Review of clean critical experiments (reactor safety).	Nov. 1.
Site criteria	Dec. 13.
Letter to JCAE—JCAE staff study on improving the AEC regulatory process.	Apr. 8.

Calendar year 1962

Dr. Franklin A. Gifford, Jr., Chairman

Specific Reactors:

D2G	Apr. 4.
Hallam nuclear Power Facility	Feb. 15
Humboldt Bay	Apr. 4.
Los Angeles, City of	Apr. 4.
MASA (Plum Brook Reactor)	Apr. 4.
NS SAVANNAH	Apr. 4.
Yankee Atomic Electric Co	Feb. 10.

APPENDIX D

MEMBERSHIP ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, APRIL 6, 1962

Chairman: Dr. Franklin A. Gifford, Jr., meteorologist in charge, Weather Bureau Research Station, U.S. Atomic Energy Commission, Oak Ridge, Tenn.
Vice Chairman: Dr. Henry W. Newson, professor of physics, Duke University, Durham, N.C.
Dr. William K. Ergen, principal physicist, Oak Ridge National Laboratory, Oak Ridge, Tenn.
Dr. John C. Geyer, chairman, department of Sanitary Engineering and Water Resources, the Johns Hopkins University, Baltimore, Md.
Dr. David B. Hall, division leader, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.
Dr. John P. Howe, professor of engineering, Department of Engineering Physics, Cornell University, Ithaca, N.Y.
Dr. Herbert J. C. Kouts, physicist, Brookhaven National Laboratory, Upton, Long Island, N.Y.
Kenneth R. Osborn, chief engineer, General Chemical Division, Allied Chemical Corp., New York, N.Y.
Donald A. Rogers, consulting engineer, Morristown, N.J.
Dr. Leslie Silverman, professor of engineering in environmental hygiene, director of radiological hygiene program, Harvard University, School of Public Health, Boston, Mass.
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. Charles R. Williams, assistant vice president, Liberty Mutual Insurance Co., Boston, Mass.
Dr. Dick Duffey, technical secretary; professor of nuclear engineering, University of Maryland, College Park, Md.

STAFF MEMBERS

James B. Graham, Executive Secretary, U.S. Atomic Energy Commission, Washington, D.C.
R. F. Fraley, Assistant to Executive Secretary, U.S. Atomic Energy Commission, Washington, D.C.

Dr. THOMPSON. During the year of 1961, ACRS held 9 meetings of the full committee, and in the same year held 31 separate subcommittee meetings. Often these subcommittee meetings were held at the reactor site.

Attached as appendix A is a list of the meetings of the full committee and its subcommittees during the calendar year.

Appendix B lists all of the meetings of the ACRS and its subcommittees for the calendar year of 1962 through April 6 only.

Appendix C lists the subject and dates of letters of advice written by the ACRS to the Commission during both periods.

It should be noted that the appendixes B and C include subject matter which is the responsibility of our present Chairman, Dr. Gifford. At his suggestion I have included this material in my testimony.

During the past year we have had a larger turnover of membership than in any other year of our statutory history. Four members' terms expired, and they were unable to accept reappointment. These members were Dr. Brooks, Dr. Conner, Dr. McCullough, and Dr. Abel Wolman. The names of these men are familiar to you and I am sure that you recognize as I do the important service that they have rendered to the ACRS, to the Commission, and to the country, during their years on the committee.

In the fall of 1961, the Commission appointed Dr. Geyer and Dr. Howe to 4-year terms on the ACRS. The committee is fortunate that men of this high caliber continue to believe in the importance of its work, and are willing to devote the long hours often at considerable personal sacrifice to its studies and deliberations.

I would like to comment in particular on our workload since some questions arose on that yesterday, and to discuss a bit more some of the details there.

During the past calendar year there was a noticeable reduction in the number of specific reactor problems considered by the full committee, and a corresponding change in the nature of the work. At the same time that the specific reactor load is decreasing, the number of minor items considered is increasing, and the ACRS staff has noticed some increase in their overall workload.

I believe that there are at least three reasons for this. First there has been in the past year or so a marked reduction in the rate of initiation of new reactor projects.

Second, the committee is beginning now to consider, if not the second generation, at least the younger brothers of the first generation of the large power reactors. Since they have for the most part the same characteristics, it is not necessary to consider in each detail these common characteristics.

Third, since the technical groundwork for basic understanding of many common reactor problems has by now been laid down by past staff and committee work and letters, many deliberations on minor problems are carried out completely by the regulatory staff. These decisions are reviewed by the Chairman of the ACRS, and the subcommittee chairmen.

If I may, I would like to read to you the definitions of the four categories of items which we now consider.

The category A items, as we call them within the committee, are those that are forwarded to the ACRS for action. We receive 18 copies, and they are distributed to the full ACRS and such items are discussed, and a decision is rendered, advising the Commission, by the full committee.

The category B items are forwarded to the ACRS for information only, but they are pertaining to projects on which the ACRS has previously advised. We receive three copies. These are forwarded to the ACRS Chairman, to the appropriate subcommittee chairman, and one copy is retained in the office.

I might say here that these items we receive only for information. In no sense does this involve any delay to an applicant. We review these because we feel that there may be some possible correlation or interrelationship with the safety of the case which we have previously reviewed. The ACRS clearly cannot in this cursory review by two

or three people expect to catch all of the implications of these items, so we are simply acting in this sense as a backstop trying to insure that at least some of our members have a full understanding of the entire case from beginning to end.

We feel that this is a part of our responsibility in reporting our advice to the Commission. When we start a case, we cannot afford to drop it halfway through, and let it simply die at that point. There may be some way provided by which we can catch developing safety problems, and we feel a responsibility to advise the Commission if this should occur.

Representative PRICE. Mr. Toll has a question to ask at this point.

Mr. TOLL. Dr. Thompson, how many members are there ordinarily on a subcommittee?

Dr. THOMPSON. I can talk about that a bit. The subcommittee membership varies from three to five or six. I should say that the subcommittee alinement is made up with a good deal of forethought. For instance, the general subcommittee group that deals with, say, boiling-water reactors or gas-cooled reactors or pressurized-water reactors, is very much the same for all of this entire class of reactors. So we are beginning to develop a bit of expertise in various subareas.

Mr. TOLL. If you have a subcommittee of three to follow a reactor all the way through, and if you have two members of the ACRS, the chairman and the subcommittee chairman, review even the most minor details, it seems to me you put almost as much effort on the minor details as on some of your major details.

Dr. THOMPSON. No; I would say this is not a correct statement of the case. To review many of these items—these are usually one- or two-page items—takes 15 or 20 minutes of an individual's time. This can be quite easily done.

Our biggest problem in workload has been basically to write the letters. To write a letter exactly right is really quite a complex and difficult job. The reporting on cases and writing letters was the biggest single problem we had. This present system with fewer letters to write is working quite well, and we are not finding so much of a load on the actual technical problem of understanding the material that comes in.

Does that answer the question?

Mr. TOLL. Yes. Thank you.

Dr. THOMPSON. The next category that we deal with is category C. These are items that are forwarded to ACRS for information involving projects on which the ACRS is not asked to advise. We receive three copies and these are distributed upon request, although normally held in the office. A summary of these is issued to each member of the committee.

A typical example of a situation that arose in this category was a control rod swelling, which first occurred, I believe, in the University of Michigan reactor. This is a characteristic which the staff and the ACRS both felt could turn out to be a safety problem in a number of swimming pool type reactors. This was discussed with the staff, and eventually a letter was written on this general topic. But it developed very naturally through this closer liaison that we have with the staff through the use of these three categories.

The fourth category are documents forwarded to the ACRS for information. These are reports on research and development safety program applicable to projects in general. We receive three copies of these also. They are filed in the office and are available to the members upon request. They are reviewed and a summary of these is sent out to each member. As you can see by this system, we have minimized our workload and at the same time have been able to keep in direct contact with new developments and in rather close contact with what is happening in all classes of problems whether they are large or small.

At this time we do not believe that we have too large a workload. In fact, I think I can cite some figures that indicate clearly that the nature of our workload is changing.

In 1960, we had 49 category B items, 98 category C, and 29 category D items. This part year, 1961, we had 101 category B items, 290 category C items, and 50 category D items. This means that the number of these smaller items has more than doubled. At the same time our total work load on each reactor as a specific item has dropped, so that overall technically we believe we are keeping on top of the situation perhaps even better than we have in the past, and at the same time we have been relieved of much of the problem of writing letters on details purely for legal reasons.

Having avoided this pitfall, we are much more able to carry out our present work.

Representative PRICE. Are you returning to your statement, Doctor?

Dr. THOMPSON. Yes.

Representative PRICE. In the interest of saving time, we have a number of witnesses this morning, and since we have already placed your full statement in the record, and we have had an opportunity to check it in advance. I think it probably would be more appropriate if I would direct a few questions to you in which the committee found some interest in reading your statement.

Dr. THOMPSON. Very good.

Representative PRICE. How many times does the ACRS review the typical power reactor case? For example, the Yankee reactor, before operation is authorized?

Dr. THOMPSON. I would rather take another reactor, if I may. That is a bad one for me, because I have a definite conflict of interest there.

Representative PRICE. Do you want to take the Dresden reactor?

Dr. THOMPSON. Dresden is an older case and that is probably an atypical one. I would rather take, if I may, one of the second generation, since this is beginning to be more typical. Big Rock or Humboldt Bay, perhaps.

Representative PRICE. Any one you desire to take, just so it is not your best case.

Dr. THOMPSON. No. The situations vary quite a bit. You mentioned the Dresden case. On the Dresden case we met with the applicant a good many times, and had long discussions because this was the first of the very large power reactors to go on the line. After it was in operation, they had difficulties, as you recall, with the control rods. So we had again to meet with them on at least two or three occasions.

I might say at this point that this is an example of a case in which we received information, and together with the AEC staff, within, I think, perhaps 10 days or 2 weeks rendered an opinion to the Commission certainly within a month of the time that all the information reached us. I do believe that they were not held up in going back to power at all because of our deliberations.

On a typical case of a reactor, the general type of which has already been considered by the committee—our case for the most part now—we normally meet with the applicant once to consider his site and to deliberate on whether a reactor of this general type can be built at that site. We meet with the applicant on the average of perhaps two or three times, depending on the case, before we are able to give the applicant a letter which the Commission can then use as advice to lead to an operating permit.

I don't know that any one case can be considered typical but our definite goal is to try to keep this down to something like two or three meetings. If an applicant comes in with something rather new, like a request for a lowered control rod margin or a new burnout correlation, then we have to deliberate sometimes one or two extra times if this is a new and different feature.

Chairman HOLIFIELD. Take the Humboldt Bay experience and let us hear what you had there.

Dr. THOMPSON. We had three letters in 1960 and I think one or two letters in 1961. We are checking the record here. I should point out that this is a typical example of the sort of thing we get into.

We know about the boiling water reactor. We had reasonable knowledge of this type of reactor. The thing we did not understand and we had to investigate very thoroughly was the pressure suppression system. This was a new feature. It required a test which the ACRS witnessed at Moss Landing. The difficulties of evaluating this rather new concept were great. It did require two or three meetings on this one item alone.

In our opinion this was a milestone and set a precedent which said, "If you can do it for reactor A, you can do it for B, C, and D." It was in a sense, a precedent-setting case.

Once we looked at it in detail on one, we should not have to do it again.

Chairman HOLIFIELD. It was considered as a major change in containment?

Dr. THOMPSON. If I may interject, we have written three letters in 1960. One of these would be the approval of the site. At least two others were on the pressure suppression. We met with them in December 1961 and March 1962 and wrote a letter of advice dated April 4, 1962, for the operating permit.

Representative PRICE. I don't believe you replied to Mr. Holifield's question whether or not the Humboldt Bay represented a major change in containment.

Dr. THOMPSON. I am sorry.

Chairman HOLIFIELD. I made it in the way of a comment but it could be considered a question.

Dr. THOMPSON. Yes, sir.

Chairman HOLIFIELD. You did consider this not a minor change, but a major change, in the nature of a movement toward a different kind of containment or suppression?

Dr. THOMPSON. We certainly did. It is one of two or three large breakthroughs that have occurred in the last 2 or 3 years in the field of containment which is one of the three primary fission product barriers.

Representative PRICE. Dr. Thompson, you mentioned your discussion with the Commissioners and you state that it enabled you to discuss, informally, safety questions as soon as they arise.

Can you give us some examples of the items you have discussed with the Commissioners over the past year?

Dr. THOMPSON. Yes. One of the things we have discussed is the radiation damage to pressure vessels. This is a problem that we have been worried about quite a bit. We have discussed this with the Commissioners.

We have discussed the design of nuclear reactor systems. We have discussed a good many different items with the Commissioners on an informal basis bringing them up to date on our feelings and a number of these have resulted in letters.

We can cite the May 20 letter on radiation damage to pressure vessels in 1961. The September 11 letter on reactor system mechanical design of 1961. We have discussed the site criteria problem from the very beginning with the Commissioners and certainly with the staff and this has been a development which we have carried out jointly.

Chairman HOLIFIELD. Did these discussions include specific reactor projects like Peach Bottom, Elk River, and Indian Point?

Dr. THOMPSON. In general, these don't. I can't recall in any case that we have discussed specific details of any particular project.

(Subsequently the Joint Committee received the following letter from Dr. Gifford:)

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS,
U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., April 23, 1962.

Mr. JAMES T. RAMEY,
Executive Director, Joint Committee on Atomic Energy, Congress of the United States, Washington, D.C.

DEAR MR. RAMEY: Dr. Thompson and I discussed, just prior to his recent departure for Europe for 2 weeks, the point we raised informally with you in relation to the question whether the Advisory Committee on Reactor Safeguards discusses specific reactor cases during its meetings with the Atomic Energy Commission, which was asked during our April 11 appearance before the Joint Committee.

Dr. Thompson and I are agreed that his reply, which was to the effect that the ACRS does not discuss specific reactor cases in detail during these sessions, conveys the substance of the situation. On the other hand, you will, of course, understand that in the natural course of these discussions, it is inevitable that specific reactors will be mentioned. The point is that such references occur within the context of general problems that are common to certain categories of reactors or aspects of reactor technology. In other words, we attempt to address ourselves to the broader safety issues and problems during these sessions with the Commission. There is no thought that these discussions take the place of the ACRS reports dealing with specific cases which the Atomic Energy Commission provides to the Joint Committee on Atomic Energy and enters into the public record.

I feel sure that Dr. Thompson would wish me to convey this word of clarification to you now, rather than delay it until his return.

Sincerely yours,

F. A. GIFFORD, Jr., *Chairman.*

Representative PRICE. In discussion of the SIFTOR project you state:

> Because I felt so strongly this project was important to the logical development of reactor safety, I suggested my employer, MIT, as a possibility to carry out this assignment, if other suitable means were not available.
> The Commission accepted this suggestion.

Specifically, to whom on the Commission did you make this suggestion?

Dr. THOMPSON. I believe it was made to Mr. Price and a number of others on the staff. I don't believe I ever made it directly to the Commissioners. It is a method of getting the job done.

Chairman HOLIFIELD. Concerning the SIFTOR project which you described, will you be the editor in chief? Who else will work on it, and who else will take care of publication and distribution?

Dr. THOMPSON. We will have as an editor—technical editor—Dr. James Beckerly, who is presently with the IAEA in Vienna and is coming back to take charge of this project from an editorial viewpoint for the next year from about September 1962 to September 1963. I will assist in the project.

We are in the midst of selecting the authors at the moment, but they will include representatives from the national laboratories, from private industry, from universities, and so on, each of them a top authority in his particular field and each of them, or most of them, with previous responsibilities as both a technical man and author to his credit.

Does this answer the question?

Representative PRICE. Dr. Gifford, either you or Dr. Thompson may answer this because I meant to ask the questions after noon.

Do you feel that there are a great number of items being referred to the ACRS that might not necessarily have to be referred to your group.

Dr. GIFFORD. No, I don't think so. My feelings, having been in the position of looking over these items as they come in for some time, is that we are getting all the necessary information that we need in the way of technical data, and that items are referred to us which it is reasonable to ask us to consider or for which we might have some interest because of our prior consideration of the projects.

I don't have the impression that there is any large amount of unnecessary material being given to us for consideration.

Representative PRICE. Are you in any way handicapped by lack of manpower to do your job?

Dr. GIFFORD. I think at the minute that we have a good balance between our own technical staff and our staff support from the AEC staff. So I would say that we are in good shape in that respect right now.

Representative PRICE. Thank you very much.

Mr. TOLL. Dr. Thompson, do you know any other members of the ACRS who have suggested that their employers do work for the committee also?

Dr. THOMPSON. No, not to my knowledge. Let me point out that this is a project—and I make that clear in the testimony—in which MIT makes no profit. As far as I am concerned if the Joint Committee on Atomic Energy would like to sponsor it, I would be delighted. It is simply a matter of getting the job done. The AEC early determined that it should not be done within the Commission

or its laboratories since this would then give the project document implications of official policy. This is a difficult problem. I would just as soon state it here as anywhere else to be certain that it is clear and aboveboard.

Representative PRICE. How big is this SIFTOR project?

Dr. THOMPSON. The total amount of funds allocated to this is $300,000. The money returns basically to the AEC if it is unused. All of the funds go to the authors or for direct expenses except for perhaps $20,000 in overhead which goes to the institute as a 50-percent overhead on those salaries of the staff people involved. These include one-quarter of my time for the next year, Dr. Beckerly's salary, because he will be on the MIT staff, and a couple of secretaries and a part-time business manager.

Representative PRICE. Basically, does this sentence on page 6 of your statement most adequately describe what the SIFTOR project is and the purpose of it?

The purpose of the series is to bring together in one place authoritative treatment of the current technical state of all phases of reactor technology as related directly to reactor safety.

Dr. THOMPSON. Yes, sir. If you sit on the ACRS for some time you cannot help but be impressed with the fact that there is much information which is of vital concern to safety which is buried and which was once known and used and which the new generation is not using. They are simply not aware that it exists.

In one reactor on which we have deliberated, the insulation on the wiring of the system is dissolved by the noninflammable-type hydraulic fluid used in the reactor control rod mechanism. They are thus forced to use an inflammable hydraulic fluid. This was a mistake in the design. The answers to this have been known a number of years in Admiral Rickover's program and certain other reactors, and it is a pity that these designers were not aware of this information. This is the sort of thing that we would hope to include and in this way lend general sound technical guidance without any policy implications to the project.

Representative PRICE. Thank you very much, Doctor, and Dr. Gifford.

Dr. THOMPSON. There has been some discussion about reactor economics. In wonder if I could make a short statement in regard to economics as directly related to safety because this is quite a complicated problem. If I may remove my ACRS hat for a moment, indicating clearly that this is not committee opinion, I would like to make a few remarks.

Representative PRICE. We would be glad to have it.

Dr. THOMPSON. While I am not a public utilities expert, I find myself in the middle of what appears to be an argument that we must make a choice between the present degree of safety and the economics of nuclear power.

I feel obligated to make some comments on this interrelationship. First, it is clear that if the country's reactor safety record continues to be good and as experience is gained with new reactors, there are likely to be certain present requirements which can be relaxed or else the exclusion distance can be more and more replaced by proven engineering safety. As far as safety is concerned, there are only two basic cases.

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First, there might occur that extremely unlikely, unforeseen, serious accident in which case the present distances and engineering safeguards should protect the public and after which the utilities will be anxious to keep these distances large.

Or, second, experience and new developments will indicate that we clearly have been overconservative.

In that case, which I deem to be the far more likely one, the cost of reactor plant safety features both in location and engineering will go gradually down.

I believe there is much fuzzy thinking going on in the region of the economics of these power reactors. Many statements are made which are in themselves true but which show only one facet of the problem and thus present a distorted picture. The reactor economists tell us of the safety cost of reactors, the new developments in coal mining, lowered conventional fuel transport cost, powerplants at the mine entrance, and so on. They imply that all of these factors are arrayed at once to reduce the cost of conventional powers against the cost of reactor safety, holding back the nuclear power development.

These factors are, in general, never applicable to any one plant. Basically, it seems unfair to talk of the economics one gets by comparing a 1,000 megawatt electrical conventional plant of the best design fed by coal mined in the most modern method and operating at the mine face with a development design of a nuclear plant in its worst economic guise. These comparisons are really not realistic.

When a utility company sets out to construct a new plant it does not have all of these lovely choices. It has, in general, a required plant size and a method of operation. It is either base loaded or peak loaded or else it is on standby. It has a general area in mind where the power is needed. It knows the availability and costs at the proposed site of the other types of fuel. Not necessarily all areas are located at the mine face and it becomes an economic problem to see whether it is cheaper to ship the fuel to the powerplant or to construct the powerlines and move the electricity the same distance.

Outside of some fortunate areas, it is clear that most utilities will face this problem. Thus their costs will be higher no matter what the situation. Further, even on the same system network if the load is far from the easy transportation access point, the line losses must be taken into account on a realistic appraisal. For instance, a seacoast access for fuel transport at one end of a power network may not improve greatly the cost of the power at the far inland end of the network. In constructing a simple, very large plant, a utility must weigh the risk that this plant might be put out of action for some cause and reduce the total network power available by some large fraction. Thus, even if the overall efficiency is higher in a 1,000-megawatt plant than it is in a 500-megawatt plant, the utility may still choose to build two 500-megawatt plants rather than a single 1,000-megawatt unit.

In summary, it is clear that eventually nuclear powerplants, either fission or fusion, will be a primary source of power. How rapidly this occurs will depend on many factors including the rate of increase of power consumption, the alternate uses of fossil fuel—which perhaps could be effected by conservation laws—the availability of foreign oil supplies, and other imponderables.

In any case, it would seem essential that the nuclear powerplants be built in order to provide a backlog of experience in the field, if for no other reason. The total cost of a power reactor is perhaps only four or five one-thousandths of a new unit the scientific community started using lately; namely, the "moon shot" financial unit which is basically a $20 billion unit. So 4 millimoon shots are sufficient to build a large power reactor. My colleague, Dr. Gifford, suggested we should call this the lunar buck.

Chairman HOLIFIELD. I think it is much more important to get a man on the moon than it is to a third great source of economic power, if I can pick the man.

Dr. THOMPSON. The second major point here is the utility will not have an infinite number of choices and will make a selection within a small limited set of possibilities and thus it is clear that a utility may often select a less than optimum economic plant for a variety of reasons and, hence the average cost of power from even newly installed plants will be greater than an optimum plantpower cost.

The third point is that the impact of reactor safety on nuclear plant costs is only one factor in making economic choices. It should be clear that the problem is a very complex one and it should be treated in that manner and not simply looked at in its various parts separately.

Thank you very much.

Representative PRICE. Thank you very much, Doctor.

Mr. Price, Mr. Toll would like to ask a question directed to the Commission.

Mr. TOLL. Mr. Price, Dr. Thompson said he suggested to you this SIFTOR project. Did you consider getting any bids on this project other than from MIT?

Mr. PRICE. Yes, sir; We did. But we did not go out for any proposals. This project had its genesis in a study—I hesitate to use the word—that an ad hoc committee made more than a year ago.

Representative PRICE. I don't blame you.

Mr. PRICE. We brought in people from the laboratories and from industry. Dr. Thompson was a member of that ad hoc committee. Prior to that the ACRS had recommended this kind of a study. When we had sifted down and sifted out the things that we thought should not be included and everybody was in agreement that this project should go forward, it was taken to the Commission and the Commission approved the execution of the contract.

Representative PRICE. We have these ad hoc committees working on $300,000 projects now?

Mr. PRICE. I hope this contract is not regarded as an ad hoc committee study. We attach considerable importance to this effort to get all of this technical information collated and correlated in one place. We were all clear about it.

Representative PRICE. I think it is a worthwhile project. I don't know how else you could operate unless you had something like that.

Mr. PRICE. In view of the background leading up to this that the obvious place to have it done was at MIT, they being willing—and they were.

Representative PRICE. Certainly a necessary project.

Mr. PRICE. Yes, sir.

Representative PRICE. You have a maze of papers. Did you want to make a comment?

Mr. OLSON. Yes; I think I should make a comment on behalf of the Commission since the question has been raised.

The very context of which it was raised of Dr. Thompson being on ACRS and the work going to MIT. I want to say that this is not a contract that there was competition for. The Commission is very grateful to Dr. Thompson for persuading MIT into developing this job.

I am sure this will not develop into a $300 million a year contract. This is a one-time service. I think that MIT was very generous and statesmanlike in undertaking it for our benefit.

Representative PRICE. I am not in any way critical of the contract. I think it is essential work and one that is beneficial to the program not only now but for all time to come.

Mr. OLSON. It gives us the benefit of continuity of supervision by Dr. Thompson who is a recognized reactor expert and who has been on the ACRS for a number of years. I think it is very beneficial to us to have this continuity of supervision of this project for collating all this technical data.

Representative PRICE. Thank you very much.

The next witness will be D. R. Shoults, representative, atomic development, General Electric Co.

We are happy to have you, Mr. Shoults.

STATEMENT OF D. R. SHOULTS, REPRESENTATIVE, ATOMIC DEVELOPMENT, GENERAL ELECTRIC CO.

Mr. SHOULTS. Thank you.

Representative PRICE. You are a veteran of the ANP wars and we are pleased to have your testimony. I don't know whether you have any comments to make on the ad hoc committee but I know you can think of a few.

Mr. SHOULTS. I suspect that my comments probably have already been duly recorded for posterity. I better stay with our current subject.

I am D. R. Shoults, and I am here to comment for General Electric Co., on H.R. 9244 and H.R. 10775. These bills would amend the Price-Anderson Act to provide vitally needed indemnity coverage to many Government contractors and their suppliers for oversea nuclear incidents involving the Government's nuclear projects and activities.

A suggestion for the law to be changed in this way was made in the 1961 section 202 review. The proposal was discussed in some detail last July in hearings before this committee. At that time the proposal was generally supported by the Atomic Energy Commission and by the representatives of other organizations which appeared in those hearings.

H.R. 9244 was introduced by Congressman Price in September 1961 for consideration during the winter. This bill provided a useful basis for study of the problem by both industry and the Government. It has been thoroughly reviewed in informal discussions by representatives of these groups.

On March 15 of this year, Mr. Price introduced H.R. 10775. As his statement concerning this bill points out, H.R. 10775 incorporates certain of the changes which were developed in the work on H.R. 9244.

We are confident that, in the main, H.R. 10775 represents a wide measure of agreement—both in the Commission and in industry—upon a solution of this very important problem. We strongly urge the committee to report the bill favorably, and trust that it will be enacted by the Congress. We would, however, suggest that the committee consider two amendments in its deliberations on H.R. 10775.

I. INDEMNITY LIMITATION

In section 4, H.R. 10775 provides that the limit of liability of contractors for a foreign nuclear incident will be $100 million. This is an important provision. At the present time there is no limit whatever on the potential liability of Government contractors for a foreign nuclear incident.

This limitation of liability would be reliably effective however, only in State and Federal courts in this country. Abroad, I am advised that a limitation of liability could be relied upon only if it is provided for in the law in effect in the country involved. To the best of my knowledge no foreign law now in place would automatically apply to nuclear incidents involving instrumentalities of our Government. In general, I understand that foreign nuclear liability laws and treaties provide limitations of liability only for nuclear incidents involving facilities licensed by foreign governments.

In section 3 the bill provides that the oversea indemnity coverage of contractors would also be limited to $100 million. This provision seems to afford coverage which would complement the liability limitation. The difficulty is that the liability limitation cannot be relied upon to be enforced in foreign countries. It would be possible, therefore, for a contractor to be held liable abroad for a foreign nuclear incident in any amount in excess of the $100 million indemnity limit in H.R. 10775.

This is a really serious problem for contractors and suppliers with assets abroad. But it is a very significant matter also for contractors or suppliers without appreciable current foreign assets. Even if a contractor or supplier has no assets abroad, foreign judgments against him could effectively foreclose him from markets outside of the United States. The risk of a gap between foreign liability and indemnity coverage is one of great importance, therefore, for all contractors to which foreign markets are attractive. In view of the real need for growth in our Nation's foreign trade, we believe that the companies which should look forward to the significant development of foreign business include a great number of the contractors and suppliers to which this bill would apply.

Here let me answer a question.

"Why should the Government spend taxpayers' money for the benefit of a few contractors and suppliers?"

I think this is a loaded question—but it is one you may hear. Let me point out first that this bill calls for no expenditure unless there is an incident for which a contractor or supplier is liable. If there is

such an incident—it will be in governmental activities undertaken for the sake of the American taxpayers.

Let me also answer the equally loaded question: "Why should we do anything more for our friends abroad when we are already giving them so much?"

The primary effect of this bill would be the protection of Government contractors and suppliers. Perhaps, a high indemnity limit may be thought to be an inducement to foreign courts to render higher judgments than would be the case if the limit were lower. But the higher judgments may be rendered in any event—with the same effect on the contrary, as a whole, if they are paid by the Government. These assets are national resources, just as public funds are. Limiting the Government's obligation—and thereby exposing contractors—would seem to us only an illusory protection of the national interest.

The indemnity limit in the law now as applied to domestic incidents is $500 million. If that figure is extended to foreign indemnification, any lower limit applied to contractor liability, including any limit below $100 million, will automatically inure to the Government's advantage.

We realize, of course, that contractors may be held liable abroad for even more than $500 million. But, again, that figure is in the law now for domestic incidents, and it is a good deal more comfortable than $100 million. Additionally, we have no thought that if a Government activity caused a great catastrophe involving foreign damages in excess of the indemnity, the Congress would be disposed to have the excess burden borne by the Government's contractors.

II. NUCLEAR DEFENSE PROJECTS

The other change in H.R. 10775 which we suggest for your consideration relates to certain presently unindemnified nuclear defense projects. In its 1957 report on the Price-Anderson bills, this committee stated:

> Although the matter was raised, it was not deemed appropriate at this time to include protection for the prime contractors of the Department of Defense alone in his bill. This is a problem which has substantial difficulties and should be resolved only after further and full investigation of the scope of the operations.

We believe that the committee's action in 1957 was entirely appropriate. It was not then at all clear how our nuclear defense programs were going to develop, or how indemnification coverage could best be provided for them.

This situation has been greatly clarified in the interim.

As your 1957 report noted, the outstanding example of nuclear defense programs has been the joint project of the Defense Department and the Atomic Energy Commission for the creation of the nuclear navy. This work was described in some detail in committee hearings in May 1960. Because this has been a joint project, Price-Anderson indemnification coverage has been extended to the reactor suppliers by the Atomic Energy Commission. Mr. Price's September 1961 analysis of this problem pointed out that H.R. 9244, and now H.R. 10775, would extend this domestic Price-Anderson coverage for contractors and suppliers in the nuclear navy program to foreign nuclear incidents. But, as the statement made clear, coverage would not similarly be

extended for other nuclear defense projects which have not to date been covered domestically by Price-Anderson indemnification.

We suggest that now is the time for indemnification above available and required insurance to be applied to all nuclear defense projects under this act. It seems clear that the projected nuclear defense programs will continue to require essential Atomic Energy Commission participation and support. Price-Anderson indemnification, therefore, would be quite in keeping with the way the work is in fact done. Additionally, it would also be in keeping with the Commission's prime responsibility, as a matter of natonal policy, for the development of our atomic energy program.

This policy is reflected in the indemnity coverage by the Commission of almost all of the Government's current nuclear projects. Coverage is extended to these projects either as licensed facilities, Commission projects, or as joint projects of the AEC and another agency, such as NASA or the Department of Defense. Indeed, as the indemnity provisions of the act are now administered, we have the puzzling anomaly that most governmental nuclear projects are covered—including many of the defense projects—while a few are not. Explaining a lack of coverage in the event of an incident involving an unindemnified project or facility would be awkward, to say the least—without regard to whether the incident happened here or abroad.

Taken alone, we believe the present provisions of section 170d of the act could be construed to enable the Commission to cover these few unindemnified projects. At the risk of repetition, the inescapable fact is that the Commission is a vital joint participant in one form or another in all the Government's nuclear activity—and it will continue to be so.

Nevertheless, the committee's 1957 observation, and the manner in which the statute has been administered since it was enacted cannot be ignored. We therefore urge the committee favorably to consider a revision of section 170d which would make clear and unequivocal the authority of the Commission to cover all of the Government's nuclear projects which are now excluded from coverage. The basis for this action would be that Commission support, whether in the form of funds, materials, information, services, or technical assistance, is an essential feature of all such Government work.

We appreciate this opportunity to appear and express our views on these bills, and particularly on H.R. 10775. We strongly urge again that the committee act favorably on that bill.

Contractor coverage for foreign nuclear incidents arising out of Government activity is urgently needed.

Representative PRICE. Thank you, Mr. Shoults. I know of the great amount of work and interest you have displayed in connection with this problem. I also know of the approach of the Department of Defense on this subject. Your last paragraph touches on this and brings us in conflict with the Department of Defense. It is a technical problem that we feel is outside of the jurisdiction of this particular committee.

The indemnification program for the defense projects, that is. I think you know as I know that there has been proposed legislation on it within the jurisdiction of another committee, and up to this time there have been no hearings scheduled on it and no definite action taken in connection with it.

Mr. SHOULTS. Mr. Chairman, it is my understanding that the problem of an indemnity law applicable to all Department of Defense activities is a much broader one than merely the coverage for nuclear incidents which stem from the joint project activity, as we have pointed out here, inescapably participated in by the Atomic Energy Commission.

In most instances, or practically all of the reactors and atomic power sources that have been put in place so far have in one way or another been covered by the indemnification under the act. There are only a very few that by contractual peculiarities have apparently not been covered. It is advice from counsel and many I have talked to who perhaps should be entitled to an opinion that in fact the present law would entitle the Commission to indemnify these projects. But it is cloudy, I agree, and our suggestion was that perhaps this could be clarified.

Representative PRICE. Mr. Shoults, on page 3 you state that even if a contractor or supplier has no assets abroad, judgments against him could effectively foreclose him from markets outside the United States. In the event of an accident and if a U.S. supplier is found liable and judgment rendered against him, wouldn't the resulting publicity ruin his prospect for further sales abroad anyway?

Mr. SHOULTS. I can't disagree, Mr. Chairman, with the fact that one of the major losses that any contractor would have in such an incident would be the loss of his public posture, prestige, and so forth. However, it is almost inevitable that there will from time to time be incidents of one sort or another, and it would be hoped that the world will recover from whatever incident there may be and that life could go on. Our concern is that if there is no legal framework for protection that this may also be a game of Russian roulette.

Representative PRICE. On the question of the indemnification limitation of a $100 million, I think in the foreign countries that do have indemnification programs, this is their limit. It is approximately their limit. Of course, we have the job of selling this legislation to the House. I remember when we chose the $500 million limitation for the domestic coverage that there was a suggestion that there be no ceiling. We had to arrive at a figure in order to be confident we could get support in the Congress. I think that plays a part here. But also the fact that the foreign governments themselves have approximately this limitation.

Do you have any figures that would indicate the total assets of any American businesses abroad that might be affected by this program of coverage?

Mr. SHOULTS. I am really not expert in the investment field. I am confident that a number of American companies may have foreign assets that exceed the $100 million, certainly in terms of the current business underway, receivables and what have you.

I would suspect that companies which have no substantial capital assets abroad may well have business contracts and others that may go into amounts of money of that or greater magnitude.

I really cannot pose as an expert in that field.

Mr. RAMEY. Isn't the monetary level of judgments abroad substantially lower than in this country so that this 100 million ratio is not unreasonable?

Mr. SHOULTS. I think the point you make is one that was given a lot of attention by the foreign governments in establishing limits. In Germany, for instance, $125 million, Euratom at $120 million.

Mr. RAMEY. In Great Britain it is $15 million?

Mr. SHOULTS. In Great Britain, Mr. Ramey, if I may comment, the obligation of the Government to indemnify is without limit. I am told that the United Kingdom has some grave reservations in regard to the Euratom treaty because in their opinion the limit of $120 million in liability and indemnity is lower than they feel comfortable with.

I should point out again that to the extent that judgments are low, that we can rely on the good faith of our associate and friendly nations abroad and the integrity of their courts, that judgments, in fact, should not perhaps run as high as they might in this country. But, nevertheless, what the courts do in fact is what the contractors would have to live by in those foreign domains.

The establishment of the $100 million liability limit in our own courts and enforcible in our own courts, would be a very great help, I am sure, in restraining the perhaps intemperate foreign courts, possibly, because it certainly would cut off judgments that would be readily applied here where the major current assets would be. The point I should like to make again is that the only time that cash is involved is when there is an assessed judicial liability.

Mr. TOLL. Mr. Shoults, what would you think of a limitation in this bill that any suits that would be intended to get at the Government indemnity must be brought in U.S. courts?

Mr. SHOULTS. I would like to say that the suits in my understanding do not get at the U.S. indemnity. They get at the liability of the contractors themselves and not the U.S. Government.

Mr. TOLL. They would get at it indirectly.

Mr. SHOULTS. Indirectly.

Mr. TOLL. It would be possible to have a limitation in the bill that before any funds are paid from the Government indemnity suit would have to be brought in the United States.

Mr. SHOULTS. This essentially is a restatement of the liability limit, if you like, of $100 million, and no further coverage outside because it would leave the contractor exposed.

The judgments in foreign courts could be rendered. They could not be enforced in the U.S. courts. But the excess judgments could be enforced externally. At this point perhaps I should ask Mr. Maher, who accompanies me as counsel, that he might make some additional comments. This is a legal matter on which I am not completely skilled.

Representative PRICE. Mr. Maher?

Mr. MAHER. I think, Mr. Toll, that a provision along the lines you suggested could be inserted in the bill.

My immediate reaction, however, would be that such provision could have the unfortunate effect of requiring the Government's indemnity obligations to be enforced in law suits between the covered contractor and the Government in actions in U.S. courts and could conceivably circumscribe the freedom of all of the interested parties, the Government and the contractors and the suppliers which might be involved in an incident, from getting at the matter of settling claims as distinguished from going through very protracted and potentially very complicated litigation, including actions overseas

against contractors and subsequent actions in the United States by contractors against the Government.

Mr. TOLL. While Mr. Maher has the microphone I might ask another legal question.

In the AEC letter of April 6, 1962, to the committee, the final paragraph said that the Bureau of the Budget advises that while there is no objection to the presentation of this report, it believes that coverage of the type contemplated by the bill should not extend beyond situations where nuclear facilities, products, or designs are owned or used by or for the United States.

What would you think of a limitation in the bill to that effect?

Mr. MAHER. Again I think, Mr. Toll, that language could be drawn that would limit the bill to exclude the items you have mentioned. It seems to me, however, that in considering that approach you have the threshold question, whether it would be in the Government's interest by writing that kind of a limitation into the law to potentially circumscribe its flexibility and capability in dealing with other governments in supplying whatever things might be deemed in the Government's interest to supply, having procured them from a U.S. contractor. As I heard the Commission's discussion on this point yesterday, it is really very difficult to know or foresee at the present time just what it might be decided to be in the Government's interest to do in this area, and to simply arbitrarily limit the Government's authority to indemnify, and thereby circumscribe doing of what would be in the Government's interest to do, could be undesirable.

Mr. TOLL. You don't see any immediate requirement for anything beyond the present need to take care of facilities or products that are under the control of the United States?

Mr. MAHER. I simply don't know from my own knowledge of any situation outside of the governmental activities and governmental facilities and instrumentalities area that presents problems to the Government.

I just would not feel competent to speak to that question, Mr. Toll. Perhaps Mr. Shoults would.

Mr. SHOULTS. I can only say that I thought Mr. Olson's statement yesterday was to the point, that the contractor has no control over what happens to its products once they come into the Government hands.

Certainly the U.S. Government, has in the past, and I assume might in the future, make available its various defense devices, ships and others, under certain conditions to friendly governments and might again in the future. It would seem to me that the Government is in a position to protect its own interest at that time, should it do so, with treaty agreements or otherwise with whoever might succeed to the control of the devices.

We are contemplating things that have not yet happened in this field. Mr. Maher has suggested, I think in better words than I was trying to use a minute ago, that the Government might well in any situation involving transfer of indemnified devices, as a matter of policy, just determine that the Government taking responsibility and use of the devices should assume the indemnity obligation the U.S. Government then has.

This could well be a policy condition on transfer of such material.

Chairman HOLIFIELD. What position are you in on private sales overseas to users in regard to indemnity?

Mr. SHOULTS. I can say that we are deeply concerned with the question of indemnity. As Mr. Toll and Mr. Ramey well know, I have spent a good share of time in the last couple of years in contact with people in foreign nations where we have commerical contracts of interest and which involve liability for nuclear incidents in Japan, Germany, Italy. I have tried to be influential to encourage the development of laws in some of those countries which would effectively, but not as effectively, I guess, as in the United States, cover the liability, with suitable limitations of liability or indemnity or combinations of both of these.

We can look today to an operating plant in Germany which is covered by German national legislation which, while it has some points that we would criticize, is reasonably effective.

Chairman HOLIFIELD. If they buy a plant from GE, if some private power company does, that is, and there is a subsequent accident, does the German law limit liability to the owners of that plant in Germany?

Mr. SHOULTS. In Germany the law makes the operator of the plant absolutely liable without proof of fault.

In other words, any injured third parties need not find fault in any particular person. The fact that the incident happened is sufficient to impose liability on the operator.

On the other hand, the operator is not, in Germany, made solely liable. Others, if negligence can be found or otherwise, may be jointly liable.

Chairman HOLIFIELD. In other words, if a flaw in the manufacturer's article could be established and the damages did run above $120 million, then there could be an all-embracive suit that could go back to the manufacturer in the United States, you feel?

Mr. SHOULTS. I may speedily get out of my department on this, but let me try. It is my understanding of the German law that there is a limitation of the liability for all parties covered in much the same way as in the United States. Their limit is $125 million. Ours is at $500 million.

Above that limit there is no liability that can be assessed by the courts on persons found liable.

Chairman HOLIFIELD. Above $125 million?

Mr. SHOULTS. Up to that point they have two coverages; an insurance coverage much as in our country that runs up to about $15 million. Above that state indemnification from there to $125 million.

Am I correct, Mr. Maher?

Mr. MAHER. Substantially correct.

Representative PRICE. There is another point in Mr. Holifield's question. You don't have to prove a flaw. All you have to prove is injury and the fact that the injury occurred due to the operation of the plant.

Mr. SHOULTS. This is correct with respect to the operator of the plant. He is absolutely liable if the incident happened.

Chairman HOLIFIELD. He is liable to the German people for damage?

Mr. SHOULTS. Yes, sir.

Chairman HOLIFIELD. But can he in turn come to you under the present arrangement and complain that it was a faulty fuel rod or pump or something else that you manufactured and try to collect some liability from you?

Mr. SHOULTS. I think I have this in mind but I better get counsel advice on this.

Mr. Maher confirms my opinion that the law provides for a right of recourse of the operator in certain very limited conditions in regard to willful acts of the legal representatives of the corporation.

In the main for German corporations this would mean members of the board of directors, president and so on of the company. Essentially these willful acts would be almost against the people. This is a much more restricted recourse than against a company for the acts of its normal employees due to negligence or the like.

Chairman HOLIFIELD. You have not answered my question satisfactorily to me.

Mr. SHOULTS. I am sorry.

Chairman HOLIFIELD. My question was, Could the owner of that reactor file an independent suit against General Electric for damage if he felt he could establish in court that it was a piece of equipment that was not made properly?

Mr. SHOULTS. I think he cannot. The only condition under which he could do that would be on a charge of a willful act against the company's legal representatives. As I have pointed out, interpreted in Germany this really means the managing directors and the like.

Chairman HOLIFIELD. If he can't do that, why are you so concerned about material that you might make for the AEC that was sent overseas for the Government of the United States?

Mr. SHOULTS. Our concern most pointedly, Mr. Holifield, is in connection with material that essentially is furnished to the Government in this country and which in its own right may go overseas in space, on the oceans, through the air or otherwise. This is the basis of our concern. We have no present case of which I am aware that the Government is sending any of our products into oversea areas.

Chairman HOLIFIELD. Let us assume that a rocket would fall on a foreign country.

Mr. SHOULTS. This is the basis of our concern or in respect to the Navy.

Chairman HOLIFIELD. Or fuel rods that might be in a SNAP device that might fall on a foreign country.

Mr. SHOULTS. That is right, that is our concern.

Chairman HOLIFIELD. Then you do not intend by supporting this to be prepared to come in and suggest that the Government be prepared to accept an indemnity liability for the ordinary sales of GE overseas of nuclear products where it is between company and company?

Mr. SHOULTS. I can categorically say that is not the point of our discussion whatsoever.

Chairman HOLIFIELD. It is not the point of your discussion but will you be in 2 years from now? These things have a habit of growing. I said when we started out on this indemnity business that we were going to open a Pandora's box and it is going to be gradually built up. The question I am asking you is not what you are here for today but what will you be here for 2 years from now?

Mr. SHOULTS. Let me say, none of us can bind our successors totally to what can happen.

Chairman HOLIFIELD. Even Congress cannot bind a future Congress. I recognize that.

Mr. SHOULTS. This is the point.

Chairman HOLIFIELD. But your heart is pure and your motives are pure?

Mr. SHOULTS. I can assure you that from my standpoint and my authority and my knowledge of the company's position, there is no intent of this nature in anything affecting our commercial sales to foreign operators or owners of plants.

I would like to make a point for the record in this regard. Should the U.S. Government wish to buy from us a nuclear powerplant, as they have bought from other suppliers, and would install this nuclear powerplant outside of the United States——

Chairman HOLIFIELD. In the Antarctic or Greenland or some place like that?

Mr. SHOULTS. Or Berlin or whatever in the Government's own discretion, wisdom and desires. If the Government so did and if indemnity protection did not automatically cover—that is, the indemnity protection available in whatever nation this was put into by that nation licensing it—and it may well be owned by the U.S. Government, that that nation would not choose to license or our Nation might not choose to apply for a license, there might be some other arrangement between governments. So the other nation indemnity procedure or indemnity coverage which would otherwise be available in their law might not apply to this plant.

At that point I would think it entirely appropriate for us or any other contractor so involved to apply to our own Government for protection, indemnity not being available otherwise. This is a sale to our Government for the purposes of our Government and in their own wisdom they are putting it here, there or elsewhere offshore and it seems reasonable that the risk should be borne by the Government.

Again I would like to be very specific in regard to sales in which we make the sales overseas to private people there or even governments there, it is not our intention to ask for U.S. governmental indemnity for those transactions.

Representative PRICE. Thank you very much, Mr. Shoults. We are pleased to have your testimony.

The next witness will be Mr. Clark Vogel, of Martin Marietta Corp.

STATEMENT OF CLARK C. VOGEL, THE MARTIN MARIETTA CORP.

Mr. VOGEL. Thank you, sir.

Mr. Chairman and members of the committee, on two previous occasions I have been privileged to discuss the subject of today's hearing with this committee. My views are in the record and I believe are well known.

My statement this morning, therefore, will be brief. It will emphasize an aspect of the proposed legislation which I respectfully submit is of growing importance and of true national interest.

My name is Clark C. Vogel. I am assistant general counsel for the Martin Marietta Corp. Martin Co., the corporation's aerospace division, is active in the nuclear field. It is also a major participant

in the Nation's missile and space programs. We are, therefore, vitally interested in and support the proposed legislation to extend the coverage of the Price-Anderson amendments to provide indemnity against liability for a nuclear incident occurring and causing damage as a result of the installation or operation for the Government of nuclear powerplants and other nuclear devices at sites beyond our national boundaries. We are also intensely interested in legislative protection for Government contractors contributing to the use of nuclear energy in the conquest of space. I emphasize this last point since it is a matter of increasing concern.

The members of this committee are well aware of the important role which nuclear energy will play—and, indeed, already is playing—in the space program. We are fast approaching what Senator Gore, in a recent farsighted address in the Senate on space leadership, referred to as "the union of space and the atom."

Martin Co. is proud of the part it is privileged to play in forging this union. Our nuclear division, under Atomic Energy Commission contract, designed and built the SNAP thermoelectric generators for the Navy's Transit IV–A and IV–B navigational satellites. These satellites were placed in orbit from Cape Canaveral in June and November of last year and the generators are still performing perfectly. These marked the first applications of nuclear energy in space.

Within the past few months we have undertaken another project to build a more powerful SNAP generator for NASA's Surveyor spacecraft which is designed for an unmanned, soft landing on the surface of the moon.

It is in the field of rocket propulsion, however, that nuclear energy has the greatest potential in space exploration. As Senator Gore stated:

> Nuclear power as generated by Rover is uniquely suited for space applications. Per ounce of fuel, it will give millions of times the energy of a chemically fueled rocket and even at this early stage of development it will give twice the performance that we can theoretically expect from chemical engines. Moreover, it does not require oxygen for operation.
>
> Taking our first major space mission, the lunar voyage, the addition of only one nuclear stage on top of the chemical engine, I am advised, would double the potential payload in lunar orbit from 110,000 to 220,000 pounds.

It seems evident, Mr. Chairman, that we are on the threshold of a new chapter in the still infant space age, a chapter which will put at stake the prestige of this country and of the free world. The outlook is as exciting as it is challenging. But it also raises great problems, not the least of which is the potential liability which would confront an industrial participant in the event of misadventure.

In spite of the concentrated efforts being made to assure the safety of nuclear rockets and other nuclear space devices, responsible management cannot rule out the possibility—however remote it may be—of a disastrous incident. This must be a factor in the decisions which will determine the extent of the effort to which a given industrial concern will commit itself.

Neither existing legislation nor contractual indemnity provide the protection which any prudent businessman has a right to expect in this new field where so many questions are still to be answered. Adequate insurance is unavailable. We are, therefore, largely in the same position as we were in 1956–57 with respect to the development of a private

atomic energy industry and the removal of the so-called roadblocks standing in the way of that development. The same reasons which led to the original Price-Anderson amendment apply here with equal if not greater force.

Mr. RAMEY. Hopefully you would do a little better than the atomic program?

Mr. VOGEL. You must admit there was a roadblock which this committee and the Congress removed. Whether or not industry progressed down the road to the extent expected is something I am not addressing myself to at the moment.

I have only two specific suggestions concerning H.R. 10775 and these generally follow the suggestion made by Mr. Shoults.

First, I would not establish the ceiling on the amount of indemnity to be made available with respect to incidents outside of the United States at $100 million, since I have extreme doubt that U.S. legislation can establish the amount of the total aggregate liability of a contractor in another country. I would have no objection on the other hand to limiting the amount of indemnity to be provided to such limt of liability as may be established by the law of the other country involved.

Second, I believe the bill should be extended to provide indemnity protection in connection with Government projects which are contracted for by Government agencies other than the Atomic Energy Commission, and that the AEC's authority should be broadened to permit the discussion of indemnity agreements with contractors of any Government agency.

As I have previously testified, my views on this point are based on the desirability of uniform ground rules, administration, and implementation. It seems appropriate to suggest that one agency be responsible for all programs of indemnification involving nuclear incidents. The Atomic Energy Commission in my judgment has both the competence and experience to do the job.

Thank you, Mr. Chairman.

Representative PRICE. Thank you very much, Mr. Vogel.

Are there any questions?

Mr. VOGEL. I was hoping to get a lesson in conflict of laws.

Mr. TOLL. What do you think of the limitation suggested by the Bureau of the Budget that this bill be limited to components or facilities under the control of the United States?

Mr. VOGEL. This was my intent, Mr. Toll, in February 1961 when I first suggested this legislation, and I adhere to that.

Representative PRICE. What specific problems or projects was in the minds of the Martin Co. when you became interested in this legislation?

Mr. VOGEL. Primarily the use of nuclear energy in space and abroad. We did have the McMurdo Sound reactor project where we have contractual indemnity which doesn't satisfy me as a lawyer for the company.

We are designing the MH–IA reactor for the Corps of Engineers. This reactor will be placed on shipboard and furnish power to remote island installations. That certainly was in our mind. When I first made the suggestion I was primarily interested in space. My concern is even greater today now that we have a SNAP device up in orbit and other devices are in the offing.

Representative PRICE. Thank you very much, Mr. Vogel. We are pleased to have your testimony.

Mr. VOGEL. Thank you, sir.

Representative PRICE. The next witness will be Mr. James H. Merritt of the Mutual Atomic Energy Liability Underwriters.

STATEMENT OF JAMES F. MERRITT, CHAIRMAN OF THE GOVERNING COMMITTEE OF MUTUAL ATOMIC ENERGY LIABILITY UNDERWRITERS; ACCOMPANIED BY DE ROY C. THOMAS, ASSISTANT GENERAL MANAGER OF THE NUCLEAR ENERGY LIABILITY INSURANCE ASSOCIATION; AND WILLIAM O. BAILEY, ASSISTANT VICE PRESIDENT OF THE AETNA CASUALTY & SURETY CO.

Mr. MERRITT. Thank you, Mr. Chairman.

Congressman Price, if it is reasonable in the interest of saving time, it might be desirable for the representatives of NELIA to join us inasmuch as our testimony and presentation covers very much the same points.

Representative PRICE. I think that would be agreeable. I don't see any reason why they could not.

Mr. Thomas, will you come around?

Mr. MERRITT. And Mr. Bailey. I have with me Mr. John K. Dane, assistant general counsel for Liberty Mutual.

Representative PRICE. Will you proceed?

Mr. MERRITT. Thank you.

My name is James H. Merritt. I am chairman of the governing committee of Mutual Atomic Energy Liability Underwriters, known as MAELU, a member of the underwriting committee of Mutual Atomic Energy Reinsurance Pool, known as MAERP, and an assistant vice president of Liberty Mutual Insurance Co.

I requested the opportunity to speak to you today in order to place before you the views of the members of MAELU and the other participants in MAERP on some of the current problems concerning insurance and indemnity.

I have in mind—

(1) Third-party and first-party protection for public corporations operating toll bridges, tunnels, port facilities, and so forth;

(2) The matter of underlying financial protection for the Commission's contractors; and

(3) the extension of Price-Anderson indemnity to the oversea operations of Government contractors.

At the hard core of them all lies the difficult question of how to strike a reasonable balance between Government indemnity and private insurance.

When dealing with the intricate matter of protecting the public and industry against the financial consequences of nuclear injury, there appears to be an unfortunate tendency to conclude all too quickly that the only thing to do is to turn the whole problem over to the Government.

For example, we understand that public corporations operating bridges, tunnels, docks, airports, and other facilities are concerned about their potential liability to third persons and damage to their property arising out of the use of their facilities in connection with

the transportation of radioactive materials. We are advised that this concern has led to a proposal that the Government indemnify them against nuclear loss in excess of $250,000 whether the loss stems from liability to third parties or from direct damage to their facilities.

While the concern of these public corporations is understandable, the proposed solution does not attempt to appraise realistically the hazards involved in transporting the various classes of radioactive material or to recognize the extent of third-party and direct-damage protection presently available through private insurance facilities, existing provisions for Government indemnity, or both. At best, such a shotgun solution appears to be to a large extent, if not wholly, unnecessary. But its real danger lies in a substantial further encroachment of the Government on the role of private enterprise in our economy.

The great majority of shipments of radioactive material involves commercial radioactive isotopes. Ordinarily there is no exclusion in regular liability policies with respect to such isotopes and there is, therefore, no reason to expect that any public corporation is unable to obtain, through its regular insurance channels, third party liability coverage in the same amounts as it normally carries for its other liability exposures. While it is not likely that the third party liability exposure arising out of commercial radioactive isotopes would exceed the normal limits of liability available, NELIA and MAELU will afford up to $60 million of protection if desired.

The numerically small residue of shipments of radioactive material remaining after commercial isotopes have been excluded involves principally unirradiated nuclear fuel, spent fuel, and waste. The more hazardous of these are spent fuel and waste. In fact, the transportation of unirradiated nuclear fuel is ordinarily not excluded from regular liability policies.

From their nature one would expect that almost all, if not all, shipments of spent fuel and waste will be between Government facilities, one or more of which would be operated by a Commission contractor or from a licensed facility to a Government facility operated by a Commission contractor. Existing Price-Anderson legislation has established a comprehensive program for protecting all interests, including those of public corporations, from public liability arising out of such shipments. If the shipments are between the Government facilities, in all probability $500 million of Price-Anderson indemnity would be applicable under a section 170d indemnity agreement. If the shipments are from a licensed reactor, $500 million of Price-Anderson indemnity would be available under a section 170c agreement in addition to underlying financial protection of up to $60 million.

Shipments of unirradiated fuel will move ordinarily to or from the same types of facilities which I have just mentioned, and, accordingly, Government indemnity, with or without underlying financial protection, will come into play in the same fashion. There will be some shipments of new fuel to or from privately owned fuel fabrication facilities with respect to which no Price-Anderson indemnity will be available. Most fuel fabricators, however, maintain nuclear energy liability policies with substantial limits, averaging about $10 million each. These policies apply to shipments of nuclear material to the

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facility from the Government or from the facility to Government facilities or to other privately owned facilities with respect to which no financial protection is required. The definition of "insured" in these policies is broad enough to afford protection to public corporations with respect to their third party liability.

Should an incident occur for which protection would not be afforded to these public corporations in any of the above ways, we should like to point out that a number of transporters of nuclear material have purchased suppliers' and transporters' coverage from NELIA or MAELU. Again, under these policies, any public corporation responsible to third parties for loss arising out of the transportation of nuclear material by such a transporter becomes an omnibus insured under the transporters' policy and is entitled to its full protection.

The "Definition of Insured" in NELIA and MAELU supplier's and transporter's policies now reads as follows:

> The unqualified word "insured" includes:
> (1) The named insured;
> (2) Any employee, officer, director, or stockholder thereof while acting within the scope of his duties as such, and if the named insured is a partnership, any partner therein, but only with respect to his liability as such; and
> (3) Any other person or organization with respect to his legal responsibility for damages because of bodily injury or property damage caused by the radioactive, toxic, explosive, or other hazardous properties of nuclear material in the course of transportation, including handling and temporary storage incidental hereto, by or on behalf of the named insured.

Subdivision (3) above does not include as an insured the United States of America or any of its agencies.

This insurance does not apply to any employee, as insured, with respect to bodilfy injury to another employee of the same employer arising out of and in the course of his employment.

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.

From this it can be seen that operators of toll roads, bridges, and tunnels will obtain substantial third-party liability protection for almost any conceivable nuclear incident arising out of the transportation of new fuel, spent fuel, or waste. But in order to fill any gaps, however small, NELIA and MAELU will afford to any public corporation desiring to purchase coverage in its own name a policy or policies with limits of liability of up to $60 million. This coverage is subject to an industry credit rating plan which has one of the lowest expense ratios available with respect to general liability insurance today and further provides that any of the premium allocated for losses which is not actually needed for that purpose will be returned ratably to the policyholders. One toll bridge authority has purchased such coverage up to the present time.

We submit that with respect to the transportation of radioactive material over or through the facilities of public corporations, there is available today a comprehensive and adequate program of third-party liability insurance and government indemnity, and that there would seem to be no need to enact special indemnity legislation in this area.

I should now like to discuss for a few moments the first-party aspects of the problem of the public authorities; that is, protection against damage to their own property. MAERP is combined third-party liability and first-party liability pool. Although normally the owners

of many toll facilities arrange for first-party insurance through an inland marine market which is outside the scope of this reinsurance pool, we understand that a lack of capacity of the conventional inland marine market is one facet of their problem. If other aspects of the problem can be satisfactorily resolved, as I feel confident they can, the physical damage side of MAERP will, I am certain, be willing to consider making its capacity available.

There is some question, however, in our minds as to the exact scope of the first-party problem of the public authorities. With respect to any damage to a toll facility to which a NELIA or MAELU policy applies, there would be coverage for the liability of any person or organization, except an agency of the United States, responsible for the incident. It is hardly likely that an incident could occur without someone being legally responsible—the shipper, the transporter, another person using the toll facility, or the public authority itself. Even in the latter situation, the public authority would be entitled to recover under the facility policy for the damage to its own property resulting from its own fault. The coverage applies not only to direct physical injury, but also to the reasonable cost of debris removal and to loss of use. In all cases to which existing Price-Anderson indemnity is applicable, the public authority would be entitled to recover for damage to its property on essentially the same basis.

Since the overwhelming majority of shipments of hazardous radioactive material will be moving under circumstances where someone will be legally liable for any incident, and where a MAELU or NELIA facility policy or government indemnity, or a combination of the three, will apply, it seems upon analysis that existing legislation and NELIA-MAELU insurance afford toll authorities very substantial protection against loss of their own property. In addition, we understand that direct damage insurers are seeking means to close any gaps that might exist. Under the circumstances, we question whether further special treatment is needed at this time.

My statement contains some further material dealing with the matter of financial protection in the contractor program and the extension of indemnity to the oversea activities of AEC contractors.

In view of the discussion yesterday, Mr. Chairman, I would like to strike this material with the understanding that Mr. Thomas of NELIA may have some comments in its statement.

Representative PRICE. Thank you.

You cite the problem of the recent request of toll authorities for Government idemnity. We are told by the toll authorities that they have tried to talk to the insurers but have been unable until recently to pin down a group that could speak for the insurance industry and that there have been many meetings.

Have you as insurers in anyway taken the initiative with toll authorities? Has there been a lack of communications on this question?

Mr. MERRITT. On the third-party liability side of this situation, sir, which is the side with which I am familiar, we have had several meetings. We have stood ready to have such meetings. We felt the problem was more on the physical damage side.

Representative PRICE. Do you plan any meetings with them as the result of some of the presentations that have recently been made?

Mr. MERRITT. May I refer that to Mr. Thomas inasmuch as he attended a meeting as recently as last week.

Mr. THOMAS. We had met with the bridge and tunnel authorities, Mr. Price, and as the result of that meeting we think we solved many of the problems that disturbed them on the liability side.

We did promise to take under advisement one or two questions which remained. Basically, I think we are convinced that there really is a very slight problem, if any, on the liability side. We think we have solved most of their difficulties.

Representative PRICE. In your own mind, do you think that they are coming into agreement with that thinking?

Mr. THOMAS. I think some of the misconceptions which had bothered them have been removed.

I do think there are one or two areas where further discussion should continue, and I think we are certainly happy to explore them and will pursue the matter.

Our basic thought here is that any legislation at this time would be somewhat premature.

Representative PRICE. Mr. Merritt, you state that MAERP is willing to make its capacity available for a first-person coverage. It is our understanding that even if MAERP and NELIA make available their entire capacity, the limit will still be $61,700,000. If the toll authorities can demonstrate a necessity for the coverage in excess of this amount, would the insurance industry still oppose this proposed legislation?

Mr. MERRITT. I believe there is an area perhaps of misconception. This involves an inland marine protection. I don't feel fully qualified on this inasmuch as I am not an inland marine market expert, but as I understand from the discussions we have had, there is some indication that at the moment it is unknown as to just exactly what inland marine capacity is available. Once this is determined, if this is insufficient, we would hope to be able to make available this additional $61,700,000 that is referred to.

Representative PRICE. Mr. Murphy of the Inland Marine Underwriters Association will be one of the witnesses this afternoon and we could perhaps further develop this point.

Do you have some comment?

Mr. THOMAS. On the liability side our position has always been that where our capacity is inadequate we have no objection to indemnity in excess of that capacity.

Representative PRICE. Thank you.

Mr. Thomas, would you present your statement?

Mr. THOMAS. Yes, Mr. Price, if you are agreeable I would like to eliminate reference to the bridge and tunnel authority problem since Mr. Merritt covered it adequately. I would like to merely express our satisfaction with the recent announced decision of the Commission to negotiate with insurers for underlying financial protection for certain of its 170(d) projects.

Because of this decision I would like to withdraw for the time being at least the proposal that we put forward last year asking for an amendment to 170(d). If the Commission exercises the discretion already provided in the present law to require financial protection in connection with certain of its indemnified contractor operations, we think

there will be no need for this amendment. We want to thank the committee and its staff for their time and their patience in this connection and for the exploration of the problem during the last year. We also want to thank the Commission staff for their courtesy and help in this area.

Representative PRICE. Mr. Thomas, even though some of your prepared statement covers some of the same subject that Mr. Merritt covered, I think we will include your full statement in the record.

Mr. THOMAS. I appreciate that, sir.

(The prepared statement of Mr. Thomas follows:)

TESTIMONY OF DE ROY C. THOMAS ON BEHALF OF THE NUCLEAR ENERGY LIABILITY INSURANCE ASSOCIATION

My name is De Roy C. Thomas and I am an assistant general manager of the Nuclear Energy Liability Insurance Association, commonly referred to as NELIA, which is an association of stock casualty insurers formed to provide nuclear energy liability insurance. With me is Mr. William O. Bailey, who is an assistant vice president of the Aetna Casualty & Surety Co. which serves on the governing committee of NELIA. Mr. Bailey is familiar with the underwriting of nuclear energy liability insurance. We have asked for the opportunity to appear before the committee today, in order to present our views with respect to several current problems relating to insurance and government indemnity.

At the outset, we want to express our satisfaction with the recently announced decision of the Commission to negotiate with insurers for some underlying "financial protection" for certain of its 170(d) projects. Because of this decision by the Commission, I would like to withdraw, for the time being at least, the proposal that we put forward last year asking for an amendment to 170(d). If the Commission exercises the discretion already provided in the present law to require financial protection in connection with certain of its indemnified contractor operations, there will be no need for the amendment.

We want to thank the committee and the committee staff for their time, patience, and understanding in connection with the exploration of this problem during the past year. We also want to thank the Commission staff for their courtesy and willingness to review the problem.

To turn to another subject, we would like to report that during the last year, we have worked with the Commission to complete a formal contract placing our claim forces at the disposal of the Commission in the event of an indemnified nuclear incident. The substantive issues have been ironed out to a large degree and initial drafts have been revised. It is expected that the formal contract will be in final form in the near future.

It will be remembered that with respect to H.R. 10775, which has been introduced by Mr. Price, we expressed concern last year that extension of first dollar indemnity would lead to further encroachment into areas where private insurers are able and anxious to perform. The Commission's decision to negotiate with private insurers for some underlying coverage for certain of its 170(d) contractors have quieted our apprehensions in this respect. However, we are aware that extension of Price-Anderson indemnity to contractors for other Government agencies has been urged. We would only point out that liability insurance against the nuclear energy hazard is available to contractors of other agencies in substantial amounts and urge that if a determination is made to extend indemnity to them, it should be afforded only where private insurance is unable to perform.

Twice during the last few weeks liability insurers have met with the staff of the Commission and representatives of bridge, tunnel, and toll road authorities to consider nuclear energy liability insurance problems arising out of the transport of radioactive materials over or through their facilities. During the course of these discussions, representatives of these authorities presented a series of questions concerning the pattern of liability insurance protection available. In many cases, we were able to resolve their liability problems immediately. With respect to others, we agreed to review the points which concerned them.

Generally, it is our judgment that liability insurance protection is available to bridge and tunnel authorities in amounts and at terms that will protect them adequately against nuclear liabilities that they may incur. In addition to omnibus insurance protection made available to the authorities through the nuclear energy liability policies which are issued to nuclear facilities, the omnibus indemnity afforded by the Price-Anderson Act and the coverage remaining in the regular liability policies purchased by the authorities, a nuclear energy liability policy (supplier's and transporter's form) can be purchased at a modest premium in an amount up to $60 million. Taken together, these measures would appear to us to resolve the liability problems of the authorities at least within the area of available liability insurance capacity.

We understand that legislation to indemnify bridge and tunnel authorities against liability arising from the nuclear energy hazard has been proposed. Until the authorities have fully explored their problems with liability and property insurers, we urge that serious consideration of such legislation be deferred. We are convinced that many of these problems will be resolved by such an exploration.

We want to thank you again for your courtesy and attention.

Representative PRICE. Incidentally, I know you are aware of the fact that this afternoon's witnesses will represent the American Bridge, Tunnel, and Turnpike Association and Port Authority of New York and you may care to remain and hear their testimony before the committee.

Mr. THOMAS. We would be happy to.

Mr. MERRITT. Thank you, sir.

Representative PRICE. Mr. Thomas, on page 1 of your statement concerning your withdrawal of the proposal on section 170(d), was this put forward as a club to get action out of AEC?

Mr. THOMAS. No, it was not, sir. Our issue here is one of principle. We have always felt that underlying insurance should be used where possible, and that where we have the capacity it should be made available.

Our problem had always been that the Commission had felt unable to exercise discretion to use underlying protection here and we thought a statutory change was needed.

Now that the Commission feels that it is willing to consider discretion in this area we feel that perhaps a statutory change will be unnecessary. I think you will find this is somewhat consistent with our testimony of last year.

Representative PRICE. At the bottom of page 1 of your prepared statement you refer to a contract to place your claims service at the disposal of the commission. Would this claim service be limited to incidents arising in the licensee program?

Mr. THOMAS. No, sir; it would not. We have always stood ready to make our liability claims service available to the Government both on the contractor and on the licensee area.

Representative PRICE. I wonder if both of you gentlemen could give the committee some idea about how the insurers have faired financially since the beginning of these pools.

Is there any way to know, up to this time?

Mr. THOMAS. On the liability side?

Representative PRICE. Yes.

Mr. THOMAS. Actually the loss experience has been tremendous, as you know. We have had no losses to speak of at all. We have had extremely heavy administration cost, largely because of the fact that there has been so much novelty attached to the program.

Furthermore, because of the retrospective rating program which will go into operation in 1966, a good portion of the premium which we have collected will be returned to the insurers.

Representative PRICE. That was the 10-year period?

Mr. THOMAS. Yes, sir; 10-year moving retrospective rating program. So, as a basic proposition, the companies have found this business modestly profitable, I think you could properly say. We have been very satisfied with the results and experiences.

Representative PRICE. Have there been any claims filed against the liability?

Mr. THOMAS. We have had several reports of incidents, Mr. Price, none of which have materialized into actual claims at the moment.

Chairman HOLIFIELD. How much reserve have you built up?

Mr. THOMAS. It is difficult for me to have that exact figure. I would be glad to submit it for the record. I would say perhaps $2 or $3 million would be right. Nothing substantial enough for a substantial incident.

(Subsequently, the following letter was received from Mr. Thomas:)

NUCLEAR ENERGY LIABILITY INSURANCE ASSOCIATION,
New York, N.Y., May 7, 1962.

HON. CHET HOLIFIELD,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States,
Washington, D.C.

DEAR MR. HOLIFIELD: When representatives of the Nuclear Energy Liability Insurance Association (NELIA) and the Mutual Atomic Energy Liability Underwriters (MAELU) appeared before the Subcommittee on Research, Development, and Radiation of the Joint Committee on Atomic Energy on April 11, 1962, you asked what reserves have been built up under the industry credit rating plan, developed by the pools. Although I hazarded a guess of $2 or $3 million, I promised to submit more accurate information to you.

As of November 30, 1961, the amount accumulated by NELIA under the plan is $2,061,474.16 and the amount accumulated by MAELU is $598,492.49. The total is $2,659,966.65. As you know, these funds will be used for the payment of claims and claims expense or returned to insureds.

I trust that this information will serve your purpose.

Most sincerely,

DE ROY C. THOMAS,
Asistant General Manager,

Chairman HOLIFIELD. What would you expect to pay claims from? That reserve?

Mr. THOMAS. The assets of the company stand behind those reserves. There are some 140 companies in NELIA and a similar number in MAERP.

Representative PRICE. I imagine your experience would be identical.

Mr. MERRITT. These reserves that Mr. Thomas speaks of are the combined reserves of the two pools.

Mr. RAMEY. There have been some property claims; have there not?

Mr. THOMAS. Yes. There was one substantial property loss, as you probably know, and I would like to ask you to defer that question to Mr. Murphy, who is coming on this afternoon. He would have the details for you. I would just be speaking from hearsay.

Chairman HOLIFIELD. Was there any liability in that Houston incident or was that before this was set up?

Mr. MERRITT. I think that was prior to this.

Mr. THOMAS. If there is any it will fall under conventional policies rather than these particular nuclear contracts.

Representative PRICE. Mr. Thomas, in your statement you conclude that the problems of toll-road insurance can be solved by mutual exploration. I would assume that you mean discussion between the insurers and the toll-road representatives? Do you feel that the AEC has a role to play here?

Mr. THOMAS. I think the offices of the AEC are always helpful in these areas and they certainly have been helpful in bringing the parties together here. We certainly appreciate their help.

As far as we are concerned we think that most of the problems on the liability side have been overcome. Perhaps this afternoon that might be borne out.

Representative PRICE. Are you getting enough information from AEC to help you to evaluate the hazards on the toll-road problem?

Mr. THOMAS. Yes; I think between the Commission and the toll-road people themselves we have had a fuller understanding of this problem.

Representative PRICE. Thank you very much, gentlemen.

Do you have a further statement or further comments to make?

Mr. THOMAS. I would only add, Mr. Price, that there was some difficulty yesterday concerning retrospective rating. We thought perhaps if you would permit Mr. Bailey to read a short statement explaining what retrospective rating is, it might clarify it for the committee.

Representative PRICE. We are glad to have it.

Mr. BAILEY. In the discussion yesterday there developed a certain amount of confusion with respect to the scope and rating of underlying insurance to be negotiated with the Commission for those contractors who do not presently have insurance coverage against nuclear liability. Perhaps an attempt at clarification will be helpful.

As you know, the combined $60 million capacity of NELIA and MAELU is available under the licensee program as financial protection and has been offered under the contractor program. We continue to be fully prepared to write as much real insurance under the contractor program as is desired. However, it is our impression from yesterday's testimony that the Commission's desire is for limited insurance protection, perhaps $1 million of coverage, written under a retrospective rating plan.

Simply stated, retrospective rating is a program under which the cost of insurance protection is adjusted based upon the insured's actual losses during the policy period. In order to prevent the cost of insurance from fluctuating widely, should there be a period of heavy losses, retrospective rating plans provide for a maximum premium selected by the insured which cannot be exceeded regardless of the magnitude of losses incurred by the insurance company.

There is also a predetermined minimum premium which will be paid to the insurance company to cover necessary expenses and a risk assumption or insurance charge for limiting the cost of insurance to the preselected maximum premium. Within the limits of the minimum and maximum premium the cost varies with the actual loss experience. The charge in the minimum premium for expenses is a fixed sum and does not vary with the dollar amounts of losses incurred.

These rating plans have no element of cost plus a percentage of cost.

Thank you.

Representative PRICE. Thank you very much, Mr. Bailey.

Thank you, gentlemen, we appreciate having your testimony.

The committee will stand in recess until 2 o'clock this afternoon.

(Whereupon, at 12:05 p.m., the committee recessed, to reconvene at 2 p.m. the same day.)

AFTER RECESS

(The committee reconvened at 2 p.m., Representative Melvin Price presiding.)

Representative PRICE. The committee will be in order.

This afternoon's session is the continuation and conclusion of the annual hearings on indemnity and reactor safety.

The first witness this afternoon will be Mr. Milton D. Stewart of the American Bridge, Tunnel, and Turnpike Association.

Mr. Stewart, will you come around, please?

STATEMENT OF MILTON D. STEWART, AMERICAN BRIDGE, TUNNEL, AND TURNPIKE ASSOCIATION; ACCOMPANIED BY JOHN P. MacARTHUR, ASSISTANT ATTORNEY GENERAL, STATE OF NEW YORK

Mr. STEWART. Mr. Chairman, I would like to have Mr. MacArthur of the State of New York, who is an assistant attorney general, representing the New York State Thruway Authority, and Mr. Zarin of the New York Port Authority, with me, if I may.

Representative PRICE. Glad to have you gentlemen with us.

Mr. STEWART. I would like to begin by expressing to the committee our thanks as an association for the help which we have had from members of your staff during the past year, and to tell you, if I may, in a few words, what seems to us to be the essence of the statement which is before the subcommittee on behalf of our association.

Our objectives can be stated as they are more fully in one of the appendixes we have given you.

Representative PRICE. May I ask you this question before you start, Mr. Stewart?

Is your statement pretty much the same as it would have been if you had delivered it before you had the recent meeting, or session?

Mr. STEWART. Yes, sir; it is. We labored long and over weekends to bring it up to date, sir.

I do not think there has been any material change in the view of the insurance industry which has been expressed to you; and our meeting with them, I think, is the only significant development in these past 10 days or so.

Our membership, sir, manages facilities representing an investment of private bondholders' funds in amounts of $10 billion and upward. Our primary legal duties, within which we would like very much to find ways to keep our facilities open to the shipment of radioactive materials, are two: First, the requirement that we provide the safest possible facilities for the traveling public, whose use of our facilities is measured in hundreds of millions of vehicle miles and vehicle trips; second, managing our facilities in a prudent, businesslike fashion to guarantee that the revenue of those facilities will be maximized, so

that we may repay the bondholders, who have saved the taxpayers $10 billion which would otherwise have had to be spent by governments.

To fully understand the nature of these legal duties, one must also keep in mind that with respect to some of these facilities the States have guaranteed the debt owed by the public corporations to the bondholders. In the case of the New York Thruway Authority, for example, the credit of the State of New York is behind approximately $500 million of the debt which we have successfully borrowed from private bondholders.

As further background, most of our statutes require us to do what we can to facilitate commerce, to aid the defense of the Nation, and to do a number of other publicly necessary and desirable things. Three general objectives with respect to radioactive shipments summarize the 10 specific ones we have given you in the statement that is before you.

The first of these is to arrive at an effective, practical, reasonably priced method of regulating the shipment of radioactive materials. We have been hampered here, by the fact that we are in an admittedly difficult area where it is hard to separate out the small, hard core of what you might call catastrophe-possible shipments from the large mass of shipments which—we are assured by AEC technicians—are probably innocuous.

A second objective is to provide financial protection deemed adequate by toll facility managements in their capacity, as trustees, if you will, for bondholders, and patrons.

Until recently, in spite of efforts by various members of our facilities, through their conventional insurance brokerage channels, we have not been able to get firm costs with respect to this insurance. We still do not have such costs. We are still, as my statement makes plain, not altogether sure about the coverage or scope of the insurance which will be available.

Generally speaking, we are sympathetic to the effort of the insurance industry to have private enterprise provide as much of this insurance as possible. We are substantial purchasers of insurance. Insurance companies are substantial purchasers of our bonds. We expect to do business with them in this area as well as in the others. But insurance costs must be measured by need, and should take into account our safety record. They should also reflect what traffic revenues will properly justify. And by traffic, here, I mean traffic which we would like to be able to carry as a matter of public interest, as well as profit-making traffic.

Within these legal duties, we come to our third objective. It is our considered judgment, in the light of the duties that I have spelled out, and in the light of what we have been led to believe is the maximum amount of insurance coverage which we can expect from private sources, that we should leave no stone unturned to persuade the Congress, beginning with this committee, of the need to extend to us the indemnity principles that have been incorporated in the Price-Anderson Act.

It seems to us that if the level of risk involved in highway transportation of radioactive materials is as low as we have been led to believe, and yet the possibility of catastrophic accident, costly

catastrophic accident, is as high as the Congress indicated it might be with respect to reactors, there is an area, here, of uninsurability.

For this reason, we have offered to the committee a draft bill which would, in our view, be an appropriate and timely and proper extension of the indemnity provisions of Price-Anderson. We believe this is at least as important to public toll facilities as it is to AEC licensees and contractors. Our toll facilities carry large masses of traffic which is not controlled in the way railways are. Our traffic is subject not only to expert drivers, using limited trackage, it is open to the whole world's drivers, regardless of competence.

We live with hazard on our roads. We know, we think, what we have to guard against, in terms of undue hazard. We know we must expect a certain incidence of accident. And it seems to us unexceptionable, as an extension of the policy which the Congress has itself established, that if the kind of indemnity available to Price-Anderson is proper for radio activity at the production stage, it is proper for our member facilities with their vastly greater exposure to masses of people. I invite you all to come to one of our toll plazas on a Sunday afternoon, and see how many vehicles and people we must accommodate, and do.

Perhaps it would be useful to have the record show that in one of our turnpike restaurant facilities alone we consume as much water in a year as a town of 50,000. When you talk about the traffic on our toll facilities, you are literally talking about this whole country on the move, out on the open road.

That is why, if we are to be able, under any reasonable circumstances, to continue to permit this traffic to move, we must have the same kind of indemnity, in the interests of our patrons and our bondholders, that is available for producers and licensees under the act as it stands today.

I will be glad to answer any questions the committee may have, either on what I have said or on my written statement.

Representative PRICE. Your full statement will be included in the record, with the appendixes which were supplied with it.

(Statement referred to follows:)

STATEMENT OF MILTON D. STEWART, AMERICAN BRIDGE, TUNNEL, AND TURNPIKE ASSOCIATION (ACCOMPANIED BY JOHN P. MACARTHUR, ASSISTANT ATTORNEY GENERAL, STATE OF NEW YORK)

My name is Milton D. Stewart, and I am a partner in the law firm of Plowden-Wardlaw, Wikler, Gottlieb, Stewart & Long, practicing in New York City, Albany, and Washington. I appear here on behalf of the American Bridge, Tunnel, and Turnpike Association, which I serve as general counsel. Mr. John P. MacArthur, an assistant attorney general of the State of New York, appears here with me on behalf of our special committee on law, on which he represents the New York State Thruway Authority.

Our association's objectives with respect to the transportation of radioactive materials were spelled out in a resolution adopted by our board of directors almost a year ago. They are appended to this statement for ease of reference as appendix 1. At the 1961 hearings of this subcommittee on "Operations Under the Indemnity Provisions of the Atomic Energy Act of 1954," Mr. MacArthur submitted and discussed a statement which indicates our association's general concern with this subject. It will be found on page 103 of the printed record of those hearings, and we shall not burden the record here by repeating or paraphrasing the general statement of our problem given there.

We wish today to inform the subcommittee of what events have—and have not—transpired since our appearance here a year ago; to state more specifically

our view of the immediate needs of toll facilities with respect to radioactive shipments; and to make two specific requests of the subcommittee.

If these hearings had been held 3 weeks ago, we should have had to advise the subcommittee that the association had made no progress since the 1961 hearings toward any of the objectives set forth in our original resolution. We did have a series of useful discussions with various specialists, largely those represented in the Institute for Nuclear Materials Management, in the handling of nuclear materials. Then on March 27, 1962, we conducted at the annual workshop meeting of our association a panel discussion on the transportation of radioactive materials. Papers prepared by AEC staff personnel for a series of meetings with the Council of State Governments were made available to us, in advance, by AEC staff members. We distributed them to the various toll facilities represented in the association and invited them to submit specific questions based on them.

Questions sent in were grouped into four classifications—cleanup after radioactive incident or accident; regulation of highway traffic in such shipment; insurance and indemnity problems; and safety standards for such shipments. To answer the questions, as well as they can now be answered, we had a panel made up of five AEC staff members, an ICC staff man and an insurance broker with experience in toll facility problems. For 3 hours, this panel answered questions which have been of concern to our 70 member facilities for many months. While I cannot say that all of our questions were disposed of to the satisfaction of everyone, we are most grateful for the forthright, responsible and patient effort made by the panelists.

The record of that workshop will be available within the next week, and I should like here to tender it to the committee, for possible inclusion as an appendix to the record of these hearings. We shall publish it for our own members, but I think the subcommittee may well wish to have it available more generally for the atomic energy community and the public.

Within a week of our workshop, the Commission staff conferred with the insurance industry, and then invited us to join in a three-way conference which was held a week ago. Toll facilities represented included the New Jersey Turnpike Authority, the Toll Facilities Department of the Maryland State Roads Commission, the Port of New York Authority, the New York State Thruway Authority, and the Triborough Bridge and Tunnel Authority. For the first time, representatives of the insurance industry indicated to us that through NEPIA and MAERP pools we may be able to purchase property damage insurance against radioactive hazard in amounts up to some $61 million. Some limitations were expressed; we were told that no insurance could be written for off-site damage, for loss of business due to "public scare." or for radioactive contamination due to cumulative exposure. Doubt was also expressed as to whether the roadways of turnpikes could be covered, and we were given no sure indication as to the premium cost of this newly available coverage. Other insurance industry staff personnel advised us that public liability insurance in amounts up to $60 million was available to us. Here again, we were left with some open questions with respect to scope and coverage.

It is fair, I think, to say that this meeting was the first solid evidence we have seen of the beginning of a serious, joint effort to resolve the common problems of the atomic energy, insurance, and toll facility industries. We have since agreed with the AEC staff to go forward promptly—within the next 2 weeks—with a similar session with them and the ICC on regulatory standards and procedures.

Our first request to this subcommittee is that it continue to lend us its good offices to speed the resolution—if there can be a resolution, as we hope and believe there can be—of the various difficulties presented to the Nation's toll facilities by this traffic.

These recent developments are one more vindication of the judgment of the Congress in providing, through the Joint Committee on Atomic Energy, continuing scrutiny and accountability with respect to the adjustment of our laws and institutions to the developing atomic energy industry. It was not the coming of spring, the cherry blossoms, the crocuses, or our association's workshop that stimulated the recent sustained effort to get something done. It was, in our judgment, the prospect of these hearings. We do not say this as the slightest criticism of the insurance industry, or any agency of Government; we, as well as they, are busy with our many, many other problems. But they, as well as we, will have to share the responsibility for further delays. We see no reason why this subcommittee should not expect, and receive, an account

of progress made or not made on all of these related transportation matters within 90 days. Otherwise, we may again find our efforts flagging until they are revived once again by the cherry blossoms and the crocuses which will once again herald the coming of spring—and these annual hearings.

We should like to formulate, for the record, the specific needs we must provide for as rapidly as possible, within the statement of objectives we have previously submitted. These are derived from our particular legal duties to the traveling public to keep our facilities as safe as possible, and our obligation to our bondholders to protect the revenues pledged to repay them, and the facilities built with their funds.

First, a definitive, authoritative classification of radioactive solids, liquids, and gases according to degree of hazard in shipment: The October 9, 1961, discussion draft of "Technical Standards To Be Used as Basis for Preparation of Regulations for the Safe Transport of Radioactive Materials" was an important step toward this goal. We have been assured again and again that the overwhelming bulk of radioactive materials shipped presents no hazard. If we could now be told specifically, in regulations, which of the small residue of shipments are "ultrahazardous," "moderately hazardous," and "minimally hazardous" we could proceed with a regulatory approach which would fit requirements and restrictions to the hazards. To be useful and realistic to transportation agencies, such definitions must take into account the worst possible, most remote highway accident conditions, not just those of the laboratory. The concept of the "maximum credible accident" presented in the International Atomic Energy Agency's regulations is a useful one—provided specialists experienced in highway safety contribute to the determination of what is a maximum credible accident.

Second, packaging requirements realistically related to degree of hazard and resulting from actual experiments with package resistance to a maximum credible highway accident: There is an enormous difference between "safe packaging" for normal handling, and "safe packaging" for resistance to the high-powered shock and the gasoline fires which must be anticipated in accidents under modern high-speed travel conditions. Packaging standards should be no more burdensome or costly to meet than is necessary to maximize safety—under the most adverse transport circumstances foreseeable.

Third, loading, handling and securing requirements which are similarly related to degree of hazard under the most adverse circumstances which can be foreseen: Unless these are spelled out, and similarly related to hazard and maximum credible highway accident, packaging requirements may be vitiated.

Fourth, special requirements and safeguards in providing competent, specially-trained drivers and adequate vehicles for ultrahazardous and some moderately hazardous classes of shipment: It would seem prudent and reasonable to take extra precautions to minimize the likelihood that the more dangerous radioactive shipments will ever become involved in accidents. In experimenting with tandem trailer trucks—because they were new and big, and not because they were particularly hazardous—the turnpikes which licensed them required special evidence of good driver safety records and set specific equipment inspection and adequacy standards. This would seem to offer an instructive parallel.

Fifth, when hazardous radioactive loads are being transported, outside vehicle markings clearly, even dramatically visible and legible at considerable distances to other travelers, to police and to toll collection and maintenance personnel: Such markings have proved their value in the transportation of such dangerous materials as explosives and inflammable chemicals. Travelers are encouraged to, and generally do, keep away from them. Enforcement and inspection personnel are assisted in taking special precautionary measures, and, in the event of accident, prompt identification of the nature of the hazard will minimize the likelihood of improper handling or needless exposure.

Sixth, traffic control requirements related to degree of hazard: Ultrahazardous shipments, however remote the prospect of accident, and however small the number of shipments, should only be moved under traffic conditions which will maximize safety. This begins with the requirement of advance notice to toll facility management. It may include special restrictions as to speed or time of day, or require special escorting. All of these are proven deterrents to accidents.

Seventh, inspection and enforcement measures related to degree of hazard: We are frankly not impressed by mail, telegraph, or telephone approvals of proposed packaging designs. At least for ultrahazardous shipments, there should be direct, on-the-spot inspection and certification of compliance by a responsible

public agency. If the number of such hazardous shipments is as infrequent as we are led to believe, this should not be a serious burden. Mere advance approvals of theoretical or sample packaging designs and specifications do not seem to us to be adequate, certainly for the most hazardous shipments, and possibly for those presenting moderate hazards.

In the same way, we are not much reassured as to the enforcement of proper driver and vehicle safety standards by routine, random sampling, spot checks of the vast army of highway vehicles. Direct, on-the-spot, independent inspection and certification of compliance also should be required, at least for ultra-hazardous shipments. Lesser standards can be applied to less hazardous shipments. Penal sanctions for violations should also be related to degree of hazard.

Eighth, adequate training for toll facility personnel in handling radioactive shipment traffic, and cooperative postincident or post accident cleanup arrangements: We must obviously look to other agencies for expertness in training personnel with respect to these matters.

Ninth, adequate financial protection for the public and for toll facilities, through insurance and Federal indemnity, against both property damage and personal injury: Our second request to this subcommittee is that it give serious and immediate consideration to amending the indemnity provisions of the Atomic Energy Act of 1954 to provide for the uninsurable portion of the risks to which toll facilities and the public will be exposed by these shipments. We are confident that the enactment by this Congress of the measure attached as appendix 2, and described in appendix 3, would be the most effective stimulant to the prompt resolution of other difficulties by regulatory agencies, the insurance industry and the toll facilities. We believe that the draft bill is consistent with the policy enunciated by the Congress in the Price-Anderson Act, and is a proper, necessary, and timely extension of that policy.

Tenth, a recognition that the costs of all of these steps are properly attributable to the national policy which makes them necessary—the policy of fostering the atomic energy industry's development for peaceful and national defense purposes: Radioactive shipments offer no prospect to toll facilities of being or becoming profitable or even self-supporting traffic. Even a special toll on ultra-hazardous shipments could not be set high enough to cover the costs of administration, enforcement, or financial protection. Serious consideration should be given to other ways of properly allocating these costs to the functions which create them. For example, shippers or carriers of hazardous radioactive cargoes might be required by the AEC and the ICC to bear the cost of premiums for the insurance of the public and the property of toll facilities.

The foregoing enumeration is not an exhaustive list of our needs in this area. But if we achieve these things, we can in good conscience probably keep the bulk of toll facilities open to radioactive shipments, and thereby minimize the burden on the atomic energy industry. Our association will continue to strive to achieve this for a reasonable period, out of a sense of public responsibility based on a recognition of the attractiveness of the safety record of our member facilities. Generally speaking, the likelihood of accident on toll roads, for example, is a small fraction of that on tax-supported roads.

But we should like to conclude with two cautions which add up to the necessity for speed in meeting the needs we have stated. Those concerned professionally with radioactive materials are preoccupied with the problem of achieving public understanding of the relative safety of the great mass of shipments of radioactive materials. This leads them to find an express continuing reassurance in the statistical improbabilities of accident, contamination, or other dangers. With all due respect, we must warn that to find comfort here is to misuse the theory of probability. Because only one radioactive shipment in a hundred thousand presents serious hazard does not mean that a hundred thousand shipments will have to take place before an accident occurs. It may be that the very next 5 hazardous shipments will result in accident, and that 500,000 will then be accident-free. Managements of toll facilities know this only too well with respect to other kinds of accidents.

A second caution we should like to express is against seeking perfection or agreement among too many interagency committees before promulgating adequate regulations. In this, as in other areas, we shall learn from experience, and the important thing is to make a quick, orderly beginning with respect to well-regulated, well-controlled highway shipments of radioactive materials. Shipments are moving now. So long as the needs we have stated are not met effectively, in our view we will have the radioactive shipment cart well before the regulatory horse.

APPENDIX I

TRANSPORTATION OF RADIOACTIVE MATERIALS

STATEMENT OF OBJECTIVES OF THE AMERICAN BRIDGE, TUNNEL, AND TURNPIKE ASSOCIATION, INC.

1. A forthright statement by national civilian and military leadership as to whether and under what circumstances the national interest requires the transportation of some or all radioactive materials over toll facilities;

2. If the national interest does require such transportation in some or all cases, action by the appropriate Federal and State officials and the insurance industry recognizing the special needs and problems of toll facilities;

3. A draft model regulation for the consideration of all American Bridge, Tunnel, and Turnpike Association members which will be simple, self-administering, and as uniform as the varying powers and needs of member facilities permit. Such a model regulation should—

A. Classify shipments of radioactive materials into—

(1) Those which may move over toll facilities without notice, without permit, without escort;

(2) Those which may move over toll facilities only after notice to the facility management, so that compliance with applicable regulations may be specifically determined;

(3) Those which may move only with escort, with restrictions based on speed, weather conditions, or time of movement;

(4) Those which may not move at all on toll facilities;

B. Be based on the best scientific information available to the responsible public agencies;

C. Be applicable to the shipments of both licensed and unlicensed shippers, and to both interstate and intrastate truckers;

D. Be satisfactory to, and consistent with, applicable laws and regulations of, the Atomic Energy Commission, the Interstate Commerce Commission, the Department of Defense, the U.S. Public Health Service, State and local transportation and health authorities, and, if necessary, international agencies;

E. Minimize the administrative burden on toll facilities, shippers, truckers, and law enforcement officials;

F. Provide for as much mutual recognition of special permits and certificates as possible, with a central information source usable by all toll facilities;

4. An effective procedure for dealing with incidents or disasters involving radioactive materials, based on adequately trained personnel;

5. All-inclusive financial protection of toll facilities through insurance or indemnification, covering any nuclear incident arising from any source on a toll facility, and adequate in amount to compensate all persons involved for injury, including death resulting from injury; all damage to property, including the costs of the loss of its use or interruption of business. Such financial protection should be provided at minimum cost, which should be borne by the shipper or trucker. The standard of coverage presently included in both the Price-Anderson amendment and private policies should be changed to discard the present requirement of "legal liability."

APPENDIX 2

AN ACT To amend the Atomic Energy Act of 1954, as amended, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 2 of the Atomic Energy Act of 1954, as amended, is amended by adding a new subsection to read as follows:

"j. In order to encourage the safe and efficient movement in commerce of radioactive materials, the United States may make funds available to indemnify any public corporation and other persons indemnified, as their interests may appear, against public liability in connection with the construction, design, ownership, operation, lease or use of any facility of commerce by said public corporation; and to compensate any public corporation for damage to or loss of use of any facility of commerce owned, operated, leased or used by such public corporation arising out of or resulting from the radioactive, toxic, explosive or other hazardous properties of radioactive materials."

SEC. 2. Subsection q. of section 11 of the Atomic Energy Act of 1954, as amended, is amended to read as follows:

"q. The term 'person' means (1) any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, Government agency other than the Commission, any State or any political subdivision [of] *thereof*, or any political entity within a State, any foreign government or nation or any political subdivision of any such government or nation, or other entity; and (2) any legal successor, representative, agent, [or] agency, *or instrumentality* of *one or more of* the foregoing."

SEC. 3. Section 11 of the Atomic Energy Act of 1954, as amended, is further amended by adding two new subsections to read as follows:

"bb. The term 'public corporation' as used herein means any agency, board, commission, authority or other instrumentality established by one or more States or political subdivisions thereof, to construct or operate one or more facilities of commerce.

"cc. The term 'facility of commerce' means any bridge, tunnel, turnpike, road or other highway; airport, heliport, pier, wharf, bus terminal, railroad terminal, truck terminal, warehouse or other terminal; railroad, ferry or other carrier; or any other building or facility which is utilized in aid to commerce."

SEC. 4. Section 170 of the Atomic Energy Act of 1954, as amended, is amended by adding the following new subsections:

"m. In addition to any other authority the Commission may have, the Commission is authorized until August 1, 1967, to enter into agreements to indemnify and hold harmless public corporations and other persons indemnified, as their interests may appear, from public liability in connection with the design, construction, ownership, operation, lease or use of any facility of commerce by said public corporations. The aggregate indemnity for all persons indemnified in connection with each nuclear incident shall not exceed $500,000,000, including the reasonable cost of investigating and settling claims and defending suits for damage. Such agreements of indemnification may contain such terms as the Commission deems appropriate to carry out the purposes of this subsection. Such agreements of indemnification, when entered into with a public corporation having immunity from public liability because it is a State agency, shall provide also that the Commission shall make payments under the agreement on account of activities of the public corporation in the same manner and to the same extent as the Commission would be required to do if the public corporation were not a State agency.

"n. In addition to any other authority the Commission may have, the Commission is authorized until August 1, 1967, to enter into agreements with any public corporation which owns, operates, leases or uses one or more facilities of commerce to compensate it for damage to, or loss of use of, any such facility arising out of or resulting from the radioactive, toxic, explosive or other hazardous properties of radioactive materials, to the extent that compensation for any such damage or loss of use is not collectible under a valid insurance policy held by such public corporation. The total compensation to any public corporation under this subsection shall not exceed $500,000,000 or such lesser sum as the Commission may specify in each agreement upon consideration of the cost of replacement of the one or more facilities of commerce with respect to which such compensation agreement is made. Such compensation agreement may contain such terms as the Commission deems appropriate to carry out the purposes of this subsection. Such compensation agreements shall also provide that upon the payment of such compensation, the Commission shall be subrogated to all of the public corporation's rights of recovery therefor: *Provided, however*, That there shall be no right of subrogation against any officer or employee of said public corporation.

"o. Any agreement pursuant to subsections m. or n. of this section may be made only after a finding by the Commission that the facility of commerce in connection with which such agreement may be made is necessary and desirable to the safe and efficient movement in commerce of radioactive materials and that the development of the atomic energy industry, in the interest of the general welfare and of the common defense and security of the United States, will be encouraged by the making of such agreement. The Commission may require as a condition of any such agreement that the public corporation have and maintain financial protection of such type and in such amounts as the Commission shall require in accordance with subsection 170 p. to cover public liability claims and damage to or loss of use of the one or more facilities of commerce with respect to which such agreement is made.

"p. The amount of financial protection required shall be the amount of insurance available from private sources, except that the Commission may establish a lesser amount on the basis of criteria set forth in writing, which it may revise from time to time, taking into consideration such factors as the following: (1) the cost and terms of private insurance, (2) the type, size, and location of the facility of commerce and other factors pertaining to the hazard, and (3) the nature and purpose of the facility of commerce. Such financial protection may include private insurance, private contractual indemnities, self insurance, other proof of financial responsibility, or a combination of such measures."

APPENDIX 3

MEMORANDUM ON PROPOSED ACT

This bill would enable the Atomic Energy Commission to enter into agreements which would provide financial protection to bridges, tunnels, turnpikes, piers, airports, terminals, and other facilities of commerce operated by public corporations of one or more States or their political subdivisions against the hazards created by the increasing utilization and shipment of radioactive material. Financial protection would be provided against property damage and loss of use as well as against public liability. This protection would be available to the extent that insurance protection is not available from private insurance companies on reasonable terms and conditions.

The bill would provide such protection only after a finding by the Atomic Energy Commission that the particular facility of commerce in connection with which the agreemnt is to be made is necessary and desirable to the safe and efficient movement in commerce of radioactive materials, and that the development of the atomic energy industry, in the interest of the general welfare and of the common defense and security of the United States, would be encouraged by the making of an agreement to provide such protection.

The bill would meet an urgent need which private insurance protection has not been able to fill adequately up to this time and would result in a wider acceptance of shipments of radioactive materials as part of general commercial traffic, without undue restrictions. Because of this lack of financial protection, a number of major bridges, tunnels, and highways (notably those of the Triborough Bridge and Tunnel Authority and the Massachusetts Turnpike Authority) are closed to shipments of radioactive materials. In the light of their responsibilities to the traveling public and to their bondholders, many other State and local officials who are responsible for such facilities have indicated that under present circumstances they cannot indefinitely continue the policy of accepting all or most of such shipments. Most of these facilities are financed through the issuance of municipal bonds. In many cases these bonds are backed only by the revenues of the facilities involved. It is noteworthy that, with the exception of shipments of radioactive material, adequate private insurance protection on reasonable terms and conditions is available with regard to shipments which are permitted through these facilities.

Section 1 amends section 2 of the Atomic Energy Act of 1954, as amended, which contains the findings of the Congress concerning the development, use, and control of atomic energy, by adding a new subsection j.

Subsection j. provides that for the purpose of encouraging the safe and efficient movement in commerce of radioactive materials, funds may be made available—

(*a*) to indemnify State agencies and instrumentalities and other persons indemnified, as their interests may appear, against public liability as a result of a nuclear incident which occurs in connection with the operation of a facility of commerce by such an agency or instrumentality, and;

(*b*) to compensate such agencies or instrumentalities for damage to or loss of use of their facilities of commerce arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of radioactive materials.

Section 2 of the bill amends subsection q. of section 11 of the Atomic Energy Act of 1954, as amended, which defines the term "person." The changes clarify the intent to include within the definition political subdivisions or instrumentalities of one or more States of the United States.

Section 3 amends section 11 of the Atomic Energy Act of 1954, as amended, by adding section bb. and section cc.

Section bb. defines the term "public corporation" to include agencies, boards, commissions, authorities, or other instrumentalities established by one or more States or political subdivisions to construct or operate facilities of commerce.

Section cc. defines the term "facility of commerce" to include highways (such as bridges, tunnels, turnpikes, and roads), terminals (such as airports, piers, warehouses, and railroad, truck, and bus terminals), carriers (such as railroads or ferries) and other buildings and facilities utilized in aid of commerce.

Section 4 amends section 170 of the Atomic Energy Act of 1954, as amended, by adding subsections m. through p.

Subsection m. provides that the Atomic Energy Commission may extend Price-Anderson indemnity protection to facilities of commerce operated by public corporations. This would provide public liability protection against nuclear incidents. It would extend to such a facility of commerce the same amount of protection ($500 million) and limitation of liability which is now extended to those licensees of the Atomic Energy Commission which the Commission requres to have and maintain financial protection in accordance with section 170 of the Atomic Energy Act of 1954, as amended. Any agreement entered into under this subsection would provide that payments would be made under such agreement to claimants without regard to whether the State agency which executes the agreement has immunity from public liability because it is a State agency. Protection under this subsection would not be utilized in the event adequate private insurance or other financial protection was provided.

Subsection n. permits the Commission to enter into agreements to provide financial protection for facilities of commerce of public corporations against property damage or loss of use arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of radioactive materials. The limit of such compensation would depend upon the cost of replacement of the facility of commerce with respect to which the agreement is made but would not exceed $500 million. In the event any such compensation is paid, the Commission would be subrogated to the public corporation's rights of recovery therefor with the exception of rights of subrogation against officers or employees of the public corporation. Protection under this subsection would not be utilized in the event adequate private insurance or other financial protection was provided.

Subsection o. provides that the Commission shall not enter into any agreement under subsections m. or n. unless the facility of commerce with respect to which such agreement is to be made is necessary and desirable to the safe and efficient movement in commerce of radioactive materials and that the development of the atomic energy industry, in the interest of the general welfare and of the common defense and security of the United States, will be encouraged by the making of such an agreement. It also provides that the Commission may require as a condition of such an agreement that the public corporation maintain private insurance or other financial protection in accordance with subsection p. with respect to the facility of commerce to which the agreement is made.

Subsection p. provides that the amount of such financial protection shall be the amount of insurance protection available from private sources or such lesser amount determined by the Commission on the basis of the cost and terms of private insurance, the type, size, location of the facility of commerce involved, other factors pertaining to the hazard, as well as the nature and purpose of the particular facility.

Representative PRICE. Now, at the bottom of page 3 of your prepared statement, you have indicated some of the limitations which insurers have proposed with regard to the nuclear endorsement which they have offered. Among those you mention off-site damage. What do you mean by "off-site damage"? Are you speaking of damage off the site of the toll facility, in the sense of third party liability, or are you speaking of first person coverage for incidents occurring off the site of the toll facility?

Mr. STEWART. It is my understanding, and I would like to be checked by my associates here, that the reference to "off site" by the insurance industry spokesman covered two kinds of accidents—those which took place a reasonable distance—we never got to the point of what that might be, exactly, but a reasonable distance—from our toll facilities, and secondly, accidents which originated elsewhere altogether.

The example was used of an upstream reactor plant which perhaps floated some radioactivity downstream to a bridge or tunnel. We are talking here about property damage.

Mr. TOLL. Mr. Stewart, is that kind of protection available to anyone? I mean, to a commercial company that may be damaged by an incident occurring somewhere else? Is that available to anybody?

Mr. STEWART. Not so far as I know, Mr. Toll. And let me emphasize, so far as we are concerned, the only reason we need to be more protected than anybody else in this respect is because we have legal duties that are higher than those of others. So far as off-site damage is concerned, I do not myself think this ultimately will be a very critical matter.

Representative PRICE. Mr. Stewart, on pages 4 through 8 of your prepared statement, which we are including completely in the record, you have spelled out some of the information you would need and the regulations you require for safe handling of radioactive shipments. I think these are very helpful, and the committee will ask the ICC and the AEC for comments on them.

I might also state that the Joint Committee will ask for a full report within the next 60 days from the Atomic Energy Commission as to progress made in solving problems of shipment through toll facilities.

(The comments of ICC appear on p. 112; those of AEC at p. 117; and the AEC progress report at p. 135.)

Mr. STEWART. On behalf of our association and industry, Mr. Chairman, we are happy to know this, and you may be assured that we will continue to do everything we can to help both the Commission and the insurance industry arrive at a reasonable resolution.

I would like, if I may, to make just this one point with respect to the urgency of this problem from our standpoint.

I do not know what your normal practice is. I would like to go off the record for a minute, if I may.

Representative PRICE. Off the record.

(Discussion off the record.)

Representative PRICE. Do you think that the insurers have greatly underestimated the potential hazard?

Mr. STEWART. Underestimated, sir?

Representative PRICE. Yes.

Mr. STEWART. I do not trust my own judgment on this very much. I think I have heard too many experts.

I will say this: I think the insurers have overestimated the mass hazard. As to their estimate that $61 million-plus would be enough for all of the incidents of one individual accident, I would say emphatically not. It cost a billion dollars to build the New York Thruway. It cost at least that much, probably more, to build the port authority. We have bridges whose replacement cost, not to speak of loss of use in occupancy or liability for personal injury, would run far in excess of $61,700,000, in my opinion.

Representative PRICE. It was mentioned here the other morning that one toll facility—I believe it was toll—did obtain coverage. Are you familiar with that?

Mr. STEWART. I believe it is third-party liability of quite a limited kind, sir.

Mr. MacArthur says it is a $10 million maximum third party liability policy.

We did know about it; yes, sir. It does not deal with either the first party property problem or——

Representative PRICE. Does it deal with the problem that you are mostly concerned with?

Mr. STEWART. No, sir. And it does not deal with the problem it purports to in large enough amounts to be of use to our industry generally.

Representative PRICE. On page 10 you state that even a special toll on ultrahazardous shipments could not be set high enough to cover the cost of administration, enforcement, or financial protection. Is it really possible to know whether a reasonable special fee can be set, without precisely knowing what the cost of insurance might be? Do you require a special toll on all ultrahazardous shipments?

Mr. STEWART. I would like to make it plain, sir, that it is hard for me to give an unequivocal answer for all of 70 facilities. Their regulations and fees vary. But in general, in view of the traffic which we are told has any element of hazard, and the frequency of shipment which some of our members have experienced, there is no reasonable prospect that we could set a fee, however high, which would meet our premium costs, administrative costs, and enforcement costs.

Representative PRICE. Any questions?

Thank you very much, Mr. Stewart.

(Mr. Stewart submitted the transcript of a panel discussion, "Safety in the Transportation of Radioactive Materials," conducted by the American Bridge, Tunnel & Turnpike Association in Washington, D.C., on March 27, 1962. The panel discussion is on file with the Joint Committee.)

(The documents referred to on p. 111 are reprinted below.)

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D.C., April 13, 1962.

HON. RUPERT L. MURPHY,
Chairman, Interstate Commerce Commission,
Washington, D.C.

DEAR MR. MURPHY: Enclosed is a copy of a statement by Mr. Milton D. Stewart, general counsel of the American Bridge, Tunnel, and Turnpike Association, submitted to the Subcommittee on Research, Development and Radiation on April 11, 1962, during the hearings on liability and indemnity matters.

Included in his statement are certain suggestions concerning classification, packaging, and labeling of shipments of radioactive materials, summarized in points 1 through 8 on pages 5–9.

The Joint Committee would appreciate the views of the Interstate Commerce Commission on these suggestions by May 15, 1962.

Sincerely yours,

MELVIN PRICE,
Chairman, Subcommittee on Research, Development and Radiation.

INTERSTATE COMMERCE COMMISSION,
Washington, D.C., May 11, 1962.

HON. MELVIN PRICE,
Chairman, Subcommittee on Research, Development, and Radiation, Joint Committee on Atomic Energy, Congress of the United States, Washington, D.C.

DEAR CONGRESSMAN PRICE: Your letter of April 13, 1962, which I acknowledged on April 19, enclosing a copy of a statement by Mr. Milton D. Stewart, general counsel of the American Bridge, Tunnel, and Turnpike Association

presented on April 11, 1962, before the Subcommittee on Research, Development and Radiation, has been given study by our staff.

You requested the views of the Interstate Commerce Commission on the suggestions contained in Mr. Stewart's presentation, particularly those relating to classification, packaging, and labeling of shipments of radioactive materials summarized in points 1 through 8 of his statement.

I am authorized on behalf of the Commission to make the following comments:

The Interstate Commerce Commission is required by the provisions of title 18, United States Code, sections 831–835, to formulate regulations for the safe transportation within the United States of explosives and other dangerous articles. This statute, revised as Public Law 86–710, 86th Congress, approved September 6, 1960, specifically includes the transportation of radioactive materials and certain other named articles as being within the Commission's responsibilities.

Section 834, which directs this Commission to formulate regulations, provides that such regulations shall be binding upon all carriers engaged in interstate or foreign commerce which transport explosives or other dangerous articles by land, and upon all shippers making shipments of explosives or other dangerous articles via any carrier engaged in interstate or foreign commerce by land or water.

This Commission also is required by provisions of the Interstate Commerce Act (49 U.S.C. 304(a)) to establish regulations relating to the qualifications and maximum hours of service of employees and safety of operation and equipment with respect to all motor carriers engaged in interstate or foreign commerce. Our safety regulations relating to these matters have been in effect for approximately 25 years. Under the provisions of sections 206 and 209 of the Interstate Commerce Act this Commission has granted certificates and permits to some 19,000 motor common and contract carriers of passengers and property engaged in interstate or foreign commerce. Many of these certificates and some permits authorize the transportation of general commodities, some of which have specific commodity exceptions, such as explosives. However, the Commission cannot lawfully cancel the operating authority represented by these certificates or permits except for specific causes enumerated in the Interstate Commerce Act.

Section 834 of the Transportation of Explosives Act, mentioned above, provides that before adopting any regulations relating to radioactive materials, the Interstate Commerce Commission shall advise and consult with the Atomic Energy Commission. Even prior to the enactment of this requirement in 1960, our staff for several years maintained a close working relationship with the staff of the Atomic Energy Commission and has regularly consulted with that staff and obtained its advice when problems relating to the transportation of radioactive materials were under consideration.

Our Commission has been represented by two staff members on the Interagency Committee for the Transportation of Radioactive Materials. That Committee is under the chairmanship of an official of the Atomic Energy Commission and includes in its membership representatives of other Federal Government agencies concerned with regulating transportation of dangerous materials. These agencies are the U.S. Coast Guard, the Federal Aviation Agency, and the Post Office Department. The Committee also has had the benefit of the advice of a representative of the Bureau of Explosives of the Association of American Railroads. Authorization for this Commission to utilize the services of that Bureau is contained in section 834(e), of the Transportation of Explosives Act.

In commenting on Mr. Stewart's suggestions, I shall reproduce the italicized headings of his statement for the first eight items and then make our comment with respect to each.

First, a definitive, authoritative classification of radioactive solids, liquids, and gases, according to degree of hazard in shipment

A substantial effort has been made, and work is now in progress, to produce a classification which will more effectively group radioactive materials in relation to their hazards in transportation.

As Mr. Stewart has noted, the Interagency Committee on the Transportation of Radioactive Materials on October 9, 1961, issued a discussion draft of "Technical Standards to be Used as a Basis for Preparation of Regulations for the Safe Transportation of Radioactive Materials." This draft contemplates the establishment of certain groups of materials, in relation to their toxicity level. The draft also proposes packaging standards which are related to the degree of hazard.

For a number of years the ICC has maintained regulations which specify adequate packaging, suitable labeling, and marking of packages, and limitation of radiation content in specific vehicles or locations. These regulations were developed essentially to guard against dangers of exposure to radiation of persons and property in the course of handling. The classification proposed by the Interagency Committee contemplates categories that will be related to the probable hazard to persons and property in the event of an accident in transit.

Under the pending proposals it is not contemplated that a small group of shipments can be classified as "ultrahazardous" as suggested by Mr. Stewart. However, the toxicity groupings and the packaging requirements to be proposed as regulatory standards are expected to be adequate to provide safety in transportation, including provisions for accidents which may occur en route. Provision will be retained, however, as in present regulations, for special consideration of containers and procedures related to high-hazard-type shipments. In each case where the hazard, in the event of accident, is particularly pronounced, both the container and the method of transport will require special approval.

Since it was issued in October 1961, and published in December 1961, the draft has been the subject of study and comment by a large number of well informed people throughout the country. These persons include representatives of firms and institutions engaged in the handling of radioactive materials, State officials, including State health departments, contractors and licensees under AEC procedures, and transportation agencies. Many of them have expressed criticisms and comments. It is important that these criticisms be considered carefully by the Interagency Committee if there is to be an adequate measure of safety without undue interference with the necessary movement of many commodities important in commerce which have some degree of radioactive quality.

While this consideration is going on, the present regulations are applicable to carriers engaged in interstate or foreign commerce and to shippers by such carriers. The Commission's regulations relating to the transportation of dangerous articles apply to all motor carriers who transport in interstate or foreign commerce including private carriers of property. The existing regulations provide packaging, marking, and labeling requirements and impose on motor carriers requirements relating to vehicles and drivers which importantly contribute to safe transportation.

Second, packaging requirements realistically related to degree of hazard and resulting from actual experiments with package resistance to a maximum credible highway accident

One of the principal purposes of the technical standards under consideration by the Interagency Committee is to provide recommended packaging requirements which are more nearly in line with present-day knowledge and practices than are required by the existing regulations. However, the present regulations require that any shipments of high-level radioactive materials must be packaged and transported in containers and under procedures specifically approved for the purpose intended. The present procedures are not inadequate in relation to the degree of hazard involved.

It must be recognized that in our present complex industrial development, dangerous articles of many different kinds and degrees of risk must be transported by the various modes of transport. The Transportation of Explosives Act requires the Commission to establish requirements that will be in keeping with the best known practicable means for securing safety in transit. All regulatory requirements, to serve the public interest, must be as reasonable as they can be made, without placing unduly harsh or burdensome requirements on carriers and shippers as to preclude transportation of the materials necessary to the economy.

The technical standards provide for containers, or packaging, of different types, to afford maximum protection against risk, in a manner related to hazards under accident conditions. Radioactive materials which are of such nature as to present substantial hazard in the event of accident will continue to be subjected to adequate packaging requirements.

Third, loading, handling, and securing requirements which are similarly related to degree of hazard under the most adverse circumstances which can be foreseen

The Motor Carrier Safety Regulations of the Interstate Commerce Commission require shipments of all types to be safely loaded and secured. The regulations do not at present contain specific requirements with respect to the strength of devices or the method of securing shipments. However, those carriers who are now

transporting heavy casks and other containers in the transportation of radioactive materials perform this service under requirements specifically stated in special approvals issued by or on behalf of the Interstate Commerce Commission.

The staff of the Bureau of Motor Carriers of the Commission constantly keeps informed as to carriers who transport materials of this nature and frequently examine the loading procedures and confer with management on the adequacy thereof. We recognize that adequate loading and securing requirements are essential as one means of preventing the shifting or tipping of containers which could cause a relatively minor incident to initiate a series of events which might develop into a major accident.

Those motor carriers who are transporting heavy containers are using loading procedures and tie-down devices have proved to be adequate. We recognize, however, that with the increasing number of shipments which will require the use of heavy containers, the adequacy of securing is important in the transportation of these items by motor vehicle. This matter is currently receiving attention and we will endeavor to assure as adequate regulatory requirements as are practicable.

Fourth, special requirements and safeguards in providing competent, specially trained drivers and adequate vehicles for ultrahazardous and some moderately hazardous classes of shipment

The regulations of the Interstate Commerce Commission now contain specific requirements as to driver physical qualifications and competence by reason of training and experience.

Our regulations for years have required adequate eyesight of a definitely specified degree, and a definite measure of hearing. The regulations prohibit the use of a driver who has suffered the loss of a hand, arm, foot, or leg. A minimum age is specified. An examination and certification by a licensed doctor of medicine or osteopathy is required at least each 3 years. Drivers are required to be conversant with the Commission's regulations and the regulations of the States in which they operate. Our rules require compliance with State and local laws and regulations relating to traffic. In addition, the rules require that every motor carrier operating a vehicle transporting explosives or other dangerous articles shall require the driver of the vehicle to have in his possession, and require the driver to keep in his possession during the course of such transportation, a manifest, bill of lading, or other shipping paper setting forth the total quantity by weight, volume, or otherwise as appropriate of each kind of explosive or other dangerous article, and showing the prescribed label required for the outside container of each article. The regulations require shippers to certify to the carrier that the articles offered for transportation are properly described and are packaged and marked and are in proper condition for transportation, and articles are required to be properly described by name as specified in the Commission's regulations.

Motor carriers specifically are required by the Commission's regulations to take into consideration the traffic violations record, and the accident record, if any, of drivers, in determining whether they may be employed or retained in service. The regulations require drivers to be competent, by training or experience, safely to operate the type of vehicle to be driven. We have continued to emphasize the importance of adequate driver training, particularly in relation to transportation of dangerous materials. Special rules require that vehicles shall not be left unattended on public streets and highways. We regard this as a fundamentally essential provision of our requirements.

Fifth, when hazardous radioactive loads are being transported, outside vehicle-markings clearly, even dramatically visible and legible at considerable distances to other travelers, to police and to toll collection and maintenance personnel

The regulations at present require vehicles transporting any quantity of radioactive materials requiring packages to be marked with the red label to be placarded on each side and the rear with the words "DANGEROUS—RADIOACTIVE MATERIALS." This placarding is required to be shown in letters not less than 3 inches high on a contrasting background. The purpose for requiring placarding of these vehicles and others transporting dangerous articles of specified kinds and amounts basically is to inform police and fire personnel of the nature of the commodity in the event of accident or fire. However, the display of the signs also serves the purpose of informing other users of the highways and persons approaching vehicles, which are parked, of the nature of the

materials contained in them. In the course of inspections we make particular efforts to determine that placards are properly displayed. We are prepared to reexamine the desirability of enlarging the size and kind of vehicle markings required. However, in the past, we have endeavored to maintain a reasonable balance between spectacularly drawing attention to the cargoes of such vehicles and the need for adequate communication to official personnel and other persons to warn them of the nature of the contents of vehicles. While we are not convinced that present placarding requirements are inadequate, this matter will be given review as promptly as possible.

Sixth, traffic control requirements related to degree of hazard

Mr. Stewart's statement suggests that ultrahazardous shipments should be moved only under traffic conditions which will maximize safety. He says this begins with the requirement of advance notice to the toll facility management. These conditions may include special restrictions as to speed or time of day, or require special escorting.

The Motor Carrier Safety Regulations of this Commission require that all vehicles shall be driven in accordance with the laws, ordinances, and regulations of the State or local jurisdiction in which they operate. Thus, a requirement by any toll facility that notice be given to it must be complied with under existing ICC regulations.

Similarly, existing regulations require compliance with speed restrictions established by toll facilities or other local jurisdictions. It has not been feasible for this Commission to prescribe speed restrictions except to require compliance with those established by local authorities. The enforcement of speed laws is within the province of the State and local police authorities.

Seventh, inspection and enforcement measures related to degree of hazard

Present requirements for approval of packaging designs for high level radioactive shipments require the submission of complete data as to containers and handling procedures.

Although the bulk of our supervision of the safety practices of motor carriers, in general, is based upon spot checks, it has long been our practice to devote particular attention on a frequent inspection basis to the practices and records of carriers known to be engaged in transporting dangerous commodities. The ICC staff has endeavored to keep informed with respect to carriers who extensively engage in the transportation of radioactive shipments, as well as those who transport explosives and other materials of unusual hazard. We make more frequent inspections of such carriers to determine their compliance with all phases of our regulations, including the selection and supervision of drivers, the maintenance of vehicles, and the compliance with dangerous articles regulations. It will be our purpose to continue close supervision of interstate carriers we know to be engaged in transporting radioactive shipments of a substantial degree of hazard.

Eighth, adequate training for toll facility personnel in handling radioactive shipment traffic, and cooperative postincident or postaccident cleanup arrangements

The Interstate Commerce Commission has for some years endeavored to assist in the training of personnel of State regulatory commissions, State highway patrols, State fire marshal personnel, and personnel of toll road facilities with respect to our basic motor carrier safety regulations. Twice each year some personnel of these agencies are invited to attend a course at our Washington headquarters. However, with respect to training in the principles of radiation and the appropriate procedures for postincident or postaccident cleanup, the AEC is more adequately equipped to furnish assistance in training of personnel of State and local agencies.

We are aware of the importance to the toll facility managements of regulations which are adequate for their purpose and which are as clear and definitive as their technical nature permits. We constantly are engaged in improved our regulations as to content and form to the fullest extent possible as new information and experience become known to us.

It must be recognized that in the case of radioactive materials the shipments to be transported are varied in kind and in the degree of their capacity for producing harmful effects if improperly packaged or handled, or if their contents accidentally are released and dispersed. However, the same principle is true with respect to a great many dangerous articles which must be transported in all

sections of the country to meet the need of commerce. Many of these dangerous commodities are essential to the conduct of the national defense effort. In order to provide adequate safety our regulations must be adequate, equitable, fair, but framed so as to avoid unduly harsh or sostly burdens on carrier and shippers. We must comply with the legal requirements of the Administratice Procedures Act in proposing and adopting new relulatory requirements. Because of the great number of demands for special consideration of problems which constantly arise we cannot make a prediction as to when work will be completed, either by the Interagency Committee, or subsequently by our staff, with respect to the newly developed proposed rules which are intended to be more adequate and informative than those now in effect.

I assure you of our intention to assist fully in the work of the Interagency Committee and that it is our purpose to keep our regulations currently in conformance with technical developments as rapidly as work can be done properly.

Sincerely,

RUPERT L. MURPHY, *Chairman.*

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C., April 12, 1962.

Hon. GLENN T. SEABORG,
Chairman, U.S. Atomic Energy Commission, Washington, D.C.

DEAR DR. SEABORG: Enclosed is a copy of a statement by Mr. Milton D. Stewart, general counsel of the American Bridge, Tunnel & Turnpike Association, submitted to the Subcommittee on Research, Development, and Radiation on April 11, 1962, during the hearings on liability and indemnity matters.

Included in his statement are certain suggestions concerning classification, packaging, and labeling of shipments of radioactive materials, summarized in points 1 through 8 on pages 5 to 9.

The Joint Committee would appreciate receiving the views of the Commission on these suggestions by May 15, 1962.

Sincerely yours,

MELVIN PRICE,
Chairman Subcommittee on Research, Development, and Radiation.

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., May 15, 1962.

Hon. MELVIN PRICE,
Chairman, Subcommittee on Research, Development, and Radiation, Joint Committee on Atomic Energy.

DEAR MR. PRICE: This is in response to your letter of April 12, 1962, in which you request the views of the Commission with respect to certain suggestions made by Mr. Milton D. Stewart, general counsel of the American Bridge, Tunnel & Turnpike Association concerning classification, packaging and labeling of shipments of radioactive materials. The suggestions were included in Mr. Stewart's statement submitted to the subcommittee on April 11, 1962, during the hearings on liability and indenmity matters.

The suggestions offered by Mr. Stewart are of constructive value in identifying significant factors bearing upon safe transportation of radioactive materials. In fact, the subject matter of certain of the suggestions was considered by the Interagency Committee on Transportation of Radioactive Materials in the preparation of the draft technical standards circulated for public comment in December 1961. The technical standards are now being redrafted by the Committee in light of comments received. The Interagency Committee, as you will recall, is composed of representatives of the Federal regulatory agencies having responsibilities for regulating the safe transportation of radioactive materials, namely, the Atomic Energy Commission, Interstate Commerce Commission, Federal Aviation Agency, Coast Guard, and Post Office Department. The Committee is chaired by an AEC representative.

Regulations governing requirements discussed in items 1 through 8 as they relate to interstate highway carriers are primarily the responsibility of the Interstate Commerce Commission. The AEC desires to assist the ICC in any way that we can be of help in improving present requirements or developing new requirements as indicated. Our comments on the suggestions themselves are appended to this letter.

We believe that the toll authorities can be of important assistance to the responsible regulatory agencies in the further development of transportation regulations. In that connection, and following the staff's joint conferences in early April with representatives of the toll authorities and the insurance industry, the Director of Regulation invited the American Bridge, Tunnel & Turnpike Association, through Mr. Stewart, to designate representatives to meet with the staff and discuss these problems in more detail. Plans for the meeting are expected to be completed when the association has designated its participants. Representative of the Interstate Commerce Commission will also participate in this meeting.

Sincerely yours,

GLENN T. SEABORG, *Chairman.*

APPENDIX

AEC COMMENTS ON SUGGESTIONS OF AMERICAN BRIDGE, TUNNEL & TURNPIKE ASSOCIATION

1. "First, a definitive, authoritative classification of radioactive solids, liquids, and gases according to degree of hazard in shipment"

While it may not be possible to classify radioactive materials to the degree of specificity suggested by Mr. Stewart, we recognize the need for a classification of materials according to degree of potential hazard under accidental conditions in shipment. The Interagency Committee's October 9, 1961, "Discussion Draft of Technical Standards To Be Used as a Basis for Preparation of Regulations for the Safe Transport of Radioactive Materials," includes such a classification. The classification in the draft technical standards is essentially the same as agreed upon by the International Atomic Energy Agency and published in the Agency's safety series No. 6, "Regulations for the Safe Transport of Radioactive Materials," which was published in May 1961. Under that classification, radioisotopes are divided into three groups according to their radiotoxicity:

Group I. Very high radiotoxicity.
Group II. High radiotoxicity.
Group III. Moderate or low radiotoxicity.

Four categories of material are established based on the radiotoxicity groupings. Quantity limitations, packaging requirements and shipping procedures for each category are related to the hazard potential.

The first category includes types and quantities of material that, because of their very low hazard potential, are exempt from packaging and labeling requirements under specified conditions of shipment and can be shipped without special approval of the regulatory authority. This category includes very small quantities of material in each radiotoxicity classification, low activity materials such as uranium ores and concentrates, low activity wastes and manufactured articles such as luminous dials, of which radioactive materials are a component part.

A second category includes types and quantities of material in each radiotoxicity classification that are of a low to moderate hazard if released from a package but which requires specification packaging and labeling in a type A package. Such a package must be designed to withstand normal handling and minor accidents incident to transportation without loss of material but may rupture in a serious accident under severe impact forces or fires. The quantities of material that may be transported in such packages are such that it is unlikely that any individual will ingest, inhale, or absorb quantities of material to present a serious health hazard in event of accidental release from the package.

A third category includes types and quantities of material in each radiotoxicity grouping that would, if accidentally released from a package, present a substantial hazard from the standpoint of exposure of individuals and contamination of property, but which can move routinely in transport without special approval provided the package is designed to contain the material and retain its shielding properties in the most severe accident considered credible for the mode of transport used, including severe impacts and gasoline fires. Such a package is designated a type B package.

A fourth category consists of types and quantities of material in each radiotoxicity classification that, if released from a package, may present a high degree of hazard to the public and serious contamination of property. Such materials are required to be shipped only in type B containers after special approval by the regulatory authority. Administrative requirements relating to routing, motifica-

tions, special precautions, etc., are determined for each individual shipment and required by the regulatory authority under the special approval.

It is to be noted that the classification as related to radiotoxicity and the four categories are based primarily on limiting the potential hazard to individuals in the vicinity of an accident in the event radioactive material is released from the package. The effort and expense involved in decontamination of property may vary widely depending upon circumstances surrounding the accident. However, since limitations are placed on quantities permitted to be shipped in a single package in each category, the risk to property is also limited. The potential risk to property is further reduced by requiring that substantial quanties of material be shipped in a type B package.

It is understood that the Interagency Committee is giving further consideration as to how the classification and categorization of materials for shipment can be further refined in the Technical Standards to assist transportation agencies in developing regulations and procedures applicable to their particular facilities.

2. *"Second, packaging requirements realistically related to degree of hazard and resulting from actual experiments with package resistance to a maximum credible highway accident"*

The draft technical standards relate packaging requirements to the radiotoxicity classifications, quantity limitations and potential hazard from material if released from the package.

The type A package must be leakproof, securely closed by a positive fastening device, shielded adequately to prevent an external dose rate in excess of the values prescribed in the regulations and must prevent loss or dispersal of the radioactive contents and retain shielding efficiency under conditions normally incident to transport (such as minor drops and spills) and under minor accident conditions. Quantities of material that may be shipped in a type A package are limited so that the degree of hazard to workers or the public is reasonably low even if the container ruptures and releases its contents.

The type B package must be designed so as to maintain its integrity under conditions normally incident to transport without loss or dispersal of the radioactive contents and the package must retain shielding efficiency under conditions normally incident to transport and in the most severe accident which is considered credible for the mode of transport involved.

Examples of type B packages are those that are used for the shipment of large quantities of radioactive material in the form of solid irradiated fuel elements which may contain hundreds of thousands of curies of radioactivity. The standards for design of such casks are laid down in the Atomic Energy Commission's proposed part 72, a copy of which is enclosed. The proposed standards specify control to protect the public health and safety from hazards relating to criticality, heat transfer, radiation exposure, structural integrity of the shipping cask and contamination in the shipment of such elements.

The Atomic Energy Commission has underway at the present time both in its laboratories and under contract with private groups a number of studies and testing programs relating to integrity of shipping containers under severe accident conditions. The information which is derived from these programs is expected to provide a basis for sound standards of transportation container design as that a high degree of confidence can be placed in the structural integrity of packages to meet type B requirements. The information will also be made available to the Federal agencies responsible for developing Federal regulations governing safety in the transportation of radioactive materials and to State, bridge, tunnel and turnpike officials responsible for regulations governing movement of radioactive materials over their facilities.

3. *"Third, loading, handling and securing requirements which are similarly related to degree of hazard under the most adverse circumstances which can be foreseen"*

Loading, handling and securing requirements deserve careful attention. Regulations governing such requirements for the transportation of radioactive materials should be related to requirements for heavy packages. However, we believe that loading and securing requirements are important primarily in assuring that the container is secured to prevent a minor incident from initiating a chain of events which could develop into a major accident.

4. *"Fourth, special requirements and safeguards in providing competent, specially-trained drivers and adequate vehicles for ultrahazardous and some moderately hazardous classes of shipments"*

The requirements for training of drivers, adequacy of equipment and equipment inspection, and standards for large shipments of radioactive material should, it would seem, be considered in the same light as standards for shipping other hazardous materials. In shipping radiocative material that would present a serious hazard to the public in the event of dispersal of the material from a package, primary reliance for safety should be placed in a well-designed container such that integrity of the container to prevent loss of material under credible severe accident conditions can be reasonably assured. However, driver and vehicle capability to prevent an accident from happening in the first place are obviously important considerations.

5. *"Fifth, when hazardous radioactive loads are being transported, outside vehicle markings clearly, even dramatically visible and legible at considerable distances to other travelers, to police and to toll collection and maintenance personnel"*

The draft technical standards would require placarding of vehicles transporting quantities of radioactive material that would present significant hazard to the public in the event the material were dispersed from the package. The Interagency Committee is giving further consideration to improving placarding requirements on vehicles transporting radioactive materials to characterize in a more definitive manner the nature of the materials being transported.

6. *"Sixth, traffic control requirements related to degree of hazard"*

It is conceivable that there may be a limited number of shipments of radioactive material which present such a high degree of potential hazard under accident conditions and dispersal from the container that special restrictions on traffic control would be warranted. It would appear that each such shipment will have to be considered on its own merits as to what appropriate restrictions might apply.

7. *"Seventh, inspection and enforcement measures related to degree of hazard"*

Regulatory agencies and shippers alike should give careful consideration to the design and approval of containers for shipment of large quantities of radioactive materials. In the case of containers for shipping irradiated fuel elements, the AEC requires under its proposed regulation 10 CFR 72, that the applicant submit detailed information relating to criticality control, heat transfer, structural integrity, including the ability of the cask to maintain its integrity under accident conditions, fire resistance, including the ability of the cask to withstand a standard 1-hour fire as designed by the National Fire Protection Associations and tests which the applicant will perform prior to shipment to demonstrate that the cask meets the criteria established in the regulation. Sufficient on-the-spot inspections of containers should be made by the responsible regulatory agencies to provide reasonable assurance that regulations and license conditions are, in fact, complied with. However, if comprehensive standards on container design are published by the regulatory agencies, shippers are responsible for meeting such standards and inspection of every shipment by the agency would not appear to be practical or necessary.

8. *"Eighth, adequate training for toll facility personnel in handling radioactive shipment traffic, and cooperative postincident or postaccident cleanup arrangements"*

It is desirable that toll facility personnel be oriented and trained with respect to—

1. Capability to determine that individual shipments of radioactive material are in accordance with the regulations and procedures of the toll facility; and
2. Immediate action to be taken in the event of an accident to protect the safety of the public until assistance arrives.

The AEC has in existence a radiological assistance plan which can be called on to give emergency assistance in the event of an accident involving radioactive materials. We would recommend that selected supervisors receive training about the procedures to be used in calling out the radiological assistance teams, and in addition be trained in measures which should be taken prior to the arrival of the team. We have training and educational materials available that can be furnished to the toll facilities depending, of course, upon the type of assistance desired.

[Reprinted in 26 Federal Register, 8982, Sept. 23, 1961]

ATOMIC ENERGY COMMISSION

[10 CFR Part 72]

PROTECTION AGAINST RADIATION IN THE SHIPMENT OF IRRADIATED FUEL ELEMENTS

Notice of Proposed Rule Making

Statement of considerations.—The following proposed regulation is designed to assure that appropriate precautions are taken in connection with shipments of irradiated fuel elements to protect against accidental criticality, radiation exposure of individuals and release of fission products. Requirements to protect against hazards in the shipment of unirradiated special nuclear material and other requirements relevant to the shipment of special nuclear material are prescribed in other parts of the Commission's regulations and in regulations of other agencies having jurisdiction over means of transportation. This proposed regulation would govern persons subject to licensing under Part 70 of the Commission's regulations (10 CFR Part 70).

The increased number of both domestic and foreign reactors, and the fact that a number of licensed reactors will soon be due for refueling, have created a need for criteria for irradiated fuel element cask design and shipping procedures which will be acceptable from a radiological and nuclear safety standpoint. The proposed regulation has been written to provide cask manufacturers, reactor licensees and other persons interested in the transportation of irradiated fuel elements with criteria to meet this need.

In March 1960, the Commission issued for public comment a proposed regulation to establish general criteria for the design of shipping containers, and to establish shipping requirements to protect against accidental criticality and radiation exposure in the shipment of irradiated fuel elements. Many comments and suggestions have been received in response to the notice of proposed rule making. In addition, conferences were held with members of the industry concerned with the shipment of irradiated fuel elements and with a Task Group of the American Standards Association working on this problem. The comments received and information developed in the conferences have been taken into consideration in preparation of the proposed regulation set forth below. In formulating this proposed regulation, the AEC also had the assistance of AEC prime contractors and the Interagency Committee on the Transportation of Radioactive Materials, which consists of representatives of the Interstate Commerce Commission, Bureau of Explosives, Federal Aviation Agency, Coast Guard, Post Office Department and the AEC.

In accordance with this proposed regulation, a license may be issued under Part 30 and Part 70 to any person to carry out any of the three operations involved in the transportation of irradiated fuel elements: Loading of the fuel elements into the cask transportation of the loaded cask, and unloading of the fuel elements from the cask. The license may authorize these operations in connection with irradiated fuel elements used by the licensee or as a service to another licensee. Once approval of a cask design and procedures has been obtained, a licensee may make an unlimited number of shipments, using casks of the same design, subject to the provisions of the Commission's regulations and to the conditions and limitations of his license.

The proposed regulation specifies the information which an applicant must submit in an application for a license. This includes the applicant's evaluation of the adequacy of the cask to protect the public health and safety from hazards relating to criticality, heat transfer, radiation shielding, structural integrity, and control of contamination.

The criteria in the proposed regulation deal with the design of the cask and procedures for packaging and shipping of the irradiated fuel elements. The methods of mounting casks on vehicles or vessels and operation of those vehicles or vessels are not covered in this regulation.

Pursuant to the exemption in Part 70, § 70.12 (10 CFR Part 70), carriers and warehousemen are exempt from special nuclear material licensing requirements, and hence from the requirements of 10 CFR Part 72, to the extent that they transport or store irradiated fuel elements in the regular course of carriage for another or storage incident thereto. Whether a special nuclear material licensee transports irradiated fuel elements in his own vehicle or delivers them to a carrier for shipment, he must meet the packaging requirements outlined.

The criteria specified in the proposed regulation involve complex technical considerations in such areas as criticality, heat transfer and structural integrity. In some areas, particularly structural integrity, adequate technical information is not available to provide completely satisfactory answers to many of the problems encountered. For example, reliable methods of predicting the extent of plastic deformation of some of the metals used in fabricating casks, as well as the forces developed as a function of angle of impact, are not at present available.

The proposed regulation is based on the assumption that there is a reasonable assurance that a cask designed and constructed in accordance with the specifications in the regulation will withstand extreme conditions of transportation to which any shipment is likely to be exposed. The extreme conditions assumed are:

(1) A 15-foot free fall on a large flat unyielding surface with the cask so oriented that it lands on any side. A force of 60 times the weight of the loaded cask applied for not less than 16 milliseconds is considered equivalent to that condition.

(2) A puncture type of accident in which a force of 30 times the weight of the cask applied for not less than 16 milliseconds on a 6-inch-diameter area of any side of the cask is followed by a fire.

(3) Exposure to a standard 1-hour fire.

(4) Submersion in water.

The crash shield (if one is used) must retain and protect the cask under a single impact of the magnitude assumed in Item (1) above. Subsequent impacts, such as from rolling down an embankment, are assumed to be of lesser magnitude. In either case, provision should be made to prevent the possibility of displacement of the lid.

Some of the principal differences between the proposed regulation set forth below and the original proposed regulation published in March 1960, are summarized in the folowing paragraphs:

In § 72.3 *License requirements*, the proposed revision of Part 72 applies only to shipments of fuel elements containing 2000 curies or more of total radioactivity. The original proposed regulation would have been applicable to the shipment of any irradiated fuel element.

In § 72.4 *Definitions*, definitions already provided in Part 30 and Part 70 have not been restated, but are incorporated by reference. The definitions of "carrier" and "cask" have been revised, and definitions of "criticality", "decay heat", "neutron poison", and "primary coolant", added.

In § 72.21 *Contents of applications*, in support of an application, the applicant must submit his evaluation of the ability of the cask to provide safety from accidental criticality, heat transfer, loss of radioactive material, radiation shielding and structural integrity under conditions likely to be encountered in transport.

A new § 72.31 *Radiation protection* is added and specifies general performance criteria to be met in packaging irradiated fuel elements.

In § 72.32 *Structural integrity*, the original proposed regulation specified that a cask be able to withstand a 30-foot drop into a solid object and, assuming that the cask fell on a cover edge, that it contain the radioactive material and that the cask and cover remain intact. As a result of comments and further discussions with stress analysis experts, it has been determined that sufficient information is not available on plastic deformation of the various materials used in cask construction and the variation of the impact forces as a function of angle of impact under dynamic loading conditions to design a cask in such a way as to predict with confidence that it would meet the 30-foot drop test. It was also noted that the meaning of "a solid object" under such an impact was uncertain. The structural integrity requirements have been rewritten to specify forces, both static and dynamic, which a cask must be able to withstand. Within certain limitations, a cask may now be designed with the available technical information on stress analysis to demonstate theoretically that the specified conditions have been met. The objective of the structural integrity requirements is to provide reasonable assurance that a cask will retain the fuel elements in the event of a serious accident. The magnitude and duration of the impact force of 60 times the weight of the cask and contents is based on a 15-foot free fall with a three (3) inch deformation and an assumption of uniform yield. The deformation of the cask must be limited in such a manner that external radiation levels will not exceed 1 rem per hour. A liquid or gaseous coolant would in all probability be lost in the event of a severe accident. However, the amount of the shipment is limited so

that in case of an accident causing loss of all liquid or gaseous coolant and failure of mechanical cooling devices, there would be only a limited release of radioactive material.

Information based on actual drop tests of containers is highly desirable in formulating structural integrity requirements, and the AEC is proceeding to obtain such data. The results of such tests may provide a basis for further revision of the proposed regulation.

Use of mechanical cooling devices, and shipment under pressure up to 50 pounds per square inch gauge, are permitted under this proposed regulation. These techniques provide additional carrying capacity as a result of improved heat transfer characteristics.

A new § 72.33 *Internal structural components* is added and specifies structural requirements for fuel element holders and neutron poisons which are purposely built into the cask. The object is to prevent mechanical damage to fuel elements and release of radioactive material into the cask coolant and to assure that, if essential to the control of criticality, the geometry of fuel elements does not change and neutron poisons do not lose efficiency because of damage or change of position.

A new §72.34 *Exterior and attachments* is added and specifies puncture resistance of the external surface of the cask. This surface provides protection of the cask from penetration by flying objects or impalement of the cask on a protruding object such as a bridge girder or railroad rail. The strength of this surface adds to the assurance that the cask will remain intact in the event of an accident. Requirements have been added with respect to exposure to a standard 1-hour fire to assure that the cask maintains its shielding efficiency, and with respect to the strength of hooks, handles, trunnions or other external appurtenances which might be used to handle a cask. It is also provided that a lifting device on the lid of the cask, which is intended only for lifting the lid, must be covered during transit in order to prevent its use for lifting the entire cask.

It is required that in the case of pressurized shipments, a cask must be equipped with a pressure relief device in order to prevent the pressure from exceeding 75 percent of the design pressure. The cask vent or the pressure relief device must be equipped with appropriate filters to prevent the loss of particulate radioactive material and, under certain conditions, the loss of radioiodine.

The cask must be provided with a flash arrester or appropriate measures taken to prevent an explosive mixture of gases from accumulating.

In §72.35 *Shielding*, the external radiation levels are the same as those originally published in the proposed rule. Requirements have been added that the shielding be supported in the cask so that it cannot change position during normal transport and, in case of accident, will not cause an excessively high external radiation level. External pipes and attachments which might contain radioactivity during shipment must be shielded.

A new § 72.36 *Materials and methods of cask construction* is added and specifies performance requirements for materials and techniques used in construction of the cask.

In § 72.37 *Standards for control of criticality*, an alternative criterin has been added which provides that the effective neutron multiplication constant (keff) shall not exceed 0.9 under specified conditions.

Neutron interaction between casks or shipments of special nuclear material must be taken into consideration in the design of the cask and in establishing the limits for the contents. The shipper will know the contents of other casks or the kind and amount of material at the point of origin of the shipment or which he will place on the same vehicle with any particular cask and, he can therefor evaluate possible interaction with that material. However, there may be other shipments at points of trans-shipment or on the same vehicle and shipments on other vehicles, the contents of which he cannot be expected to know. For other shipments at intermediate points or on the same vehicle, the applicant must consider possible effects of interaction with his shipment and in some cases take positive action to control the interaction between shipments or to insure that other shipments are maintained at a safe distance. Because of the factors of safety inherent in the assumptions on which the safety of a shipment of irradiated fuel elements is based in this regulation, the contribution due to neutron interaction between a shipment made under this regulation on one vehicle and any shipment of special nuclear material on a separate vehicle is considered to be insignificant and need not be further evaluated by the applicant.

Section 72.38 *Heat removal* has been completely revised. The original proposed regulation required that the fuel elements should not reach a temperature greater than 180° F. below the melting point in the event of loss of coolant. This original requirement did not adequately protect against the loss of fission products resulting from rupture of some types of fuel elements at temperatures below the melting points of the elements, nor did it provide appropriate criteria for ceramic-type fuel elements. The present proposed regulation meets these deficiencies.

The present requirements specify maximum temperatures which any fuel element may reach during normal and emergency shipping conditions in terms of the failure temperatures of the type of fuel element. The failure temperature may be determined by actual operating experience in a reactor or may be calculated from reliable experimental data. The intent of the requirements is to provide reasonable assurance that during normal transport, fission products are not released from the fuel elements into the cask in excessive quantities and that under emergency conditions which may cause loss of gaseous or liquid coolant and failure of mechanical cooling devices, the release of fission products as a result of elevated temperatures will be limited to specified quantities. In no case may the fuel elements reach a temperature as high as the melting point of the fuel or cladding.

To determine the maximum temperature of any fuel element in the fuel element holder, the temperature gradient across the fuel element holder must be established by calculation or experiment for both normal and emergency shipping conditions. Wherever possible, a mockup of this arrangement should be used to justify the assumptions made in any design.

When the amount of decay heat generated in the fuel elements and the transfer of heat to the surface of the fuel element holder has been established, the transfer of heat to the inner cask wall and subsequent transfer and dissipation of that heat by the cask must be established. To verify the assumptions made in the design of the cask in regard to bonding of various components and the heat dissipating properties of the external surface of the cask, operating characteristics of the cask as they relate to the original design must be established prior to initial use of the cask. Wherever possible, it is preferable to verify the effectiveness of the over-all cask design with fuel element loading in place. Under § 72.44, the calculated heat transfer characteristics of each cask must be verified by experiment or by a thorough check of the initial loading of the cask, both as to internal and external temperatures. After the temperature gradients across the cask are established, the internal temperature can usually be determined indirectly, under normal circumstances, by measuring the temperature of the outer wall. In addition, where it is possible during the initial loading of the cask to carry out such an experiment without serious risk, it is desirable to simulate emergency conditions by draining the primary coolant, if it is a liquid, and determining both internal and external temperatures of the cask. The temperature of any surface of the cask which may be in contact with any part of a vehicle in land transport must not exceed 350° F. This temperature, which is well below the self-ignition point for wood shavings, will prevent charring of wood structures of vehicles.

The original proposed regulation required that casks operate at atmospheric pressure. The present proposed regulation allows pressurization of casks to a maximum of 50 pounds per square inch gauge or 50 percent of the design pressure, whichever is lower. Each cask must be designed for 20 pounds per square inch gauge pressure and tested for leaktightness at no less than 5 pounds per square inch gauge pressure. As a result of this leaktightness gases released from casks should be released only through the filter required in the vent or pressure relief device. Shipping the cask under pressure with a pressure relief device will help prevent loss of the coolant should the cask be overturned and will also help in the retention of fission gases which may be released into the cask during transport. The advantages of pressurized casks include the ability to increase substantially the number of fuel elements which may be shipped in one cask because of the increased heat transfer efficiency of the cask at a slight pressure and somewhat elevated temperatures. The disadvantage of a pressurized cask is that, in the event of loss of pressure, some of the coolant may be lost from the cask by ejection and by evaporation if the cask reaches a temperature greater than the boiling point of the coolant. However, experience indicates that pressure systems can be fabricated with a high degree of reliability. Under the criteria specified in the proposed regulation, even if the cask loses all of its

coolant the heat transfer characteristics must be such that there will not be a substantial release of fission products.

Other new §§ 72.41 to 72.46 are added and deal with the canning of ruptured fuel elements and specify tests to be carried out on each new cask, prior to each shipment, and in case of accident.

The labeling requirement in the original proposed regulation has been eliminated in view of the existing requirements for marking and labeling of the Interstate Commerce Commission.

Notice is hereby given that adoption of the following rule is contemplated. All interested persons who desire to submit written comments and suggestions for consideration in connection with the proposed rules should send them in triplicate to the Secretary, U.S. Atomic Energy Commission, Washington 25, D.C. within 90 days after publication of this notice in the FEDERAL REGISTER. Pending adoption of the proposed regulation as an effective regulation the Commission will apply the criteria in the proposed rule in its review of applications for license to transport solid irradiated fuel elements.

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APPENDIX A—STANDARD ONE-HOUR FIRE

AUTHORITY: §§ 72.1 to 72.71 issued under secs. 53 and 161; 68 Stat. 930 and 948, as amended; 42 U.S.C. 2073 and 2201.

GENERAL PROVISIONS

§ 72.1 Purpose.

This part (Part 72) establishes procedures and criteria for obtaining Atomic Energy Commission approval of cask designs and procedures for the shipping of irradiated solid nuclear reactor fuels and certain requirements for such shipments. The criteria include safeguards against accidental conditions of criticality, overheating of the cask, meltdown of fuel elements, release of fission products or special nuclear material, and excessive exposure of individuals to

radiation. Requirements to protect against hazards in the shipment of unirradiated special nuclear materials are prescribed by other parts of this chapter. Special nuclear material shipments are also subject to the regulations of other agencies having jurisdiction over means of transportation. Accordingly, the requirements of this part are in addition to and not in substitution for other requirements.

§ 72.2 Scope.

This part applies to all persons licensed pursuant to Part 70 of this chapter to receive, possess, use or transfer special nuclear material in the form of solid irradiated fuel elements. Shipment of nuclear fuel in other than solid form is beyond the scope of this part. Shipment by air is not authorized by this part.

§ 72.3 Requirements for shipment of irradiated fuel elements.

No licensee shall receive, transport or deliver to a carrier for transportation any irradiated fuel element outside the confines of his plant or other authorized location if the total amount of radioactivity in a single cask is in excess of 2,000 curies, unless the cask and procedures used have been approved by the Commission. Approval will be granted by the issuance of a license or an amendment to a license under Part 30 and Part 70 of this chapter.

§ 72.4 Definitions.

As used in this part:

(a) "Carrier" means a person who is exempted by Section 70.12 from the regulations in Part 70 of this chapter;

(b) "Cask" means a container in which irradiated fuel elements are transported. A cask may consist of an inner container or receptacle immediately surrounding one or more fuel elements and an outer container which may include shielding, arrangements for cooling, and auxiliary equipment. An inner and outer container may constitute a single structural unit. An external structure may enclose or be attached to the cask for the purpose of absorbing mechanical shock, controlling access, or providing space for cooling;

(c) "Commission" means the Atomic Energy Commission or its duly authorized representatives;

(d) "Criticality" means the state in which the effective neutron multiplication constant (keff) of an array of special nuclear material equals or exceeds unity, so that a nuclear chain reaction occurs;

(e) "Decay heat" means heat caused by radioactive decay;

(f) "Neutron poison" means a substance which effectively absorbs neutrons;

(g) "Primary coolant" means a gas, liquid or solid, or combination of them, in contact with one or more fuel elements or the interior of a cask and used to dissipate heat.

Terms defined in Part 30 and Part 70 have the same meanings when used in this part.

§ 72.5 Communications.

All communications concerning the regulations in this part, and applications filed under them, should be addressed to the Atomic Energy Commission, Washington 25, D.C., Attention: Director, Division of Licensing and Regulations.

§ 72.6 Interpretations.

Except as specifically authorized by the Commission in writing, no interpretation of the meaning of the regulations in this part by any officer or employee of the Commission other than a written interpretation by the General Counsel will be recognized to be binding upon the Commission.

§ 72.7 Specific exemptions.

The Commission may, upon application of any interested person, or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.

§ 72.8 Additional requirements.

The Commission may, by rule, regulation, or order impose upon any licensee such requirements, in addition to those established in the regulations in this part, as it deems appropriate or necessary to protect health or to minimize danger to life or property.

§ 72.9 Casks now in use.

Any cask which has been approved by the Commission for transportation of irradiated fuel elements prior to the effective date of this part may be used for that purpose until the Commission shall have acted upon an application for a license authorizing its use pursuant to this part. *Provided*, That (a) an application is submitted to the Commission within 90 days of the effective date of this part, and (b) each shipment is made in compliance with all of the provisions of this part except §§ 72.31 to 72.36 and in substantial compliance with the provisions of §§ 72.37 and 72.38.

LICENSE APPLICATIONS

§ 72.21 Contents of applications.

An application for a license or for amendment of a license to receive, possess, use or transfer special nuclear material under the authority of Part 70 of this chapter, may request approval of one or more proposed methods of transporting irradiated fuel elements. The application shall be organized and presented in accordance with the requirements of this section and shall include:

(a) The applicant's evaluation of the adequacy of the cask and procedures to protect the public health and safety against ionizing radiation and the release of radioactive substances, including:

(1) Structural integrity of the cask, including an analysis of the design in accordance with the application provisions of §§ 72.32, 72.33, and 72.34;

(2) Resistance of the cask to fire, including an anlysis in accordance with the provisions of § 72.31 and paragraph (b) of § 72.34;

(3) Shielding against ionizing radiation, including an analysis in accordance with the provisions of § 72.35;

(4) Prevention of the occurrence of criticality, taking into account the possibility of accidents including flood, fire and change of configuration, in accordance with the provisions of § 72.37;

(5) Removal of decay heat, in accordance with the provisions of § 72.38;

(6) Adequacy of available equipment and facilities to handle the cask at all planned loading, transfer and unloading sites.

(b) Supporting information as to the design and construction of the cask, including:

(1) Information and engineering drawings describing the cask, a description of the fuel elements proposed to be transported in it, with experimental information, calculations and references to published information;

(2) Testing program to confirm the structural integrity of the cask and its leaktightness, and test results;

(3) Characteristics of fuel element holders, coolant, valves, sampling ports, handling devices, and other features of the cask;

(4) Shielding against the transmission of radiation from the cask, including the composition, structure, means of attachment, and other characteristics, with experimental information, calculations and references to published information;

(5) Devices designed to protect against accidental conditions of criticality during all loading, transport and unloading of the fuel elements and the cask;

(6) Structural, mechanical and other means of tranfer, dissipation and removal of decay heat, with experimental information, calculations and reference to published information.

(c) Supporting information as to proposed handling and shipping procedures, including:

(1) Type, maximum number, physical state, chemical composition, irradiation history and decay history of fuel elements to be transported, and maximum radiation levels and maximum decay heat anticipated at any time during loading, transport and unloading;

(2) Procedures for loading fuel elements into the cask and unloading fuel elements from the cask, stating gross weights, methods for control of criticality, and methods of control of exposures of personnel to radiation, maximum anticipated coolant pressures in all portions of the cask cavity, and methods of measuring and relieving coolant pressures;

(3) Mode of transport, general route, including destination and any transfer points, anticipated solar heat load, maximum predicted temperature of the fuel elements and the exterior surface of the cask during transport, and methods of handling the cask, including any special handling and emergency precautions;

(4) In the event that any ruptured or damaged fuel element is to be shipped,

a description and evaluation of the adequancy of the proposed method of interior containment, with supporting information as to methods of handling and special precautions;

(5) Procedures for measuring:

(i) Temperatures of the internal and external surfaces of the cask;

(ii) Levels of radioactivity of the coolant and of the external surfaces of the cask;

(iii) Radiation levels outside of the cask.

(6) Procedures for testing the loaded cask for leaktightness;

(7) Procedures for confirming the presence and effectiveness of neutron poisons.

§ 72.22 Elimination of repetition.

An application may incorporate by clear and specific reference any information in previous applications, statements or reports filed with the Division of Licensing and Regulation of the Commission.

PACKAGING

General packaging-requirements

§ 72.31 Radiation protection.

(a) Any irradiated fuel elements to be transported shall be contained in a cask which is leaktight within the limits prescribed by paragraph (c) of § 72.45, and is securely closed by a positive fastening device which cannot be opened unintentionally or by any predictable internal pressure.

(b) The cask shall constitute a shield, or shall be enclosed in a shield, adequate to reduce external radiation levels within the limits prescribed by paragraph (a) of §72.35.

(c) The cask and shield shall be adequate to prevent reduction of effectiveness of shielding which would permit radiation levels in excess of the limits prescribed by paragraph (b) of § 72.35 or loss of radioactive materials, as a result of the action of the standard one-hour fire (see Appendix A), water, and the application to the cask of the forces described in §§ 72.32 and 72.34; corrosion of the cask and attached devices by the contents; changes in temperature and pressure; contamination of the surfaces of the cask and shield; and explosive or other effects of gasses which may be generated by radiolytic, chemical or other processes.

(d) The construction of the cask, including internal fuel supporting structures and neutron poisons, shall be such that criticality cannot be attained under the normal conditions of transport or the conditions described in paragraph (c) of § 72.31.

(e) The cask shall be so constructed that decay heat will not, under normal conditions, significantly impair its effectiveness as a shield or container either through melting of the shielding or cracking of the cask, cause any internal fuel container to melt, or alter the form or nature of the fuel.

CONSTRUCTION DETAILS OF THE CASK

§ 72.32 Structural integrity.

(a) The cask, regarded as a simple beam supported at its ends along the major axis, shall be capable of withstanding a static load, normal to the major axis, uniformly distributed along the major axis, and equal to 10 times the weight of the cask when fully loaded, without exceeding the ultimate strength of the cask, considered as a whole.

(b) The cask, either alone or in combination with any shock absorbing structure securely fastened to it, shall be capable of withstanding an impact force in a direction normal to any side, including the top or bottom, caused by a free fall of the loaded cask through a distance of 15 feet upon an unyielding horizontal flat surface, without either:

(1) Exceeding the ultimate strength of any structural portion of the cask, or

(2) Deforming the cask to an extent which would permit the escape of fuel elements or portions of them or permit the level of external radiation to exceed 1 roentgen per hour at any point one meter from any accessible surface of the cask.

A force equal to 60 times the weight of the loaded cask and lasting not less than 16 milliseconds may be deemed equal to the impact force described in this paragraph.

(c) The lid and the lid closing mechanism, including bolts, clamps and other positive fastening devices, shall be capable of withstanding a force in any direction of at least 60 times the weight of the lid and the contents of the cask and, if the lid projects above the body of the cask, at least 15 times the weight of the loaded cask, without stress at any point exceeding the ultimate strength of the material. The duration of the applied force shall be assumed to be not less than 16 milliseconds.

(d) The cask shall be capable of withstanding a design pressure equal to an internal gauge pressure of not less than 20 pounds per square inch or twice the operating pressure, whichever is greater, with stresses which do not exceed the yield strength of the material of which the cask is composed.

§ 72.33 Internal structural components

(a) Fuel element holders shall be adequate to protect fuel elements from mechanical damage under normal conditions of transport, and to avoid criticality when the cask is subjected to the forces described in § 72.32 if preservation of the geometry of the fuel elements is necessary for that purpose.

(b) Neutron poisons shall be so constructed and installed that application to the cask of the forces described in § 72.32 will not result in loss of efficiency and so that built-in neutron poisons will remain present and effective at all times.

(c) Any internal container for one or more fuel elements shall be leaktight and shall be so constructed that the maximum stress in the material of the container will not exceed the yield strength under normal conditions of transport.

§ 72.34 Exterior and attachments

(a) Every exterior surface of the cask shall be capable of withstanding a force equal to 30 times the weight of the loaded cask, applied normal to that surface and over any circular area 6 inches in diameter, without exceeding the ultimate strength of the material of which the exterior surface is constructed. The duration of the applied force shall be assumed to be not less than 16 milliseconds. An exterior surface of steel with a total thickness equal to or greater than that indicated below satisfies the requirements of this paragraph.

Loaded cask weight (in pounds):	*Thickness of steel (in inches)*
5,000 to 20,000	3/8
20,000 to 30,000	1/2
30,000 to 40,000	5/8
40,000 to 55,000	3/4
55,000 to 70,000	7/8
70,000 to 90,000	1
90,000 to 120,000	1 1/8
120,000 and above	To be determined on specific application.

(b) Uranium or any substance having a melting point lower than 1000° F. used as shielding shall be completely encased in welded mild steel or other material having a melting point higher than 1000° F., having all joints welded and having a minimum wall thickness of 1/8 inch for not more than 6 inches of shielding thickness or 1/4 inch for more than 6 inches of shielding thickness. If shielding material has a melting point lower than 1000° F., provision shall be made for assuring, by deformation of the container walls or controlled voids in the shell or similar means, that the welded shell will not rupture if the cask is exposed to a standard one-hour fire as defined in Appendix A to this part. The use of fusible plugs or discs or other types of vents in order to avoid rupture of the welded shell is prohibited if such use could result in loss of shielding to such an extent that the level of radiation could exceed 1 roentgen per hour at a distance of 1 meter from the accessible surface of the cask.

(c) The cask shall be provided with adequate hooks, handles, trunnions, skids, base plate, or other devices which will permit adequate tie down and support during transport and facilitate normal handling.

(d) Any device which is attached to the cask and which is designed or could be employed to tie the cask down during transport shall be sufficient to withstand a static force having a vertical component of 2 times the weight of the loaded cask and a horizontal component of 10 times the weight of the loaded cask without exceeding the yield strength of the materials in the device.

(e) Any device which is attached to the cask and which is designed to lift the cask shall be capable of lifting 6 times the weight of the loaded cask without exceeding the yield strength of the materials in the device.

(f) Any device which is attached to the cask and which is designed to lift the lid shall be capable of lifting 6 times the combined weights of the lid and contents of the cask without exceeding the yield strength of the materials in the device. If the device is attached to the lid during transport, it shall be securely covered during transport unless it complies with paragraph (e) of this section.

(g) The cask shall be capable withstanding vibration incident to shipment without impairing the integrity of the closure or of the cask itself.

(h) Means shall be provided for applying a seal so that the lid cannot be opened without destroying the seal.

(i) Means shall be provided for measurement, either directly or indirectly, of the internal cask wall temperature at any time.

(j) Valves, piping, expansion tanks and other external functional parts of the cask shall be protected from mechanical damage to be anticipated during normal handling and transport. Any such part projecting beyond the contour of the body of the cask or the lid shall be so constructed or protected that mechanical damage will not cause loss of shielding which would permit the level of radiation to exceed 1 roentgen per hour at any point one meter from the accessible surface of the cask.

(k) Any valve, other than pressure relief devices, through which primary coolant could leak during transport to such an extent that the level of radiation could exceed 1 roentgen per hour at a distance of one meter shall be protected by a sealed, gasketed or welded closure adequate to retain leakage and shielding sufficient to reduce radiation to that level. A means shall be provided for detecting and safely removing coolant which may leak through any such valve.

(l) Any valve through which primary coolant can flow shall be provided with a lock, which shall be locked during transport.

(m) Any cask in which the operating pressure exceeds atmospheric pressure during transport shall be equipped with a pressure relief device which will prevent exceeding 75 percent of the design pressure prescribed by paragraph (d) of § 72.32.

(n) Each cask vent or pressure relief device shall be equipped with a filter capable of removing at least 99.9 percent of particles greater than 0.3 micron in size, and of sufficient capacity for the maximum rate of discharge of the vent or device. The filter shall be protected against impairment of efficiency by mechanical shock or absorption of moisture.

(o) When the total amount of iodine 131 which will be released from the fuel element under the conditions specified in paragraph (b) of § 72.38 exceeds 10 curies or the amount of iodine 129 which will be released under those conditions exceeds 1 curie, the pressure relief system shall be equipped with an iodine gas removal device having a removal efficiency and retention capacity in the anticipated temperature range adequate to reduce the total iodine which may be released from the cask to those quantities.

(p) In any case in which an explosive mixture of gases or of gas and vapor may accumulate within the cask, provision shall be made to prevent explosion by equipping the cask with a flash arrester, prepurging void spaces with inert gas, adding an appropriate catalytic recombiner, or assuring that the maximum temperature of the fuel will remain under all circumstances, including loss of all liquid or gaseous coolant and with all mechanical cooling devices being inoperative, at least 200° F. below the ignition temperature of the explosive mixture.

(q) Means shall be provided, either by a sampling port or pipe connection or otherwise, for obtaining samples of gas or liquid coolant in the cask while the lid is in place and the cask is in the vehicle or vessel.

(r) Means shall be provided for safely equalizing the internal pressure of the cask with the pressure of the atmosphere.

(s) The pressure relief system shall have sufficient capacity to avoid a pressure surge exceeding the design pressure of the cask in the event of steam generation resulting from the introduction of water after loss of gas or liquid coolant.

(t) Pipe connections shall be provided capable of removing substantially all liquid from the interior of the cask while the lid is in place.

(u) Any piping passing through lead shielding shall be so installed that damage will not result from settling or deformation of the lead during handling and transport.

(v) Provisions shall be made to prevent freezing in the cask or its attachments of any liquid normally present or resulting from condensation, unless freezing of the liquid will not impair the efficiency of the cask or damage the cask or its contents.

§ 72.35 Shielding.

(a) The external radiation level shall not exceed 200 milliroentgens per hour at the accessible surface of the cask or of the external structure, if used, or 10 milliroentgens per hour at a distance of 1 meter from the accessible surface of the cask or the external structure, except that when transport of a single cask has the exclusive use of a freight car or other vehicle the radiation level shall not exceed 200 milliroentgens per hour at the accessible surface of the cask or 10 milliroentgens per hour at a distance of 3 meters from such surface.

(b) The shield shall be so constructed that in the event of the escape of all substances which are liquid at ordinary temperatures, and in the event of loss of all external shielding which is not an integral part of the cask, radiation levels will not exceed 1 roentgen per hour at a distance of 1 meter from the accessible surface of the cask. Shielding provided by any solid coolant may be taken into account in determining compliance with this paragraph only if that coolant will remain in the cask in the event of any accident.

(c) Shielding shall prevent beaming of radiation to the exterior of the cask, and shall be free of voids other than controlled voids designed to contain shielding in the event of melting.

(d) Shielding shall be supported in the cask so that it cannot change position or configuration under normal conditions of transport. The inner shell of the cask shall be supported so that it will not be displaced if the shielding should melt.

(e) Any pipes or other attachments which might contain radioactivity during shipment shall be shielded in accordance with paragraph (a) of this section, taking into account the possibility of flow of liquid primary coolant as a result of thermal expansion or the release of radioactive gas from fuel elements.

§ 72.36 Materials and methods of cask construction.

(a) Materials of which the cask and any components or internal structures are constructed shall be such that there is no significant chemical, galvanic, or other reaction between them or with fuel elements.

(b) There shall be no pockets or crevices on the external surfaces of the cask which will not drain free, or which are not easily accessible for decontamination.

(c) All external and internal exposed surfaces of the cask shall be free of pits, cracks or porosity from which contamination is not readily removable.

(d) All welding and brazing of the cask shall be performed in a workmanlike manner and free of significant defects, and shall provide a mechanical joint efficiency of not less than 85 percent. The melting point of any brazing material shall not be lower than 1000° F.

(e) Any hole drilled in the body of the cask and extending into low melting point shielding material shall terminate within a boss pad welded to the shell of the cask body through which the hole penetrates, unless loss of shielding material through the hole cannot occur.

CRITICALITY AND HEAT REMOVAL

§ 72.37 Standards for control of criticality.

(a) The transportation of irradiated fuel elements will be permitted only if either:

(1) The number of fuel elements in a single cask does not exceed 75 percent of the number required to attain criticality under the conditions specified in paragraph (b) of this section, or

(2) The effective neutron multiplication constant k_{eff}, does not exceed 0.9 under the same conditions.

(b) In determining whether either of the conditions specified in paragraph (a) of this section exists, the following assumptions shall be made:

(1) Water is in and around the cask in such quantities and so distributed as to cause maximum reactivity. If more than trace quantities of beryllium, graphite or heavy water are present then further evaluation is required.

(2) If reactivity decreases with irradiation, the fuel elements are unirradiated. If reactivity increases with irradiation, the fuel elements are irradiated to the condition of maximum reactivity.

(3) Fuel elements are in the most reactive array, unless the proposed spacing will assure less than maximum reactivity and the fuel elements cannot be rearranged into a more reactive array.

(4) Structural materials, including spacers, cask components, and neutron poisons intentionally built into cask components or fuel elements may be considered if their effectiveness as neutron poisons cannot be reduced by application to the cask of the forces described in § 72.32, by melting of the fuel or neutron poison, or by other cause under normal conditions of transport or in the event of accident.

(c) Each cask and each shipment, whether including one or more casks, shall be so constituted as to avoid criticality resulting from neutron interaction between casks or other shipments of special nuclear material on the vehicle or at point of origin, trans-shipment or delivery. Bracing and dunnage shall be adequate to prevent relative movement of each cask under normal conditions of transport.

§ 72.38 Heat removal.

(a) The cask shall be so constructed and loaded that under normal conditions of transport:

(1) The temperature of any easily accessible surface of the cask or of any external structure will not at any time exceed 180° F. The temperature of any surface which may be in contact with dunnage or any part of the vehicle or vessel shall not exceed 350° F. in land transport or 180° F. in water transport.

(2) Any coolant or cooling system meets the following conditions:

(i) Primary gaseous or liquid coolant is not circulated outside of the shielding of the cask.

(ii) Provision is made to prevent freezing of any liquid coolant under the most adverse weather conditions to be anticipated and with any proposed fuel loading. Any antifreeze is of a type which will not under such circumstances undergo chemical change which might impair the efficiency of the cooling system.

(iii) The temperature of any liquid primary coolant will remain at all times at least 20° F. below its boiling point at the anticipated operating pressure within the cask, under the conditions described in paragraph (b) of § 72.38.

(iv) Any primary coolant will not cause significant corrosion of the fuel element, fuel element cladding or any interior surface of the cask, or react with any components of fuel elements or cask with which it might come in contact.

(v) The gauge pressure of the primary coolant will not exceed 50 pounds per square inch or 50 percent of the design pressure, whichever is lower.

(vi) Each cask equipped with a mechanical cooling device is equipped with a standby cooling device of similar characteristics which operates automatically in the event of failure of performance of the first device, unless failure of performance of the first device will result neither in a rise in temperature exceeding 100° F. nor an increase of pressure beyond 75 percent of the design pressure.

(3) The maximum surface temperature of any fuel element will be no higher than the highest of the following:

(i) 300° F.;

(ii) The maximum temperature which the type of fuel element has maintained during at least 30 days of irradiation in an operating reactor, without failure of any portion of the fuel element, as measured directly or calculated from experimental data; or, if the type of fuel element has not been irradiated for at least 30 days, then the average temperature which the type of fuel element has maintained during the maximum period of irradiation and not less than two days;

(iii) 300° F. below the failure temperature of the type of fuel element, with due consideration for the irradiation and decay history of the fuel elements to be shipped in the cask.

(4) For the purposes of this paragraph, failure temperature shall be considered to be the minimum temperature at which initially sound fuel elements of the character and amount being considered as the cask load will, within 48 hours, release to the primary coolant 100 curies of beta-gamma radioactivity or one curie of alpha radioactivity. In no case may failure temperature be taken as higher than the melting point of the fuel or cladding, whichever is lower.

(b) The cask shall be so constructed and loaded that, in the event all liquid or gaseous coolant should be lost, and mechanical cooling devices have become inoperative, but solid coolants including granular solids remain in the cask, the maximum surface temperature of any fuel element will not exceed a temperature of 100° F. above the temperature specified in subdivision (iii) of paragraph (a) (3) of this section. Fuel element surface temperatures may exceed the melt-

ing point of the cask shielding material if melting of the shielding material will not occur.

(c) Computation of the temperature within the cask shall in every case assume ambient air at 100° F. without wind, with maximum solar-heat load anticipated for the proposed route and conditions of shipments and, in the circumstances described in paragraph (b) of this section, loss of any sun shade or enclosure which would intercept solar radiation.

SHIPPING PROCEDURES

§ 72.41 Ruptured fuel elements.

Prior to the transport of any fuel element having any break or defect in its cladding, the licensee shall completely enclose the fuel element in an internal container, unless the fuel element can be carried in the cask without significant reaction or contamination of the primary coolant in excess of one-tenth of the permissible limits prescribed in paragraph (d) of § 72.45.

§ 72.42 Defective casks.

The licensee shall not transport or cause to be transported irradiated fuel elements in any cask which the licensee knows or has reason to believe is defective in any respect having a potentially significant adverse effect on the efficiency of the cask.

TESTING OF CASKS

§ 72.43 Requirements for tests.

(a) No irradiated fuel elements shall be transported until the licensee has completed the tests described in §§ 72.44 and 72.45 and has determined that the loaded cask complies with the provisions of this part and the conditions of the license.

(b) No cask which has been involved in any accident or in which significant corrosion is suspected shall be employed for the transportation of irradiated fuel elements until the licensee has tested the cask and determined that it complies with the provisions of this part.

§ 72.44 Preliminary tests.

(a) Prior to the first use of any cask, the licensee shall experimentally verify the calculated heat transfer characteristics of the cask and any mechanical cooling device under normal conditions of transport.

(b) Prior to the first use of any cask, the licensee shall determine the effectiveness of the cask shielding and shall establish the absence of cracks, pinholes, uncontrolled voids or other defects.

§ 72.45 Routine and periodic tests.

(a) *External radiation levels.* Prior to each shipment of any cask, the licensee shall determine that the external radiation levels of the loaded cask comply with the provisions of paragraph (a) of § 72.35.

(b) *External contamination.* Prior to each shipment of any cask, the licensee shall survey representative parts of the surface of the loaded cask for external contamination by wiping an area of approximately 100 square centimeters with clean absorbent paper, applying moderate finger pressure, and measuring contamination on the paper through standard counting techniques for beta-gamma and alpha activity. Surface contamination so measured shall exceed neither 4,000 disintegrations per minute per 100 square centimeters of beta-gamma activity nor 500 disintegrations per minute per 100 square centimeters of alpha activity.

(c) *Pressure test.* Prior to each shipment, the licensee shall test the loaded cask with primary coolant in place for leaktightness using an internal pressure at least 50 percent higher than the maximum anticipated internal gauge pressure, and in any event not less than 5 pounds per square inch.

(d) *Activity of coolant.* If all or any part of the primary coolant is liquid or gas, the licensee shall take a representative sample of the coolant prior to each shipment. The sample shall not be taken until at least 4 hours after the fuel elements and the primary coolant have been placed in the cask. The licensee shall measure the activity of the sample and the following limits of activity shall not be exceeded :

Liquid coolant:
10^{-6} curies of beta or gamma activity per milliliter.
10^{-7} curies of alpha activity per milliliter.
Gas coolant:
10^{-7} curies of beta or gamma activity per milliliter.
10^{-10} curies of alpha activity per milliliter.

(e) *Neutron poisons.* The licensee shall perform periodic tests to establish that any built-in neutron poisons are present and effective in accordance with the approved cask design.

§ 72.46 Temperature and pressure.

(a) The licensee shall not transport or cause to be transported any cask containing irradiated fuel elements until the temperature of the cask and contents has reached equilibrium or until it has been determined that equilibrium conditions will comply with § 72.38.

(b) Prior to shipment, the licensee shall determine that the internal pressure of the cask will not exceed 50 pounds per square inch gauge or 50 percent of the design pressure, whichever is less, under normal conditions of transport.

NOTIFICATION, RECORDS AND INSPECTION

§ 72.51 Notification of AEC.

At least 20 days prior to the date each shipment is scheduled to be made, the licensee shall forward to the Director, Division of Licensing and Regulation. Washington 25, D.C., the following information concerning the intended shipment:

(*a*) Date of the proposed shipment, the proposed route, mode of transport, and destination.

(*b*) Type of cask and AEC license number under which the shipment is authorized.

(*c*) Description of the irradiated fuel to be carried, including the type of fuel element, irradition history and cooling time, estimated maximum fission product content and estimated maximum heat output.

(*d*) Any special conditions of shipment, such as any ruptured or leaking fuel elements, with special precautions to be taken.

§ 72.52 Records.

Each licensee shall keep the following records with respect to the irradiated fuel elements in the licensee's possession and shipments which the licensee has made:

(*a*) Identification of each fuel element and the amount of special nuclear material contained in each fuel element prior to use in a reactor.

(*b*) The irradiation history of each element.

(*c*) The time during which each element has cooled since its removal from the reactor.

(*d*) Details of any abnormal condition of any fuel element.

(*e*) Details of each shipment, including list of fuel elements, type and quantity of coolant, gross weight, shipping date, mode and general route of transport.

(*f*) Details and results of tests and observations made on each cask, including calculated and observed rates of heat generation and dissipation, coolant and cask temperatures and pressures, and radiation and contamination surveys.

§ 72.53 Inspection and tests.

(*a*) Each licensee shall afford to the Commission at all reasonable times opportunity to inspect irradiated fuel elements, casks, and the premises and facilities wherein irradiated fuel elements or casks are used, produced, tested, stored, or transported.

(*b*) Each licensee shall make available to the Commission for inspection all records required by this part.

(*c*) Each licensee shall perform, or permit the Commission to perform, such tests as the Commission deems appropriate or necessary for the administration of the regulations in this part.

ENFORCEMENT

§ 72.71 Violations.

An injunction or other court order may be obtained prohibiting any violation of any provision of the Act or any regulation or order issued thereunder. Any person who willfully violates any provision of the Act or any regulation or order issued thereunder may be guilty of a crime and, upon conviction, may be punished by fine or imprisonment or both, as provided by law.

APPENDIX A—STANDARD ONE-HOUR FIRE

The "standard one-hour fire" mentioned in this part assumes exposure for one hour to a fire in which the following temperatures are reached at various times after the beginning of the fire:

1000° F. after 5 minutes;
1300° F. after 10 minutes;
1550° F. after 30 minutes;
1700° F. after 1 hour.

NOTE: The standard fire is described in specifications of the National Fire Protection Association (NFPA, No. 251) and the American Society for Testing Materials (ASTM, Design E 119–59). Details of methods for testing by means of the standard fire may be found in the cited references.

Dated at Germantown, Md., this 18th day of September 1961.

For the Atomic Energy Commission.

WOODFORD B. MCCOOL,
Secretary.

[F.R. Doc. 61–9151; Filed, Sept. 22, 1961; 8:54 a.m.]

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D.C., April 13, 1962.

Hon. GLENN T. SEABORG,
Chairman,
U.S. Atomic Energy Commission,
Washington, D.C.

Dear DR. SEABORG: During the recent indemnity hearings, the Subcommittee on Research, Development, and Radiation received extensive testimony concerning insurance and indemnity problems arising out of the transportation of radioactive materials across toll roads, tunnels, and bridges.

At the conclusion of the testimony on this problem, I stated that I would expect a progress report from the Atomic Energy Commission within 60 days. This letter is to formally confirm that request.

We were gratified to learn that through the good offices of the Atomic Energy Commission some progress had been made in negotiations between the insurance industry and the tool authorities. It is my hope that the AEC will continue to encourage active negotiations between the parties. In addition, I believe that the AEC can play a very useful role in furnishing to the insurance industry and the toll authorities the essential information concerning the hazards of radioactive shipments which they require in order to pursue these negotiations successfully.

Your cooperation in this matter will be sincerely appreciated.

Sincerely yours,

MELVIN PRICE,
Chairman, Subcommittee on Research, Development, and Radiation.

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., June 22, 1962.

Hon. MELVIN PRICE,
Chairman, Subcommittee on Research, Development, and Radiation, Joint Committee on Atomic Energy, Congress of the United States.

DEAR MR. PRICE: This is in reply to your letter of April 13, 1962, requesting a progress report from the Commission within 60 days with respect to the insurance and indemnity problems arising out of the transportation of radioactive materials across toll roads, tunnels and bridges.

We are please to advise you that some progress has been made to solve both the third-party liability and first-party property insurance problems which were presented by the bridge, tunnel, and turnpike authorities to the Subcommittee

on Research, Development, and Radiation during the recent indemnity hearings.

In connection with third-party liability insurance, a number of suggestions for amending the NELIA and MAELU policies either have been adopted or are under consideration by the NELIA and MAELU groups. For example, in the general liability insurance policy form, there is a specific provision which makes the policy inapplicable where the insured is also insured under a NELIA or MAELU policy, or is entitled to be indemnified under the provisions of section 170 of the Atomic Energy Act of 1954, as amended. The bridge, tunnel, and turnpike authorities pointed out that such an exclusion could very well reduce the coverage if a NELIA or MAELU policy had been issued for an amount less than the authorities' general liability policy. We understand that steps are being taken by the liability insurers to remedy this situation by making this exclusion applicable only to the extent of the actual amount of financial protection or indemnity paid on account of a claim against the insured. Thus, in the example used in the Port of New York Authority letter, copy attached, if a claim against an insured were to be paid to the extent of $1 million and the insured had $20 million in conventional liability insurance protection, the insured would have $19 million of his conventional liability protection still available.

Another problem which appears to have been solved concerns clause III(b) of the general liability policy which excludes liability coverage from the policy if nuclear material contained in spent fuel or waste is handled by or on behalf of the insured. This provision was the cause of some concern on the part of the bridge, tunnel, and turnpike authorities in the event that the material would be handled by their employees as a consequence of an incident on their property involving such materials. A recommendation has been made by insurance representatives that paragraph III(b) of the exclusion be interpreted so that it does not apply to such involuntary handling of spent fuel and waste.

Another matter which was at issue during the hearings was the 2-year period for the filing of claims. The NELIA and MAELU policies as presently written provide coverage for bodily injury or property damage caused during the policy period by the nuclear energy hazard and for which written claim is made against the insured not later than 2 years after the end of the policy period. The bridge, tunnel, and turnpike authorities had pointed out that such a provision is one which they could not control, nor did it appear in their conventional liability policy. We now understand that for a premium consideration, NELIA and MAELU are willing to modify this provision so as to make it clear that coverage would not be denied for a claim made with respect to any incident which occurs during the policy period without regard to whether the policy is still in effect at the time the claim is made.

In the first-party property area, a major change has occurred. The Inland Marine Insurance group has decided that first-party property insurance for bridges, tunnels, and turnpike (from the point of view of the insured) would be better served if the nuclear coverage were handled by NEPIA and MAERP.

At a meeting of the governing committee of NEPIA late in May, NEPIA was empowered to provide direct insurance of this nature. While formal confirmation of such an arrangement has not yet been obtained from foreign reinsurers of NEPIA and MAERP, we have been advised that informal discussions with representatives of the foreign reinsurers have led representatives of NEPIA and MAERP to conclude that there should be no problem in this area. Under this new arrangement, both syndicates combined are prepared to bind coverage in an amount up to $61,700,000.

We further understand that while the exact wording of the policy forms has not been developed as yet, coverage as contemplated would be essentially that set forth in the endorsements prepared by the Inland Marine group. Under the circumstances, it would appear that there is still much work to be done to clarify certain of the differences of opinion between the bridge, tunnel, and turnpike authorities and the insurance industry as to the full nature and scope of the earlier endorsements.

I am attaching for your information copies of letters received from the insurance industry and the bridge and tunnel authorities. You will note that the Port of New York Authority believes that the full solution of this problem will require legislation, which would be effective to the extent that private insurance protection does not fill the need. We are hopeful, of course, that as negotiations continue, adequate coverage will be provided by the insurance industry.

Sincerely yours,

GLENN T. SEABORG, *Chairman.*

NUCLEAR ENERGY LIABILITY INSURANCE ASSOCIATION,
New York, N.Y., June 5, 1962.

Mr. CHARLES F. EASON,
Counsel, Federal-State Relations,
U.S. Atomic Energy Commission,
Washington, D.C.

DEAR MR. EASON: The other day you called to ask what progress the liability insurerers have made with the bridge, tunnel, and thruway authorities with respect to the concern which the authorities registered with the Joint Committee on Atomic Energy on April 12, 1962, over the liability insurance available to them against the nuclear energy hazard.

On May 3, 1962, representatives of NELIA and MAELU met with representatives of the bridge, tunnel, and thruway authorities to explore any problems that the authorities throught they might have with the nuclear energy liability insurance program.

In general, the meeting proved to be very satisfactory. The authorities complained of paragraph III(b) of the exclusion which would deny coverage for involuntary handling of spent fuel and wastes by bridge, tunnel, and thruway authorities at one of their locations after a nuclear incident had occurred. Insurers agreed to recommend that paragraph III(b) of the exclusion be interpreted so that it does not apply to such involuntary handling of spent fuel and waste. Already, steps have been taken to place this recommendation before insurance representatives properly concerned with this matter.

The insurers also agreed to attempt to specially limit by endorsement the coverage afforded by the nuclear energy liability policy (supplier's and transporter's form) so that it insures only any exposure which might result from the operation of section I(a) of the nuclear energy liability exclusion endorsement which has been attached to the authorities' regular liability policies. Of course, it was understood that the rate would reflect the reduction in coverage.

On May 18, 1962, J. S. Frelinghuysen Corp. wrote on behalf of the Port of New York Authority expressing a definite interest in the limited coverage and asked for a draft of the proposed wording. Endosement language is now in the course of preparation.

Insurers also said that they would be willing to consider the deletion of insuring agreement IV, section 2, in a policy issued to an authority for a rating consideration. As you know, this problem of the discovery period has been a primary source of concern to the authorities.

Generally, I think it is fair to say that substantial progress has been made. Insurers have attempted to provide solutions for the three problems that most troubled the authorities in a very short period of time. Further, I think it is also fair to state that the authorities seemed pleased with the suggestions made by liability insurers.

You can be sure we will continue to press for the final solution of these problems and we will keep you informed of our progress.

Very truly yours,

DE ROY C. THOMAS,
Assistant General Manager.

THE PORT OF NEW YORK AUTHORITY,
LAW DEPARTMENT,
New York, N.Y., June 5, 1962.

Mr. W. J. SATTERFIELD, Jr.,
Chief, Insurance Section,
U.S. Atomic Energy Commission,
Washington, D.C.

DEAR MR. SATTERFIELD: As stated in my letter to you dated May 18, 1962, and as we discussed in the telephone conversation which you, Mr. Eason, and I had last week, we have continued our efforts to obtain from the insurance industry adequate and reasonable financial protection against public liability, property damage, and loss of use which may result from nuclear reaction, nuclear radiation, or radioactive contamination. In response to your request, this letter is intended as a report of the major developments which have occurred since the hearings on this subject on April 11, 1962, before the Subcommittee on Research, Development, and Radiation, of the Joint Committee on Atomic Energy under the chairmanship of Congressman Melvin Price, of Illinois. We understand that you will use this information in the report to the subcommittee which has been requested from you by Mr. Price. I hope that you will be able to favor us with a copy of that report.

LIABILITY TO THIRD PARTIES

Representatives of the liability insurers have agreed to clarify, in several respects, the nuclear energy liability insurance exclusion endorsement set forth and discussed in my letter to you dated March 22, 1962. While the precise form of these clarifications has not yet been made available to us, we understand their intention to be as follows:

> Exclusion I(b) shall apply only to the extent of the actual amount of financial protection or indemnity under I(b) (1) or (2) paid on account of a claim against the insured. Thus, if a claim against an insured were to be paid to the extent of $1 million and the insured had $20 million in conventional liability insurance protection, the insured would have $19 million of his conventional liability insurance protection still available.
>
> Clause III(b) shall not result in the denial of coverage in the event that possession, handling, using, processing, storing, or transporting of spent fuel or waste by an insured who operates a terminal or transportation facility is for the purpose of preventing an incident or mitigating the consequences of an incident involving such materials.

However, the liability insurance companies still insist that a NELIA supplier's and transporter's policy must be purchased in order to eliminate the possibility of a gap in coverage as a result of exclusion clause I(a) which purports to eliminate coverage under a conventional liability insurance policy in the event the insured is also insured under a NELIA, MAELU, or Nuclear Insurance Association of Canada policy (regardless of the adequacy of any such policy).

It should be noted that NELIA now agrees to dovetail the S. & T. form with the conventional liability policy so that instead of covering the nuclear energy liability hazard completely, the S. & T. form would fill the gaps created by the nuclear energy liability exclusion clause. This change would be reflected in a reduced premium for the S. & T. form and the total insurance protection under both policies would be unaffected.

Furthermore, the new form would guarantee the availability of the full amount of insurance purchased under that form, notwithstanding any other insurance purchased by any other person (whether or not such insurance contains an omnibus insured clause), but provided that no payment would be made which would result in total payments as a result of any one incident being greater than the pool limits.

You will recall that one of our principal objections to the purchase of the S. & T. form is the "application of policy" clause. We have been advised that NELIA, for a premium consideration, would be willing to change the form so as to make it clear that coverage could not be denied for a claim made with respect to an incident which occurs during the policy period, without regard to whether the policy is still in effect at the time the claim is made. I am sure that you will also recall that at our April 4 meeting, we were advised by NELIA that it would not cancel the S. & T. policy after an incident so as to cut off claims which might be made with respect to that incident. Therefore, we would not expect more than a token premium differential, if any, as a result of this intent actually being written in the policy.

NELIA still requires that the S. & T. form limit all recoveries with respect to an incident to the amount of the pool limits, rather than guaranteeing each insured that he will be covered at least to the extent of the insurance which he has purchased. Thus, if the pool limits are exceeded in a given case, they may argue that an individual insured has no protection whatsoever, because claims paid out with respect to that incident have exceeded the pool limits.

PROPERTY DAMAGE AND LOSS OF REVENUE

We were advised yesterday that late last week, the jurisdiction over property damage and loss of revenue insurance against the nuclear energy hazard as it affects bridges and tunnels has been assumed by NEPIA and MAERP. Thus, the terms and conditions of coverage and the cost of coverage will have to be worked out anew with NEPIA and MAERP. We are immediately commencing such negotiations.

However, it is only fair to point out that over the last 3 years, the insurance industry refused to deal with this phase of the problem, except through the inland marine insurers who generally insure bridges and tunnels. We shall always be willing to negotiate terms and conditions with respect to this problem. But, as you know, the question of whether it is wise to continue to allow ship-

ments of radioactive materials through facilities until the time that such negotiations bear fruit is currently under the most serious reexamination.

You will also be interested to know that we have been offered an endorsement to our fire policy which would afford certain protection with respect to radioactive contamination which does not result from a nuclear reactor capable of sustaining nuclear fission in a self-supporting chain reaction, or any new or used nuclear fuel which is intended for or which has been used in such a nuclear reactor. This clause is offered with respect to premises covered under our fire and extended coverage policy. While the clause has only limited application with respect to the premises which would be protected and the nature of the materials which would be protected against, it is under careful consideration and negotiation at the present time.

In summary, while some progress has been made since April 11, it still remains clear that the solution to this problem requires legislation which would be effective to the extent that private insurance protection does not fill the need. As noted above, in the liability area, there is no assurance that coverage will be there when it is most needed. The pool limits may be exhausted at the time when claims against us must be paid. And in the field of property damage and loss of revenue coverage, the insurance companies have not yet come to grips with providing the necessary protection. Such legislation would enable us to continue to accept most shipments of radioactive materials as part of general commercial traffic without undue restrictions.

Very truly yours,

MICHAEL S. ZARIN, *Attorney.*

NUCLEAR ENERGY PROPERTY INSURANCE ASSOCIATION,
Hartford, Conn., June 5, 1962.

Re bridges and tunnels insurance against loss due to shipment of nuclear materials over or through.

Mr. CHARLES F. EASON,
Counsel, U.S. Atomic Energy Commission,
Washington, D.C.

DEAR MR. EASON: We have advised you over the phone of most recent developments in connection with the captioned subject and you indicated you need something in writing in your hands prior to Wednesday of this week.

What has transpired since our last conferences with you is that we have met with Mr. Stewart and Mr. Zarin of the American Bridge, Tunnel, & Turnpike Association and have clarified, we think, the extent of coverage available which does not and will not include any "fallout" type of coverage from incidents occurring offsite. At the time of that meeting we were not able to indicate definitely what the insurance market would be.

I am sure you understand the reasons why no group of people in the insurance business can get together and say "insurance of a particular type must be written by X, Y, or Z." What has happened is that the majority of those providing basic insurance on bridges and tunnels have indicated that they would prefer not to handle insurance against nuclear losses but rather would prefer to have NEPIA do so.

At a meeting of the governing committee of the association last week, the association was empowered to provide direct insurance to this end. Formal confirmation of their intent to participate similarly with the association has not yet been obtained from foreign reinsurers or the Mutual Atomic Energy Reinsurance Pool. Informal discussions with representatives of foreign reinsurers and with Mr. Ambrose Kelly of MAERP have, however, led us to conclude that there should be no problems in this area. Thus, while we cannot guarantee it at the moment but expect to be able to within a few days, NEPIA and MAERP are prepared to bind coverage upon application in amounts up to $61,700,000. Tentative rate information has been furnished to you previously.

We do not anticipate providing other than full coverage except where we lack sufficient capacity so to do. The exact wording of policy forms has not been developed as yet but the coverage contemplated is essentially that set forth in the previous endorsements which you are familiar with. Policy forms will be developed without delay.

We shall keep you informed and should you have any further questions, please let us know.

Very truly yours,

H. S. STANLEY.

ISLAND MARINE INSURANCE BUREAU,
New York, N.Y., June 4, 1962.

Re nuclear coverage on toll bridges and tunnels.

Mr. CHARLES F. EASON,
Counsel, Federal-State Relations,
U.S. Atomic Energy Commission,
Washington, D.C.

DEAR MR. EASON: Pursuant to your request I confirm that since our most recent discussions in Washington and our appearance before the joint congressional committee, four inquiries have been received by us with respect to nuclear coverage on toll bridge and tunnel facilities. They came from the operators of the Keokuk bridges at Keokuk, Iowa, the Indiana Toll Road, the Iowa-Illinois Memorial Bridges, and the Richmond-Petersburg Turnpike.

Following our canvass of the market, which indicated a practically unanimous opinion that all interests, and in particular the insured's, would better be served if nuclear coverage were handled in NEPIA, we advised the aforementioned bridge and tunnel operators accordingly and suggested that they approach NEPIA through the usual channels.

Prior to the Washington conferences, we had received requests for rates on or from the following:

Mackinac Bridge, Michigan
Mystic River Bridge, Massachusetts
Burlington-Bristol, New Jersey
Tacony-Palmyra, New Jersey
Ben Franklin Bridge, New Jersey
Walt Whitman Bridge, New Jersey
Potomac River Bridge, Maryland
Susquehanna Bridge, Maryland
Chesapeake Bay, Maryland
Patapsco Tunnel, Maryland
Triborough Bridge & Tunnel Authority,
Port of New York Authority
Garden State Parkway
Carquinez Bridge, California
Golden Gate Bridge, California
New Jersey Turnpike

These requests were processed and rates promulgated. I assume that if any of this latter group is still interested in the coverage, they too, will now approach NEPIA.

With kindest personal regards,
Sincerely,

HAROLD L. WAYNE, *General Manager.*

TRIBOROUGH BRIDGE AND TUNNEL AUTHORITY,
TRIBOROUGH STATION,
New York, N.Y., June 1, 1962.

Re transportation of radioactive materials.

MR. W. J. SATTERFIELD, Jr.
Chief, Insurance Section,
Atomic Energy Commission,
Washington, D.C.

Dear MR. SATTERFIELD: I have your letters of April 13 and May 16, 1962, inquiring as to the present status of any negotiations I may have had on behalf of Triborough Bridge & Tunnel Authority with representatives of the insurance industry on first-party property coverage and third-party liability insurance.

We have met with several representatives of the insurance industry but thus far no fruitful progress has been made toward a solution of the authority's problems. Our efforts are directed to securing a full solution of our insurance problems and I do not believe that the private insurance industry has manifested any ability to fill that need.

Very truly yours,

MEYER SCHEPS, *Assistant Counsel.*

Representative PRICE. The next witness will be Mr. Michael Zarin, Port of New York Authority.

STATEMENT OF MICHAEL S. ZARIN, ATTORNEY, THE PORT OF NEW YORK AUTHORITY

Mr. ZARIN. Mr. Chairman, members of the committee, my name is Michael S. Zarin, and I am an attorney with the Port of New York Authority.

The Port of New York Authority as the bistate agency of New York and New Jersey is responsible for six interstate bridges and tunnels between New York and New Jersey; namely, the George Washington Bridge, the Holland Tunnel, and the Lincoln Tunnel connecting Manhatan Island with New Jersey, and the Goethals Bridge, the Bayonne Bridge, and the Outerbridge Crossing linking Staten Island and New Jersey; the four metropolitan airports, namely, New York International, La Guardia, Newark, and Teterboro; many of the pier facilities in the New York-New Jersey Harbor; a union bus terminal; two truck terminals; Union Island Freight Station No. 1 in Manhattan; and two heliports, one on the West Side and one on the East Side of Manhattan Island.

The port authority greatly appreciates this opportunity to present its views on the subject of the need for and the availability of financial protection against public liability, property damage, and loss of use as a result of the increasing utilization and shipment of radioactive material; and I deem it a high privilege to appear before you today for that purpose.

I have also been asked to express to you the concern of the Triborough Bridge and Tunnel Authority in regard to this problem. Mr. Meyer Scheps, Triborough's assistant counsel, who has been representing that agency in this area, could not be in Washington today. As you know, Triborough's bridges and tunnels do not permit shipments of radioactive material.

I might add that the port authority currently permits most of such shipments over its bridges, subject to regulation.

A comprehensive statement on this subject by Mr. Roger H. Gilman, the port authority's director of port development, was submitted and made part of the record of the indemnity hearings last July. At the request of the Governors of New York, New Jersey, and Connecticut, Mr. Gilman is presently on leave in order to serve as the director of the Tri-State Transportation Committee. I hope that his statement will be read in conjunction with any examination of this testimony.

A word or two in summary of our activities in this area may be in order. Our consideration of this problem began in 1959, when a new standard exclusion clause which would bar recovery in the event of losses due to nuclear reaction, nuclear radiation, or radioactive contamination was made part of our property damage and loss of revenue insurance policies in those cases in which such policies previously covered losses of this kind. We have been unable to obtain adequate reasonable alternate protection on those of our facilities which were covered against these hazards or on other facilities for which, because of the development of the nuclear industry, we feel such protection to be desirable.

In cooperation with many other public agencies, we have explored with the insurance companies, the staff of the Atomic Energy Com-

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mission and the staff of the Joint Committee various possibilities of obtaining adequate financial protection. Unfortunately, the protection in adequate amounts and on reasonable terms and conditions has not been forthcoming from the insurance industry.

As you know, because this hazard is not covered by insurance, the Massachusetts Turnpike Authority and the Triborough Bridge and Tunnel Authority, among others, bar shipments of radioactive materials from their facilities. This problem must be solved if other facilities of commerce are to continue to permit the passage of shipments of radioactive materials.

With the exception of shipments of radioactive material, we have adequate private insurance protection on reasonable terms and conditions with respect to all traffic permitted to pass through our facilities. An educated guess as to the total revenue derived from all shipments of radioactive materials through our facilities would be well under $2,000 per year.

We believe that to the extent that insurance protection is available from private insurance companies on reasonable terms and conditions, they should be afforded every opportunity to participate in furnishing the protection which is needed. It is abundantly clear, however, that at the present time private insurance protetcion is inadequate. It is for that reason that we support legislation which will enable us to continue to accept most shipments of radioactive materials as part of general commercial traffic, without undue restrictions.

The status of our negotiations with the insurance industry on March 22, 1962, is summarized in my letter of that date to Mr. Charles Eason, Counsel for Federal-State Relations, AEC.

I would hope, Mr. Chairman, that that letter, which I have attached to my statement as exhibit A, might be included in the record at this point.

Representative PRICE. Without objection, it will be included in the record.

(Letter referred to follows:)

EXHIBIT A

THE PORT OF NEW YORK AUTHORITY,
New York, N.Y., March 22, 1962.

CHARLES F. EASON, ESQ.,
Office of General Counsel,
Atomic Energy Commission,
Washington, D.C.

DEAR MR. EASON: In response to your request last Friday, I am enclosing herewith copies of the nuclear exclusion clause and the limited nuclear damage assumption endorsement (property damage form) which pertain to property damage and revenue insurance policies, and the nuclear energy liability exclusion endorsement (broad form) applicable to liability policies. These are annexed hereto as schedules A, B, and C, respectively. Comments on these forms, which you also requested, are noted below under the headings: Property Damage and Loss of Revenue, and Liability to Third Parties.

PROPERTY DAMAGE AND LOSS OF REVENUE

An examination of the nuclear exclusion clause reveals that there is no coverage for property damage or loss of revenue resulting from nuclear reaction, nuclear radiation or radioactive contamination. The only exception to this statement is, of course, that direct loss by fire resulting from such hazards is still insured against under the terms of the policy to which the exclusion applies.

An examination of the limited nuclear damage assumption endorsement

(property damage form) reveals that only "direct physical loss or damage caused by sudden and accidental nuclear reaction" radiation or radioactive contamination would be covered, provided the loss or damage is caused by nuclear or radioactive materials in transit on the insured facility.

The assumption endorsement does not eliminate the exclusion of losses due to radioactive hazards "whether controlled or uncontrolled, and whether such loss be direct or indirect, proximate or remote, or be in whole or in part caused by, contributed to, or aggravated by peril(s) insured against" which is the language of the original exclusion. Thus it is clear that the assumption endorsement was not intended to reinstate the insurance eliminated by the nuclear exclusion clause.

It is difficult to forecast in advance whether an incident would be considered to be "sudden and accidental" and therefore merit inclusion under the assumption endorsement language. Perhaps damage resulting from a collision of a perfectly packaged and loaded truck carrying radioactive material in transit on an insured facility would be covered. However, I should not be surprised to find insurance companies contending, after almost any incident involving a shipment of radioactive materials, that loss or damage sustained is not covered under this endorsement because it is not sudden and accidental. Indeed, representatives of insurance companies have stated that loss or damage caused by liquid waste dripping from a tank truck or damage caused by faulty packaging or loading would not be covered under this endorsement.

The assumption endorsement also restricts recovery to damage resulting from materials in actual transit on the insured facility. However, the location of the source from which damage comes matters little to vast numbers of the traveling public who rely on the facility being open to traffic or to others to whom we owe responsibility. Coverage for damage from any source is necessary. Moreover, there is little likelihood that shipments of radioactive materials would be within several miles of an insured facility were it not for the fact that shipment of such materials is permitted on the facility.

Among the other problems presented by the assumption endorsement, we have been advised that the cost of debris removal would not be insured against.

We have been advised that a loss of revenue form with respect to bridges and tunnels would be available embodying the same terms as the property damage assumption endorsement discussed above. Such terms, of course, are completely unsatisfactory. Please refer to my letter to you dated November 27, 1961, and the letter enclosed therewith to Mr. Jack Newman of the Joint Committee on Atomic Energy staff which outlines in detail the inadequate amount of coverage and excessive cost of the assumption endorsement. In addition, as you know, we have attempted and desire to obtain property damage and loss of revenue insurance against nuclear hazards for all of the facilities of the port authority.

LIABILITY TO THIRD PARTIES

Under clauses I (a) and (b) of the nuclear energy liability exclusion endorsement the insurance companies might argue (after an incident) that the possibility of coverage elsewhere than under the insured's liability policy eliminates coverage under the insured's liability policy whether or not such other coverage actually protects him.

If all clauses I (a) and (b) are designed to do is to state: "In the event and to the extent that the insured is otherwise held harmless from legal liability on account of incidents involving radioactive materials, the insured is not covered under this policy," this can be said in clear terms. To the extent that more may be meant, additional protection is needed.

Unfortunately, it appears that more is meant by exclusions I (a) and (b). Under I(a), what coverage is provided in the event NELIA or MAELU or "Canadian" policies with omnibus insured clauses are issued with limits of liability lower than that carried under the insured's conventional liability protection? What nuclear coverage is provided if part or all of the alternate coverage is exhausted?

Under clause I(b)(1), what if the required financial protection is not in fact obtained or if the requisite self-insurance protection is not in fact available when required? Apparently no contingency under clause I(b)(1) or I(b)(2) results in any attack on the nuclear liability insurance pools yet these clauses afford an opportunity for argument that possibly inadequate indemnity protection may preclude insurance protection which otherwise would be in force.

In that event, the insurance companies would suffer no loss and the coverage elsewhere would be inadequate.

It has been suggested that the exclusions under I (a) and (b) are merely designed to prevent the pyramiding of coverage beyond the extent of the liability insurance pools presently available. As pointed out above, it may be argued that they go further than that. But even if that were the extent of the application of these clauses, such application would be palatable to an insured only in the event Price-Anderson protection fills in the gaps of and caps the alternate insurance of indemnity protection, and this, of course, would not necessarily be true under I(a) and may or may not be true under I(b).

In addition, under clause III(b), there is a possibility that the insurance companies might argue that under certain circumstances coverage would not be forthcoming for liability resulting from incidents involving spent fuel or waste. For example, we have been advised that NELIA would consider towing or pushing a truck loaded with radioactive spent fuel or waste material off the George Washington Bridge not to be within the exclusion; but that if port authority employees were to pick up radioactive waste and transport it off a facility via port authority transportation, this would be within the exclusion.

In the face of these troublesome exclusions which might be eliminated by more judicious wording, it has been suggested that an insured purchase the NELIA suppliers and transporters form. However, under its terms this form contains the possibility of exhausting the insured's coverage through application of some other person's policy to an incident unrelated to any liability of the insured. Equally important, the liability protection available under the suppliers and transporters form is not adequate in that the policy applies only to bodily injury or property damage 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. This is a condition which is in no way under the control of the insured and which is impossible for the insured to guard against. It is not found in our conventional liability insurance policy.

This letter has been considered by the representatives of the Triborough Bridge and Tunnel Authority, the New York State Thruway Authority, and the American Bridge, Tunnel and Turnpike Association, who met with you and other members of the staff of Atomic Energy Commission and the staff of the Joint Committee on Atomic Energy last week, and they are in substantial accord with the views expressed.

Very truly yours,

MICHAEL S. ZARIN, *Attorney.*

Carbon copies to:

John P. McArthur, Esq., New York State Thruway Authority.

Capt. Edgar O'Neil, adviser on atomic energy to the State of New Jersey.

Meyer Scheps, Esq., Triborough Bridge & Tunnel Authority.

Milton D. Stewart, Esq., American Bridge, Tunnel and Turnpike Association.

Mr. Oliver Townsend, director, New York State Office of Atomic Development.

Schedule A

This policy does not insure against:

1. (e) Loss by nuclear reaction or nuclear radiation or radioactive contamination, all whether controlled or uncontrolled, and whether such loss be direct or indirect, proximate or remote, or be in whole or in part caused by, contributed to, or aggravated by the peril(s) insured against in this policy; however, subject to the foregoing and all provisions of this policy, direct loss by fire resulting from nuclear reaction or nuclear radiation or radioactive contamination is insured against by this policy.

Schedule B

LIMITED NUCLEAR DAMAGE ASSUMPTION ENDORSEMENT (PROPERTY DAMAGE FORM)

The Limit of Liability under this Endorsement is $————, which is part of, and not in addition to, the amount of the policy to which this endorsement is attached.

In consideration of an additional premium of $———, and effective ———— at noon, Standard Time at location of the property, the insurance afforded by this policy is modified in the following, and in no other respect:

The exclusion of loss by nuclear reaction or nuclear radiation or radioactive contamination contained in clause 1(e) of the policy shall not be applicable to direct physical loss or damage caused by sudden and accidental nuclear reaction, sudden and accidental nuclear radiation, nor sudden and accidental radioactive contamination including resultant radiation damage to the property covered, if the nuclear reaction, nuclear radiation or radioactive contamination causing such loss or damage originates in, or emanates from, nuclear or radioactive materials while such materials are in the course of actual transportation upon the bridge properties or through the tunnel properties covered by this policy.

Within the "Limit of Liability" set forth above, the liability of the Company for loss or damage under this endorsement is for the same percentage interest as is assumed by the Company under the policy to which this endorsement is attached.

All other terms and conditions of the policy shall remain unchanged.

NOTE.—Where more than one structure is insured under the same policy, a separate Limit of Liability shall be shown for each and the following wording added: "The foregoing conditions shall apply separately to each item covered by this policy."

Schedule C

NUCLEAR ENERGY LIABILITY EXCLUSION ENDORSEMENT (BROAD FORM)

It is agreed that the policy does not apply:

I. Under any Liability Coverage, to injury, sickness, disease, death or destruction

(*a*) with respect to which an insured under the policy is also an insured under a nuclear energy liability policy issued by Nuclear Energy Liability Insurance Association, Mutual Atomic Energy Liability Underwriters or Nuclear Insurance Association of Canada or would be an insured under any such policy but for its termination upon exhaustion of its limit of liability; or

(*b*) resulting from the hazardous properties of nuclear material and with respect to which (1) any person or organization is required to maintain financial protection pursuant to the Atomic Energy Act of 1954, or any law amendatory thereof, or (2) the insured is, or had this policy not been issued would be, entitled to indemnity from the United States of America, or any agency thereof, under any agreement entered into by the United States of America, or any agency thereof, with any person or organization.

II. Under any Medical Payments Coverage, or under any Supplementary Payments provision relating to immediate medical or surgical relief, to expenses incurred with respect to bodily injury, sickness, disease or death resulting from the hazardous properties of nuclear material and arising out of the operation of a nuclear facility by any persons or organization.

III. Under any Liability Coverage to injury, sickness, disease, death or destruction resulting from the hazardous properties of nuclear materials, if

(*a*) the nuclear material (1) is at any nuclear facility owned by, or operated by or on behalf of, an insured or (2) has been discharged or dispersed therefrom;

(*b*) the nuclear material is contained in spent fuel or waste at any time possessed, handled, used, processed, stored, transported or disposed of by or on behalf of an insured; or

(*c*) the injury, sickness, disease, death or destruction arises out of the furnishing by an insured of services, materials, parts or equipment in connection with the planning, construction, maintenance, operation or use of any nuclear facility, but if such facility is located within the United States of America, its territories or possessions or Canada, this exclusion (c) applies only to injury to or destruction of property at such nuclear facility.

IV. As used in this endorsement:

"hazardous properties" include radioactive, toxic or explosive properties;

"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 a 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 (a) or (b) thereof;

"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 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,

(*d*) 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;

"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;

With respect to injury to or destruction of property, the word "injury" or "destruction" includes all forms of radioactive contamination of property.

Forming a part of the policy, to which attached, from its inception date.

Nothing herein contained shall vary, alter or extend any provision or condition of the policy other than as above stated.

Mr. ZARIN. Thank you, sir.

The letter demonstrates that the scope of coverage offered on March 22 of this year with regard to property damage and loss of revenue, as well as public liability protection, was inadequate. Coverage offered today, 20 days later, still does not meet the need.

I do not believe that our conventional liability insurance policy should contain any exclusion for this risk with the exception of a $60 million ceiling on insurance company loss from any single incident, which should be applied first to satisfy conventional rather than nuclear liability insurance policies. The fact is, however, that it does contain such exclusions and that the liability insurance underwriters have not changed their position. If we wish to insure the nuclear liability hazard, the liability insurance companies suggest that we purchase alternate coverage under a separate policy. As detailed in the letter to Mr. Eason, this policy also contains serious gaps in coverage which are apparently beyond the capacity of NELIA to eliminate.

We have come to expect changes in position on the part of the insurance companies immediately prior to meetings of this committee. Last year, just before the indemnity hearings, the Inland Marine Insurance Bureau furnished us with a woefully inadequate clause which they called a limited nuclear damage assumption endorsement.

On the strength of their offer, we agreed to work toward a solution of these problems without seeking legislative assistance for the time being. Notwithstanding questions from the committee and staff which, in essence, suggested that legislation might be an appropriate solution, we continued to hold to that approach. Not until last week did the insurance companies, through the good offices of the Atomic Energy Commission, agree to modify that form in any respect.

If all the insurance company indications which we received last week were fulfilled, we still could not operate our facilities in the confident belief that we would be covered by adequate insurance protection if an incident occurred. These assurances fell far short of a buy-back of the nuclear exclusion clause. What we now have is some indication that the scope of coverage may be increased from the totally inadequate coverage under the limited endorsement. Even these changes are still in the talking stage, and no new endorsement has been offered.

The committee will recall that at the indemnity hearings last year, in response to a question by Mr. Newman, it was indicated that NEPIA and MAERP resources of over $60 million would be made available if the inland marine insurers who insure bridges and tunnels so desired. Apparently they did not so desire until last week. We had requested many times that this coverage be made available. Until last week, however, the maximum amount of coverage we could obtain on the George Washington Bridge against the radioactive hazard was approximately $6,600,000.

The amount of coverage which the insurance companies now state would be available to insure bridges and tunnels against the hazards involved in the shipment of radioactive materials is $61,700,000. They state that this is the full extent of the world market, and that it represents the full capacity of NEPIA and MAERP pools.

While this coverage is most welcome, it is inadequate for the port authority's facilities. Property damage and loss of revenue insurance on a number of our facilities and those of other agencies is far in excess of this amount.

In addition, there has been no indication that such capacity would be extended generally to piers and airports. The Atomic Energy Commission has expressed a continuing desire to ship both low- and high-level radioactive materials through these facilities, as well as through bridges and tunnels.

It should also be noted that we have received no indication as to what premium would be charged for any of the new proposals.

While we wish to continue to work actively with the insurance companies on this problem, we have reached the point where the insurance that they offer is simply inadequate to be able to provide reasonable financial protection for public facilities of commerce within a reasonable time.

Our action during the past 3 years in permitting most radioactive materials to pass through our facilities is certainly more than adequate evidence of our willingness to cooperate in the development of the nuclear industry. Such cooperation must, of necessity, have its limitations in the light of our other responsibilities.

The present answer to these problems has not been suggested until all avenues of private insurance protection were explored. It is now necessary that financial protection be provided by legislation which

would be effective to the extent that private insurance protection cannot fill the need.

Representative PRICE. Thank you very much, Mr. Zarin.

On page 3 you state that an educated guess as to the total revenue derived from shipments of radioactive materials through your facility would be well under $2,000 a year. Nor, do you require that each type of shipment justify its passage through your facility in terms of the revenue derived?

Mr. ZARIN. We have no necessity to put exactly that type of stricture on any other shipments, Mr. Price, but we have insurance for those under blanket insurance protection.

This is something new to us. We have had all-risk insurance protection before, and this is a separate policy contemplated in both property damage and loss of revenue, as well as in public liability fields.

Representative PRICE. You have coverage for other hazardous materials under general liability insurance, or not?

Mr. ZARIN. Yes, Mr. Chairman. That is true.

Representative PRICE. Are these the only types of shipments over the road that are giving you any trouble now?

Mr. ZARIN. Generally speaking, that is correct.

I would like to state that this is not the first experience we have had with radioactive shipments. There has been a longtime exclusion from the policies for nuclear weapons of war, and immediately upon such an exclusion going into the policies, this type of shipment was excluded from the facilities.

This step has not been taken with regard to the vast bulk of radioactive materials, largely because we have been dealing over the past 3 years with the Atomic Energy Commission and others on this subject, and we have been trying to hold off such an effect as long as we possibly could, sir

Representative PRICE. Did you ever have any exclusion clauses on any other type of hazardous shipment, like high expolsives?

Mr. ZARIN. Well, we do differentiate between materials that pass through the bridges and those which pass through the tunnels.

I would be happy to leave with the committee a copy of our booklet, which outlines the rules and regulations governing the transportation of explosives and other dangerous articles.

The major difference is that, as made clear by the Holland Tunnel fire of some years back, we feel that it is absolutely essential to make certain differentiations between bridge and tunnel facilities.

Representative PRICE. We will receive it for the committee file.

Mr. ZARIN. I might, sir, include the air terminal regulations, as well.

(The regulations referred to are on file with the Joint Committee.)

Representative PRICE. If the Price-Anderson Act covers a particular shipment, do you have any remaining concern as to your liability?

Mr. ZARIN. Not as to liability protection, sir. Of course not. We do have a problem, however, when it comes to whether or not we could recover for the property damage to our own facilities. If Price-Anderson covers the particular shipment on the facility, we would not have liability problems.

Representative PRICE. If those specific radioactive materials which do not present a substantial hazard were insured under your regular insurance policy, would not most of the problem be solved?

Mr. ZARIN. You are referring to——

Representative PRICE. Specific radioactive materials which do not present a substantial hazard.

Mr. ZARIN. Oh, a substantial hazard.

Yes, sir, I think that most of the problem would be solved; because we have been informed by the Atomic Energy Commission that the vast bulk of such shipments do not present any more hazard than, to give a high example of what they compared this to, a truck load of gasoline.

I have never seen any reason and the port authority has never seen any reason why there was a blanket exclusion placed on the property damage and loss of revenue policies.

I think it might be well to read briefly into the record the exclusion that presently is on those policies:

> This policy does not insure against loss by nuclear reaction or nuclear radiation or radioactive contamination, whether controlled or uncontrolled, and whether such loss be direct or indirect, proximate or remote, or be in whole or in part caused by, contributed to, or aggravated by the perils insured against in this policy. However, subject to the foregoing, and all provisions of this policy, direct loss by fire resulting from nuclear reaction or nuclear radiation or radioactive contamination is insured against by this policy.

This is considered in the letter, Mr. Chairman, that I have inserted in the record. But it obviously is a complete exclusion clause, with no consideration for the fact that certain shipments of radioactive materials have a much lower level of hazard than others.

Representative PRICE. Mr. Toll?

Mr. TOLL. Yes, I have one or two.

Mr. Zarin, from your testimony concerning military shipments, does that mean you do not allow atomic weapons to pass through your facility under any circumstances?

Mr. ZARIN. Under present circumstances, Mr. Toll, such shipments are not permitted, and we have worked out appropriate arrangements as to those shipments. They follow our regulations completely at this time.

Mr. TOLL. Does Price-Anderson cover most of the hazardous shipments through your facility now?

Mr. ZARIN. We do not know which shipper has Price-Anderson protection, and which shipper does not have Price-Anderson protection. We did when we started out in this area have an all-risk policy. Right now, we do not.

As far as the liability area is concerned, and that, I suppose, is where your question is directed, if a particular shipment has such protection, of course, then it does not pose the liability problem.

I would say that the vast bulk of shipments do not have Price-Anderson protection, because the vast bulk of shipments do not present a substantial hazard, by definition.

Mr. TOLL. I was referring not to the vast bulk, but the ones in which you might have a serious large-scale incident causing large damage. In most cases these would be fuel elements or some sort of reactor material coming from or going to a reactor either licensed or built under contract with the AEC, that would be covered by Price-Anderson.

In that event, would you not have not only protection for liability, but also for property claims?

Mr. ZARIN. I do not think that I could rely, as an attorney advising my client, that we would have protection insofar as property claims are concerned.

As far as a large incident is concerned, Mr. Toll, a bridge is a fairly narrow thing. I do not know exactly how large these incidents are that you have in mind.

I know that Mr. MacArthur's facilities and Mr. Stewart's carry, in some cases, more of these shipments than the Port Authority does. Would you care to comment on that, Mr. Stewart?

Mr. STEWART. Only to this extent: Insofar as we are covered by presently enforced Price-Anderson indemnities by virtue of the fact that they are available to contractors, we are delighted, Mr. Toll. We do not know why we should have any question about their covering everybody. This is why we think it makes sense to enact the measure which we have offered to the committee. We think this is what Congress intended at one point with respect to one specific class of atomic facility.

Atomic shipment traffic has now reached the point where it appears to us that we must be sure that it applies to all hazardous shipments, and we may not, it seems to me now, just giving you my own opinion, presume or assume that Price-Anderson does in fact apply to every potentially hazardous shipment, unless we jolly well know it. And we do not.

What is more, we do not know anybody who is really in a position to tell us unequivocally that it does.

Mr. TOLL. I think that it is clear that it would be desirable to give you more notice as to these types of shipments before they came through your facilities, and if possible to indicate whether they were coming from an AEC licensed or contract facility that would be covered.

I do not know. But I think it may be possible that the large-scale incidents which are beyond the capacities of insurance companies may already be covered under Price-Anderson, and the smaller incidents it might be possible for you to find existing insurance for.

Mr. ZARIN. I would like to emphasize two points insofar as this is concerned.

One is that as an insurance matter, based upon the advisability of obtaining adequate protection, I cannot say that Price-Anderson covers us for property damage or loss of revenue. That is one of our principal concerns in this area: whether the shipment is coming from a Commission-licensed activity which is covered by Price-Anderson, whether it is coming from a fuel fabricator, or whether it is just a shipment of low-hazard material.

Mr. TOLL. Is this because of the exclusion as to onsite property damage?

Mr. ZARIN. No, sir, this is because of the language of the Price-Anderson Act, which protects against public liability, but does not protect against first-person property damage.

Mr. TOLL. But as I understand it, under AEC interpretation, if there were to be an incident, the site would be considered the truck or the shipper, and he would be liable, and the toll facility would be in the position of a third party and therefore able to collect under Price-Anderson.

Mr. ZARIN. Well, that is my understanding, as well; with the one additional observation that I would like to make, Mr. Toll, and that is that under the present statute we may have to prove liability; and this is a very serious consideration.

Mr. TOLL. Just one more question, Mr. Chairman.

You indicate that you are worried about the fact that there is only $61 million worth, approximately, of property coverage available. Do you require 100 percent coverage of your facilities against other types of risks?

Mr. ZARIN. This is not a question of 100-percent coverage by any means, Mr. Toll.

Take the George Washington Bridge, for example, which is our most exposed facility. If we get $61,700,000 worth of coverage, under our present insurance policies this would leave a gap of $47,500,000 of insurance protection which would be uncovered.

There is currently $80 million worth of property damage insurance on the bridge, plus $29,200,000 of loss revenue insurance. This does not include, of course, the tremendously large factor of self-insurance protection. The figure represents current insurance in force.

I would like to make one additional observation. Our problems are not confined to the amount.

We have very serious problems with respect to the terms and conditions which have been offered from time to time by the insurance companies. The insurance companies have always told us that certainly they are willing to negotiate with us as to terms and conditions. But this is a very different thing from coming to grips with terms and conditions that will be satisfactory.

Even now the word "accident" has been used in describing the terms and conditions which might be available, rather than coverage on an occurrence basis. Who is to say what is an accident and what is not an accident?

We are only concerned with whether damage in fact has occurred. That is the basis on which we normally buy insurance.

Representative PRICE. Mr. Westland?

Representative WESTLAND. Have you taken any people from the insurance companies out to actually see how the radioactive materials are transported?

Mr. ZARIA. Mr. Westland, we have periodically, I understand, insurance company inspections of our facilities. They are very well aware of our entire hazardous cargo program, not only in the area of radioactive materials but throughout the entire gamut of hazardous materials.

For example, on the George Washington Bridge our police officers are trained to cope with incidents involving radioactive materials. Certain of those materials require 2 hours' notice. Some of them are escorted over the facilities. Some of them can move only during low traffic periods.

I would point out, in regard to that, that one of the exclusions in the conventional liability policy is that if a police officer was to pick up a package of radioactive material which had fallen off a truck, and take it off the facility in a police car, our liability policy would not cover that movement according to the insurance company's interpretation of the policy.

Representative WESTLAND. But you say you are principally concerned over property damage?

Mr. ZARIN. Well, we started in this area with a large concern about property damage, because that was a total exclusion, Mr. Westland; that is true. There are also certain problems with the liability policy, sir.

For example, even under the policy that NELIA would have us buy, there is a limitation which requires discovery and notice within 2 years after the end of the policy period.

With regard to that exclusion, the insurance companies could cancel immediately after an incident; and as we know, since this is peculiarly a field in which discovery of injury might take place some years later, we might find ourselves without coverage.

In addition, that coverage under the so-called suppliers' and transporters' form is limited to an amount of $60 million, and that $60 million could be exhausted without any of our liability being protected under a $20 million policy, for example, that we might buy.

Representative WESTLAND. The only reason I ask that question, Mr. Zarin, is because I am wondering whether or not the insurance companies really know the subject, whether they know how carefully these materials are packaged or contained, or when they are being transported.

Perhaps they do. I frankly do not know.

Mr. ZARIN. I think the Atomic Energy Commission has been doing a very good job in going around the entire country and telling the public authorities—and I know they are also telling the insurance companies just what the hazards are, because they are present at some of these meetings. And the emphasis has been that 90 to 95 percent of these shipments do not present more than the conventional hazards of ordinary shipments.

Therefore, I am at a loss to understand why all of these shipments are excluded from our policy.

I think that the insurance companies really have a much broad base of coverage than one might imagine at first look. The base of coverage would be all hazardous materials up to a certain level. If 95 percent of that could be covered, if our insurance policy only excluded—for example, Mr. Toll mentioned spent fuel elements and liquid waste or one or two other things—if those were the only exclusions, we could pay attention to the really hazardous materials. As it is, we cannot so focus our attention.

Representative WESTLAND. Do you think the AEC could do anything with these insurance companies in a primer course, sort of, on just how things are really handled?

Mr. ZARIN. Mr. Westland, I think that they have had much more than a primer course, because I think the AEC has been on the job in this respect.

I think what the AEC could really give us here is a list of one, two, three, or four particular shipments, and I believe they know what is moving, which are of substantially hazardous nature; then the insurance companies might, depending upon what they wished, exclude them from the insurance policy, or not.

That I think could and should be done. Of course, for those shipments, if we were to permit them to move across the facilities, I think we would have to get protection some place for them.

Representative WESTLAND. That is all, Mr. Chairman.

Representative PRICE. Thank you very much, gentlemen.

I might say that the committee will be in close contact with the AEC on the points raised here, and will try to nail down some of these areas that are giving us a little concern.

Mr. ZARIN. I think that would be most helpful, sir.

Representative PRICE. The next witness will be Mr. Joseph Murphy of the Inland Marine Underwriters Association.

Mr. Murphy?

STATEMENT OF JOSEPH F. MURPHY, CHAIRMAN, LEGISLATIVE COMMITTEE, INLAND MARINE UNDERWRITERS ASSOCIATION; ACCOMPANIED BY HAROLD WAYNE AND SUMNER STANLEY

Mr. MURPHY. Mr. Chairman, I would like to ask Mr. Wayne and Mr. Sumner Stanley to sit up here with me, if I may.

For the record, I would like to introduce Mr. Sumner Stanley, assistant general manager of NEPIA, who also holds a proxy from the mutual pool with respect to a commitment which we will mention here, and Mr. Harold Wayne, general manager of the Inland Marine Insurance Rating Bureau.

Mr. Chairman, in his statement, Mr. Zarin made several points, as to which I will not attempt a refutation point by point, but I assume the questioning later may bring out a number, so I will not go into them now.

My name is Joseph F. Murphy, and I am vice president and counsel of the insurers comprising the America Fore Loyalty Insurance Group. The parent organization of our group is the Continental Insurance Company.

Today, however, I am speaking in my capacity as the chairman of the legislative committee of the Inland Marine Underwriters Association, and this statement is addressed to the insurances available to instrumentalities of commerce such as toll bridges and tunnels against damage or contamination from nuclear incidents.

The IMUA is an unincorporated trade association representing stock property insurers writing inland marine insurances. Our membership consists of 155 insurers, which write approximately 70 percent of the domestic inland marine market in the United States, including the toll bridge and tunnel exposures.

It is our belief that ample capacity is available at reasonable rates in the private insurance market for such risks in respect to onsite exposures due to the transportation of nuclear materials over or through these facilities. It follows that we also believe that a Government indemnity program by way of an amendment to the Atomic Energy Act is unnecessary and, in our judgment, inadvisable.

The committee is well aware of the circumstances giving rise to the exclusion of nuclear perils in first party as well as third party policies. You are also informed in respect to the availability of a limited buy-back coverage which in substance permits an insured to reacquire certain coverage for onsite exposures.

Briefly, this buy-back as respects toll bridges and tunnels provides coverage against direct physical loss or damage to the insured property arising out of an accidental nuclear incident originating in or from

nuclear or radioactive materials while such materials are in the course of transportation in or on the insured property.

While in a number of industries similar coverage has been purchased as a supplement to fire and extended coverage insurance and various inland marine forms——

Parenthetically, I want to observe that the coverage available in these instances is narrower than that being offered to the toll bridges in their buy-back endorsement, in that it generally covers only the handling of commercial radioactive isotopes.

Incidentally, again, and in partial response to Mr. Zarin, there is readily obtainable, in respect to the handling of radioactive isotopes, a ready market, which is really not what we are talking about here today.

As stated, however, we believe that an ample market for the coverage for nuclear material exists at reasonable rates.

There have been informal discussions between representatives of the toll bridge and tunnel authorities and several of the underwriters of toll bridge and tunnel risks. Last Wednesday, representatives of the underwriters met with bridge and tunnel people here in Washington at a meeting called and attended by representatives of the Atomic Energy Commission. Members of the staff of your committee were also present.

At this meeting, representatives of the toll bridge and tunnel authorities developed discussion along three main points: (*a*) Scope of coverage; (*b*) market capacity; and (*c*) cost.

There was also before us at that time a draft of an amendment to the Atomic Energy Act which would, in substance, provide governmental indemnity on first party coverage to toll bridges and tunnels to an amount of $500 million, in excess of $250,000, to the extent—

that compensation for any such damage or loss of use is not collectible under a valid insurance policy.

This legislation, which was apparently prepared by a toll bridge and tunnel representative, appeared to include both onsite and offsite exposures.

Without burdening the committee with a detailed résumé of the discussions, it may suffice to say at this stage:

Scope of coverage: Representatives of the insurance industry made it clear that the industry was willing to review the language of the buy-back, onsite clause and make such changes as appeared necessary in the interest of clarity.

Similarly, most of the toll bridge and tunnel people present appeared to recognize that as to offsite coverage, no unique exposure was presented by the transportation of nuclear materials and that as to offsite exposures, toll bridges and tunnels shared this risk with any other business or householder.

Capacity: It did not appear that the market had been fully canvassed, and at the meeting representatives of Nuclear Energy Property Insurance Association and Mutual Atomic Energy Reinsurance Pool stated that their full and combined capacity amounts to $61,700,000 per risk, and in addition we believe that there may be a substantial voluntary market on top of this capacity.

Price: The general discussion was typical of that between buyers and sellers, and it is anticipated that the bargaining will continue.

In conclusion, it appears to us that there is much more to be done in respect to this problem before legislation to amend the Atomic Energy Act is considered, or even proposed.

Since this, however, is a legislative forum, on behalf of the IMUA I wish to record our firm conviction that insurance against nuclear hazards should remain in private hands to the extent that the insurance industry is able to respond to reasonable requirements. It is only after the capacity of the industry is exhausted or where a risk is truly uninsurable that Government should consider providing further indemnity.

May I make one further statement in connection with this: It was observed that our offer here, perhaps, came because of the imminence of legislation, or the threat of legislation. I wish to take exception to that comment and point out that we are attempting to deal in good faith.

I may be pardoned if I make the observation that there may be those who prefer to deal with legislation pending rather than to deal in the absence of such legislation.

I am reliably informed that there were no concerted efforts made in our industry to obtain this coverage, and that the market was not fully canvassed. That is the reason that it has been of comparatively recent origin that we were able to make this capacity available to those who want it.

Representative PRICE. Well, it is still a new area and a new field, and I imagine it will take quite some time before you get around to adjusting all the problems incidental to it.

Mr. MURPHY. And there are many underwriters involved, Mr. Chairman, as we appreciate.

Representative PRICE. Mr. Murphy, how have the property insurance pools fared since 1957?

Mr. MURPHY. Mr. Stanley is here, and I think he is better able to answer that question than I.

Mr. STANLEY. Mr. Price, I do not have precise figures, but I can give you approximately the results to date.

Representative PRICE. Could you furnish the figures eventually for the record?

Mr. STANLEY. Yes; we can. Would you like approximate figures in the meantime?

Representative PRICE. Yes.

Mr. STANLEY. It would be my estimate, and I believe it is fairly accurate, that as of the end of 1961, the premiums received had been somewhere slightly over $2½ million, and the losses something over $1¼ million.

Representative PRICE. So what type of reserve have you been able to provide?

Mr. STANLEY. We do not have a reserve as such, because this is not a retrospective plan. This is a reporting quarterly to the companies.

But our underwriting gain, for want of a better term, up to the present, which would be the equivalent of a reserve on another basis, would be about $1 million, I would think. A little bit over.

Representative PRICE. What has been the nature of the accidents that you have had to pay claim on, generally speaking?

Mr. STANLEY. As you perhaps know, the principal nuclear loss was the Westinghouse reactor at Walt's Mill, where a short section of a

fuel element burned, and that loss was $1,004,040. I remember the figure well. That was a piece of fuel element about this long and about this big around [indicating].

Representative PRICE. At the bottom of page 1, Mr. Murphy, you mentioned the exclusion of nuclear perils and the possibility of buy-back coverage. Would it be possible, rather than having a broad exclusion in the basic policy and a limited buy-back on the second policy, to rewrite the exclusion more narrowly and handle the problem by amending the existing policy?

Mr. MURPHY. Mr. Chairman, I assume that is largely a matter of drafting, and the method of doing it up to now has been to take it out and put it back in.

This would be unique in this field if we did it that way. I would not say that anything was impossible, and I think it is a matter that could be discussed; but precedent is on the other side, for what weight that would bring to bear on it.

Representative PRICE. On page 3, you state that the combined capacity of the policy amounts to $61,700,000 per risk, and in addition you believe that there may be a substantial voluntary market on top of this capacity?

What is your estimate of a possible voluntary market on top of the existing capacity?

Mr. MURPHY. It is difficult at this point to give you a dollar estimate. I would like to give you some of the rationale underlying my statement.

In the first place, I think I should make it clear—I believe the record this morning might have been somewhat confused in this respect—that the capacity of the pools will be primary. In other words, the capacity of the pools, which has now been offered, the $61,700,000, will not come in on top of any voluntary coverage. Rather, it will be the other way around. The voluntary coverage will come in on top of the pools in those few cases where it will not be enough.

Now, the reason we feel that there will be a voluntary market is that Mr. Wayne has had some informal discussions with some of the principal marine underwriters, and they have indicated that they would probably participate.

Secondly, in the case of a NEPIA risk, which required more than NEPIA capacity, it was able to obtain substantially more on a voluntary basis.

And thirdly, in respect to these bridges, the NEPIA–MAERP capacity would be in respect to partial losses, so to speak; whereas if an underwriter who was participating through those pools were to come in voluntarily, he would underwrite this on the basis of a total-loss-only consideration, which would enable him to take a fresh look at it. He would not be doubling his exposure, but he would be in effect taking a different kind of risk.

So those considerations underlie our expectation that there would be a considerable voluntary market on top of the pools, where required.

Representative PRICE. Beyond scope, market capacity, and cost, is there not another problem? Public authorities have indicated that there is a question as to the percentage of insurable interest which the insurers will be willing to cover.

Would you comment on this?

Mr. MURPHY. I do not know that I quite understand the question.

Representative PRICE. Well, the public authorities have indicated that there is a question as to the percentage of insurable interest which the insurers will be willing to cover.

Mr. MURPHY. Well, again, I take that question to be just the capacity problem asked in another way.

I have attempted to address myself to the capacity problem, and believe that in practically all cases the voluntary market in excess of the $61 million should, as a practical matter, handle most cases. At least it is our expectation that it would. We will try.

Representative PRICE. Do you have much disagreement or problems in your discussions with the prospective clients as to the premiums, the rate of premium?

Mr. MURPHY. I attempted to pass over that in the least controversial method possible in my statement.

Representative PRICE. I noticed that. I was going to ask you what that would be.

I do not know whether it is a trade secret.

Mr. MURPHY. It is not a trade secret, Mr. Chairman.

We have a situation, as you well know, peculiar, perhaps, to our insurance business, where a trade association such as the one I am representing now does not get into ratemaking; and so any information I am relaying to you I am relaying by others. We do not make rates in our trade association. That is done by Mr. Wayne's group. That is why I asked Mr. Wayne to be with us up here.

Why do you not speak to the rate? You gave it to me. You might as well mention it.

Mr. WAYNE. Mr. Chairman, the rates indicated to date have been 1 cent per $100 for a 10 percent limit of liability, 2 cents per $100 for a 50-percent rate of liability. And last Wednesday, during our discussions, I indicated that the rate would have been 2½ cents per $100 for 100-percent limit of liability, had we been asked to quote for 100 percent coverage.

Representative WESTLAND. Your rates go up on full insurance?

Mr. WAYNE. The liability also increases very materially. In other words, the actual premium goes down in proportion.

That 1 cent per $100, for instance—the premium would be $10,000 for $10 million of coverage on a $100 million risk, and $25,000 for $100 million of coverage.

If my mathematics are correct, that is a ratio of about 4,000 to 1, as between the liability and the premium.

Mr. STANLEY. Another example would be that if we insured 50 bridges for a hundred years at approximately that rate, we would have enough premium to pay for one of them.

Representative PRICE. You are still in negotiation with the toll roads group and bridge group, are you not?

Mr. MURPHY. After last Wednesday's meeting, Mr. Chairman, we indicated to them that we would meet with them. In fact, they asked Mr. Wayne to make an informal exploration of the market, and he has done some of that. And I take it from what was said by prior speakers that we will be in consultation with them on this matter.

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Mr. STANLEY. If I may add one thing: I hope it is well understood that this matter of the large, in fact the vast, majority of shipments which are of low hazard—there is no insurance problem as to market. The rates are very low for that type of coverage. And I do not know that that has been clearly brought out.

This we understand, however, is not adequate to meet the needs and desires of these people.

Representative PRICE. I do not know whether it was adequately brought out, but it has been referred to.

Mr. Toll?

Mr. TOLL. In that connection, I do not know whether you know, or whether we need to ask Mr. Price or somebody from AEC, but does AEC separate out and identify different classes of hazards adequately so that the insurers know what they are dealing with?

Mr. STANLEY. Well, I am not able to answer that, except from an insurance standpoint. There is generally available to all insurers, insurance against onsite contamination from what for want of a better term we will call radioisotopes, commercial radioisotopes. That is, other than special nuclear material, as defined in the act. That is available to anybody.

The type of endorsement that has been offered to the bridges and tunnels has only been offered to the bridges and tunnels.

As for the other type, without knowing just how the separation is made by the AEC in their identification of material—the separation is in the insurance contract. That is, it is very easy, in the general insurance market, to obtain coverage against radioisotope contamination damage.

The exclusion is of damage resulting from special nuclear material.

Mr. TOLL. But if a shipment comes up to a toll facility, they have to know, by easy check, whether or not this is an isotope shipment, which may be covered, or whether it is spent fuel elements, which may not be.

Mr. STANLEY. Agreed. And I am unable to answer what the marketing would be as between the two, or whether they could identify it.

Mr. TOLL. I have one other question I would like to ask, Mr. Chairman.

At the bottom of page 1, where you refer to the buyback policy that is available, and you say that it provides coverage against direct physical loss or damage to the insured property arising out of an accidental nuclear incident, and so forth: Could you say what you mean by the words "direct" and also "accidental"?

Mr. MURPHY. Well, those words, as you will recognize, attempt to be a paraphrase of the endorsement. What we are trying to do here is eliminate, in the use of the word "direct," indirect consequences, something happening off-site which causes damage on-site.

And "accidental" is apart from something which the insured would do purposely, but mainly it is designed to exclude so-called housekeeping oversights.

For example, accumulations which took place over a long span.

As a matter of fact, I think you were there, Mr. Toll, when we had a discussion, last Wednesday, about this language, and we agreed that we would sit down and go over the language with the prospective insureds.

It seemed to me that in that discussion there was a meeting of the minds as to what the coverage should be. There was a quarrel merely in respect to the language. So it is up to us to have our language express the thoughts we apparently agree upon.

We want to exclude housekeeping generally. That is the purpose of the "accidental."

Mr. TOLL. Have you made any progress in drafting this language since the meeting last Wednesday?

Mr. MURPHY. We have not met with them. But again, it was only a week ago, and we had this meeting in prospect. I would expect that we should be able to proceed immediately on that. We are willing to, and ready.

Representative WESTLAND. Have you had this same problem in other areas?

Mr. MURPHY. Not that I am familiar with.

Representative WESTLAND. In New York, for example?

Mr. MURPHY. What class of risk, Mr. Westland?

Representative WESTLAND. Well, these bridges, for example. I come from the State of Washington.

Mr. MURPHY. Well, I cannot speak specifically as to bridges, but since the Bridge, Tunnel and Turnpike Association posed it as a problem, I assume it is a general problem rather than a specific problem.

Representative WESTLAND. Mr. Zarin was speaking for the United States?

Mr. MURPHY. No; Mr. Zarin was not. Mr. Stewart was, as I understand.

Representative PRICE. Since Mr. Stewart is still here, and since we did not tie that down: Would you give us the extent of the coverage that your association was interested in?

I will confess, as Mr. Westland said, that almost all of the testimony has been directed toward the New York area.

Mr. STEWART. Again, for the record, Mr. Chairman, we want to make it perfectly plain that our concern is with the whole country. We have member affiliates in 26 States, and other toll facilities exist in other States.

I am not sure I understand the question, but if it is how far from this facility we have to be concerned——

Is that it? I am sorry.

Representative WESTLAND. I mean: Have you had a problem with the toll bridge authority out in the State of Washington, for example, of obtaining insurance?

Mr. STEWART. Yes, sir.

Representative WESTLAND. That is what I wanted to know.

Mr. STEWART. Emphatically yes.

Representative PRICE. He wanted to know whether it was a national problem.

Mr. STEWART. Emphatically yes.

Representative PRICE. Would you gentlemen care to make any further comments?

Thank you, gentlemen.

Representative PRICE. The next witness will be Mr. Arthur Murphy, of the law firm of Baer, Marks, Friedman, and Berliner.

STATEMENT OF ARTHUR W. MURPHY, ATTORNEY, NEW YORK CITY, PERSONALLY AND ON BEHALF OF THE OFFICE OF ATOMIC DEVELOPMENT OF THE STATE OF NEW YORK

Mr. MURPHY. As you all know by now, my name is Arthur W. Murphy. I am a practicing lawyer in New York City. I appear before the committee today in two capacities.

The first is as an interested observer in the progress of the indemnity legislation, the birth of which, as most of you know, I attended. In that capacity, I will address my remarks to the pending bill, extending protection to contractors for incidents outside the United States, and more generally to certain related problems.

I have also been asked by the Office of Atomic Development of the State of New York to look into the question, about which you have heard this afternoon, raised by the bridge and tunnel authorities, and I would like on behalf of the office to briefly comment on that problem.

At the hearings last July, I testified in favor of the proposal by the Martin Co. that indemnity protection be extended to Government contractors against incidents outside the United States. At that time, I urged that, when Government policy requires the building of nuclear installations outside the United States, the Government cannot, in good conscience, insist that its contractors assume the burden of possibly ruinous liability, which, it must be remembered, might be imposed without regard to fault on the part of the contractors. I see no reason for changing that position, and so, of course, I am strongly in favor of the pending legislation.

As to the specific proposal embodied in H.R. 10775, I have only two comments to make.

First, I would like to echo Mr. Shoults' objection to the limitation of indemnity to $100 million. To be sure, even if the full $500 million coverage were extended, contractors would remain subject to the risk that the limitation on liability might not be respected abroad: but the risk would be substantially greater with the lower level of protection.

While I am in sympathy with the objective of not encouraging raids on the U.S. Treasury, it does seem that to protect the Treasury at the expense of the contractors is inconsistent with the basic purpose of the bill. I can see no reason for treating projects which would come under the pending bills differently from the *Savannah*, where the Government extended the full protection of Price-Anderson to incidents outside the United States.

I should also say that I see no good reason for narrowing the definition of person indemnified—any more than in the case of the *Savannah*. While the suggested language—which would restrict protection to contractors and subcontractors—would seem to cover all of the people with whom we are primarily concerned, one never can tell how restrictive language will be interpreted.

As a practical matter, the likelihood that liability will be assessed on anyone other than the operator or supplier is extremely remote, and I wonder whether we do not do our public image more harm by this approach than is justified by that remote possibility. Again, I would urge that the generous spirit of the *Savannah* amendment be followed.

The root of our problem is, of course, that we cannot unilaterally

limit liability for foreign incidents; what this suggests to me is—not that we should shift the risk to contractors—that we should vigorously push efforts to secure international solutions, such as the IAEA convention and the nuclear ship convention.

Parenthetically, I might note that I understand that our present position on the ship convention is that naval vessels should not be covered. While I am unfamiliar with the policy considerations underlying that position, it does seem pertinent to observe that at least some of the problems we are worrying about here would be eliminated if the convention did apply to such vessels.

The question of adhering to international conventions—as indeed all of the questions raised at these hearings and similar hearings over the past few years—brings to mind that the Price-Anderson Act is now almost 5 years old, and that we must soon begin to think about what should be done after the 10-year "probationary period" is over.

When we first urged passage of the act, we did so in frank recognition that the solution proposed could not be final. The objective was to take care of the immediate problem, and to leave other problems for solution as they appeared. There is no doubt in my mind that Congress achieved its initial objective of removing a roadblock to private participation in the atomic energy program; to that extent, the experiment has been successful. Now, however, the matters left for the future are beginning to take shape, and, without trying to give answers, I would like to suggest some of those questions which deserve consideration over the next few years.

One of them, which will become of increasing importance as we consider adherence to international conventions, is the question of enacting substantive rules of liability. When the act was passed, I urged that that question be left for resolution by the States. At the moment, however, the States do not seem very interested, and if their lack of interest persists, it seems likely that the Federal Government will be asked to consider the adoption of a rule of strict and exclusive liability, at least for indemnified facilities.

A second question, which was mentioned by Mr. Shoults earlier, concerns the fact that some essentially nuclear projects of the Defense Department are not yet covered. As I testified last year, I have always felt that the act was broad enough to include such projects within its scope. In that connection, I should like to point out that a great deal of time and trouble for the Commission and the industry could be avoided if we made the statute self-executing, and eliminated the need for indemnification contracts. One byproduct of such a simplification might be to obviate the conceptual difficulty of having Defense Department contractors enter into contracts with the Commission.

A third problem is that being raised by the bridge and tunnel authorities, which is, in turn, related to the as yet unsolved problem of liability for damage to on-site property. Action on these problems was deferred when the act was under consideration, in the belief that they would be amenable to solution by private insurance; but here, again, the passage of time suggests that it may be necessary to deal with them directly.

A number of other areas could be mentioned, but these should suffice for present purposes. I hasten to add that none of this is, of

course, meant as criticism of the act or its administration, but only as a reminder that our child is growing up, and we must start to think about its future.

Putting on my second hat, I would like to comment briefly on the problem posed by the bridge and tunnel authorities.

I might say as an aside, here, that when these remarks were prepared, I had not had the opportunity of hearing the testimony. I think that I would still like to go ahead with the prepared script, and then if there are any questions about anything that has been said, I will be happy to try to answer them.

I was asked by the New York State Office of Atomic Development to look into the problem only last week, and I am afraid that I have not had an opportunity to examine the subject very deeply; moreover, I understand that there have been meetings between representatives of the bridge and tunnel authorities and the insurers sponsored by the Atomic Energy Commission, from which at least some progress—at least this is what I thought when I wrote it—toward a solution has apparently been forthcoming. I am not so sure after this afternoon.

On the surface, the problem would seem to be solvable within the framework of private insurance. So far as liability insurance is concerned, if there is a pool policy in effect, the bridge and tunnel authorities would be covered. On the other hand, since the reason for writing such coverage out of standard polices was to prevent pyramiding of the potential liability of the insurer, there would seem to be no need to exclude coverage where a pool policy is not in effect. Accordingly, I would think that the liability problem can be solved by writing the exclusion clause a little differently, or possibly by providing pool coverage analogous to the suppliers and transporters policy.

Direct insurance promises to be a more difficult problem. When the indemnity legislation was being considered, it was known that private insurers intended to write out from their direct property policies, coverage against damage from radioactivity. Nevertheless, it was felt that a program designed to provide direct insurance coverage was not warranted, and that the proper method for taking care of the needs of the public would be to protect them indirectly by assuring a financially responsible defendant against whom claims could be asserted.

So far as the general public is concerned, in view of the remoteness of the risk, this approach still seems fundamentally sound. In the case of the bridge and tunnel authorities, however, they will have a direct exposure to radioactive materials being transported over their facilities and, it would seem, that coverage ought to be provided. Here, too, provided that coverage is restricted to accidents in the course of transportation over the facilities, there should be no serious problem of pyramiding.

It does seem fair, however, to point out that the problem has been pending for a number of years, without solution.

The Office of Atomic Development has a very real interest in the free movement of radioactive materials, and takes a serious view of this problem. Mr. Axelrad, Counsel to the Office, testified on this subject last July, and the Office has been active in seeking a solution. The position of the Office is that if the problem is not soon solved by private insurance, it is a proper subject for legislation.

I might add in closing that the interest of the bridge and tunnel authorities, in securing such protection, is not substantially different from the interest of nuclear industry at the time the Price-Anderson Act was pending, and the justification on the part of Congress for providing such coverage is also similar. Here, as earlier, the Government is asking a segment of the public to cooperate in the development of peaceful uses of atomic energy—by permitting the use of their facilities for needed transportation. By cooperating, the bridge and tunnel authorities will be exposing their facilities to a risk which may be uninsurable. If adequate private insurance is not forthcoming, the bridge and tunnel authorities would be squarely within the spirit of the Price-Anderson Act.

Representative PRICE. Thank you very much, Mr. Murphy.

You have certainly been with this problem for a long time. I remember your work on the Columbia study, which was read very thoroughly by most of the members of this committee when we were working on the original indemnification act.

Mr. Morris?

Representative MORRIS. No questions.

Representative PRICE. Mr. Westland?

Representative WESTLAND. Just one question, Mr. Murphy.

On page 4, in your second paragraph, you talk about adherence to international conventions, and then you discuss the problem further and use the word "states." Are you talking about the 50 United States, or are you talking about the foreign nations?

Mr. MURPHY. Where I use the word "states," there, Mr. Westland, I am talking about the 50 United States.

When we were originally considering, in the Columbia report, what shape the program ought to take, we felt that we ought not to ask Congress to pass rules of substantive liability, especially at a time when everybody was searching for ways in which the States might become active in the nuclear field.

As I say later on. I am not sure that the States are going to take any action.

This question comes up in connection with international conventions, because most of them will provide for the adoption of rules of strict and exclusive liability, and if the United States is to adhere to those conventions, it will have to decide whether to enact them or not.

Now, if the States were, for example, to enact a uniform rule of liability, it might be unnecessary for the Federal Government to do anything, but, as matters stand, I would think if we were going to adhere to either of the two conventions which I mentioned, we would have to take some action federally.

Representative WESTLAND. Do you think that the States should have, let us say, a standard policy, liability policy?

Mr. MURPHY. No, a rule of law, rather than an insurance policy; which, of course, is one of the problems that was mentioned by one of the earlier witnesses on behalf of the bridge and tunnel authorities. Under present law they might have to prove negligence on the part of somebody who transported something over their facilities. On the other hand, if the States were to adopt a rule of strict liability, either judicially or by statute, that particular problem would be eliminated,

and I would suppose they would feel happier about the kind of protection afforded them by Price-Anderson as it now stands.

Representative PRICE. Mr. Toll, do you have anything further?

Mr. TOLL. Mr. Murphy, on page 3 you suggest that we should not shift the risk to contractors, but that we should vigorously push efforts to secure international solutions, such as the IAEA convention and the nuclear ship convention.

Does not this bill actually shift the risk from contractors to the U.S. Government?

Mr. MURPHY. Well, it does up to the level provided by the bill; yes.

Mr. TOLL. Once contractors are off the hook, would there be less pressure from contractors in the United States to encourage the United States to join in such an international convention?

Mr. MURPHY. No, I would think that even at $500 million, the contractors would still, simply in order to solve the problems they have outside the contract program, still be very interested in seeing the United States become party to a convention.

Mr. TOLL. This bill might serve to make them less interested in an international solution, and therefore I was wondering whether it would be wise to hold up on this bill for a year or two until those conventions were ready for adoption, and then see what problems were left after the convention.

How would you feel about that?

Mr. MURPHY. I would not think that was such a good idea.

Mr. TOLL. I did not think you would.

On page 4 you have discussed the possibility of the Federal Act providing for strict liability. Some legal scholars and others have pointed up possible problems under the 10th amendment to the Constitution. Would you care to comment on that question?

Mr. MURPHY. It has always seemed to me that if you can justify the constitutionality of the federalization of atomic energy, in the first instance, and I think you can, that there is no serious problem in this area.

We had an analogous question in the case of the limit of liability, that is, whether the limit of liability in Price-Anderson is constitutional. I have no doubt in my own mind that it is. I would have no doubt in my own mind that a statute which established rules of liability, at least to the extent in which Federal indemnity is involved, would be equally constitutional.

Mr. TOLL. Has not the Commission of Uniform State Laws done some work in this area to propose State legislation?

Mr. MURPHY. Well, there was consideration of a uniform State law, and a draft, which was not, I think, completely satisfactory, was presented to the uniform State law commissioners, and it was rejected as a uniform law; but if my recollection is correct, it was adopted as a model law. It is there, and if anybody wants to enact it, fine; but the uniform commissioners assume no responsibility for urging that the law be adopted in any State.

Mr. TOLL. One final question: Can you explain further what you mean by self-executing indemnity provisions in the act? What would be the advantages of such a system, in your opinion?

Mr. MURPHY. Well, I have always thought, and thought when the act was being written, that the requirement of a physical signed contract between a person indemnified and the Atomic Energy Commis-

sion was a mistake. I think that what should have been done was to have the statute simply provide for indemnification above a certain amount, and against certain kinds of liability. If later on there were questions about the scope of coverage, or the "meshing" between private insurance and Government indemnity—the kind of things that people have been wrestling with in and out of the Commission for 5 years—they could have been straightened out in the courts.

I think that the requirement of an indemnity agreement program becomes particularly troublesome in the contract because the Commission has been hung up from time to time on the question of whether or not, if there is a contract in effect with respect to a facility, the umbrella of the indemnity covers only subcontractors or subsequent people.

My own feeling is that if the act had defined the kinds of facilities to which indemnity protection was available, and defined the scope of the indemnity protection, this kind of difficulty could have been avoided.

One of the byproducts of the requirement has been to create the feeling on the part of the Commission and the Defense Department and the other Government agencies that somehow it is their money that they are putting on the line. They are always worried about: How can the Commission put its funds up to protect the Defense Department, and things of that sort. I just think from the point of view of the Government as a whole this all gets to be kind of silly, and that a simple statute would have been a lot easier.

Representative WESTLAND. Mr. Chairman, could I ask one question here?

Representative PRICE. Mr. Westland.

Representative WESTLAND. You speak of insuring, or some sort of an indemnity, on naval vessels. Have you considered the probability, I would think, that in the event the *Savannah* were to blow up, or the *Enterprise*, or a ship of that nature, in a foreign port, or one of the submarines, these things would be handled through administrative action? This country has done it before. Do you think a dollar sign is an answer to that?

Mr. MURPHY. Well, I have never thought that the $500 million limitation should be in the act, either, for that matter.

Representative PRICE. That was strategy.

Mr. MURPHY. Strategy; that is right. I think that, with a certain amount of justice, people felt they could not ask for an open-end commitment.

As to how these things will be handled in the event of an actual catastrophe—I suppose that we will not know until we have one.

The problem of indemnity, though, is to protect the Government contractors who are involved. If only the Government were involved, you could just leave things as you have under the Tort Claims Act, and let people bring suits against the Government; and if there is a disaster, you would mobilize whatever facilities we have for treating with disaster. The only purpose that the indemnity serves is to give people the assurance that they can limit their liability in some way and therefore go on with the job.

Representative WESTLAND. You are speaking of a limit of liability, then, to the contractor that built the *Savannah*, let us say?

Mr. MURPHY. Yes.

Representative PRICE. As of now the contractors of the *Savannah* are protected by the Indemnification Act. The contractors on the *Enterprise* are not.

Mr. MURPHY. I think that is true; yes.

Representative PRICE. Are there any further questions?

Representative MORRIS. Mr. Chairman, I would like to make one observation.

As an engineer serving in the Congress, where the majority of them are lawyers and attorneys, Mr. Murphy makes a statement which intrigues me very much, and that is a matter of a simple statute. I think that would be probably the most impossible task that we could undertake.

Mr. MURPHY. I did not mean to bring in any heresy.

Representative MORRIS. I am sure you did not.

Representative PRICE. Thank you very much, Mr. Murphy.

If there are no further questions, this will conclude the open public hearing on indemnity and reactor safety, and the committee will stand adjourned, subject to the call of the Chair.

(Whereupon, at 3:40 p.m., Wednesday, April 11, 1962, the committee was adjourned, to reconvene upon call of the Chair.)

(The Joint Committee received the following letters to be printed in the record of the hearings:)

WESTINGHOUSE ELECTRIC CORP.,
Pittsburgh, Pa., April 3, 1962.

Hon. MELVIN PRICE,
Chairman, Subcommittee on Research, Development and Radiation, Joint Committee on Atomic Energy, U.S. Capitol, Washington, D.C.

DEAR MR. PRICE: Westinghouse Electric Corp. supports the passage of H.R. 10775 which was introduced by you on March 15, 1962.

Westinghouse is and plans to continue to be engaged in activities under Government contracts, as a result of which a nuclear incident might occur outside the United States. For example, Westinghouse's participation in the NERVA program, from which such an incident might arise, is under a contract with the Government acting through the AEC–NASA Nuclear Propulsion Office. Westinghouse is also a participant, at both prime and subcontract levels, in the naval reactors program, and to a lesser extent, we are involved or will be involved in other programs, such as SNAP. The proposed amendment would provide needed protection for these programs.

As indicated in your analysis of H.R. 9244 upon its introduction last September 15, the amendment would also protect subcontractors and suppliers if an incident arising, for example, out of the operation of nuclear submarines, or the joint AEC–NASA Rover program, and traceable to their activities, in the case of submarines, under an AEC contract or a Navy contract with respect to which the AEC had extended its indemnity coverage, or an AEC–NASA contract, caused damage abroad. It would be well for the illustrative material cited in that analysis to be reaffirmed in the legislative history of H.R. 10775. Automatic coverage for subcontractors and suppliers, as contemplated by the proposed amendment, is extremely important.

I would appreciate your including this letter in the hearing record.

Sincerely,

CHARLES H. WEAVER,
Vice President.

AKRON, OHIO, *April 6, 1962.*

Subject: H.R. 10775.

Hon. MELVIN PRICE,
House of Representatives,
Washington, D.C.

DEAR MR. PRICE: Upon reading H.R. 10775 and some material relating to it, I have misgivings which I would like to forward to you for such consideration as you think they might merit.

Extension of the concept of Price-Anderson indemnity to incidents occurring outside the United States has great superficial attraction, but I wonder if full consideration has been given to the way in which it may be handing a key to the U.S. Treasury to foreign courts.

Suppose, for example, that the USS *Savannah* is steaming up the Thames when a nuclear incident takes place. Suppose further that United Kingdom jurisprudence imposes absolute liability, as many jurisdictions undoubtedly will do, for all damage in the case of a nuclear incident. I cannot tell whether H.R. 10775 restricts its coverage to damages awarded in a U.S. court; but I see nothing in it that restricts it to the U.S. judicial system. If I am correct, then the only remaining step would be for a British court or jury to assess damages, and the only restraint on that assessment would be one of conscience. If the United Kingdom dollar exchange position happened to be a little weak at the moment, do you feel that the assessment would be completely objective?

All the same questions that I have asked in the previous paragraph could similarly be asked even when the nuclear incident was merely alleged and had never actually taken place. Every lawyer is familiar with fake tort claims based on alleged accidents which never actually happened and on alleged injury which was never actually suffered. I find it hard to see why alleged nuclear incidents and alleged nuclear damage should not be even more unmanageable in this respect than conventional accidents because of the general ignorance, which would certainly be characteristic of juries in countries where there are juries and even of courts (for proof consider the wording of the opinions of some of our own appellate courts in nuclear cases) concerning nuclear subjects.

I have asked these questions concerning what I would regard as the most conservative hypothetical case one could imagine, because United Kingdom jurisprudence is the most familiar foreign system to us and it is extremely orderly. Land-based reactors in the Near East or in Asia or in Africa, and to a somewhat lesser extent in Europe, would expose the U.S. Treasury to the vagaries of quixotic jurisprudential systems about which we have little knowledge and which could easily be made by political authorities to contribute substantially to local economic conditions without going through the usual foreign aid loan or grant formalities.

Are we really prepared to underwrite the marketing of U.S. manufactured nuclear equipment in foreign countries at the risk of totally unforeseeable drains on the Treasury in the form of damage judgments, spurious as well as legitimate? Why not force all such litigation, where any indemnity by the U.S. taxpayers is involved, to be brought in U.S. courts? U.S. industrial enterprises can have legitimate fears about the way they may be handled in foreign courts, but by their very nature they have little to fear compared to the way the U.S. Treasury would be likely to be handled. I suggest stringent jurisdictional limitations be written into any legislation on the subject.

Perhaps the point I raise has already been handled in this draft bill, but I do not see it in the limited materials available to me at the moment.

Respectfully,

JOHN F. FLOBERG.

APRIL 12, 1962.

Mr. JOHN F. FLOBERG,
Akron, Ohio.

DEAR MR. FLOBERG: Thank you for your letter of April 6, 1962, concerning H.R. 10775, my bill to extend the coverage of the Price-Anderson Act to incidents occurring outside the United States. I received it on April 10, after the hearings had commenced, and instructed Dave Toll, our staff counsel, to invite you by telephone to testify the following day. I am sorry you were unable to come.

Before I attempt to respond to some of the specific questions raised in your letter, I believe it is important to place this bill in proper perspective. I would emphasize first that H.R. 10775 covers only contractors of the Atomic Energy Commission or those who qualify for Price-Anderson coverage by virtue of participating in a "joint project" under section 170 d. of the act. It therefore does not, in any sense, underwrite the risks of purely private atomic energy activities abroad.

I was impressed with the need for this legislation during testimony at the 1961 "202" and indemnity hearings and, more recently, during the 1962 indemnity hearings held this week. Industrial firms in the United States, as you know, are being called upon, with increasing frequency to participate in nuclear projects important to the defense and space programs of our country. As examples,

I would mention the nuclear submarine program, the military reactors in the Antarctic and Greenland, and the Rover and SNAP projects. The contractors who participate in these projects, as you are undoubtedly aware, expose themselves to the potential risk of ruinous liability. H.R. 10775 offers, at least limited protection in these cases by creating a limit of liability and concomitant indemnity protection set at $100 million.

Enclosed, in case you have not already seen it, is a copy of the bill analysis which I placed in the Congressional Record on March 15, 1962, the day I introduced it.

You are correct in pointing out that lawsuits arising out of nuclear incidents abroad would be subject to the peculiarities of foreign courts. Moreover, as in the United States, there might be fictitious claims. Notwithstanding these justifiable fears, the question nevertheless remains, "Who shall bear the risk?"

The activities which will be covered by this bill are undertaken for, or on behalf of, the U.S. Government. They are essential to the defense and technological leadership of this Government. It seems to me, therefore, that the United States has some obligation to bear at least some portion of the risk.

True, private corporations do not act out of entirely altruistic or patriotic motivations in participating in these projects—there is every expectation of private profit. It is therefore appropriate that they should bear a portion of risk and they do so under the provisions of H.R. 10775 whose umbrella of protection terminates at $100 million. Beyond this, of course, every contractor who supplies a component or a device to the United States in a Government project stakes his business reputation on its successful operation. A failure in the component or device could not only result in enormous immediate liability; it could forever foreclose the possibility of future participation in the field. I believe, therefore, you will agree that the contractor does shoulder a heavy responsibility and that he should not be required to bear it alone.

I share your concern that the Treasury of the United States should not be subject to the whim of foreign judicial systems. I would point out, however, that whether it be United States or one of its contractors which is required to pay extensive damage claims, the result is not essentially different. The assets are in, any event, national resources which will flow to another country. To protect the Treasury, at the expense of the U.S. Government's contractors resources, would not seem to be the ideal solution.

Finally, your suggestion that all litigation, where any Government indemnity is involved, should be brought in U.S. courts, has considerable appeal at first glance. It would, on the surface, assure that the basic litigation in tort would occur within the framework of our own judicial system. As a practical matter, however, we cannot control, by domestic legislation, the course of litigation in a foreign country.

Assume, for example, that an incident from a SNAP satellite device occurred in Italy causing $20 million damage and that the U.S. corporation involved had assets in this amount within the jurisdiction. The provision which you have suggested would undoubtedly have no effect on the Italian plaintiff who would clearly elect to pursue his remedy in Italy against the assets there. Your suggestion would leave the American corporation without any recourse to indemnity and the basic policy underlying H.R. 10775 would be left unfulfilled.

In closing, I would like to thank you for your thoughtful comments. Your comments have stimulated much thought on my part and in the minds of those who are vitally interested in this question. Some of your questions were useful to us during the hearings, and we asked several witnesses for comments on the ideas you raised.

If you desire, I would be pleased to include this correspondence in the record of the 1962 indemnity hearings.

Sincerely yours,

MELVIN PRICE,
Chairman, Subcommittee on Research, Development and Radiation.

CONSUMERS POWER CO.,
Jackson, Mich., April 9, 1962.

HON. MELVIN PRICE,
Chairman, Subcommitee on Research, Development, and Radiation,
Joint Committee on Atomic Energy, Congress of the United States,
Washington, D.C.

DEAR MR. PRICE: In view of your recent announcement that the Subcommittee on Research, Development and Radiation will hear testimony on H.R. 9244 and H.R. 10775 on April 10–11, we wish at this time to reaffirm our belief in the desirability of amending the Atomic Energy Act so as to insure indemnity protection for damages caused outside the United States as a result of nuclear incidents occurring within the United States.

In hearings before the Subcommittee on Legislation on June 10, 1960, and in letters to Mr. David Toll and Mr. Chet Holifield dated June 14, 1960, and May 10, 1961, respectively, Mr. J. H. Campbell, president of Consumers Power Co., stated that this company was proceeding with its Big Rock Point project in reliance upon the opinion of the General Counsel of the Atomic Energy Commission that existing law provides such indemnity protection. However, because of certain expressions of doubt based largely upon language appearing in the Joint Committee report which accompanied the Price-Anderson Act, Mr. Campbell suggested a revision of Section 11 o. of the Atomic Energy Act of 1954 designed to clarify this matter and make it certain that such protection is afforded by the act. The proposed amendment to section 11 o. contained in both H.R. 9244 and H.R. 10775 accomplishes this objective. I therefore strongly endorse this proposed amendment and earnestly urge your subcommittee to act upon it favorably.

Yours very truly,

A. H. AYMOND, JR., *Chairman of the Board.*

CHAMBER OF COMMERCE OF THE UNITED STATES,
Washington, D.C., April 9, 1962.

HON. MELVIN PRICE,
Chairman, Subcommitee on Research, Development, and Radiation,
Joint Committee on Atomic Energy, Washington, D.C.

DEAR MR. PRICE: The Chamber of Commerce of the United States takes this opportunity to present its views on H.R. 10775 to amend the Price-Anderson indemnity provisions of the Atomic Energy Act.

The principal change H.R. 10775 would make would be to extend, for Atomic Energy Commission contractors and their suppliers, the indemnity protection against ilabilities for domestic nuclear incidents which is presently provided by the act to nuclear incidents occurring outside of the United States.

The national chamber supports the purpose of this bill to assure proper protection to contractors and their suppliers who may be subjected to potential liability for nuclear hazards outside of the United States by reason of work on Government atomic projects. The lack of this protection in the face of the steadily increasing foreign atomic activities of the Government, which involve the potential of worldwide liabilities in excess of the amounts available through private insurance, has been a source of increasing and serious concern. In addition, the chamber is deeply concerned with the failure of the Commission to require underlying financial protection in connection with indemnity agreements entered into with commission contractors pursuant to the provisions of the Price-Anderson Act. Consequently, the national chamber's view is that the extension of indemnity which would be effected by H.R. 10775 should not deprive private insurers of their present opportunity to afford such basic insurance as is available in this new area.

It is the position of the national chamber that enactment of H.R. 10775 in terms which would assure the required indemnity protection above adequate levels of private insurance would be in the interests of the United States and of the community of Government suppliers to which it would apply.

The above stated views are based on recommendations of our Committee on Commercial Uses of Atomic Energy, concurred in by our Insurance Committee, and approved by the national chamber's board of directors on February 23, 1962.

We would appreciate it if you would make this letter a part of the record of the hearings on liability, indemnity, and reactor safety.

Sincerely yours,

THERON J. RICE,
Legislative Action General Manager.

WASHINGTON, D.C., *April 20, 1962.*

Hon. MELVIN PRICE,
House Office Building,
Washington, D.C.

DEAR MR. PRICE: I have noticed that in Mr. Vogel's testimony before the Joint Committee he throws doubt on the ability of the U.S. legislation to establish a limit of liability for a nuclear incident abroad.

I want to let you know that I concur with Mr. Vogel's remarks, and that I believe his suggestion of having the limitation that of the country where the incident occurs is preferable.

In examining possible bases for limitation of liability for the Price-Anderson bill, the only source of authority which I could find was bankruptcy law. It did not seem possible that any company could survive a $500 million loss. A $100 million loss might be absorbable—though with difficulty.

I would also like to suggest that the legislation be drafted so as to be in existence only until the IAEA Convention is enforced.

Sincerely yours,

GEORGE NORRIS, Jr.

NATIONAL ASSOCIATION OF MANUFACTURERS
OF THE UNITED STATES OF AMERICA,
New York, N.Y., May 1, 1962.

Hon. MELVIN PRICE,
Chairman, Subcommittee on Research, Development, and Radiation, Joint Committee on Atomic Energy, Washington, D.C.

DEAR MR. PRICE: The Nuclear Energy Committee of the National Association of Manufacturers wishes to take this opportunity to comment on H.R. 10775 which would amend the Price-Anderson indemnity provisions (Public Law 85–256) of the Atomic Energy Act.

This legislation would provide indemnification to contractors, or subcontractors at any tier, for nuclear incidents occurring both inside and outside of the United States and further would establish $100 million as the limit of Government indemnification liability for incidents occurring outside of the United States.

The NAM Nuclear Energy Committee supports the principle underlying H.R. 10775. We are gratified to note the clarification of indemnity coverage for contractors and subcontractors on the domestic level. Furthermore, we are pleased that action is being taken on the international level as well. These provisions are in line with suggestions we made in 1957 at the time of consideration of legislation that eventually became the Price-Anderson amendment to the Atomic Energy Act.

In a policy position, "International Aspects of Peaceful Development of Nuclear Energy," adopted by the NAM board of directors on February 11, 1960, it is stated, in part, "Prompt solution to the problem of adequate insurance or indemnification is necessary in the foreign field. Unless U.S. industry can be assured of adequate financial protection against liability for damages resulting from a nuclear accident, U.S. firms cannot supply the foreign market without great risk."

Although we favor the basic principles of H.R. 10775, we would like to suggest that you consider a modification to the bill under which the AEC would be required to utilize the capabilities of private insurance protection for its contractors. The indemnity protection thus would come into play only in those instances where liability claims exceeded private insurers' capabilities.

The utilization of private insurers would be in the best interests of the United States as a whole and in keeping with the stated policy of the Government to utilize private facilities whenever possible. It is also in keeping with our private facilities whenever possible. It is also in keeping with our private enterprise system.

The limit of liability of $100 million for oversea incidents may be effective only if provided for in the laws of the countries involved. To our knowledge no foreign law now would provide automatic limit of liability to accidents involving contractors or subcontractors of the U.S. Government. However, since one of the principal objectives of H.R. 10775 is to assure adequate financial coverage for the public in the event of a catastrophic accident, we presume that additional legislation would be passed in the event that liability exceeded the $100

million figure. Other than to comment on this matter, we do not wish to express an opinion as to the most appropriate dollar ceiling for liability.

In summary, we support the principles underlying H.R. 10775 and urge favorable action on it with the modification concerning use of private insurers as outlined above. We appreciate the opportunity to express our opinions about this piece of legislation and request that this letter be incorporated in the record of the hearings on H.R. 10775.

Sincerely yours,

GEORGE W. WUNDER,
Chairman, Nuclear Energy Committee.

AMERICAN FEDERATION OF LABOR AND
CONGRESS OF INDUSTRIAL ORGANIZATIONS,
Washington, D.C., May 1, 1962.

Representative CHET HOLIFIELD,
Chairman, Joint Atomic Energy Committee,
Washington, D.C.

DEAR MR. CHAIRMAN: I wish to have the following statement on behalf of the American Federation of Labor and Congress of Industrial Organizations dealing with H.R. 8708 and S. 2419 included in the record of the hearings recently conducted by the Joint Committee on Atomic Energy on this legislation.

H.R. 8708 and S. 2419 are identical bills which would amend the Atomic Energy Act of 1954 to make certain administrative and procedural changes in the Commission's regulatory process dealing with health and safety of workers and the general public.

1. The legislation would add a new section 191 to establish an Atomic Safety and Licensing Board composed of three members and appointed by the Atomic Energy Commission. The Board would be empowered to hold hearings, make intermediate and final decisions dealing with licensing and other regulation. The Board could be designated as an ad hoc or permanent piece of administrative machinery.

Section 191b provides that members of the Board can be appointed from private life, from the Commission staff, or from other Federal agencies.

Section 2 of the pending legislation would amend subsection 189a of the 1954 act to provide for hearings on each application for a construction permit for power or test reactors. It would allow issuance of an operating license after granting of a construction permit in the absence of adversary request by affected person, accompanied by 30 days' notice and publication of intent to do so in the Federal Register. This section would also allow waiving of the 30 days' notice and publication, should the Commission determine that amendments to construction permits or operating licenses did not involve significant hazards.

Section 3 of the bill requires that the Advisory Committee on Reactor Safeguards review applications for construction permits or operating licenses for power or testing facilities, or for such amendments specifically referred to ACRS by the Commission. ACRS would be required to submit a report on such matters as a part of the public record, except with respect to aspects of security classification.

The AFL–CIO endorses this legislation and urges that it pass, with these suggestions for strengthening:

(*a*) We urge that section 1 of this bill be expanded to give authority to the Atomic Safety and Licensing Board to review proposed standards and regulations of both the AEC and its contractors and for licensed users of AEC owned fissionable materials.

(*b*) We also urge consideration of an amendment which would establish the Atomic Safety and Licensing Board as the Federal agency responsible for reviewing and unifying Federal radiation standards, now scattered among a number of different Federal agencies. In effect, this would amend Public Law 86–373 to remove certain powers of this kind from the Federal Radiation Commission.

We are pleased that H.R. 8708 and S. 2419 embody some of our major proposals for improving the Commission's regulatory process which we presented to the Joint Committee at its hearings held on this matter in June of last year.

Labor believes that adoption of this legislation with the two amendments above, will constitute a substantial improvement of the AEC regulatory process in the interest of workers and the general public.

Sincerely yours,

ANDREW J. BIEMILLER,
Director, Department of Legislation.

PACIFIC AMERICAN STEAMSHIP ASSOCIATION,
San Francisco, Calif., May 10, 1962.

Re H.R. 10775.

Hon. JOHN O. PASTORE,
Vice Chairman, Joint Committee on Atomic Energy,
Senate Office Building, Washington, D.C.

DEAR SENATOR PASTORE: We are happy to note that the Joint Committee on Atomic Energy is having hearings on H.R. 10775 which is designed to extend the liability and limitation benefits of the Price-Anderson Act to contractors and subcontractors of the AEC outside of the United States.

The Pacific American Steamship Association represents the majority of the U.S. flag dry cargo carriers that operate from the west coast of the United States, and we have become acutely aware of the problems of obtaining adequate liability coverage for the transportation of atomic materials on the high seas.

Our concern with the problems of transporting atomic materials covers a long period of time. To help obtain answers to some of the industry problems we sponsored a 3-day symposium in San Francisco on the "Ocean Transportation of Atomic Materials" during July 1961. The wide interest and success of this forum led to a similar discussion in New York in January 1962. These forums were attended by representatives of the steamship industry, shipyards, U.S. Coast Guard, Atomic Energy Commission, insurance groups, legal profession, stevedores, and other interested parties.

One clear problem arose out of these discussions. The ocean carriers of atomic materials had a definite need for some form of indemnity provision such as currently enjoyed by the domestic land carriers under the Price-Anderson Act.

The United States is expending large amounts of money, material, and effort to expand the worldwide peaceful use of atomic energy and this program should not be hampered by restrictions in oversea transportation, and as H.R. 10775 appears to provide the coverage necessary for the great bulk of ocean atomic shipments we wish to go on record as heartily endorsing this bill.

Very truly yours,

RALPH B. DEWEY, *President.*

APPENDIXES

APPENDIX 1

U.S. ATOMIC ENERGY COMMISSION REPORT TO THE JOINT COMMITTEE ON ATOMIC ENERGY ON OPERATIONS UNDER SECTION 170 OF THE ATOMIC ENERGY ACT OF 1954, AS AMENDED, MARCH 31, 1962

The Atomic Energy Commission submits herewith its fifth annual report to the Joint Committee on Atomic Energy on operations under section 170 of the Atomic Energy Act of 1954, as amended. As in previous years, the report covers indemnification of activities under license by the Commission, indemnification of activities conducted under contract with the Commission and international and maritime indemnity. Similarly, the report includes a summary of the operations of the Advisory Committee on Reactor Safeguards.

PART I. INDEMNIFICATION OF LICENSEES

During the past year the Commission's operations under the act consisted, in the main, in the completion of the basic indemnity regulations. Evaluations were completed or initiated with respect to the question whether indemnity should be extended to licensees of certain materials. Negotiations were pursued with NELIA and MAELU looking toward the execution of a contract providing for claims settlement services. These and other actions taken during the year are described in this report.

Regulations

An amendment was made effective on July 23, 1961, to prescribe the definitive forms of indemnification agreements to be executed between the Commission and (*a*) licensees furnishing insurance policies as proof of financial protection, and (*b*) licensees furnishing proof of financial protection in the form of their own resources. These two amendments were described in detail in the Commission's 1961 report to the Joint Committee.

The following actions were also taken by the Commission with regard to amendment of part 140:

(*a*) Adopted an amendment approving the endorsement proposed by the Nuclear Energy Liability Insurance Association (NELIA) and the Mutual Atomic Energy Liability Underwriters (MAELU) to be added to all nuclear energy liability insurance policies.

(*b*) Adopted the forms of the indemnity agreements to be executed by the Commission with (*a*) Federal agencies and (*b*) nonprofit educational institutions.

(*c*) Adopted an amendment to the approved forms of indemnity agreement eliminating indemnity coverage for so-called onsite property pursuant to Public Law 87–206 which amended the definition of "public liability" under section 11 u. of the Atomic Energy Act.

Adoption of NELIA–MAELU amendment endorsement

On August 4, 1960, NELIA and MAELU requested the Commission's approval of a change in the facility form of their policy. The proposed change was an amendatory endorsement which was intended to eliminate certain possible ambiguities occasioned by use of "companies" in different senses in different parts of the policy.

The notice of proposed amendment containing the endorsement was published in the Federal Register on April 14, 1961, with a 30-day period provided for public comment. That period expired on May 14, 1961, with no public comments having been received. In view of the fact that the endorsements did not appear to effect material changes in the provisions of the policies, the amendment was made effective upon publication on July 26, 1961.

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Indemnity agreement forms for Federal agencies and nonprofit educational institutions

On April 22, 1961, the Commission issued for public comment a proposed amendment to part 140 which would establish the form of indemnity agreement to be executed by the Commission with Federal agencies and nonprofit educational institutions subject to part 140. The 60-day comment period expired on June 22, 1961. Adoption and publication of the proposed forms was delayed in order that the amendment making the forms effective could be combined with amendments to implement Public Law 87–206. These amendments to part 140 became effective March 29, 1962.

The forms of indemnity agreement which the Commission will execute with Federal agencies and nonprofit educational institutions are similar to those in use for execution with licensees who furnish financial protection with the exception of changes that are made because Federal agencies and nonprofit educational institutions are not required to furnish financial protection.

Damage to "onsite" property

The 1961 report on indemnity operations described the Commission's recommendations to Congress that Congress adopt an amendment to the indemnity provisions of the 1954 act to eliminate coverage of liability for damage to property, which is at the site of, and used in connection with, the licensed activity.

On September 6, 1961, Public Law 87–206 was made effective. This law amends the definition of "public liability" to eliminate indemnity coverage for such onsite property. The relevant provision of the Price-Anderson Act is section 11u. of the Atomic Energy Act of 1954, as amended.

Appropriate changes were made in the forms of the indemnity agreements to be entered into with licensees furnishing proof of financial protection, and with licensees who are educational institutions or Federal agencies.

Indemnification of materials licensees

In the indemnity report to the Joint Committee for 1961 there was discussion of the question whether the Commission should exercise its discretionary authority to require proof of financial protection from and to indemnify licensees, such as reactor fuel processors and fabricators, who possess and use substantial quantities of unirradiated enriched uranium.

Following its consideration of the question, and of public comment thereon, the Commission concluded that extension of Government indemnity to licensees of unirradiated enriched uranium was not justified at the present time inasmuch as the consequences of a maximum credible accident would not be of such magnitude as to exceed the presently available underwriting capacity of the private insurance industry.

The Commission staff is currently studying the possible extension of financial protection requirements and Government indemnity to licensees who handle plutonium, uranium 233, and megacurie quantities of byproduct material, all of which present safety considerations different from those involved in the processing and fabrication of unirradiated enriched uranium.

Administration of licensee indemnity

Formal indemnity agreements have been executed with 10 of the 20 private organizations subject to the financial protection requirements of part 140. The form of indemnity agreement with the private organizations is that contained in section 140.76, appendix B of part 140. Of the 10 indemnity agreements thus entered into, 2 provide "storage only" coverage for special nuclear material for reactors which have construction permits. These agreements will be amended to cover all the licensed operations of the reactors when the proper operating licenses are issued.

With the Commission approval of the indemnity agreement forms to be entered into with nonprofit educational institutions and Federal agencies (apps. D and E of pt. 140), the Commission will undertake the execution of definitive indemnity agreements with these groups. There are currently 34 nonprofit educational institutions and 7 Federal agencies that are indemnified under the provisions of the Price-Anderson Act. These licensees, as well as those subject to the financial protection requirements, with whom formal indemnity agreements have not yet been signed, continue to operate under the short-form interim indemnity agreements which restate the appropriate provisions of the Price-Anderson Act and provide for their being superseded by the formal indemnity agreements.

Execution of the indemnity agreements has proceeded without difficulty although some questions have been raised with regard to description of "the location" (for the purposes of the indemnity agreement), of the indemnified facility. These questions are being resolved satisfactorily on a case-by-case basis.

The Commission has received no claims under indemnity agreements with licensees. Indemnity fees charged by the Commission since the inception of the indemnity program totaled $115,458.11 as of February 28, 1962.

PART II. INDEMNIFICATION OF ACTIVITIES CONDUCTED UNDER CONTRACT WITH THE COMMISSION

As reported in previous years, under authority contained in section 170d. of the Atomic Energy Act of 1954, as amended by Public Law 85–256, 85th Congress, the Commission adopted a policy of entering into agreements of indemnification extending the statutory indemnity:

(*a*) To AEC contractors engaged in the operation of nuclear reactors;

(*b*) To AEC contractors engaged in operating production or utilization facilities;

(*c*) To AEC construction contractors whose work may place them under the risk of occurrence of a substantial nuclear incident; and

(*d*) Subject to authorization by the General Manager, to any other AEC contractors, other than those specified in a., b., and c., who engage in activities involving the risk of occurrence of a substantial nuclear incident.

In carrying out this policy the Commission has executed statutory indemnity agreements as to 59 contractors. These agreements cover all of the major AEC installations operated by AEC contractors who are eligible under Commission policy for indemnity agreements.

To date there have been no claims filed under the statutory indemnity and consequently no expenditure of money.

With respect to the administration of insurance claims under section 170d. of the Atomic Energy Act of 1954, the Commission has a contract with the National Association of Independent Insurance Adjusters to provide such services when called upon to do so. The claims service to be furnished by this organization is available for either contractor or licensee activities. The Commission is continuing to negotiate with NELIA and MAELU for a contract to provide claims service in this area.

PART III. INDEMNITY AND INSURANCE IN TRANSPORTATION OF RADIOACTIVE MATERIALS

Highway and tunnel authorities

Approximately a year ago the Commission was informed by representatives of the New York State Committee on Transportation of Radioactive Materials that such agencies as the New York State Thruway, Port of New York, and Triborough Bridge Authorities were seriously concerned about their inability to obtain "first person" and "loss of revenue" insurance which they believe is necessary to protect against the risk of nuclear incidents occurring in the transport of radioactive materials over or through their facilities.

While the authorities are aware of the protection afforded by Price-Anderson as regards transportation of material to or from an indemnified facility, their problem is that there must be a determination of liability. They believe that they must have a type of protection which enables them immediately to recover for damage to their property, regardless of liability, so as to minimize disruptions to their operations. It must also be noted that Price-Anderson is not presently applicable to all shipments of radioactive materials.

The AEC staff has worked with representatives of the authorities and the insurance industry over the past year to assist, wherever possible, in dealing with the authorities' problem.

As a result of discussions between the authorities and the insurance industry, a limited form of "first party" insurance has been made available; however, we understand that it does not fully satisfy the authorities as to scope, amount of coverage and reasonableness of rates.

One proposal which has been brought to our attention is that the Price-Anderson legislation (sec. 170 of the Atomic Energy Act) be amended to indemnify public corporations and to compensate public corporations for first party property damage or loss arising out of or resulting from the radioactive, toxic,

explosive or other hazardous properties of radioactive materials, including but not limited to those materials now being regulated by the Commission.

Rail transportation

Meetings have also been held in the past year with representatives of the Traffic Executive Association-Eastern Railroads, to discuss a number of indemnity matters of concern to the association. These matters chiefly involve the extent of Government indemnity coverage available to the railroads and questions of interpretation of AEC indemnity regulations. Our staff is working with the association on these matters.

Information meetings

The Commission believes that one important way in which it can be helpful to carriers and other transportation authorities is in providing information on the nature of hazards associated with the transportation of radioactive materials and the safeguards required by AEC to control such hazards for the protection of public health and safety.

In recent months, AEC has cooperated with the ICC, FAA, Coast Guard, and Council of State Governments in conducting regional meetings with State and local officials, including representatives of bridge, turnpike, tunnel, and port authorities, for that purpose. The meetings have been well attended, and we believe, have served their intended purpose.

PART IV. MARITIME INDEMNITY PROBLEMS

NS "Savannah" foreign acceptance agreements

As reported to the Committee on December 14, 1961, an acceptance agreement with Norway is in the final stages of negotiation. A similar agreement is also in final negotiation stages with the Royal Government of Greece. Certain aspects of the indemnification arrangements contained in the German agreement still remain to be resolved, but it is expected that a final solution of these problems will be accomplished in the near future.

Several European governments which had asked for delays in acceptance agreement negotiations in the belief that an international nuclear ship convention could be formulated at Brussels in April 1961, have again agreed to consider liability provisions. These are the Netherlands, Belgium, and France. The Government of Sweden has indicated its willingness to accept the liability provisions offered by the United States and its intention to pass a law applicable to the *Savannah* to overcome impediments in the Swedish liability laws.

Negotiations with the United Kingdom on liability provisions related to the *Savannah* have not progressed during the past year.

It is believed that substantial progress can be made with other acceptance agreements after the conclusion of those with Norway, Germany, and Greece.

Private insurance protection for nuclear ships

The General Agent, operator of the *Savannah*, has obtained quotations on protection and indemnity coverage for the *Savannah*. A quotation for nuclear coverage was offered with a maximum of $1 million at a cost of $10 per ton or $130,000 annual premium. Conventional coverage, with a maximum of $2,500,000 at $7.50 per ton or $95,000 annual premium will probably be obtained by Maritime Administration.

PART V. PROBLEMS OF FOREIGN INDEMNITY

During the past year, the Commission continued to participate, in cooperation with other agencies of the U.S. Government, in the development of adequate international standards to govern civil liability for nuclear damage and in the encouragement of other governments in their efforts to provide adequate financial protection to the public, the operators of nuclear facilities, and the suppliers of nuclear equipment.

The most important developments of the year concerned the drafting of two international conventions. In the first instance, representatives of the member states of Euratom agreed upon a draft convention to supplement the Paris (OEEC) Convention of July 29, 1960, and invited other signatories of the latter to consider it. In the second instance, 53 countries participated in the drafting of a convention regarding the civil liability of the operators of nuclear ships, and a diplomatic conference for final drafting and signature was scheduled for May 1962.

Progress was also made in other areas of the nuclear liability field. An intergovernmental committee convened by the International Atomic Energy Agency produced a revised version of a convention designed for worldwide applicability in respect to land-based facilities. The Paris (OEEC) Convention was ratified by Spain and Turkey, and will come into effect upon three more ratifications, which are expected to be accomplished in the near future. Relevant national legislation was enacted in Japan and in the Philippines and was introduced in a number of additional countries.

The Commission has again reviewed the availability of third-party liability protection with respect to its effect on current reactor projects which are underway overseas and which involve power or power demonstration reactors of U.S. design and manufacture. There are no cases in which the physical progress of these projects is being held up due to the lack of suitable third-party liability protection in the other countries. In the case of the small Belgian power reactor, BR–3, the transfer of the reactor core (which was being held up at the time of last year's report) was effected in December 1961, under the condition that the reactor would not go to full power until the pending Belgian ratification of the Paris (OEEC) Convention is acomplished and the convention comes into effect. It is anticipated that this will take place well in advance of the desirable time for taking the reactor to full power.

There follows a brief summary of the more important aspects of the developments mentioned above.

Euratom supplementary convention

Following general approval by the Euratom Council of Ministers in February 1961, the draft supplementary convention, which presupposes the prior or simultaneous coming into effect of the Paris (OEEC) Convention, was considered by the permanent representatives to Euratom with respect to several unresolved problems. The main problem concerned the allocation of the responsibility for damage between $70 million and $120 million in amount, which is to be borne collectively by signatories of the convention. (It will be recalled that compensation for nuclear damage under this convention will be provided in the first instance from the private financial security maintained by the operator in accordance with the Paris (OEEC) Convention. This will be supplemented by a second stage of unilateral state intervention up to a total of $70 million, and finally by collective coverage of the signatory governments from that level up to $120 million.) After a rather prolonged negotiation, agreement was reached on an allocation formula which gives equal weight to gross national product and installed nuclear capacity, respectively.

In November 1961, the draft convention was officially transmitted to all signatory states of the Paris (OEEC) Convention and to the United States. The signatory states were urged to participate in the early conclusion of the supplementary convention and invited to attend a Euratom-sponsored information meeting on the text in Brussels on December 20. At this meeting representatives of the Euratom States, the United Kingdom, Sweden, Denmark, Norway, Switzerland, and Spain were present, and Austria also showed interest although it was unable to attend. It has been reported that there was general agreement concerning the basic provisions of the convention and that experts from the above countries are preparing for a negotiating meeting to consider specific proposals for revision.

From the U.S. standpoint the only problem of major significance concerns the termination provision. While the convention enables parties to withdraw after 10 years, it calls for consultation among the parties on measures to provide comparable coverage to that afforded by the convention in the event of termination during the normal life of a facility. Over the past 2 years, the United States has made known its hope that explicit provisions might be developed, calling for continued protection of facilities begun while the convention was in force. The governments concerned have been unwilling to commit themselves in an international agreement to a specified mode of protection for domestic installations for an indefinite period. On the other hand, these governments have expressed, through the provisions cited above and in other statements, their feeling of obligation to afford, in event of termination, a protective system for existing installations. In addition, as discussed below, a number of the governments have in existence or in process pertinent national legislation which could afford continuing protection.

Maritime convention

The Diplomatic Conference on Maritime Law, which was in session in Brussels from April 17 through 29, 1961, prepared a draft international convention on the liability of operators of nuclear ships based on drafts sponsored respectively by the International Atomic Energy Agency and the International Maritime Committee. The U.S. delegation to the Brussels conference included Commission representatives as well as representatives from the Maritime Administration, the Department of State, the Department of Justice, and private law firms.

In its final resolution, the conference (1) submitted the draft to governments for review and comment, (2) established a Standing Committee of 14 nations including the United States to receive and correlate comments, and (3) proposed the convening of another diplomatic conference at the earliest feasible date for a final examination of the text and opening the convention for signature. The conference decided to submit its draft to governments for further review because, although a majority of the participants had reached agreement on every major question except jurisdiction for suit and enforcement of judgments (which there had not been time to consider adequately), the majority also felt that the resulting language required further review before the convention could be opened for signature.

The basic objectives of the United States at the conference were to establish a convention which would (1) channel an exclusive and absolute liability for nuclear damage to the nuclear ship operator, (2) limit the aggregate liability of the operator arising out of a single nuclear incident to $100 to $125 million, (3) require governmental indemnification up to such a limit to the extent the operator's liability exceeds the insurance or other private financial protection required of him, (4) limit rights of recourse to actions against the individual who intentionally caused the nuclear damage, (5) see to the adoption of a satisfactory provision on jurisdiction for suit and enforcement of judgments, and (6) exclude nuclear warships from the coverage of the convention. The United States was successful on the first four objectives and unsuccessful on the sixth. The conference did not decide the fifth point.

The U.S. delegation made determined efforts to urge the exclusion of warships from the convention. Specific proposals to meet the U.S. position were defeated and the inclusion of warships was approved. It is expected, therefore, that this will be a matter of discussion at the next conference.

The Standing Committee met on October 9 through 13, 1961, and representatives of the United States participated in its work. It considered alternative proposals dealing with jurisdiction for suit and enforcement of judgments, which had not been decided at Brussels, and certain new articles which had been proposed by various governments for addition to the convention. The Committee submitted a report of its discussions and recommendations, including draft texts, to all of the governments which had been represented at the Brussels conference. The Committee recommended that the diplomatic conference be scheduled in April or May and that it last two weeks.

The conference has been scheduled for May 14 to 25 in Brussels, and the United States has agreed to participate. The U.S. position on the convention is being reviewed by the interdepartmental committee established last year for this purpose. As soon as the position is definitive the Joint Committee will be informed of its substance.

IAEA convention for land-based installations and transport

The International Atomic Energy Agency has been working since 1958 to draft an international convention on minimum standards regarding civil liability for nuclear damage connected with land-based nuclear installations and the transport of radioactive materials to and from such installations. Previous reports to the Joint Committee have touched on the preliminary work that has been done by the IAEA with support from the United States and on the difficult problems of reconciling widely divergent legal systems and economic situations to produce a widely acceptable and yet adequate convention.

Significant progress on this convention was made, nevertheless, by an intergovernmental committee which met in Vienna on May 3 to 13, 1961, at the request of the IAEA's Board of Governors. This Committee consisted of representatives of Argentina, Brazil, Canada, the Czechoslovak Socialist Republic, Finland, France, the Federal Republic of Germany, India, Japan, Poland, the U.S.S.R., the United Arab Republic, the United Kingdom, and the United States. A number of additional countries and international organizations were represented by observers. The Commission was represented on the U.S. delegation.

The draft convention produced by the intergovernmental committee is similar in approach in many respects to both the Paris (OEEC) Convention and the Brussels Convention for Maritime Reactors. The definitions have largely been correlated. Absolute liability is channeled to the operator; however, a state may determine that other persons shall also be liable on the condition that the limit of liability is not exceeded and the persons liable are covered by the operator's financial security.

Although there was general agreement that the establishment of the liability limit should be left for a diplomatic conference, all delegations which expressed opinions (except the United States) spoke in terms of the OEEC Convention levels of $5 to $15 million, which it was hoped would be covered by private insurance. The U.S. delegation strongly urged a liability limit of $125 million per incident with the attendant need for governmental indemnification.

The Committee was unable to reach unanimity on two clauses; namely, whether limitation of liability should be per incident or per installation, and whether recourse rights should be limited to the individual who acted with the intent to cause damage (the U.S. position) or broadened to include negligent suppliers of materials and services. Alternate provisions were drafted on these items.

The duration and termination provisions were not discussed for lack of time. However, a U.S. proposal providing for continued application of the Convention's standards during the lifetime of a nuclear facility notwithstanding the termination of the convention was included in the committee's report.

The draft convention prepared by the Committee and its report were submitted at the end of last year to all member states, with a request for comments.

Meanwhile, the question of convening a diplomatic conference to consider the draft convention was considered by the IAEA Board of Governors in March 1962, and it was decided to convene a conference early in 1963 in Buenos Aires. As soon as the U.S. position for this conference has been definitive, it will be brought to the Joint Committee's attention.

National legislation

The national legislation in effect in the United Kingdom, the Federal Republic of Germany, Switzerland, and Sweden was described in previous reports.

Japan.—Japanese legislation concerning nuclear damage indemnity was enacted on June 8, 1961. Under this legislation, absolute liability is channeled to the operator of the nuclear facility, who must make arrangements for the compensation of nuclear damage. These arrangements include liability insurance, and indemnity contract with the Japanese Government providing for the payment of losses not covered by insurance, and a deposit with the Government of sufficient collateral to guarantee the payment of claims aggregating up to 5 billion yen (approximately $14 million) per installation. If the aggregate claims exceed this amount, the Government may provide the operator with aid to compensate injured parties.

The Japanese Government is on record to the effect that it does not intend to seek subrogation against a supplier in cases where it has indemnified parties as the result of a nuclear incident. Other questions concerning this legislation have been raised but there is a feeling, both in the United States and in Japan, that helpful interpretations or amendments will be worked out, based on Japanese experience under the present law and with the international agreements being formulated at Brussels and Vienna.

Philippines.—Legislation of a very limited nature was passed in the Philippines. It provides only that the Government will indemnify and hold harmless all suppliers of goods and services connected with the Philippine nuclear reactor project. The Government reserves the right of recourse in case of willful misconduct or bad faith on the part of responsible officers. The limit of the Government's indemnification responsibility is 5 million pesos (about $2.5 million) per incident.

Italy.—The Italian legislation introduced in 1960 as part of the nuclear energy bill was abandoned. The United States has been informed that the Italian Government plans instead to ratify the Paris (OEEC) Convention and the Euratom supplementary convention as soon as the latter is completed.

Other countries.—Legislation was in preparation in France, the Netherlands, Austria, Spain, Norway, Denmark, Israel, South Africa, Venezuela, and possibly other countries. In addition, several governments had the nuclear liability problem under consideration although the preparation of legislation had not

yet begun. A number of governments having no legislation in effect have agreed to hold harmless the suppliers of goods and services connected with specific reactors located in those countries.

PART VI. OPERATIONS OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

This part of the report summarizes the activities of the Advisory Committee on Reactor Safeguards during the period April 1, 1961, through February 28, 1962. It includes a brief discussion of each of the reactor projects referred to the Committee during that period for review and advice. It also describes briefly reactor safety matters of broad significance and applicability on which the Committee has also rendered advice to the Commission.

In addition to those reactors (power and testing) required by section 182b of the 1954 act to be reviewed by the Committee, the Commission has continued the procedure of obtaining the Committee's advice on all major reactor projects built under contract with the Commission and on all major Department of Defense reactors reviewed by the Commission. The Committee is kept currently informed in addition on safety reviews of the small research reactors as well as of other staff activities concerned with reactor safety.

Through February 28, 1962, the Advisory Committee held seven meetings. In the course of its meetings, the Committee reviewed and advised the Commission concerning the safety aspects of 8 reactor projects subject to licensing, 6 Commission-owned reactor projects subject to parallel hearing procedures, and 18 AEC and Department of Defense projects. Copies of the Committee's reports to the Commission on all of these cases have been forwarded to the Joint Committee. The current status of each of the projects is described below. Similar information on classified reactor projects is being submitted separately.

Reactors subject to licensing

General Electric Co.—Vallecitos superheat reactor (VESR).—General Electric filed an application dated February 1, 1961, for a license to construct and operate a 12.5 Mwt experimental steam superheat reactor at its Vallecitos Atomic Laboratory in California. The staff submitted the applicant's preliminary hazards summary report, amendments thereto, and its own hazards evaluation to the Committee. The ACRS appointed a subcommittee to review and report on the proposed facility. Subcommittee meetings were held on March 14, 1961, and April 25, 1961. The project was reviewed by the full Committee at its April and May 1961 meetings. In a report dated May 20, 1961, the Committee advised that, with the addition of safety rods designed solely for the scram function, a reactor of the type proposed can be constructed at the Vallecitos site with reasonable assurance that it can be operated without undue risk to the public. A public hearing in the matter was held on June 29, 1961, and pursuant to the intermediate decision of the hearing examiner a construction permit was issue on August 10, 1961.

Lockheed Aircraft Corp.—Radiation effects reactor.—In the fourth annual report it was indicated that action was pending on an application filed by Lockheed to operate the 10 Mwt radiation effects reactor located at Air Force Plant No. 67 in Dawson County, Ga., under contract to the Air Force. On June 22, 1961, the Air Force and Lockheed withdrew their respective applications to operate this reactor as a licensed facility and consequently the docket was closed. A license application for this facility was resubmitted on March 2, 1962.

Philadelphia Electric Co.—In the fourth annual report it was reported that the ACRS had reviewed the proposal of the Philadelphia Electric Co. to build a nuclear powerplant at Peach Bottom, Pa. The Committee at that time indicated that while the site was suitable there were many questions that remained to be answered by the research and development program which was still in its early stages. During 1961 an ACRS subcommittee had several meetings with the applicant, contractor and staff to review the progress of the R. & D. program. The full Committee reviewed the proposed project at its October 1961 meeting and reported to the Commission that the extensive research and development program which had been undertaken had resulted in the development of pertinent information. In addition, design modifications have been made which appear to resolve the safety questions that have been raised previously. The Committee concluded that the proposed reactor can be constructed at the Peach Bottom site with reasonable assurance that it can be operated without undue risk to the public. On December 18, 1961, a public hearing was held to consider issuance of a construction permit for the proposed facility. An initial decision, by the Presiding Officer granting the construction permit was issued

on February 2, 1962, to become final on March 5, 1962. The construction permit was issued on February 23, 1962.

National Aeronautics and Space Administration.—Pursuant to the intermediate decision of the hearing examiner, a provisional operating license was issued to NASA authorizing initial loading and low power operation to 100 kilowatts (thermal) of its Plum Brook reactor facility. On December 8, 1961, an order was issued extending the latest date for completion of construction of this facility to July 1, 1962. The AEC received an application on March 23, 1962, from NASA requesting an increase in the operating power level to 60,000 kilowatts (thermal).

National Bureau of Standards.—The National Bureau of Standards filed an application dated February 1, 1961, for a license to construct and operate a 10 megawatt, heavy-water moderated tank-type research reactor with highly enriched MTR type fuel elements at its new NBS site near Gaithersburg, Md. Although the reactor is designed for initial operation at 10 Mwt. it is to have a capability for 20–25 Mwt. built into the facility. The application was referred to the ACRS for its review and advice. In September 1961 the Committee reported that, subject to a demonstration of the integrity of the confinement building, the efficiency and adequacy of the exhaust and filter systems and the reliability of the dynamic protection system, the proposed reactor can be constructed at the proposed location with reasonable assurance that it can be operated at a power up to 10 Mwt. without undue risk to the public. On November 28, 1961, a public hearing was held to consider the issuance of a construction permit. An intermediate decision by the presiding officer was issued on January 26, 1962, which deferred decision in the matter pending the development of additional data on certain aspects of design and until NBS selected a contractor for construction of the facility and submitted his qualifications for the record.

Yankee Atomic Electric Co.—At its May 1961 meeting the ACRS considered operating reports Nos. 1–4 of operations of the Yankee reactor at power levels up to 392 Mw. (thermal), and certain proposed changes and amendments respecting the Yankee reactor. In its subsequent report, the Committee noted that there has been no detectable effects of plutonium buildup during the first 2,000 hours of operations, and expressed the opinion that use of in-core monitors should continue at least for the first core. It concluded that with the changes requested the plant could be operated at steady state power levels of approximately 485 Mw. (thermal).

Pursuant to a decsion of the presiding officer following a public hearing on June 8, 1961, amendment No. 3 to Yankee's license was issued. The amendment (1) extended the expiration date of the license to November 4, 1997, (2) increased the maximum authorized steady State power level from 392 Mw (thermal) to 485 Mw (thermal), (3) revised the technical specifications, and (4) included reporting requirements suitable for a permanent operating license.

At its February 1962 meeting, the ACRS reviewed a request for advice by Yankee concerning the use of boric acid during operation at power with core III which may be loaded into the reactor in 1963. The use of higher enrichment of fuel (4.1 percent) would increase reactor core life, but would necessitate use of boric acid dissolved in the primary coolant, at power, to provide adequate control. Noting that there were several questions which must be answered before definite approval can be given for operation of the reactor with core III, the committee reported that it saw no reason at that time to advise against specifying the higher enrichment with a view to using boric acid in the primary coolant during operation at power with core III.

Consolidated Edison Co.—Amendment No. 3 to Consolidated's construction permit was issued by the Commission on August 4, 1961, as a result of a review of information on the final design of the plant and pursuant to the findings of a public hearing on the matter held on May 9 and 12, 1961.

At its September and October 1961 meetings, the ACRS considered previously unresolved questions regarding the design and operation of the reactor. In its report to the Commission of November 1, 1961, the Committee concluded that the Consolidated Edison reactor could be operated without undue hazard to the public health and safety.

Hearings were held on December 7 and 20, 1961, and January 3, 1962, to consider issuance of a provisional operating license for this facility. An initial decision was issued on February 21, 1962, by the presiding officer authorizing the immediate issuance of the provisional operating license. This decision will become final on April 9, 1962, in the absence of a petition for review

or on motion by the Commission. An order issued on January 30, 1962 extended to April 2, 1962, the latest completion date specified in the construction permit. On March 26, 1962, the provisional operating license was issued.

Saxton Nuclear Experimental Corp.—The Saxton reactor facility was considered by the ACRS at its July 1961 meeting. Prior to the meeting an ACRS subcommittee had visited the site. The Committee in its report concluded that the facility could be operated safely through its startup program up to the rated power level of 20 Mw (thermal).

Pursuant to an intermediate decision by the hearing examiner following a public hearing on September 6, 1961, relative to issuance of a provisional operating license, Saxton was authorized, upon completion of certain systems, to load the first core and operate with the pressure vessel head off up to a maximum power level of 200 kilowatts (thermal). Operations of full rated 20 Mw (thermal) power was authorized upon completion of the facility as described in the application.

As of the date of this writing all systems required for loading had not yet been completed.

Commonwealth Edison Co.—On March 28 and 29, 1961, public hearings were held relative to resumption of operation of the Dresden reactor following difficulties with control-rod drives and the occurrence of cracks in the poison sections of the control rods. On March 31 the hearing examiner issued an interim order that Commonwealth be authorized to operate up to 100 kilowatts with modified control-rod drives and new poison blades for performance of low-level tests as proposed.

At its April 1961 meeting, the ACRS considered the continued use of the new control-rod blades. In its report dated April 8, 1961, the Committee concluded that in view of the inspection and surveillance program proposed for the rods and the fact that some experience existed for use of rods of that type, they could be used safely in the Dresden reactor.

Public hearings were resumed on April 10 and 17, 1961, at which time the ACRS report was received in evidence, and testimony was given by the applicant that cracks had been found in the grid structure.

On May 2, 1961, the hearing was resumed and the AEC staff offered testimony on (1) its evaluation of the cracks in the grid structure, (2) full power operations, and (3) control-rod test and inspection procedures. On June 9, 1961, pursuant to the fourth supplemental intermediate decision of the hearing examiner, Commonwealth's license was amended to authorize operation of full-rated power (630 megawatts (thermal)), to include certain changes in the technical specifications, and to require additional operating and testing procedures for the control-rod-drive mechanisms. The reactor has since resumed operation at full power.

REACTORS SUBJECT TO PARALLEL PROCEDURES (PT. 115)

Consumers Public Power District—Hallam nuclear power facility.—At its October 1961 meeting the ACRS considered an application by Atomics International, construction contractor for the Hallam nuclear power facility, for authorization to operate the facility for dry critical experiments only, pending completion and testing of the plant for "wet" operations. A subcommittee visited the plant on August 4, 1961. The Committee reported to the Commission that the dry critical experiments may be conducted without undue hazard to the public. Subsequently, a public hearing was held on November 30, 1961, to consider the issuance of a provisional operating authorization for dry critical experiments only. An intermediate decision was issued by the presiding officer on December 28, 1961, authorizing the issuance of the provisional operating authorization subject to a finding by the Director, Division of Licensing and Regulation, that construction was complete and the facility was ready for loading. Following an inspection such a finding was made and the provisional operating authorization issued on January 4, 1962. Initial criticality was achieved on Jnauary 19, 1962.

In February 1962, the Committee reviewed proposals for conducting wet critical experiments on the HNPF and operation of the facility up to full power. In a report dated February 15, 1962, the ACRS advised that subject to installation of a suitable halogen-collection system and further consideration by the regulatory staff of certain other matters, the reactor can be operated up to 15 percent of full power without undue hazard to the public. It is expected that a

public hearing to consider the issuance of an authorization for operations of the reactor up to 15 percent of full power will be held in the spring of 1962.

Piqua nuclear power facility.—An ACRS subcommittee held a meeting at the site in April 1961 to discuss proposed operation of the facility. At its May 1961 meeting the ACRS reviewed the final safeguards report and supplements thereto submitted by Atomics International for the city of Piqua nuclear power facility. In a report dated May 20, 1961, the Committee suggested that at each partial fuel reloading cycle an inspection be made of typical samples of remaining fuel elements and gave its opinion that this reactor can be operated by Atomics International without undue hazard to the public. At the February 1962 meeting the ACRS was briefed by Atomics International on the progress to date. Construction of the reactor is proceeding and is expected to be completed in the spring of 1962. The matter of issuance of an operating authorization will be scheduled for hearing near the completion of construction.

Rural Cooperative Power Association reactor (Elk River).—On March 7–9, 1961, public hearings were held in St. Paul, Minn., relative to the Elk River reactor. A number of limited appearances were made by interested persons. Testimony was offered in behalf of the applicant; however, no testimony was offered by the AEC regulatory staff regarding health and safety since there were at that time problems of design still to be resolved by the applicant.

On April 3, 1961, Allis-Chalmers discovered cracks in the stainless-steel cladding inside the pressure vessel. At its July 6–8 meeting the ACRS was asked to furnish advice as to the adequacy of the pressure vessel in view of presence of cracks. Since there was at that time insufficient information on which to base an opinion, the Committee appointed an Ad Hoc Subcommittee to study the matter further. On the basis of the Subcommittee's findings and conclusions, the ACRS advised the Commission on August 3, 1961, that the vessel was acceptable from a safety viewpoint if no further detrimental information developed.

Further information on this problem was subsequently presented by the applicant. This information raised additional questions regarding the adequacy of the vessel. The Division of Licensing and Regulation then advised the applicant that sufficient evidence had not been presented regarding the integrity of the vessel. The applicant is conducting intensive tests on the vessel and additional information is expected in the near future.

Other Commission-owned reactor projects

Brookhaven high flux beam research reactor (HFBRR).—At its July 1961 meeting the ACRS considered the containment design for the HFBRR and preliminary design for fuel elements, control rods, beam-tube structures, and other components plus coolant-flow problems. In a report dated July 8, 1961, the Committee stated that the proposed containment design is clearly adequate and desirable, and that studies now in progress should result in a design which will provide reasonable assurance that operation of the proposed reactor at Brookhaven will not present undue hazard to site personnel or the public. The reactor is now under construction and scheduled for completion in July 1963.

Experimental breeder reactor (EBR–II).—The ACRS was requested to review at its April 1961 meeting a proposal that fuel be loaded into EBR–II without presence of sodium coolant to check instrumentation, neutron shielding, and critical loading in a dry condition. An ACRS subcommittee visited the site prior to the regular committee meeting. The Committee reported on April 10. 1961 its opinion that the proposed tests would be carried out without undue risk to the public. The dry critical experiments were approved and have now been completed.

Experimental organic cooled reactor (EOCR).—The design details for the EOCR under construction at the National Reactor Testing Station were reviewed by the ACRS at its July 1961 meeting. In a report dated July 8, 1961, the Committee listed a number of technical questions which must be resolved, but stated that upon resolution of these questions, it believes there will be reasonable assurance that this reactor may be considered acceptable for operation without undue hazard to the public and site personnel. This facility is scheduled for completion in October 1962.

Heavy-water components test reactor (HWCTR).—The final hazards report for the HWCTR and supplemental documents concerning specific design details were reviewed by the ACRS at its October 1961 meeting. An ACRS subcommittee visited the HWCTR prior to the meeting. In a report dated November 1, 1961, the Committee concluded that this reactor can be operated without undue risk to the public. Initial criticality was achieved on March 3, 1962.

Molten salt reactor experiment (MSRE).—The ACRS was asked to review the preliminary hazards summary report for the proposed molten salt reactor experiment to be constructed at ORNL. This reactor is to be a 10 megawatt thermal experimental study of molten fluoride mixtures and container materials for circulating fuel reactors. In a report dated September 11, 1961, the Committee stated that with satisfactory resolution of questions pertaining to nuclear instrumentation and control-rod systems, the MSRE can be constructed with reasonable assurance that it can be operated without undue hazard to the public or site personnel. Modification of the former aircraft reactor test facility to house the MSRE and fabrication of components is underway. Actual installation will begin in July 1962.

Sandia pulsed reactor facility (SPRF).—The hazards evaluation report for operation of the SPRF at Sandia Base was considered at the April 1961 meeting. The SPRF is patterned after Godiva II and is located in an area separated from other installations. It was the opinion of the ACRS reported on April 10, 1961, that there is reasonable assurance that operation of the SPRF will not endanger health and safety of the general public, but the need for careful selection of the operating staff and frequent inspections was stressed. This facility went critical on May 1961 and has been operating at design power since June 1961.

PM–1.—The ACRS reviewed the PM–1 reactor which was being built at Sundance, Wyo., and was designed and is to be initially operated for the AEC by the Martin Co.

The Committee agreed that the absence of conventional containment for this facility was acceptable. The Committee stated its opinion that the Martin Co. staff is technically competent to operate the reactor, but recommended that the facility be inspected in a manner comparable to a licensed reactor installation. With this provision, the Committee concluded that this reactor can be operated as proposed without undue hazard to the health and safety of the public, including site personnel. The inspections were carried out by the Commission's Division of Inspection. The reactor went critical on February 25, 1962.

Borax V.—At their September 1961 meeting, the ACRS reviewed the Argonne National Laboratory's Borax V reactor facility which was under construction at the National Reactor Testing Station. The Committee noted that certain accidents to this reactor could require evacuation of other NRTS installations and recommended that ANL study such accidents further.

With the addition of instrumentation suggested by the Committee and with evacuation plans incorporating the results of further accident studies, the Committee concluded that this facility may be operated without undue hazard to the health and safety of the public and site personnel.

The recommendations of the Committee are being implemented. The reactor achieved criticality February 9, 1962.

Experimental boiling water reactor (EBWR).—EBWR has operated intermittently for four years at Argonne National Laboratory at power levels up to 20 Mw (th). The ACRS in 1959 considered proposed operation at 100 Mw (th) and expressed a generally favorable opinion in which it recommended several mechanical and procedural modifications. At its July 1961 meeting, the Committee observed that its recommendations regarding mechanical changes had been satisfactorily incorporated; however, several additional points suggested that procedural improvements were desirable. The Committee concluded that with the reliable containment provided the reactor could be operated up to 100 Mw (th) without undue public hazard. Loading of the reactor for these experimental operations is presently being conducted.

PM–3A.—The ACRS was requested by the Commission to review the Final Hazards Summary Report concerning operation of PM–3A reactor. The PM–3A is a low power 9.36 Mw (th), pressurized water reactor designed for operation in isolated areas such as the Antarctic. The plant, including its containment, is designed for air transportation and can be readily assembled at the site.

By letter dated September 11, 1961, the ACRS recommended that the contractor re-evaluate fission product releases using meteorological techniques and parameters more suitable to Antarctic meteorological conditions and that an independent safety inspection of the facility be arranged. The ACRS advised that subject to these considerations, the reactor could be operated as proposed without undue hazard to the health and safety of the site personnel. The contractor's re-evaluation of fission product releases is being reviewed by the AEC. The safety inspection of the facility was made by the Division of Inspection. The reactor achieved criticality on March 3, 1962.

Department of Defense reactor projects

PM–2A.—PM–2A is a 10 Mw (th) pressurized water Army reactor in operation at Camp Century on the Greenland ice cap, 150 miles east of Thule Air Force Base.

At its December 1961 meeting the ACRS considered the safety aspects of PM–2A and concluded that, although it could be operated safely as constructed, there were certain aspects of its design which should be modified in future reactors of a similar type. The Committee recommended periodic checks of containment integrity and improved emergency procedures.

Prior to the ACRS report, the Commission had requested additional information from the Army concerning these design matters. Upon receipt and review of this information, the Commission will complete its safety review of PM–2A operations.

Other activities

Sites for proposed reactors.—In addition to requesting Committee advice on the design and operation of reactor facilities, the Commission also seeks the advice of the Advisory Committee on Reactor Safeguards on the suitability of sites proposed for major reactor facilities. Since March 1961 Committee advice was requested and received on the projects listed below.

Reactor sites for the city of Los Angeles Department of Water and Power.—The Los Angeles Department of Water and Power is considering the development of a large nuclear power complex which would consist of approximately four light water reactors each of which would produce about 300 megawatts of electric power. The Department requested a preliminary review by the AEC and the ACRS of the safety suitability of eight sites located in three general areas approximately 40 miles inland from the Pacific Coast. The sites were considered by the ACRS during its 36th meeting in September 1961. The Committee concluded that, with proper consideration of hydrological and meteorological aspects, the exclusion area and population distribution, it was feasible to locate reactors of this type and power level at these sites without undue risk to the health and safety of the public.

The department of water and power is currently considering the feasibility of additional sites along the Pacific coast for the nuclear power station. ACRS review of these sites has been requested.

Proposed sites for 200 Mwt. organic cooled and moderated prototype reactor.—In connection with the power demonstration program, the Commission considered construction of an organic cooled and moderated reactor which would generate 200 thermal megawatts (50 Mwe.) of power at a site to be provided by a publicly or cooperatively owned utility. During the 33d meeting in April 1961, the ACRS reviewed information regarding sites proposed by four interested utilities and concluded that each of the sites proposed would be acceptable for a reactor of the general type and power level proposed. Further action with regard to construction of this reactor project has been deferred beyond fiscal year 1963 by the Commission.

Dairyland power cooperative boiling water reactor.—(LaCrosse boiling water reactor) Dairyland Power Cooperative, Inc., proposed a site near Genoa, Wis., for a 50 Mwe. improved cycle boiling water reactor. The site proposed was one of the locations found suitable for 50 Mwe. organic cooled prototype reactor by the ACRS during its 33d meeting.

During the 34th meeting in May 1961, the ACRS concluded that the Dairyland site would be suitable for a boiling water reactor of the general type and power level proposed.

It is expected that action with regard to construction of this project will proceed when contractual matters are completed. Regulatory review of this project will follow the parallel procedures established for review of reactors not subject to licensing.

Ordnance Corps research reactor at Picatinny Arsenal.—Before requesting construction authority the U.S. Army Ordnance Corps requested a preliminary review of the site at Picatinny Arsenal for a 20–30-megawatt research reactor patterned after the Oak Ridge research reactor, but with a high integrity containment shell which would prevent accidental release of radioactivity either to the air or the ground. The ACRS reviewed this site during the 35th meeting of the Committee in July 1961. The Committee concluded that the proposed site would be suitable for a research reactor of the type and power level proposed with proper design and construction of the containment vessel and associated storage facilities for liquid wastes.

Proposed sites for process heat reactor.—The Commission invited industrial interest in participating in a cooperative demonstration project for a 30–40-megawatt low-temperature process heat reactor. Sites proposed by four industries who expressed interest in the project were reviewed by the ACRS during its 36th meeting in September 1961. The Committee concluded that two of the sites were suitable for a reactor of the general type and power level proposed, but a more comprehensive study would be required before recommendations could be formulated regarding the other sites.

Plans to proceed with this project have been deferred indefinitely by the Commission.

Advice and assistance of the ACRS was obtained on a number of matters in connection with Commission efforts to develop more detailed guides and standards on reactor safety:

Reactor site criteria.—The AEC has been attempting for some time to define a more objective approach to the evaluation of sites proposed for stationary power and testing reactors. AEC staff review of this matter, including consultation with the ACRS, led to the formulation of a set of criteria in the form of proposed guides for the selection of sites which were published for public comment in February 1961.

Numerous comments were received both from individuals and organizations, including several from foreign countries. General reaction was one of approval of the issuance of guidance by the Commission on the problem of reactor siting, although a variety of objections were voiced as to detailed features of the guides. The comments received were summarized and considered by the Commission staff in finalizing the criteria. These criteria were reviewed by the ACRS, who in a report to the Commission dated December 13, 1961, endorsed the plan to issue the criteria in the form of guides. The Commission approved the reactor site criteria on March 23, 1962. They will be published in the Federal Register in early April.

Radiation damage to reactor pressure vessels.—The potential damage to reactor pressure vessels from the integrated neutron flux to which they are subjected during their lifetime has been recognized as an important consideration in the safety assessment of reactor plants. The AEC has for some time sponsored experimental work to provide a basis for better understanding such potential effects. The ACRS discussed the significance of this problem in relation to the SM–1A in a report to the Commission dated May 20, 1961. Results obtained to date indicate that no immediate problem exists in pressure vessels now in operation but the potential long-term effects may require operating restrictions sometime in the future.

A survey was initiated in 1961 to determine more precisely how the potential long-term effects of radiation have been factored into pressure vessel design and the extent, if any, of operating restrictions that may eventually be required. In addition, experimental efforts are being expanded to advance understanding of the technical phenomena involved. Staff work is being supplemented by a group of consultants having specialized experience in pressure vesel design and fabrication. Members of the ACRS have been participating in this review.

Mechanical design of reactor primary system components.—The design of mechanical components for nuclear systems has been based heavily upon the art developed over the years and applied to nonnuclear components. As the industry has developed, the limitations of existing codes, design criteria, and inspection techniques have become apparent. Updating of applicable codes through revisions and addenda is an almost continuous process carried on primarily by the industry but often with active participation of representatives from the Government agencies. In some cases, AEC contractor specifications for nuclear components have been based upon the minimum requirements embodied in industrial codes, but expanded to insure a superior quality than required for nonnuclear applications. However, there appears to be considerable variation in procurement practices of AEC contractors with respect to the details specified. Safety review of mechanical components proposed for nuclear plant service has shown the importance of added emphasis on design detail and inspection techniques. Work is underway to develop and disseminate appropriate design standards. The ACRS discussed the importance of this problem in a report to the Commission dated September 11, 1961.

Reactor safety guides.—The AEC is sponsoring a program for the preparation of a series of monographs on various safety aspects of reactor technology. Members of the ACRS advised the AEC staff in the selection of subjects to receive such treatment. The work is to be done under the direction of the Massa-

chusetts Institute of Technology under contract with the AEC. The objectives of the series is to bring together in one place a brief authoritative treatment of the current technical state of the art on the various phases of reactor technology pertinent to reactor safety. By preparing the series as an integrated whole, authoritative views on good safety practices can be made available to the nuclear community as ready reference material. Such an effort is considered an important step in the evaluation of safety standards.

Meteorological conditions in southern California.—Consideration of several sites proposed for locating nuclear reactors in the southern California area showed the need for more comprehensive information on meteorological conditions in this area than is generally required in site evaluations. The problem is well beyond what any one applicant for a reactor plant construction permit might be expected to assess. Although studies related to the so-called smog situation in southern California provided much information about the prevalence of inversion conditions, stagnant air masses, and transport of pollutants, a better understanding of meterological conditions pertinent to reactor hazards analysis was considered desirable. The considerable interest shown in the application of nuclear power to the future needs of the area makes it particularly important to understand limitations that may be imposed by meteorological conditions upon proportional aspects as well as the health and safety of the public. Toward this end, an investigation is being conducted by the U.S. Weather Bureau as part of a cooperative meteorological research program with the AEC.

Nuclear safety research.—At its February 1962 meeting, the ACRS established a subcommittee to work with and advise the staff on research and development programs in nuclear safety.

MEMBERSHIP OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

The present membership of the committee is as follows:

Dr. Franklin A. Gifford, Jr., Chairman, meteorologist in charge, Weather Bureau Office, U.S. Atomic Energy Commission, Oak Ridge, Tenn.
Dr. Henry Newson, Vice Chairman, professor of physics, Duke University, Durham, N.C.
Dr. William K. Ergen, principal physicist, Oak Ridge National Laboratory, Oak Ridge, Tenn.
Dr. John C. Geyer, chairman, department of sanitary engineering and water resources, the Johns Hopkins University, Baltimore, Md.
Dr. David B. Hall, division leader, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.
Dr. John P. Howe, professor of engineering, Cornell University, Ithaca, N.Y.
Dr. Herbert J. C. Kouts, group leader, reactor physics, Brookhaven National Laboratory, Upton, N.Y.
Kenneth R. Osborn, chief engineer, General Chemical Division, Allied Chemical Corp., New York, N.Y.
Donald A. Rogers, director of project analysis, central research laboratory, Allied Chemical Corp., New York, N.Y.
Dr. Leslie Silverman, professor of engineering in environmental hygiene and director of radiological hygiene program, Harvard University, Boston, Mass.
Reuel C. Stratton, consulting engineer, Hartford, Conn.
Dr. Theos J. Thompson, director, MIT nuclear reactor, Massachusetts Institute of Technology, Cambridge, Mass.
Dr. Charles R. Williams, assistant vice president, Liberty Mutual Insurance Co., Boston, Mass.

Dr. Gifford was elected Chairman of the Committee effective January 1, 1962, to succeed Dr. Thompson upon expiration of Dr. Thompson's term in that office. Dr. Newson was elected Vice Chairman of the Committee.

During 1961, the following members, whose terms expired, were unable to accept reappointment:

Dr. Harvey Brooks
Dr. Willard P. Conner, Jr.
Dr. C. Rogers McCullough
Dr. Abel Wolman

The Commission acknowledges with gratitude the important service rendered by these members during their terms of office.

Drs. Geyer, Howe, and Kouts were appointed to membership for 4-year terms.

APPENDIX 2

[U.S. Atomic Energy Commission, Washington, D.C., for immediate release, Monday, Apr. 9, 1962]

AEC APPROVES REACTOR SITE CRITERIA GUIDES

The Atomic Energy Commission has approved criteria which it will use to guide its evaluation of proposed sites for stationary power and test reactors licensed by AEC.

The Commission has developed the guides so that industry, State, and local officials and the general public will be familiar with the factors which are considered by AEC in judging proposed sites for reactors.

The guides reflect an attempt to provide an objective basis for reactor siting to the extent that current reactor technology allows, but do not eliminate entirely the continued need for subjective judgments both by applicants for reactor permits and licenses and by the Commission. The criteria have been established as guides for the interim period until enough experience can be accumulated with reactors to provide a more definitive correlation of factors pertinent to the question of reactor siting and to permit the writing of more definitive standards. Sufficient flexibility has been included in the guides to allow for this orderly evolution of siting standards as the industry progresses.

The guides apply primarily to power and testing reactors of a general type and design on which operational experience has been gained, but they can also be applied, with appropriate modifications, to other reactors. For reactors that are novel in design and unproved as prototypes, it is expected that the criteria will be applied in a manner that takes into account the lack of experience. Applicants for reactor construction permits may demonstrate to AEC the applicability and significance of factors other than those set forth in the guides.

The guides were developed by the Commission in consultation with its Advisory Committee on Reactor Safeguards and following discussions with industrial groups. They were published for public comment on February 11, 1961, and 34 formal comments were received. There was widespread support of the AEC proposal to issue guides and there was general acceptance of the basic factors included in them, particularly the issuance for the first time of radiation exposure values which could be used in the design of reactors and in the evaluation of sites with respect to potential accidents.

Objective of these guides and of all Commission activities involving reactor licensing and operation is to keep the exposure of individuals to radiation at a minimum in the event, however remote, that an accident should occur with a reactor.

Factors which are considered by the Commission in judging proposed sites are:

1. Population density in the area surrounding the proposed site, and the uses which are made of this area, such as industrial, farming, residential.

2. Physical characteristics of the site, including seismology, meteorology, geology, and hydrology.

3. Characteristics of the proposed reactor, including maximum power level; use of the facility; extent to which the design of the reactor incorporates well-proved engineering standards; and the extent to which the reactor incorporates unique or unusual features which have a significant bearing on the probability or consequences of an accident.

An applicant is required to calculate three distances:

A. *Exclusion area*, the area surrounding the reactor in which the licensee has authority to determine all activities, including exclusion or removal of personnel and property from the area. Residence within this area normally would be prohibited. If residence is permitted, it must be possible to move these persons quickly in order to minimize hazard.

B. *Low population zone*, the area immediately surrounding the exclusion area. In this area the number of residents must be small enough so that they could be evacuated or other protective measures taken on their behalf in the event of a serious accident.

C. *Population center distance*, the distance from the recactor to the nearest boundary of a densely populated center containing more than 25,000 residents.

Public comments received following publication of the proposed guides raised objection to the appendix section which included an example of calculation distances for the exclusion area, low population zone, and population center distance for a hypothetical reactor. Objections centered around concern that the

numerical values expressed in the appendix and the resulting distances represented a larger degree of inflexibility in the guides than intended.

In order to eliminate ambiguity, the example calculation has been deleted from the site criteria guides. The calculational procedure used to arrive at these distances and related explanatory information are being incorporated into a "Technical Information Document 14844" which soon will be issued by AEC. This document should be helpful to industry as a reference work. The calculational approach illustrated in the TID results in distances which generally correspond with current siting practices of the Commission.

Other significant differences between the criteria guides as first published for comment and those approved by the Commission are:

1. Some editorial changes have been made to clarify the intent of the guides, particularly to emphasize their interim nature and to identify the criteria as being specific to the United States.

2. The material describing factors to be considered in evaluating sites has been reorganized to clarify the emphasis placed under characteristics of the reactor design and the proposed operation.

3. The criteria now specifically state that the guides are directly applicable to stationary power and test reactors, thus eliminating any ambiguity about their application to mobiles plants, which was not intended.

4. A section has been included to deal with the question of locating more than one reactor at a single site.

The Commission is giving notice that it has adopted these reactor site criteria guides, 10 CFR, part 100, effective 30 days after publication in the Federal Register.

A copy of the "Reactor Site Criteria Guides" is attached.

[Attachment]

ATOMIC ENERGY COMMISSION (10 CFR PT. 100) REACTOR SITE CRITERIA

Pursuant to the Administrative Procedures Act and the Atomic Energy Act of 1954, as amended, the following guide is published as a document subject to codification, to be effective 30 days after publication in the Federal Register.

STATEMENT OF CONSIDERATIONS

On February 11, 1961, the Atomic Energy Commission published in the Federal Register a notice of proposed rulemaking that set forth general criteria in the form of guides and factors to be considered in the evaluation of proposed sites for power and testing reactors. The Commission has received many comments from individuals and organizations, including several from foreign countries, reflecting the widespread sensitivity and importance of the subject of site selection for reactors. Formal communications have been received on the published guides, including a proposed comprehensive revision of the guides into an alternate form.

In these communications, there was almost unanimous support of the Commission's proposal to issue guidance in some form on site selections, and acceptance of the basic factors included in the proposed guides, particularly in the proposal to issue exposure dose values which could be used for reference in the evaluation of reactor sites with respect to potential reactor accidents of exceedingly low probability of occurrence.

On the other hand, many features of the proposed guides were singled out for criticism by a large proportion of the correspondents. This was particularly the case for the appendix section of the proposed guides, in which was included an example calculation of environmental distance characteristics for a hypothetical reactor. In this appendix, specific numerical values were employed in the calculations. The choice of these numerical values, in some cases involving simplifying assumptions of highly complex phenomena, represent types of considerations presently applied in site calculations and result in environmental distance parameters in general accord with present siting practice. Nevertheless, these particular numerical values and the use of a single example calculation were widely objected to, basically on the grounds that they presented an aspect of inflexibility to the guides which otherwise appeared to possess considerable flexibility and tended to emphasize unduly the concept of environmental isolation for reactors with minimum possibility being extended for eventual substitution thereof of engineereed safeguard.

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In consequence of these many comments, criticisms and recommendations, the proposed guides have been rewritten, with incorporation of a number of suggestions for clarification and simplification, and elimination of the numerical values and example calculation formerly constituting the appendix to the guides. In lieu of the appendix, some guidance has been incorporated in the text itself to indicate the considerations that led to establishing the exposure values set forth. However, in recognition of the advantage of example calculations in providing preliminary guidance to application of the principles set forth, the AEC will publish separately in the form of a technical information document a discussion of these calculations.

These guides and the technical information document are intended to reflect past practice and current policy of the Commission of keeping stationary power and test reactors away from densely populated centers. It should be equally understood, however, that applicants are free and indeed encouraged to demonstrate to the Commission the applicability and significance of considerations other than those set forth in the guides.

One basic objective of the criteria is to assure that the cumulative exposure dose to large numbers of people as a consequence of any nuclear accident should be low in comparison with what might be considered reasonable for total population dose. Further, since accidents of greater potential hazard than those commonly postulated as representing an upper limit are conceivable, although highly improbable, it was considered desirable to provide for protection against excesssive exposure doses to people in large centers, where effective protective measures might not be feasible. Neither of these objectives were readily achievable by a single criterion. Hence, the population center distance was added as a site requirement when it was found for several projects evaluated that the specification of such a distance requirement would approximately fulfill the desired objectives and reflect a more accurate guide to current siting practices. In an effort to develop more specific guidance on the total man-dose concept, the Commission intends to give further study to the subject. Meanwhile, in some cases where very large cities are involved, the population center distance may have to be greater than those suggested by these guides.

A number of comments received pointed out that AEC siting factors included considerations of population distributions and land use surrounding proposed sites but did not indicate how future popualtion growth might affect sites initially approved. To the extent possible, AEC review of the land use surrounding a proposed site includes considerations of potential residential growth. The guides tend toward requiring sufficient isolation to preclude any immediate problem. In the meantime, operating experience that will be acquired from plants already licensed to operate should provide a more definitive basis for weighing the effectiveness of engineered safeguards versus plant isolation as a public safeguard.

These criteria are based upon a weighing of factors characteristic of conditions in the United States and may not represent the most appropriate procedure nor optimum emphasis on the various interdependent factors involved in selection of sites for reactors in other countries where national needs, resources, policies and other factors may be greatly different.

Sec.

§ 100.1 *Purpose*

It is the purpose of this part to describe criteria which guide the Commission in its evaluation of the suitability of proposed sites for stationary power and testing reactors subject to Part 50 of this chapter.

Insufficient experience has been accumulated to permit the writing of detailed standards that would provide a quantitative correlation of all factors significant to the question of acceptability of reactor sites. This part is intended as an interim guide to identify a number of factors considered by the Commission in the evaluation of reactor sites and the general criteria used at this time as guides

in approving or disapproving proposed sites. Any applicant who believes that factors other than those set forth in the guide should be considered by the Commission will be expected to demonstrate the applicability and significance of such factors.

g 110.2 *Scope*

(*a*) This part applied to applications filed under Part 50 and 115 of this chapter for stationary power and testing reactors.

(*b*) The site criteria contained in this part apply primarily to reactors of a general type and design on which experience has been developed, but can also be applied to other reactor types. In particular, for reactors that are novel in design and unproven as prototypes or pilot plants, it is expected that these basic criteria will be applied in a manner that takes into account the lack of experience. In the application of these criteria which are deliberately flexible, the safeguards provided—either site isolation or engineered features—should reflect the lack of certainty that only experience can provide.

g 100.3 *Definitions*

As used in this part:

(*a*) "Exclusion area" means that area surrounding the reactor, in which the reactor licensee has the authority to determine all activities including exclusion or removal of personnel and property from the area. This area may be traversed by a highway, railroad, or waterway, provided these are not so close to the facility as to interfere with normal operations of the facility and provided appropriate and effective arrangements are made to control traffic on the highway, railroad, or waterway, in case of emergency, to protect the public health and safety. Residence within the exclusion area shall normally be prohibited. In any event, residents shall be subject to ready removal in case of necessity. Activities unrelated to operation of the reactor may be permitted in an exclusion area under appropriate limitations, provided that no significant hazards to the public health and safety will result.

(*b*) "Low population zone" means the area immediately surrounding the exclusion area which contains residents, the total number and density of which are such that there is a reasonable probability that appropriate protective measures could be taken in their behalf in the event of a serious accident. These guides do not specify a permissible population density or total population within this zone because the situation may vary from case to case. Whether a specific number of people can, for example, be evacuated from a specific area, or instructed to take shelter, on a timely basis will depend on many factors such as location, number and size of highways, scope and extent of advance planning, and actual distribution of residents within the area.

(*c*) "Population center distance" means the distance from the reactor to the nearest boundary of a densely populated center containing more than about 25,000 residents.

(*d*) "Power reactor" means a nuclear reactor of a type described in gg 50.21(b) or 50.22 of this chapter designed to produce electrical or heat energy.

(*e*) "Testing reactor" means a "testing facility" as defined in g 50.2 of this chapter.

g 100.10 *Factors to be considered when evaluating sites*

Factors considered in the evaluation of sites include those relating both to the proposed reactor design and the characteristics peculiar to the site. It is expected that reactors will reflect through their design, construction and operation an extremly low probability for acidents that could result in release of significant quantities of radioactive fission products. In addition, the site location and the engineered features included as safeguards against the hazardous consequences of an accident, should one occur, should insure a low risk of public exposure. In particular, the Commission will take the following factors into consideration in determining the acceptability of a site for a power or testing reactor:

(*a*) Characteristics of reactor design and proposed operation including:

(1) Intended use of the reactor including the proposed maximum power level and the nature and inventory of contained radioactive materials;

(2) The extent to which generally accepted engineering standards are applied to the design of the reactor;

(3) The extent to which the reactor incorporates unique or unusual features having a significant bearing on the probability or consequences of accidental release of radioactive materials.

(4) The safety features that are to be engineered into the facility and those barriers that must be breached as a result of an accident before a release of radioactive material to the environment can occur.

(*b*) Population density and use characteristics of the site environs, including the exclusion area, low population zone, and population center distance.

(*c*) Physical characteristics of the site, including seismology, meteorology, geology, and hydrology.

(1) The design for the facility should conform to accepted building codes or standards for areas having equivalent earthquake histories. No facility should be located closer than ¼ mile from the surface location of a known active earthquake fault.

(2) Meteorological conditions at the site and in the surrounding area should be considered.

(3) Geological and hydrological characteristics of the proposed site may have a bearing on the consequences of an escape of radioactive material from the facility. Special precautions should be planned if a reactor is to be located at a site where a significant quantity of radioactive effluent might accidentally flow into nearby streams or rivers or might find ready access to underground water tables.

(*d*) 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.

g 100.11 *Determination of exclusion area, low population zone, and population center distance*

(*a*) As an aid in evaluating a proposed site, an applicant should assume a fission product release[1] from the core, the expected demonstrable leak rate from the containment and the meteorological conditions pertinent to his site to derive an exclusion area, a low population zone and population center distance. For the purpose of this analysis, which shall set forth the basis for the numerical values used, the applicant should determine the following:

(1) An exclusion area of such size that an individual located at any point on its boundary for two hours immediately following onset of the postulated fission product release would not receive a total radiation dose to the whole body in excess of 25 rem[2] or a total radiation dose in excess of 300 rem[2] to the thyroid from iodine exposure.

(2) A low population zone of such size that an individual located at any point on its outer boundary who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage) would not receive a total radiation dose to the whole body in excess of 25 rem or a total radiation dose in excess of 300 rem to the thyroid from iodine exposure.

(3) A population center distance of at least 1 and 1/3 times the distance from the reactor to the outer boundary of the low population zone. In applying this guide, due consideration should be given to the population distribution within the population center.

Where very large cities are involved, a greater distance may be necessary because of total integrated population dose consideration.

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[1] The fission product release assumed for these calculations should be based upon a major accident, hypothesized for purposes of site analysis or postulated from considerations of possible accidental events, that would result in potential hazards not exceeded by those from any accident considered credible. Such accidents have generally been assumed to result in substantial meltdown of the core with subsequent release of appreciable quantities of fission products.

[2] The whole body dose of 25 rem referred to above corresponds numerically to the once in a lifetime accidental or emergency dose for radiation workers which, according to NCRP recommendations may be disregarded in the determination of their radiation exposure status (see NBS Handbook 69 dated June 5, 1959). However, neither its use nor that of the 300 rem value for thyroid exposure as set forth in these site criteria guides are intended to imply that these numbers constitute acceptable limits for emergency doses to the public under accident conditions. Rather, this 25 rem whole body value and the 300 rem thyroid value have been set forth in these guides as reference values, which can be used in the evaluation of reactor sites with respect to potential reactor accidents of exceedingly low probability of occurence, and low risk of public exposure to radiation.

(b) For sites for multiple reactor facilities consideration should be given to the following:

(1) If the reactors are independent to the extent that an accident in one reactor would not initiate an accident in another, the size of the exclusion area, low population zone and population center distance shall be fulfilled with respect to each reactor individually. The envelopes of the plan overlay of the areas so calculated shall then be taken as their respective boundaries.

(2) If the reactors are interconnected to the extent that an accident in one reactor could affect the safety of operation of any other, the size of the exclusion area, low population zone and population center distance shall be based upon the assumption that all interconnected reactors emit their postulated fission product releases simultaneously. This requirement may be reduced in relation to the degree of coupling between reactors, the probability of concomitant accidents and the probability that an individual would not be exposed to the radiation effects from simultaneous releases. The applicant would be expected to justify to the satisfaction of the AEC the basis for such a reduction in the source term.

(3) The applicant is expected to show that the simultaneous operation of multiple reactors at a site will not result in total radioactive effluent releases beyond the allowable limits of applicable regulations.

(NOTE.—For further guidance in developing the exclusion area, the low population zone, and the population center distance, reference is made to Technical Information Document 14844, dated ————, which contains a procedural method and a sample calculation that result in distances roughly reflecting current siting practices of the Commission. The calculations described in Technical Information Document 14844 may be used as a point of departure for consideration of particular site requirements which may result from evaluation of the characteristics of a particular reactor, its purpose and method of operation.)

Copies of Technical Information Document 14844 may be obtained from the Commission's Public Document Room, 1717 H Street N.W., Washington, D.C., or by writing to the Director, Division of Licensing and Regulations, U.S. Atomic Energy Commission, Washington 25, D.C.

Authority: Sections 100.1 to 100.11 issued under Sec. 103, 68 Stat 936, Sec. 104, 68 Stat 937, Sec. 161, 68 Stat 948, Sec. 182, 68 Stat 953; 42 U.S.C. 2133, 2134, 2201, 2232.

Dated at Germantown, Maryland this —— day of ———— 1962.

WOODFORD B. MCCOOL, *Secretary.*
(For the Atomic Energy Commission).

APPENDIX 3

[AEC letter to James T. Ramey, executive director, JCAE, dated May 22, 1962, forwarding a summary of incidents during the period July 1 through December 31, 1961]

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C. May 22, 1962.

Mr. JAMES T. RAMEY,
Executive Director,
Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. RAMEY: Enclosed for your information is a summary which includes all incidents reported under section 20.403 (a) and (b) of 10 CFR 20 for which the AEC investigations and corrective actions were completed during the period July 1 through December 31, 1961. Investigations of lost radioactive material for the same period are also included.

Sincerely yours,

H. L. PRICE, *Director of Regulation.*

SUMMARY OF INCIDENTS

The following summary includes incidents reported under section 20.403 (a) and (b) of 10 CFR 20, for which the AEC investigations and corrective actions were completed during the period of July 1 through December 31, 1961. Also included are investigations of lost radioactive material for the same period.

INCIDENTS REPORTED UNDER SECTION 20.403(a)

1. Gulton Industries, Inc., Albuquerque, N. Mex.

Voltage generator cells which contained krypton 85 developed leaks. The escaping krypton 85 was unknowingly exhausted to the atmosphere in concentrations exceeding those permitted by 10 CFR 20. An AEC investigation indicated that surveys were not conducted to determine such losses. However, no personnel appeared to have been exposed to radiation in excess of the permissible limits of 10 CFR 20. The AEC, under its regulatory authority, required the licensee to correct these deficiencies. The licensee (*a*) installed a radiation monitor in the vacuum pump discharge pipe for the detection of krypton 85 leakage during cell evacuation; and (*b*) restricted access to the area around the discharge pipe.

2. University of Texas, Austin, Tex.

A defective helium shell burst, causing the release of approximately 10 curies of hydrogen 3 to an unrestricted area adjacent to the radioisotope laboratory. There was no apparent violation of AEC regulations. No personnel appear to have been exposed to radiation in excess of permissible limits. The defective shell was replaced.

3. Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

A film badge reading in excess of 80 rem was noted for one radiographer who used a 52 curie iridium 192 radiography source. Analysis of the film badge revealed that it had been exposed to X-rays rather than iridium 192. However, the investigation revealed no instance in which the radiographer was likely to have been exposed to X-rays. It was concluded that the radiographer did not receive an 80-rem exposure and that the badge was probably exposed to X-rays at a time when the radiographer did not have it on his person. There were no apparent violations of AEC regulations.

INCIDENTS REPORTED UNDER SECTION 20.403(b)

4. General Atomics Co., San Diego, Calif.

During the routine transfer of an irradiated chlorine 38 sample from a reactor to a radiochemical laboratory, two individuals received calculated radiation doses of 96 rem and 48 rem to the hands. The overexposures resulted from a failure of a research assistant to properly survey the sample after it was removed from the reactor and prior to the time it was handled. It was also observed that the licensee's radiation safety instructions were not provided to employees involved in this incident. The AEC, under its regulatory authority, required the licensee to correct these deficiencies.

5. Battelle Memorial Institute, Columbus, Ohio.

While BMI employees were attempting to position an experimental aluminum capsule containing 1.7 grams of uranium oxide in the core of a BMI pool reactor, the lead sinker weight attached to the source was bent. In an attempt to replace the bent wire, the capsule was pulled above the surface of the reactor water to approximately 18 inches from the employee's waistline for about 30 seconds. An employee received an exposure of 13.2 rem and 44.7 rad. The incident was the result of an error in judgment. The licensee installed additional radiation alarms in the reactor room and established procedures for conducting surveys during such operations.

6. Ingalls Shipbuilding Corp., Pascagoula, Miss.

A radiographer received an exposure of approximately 7 rem to the whole body and 120 rem to the hands while working with a 13 curie and a 27 curie iridium 192 source. Investigation revealed an apparent violation of AEC regulations in that no survey was made by the radiographer prior to resuming use of the source to determine whether it was in an exposed position. The AEC, under its regulatory authority, required the licensee to correct these deficiencies.

REPORTS AND INVESTIGATIONS OF LOST RADIOACTIVE MATERIAL

7. G. T. Schjeldahl Co., Northfield, Minn.

During experimental research on high-level densitometers, a 400-millicurie tritium sealed source was installed in a balloon which was launched from Crosby-Ironton, Minn. The unit containing the source fell into Lake Michigan and could

not be recovered. The investigation revealed no apparent violations of AEC regulations. Exposure of personnel in excess of AEC limits appears unlikely.

8. Birdwell Division, Seismograph Service Corp., Tulsa, Okla.

During oil well logging at Bradford, Pa., a 25-millicurie cobalt 60 source was lost. The bottom of the tool in which the source was located was accidentally cut off and the source dropped to the bottom of the well. With AEC approval, the licensee sealed the source at the bottom of the well with lead wool capping. No apparent violations of AEC regulations were associated with the incident. There appeared to be no exposure of personnel in excess of AEC regulation limits.

9. Aerojet General Corp., Azusa, Calif.

During a routine housekeeping and cleanup, it was determined that approximately 2.5 ounces of depleted uranium were unaccounted for. All attempts to find the material were unsuccessful. It was concluded that this material had probably been disposed of during the cleanup process to normal trash. The investigation revealed no apparent violations of AEC regulations. Exposure in excess of AEC regulation limits appear unlikely as a result of the loss.

10. Radio Corp. of America, Van Nuys, Calif.

A 1.5 millicurie polonium 210 bar was lost when an employee inadvertently discarded the box containing the source to normal trash. Evidence obtained during the investigation indicated that the source had probably been buried in a public dump. The investigation revealed no apparent violations of AEC regulations. Exposure to personnel in excess of AEC regulations appears unlikely. The company instituted closer controls to prevent a recurrence of this incident.

11. Portsmouth Naval Shipyard, Portsmouth, N.H.

During a training exercise, a 7- by 3-inch plate containing approximately 0.47 microcuries of uranium 233 was lost. All attempts to find the material were unsuccessful. The investigation revealed no apparent violation of AEC regulations. Improved procedures for handling and controlling material were adopted by the shipyard.

12. University of Chicago, Chicago, Ill.

An inventory revealed that 200 millicuries of strontium 90 in solution form were missing. All attempts to find the material were unsuccessful. The investigation indicated that the material was probably shipped to Oak Ridge for land burial. The investigation revealed no apparent violations of AEC regulations. Improved control measures pertaining to the handling of such material were instituted by the university.

13. W. L. McDermott, Rock Hill, S.C.

During a training exercise, a 0.5 millicurie cobalt 60 civil defense source was lost. All attempts to find the source were unsuccessful. Investigation revealed certain violations of AEC regulations and conditions of the license. The AEC, under its regulatory authority, required the licensee to correct these deficiencies. The licensee has since disposed of all remaining byproduct material in his possession.

14. University of Wyoming, Laramie, Wyo.

During an inventory, it was determined that a 300-microcurie strontium 90 source contained in a slow neutron monitor and a 40-microcurie strontium 90 source contained in a survey instrument were lost. All attempts to find the material were unsuccessful. Exposure of personnel in excess of regulatory limits appears unlikely. No apparent violations of AEC regulations were associated with the incident. The university instituted improved control measures to prevent recurrence of such losses.

15. Rensselaer Polytechnic Institute, Troy, N.Y.

During a routine physical inventory, it was determined that approximately 4 pounds of natural uranium were lost. All attempts to find the material were unsuccessful. No apparent violations of AEC regulations were noted. The institute initiated improved control measures to prevent recurrence of such losses.

Summary of Incidents

The following summary includes incidents reported under section 20.403 (a) and (b) of 10 CFR 20, for which the AEC investigations and corrective actions were completed during the period of July 1 through December 31, 1961. Also included are investigations of lost radioactive material for the same period.

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During a routine physical inventory, it was determined that approximately 4 pounds of natural uranium were lost. All attempts to find the material were unsuccessful. No apparent violations of AEC regulations were noted. The institute initiated improved control measures to prevent recurrence of such losses.

APPENDIX 4

(Letter dated Apr. 11, 1962, from Congressman Price to Commissioner Olson, and AEC reply dated July 18, 1962, furnishing answers to certain questions on indemnity and reactor safety)

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D.C., April 11, 1962.

Hon. LOREN K. OLSON,
Commissioner, U.S. Atomic Energy Commission,
Washington, D.C

Dear MR. OLSON: At the conclusion of your testimony yesterday, I indicated that certain questions would be forwarded to AEC and that your answers would be included in the record.

Enclosed are some questions numbered 12 through 21 based on your statement. Although some of these questions were briefly touched upon yesterday, I believe that more complete answers might be desirable, and it is therefore requested that the Commission furnish answers for the purpose of completing the record of your testimony.

Sincerely yours,

MELVIN PRICE,
Chairman, Subcommittee on Research, Development and Radiation.

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., July 18, 1962.

Hon. MELVIN PRICE,
Chairman, Subcommittee on Research, Development, and Radiation, Joint Committee on Atomic Energy, Congress of the United States.

DEAR MR. PRICE: In your letter of April 11, 1962, addressed to Commissioner Olson, you requested responses to a list of questions which you enclosed in order to complete the record of Commission testimony in the hearings on indemnity and reactor safety conducted by the Subcommittee on Research, Development, and Radiation.

The answers to your questions are enclosed. We have repeated the questions in numerical order for your convenience. We shall be pleased to furnish any additional information that may be desired on any of these subjects.

Sincerely yours,

GLENN T. SEABORG, *Chairman.*

12. Where do you get your authority to indemnify the railroads? Why couldn't this same principle be extended to Government shipments through toll facilities?

Answer. AEC-sponsored shipments of radioactive materials involving a risk of public liability for a substantial nuclear incident are generally made by AEC contractors who are protected by Price-Anderson agreements. Toll facility authorities, among others, are "persons indemnified" under these agreements, and are indemnified against public liability arising out of these contractor shipments. There is, therefore, no need for further Price-Anderson indemnification covering these shipments.

AEC's nationwide agreement with the railroads was designed to cover certain shipments made by AEC itself, which could conceivably involve a risk of public liability for a substantial nuclear incident and which were not covered by the Price-Anderson agreements of our contractors. These shipments might be made on very short notice, and could involve the facilities of almost any railroad in the country. Authority for this contract is contained in section 170 d. of the Atomic Energy Act of 1954.

There are few, if any, direct AEC shipments over toll facilities which could conceivably involve a risk of public liability for a substantial nuclear incident,

and which are not covered by Price-Anderson agreements of our contractors. In the case of any such shipments, it might be possible to enter into an agreement with the toll facility involved which would provide Price-Anderson protection for the shipment, but it appears unlikely that there would be any justification at the present time for a nationwide agreement with the toll facilities, similar to the railroad agreement. In addition to the fact that most problems associated with a particular shipment or shipments could be handled by a single Price-Anderson agreement with the toll facility authority involved, we do not know that any one person or group of persons has the legal authority to enter into a Price-Anderson contract on behalf of all the toll facilities. Moreover, not all toll facilities would necessarily be utilized for shipments, and the interconnection of facilities common to railroads does not appear to be present to the same extent with toll facilities.

13. Under your interpretation, does Price-Anderson indemnity cover, in the case of railroads, "loss of use of right-of-way and loss of profits"?

Answer. In our view, Price-Anderson indemnity does not create any tort liability but provides payment for claims for "public liability." Therefore, the substantive law of the various jurisdictions will determine the type of damages for which payments will be made under Price-Anderson indemnity. Thus, if the law of the jurisdiction where an indemnified nuclear incident occurred permits recovery for "loss of use of right-of-way" and "loss of profits," Price-Anderson indemnity coverage would be available.

14. Can the Commission resolve these differences with the railroads by further discussions or administrative action? Do you believe legislation is necessary?

Answer. The Commission is optimistic that the problems presented to us by the eastern railroads can be resolved without the need for legislative action. The letter of April 4, 1962, to Mr. Schultz, chairman, Traffic Executive Association—Eastern Railroads, copies of which have been furnished the subcommittee, is an example of the type of administrative action which, we think, will be useful to the railroads in resolving their concerns.

15. Concerning the convention on liability of operators of nuclear ships, last year the U.S. delegation took the position that warships should be excluded from the convention. Why? Would it not be to the advantage of the United States to have warships included, and thus limit the potential liability of our nuclear submarines during visits to foreign ports?

Answer. The official U.S. position favoring exclusion of nuclear warships from the proposed convention on liability of operators of nuclear ships was based upon the decision of the Secretary of Defense as concurred in by the Secretary of State. The AEC concluded that the question was one not properly within our purview.

16. Is the Japanese nuclear liability legislation satisfactory from the point of view of U.S. suppliers?

Answer. Certain questions have been raised concerning the adequacy of the Japanese nuclear liability legislation from the standpoint of the American supplier. We are fortunate in having received recently copies of the Atomic Industrial Forum's comments on the Japanese legislation. These comments are enclosed in response to your inquiry concerning the views of the American supplier.

17. In discussing the foreign activities you mention a number of countries now considering or having enacted nuclear liability legislation. Do most of these statutes provide for channeled, strict liability? Would such a uniform law be a good idea in the United States?

Answer. Of the national legislative schemes concerning liability of persons engaged in atomic energy activities, all but the United States provide for the channeling of an exclusive and absolute liability to the person who is responsible for the operation of the reactor or the conduct of the activity (reprocessing and waste disposal) involved. Although the Commission has not as yet formulated a position on the advisability of applying such principles in the United States, the issue has been presented in connection with U.S. participation in the development of the IAEA land-based reactor liability convention. We will, of course, keep the Joint Committee informed concerning our consideration of this issue.

18. Before proceeding to your statement on the operations of the ACRS, we have two questions on your March 31 report. At page 9, the report states that "Price-Anderson is not presently applicable to all shipments of radioactive materials." Generally, what type of shipments are not covered? Do they present a serious hazard?

Answer. At page 9 of our March 31, 1962, report, we stated that "Price-Anderson is not presently applicable to all shipments of radioactive materials." In the case of AEC contractors, the indemnity agreement covers nuclear incidents which arise out of or in the course of transportation of source, special nuclear or byproduct materials to or from a "contract location." With respect to licensee indemnity, there is coverage only for shipments (to and from a licensed reactor) of source, special nuclear and byproduct material which is used or to be used in, or which is irradiated to to be irradiated by, the licensed reactor, or which is produced as a result of the operation of the licensed reactor. Other shipments between licensees may not be covered. For example, a shipment from an unindemnified shipper of source, special nuclear or byproduct material to a licensee (even a facility licensee) to be used in hot-cell operations would not be covered by Price-Anderson indemnity.

On the basis of our experience, it is our opinion that the hazards of such unindemnified shipments are not of such magnitude to warrant the extension of Price-Anderson indemnity. This is not to imply, however, that as the atomic energy industry develops, indemnity may not be extended for shipments of large quantities of the more hazardous radioactive materials. This matter is of continuing interest to the Commission in its administration of the indemnity provisions of the act.

18. At page 12, the report discusses the "acceptance agreements" which are being negotiated for the NS *Savannah*. What is the general content of these agreements? What does the United States obtain and what commitments or obligations does it make?

Answer. Aside from those provisions of the proposed "acceptance agreements" relating to liability and indemnification, the agreements are largely procedural in content. Consistent with the recommendations of the Safety of Life at Sea Convention of 1960, the United States is to provide the foreign government with a safety assessment of the *Savannah* to serve as a basis of review and acceptance of the ship. Notification of acceptance is to be provided the United States as soon as practicable after the safety assessment is received by the foreign government. The national legislation of some foreign governments will require specific licensing action as a condition to entry.

Approach and entry routes are to be agreed upon in advance, and the *Savannah* is subject to reasonable access for normal inspection purposes. Disposal of radioactive wastes within the foreign government's territorial waters will require prior approval, unless gaseous and below specified permissible levels.

Adequate berthing arrangements are to be provided once approval is given for acceptance of the ship, and normal access to port facilities is included in such arrangements. Operation of the ship will be in accordance with the U.S. safety assessment, which, as noted above is provided the concerned foreign government.

The liability and indemnification provisions have three basic features. First, the United States agrees to consent to suit and not plead sovereign immunity in connection with any action for damages brought against it, which arises out of the operation of the *Savannah*. Second, the United States agrees that in any such action it will not interpose the defense of the conventional shipowner's limitation of liability. Third, the United States agrees, based upon the Commission's Price-Anderson Act indemnification of the Maritime Administration, to indemnify any person who may be liable for public liability arising from a nuclear incident in connection with the design, development, construction, operation, repair, maintenance, or use of the *Savannah*, provided that the aggregate liability of the United States arising out of a single incident involving the *Savannah* regardless of where damage may be suffered, shall not exceed $500 million.

19. We are pleased that the Commission has finally promulgated reactor site criteria. There are, however, a few matters concerning the philosophy of the regulation and its interpretation by AEC and the ACRS which need clarification.

In the press release accompanying the regulation it is stated that "sufficient flexibility has been included in the guides to allow for orderly evolution of site standards as the industry progresses."

Although this is a desirable long-term objective, what effect will the criteria have in the period immediately ahead? Will they have the affect of discouraging new reactor projects?

Specifically, we note that the criteria have already had their effect in connection with the ACRS review of the sites most recently proposed by the city

of Los Angeles. The ACRS letter states: "Neither of the locations can meet the site criteria guidelines proposed in 10 CFR 100 for the power level requested." Does this interpretation permit much "flexibility"? Are all reactors now built or under construction within the terms prescribed by the criteria? Could a reactor be approved if it fails to meet these guidelines?

Answer. In TID 14844, the Commission has set forth a method of calculations of distance factors for a hypothetical reactor to illustrate the type of analysis expected from an applicant in the evaluation of his own particular project. It is stated that all assumptions made in deriving the distances for this sample calculation may not be appropriate in all cases. The "flexibility" provided by the siting guides is in the recognition that applicants may develop different ways of calculating potential consequences of abnormal reactor behavior as the technology is advanced. It is possible that experiences with specific safeguards systems may demonstrate that certain assumptions now commonly made are too conservative. In fact, considerable nuclear safety research work of the AEC is devoted to providing information and data that will add to the present knowledge about abnormal reactor behavior and phenomena encountered during accident conditions. Such data and any similar evidence developed by the industry will be applied in predicting possible consequences of accidents and the safeguards needed to assure a minimum of public hazard. However, the applicant must demonstrate by other than "paper studies" that considerations other than those set forth in the guides are justifiable.

We cannot specifically predict what effect these criteria will have in the period immediately ahead in terms of new reactor projects, except in the most general sense. It is possible that the criteria may tend to dampen the enthusiasm of those who might have hoped to install large-size reactor plants, based on present technology, in proximity to large population centers. On the other hand, the guides permit anyone to demonstrate that operation can be performed at such a location without undue risk to the public. We have approved construction of reactors that would not meet the distances calculated by the method and assumptions illustrated in TID 14844 when the application was supported by adequate information which showed that there would be no undue hazard to the health and safety of the public. It is not, however, appropriate to say that such reactors "do not meet the site criteria" set forth in 10 CFR 100. The guides state that an applicant is to assume factors such as leak rate and meteorological conditions pertinent to his site. The results of such calculations are then considered with the other factors, as stated in the guide, in the evaluation of a proposed reactor site.

A question such as "Could a reactor be approved if it fails to meet these guidelines?" attributes a degree of specificity to the guides that is not intended or stated therein. The guides identify factors the Commission considers but do not put specific limits on these factors. Acceptance of a site still requires a judgment by those knowledgeable in the field who must evaluate the factors peculiar to each proposed site and reactor. The guides specify the basic factors to be considered in the evaluation of a site.

20. The site criteria indicate that "unique or unusual features having a significant bearing on the probability or consequence of accidental release of radioactive materials will be taken into account by the Commission." This would appear to be desirable by providing needed flexibility. How does the Commission interpret this phrase? Does it put a new and heavier burden on the person seeking a reactor construction permit?

The ACRS has apparently already interpreted this section in its letter concerning the two sites most recently proposed by the city of Los Angeles. It states: "If the sites proposed are to be considered acceptable, then reliance must be placed on *proved* engineering safeguards as a means of preventing exposure of significant numbers of people to possible radiation injury." The word "proved" has been emphasized by the ACRS. Doesn't this represent a very significant interpretation of the reactor site criteria? Would you please comment on this interpretation and its consequences for atomic power development.

Answer. The statements in the site guides with respect to "unique or unusual features" do not put a new and heavier burden on an applicant. Past safety reviews have always focused sharply on the unique or unusual features for which limited or no prior experience was available for use as a basis of evaluation. The guides, which attempt to identify clearly for applicants the factors the Commission reviews, state this principle.

The guides state that where unfavorable characteristics of a site exist (this includes proximity to large concentrations of population), a proposed site may be approved if the design of the facility includes adequate compensating engineering safeguards. We consider the recent ACRS report on the sites proposed by the city of Los Angeles as representing an unwillingness to accept the proposed safeguard features because the information submitted did not demonstrate the reliability of those features sufficiently to provide reasonable assurance of safety.

At this stage of reactor technology, it cannot be specifically stated as to how much proof will be required in cases of this type. However, reliable evidence of effectiveness should generally be required when engineered features in lieu of distance, are proposed as a safeguard against an accident that could be catastrophic in nature.

21. We have several questions on your March 30 report. At page 25 reference is made to the General Electric Co. Vallecitos superheat reactor. Has data been submitted to the ACRS on the superheat reactor fuel element failures which the Commission referred to in its recent 202 testimony? Is this a serious problem relative to the superheat reactors?

Answer. Data concerning the superheat reactor fuel element failures referred to in our 202 testimony have not been submitted to the ACRS but are available in progress report form. At present, fuel element failures are considered a serious problem in connection with superheat reactors and will likely remain so until a successful fuel element, or modifications in facility design to overcome the difficulties, have been developed. Research and development is underway with a view to resolving the problem. The results of this program will be considered by the regulatory staff and the ACRS as part of their review of the final design and operating procedure for these reactors prior to issuance of any license or authorization to operate the several superheat reactors under construction.

21. At page 25 of your report reference is made to the Lockheed radiation effects reactor. What are the latest plans for this reactor?

Answer. The Lockheed Aircraft Corp. has leased the radiation effects reactor from the Air Force until April 4, 1963, and plans, if licensed by the AEC, to conduct both Government and private industry research projects. The application is presently under review by the regulatory staff. By letter dated April 12, 1962, the Commission was informed by the Department of the Air Force that they plan to submit in the near future a disposal report to the Senate and House Armed Services Committees proposing that the property be reported to the General Services Administration for disposal.

21. At page 33, reference is made to the Elk River reactor. What is the status of the safety review of this reactor?

Answer. Information filed on April 12 respecting the reactor vessel for the Elk River reactor has been reviewed by the regulatory staff and its consultants, who are experts in the disciplines related to evaluation of the data submitted, and by the ACRS. In a report dated May 26, 1962, the ACRS stated that subject to a yearly internal inspection and other restrictions, the reactor vessel would be acceptable for operation for 5 years or 250 cycles, whichever occurs first. The chairman in a letter to the ACRS dated June 1, 1962, requested clarification of the lifetime and cycle limitations recommended by the committee. A reply from the ACRS dated June 29, 1962, was furnished to the Joint Committee on Atomic Energy on July 11, 1962.

21. At page 39 reference is made to the PM–2A, the Army reactor in Greenland. The ACRS letter of December 13, 1961, to the AEC on the Greenland reactor said that although the reactor has been in operation since March 8, 1961, the advice of the ACRS on this reactor was not requested until December 1961. Why was this project not reviewed prior to start of construction? Prior to start of operation?

Answer. Your question concerning construction and startup of the PM–2A Army reactor in Greenland without prior reference to the ACRS was answered in a letter from Harold L. Price to Mr. James T. Ramey dated February 16, 1962. A copy of the letter is attached.

21. At page 38 reference is made to the PM–3A at McMurdo Sound, Antarctica. It is indicated that the ACRS recommended a reevaluation of fission product releases, although the reactor has already started operation. Should the reactor be shut down until this reevaluation is completed?

Answer. The PM–3A at McMurdo Sound, Antarctica, was authorized to operate at low power for startup physics experiments after receipt of the ACRS report and review by the regulatory staff while the consequences of a fission product release was being reevaluated. In view of the resultant low fission product inventory involved in these interim operations, the authorization was considered to constitute a minimum hazard. Additional information concerning the consequences of fission product release and the results of the low power tests have been received and are being evaluated by the regulatory staff. Operation at a higher power level will not be authorized until the safety evaluation of the additional information is completed.

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