NUREG-0957

THE PRICE-ANDERSON ACT--THE THIRD DECADE

Report To Congress

by the

U.S. NUCLEAR REGULATORY COMMISSION

October 1983

A-1

ABSTRACT

Subsection 170p. of the Atomic Energy Act of 1954, as amended, requires that the Commission submit to the Congress by August 1, 1983, a detailed report on the need for continuation or modification of Section 170 of the Act, the Price-Anderson provisions. The report is divided into four sections with detailed subject reports appended to the main report. Sections I through III include an examination of issues that the Commission was required by statute to study (i.e., condition of the nuclear industry, state of knowledge of nuclear safety, and availability of private insurance), and discussion of other issues of interest and importance to the Congress and to the public. The subjects covered are as follows: (1) overview of the Price-Anderson system; (2) the state of knowledge of nuclear safety; (3) availability of private insurance; (4) condition of the nuclear industry; (5) causality and proof of damages: (6) limitation of liability and subsidy; and (7) a proposal that would provide for removal of the limitation of liability but with limited annual liability payments. Section IV of the report contains conclusions and recommendations. Section V contains a bibliography.

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Ira Dinitz, Office of State Programs
Michael Karlowicz, Office of State Programs
James Martin, Office of Nuclear Regulatory Research
Darrel Nash, Office of State Programs
Jim Petersen, Office of State Programs
Harold Peterson, Office of Nuclear Regulatory Research
Jerome Saltzman, Assistant Director for State and License Relations, Office of State Programs
William Shields, Office of the Executive Legal Director
Robert Wood, Office of State Programs
Dr. David Strip, Sandia National Laboratory
Dr. John Long, Consultant to the Office of State Programs and Chairperson, Insurance Department, Indiana University

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ACRONYMS AND INITIALISMS

ACRS	Advisory Committee on Reactor Safeguards
AFUDC	Allowance for funds used during construction
AMRECO	American Mutual Reinsurance Company
ANI	American Nuclear Insurer
APIC	American Power Insurance Corporation
APPA	American Public Power Association
ASLB	Atomic Safety and Licensing Board
BEA	Bureau of Economic Analysis
BWR	boiling-water reactor
CFR	Code of Federal Regulations
CPI	Consumer Price Index
CRAC 2	Consequences of Reactor Accidents Code, Version 2
CWIP	construction work in progress
DOE	Department of Energy
EEI	Edison Electric Institute
ENO	extraordinary nuclear occurrence
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
GAO	General Accounting Office
H.R.	House of Representatives
IBNR	incurred-but-not-reported (losses)
ICRP	Industry Credit Rating Plan
ISO	Insurance Services Office
LWR	light-water reactor
MAELU	Mutual Atomic Energy Liability Underwriters
MAERP	Mutual Atomic Energy Reinsurance Pool
NAIC	National Association of Insurance Commissioners
NARUC	National Association of Regulatory Utility Commissioners
NEIL	Nuclear Electric Insurance Limited
NELIA	Nuclear Energy Liability Insurance Association

NELP	Nuclear Energy Liability Policy
NEL-PIA	Nuclear Energy Liability - Property Insurance Association
NEPIA	Nuclear Energy Property Insurance Association
NML	Nuclear Mutual Limited
NRC	Nuclear Regulatory Commission
NSSS	nuclear steam supply system
PAG	Protective Action Guide
P.L.	Public Law
PRA	probabilistic risk analysis
PWR	pressurized-water reactor
R-Y	reactor-years
S.	Senate
SEC	Securities and Exchange Commission
SFSP	spent fuel storage pool
SIC	standard industrial classification
SNL	Sandia National Laboratory
SST	siting source term
S&T	Supplier's and Transporter's (Form)
TLD	thermoluminescent dosimeters
TMI-2	Three Mile Island Unit 2

Pages 11 through 15 redacted for the following reasons:
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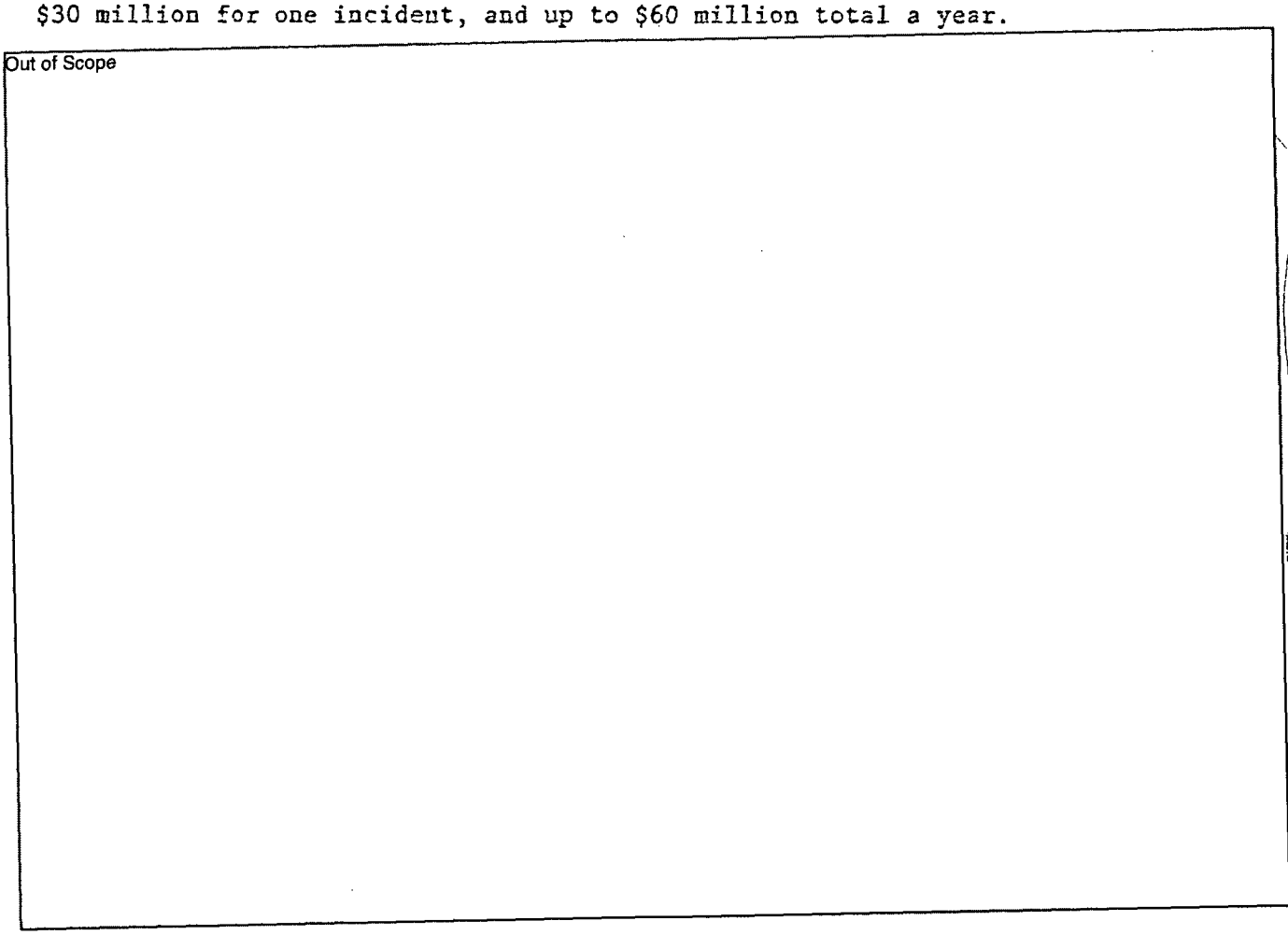
OUT OF SCOPE

The scope of Price-Anderson coverage includes any incident in the course of transportation of nuclear fuel to the site, in the storage of nuclear fuel at the site, the operation of the reactor including discharges of radioactive effluents, in the storage of nuclear wastes at the reactor site, and in the transportation of radioactive material from the reactor.

The insurance industry formed two insurance pools to provide nuclear liability insurance capacity to the utility industry at the time of passage of the Price-Anderson Act. One pool, Nuclear Energy Liability Insurance Association (NELIA), which has since changed its name to American Nuclear Insurers (ANI), is made up of insurance companies owned by stockholders (stock insurers) while the other pool, Mutual Atomic Energy Reinsurance Pool (MAERP) consists of companies owned by its policyholders (mutual insurers). All of the nuclear liability policies of MAERP are issued by Mutual Atomic Energy Liability Underwriters (MAELU), its underwriting syndicate. Although ANI and MAERP are separate entities, they coordinate all of their major activities.

Reactor licensees and other operators of nuclear facilities (such as fuel fabricators) purchase what is called the Facility Form of nuclear energy liability policy (NELP). The nuclear insurance pools (ANI-MAELU) also administer the secondary layer of required financial protection by issuing policies to insureds which set forth terms, conditions and obligations of the parties to cover the retrospective premium layer of insurance. The pools agree to pay for licensees defaulting in the payment of retrospective premiums up to $30 million for one incident, and up to $60 million total a year.



Out of Scope

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The Commission stated in its letter transmitting the June 9, 1975 report that a basic question presented by Price-Anderson in general, and by coverage of sabotage and theft risks in particular, is that of identifying who is responsible for these risks and, therefore, who will bear the financial burden of this coverage. Although NRC generally supported the proposition that private industry should assume the burden of risks that may be created in undertaking a commercial operation, a case might be made for at least partial government responsibility for the costs of public protection for incidents arising out of sabotage and theft, particularly where there is no clear connection between the damage-causing event and a specific licensee. The Commission further stated that although incidents arising out of certain acts of sabotage and theft are covered under Price-Anderson, there are gaps in coverage that the Ribicoff amendment would have closed provided the nuclear material causing the contamination could be traced to a particular insured licensee. With such proof absent, however, the NRC view was that any compensation to the injured public should be a government responsibility.

Exclusion of Costs of Investigating, Settling and Defending Claims

The 1975 amendment of the Price-Anderson Act also excluded from the limit of liability the costs of investigation, settlement, and defense of claims. These defense costs had heretofore been included in the amount of financial protection and government indemnity available. Amendment of the "costs" provisions of the Price-Anderson Act was proposed by Senator Hathaway during Senate consideration of the bill. Because there was virtually no legislative history beyond Senator Hathaway's remarks introducing the amendment and a short colloquy that followed, questions developed in the implementation of the amendment.

Because the Hathaway amendment excluded costs only from those sections of the Price-Anderson Act relating to government indemnity, and because no other sections of the Act were similarly amended, the insurance pools and others believed that the costs could continue to be paid out of the insurance layer. Insurers believe that if claims expenses were not included in the maximum sums an insurer commits to the pools, and the insurers were also asked to be responsible for additional undetermined sums for claims expense, insurers in the pools would reduce the amounts they commit to the pools to allow for the unknown expense factor, and some insurers would likely withdraw from the pools because of the uncertainty that would be created. The NRC argued, however, that Senator Hathaway intended that these costs be excluded from both the financial protection and government indemnity layers so as to make available the full $560 million to compensate injured parties. To do otherwise, the NRC believed, would be to negate the effect of the amendment especially as the secondary retrospective insurance layer would continue to increase and eventually eclipse the government indemnity layer. Because of these differing interpretations, the NRC requested the interpretation of the amendment by the Department of Justice.

The Department differed with the NRC interpretation and concluded that the Act should be interpreted to exclude the costs of investigation, settlement, and defense of claims under the government indemnity but to include these costs in the primary and secondary retrospective insurance layers.

Supreme Court Price-Anderson Decision: Duke Power Company vs. Carolina Environmental Study Group, Inc.

In December 1975, at the time when the most recent bill extending the Price-Anderson Act was being considered, an amendment was introduced on the Senate floor that would have provided for a court test of the limit on liability provision of the Act. The amendment was narrowly defeated. Subsequent to that, however, a suit was filed in the U.S. District Court for the Western District of North Carolina by the Carolina Environmental Study Group, challenging the constitutionality of the Price-Anderson Act. On March 31, 1977, the district court concluded that the limit on liability provision violated both the due-process and equal-protection clauses of the Constitution.

In a decision handed down on June 26, 1978, the Supreme Court overturned the district court's decision and unanimously upheld the liability limit provision. In his opinion, Chief Justice Burger stated that the liability limit was neither arbitrary nor irrational because the statutory limit was rationally related to Congress' desire to encourage the private sector to build and operate nuclear power plants. The Court went on to state that the $560 million figure chosen as the liability limit was also constitutional.

Claims History Under Price-Anderson

From 1957 to March 1983, claims for ninety-nine alleged incidents involving nuclear material under various liability policies were filed. Earlier claims tended to be property damage claims arising out of alleged radiation from leakage or other accidents involving the containers of nuclear materials in transit. By contrast, more recent claims have emphasized bodily injury arising out of radiation exposure, especially by contractor employees working on the site of operating nuclear power plants. The insured losses and expenses paid through this period total approximately $30 million. Of this amount about $28 million arose out of the Three Mile Island Unit 2 (TMI-2) accident that began on March 28, 1979.

TMI Claims--The insurance pools responded rapidly to the accident and established an office to pay claims for the living expenses of the families with pregnant women and pre-school age children who evacuated the five-mile area around the TMI-2 reactor, at the Governor's suggestion. A total of approximately $1.4 million in claims for living expenses and lost wages was eventually paid to some 3,170 claimants. Following the TMI-2 accident, numerous lawsuits were filed in State and Federal courts in Pennsylvania, alleging various injuries and property damages. These suits were consolidated into one suit before the Federal District Court in Harrisburg. In early September 1981, a Settlement Agreement was signed in the TMI-2 class action litigation. Under the terms of the agreement, the insurance pools paid into a Court managed fund $20 million for economic harm to businesses and individuals within 25 miles of TMI-2, and $5 million for the establishment of a Public Health Fund in the TMI-2 area.

At the end of February 1983, the District Court authorized the disbursement of $2.35 million in evacuation loss claims and wage loss claims to 10,993 claimants. Evaluation by the Court of other types of claims, such as business losses and property damage loss, is continuing. The Court has also approved the payment of more than $2.5 million in attorneys' fees and expenses in connection with the accident.

Coverage for Precautionary Evacuation--On a related issue, a report of the General Accounting Office (GAO) dated September 14, 1981 (EMD-81-111), examined the question as to whether the Price-Anderson Act covers public liability claims in potential nuclear accident situations, even when there is no radioactive release. Although that report focused primarily on the Price-Anderson Act's applicability to Department of Energy nuclear operations, GAO examined the question of whether the definition of "nuclear incident" in the Act is broad enough to cover liability resulting from a nuclear incident in which a radiation release appeared imminent but did not occur and yet a precautionary evacuation was ordered.

This question may be of less significance for reactors licensed and indemnified by NRC because of the terms of the primary and secondary insurance provided by these licensees. Both the primary and secondary insurance policies provide for the payment "for loss of use of property while evacuated or withdrawn from use because...of imminent danger of such contamination." However, it remains to be seen how the insurers would interpret coverage under this provision in specific circumstances. DOE contractors are not required to maintain nuclear insurance for their activities but are indemnified by DOE under Price-Anderson for claims up to $500 million.

Because neither the Price-Anderson Act nor its legislative history specifically addresses this question, it is uncertain whether costs arising from a precautionary evacuation would be covered. In the absence of Congressional modification to either the definition of "nuclear incident" or "public liability" to specifically provide for payment of these evacuation costs, the determination of whether these costs are allowable under Price-Anderson would be made by the appropriate court.

Determination of an Extraordinary Nuclear Occurrence (ENO)

Principal obstacles to a claimant's recovery for injuries or damages under the Price-Anderson Act could be the traditional legal defenses against liability available to the defendant such as conduct of the claimant, fault of persons indemnified or charitable or governmental immunity. Congress attempted to remove these obstacles in 1966 by amending Price-Anderson to introduce the concepts of extraordinary nuclear occurrence and waiver of defenses. The Atomic Energy Act of 1954, as amended, defines the term "extraordinary nuclear occurrence" (ENO) as any event causing an offsite dispersal of source, special nuclear, or byproduct material from its intended place of confinement in amounts off site, or causing radiation levels off site that NRC determines to be substantial, and that NRC determines has resulted or will probably result in substantial damages to persons located off site or property off site. When NRC determines that a nuclear incident is an ENO, then the waiver of defenses provisions of the insurance policies and indemnity agreements making up the

Price-Anderson system are activated, resulting in an essentially "no-fault" recovery scheme.* For NRC to determine that there has been an ENO, both Criterion I and Criterion II as set out in NRC regulations must be met. Criterion I relates to whether there has been substantial discharge or dispersal of radioactive material off the reactor site, or a substantial level of radiation offsite. If Criterion I is satisfied, Criterion II must then be applied, i.e. to determine whether the event has resulted or will probably result in substantial damages to persons off the site or property off the site as would be shown by any one of three specified findings.

Three Mile Island ENO Determination--On August 17, 1979, the Nuclear Regulatory Commission directed that a panel composed of principal staff be formed to assemble relevant information to determine whether or not the accident at TMI-2 constituted an "extraordinary nuclear occurrence." As directed by the Commission, the panel made its findings by applying to the information about the accident the explicit criteria set forth in the Commission's regulations, 10 CFR 140.84 and 140.85. The panel found that the first criterion, pertaining to whether the accident caused a discharge of radioactive material or levels of radiation offsite as defined in the regulations, had not been met. It further found that there was insufficient information to support any definitive finding as to whether or not the second criterion, relating to damage to persons or property offsite as defined in the regulations, had been met. Because the panel could not find that both criteria had been met, it recommended that the Commission determine that the TMI-2 accident was not an ENO. The Commission accepted this recommendation and on April 16, 1980 determined that the TMI accident did not constitute an ENO.

Proposed ENO Criteria--Because of the difficulties in determining whether the TMI-2 accident constituted an ENO, especially whether the second (damage) criterion was met, a number of parties urged either the modification or elimination of Criterion II. Others have recommended eliminating the first (dose-release) criterion. Congress has the option to either modify the present ENO definition, eliminate it completely, or propose its own ENO criteria. NRC is considering comments received in connection with the TMI-2 ENO determination and is presently evaluating this question.

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*Subsection 170n. of the Act provides that these waiver provisions are activated only if an ENO occurs at a production or utilization facility or occurs in the course of transportation to or from such a facility. Therefore, even if NRC exercises its discretionary authority to require financial protection and extend indemnity to other materials licensees, the waivers would not be applicable. The legislative record offers no explanation of why the waivers and ENO provisions were limited to production and utilization facilities in the 1966 amendments.

SECTION II. PRINCIPAL ISSUES BEARING ON NEED TO CONTINUE PRICE-ANDERSON ACT

STATE OF KNOWLEDGE OF NUCLEAR SAFETY

Licensing and Regulation

The Commission's regulation of radiological risks from nuclear power plants has evolved since the late 1950s into a complex system of binding rules (10 CFR Chapter 1, primarily 10 CFR 20, 50, and 100) and supplementary regulatory guidance (usually in the form of regulatory guides). At its most fundamental level, the approach that has been used and is being used currently requires plants to be constructed and operated in a manner consistent with sound engineering practice. Sound engineering practice as applied to nuclear power plants is embodied in a defense-in-depth concept. This practice involves quality assurance and control in plant design, construction, and operation to reduce the likelihood of accidents; installation of backup systems to nullify the consequences of malfunctions in important plant systems and to prevent individual malfunctions from escalating into major accidents; and installation of engineered safety features to confine the consequences of certain postulated major design-basis accidents to minimize effects on the public health and safety. The Commission has also discouraged the siting of nuclear plants in areas of high population density or in locations near natural or man-made hazards. More recently, siting policy has also emphasized the requirement of reasonable assurance that adequate emergency planning exists so that protective measures can and will be taken by the licensee and the state and local authorities in the event of accidents more serious than design-basis accidents.

The basic principles of regulatory practice consistent with the statutory mandates of the Atomic Energy Act and inherent in the safety approach that has been followed are summarized below:

(1) Absolute safety or "zero risk" is not legally required. The Atomic Energy Act refers to "adequate" rather than "absolute" protection of the public health and safety. There is risk in nuclear power, just as there is risk in all technologies, including competing energy technologies, as well as in every personal activity in which people engage. The intent of Congress expressed in that legislation is that nuclear power be developed under a licensing system to reasonably ensure safe commercial use in generating electricity.

(2) The Commission's continuing practice of conservatism and use of the defense-in-depth concept is intended to provide an extra margin of public protection. Nuclear power plants have been designed, constructed, and operated to reasonably ensure that an extra margin of safety is provided against unforeseen events.

(3) Regulatory decisions are made on the basis of the best available evidence despite the presence of residual uncertainties. This approach has involved striking a balance between the degree of uncertainty and the potential radiological consequences of a decision made under uncertainty. In cases

where the uncertainty regarding radiological hazard has been sufficiently great, the potential source of the hazard has not been permitted.

Nuclear Safety Progress

The NRC and the nuclear industry have improved the state of knowledge of nuclear safety since the 1975 Price-Anderson extension by (1) studying and resolving safety significant technical concerns referred to as "unresolved safety issues," (2) conducting over two dozen probabilistic analyses of selected nuclear plants, and (3) being responsive to lessons learned from operational events such as the accident at TMI-2 and precursors to other accidents.

Since 1974 a total of 26 unresolved safety issues (USI) have been identified that require resolution. The status of these issues has been regularly reported in the Commission's annual reports. Table II.1 lists the USIs that have been technically resolved and Table II.2 reports the schedule for the remaining issues. These issues can be generally characterized as complex technical problems requiring extensive analyses and/or testing. Fluid dynamics in pressure suppression containments and fluid systems are being analyzed; metallurgical concerns involving pipe cracks and material toughness as well as strength-of-materials problems are included. System performance and reliability concerns are also included involving the failure to scram, plant emergency electrical power, and the availability of decay heat removal systems. As of the beginning of 1983, half of the identified safety issues have been technically resolved with implementation of the resulting licensing requirements either complete, under way, or scheduled to begin within the next year.

Since the publication of the Reactor Safety Study in 1975, a substantial number of additional probabilistic analyses have been initiated. Table II.3 summarizes those analyses that have been completed and those under way as of June 1983. The studies listed in Table II.3 have varied in scope, ranging from estimates of the core melt probability to estimates of the risks to the public. It was recognized at the outset that use of the probabilistic risk analysis (PRA) methodology had to be done with care because of the large uncertainties in the analysis. Therefore, the NRC has had programs under way since 1975 to improve the PRA methodology. Progess is being made and the program has provided useful insights on nuclear reactor safety. However, there remain significant uncertainties associated with the overall results of PRAs, and there exists a wide sprectrum of expert views on the ability of the PRA methodology to provide reliable estimates of the risk associated with the operation of nuclear power plants. Furthermore, the studies done thus far have not been performed using consistent methodology and assumptions. Nevetheless, this growing base of risk information has influenced the current understanding of nuclear safety. It has identified some risk significant factors associated with the design and operation of plants. It has pointed out the importance of human error. It has enabled licensing and research efforts to focus on some of the more significant safety questions while de-emphasizing those of less importance. Improvements in the overall reliability of the auxiliary feedwater systems in PWRs have been made in part as a result of insights gained from probabilistic analyses as well as a generic reliability assessment of all auxiliary feedwater systems. Plant-specific changes in equipment and operation also have been made as a result of risk and reliability analysis, many on a voluntary basis by utilities. Some safety weaknesses arising out of dependencies between systems, single

failure vulnerabilities, poor or improper test or operational procedures, potential vulnerabilities from fire, flood, and earthquake have been discovered as a result of probabilistic analyses.

Since 1975 a number of operational events and equipment failures have provided a third avenue for safety improvements and have signaled possible weaknesses in plant design and operation. Table II.4 lists a number of recent events that have resulted in specific safety improvements in light water reactors. The TMI event constitutes the most significant in terms of the number and extent of safety improvements required of the nuclear industry. The "NRC Action Plan Developed as a Result of the TMI-2 Accident," NUREG-0660, Vols. 1 and 2, and "Clarification of TMI Action Plan Requirements," NUREG-0737, provided an action plan for short-term and long-term actions to be taken by the NRC and industry in the broad subject areas of Operational Safety; Siting and Design; Emergency Preparedness; and NRC Policy, Organization and Management. The TMI-2 event and subsequent events of importance have been carefully studied, their safety implications determined, and new design and operational requirements developed to ensure the maintenance and improvement in the level of nuclear safety.

In summary, a great deal more is known today about nuclear reactor technology than was known in the late 1950s. Yet, inevitably, uncertainties remain. Major research and development programs continue within both NRC and the nuclear industry to enhance and confirm the safety of some plant systems and to improve safety evaluation methods.

Potential failures and accident scenarios continue to be studied to improve the knowledge of reactor safety. Estimates of the residual risks from potential failures have been, and are being, attempted through the use of probabilistic risk assessment techniques.

A brief summary of PRA methods and results is presented in the remainder of this section. The emphasis is placed on the risks and potential liability for offsite consequences of severe accidents (i.e., aspects directly related to the Price-Anderson issues). However, it must be recognized that the true benefits of a PRA are the identification of accident sequences that potentially could result in significant damages to a plant and the environment, and to assist in the implementation of preventive or corrective measures that reduce the probability of a serious accident, as well as in the implementation of mitigative measures that would reduce the consequences of an accident should one occur.

Probabilistic Assessment Perspectives

This section provides information on methods used to mathematically calculate possible risk to the public in the event of certain postulated nuclear accidents at nuclear power plants.

The term "consequences" used in this section quantifies the estimated outcome of an accident should it occur. "Risk" is the term applied to the result of consequences multiplied by the probability of an accident occurring. For example, if the consequences were expected to be 20 injuries given an accident and the chance of the occurrence of the accident was expected to be one-tenth per year, then the risk would be two injuries per year. In spite of the potentially large consequences of some postulated reactor accident sequences, the risk calculated in this manner is usually very low because of the very

small likelihood of occurrence of these accidents. As a general rule, the larger the consequences, the smaller the probability of occurrence, so that the estimated monetized risk of a single nuclear accident offsite is usually no larger than some tens of thousands of dollars per year. Of course, these estimates are subject to substantial uncertainties because of the complexities of risk analyses and the lack of an actuarial base of experience.

During previous Congressional considerations of the Price-Anderson Act, information available indicated that the likelihood of occurrence of a serious nuclear accident with severe consequences for the public was extremely small. Nevertheless, that information did not imply that such an accident would not occur.

These determinations continue to be valid and are in accord with the relevant studies of reactor risks. In general, these studies confirm that a wide range of consequences from a nuclear accident is possible. The consequences depend on many factors such as the exact conditions under which the accident occurs, prevailing weather conditions, population distribution around the reactor site, and assumptions that are made in the analysis of the events associated with the accident and the resulting consequences. The estimates of consequences of a nuclear accident are highly dependent on site-specific and plant-specific factors and are influenced greatly by the assumptions made for purposes of the analysis. Thus, generic conclusions regarding consequence estimates from any risk analysis of specific reactors should be reached only after considering these many factors and uncertainties.

The first major risk study (WASH-740) was available at the time of the original enactment of the Price-Anderson Act in 1957. WASH-740 summarized the accident risks (under the conditions postulated for purposes of that report) by giving essentially qualitative estimates of accident probability, and extreme consequence estimates "[which stretch] possibility far out toward its extreme limits."*

In 1965, about 8 years after WASH-740 was first issued, there was some additional work performed on reactor risk qualification for a possible revision of WASH-740. The work showed higher possible consequences than that presented in WASH-740. Perhaps the most significant factors were the direct growth in estimates of potential consequences with growth in reactor size and the continued inability to provide more than essentially qualitative probability estimates.

In 1974, the Reactor Safety Study (formerly WASH-1400; now NUREG-75/014) showed extreme values similar to WASH-740, but in a context of a fairly comprehensive PRA that systematically estimated both the probabilities and consequences of accidents in large nuclear power reactors. The Study showed, as one would expect, that the probability of accidents decreases significantly as the magnitude of the potential consequences increases.

The NRC staff has not initiated a comprehensive reactor safety study subsequent to WASH-1400 although industry has undertaken several extensive studies. As noted earlier, however, WASH-1400 has provided the foundation for later risk

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*Letter from H. S. Vance (Acting Chairman, AEC) to Congressman C. T. Durham, transmitting WASH-740 to the Congress, March 22, 1957, p. 1.

studies based on use of the probabilistic risk assessment techniques.* The estimated risk from nuclear power plant accidents may of course be affected by a great deal of re-evaluation, which is now under way.

There are many uncertainties in the various factors that go into the overall assessment of public risks. The probabilities are one such uncertainty. Another is in the estimate of the amount of fission products released. This latter factor is believed by many analysts to be highly conservative and is a concern currently under extensive re-evaluation. Other uncertainties in PRA relate to completeness. For example, sabotage is not included and the risk from seismic events is frequently not considered. Also, the economic models have not been subject to rigorous critique, especially the property damage models.

The NRC staff and its contractors conducted a study of the source term matter in 1980-1981 and published the results in NUREG-0772, "Technical Bases for Estimating Fission Product Behavior During LWR Accidents." That report was not conclusive in establishing substantial reductions in accident source term estimates, but it showed that, with additional research, such reductions were likely to be established. That research has been under way since 1981 and its results are now coming under peer review as the work progresses. A report on the subject is to be released by the NRC for public comment after the scientific peer review of the work is completed in mid-1984. Until the work is complete and tested by the peer review process, the NRC continues to use the current accident source term estimates, which are believed to be pessimistic, in risk estimates.

Present work in probabilistic risk assessment is expected to better characterize the uncertainties, both in accident probabilities and in the analysis of possible releases from the containment. Of course, uncertainties will still remain.

Thus, the current emphasis on risk analysis is part of the continuing long-term effort to improve safety and NRC staff understanding of the overall risk of nuclear power plants. Probabilistic risk assessment methods are continually evolving (NUREG/CR-2300) to study very unlikely or rare events that could lead to major radioactive releases and to trace through the paths of potential impacts on the environment (persons and property). There are three principal steps in calculating the overall risks from reactor accidents. These are

(1) estimates of the expected frequencies of accidents that could severely damage the reactor core

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*For example, see NUREG-0715, "Task Force Report on Interim Operation of Indian Point," U.S. Nuclear Regulatory Commission, August 1980. The techniques have also been used to provide perspectives on risks at other sites, including sites in surrounding environs of high, intermediate and low population densities. These studies have been available to the Congress and the public.

On December 31, 1980, Chairman Ahearne of the NRC wrote to the Congress to respond to the GAO analysis of the Price-Anderson Act (GAO Report EMD-80-80, "Analysis of the Price Anderson Act," August 1980). That letter gave a range of probabilities and consequences which had been calculated in NUREG-0715 for a representative set of U.S. sites.

(2) analysis of the timing and amount of release of fission products from the plant to the environment, given the occurrence of a severe accident

(3) analysis of the transport of the fission products through the environment after leaving the containment and the resulting consequences (health effects and property damage)

Of the three steps in risk evaluation, the first is treated probabilistically. The occurrence of a particular sequence of events leading to an accident is strongly dependent on the design of the plant, the likelihood of events occurring that could initiate an accident, whether the plant systems and equipment perform as designed, and whether plant personnel react properly to the accident symptoms. The second step, the transport of fission products from the reactor to the environment, currently is considered deterministically* because it behaves according to chemical and physical laws, although some parts of it, such as containment systems performance, are treated probabilistically. The third step, the calculation of consequences, is again treated probabilistically and is dependent on a number of random events, primarily the probability of various meteorological conditions (such as wind speed, wind direction, rain) following a release. This third step is characterized by conditional probabilities, meaning that steps one and two must occur (i.e., an accident happens and radioactive materials are released to the environment) before step three can occur.

The staff has developed a generic set of accident releases (NUREG-0733) that could be used to provide insights into proposed rulemaking actions concerning siting policy and criteria. In this formulation, a wide range of accident sequence severities was covered by considering release groups which account for a spectrum of possible degraded engineered safety features.

This set of generic source terms was developed using insights from previous probabilistic analyses on accident sequences and associated fission product releases. These generic source terms have been used (NUREG/CR-2239) to encompass the full spectrum of severe accident release possibilities and to develop technical bases for possible modification of the Commission's current siting criteria for reactors. These have been characterized as "siting source terms" and reflect a set of five fission product release groups designated SST1 through SST5.

Those accidents in SST1 would be very severe accidents in which essentially all engineered safety features fail, including direct breach of reactor containment. At the other extreme, SST5 accidents would have limited core damage, essentially no failure of engineered safety features, and the containment leakage integrity remains intact.

Based on currently available probabilistic risk assessments, representative probabilities of occurrence (per year) for the generic source terms can be estimated as follows. The probabilities for SST1 and SST2 are one and two chances in 100,000 years, respectively. The probability for categories SST3, SST4, and SST5 are each one chance in 10,000 years. There are expected to be large variations (factors of 10 or more) in the accident probabilities

*As noted earlier in the text, the estimation of fission product behavior during LWR accidents is now the subject of intensive research.

associated with a specific design, and caution must be used against attributing these numbers to a given plant. In addition, there are very large uncertainties associated with the development of such a set of source terms, and it must be clearly recognized that these estimates represented the NRC staff's best judgments at the present time.

SST1 dominates accident risks offsite and represents at least 50 times the risk of the next most serious accident category, SST2. In turn, SST2 contributes at least twice the risk of SST3. SST4 and SST5 result in very small releases from the containment. Nearly all the risk is accounted for by the unlikely potential for SST1 and SST2 accident scenarios and releases.

AVAILABILITY OF PRIVATE INSURANCE

There are a number of possible methods for increasing the presently available insurance capacity under the existing Price-Anderson framework. One method is for the nuclear insurance pools to increase the primary insurance levels beyond the present $160 million. In fact, the pools hope to have $200 million in primary insurance early in 1985. However, it is unlikely that primary insurance will increase much beyond the projected 1985 level without strong pressures from outside the insurance industry. A second method of achieving growth in insurance capacity would be by raising the secondary retrospective assessment layer.* Finally, a third method for raising capacity as discussed later in this section could be the removal of the nuclear exclusion provision in property insurance policies to provide protection against nuclear-related losses directly in property insurance sold to homeowners and other members of the public.

Increasing Assessments for Retrospective Premiums

Bills have been introduced in Congress to increase dramatically the size of the maximum assessments in the secondary-level nuclear liability insurance program. If such bills were enacted, the financial consequences of the assessments could become much more severe than is now the case. Furthermore, an assessment feature is now found in three other types of nuclear insurance carried by utilities.**

*It should be noted that some commenters on the Price-Anderson Act have suggested that in order to increase the available liability funds, nuclear manufacturers and architect-engineers enter into a retrospective premium insurance agreement for each power reactor they build or design.

**These additional forms of nuclear insurance that use an assessment feature of retrospective premiums are for insurance to utilities for losses suffered by the utilities themselves. They provide

(1) nuclear property insurance up to $500 million for losses to the reactor property itself (called primary property insurance);

(2) nuclear property insurance in excess of $500 million for losses to the reactor property itself (called excess property insurance);

(3) nuclear extra expense insurance to provide a portion of a utility's extra expenses in purchasing replacement power from other sources during an extensive period when a utility is unable to produce its own power due to a loss of its own reactor (called extra-expense insurance). (See Subject Report H for more details on these forms of insurance.)

A nuclear incident that would trigger a call for maximum retrospective premiums at the secondary level of nuclear liability insurance could also trigger a call for assessments under other policies now in place. Each calls for a multiple of the annual premium if claims arising out of a single nuclear incident occur in successive years. In the extremely unlikely situation of multiple accidents, the impact of such assessments would become more severe for the utilities.

In 1976, NRC published a research report prepared by Professor Ronald W. Melicher of the University of Colorado entitled "Financial Implications of Retrospective Premium Adjustments on Electric Utilities."* The report estimated the possible financial consequences to four representative nuclear utilities, assuming that each utility had been required to pay credible levels of nuclear liability assessments in 1975. The report concluded that each utility would have been able to pay these assessments in 1975 without suffering undue financial stress and would thus render this assessment insurance program viable. However, concerns were raised that the impact of assessments may be compounded in the form of changing "risk" attitudes or perceptions. The ability of nuclear utilities to compete effectively in capital markets might be hampered in the event of a major nuclear accident. Unless risk perceptions become permanent, however, the repercussions of such an accident or capital markets are likely to be severe but temporary.

Subject Report I applies an analysis similar to Melicher to the 1981 operating data of the same four utilities and takes cognizance of the other assessable nuclear insurance programs now in operation. The primary concern is whether utilities can support assessments for one accident. This would be, in the worst case, about $56 million per reactor year for the four insurance programs.** (The vast majority of accidents, however, would result in total assessments less than this maximum.) Updating Melicher's analysis using 1981 operating data of the same four utilities, three could likely accommodate an assessment of $20 million made up of any combination of assessments for the four insurance programs. The other, a large utility owning several reactors, would experience significant financial stress. Lower assessments could probably be handled by all four utilitites. The results for 1981 operating data leave little doubt that assessments at the $50 million level per reactor would pose major problems for all four utilities, but especially for the two with more than one reactor each. To the extent that the assessments may ultimately be passed along to the consumers in the form of increased rates for electricity, the problem posed by the possible assessments is perhaps more one of maintaining adequate cash flow than of maintaining long-run solvency. Yet solvency depends in large part on net positive cash flows. These analyses have been done for four utilities for specific years only and do not necessarily represent all other utilities or the same utilities in other years. It could well be that the number of reactors owned does not by itself indicate a problem in managing post-loss assessments but rather the number of reactors relative to net income and other measures of financial performance.

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*NR-AIG-003, September 1976.

**The $56 million consists of $5 million for retrospective premiums for the secondary layer of liability insurance, $35 million for primary property insurance, $8 million in extra-expense insurance, and $8 million in excess property insurance (see Subject Report I, Table I.1).

The Nuclear Exclusion in Personal Lines Property Insurance

Finally, some have argued that more private insurance could be made available for nuclear losses if the nuclear exclusion in property insurance were deleted.

Almost all property-liability insurance policies issued in the United States, except the policies issued by the nuclear insurance pools, exclude nuclear damage. This means that claims for damage to one's home, automobile, or other insured property caused by radiation or contamination from a nuclear accident would not be collectible under a personal property insurance policy. The insurance industry has advanced various reasons for retaining the nuclear exclusion in the standard policies while channeling liability through the nuclear liability insurance pools under the Price-Anderson system. First, the industry argues that because the nuclear risk is unique (and therefore uninsurable in the classical sense of the term), the only practical way of insuring the nuclear hazard is to insure the nuclear industry as a whole and to spread the losses over extended periods of time. Second, the industry has stated that by following its present approach, the amount of nuclear insurance in force has been maximized and a better quality of nuclear insurance has been made available. Third, the industry has argued that nuclear liability insurance offers superior coverage to first-party insurance in which the nuclear exclusion has been removed. Finally, the argument is made that if the nuclear exclusion were removed from standard policies, some insurers might not be able to satisfy claims should a catastrophic nuclear incident occur.

Critics of retaining the nuclear exclusion, however, point out that although numerous insurers participating in the nuclear pools might cut back on their pool participation if the exclusion were eliminated, this reduction might be offset by greater participation in nuclear insurance available through the standard policies.

These arguments are not easily resolved. To say that the maximum exposures that would be created by removal of the exclusion are unknown is to say that the nuclear property risk is uninsurable. If the risk is uninsurable and compensation does not come through third-party coverage, property owners are vulnerable to uncompensated loss through no fault of their own. If some losses would remain uncompensated, the present system--even though it might be the best that could be devised--falls far short of the ideal. On the other hand, it must be recognized that a solution to covering a risk that is uninsurable in the traditional fashion is to handle it in a nontraditional fashion. This nontraditional coverage is precisely what the Price-Anderson system attempts to provide. The mere fact that Price-Anderson is used, however, is not conclusive that this risk really is uninsurable or that Price-Anderson is the best alternative system to traditional insurance that could be devised.

Over the last few years, the National Association of Insurance Commissioners (NAIC), through its Advisory Committee on Excess Nuclear Limits, has examined the question of whether insurers could include in their standard policies coverage for nuclear property damage. In early December 1982, the NAIC approved a report calling for a study of this question. It is expected that the NAIC study will further clarify this controversial question.

THE CONDITION OF THE NUCLEAR INDUSTRY AND THE NEED FOR PRICE-ANDERSON

In testimony submitted in support of the initial enactment of the Price-Anderson Act in 1957 and in renewals in 1965 and 1975, companies in the nuclear industry, including utilities and suppliers, indicated that they would probably not participate in the nuclear industry without a liability limitation such as that provided under Price-Anderson. In the preparation of this report, no attempt was made to do an independent analysis of the condition of the nuclear industry in 1983. Instead, the staff chose to report on what is being said about those companies' condition by the companies themselves, by industry analysts, and by their regulators (in the case of utilities). The staff concluded that a fair assessment of the nuclear industry's condition could be obtained through a review of those combined sources that often provide checks on each other.

The so-called "nuclear industry," as it is considered in the Price-Anderson context, is an industry to the extent that each of the numerous entities making up the group contributes in some way to the design, construction, or operation of nuclear power plants. Although electric utilities own and generally operate the plants, hundreds of companies provide components or services for the construction and operation of the plants. The vast majority of the participants in the nuclear industry do most of their overall business in nonnuclear pursuits and are thus considered to be members of industries other than the nuclear industry. Nonetheless, they contribute to the construction and operation of nuclear plants and are covered in those nuclear activities under the omnibus provisions of the Price-Anderson Act. The financial condition of the nuclear industry is, therefore, a complex phenomenon relating to a diverse group of entities.

An assessment of the financial condition and outlook of the electric utility sector of the nuclear industry depends on the point of view of the assessor and the assumptions made. There is no consensus among knowledgeable authorities on the financial health and future of this sector. Certain segments of the utility industry itself, although acknowledging recent economic gains among some investor-owned utilities, perceive the industry in general as being in a difficult financial situation. Two well-publicized examples of this situation are General Public Utilities, the investor-owned electric utility holding company that suffered the accident at Three Mile Island, and Washington Public Power Supply System, an organization of public utilities that faces possible default due to cancellation of a major portion of its nuclear construction program. Thus, although members of the industry are willing to acknowledge recent gains in allowed earnings by regulators, they still believe that the industry faces long-term difficulties in load growth and in the regulatory and political climate. Some utility regulators and stockbrokers, however, take an optimistic view of the electric utility industry in general, by pointing to favorable rate relief and significant recovery of utility stock prices during the last year or so. There is a widespread attitude among state utility regulators that they are doing their part to assist utilities and that any problems are largely unrelated to rate regulation. Although many utilities are using a capital minimization strategy in which plants are being postponed, there is industry concern that such a strategy makes these utility securities appear more attractive in the near term at the cost of risking future electricity shortages. Because of such possible shortages, assumptions of energy

and electricity demand by the end of the century are critical in judging the wisdom of utility strategies that minimize new plant construction during the present period of excess generating capacity.*

Based on currently available information, no new nuclear plants can be identified that would receive construction permits after August 1, 1987, the expiration date of current Price-Anderson provisions. Under the terms of the Price-Anderson Act, even if the Act were to be allowed to expire on August 1, 1987, every reactor that was issued a construction permit before that date would be brought under the Price-Anderson system for the life of the operating license for the facility. Because Price-Anderson will apply to all reactors that can presently be identified and given the absence of indicators of specific plans to build nuclear plants in the future, it could be argued that there is no need for an extension of Price-Anderson beyond August 1, 1987. On the other hand, industry argues for preserving the option of building nuclear plants in the future when the need arises and when current financial constraints are eased. It sees the continued existence of liability protection, such as that provided by Price-Anderson, as one factor in preserving that option. Given industry perception of the continuing need for Price-Anderson, and in view of the lack of new orders for plants, the situation is in some respects similar to what it was when Congress saw the need for enactment of the original Price-Anderson Act. A primary difference, however, is that in 1957, the nuclear industry was in the development stages of the technology, whereas it is now well beyond those stages.

The importance of Price-Anderson in preserving the nuclear option is difficult to judge. Critics of Price-Anderson would argue that if nuclear power is as safe as the nuclear industry asserts, then the special system provided by the Act would not be needed in the future. But the potential burden on owners of new nuclear plants to operate without Price-Anderson while present owners continue to operate under the Act might be critical in decisions on undertaking nuclear facilities in the future. Furthermore, the cost to the utility of selling its securities is dependent in large part on the risk perceived by investors to be inherent in the securities. That is, if investors feel that there is a significant possibility of loss of their investment or that dividends or interest may not be paid as scheduled, the company's cost of capital will increase commensurately. Likewise, the interest rate paid by a company on a short-term debt is determined by its credit rating. The credit rating is primarily a measure of the probability that the borrower will make interest and principal payments as scheduled. An assessment of the borrower's ability to make future payments includes an analysis of his other obligations and the possible outcome of pending claims and lawsuits against him.

If a company is exposed to the possibility of unlimited liability arising from a nuclear accident (even though the likelihood is low), the cost of outside financing may very well be increased. Independent auditors and members of the financial community have indicated to the NRC staff that a lack of liability coverage and/or liability limitation for nuclear accidents would have to be disclosed to investors under existing Securities and Exchange Commission (SEC)

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*See The Future of Electric Power in America: Economic Supply for Economic Growth, DOE/PE-0045, Department of Energy, June 1983, Chapter 6.

rules and generally accepted financial accounting practice. Securities rating services have also indicated that they would consider such liability exposure to be a significant rating factor. According to members of the financial community, investors and lenders would be sensitive to such potential liability and to the uncertainties surrounding a possible nuclear accident. It is conceivable under those circumstances that the borrower could not obtain outside financing at a cost considered reasonable or could not obtain financing at all. In this regard, General Public Utilities and its directors settled a suit by stockholders for an estimated $20 million. The suit claimed that stockholders had not been informed of the financial risk of a major accident.

Some care must be taken in placing weight on perceived financial risk because of the existence or absence of Price-Anderson. In isolation, questions of liability losses, especially unlimited liability losses, would be identified as important to the cost of financing. But any accident that would include a catastrophic liability loss would almost inevitably involve a catastrophic loss to the reactor asset itself. Except for a flurry of concern relating to the adequacy of property insurance for power reactors that was evident during the attempts to raise funds through Congressional action to help pay for the cleanup of the Three Mile Island accident, there has been no noticeable sustained pressure from the investment community to ensure that their assets are "fully" insured for catastrophic losses. Therefore, the actual impact on the cost of financing future nuclear plants of perceived higher risks of liability losses alone is open to question.

The attitude generally expressed by the suppliers who provide a variety of products and services to the nuclear industry is that limitation of liability is essential to their participation in the nuclear industry. Many of the suppliers are relatively small entities and derive most of their sales and profits in non-nuclear activities. They have indicated that they would not risk the possibility of complete loss of their investment as a result of the exposure to unlimited liability (in the absence of Price-Anderson omnibus coverage or alternate coverage) arising from a nuclear accident. They also have indicated the likelihood that they would probably stop supplying the nuclear industry rather than expose themselves to such a risk, however unlikely an accident might be.

A number of suppliers serve non-nuclear industries in which there is also the possibility of massive liability caused by the supplier's faulty product or service. Each supplier indicated that it was protected by commercial liability insurance for these non-nuclear risks. For example, one nuclear steam system supplier carries liability insurance for injury to third parties resulting from defective components that it produces for fossil-fueled power plants. Several trucking companies that transport new nuclear fuel and spent nuclear fuel also carry other hazardous materials such as explosives and petrochemicals. Each carries liability insurance against the risk of third-party claims following an accident involving non-nuclear cargoes. One trucking company indicated that if it lost Price-Anderson coverage and could not get alternate coverage, it would discontinue carrying spent fuel. (The company said that it would probably continue carrying new fuel, however, because the potential for a serious radioactive release is absent with fuel not yet irradiated.) The supplier and trucking companies contacted indicated that they considered the amount of commercially available liability insurance to be adequate for non-nuclear risks but not for nuclear risks. Most likely such views are based on visceral reactions rather than on any objective analyses of relative risks.

Table II.1 Unresolved safety issues for which a final technical resolution has been completed (as of February 1983)

Task	Title	Report number	Date	Implementation status
A-2	Asymmetric Blowdown Loads	NUREG-0609	Nov. 1980	Additional licensee responses under review.
A-6	Mark I Short Term Program	NUREG-0408	Dec. 1977	Complete
A-7	Mark I Long Term Program	NUREG-0661	July 1980	Licensees are performing analyses and installing modifications in accordance with Commission order.
A-8	Mark II Containment Pool Dynamic Loads	NUREG-0808	Aug. 1981	Implemented as a part of the OL review of each Mark II containment.
A-9	Anticipated Transients Without Scram	NUREG-0460, Vol. 4	Sept. 1980	Three proposed rules issued for public comment.*
A-10	Boiling Water Reactor Nozzle Cracking	NUREG-0619	Nov. 1980	Detailed implementation for each licensee in progress.
A-11	Reactor Vessel Material Toughness		Oct. 1982	Complete--provides an improved procedure for performing fracture toughness analysis.
A-24	Quantification of Class IE Safety Related Equipment	NUREG-0588, Rev. 1	July 1981	Implementation included in rulemaking on environmental qualification in progress.*
A-26	Reactor Vessel Pressure Transient Protection	NUREG-0224	Sept. 1978	Complete
A-31	Residual Heat Removal	No Formal Report SRP 5.4.7, Rev. 2**	1978	Implementation on operating reactors incomplete.
A-36	Control of Heavy Loads Near Spent Fuel	NUREG-0612	July 1980	Detailed implementation for each licensee in progress.
A-39	SRV Pool Dynamic Loads***		Oct. 1982	Complete--method to obtain credit for higher operational pool temperature limits for BWR containments with quencher devices and provides acceptance criteria of SRV hydrodynamic loads.
A-42	Pipe Cracks in Boiling Reactors	NUREG-0313	July 1980	Licensee responses under review.

*The final rule will determine the licensing requirements.
**SRP denotes Standard Review Plan (see NUREG-0800, Section 5.4.7, July 1981).
***SRV denotes safety relief valve.

Table II.2 Schedule for resolution of current unresolved safety issues

Task no.	Unresolved safety issue	Schedule for final staff report as of February 27, 1983
A-1	Water Hammer	December 1983
A-3	PWR Steam Generator Tube Integrity	July 1983
A-4	PWR Steam Generator Tube Integrity	July 1983
A-5	PWR Steam Generator Tube Integrity	July 1983
A-12	Steam Generator and Reactor Vessel Supports	October 1983
A-17	Systems Interactions	October 1984
A-40	Seismic Design Criteria	July 1984
A-43	Containment Emergency Sump	January 1984
A-44	Station Blackout	March 1984
A-45	Shutdown Decay Heat Removal Requirements	October 1985
A-46	Seismic Qualification of Equipment in Operating Plants	April 1984
A-47	Safety Implications of Control Systems	March 1985
A-48	Hydrogen Control Measures and Effects of Hydrogen Burns	June 1985

Table II.3 Summary of probabilistic assessments

Sponsor	Plant	Reactor type	Reactor vendor
NRC--Reactor Safety Study (RSS)	Peach Bottom	BWR	GE
	Surry	PWR	W
NRC--Reactor Safety Study Methodology Applications Program (RSSMAP)	Calvert Cliffs Unit 2	PWR	CE
	Grand Gulf Unit 1	BWR	GE
	Oconee Unit 3	PWR	B&W
	Sequoyah Unit 1	PWR	W
NRC--Interim Reliability Evaluation Program (IREP)	Crystal River Unit 3	PWR	B&W
	Arkansas Nuclear One Unit 1	PWR	B&W
	Browns Ferry Unit 1	BWR	GE
	Calvert Cliffs Unit 1	PWR	CE
	Millstone Unit 1	BWR	GE
Industry	Limerick Unit 1	BWR	GE
	Big Rock Point	BWR	GE
	Indian Point 2	PWR	W
	Indian Point Unit 3	PWR	W
	Zion Unit 1	PWR	W
	Oconee*	PWR	B&W
	Seabrook Unit 1*	PWR	W
	Millstone Unit 3*	PWR	W
	Shoreham	BWR	GE
	GESSAR II*	BWR	GE
	Susquehanna*	BWR	GE
	Browns Ferry Unit 1*	BWR	GE
	Midland*	PWR	B&W
Foreign	Biblis B (German)	PWR	SIEMENS
	Barseback (Sweden)	BWR	ASEA-ATOM
	Kuosheng (Taiwan)*	BWR	GE
	Ringhals (Sweden)	PWR	W
	Sizewell B Analysis (UK)	PWR	W

*Not completed as of June 1983.

Table II.4 Safety improvements resulting from operational occurrences

Plant/date	Event	Resulting safety improvements
Three Mile Island Unit 2 March 28, 1979	Improper decay heat removal and partial destruction of core	Numerous industry-wide improvements in design, operation, operator training, personnel requirements, instrumentation and controls, onsite and offsite emergency preparedness.
Crystal River Unit 3 February 26, 1980	Loss of non-nuclear instrumentation (NNI) and integrated control system power	B&W plant operators committed to reducing the likelihood of NNI failure as well as upgrading operator training to respond to the loss of NNI.
Davis-Besse Unit 1 April 19, 1980	Temporary loss of decay heat removal	IE Bulletin 80-12 required extensive revision of procedures involving alternative methods for decay heat removal, assuring adequate and reliable instrumentation, and pre-conditions for allowing a redundant decay heat removal system to be taken out of service.
Browns Ferry Unit 3 June 28, 1980	Partial scram system failure	IE Bulletin 80-17 and supplements required all BWRs to inspect and modify the scram discharge volume (SDV) and to upgrade procedures to eliminate and mitigate scrams caused by the failure of the SDV.

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SECTION IV. CONCLUSIONS AND RECOMMENDATIONS

INDUSTRY AND PUBLIC NEED FOR PRICE-ANDERSON

When the Act was first enacted in 1957, nuclear power was in its early stages of conversion from a federal government monopoly to a government-encouraged private enterprise. The Act was intended to overcome reluctance to participate by the nascent industry worried by the possibility of catastrophic, uninsured claims resulting from a large nuclear accident. Congress was also concerned with the prospect of delays or failures in providing compensation to the public for injuries and damages caused by such accidents. By 1965, when the first 10-year extension of the Act was being considered, a handful of nuclear power reactors was coming into operation and the nuclear industry considered itself on the verge of expanding into large-scale nuclear power generation. Thus, the need for continued operation of the Price-Anderson system for the forthcoming 10 years was believed to be critical for the unrestricted development of nuclear power.

By the time the second extension of the Act was being considered in 1974 and 1975, the construction and operation of utility-owned nuclear power was in large-scale development with dozens of plants in operation or under construction and with hundreds more being contemplated to be in operation by the end of the century. The industry urged not only that the Act be extended but also that this action be taken by Congress as early as possible so that any uncertainty about extension would not disrupt nuclear power development.

Another key element in the decisions to extend the Price-Anderson Act in 1965 and in 1974-1975 was the belief that the Act provides an essential mechanism for ensuring the prompt availability and equitable distribution of funds to pay public liability claims in the event of a nuclear accident.

With respect to future power plants, the nuclear industry in the early 1980s contrasts greatly with the industry in the periods of the earlier extensions of Price-Anderson. Few construction permit applications are under review at the NRC and no additional construction permit applications are anticipated before the present Act expires on August 1, 1987. As noted in Section II, no construction permit applicants are identifiable in the foreseeable future after that date, although applications for standardized design approvals that could be used for future plants are likely. Industry views of its financial situation are mixed. Some feel that although there have been recent gains in allowed earnings by regulators, the industry faces long-term difficulties in load growth and the regulatory and political climate. Those utilities that might build nuclear power plants are subject to powerful financial, load growth, political, regulatory, and other restraints on their decisions to develop more nuclear facilities. Many nuclear suppliers express the view that without Price-Anderson coverage, they would not participate in the nuclear industry. Given industry perception of the continuing need for Price-Anderson and in view of the lack of new orders in plants, the situation is in some respects similar to what it was when Congress saw the need for enactment of the

original Price-Anderson Act. A primary difference, however, is that in 1957, the nuclear industry was in the development stages of the technology whereas it is now well beyond those stages.

It cannot be said at this point that a failure to extend the Price-Anderson Act for new facilities beyond August 1, 1987, would, in and of itself, foreclose construction that would otherwise be undertaken. It is also uncertain whether extension of Price-Anderson would be necessary to a renewal ~~to~~ of utility interest in nuclear technology. However, if additional plants are constructed after August 1, 1987, a failure to extend the Act would deny the public protection benefits of the Act for those plants.

In considering the future direction of the Price-Anderson Act, the Congress has before it a full range of possible actions from termination of the Act to its extension unchanged. Modifications could be made to the system for existing facilities and for new ones with respect to which no financial commitments have yet been made. Alternatively, Congress could leave the present program intact for existing ~~for~~ and future licensees. Congress also has the option of waiting to take action for future licensees until such time as renewed nuclear power programs develop. The present situation regarding future nuclear power plant development would appear to permit an exhaustive Congressional review of the future direction of the Act. However, the Commission believes that in view of the strong public policy benefits in ensuring the prompt availability and equitable distribution of funds to pay public liability claims, the Price-Anderson Act should be extended to cover future as well as existing nuclear power plants. The Commission also believes that the same amount, type, and terms of public liability protection should be provided for future and existing plants.

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