

STATEMENT SUBMITTED  
BY THE  
UNITED STATES NUCLEAR REGULATORY COMMISSION  
TO THE  
SUBCOMMITTEE ON ENERGY AND AIR QUALITY  
COMMITTEE ON ENERGY AND COMMERCE  
UNITED STATES HOUSE OF  
REPRESENTATIVES

FOR THE HEARING ON  
HYDROELECTRIC RELICENSING AND NUCLEAR ENERGY

SUBMITTED BY  
RICHARD A. MESERVE  
CHAIRMAN

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U.S. NUCLEAR REGULATORY COMMISSION  
HEARING ON  
HYDROELECTRIC RELICENSING AND NUCLEAR ENERGY

**Introduction**

Mr. Chairman, members of the Subcommittee, it is a pleasure to appear before you today.

As you know, the NRC's mission is to ensure the adequate protection of public health and safety, to promote the common defense and security, and to protect the environment in the application of nuclear technology for civilian use. The Commission does not have a promotional role - - rather, the agency seeks to ensure the safe application of nuclear technology and materials.

The Commission's highest priority is to fulfill its fundamental mission of ensuring adequate protection of public health and safety. The Commission also recognizes, however, that its regulatory system should not establish inappropriate impediments to the application of nuclear technology and materials. Many of the Commission's initiatives over the past several years have sought to maintain or enhance safety while simultaneously improving the efficiency and effectiveness of our regulatory system. We believe the Commission's most recent legislative proposals would enhance safety and improve our regulatory system even further and are pleased to see that many of our proposals have been incorporated into the bills before this Congress. The Commission also recognizes that its decisions and actions as a regulator influence the public's perception of the NRC and ultimately the public's perception of the safety of nuclear technology. For this reason, the Commission's primary performance goals also include increasing public confidence.

## **Background**

Currently there are 104 nuclear power plants licensed by the Commission to operate in the United States in 31 different states. As a group, they are operating at high levels of safety and reliability. (See Charts on Attachments 1 and 2.)

These plants have produced approximately 20 percent of our Nation's electricity for the past several years and are operated by about 40 different companies. In 2000, these nuclear power plants produced a record 755 thousand gigawatt-hours of electricity. (See Graph on Attachment 3.)

### Improved Reactor Licensee Efficiencies (Increased Capacity Factors)

The Nation's nuclear electricity generators have worked over the past 10 years to improve nuclear power plant performance, reliability, and efficiency. According to the Nuclear Energy Institute, the improved performance of the U.S. nuclear power plants since 1990 is equivalent to placing 23 new 1000 MWe power plants on line. The average capacity factor for U.S. light water reactors was 88 percent in 2000, up from 63 percent in 1989.<sup>1</sup> (See Table on Attachment 3.) The Commission has focused on ensuring that safety is not compromised as a result of these industry efforts. The Commission seeks to carry out its regulatory responsibilities in an effective and efficient manner so as not to impede industry initiatives inappropriately.

### Electric Industry Restructuring

As you are aware, the nuclear industry is undergoing a period of remarkable change. The industry is in a period of transition in several dimensions, probably experiencing more rapid change than in any other period in the history of civilian nuclear power. As economic deregulation of the electric power industry has proceeded, the Commission has seen significant restructuring among its licensees and the start of the consolidation of nuclear generating

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<sup>1</sup> Capacity factor is the ratio of electricity generated, for the period of time considered, to the amount of energy that could have been generated at continuous full-power operation during the same period.

capacity among a smaller group of operating companies. This change is due, in part, to an industry that has achieved gains in both economic and safety performance over the past decade and thus is able to take advantage of the opportunities presented by industry restructuring.

### **Price-Anderson Act Renewal**

Legislation will be needed to extend the Price-Anderson Act. The Act, which expires on August 1, 2002, establishes a framework that provides assurance that adequate funds are available in the event of a nuclear accident and sets out the process for consideration of nuclear claims. Without the framework provided by the Act, private-sector participation in nuclear power would be discouraged by the risk of large liabilities.

I am here to deliver the strong and unanimous recommendation of the Commission that the Price-Anderson Act be renewed with only minor modifications. But I would like to preface my statement of that position with the reminder that the Commission's primary concern is public health and safety. Our mission is to ensure the safe use of nuclear power. We can look back on a successful history of safe operation and intend to exercise vigilance to maintain or improve on this record of safety. Nonetheless, it remains important to assure that if a highly improbable accident should occur, the means are provided to care for the affected members of the public. It is also important, if the Congress intends that nuclear power remain a part of the Nation's energy mix, that this option is not precluded by the inability of nuclear plant licensees to purchase adequate amounts of commercial insurance.

As you know, Congress first enacted the Price-Anderson Act in 1957, nearly a half century ago. Its twin goals were then, as now:

- (1) to ensure that adequate funds would be available to the public to satisfy liability claims in a catastrophic nuclear accident; and
- (2) to permit private sector participation in nuclear energy by removing the threat of potentially enormous liability in the event of such an accident.

On original passage the Congress provided a term during which the Commission could extend Price-Anderson coverage to new licensees and facilities. When that term expired, the Congress then, and repeatedly since, has decided that the Nation would be served by extending the Price-Anderson Act so that new coverage would be available for newly licensed reactors. This action preserved the option of private sector nuclear power and assured protection of the public. At this point, in order to avoid confusion, I should note that Price-Anderson coverage for NRC licensees is granted for the lifetime activities of the covered facility and does not "expire" in 2002. Thus, in any event, Price-Anderson coverage with respect to already licensed nuclear power reactors will continue and will afford prompt and reasonable compensation for any liability claims resulting from an accident at those facilities.

While Congress has amended the Price-Anderson Act from time to time, it has done so cautiously so as to avoid upsetting the delicate balance of obligations between operators of nuclear facilities and the United States government as representative of the people.

Perhaps the most significant amendments to date were those that effectively removed the United States government from its obligation to indemnify any reactor up to a half billion dollars and that placed the burden on the nuclear power industry. Congress achieved this by mandating in 1975 that each reactor greater than 100 MWe, essentially every reactor providing power commercially, contribute \$5 million to a retrospective premium pool if and only if there were damages from a nuclear incident that exceeded the maximum commercial insurance available. The limit of liability was then \$560 million. Government indemnification was phased out in 1982 when the potential pool and available insurance reached that sum.

In 1988, Congress increased the potential obligation of each reactor in the event of a single accident at any reactor to \$63 million (to be adjusted for inflation). The maximum liability insurance available is now \$200 million. When that insurance is exhausted each reactor licensee must pay into the pool up to \$83.9 million, as currently adjusted for inflation, if needed to cover damages in excess of the sum covered by insurance. The \$83.9 million is payable in annual installments not to exceed \$10 million. Today, the commercial insurance and the reactor pool together would make available over \$9 billion to cover any personal or property harm to the public caused by an accident.

In 1998, as mandated by Congress, the Nuclear Regulatory Commission submitted to the Congress its report on the Price-Anderson system. The report included a concise history and overview of the Price-Anderson Act and its amendments as well as an update on developments and events pertaining to nuclear insurance and indemnity in the last decade. Congress had also required the NRC to address various topics that relate to and reflect on the need for continuation or modification of the Act: the condition of the nuclear industry, the state of knowledge of nuclear safety, and the availability of private insurance.

After considering pertinent information, the Commission considered what its recommendations should be. It concluded then that it should recommend that Congress renew the Price-Anderson Act because it provides a valuable public benefit by establishing a system for the prompt and equitable settlement of public liability claims resulting from a nuclear accident. That, as I said at the outset, remains today the strongly held position of the Commission.

Having noted that substantial changes in the nuclear power industry had begun and could continue, the Commission believed it would be prudent to recommend renewal for only ten years rather than the 15-year period that had been adopted in the last reauthorization so that any significant evolution of the industry could be considered when the effects of ongoing changes would be clearer. Notwithstanding that view, the Commission recommended that the Congress consider amending the Act to increase the maximum annual retrospective premium installment that could be assessed each holder of a commercial power reactor license in the event of a nuclear accident.

The NRC suggested that consideration be given to doubling the ceiling on the annual installment from the current sum of \$10 million to \$20 million per year per accident. The total allowable retrospective premium per reactor per accident was to remain unchanged at the statutory “\$63 million” adjusted for inflation. (It is now \$83.9 million as so adjusted). The Commission recommended consideration of an increase to \$20 million because it then appeared likely that in the coming decade a number of reactors would permanently shut down. The effect of these shutdowns would have been to reduce the number of contributors to the reactor retrospective pool. Fewer contributors would, in turn, reduce the funds that, in the event of a nuclear accident, would become available each year to compensate members of the public for personal or property damage caused by an accident. Increasing the maximum annual

contribution available from each reactor licensee would provide continuing assurance of “up front” money to assist the public with prompt compensation until Congress could consider whether to enact additional legislation providing further relief, should it be needed.

Recent events have led the Commission to review its 1998 recommendations and to reevaluate its recommendation that Congress consider increasing the annual installment to \$20 million. The outlook for the future of nuclear power has changed from pessimistic in 1998 to more optimistic in 2001. There is now a heightened interest in extending the operating life for most, if not all, of the 104 currently licensed power reactors, and some power companies are now examining whether they wish to submit applications for new reactors or complete construction of reactors that had been deferred. As a result, the Commission does not believe that there is now justification for raising the maximum annual retroactive premium above the current \$10 million level.

## **Initiatives in the Area of Current Reactor and Materials Regulation**

### Reactor License Transfers

One of the more immediate results of the economic deregulation of the electric power industry has been the development of a market for nuclear power plants as capital assets. As a result, the Commission has seen a significant increase in the number of requests for approval of license transfers. These requests have increased from a historical average of about two or three per year, to 20 - 25 in the past two years.

The Commission seeks to ensure that our reviews of license transfer applications, which focus on adequate protection of public health and safety, are conducted efficiently. These reviews sometimes require a significant expenditure of staff resources to ensure a high quality and timely result. Our legislative proposal to eliminate foreign ownership review could help to further streamline the process, while retaining the ability to address any associated issues that pertain to common defense and security. To date, the Commission believes that it has been timely in these transfers. For example, in CY 2000, the staff reviewed and approved transfers

in periods ranging from four to eight months, depending on the complexity of the applications. The Commission will strive to continue to perform at this level of proficiency.

### Reactor License Renewals

Another result of the new economic conditions is an increasing interest in license renewal that would allow plants to operate beyond the original 40-year term. That maximum original operating term, which for many plants was established in the Atomic Energy Act (AEA), did not reflect a limitation that was determined by engineering or scientific considerations, but rather was based on financial and antitrust concerns. The Commission now has the technical bases and experience on which to make judgments about the potential useful life and safe operation of facilities and is addressing the question of extensions beyond the original 40-year term.

The focus of the Commission's review of license renewal applications is on maintaining plant safety, with the primary concern directed at the effects of aging on important systems, structures, and components. Applicants must demonstrate that they have identified and can manage the effects of aging so as to maintain an acceptable level of safety during the period of extended operation.

The Commission has now renewed the licenses of plants at three sites for an additional 20 years: Calvert Cliffs in Maryland, Oconee in South Carolina, and Arkansas Nuclear 1 in Arkansas, comprising a total of six units. The thorough reviews of these applications were completed ahead of schedule, which is indicative of the care exercised by licensees in the preparation of the applications and the planning and dedication of the Commission staff. Applications for units from two additional sites -- Hatch in Georgia and Turkey Point in Florida -- are currently under review. Also, we recently received application from four additional sites; Surry and North Anna in Virginia, Catawba in South Carolina, and McGuire in North Carolina, comprising a total of eight units. As indicated by our licensees, many more applications for renewal are anticipated in the coming years.

Although the Commission has met or exceeded the projected schedules for the first reviews, it seeks to have the renewal process be as effective and efficient as possible. The extent to which the Commission is able to sustain or improve on our performance depends on the rate at which

applications are actually received, the quality of the applications, and the staff resources available to complete the review effort. The Commission recognizes the importance of license renewal and is committed to providing high-priority attention to this effort. As you know, the Commission encourages early notification by licensees of their intent to submit license renewal applications in order to allow adequate planning of demands on staff resources. The Commission is committed to maintaining the quality of its safety reviews.

### Reactor Plant Power Uprates

In recent years, the Commission has approved numerous license amendments that permit licensees to make relatively small power increases or uprates. Typically, these increases have been approximately two percent to seven percent. These uprates, in the aggregate, resulted in adding approximately 2000 MWe or the equivalent of two new 1000 MWe power plants.

The NRC is now reviewing six license amendment requests for larger power uprates. These requests are for Boiling Water Reactors (BWR's) and are for uprates of 15 percent to 20 percent. (There are two primary designs for operating light water reactors: Boiling Water Reactors and Pressurized Water Reactors.) While the staff has not received requests for additional uprates beyond these six, some estimates indicate that as many as 22 BWR's may request uprates in the 15 percent to 20 percent range. These uprates, if allowed, could add approximately 3000 to 4500 MWe to the grid.

Approvals for uprates are granted only after a thorough evaluation by the NRC staff to ensure safe operation of the plants at the higher power. Plant changes and modifications are necessary to support a large power uprate, and thus require significant financial investment by the licensee. While the NRC does not know the number of uprate requests that will be received, the staff is evaluating ways to streamline the review process. We would note that power uprates of five percent or more are considered by the NRC staff to be substantial and to require significant technical review and analysis. As with license renewals, the Commission encourages early notification by licensees, in advance of their applications for uprates, in order to allow adequate planning of demands on staff resources.

### High-Level Waste Storage/Disposal (Spent Fuel Storage)

In the past several years, the Commission has responded to numerous requests to approve spent fuel cask designs and independent spent fuel storage installations for onsite dry storage of spent fuel. These actions have provided an interim approach pending implementation of a program for the long-term disposition of spent fuel. The ability of the Commission to review and approve these requests has provided the needed additional onsite storage of spent nuclear fuel, thereby avoiding plant shutdowns as spent fuel pools reach their capacity. The Commission anticipates that the current lack of a final disposal site will result in a large increase in on-site dry storage capacity during this decade.

The NRC staff is currently reviewing an application for an Independent Spent Fuel Storage Installation on the reservation of the Skull Valley Band of Goshute Indians in Utah. This application is currently subject to an ongoing adjudicatory hearing before an Atomic Safety and Licensing Board.

We continue to prepare for a potential license application from DOE for a proposed high-level waste geologic repository at Yucca Mountain. These efforts include rulemaking to codify recently set radiation standards for the proposed repository and periodic technical exchange meetings between NRC and DOE staff which are open to the public.

We are also revising our requirements for the transportation of spent fuel and radioactive material to make them more risk-informed and consistent with international standards. We are doing this in partnership with the Department of Transportation, which will simultaneously revise its own rule in this area.

### Risk-Informing the Commission's Regulatory Framework

The Commission also is in a period of dynamic change as the agency moves from a prescriptive, deterministic approach toward a more risk-informed and performance-based regulatory paradigm. Improved probabilistic risk assessment techniques combined with more than four decades of accumulated experience with operating nuclear power reactors has led the Commission to recognize that some regulations may not achieve their intended safety purpose and may not be

necessary to provide adequate protection of public health and safety. Where that is the case, the Commission has determined it should revise or eliminate the requirements. On the other hand, the Commission is prepared to strengthen our regulatory system where risk considerations reveal the need.

Perhaps the most visible aspect of the Commission's efforts to risk-inform its regulatory framework is the new reactor oversight process. The process was initiated on a pilot basis in 1999 and fully implemented in April 2000. The new process was developed to focus inspection effort on those areas involving greater risk to the plant and thus to workers and the public, while simultaneously providing a more objective and transparent process. Although the Commission continues to work with its stakeholders to assess the effectiveness of the revised oversight process, the feedback received from industry and the public is favorable.

## **Future Activities**

### Scheduling and Organizational Assumptions Associated with New Reactor Designs

While improved performance of operating nuclear power plants has resulted in significant increases in electrical output, significant increased demands for electricity will need to be addressed by construction of new generating capacity of some type. Serious industry interest in new construction of nuclear power plants in the U.S. has only recently emerged. As you know, the Commission has already certified three new reactor designs pursuant to 10 CFR Part 52. These designs include General Electric's Advanced Boiling Water Reactor, Westinghouse's AP-600 and Combustion Engineering's System 80+ (now owned by Westinghouse). Because the Commission has certified these designs, an application for a combined construction permit and operating license under Part 52 may reference one of these approved designs. Licensees have also indicated to the NRC that applications for early site permits could be submitted in the near future. These permits would allow pre-certification of sites for possible construction of nuclear power plants.

In addition to the three already certified advanced reactor designs, there are new nuclear power plant technologies, such as the Pebble Bed Modular Reactor, which some believe can provide

enhanced safety, improved efficiency, and lower costs, as well as other benefits. To ensure that the NRC staff is prepared to evaluate any applications to build these advanced nuclear reactors, the Commission recently directed the staff to assess the technical, licensing, and inspection capabilities that would be necessary to review an application for an early site permit, a license application, or construction permit for a new reactor unit. This will include the capability to review the designs for Generation III+ or Generation IV light water reactors, including the Westinghouse AP-1000, the Pebble Bed Modular Reactor, General Atomics' Gas Turbine Modular Helium Reactor, and Westinghouse's International Reactor Innovative and Secure (IRIS). In addition to assessing its capability to review the new designs, the Commission will also examine its regulations relating to license applications, such as 10 CFR Parts 50 and 52, in order to identify whether any enhancements are necessary. We also recently established the Future Licensing Project Organization in order to prepare for and manage future reactor and site licensing applications.

In order to confirm the safety of new reactor designs and technology, the Commission believes that a strong nuclear research program should be maintained. A comprehensive evaluation of the Commission's research program has been completed with assistance from a group of outside experts and from the Advisory Committee on Reactor Safeguards. With the benefit of these insights, the Commission expects to undertake measures to strengthen our research program.

### Human Capital

Linked to these technical and regulatory assessments, the Commission is reviewing its human capital to ensure that the appropriate professional staff are available for the Commission to fulfill its traditional safety mission, as well as any new regulatory responsibilities in the area of licensing new reactor designs.

In some mission critical offices within the Commission, nearly 25 percent of the staff are eligible to retire today. As with many Federal agencies, it is becoming increasingly difficult for the Commission to hire personnel with the knowledge, skills, and abilities to conduct the safety reviews, licensing, research, and oversight actions that are essential to our safety mission. Moreover, the number of individuals with the technical skills critical to the achievement of the Commission's safety mission is rapidly declining in the Nation, and the educational system is not

replacing them. The NRC staff has taken initial steps to address this situation, and as a result, is now systematically seeking to identify future staffing needs and to develop strategies to address the gaps. It is apparent, however, that the maintenance of a technically competent staff will require substantial effort for an extended time. (The various energy bills properly give attention to such matters.)

### Budget

The NRC has submitted a proposed bill for authorization of appropriations for Fiscal Year 2002. We respectfully request the Committee's support for our budget request. However, as I mentioned earlier, serious industry interest in new construction of nuclear power plants has only recently emerged. Therefore, our budget proposal now before Congress does not include resources to prepare for this initiative.

### **Legislative Proposals**

The Commission has identified in its legislative proposals areas where new legislation would be helpful to eliminate artificial restrictions and to reduce the uncertainty in the licensing process. These changes would maintain safety while increasing flexibility in decision-making. Although those changes would have little or no immediate impact on the Nation's electrical supply, they would help establish the context for consideration of nuclear power by the private sector without any compromise of public health and safety or protection of the environment.

Commission antitrust reviews of new reactor licenses could be eliminated. As a result of the growth of Federal antitrust law since the passage of the AEA, the Commission's antitrust reviews are redundant of the reviews of other agencies. The requirement for Commission review of such matters, which are distant from the Commission's central expertise, should be eliminated.

Elimination of the ban on foreign ownership of U.S. nuclear plants would be an enhancement since many of the entities that are involved in electrical generation have

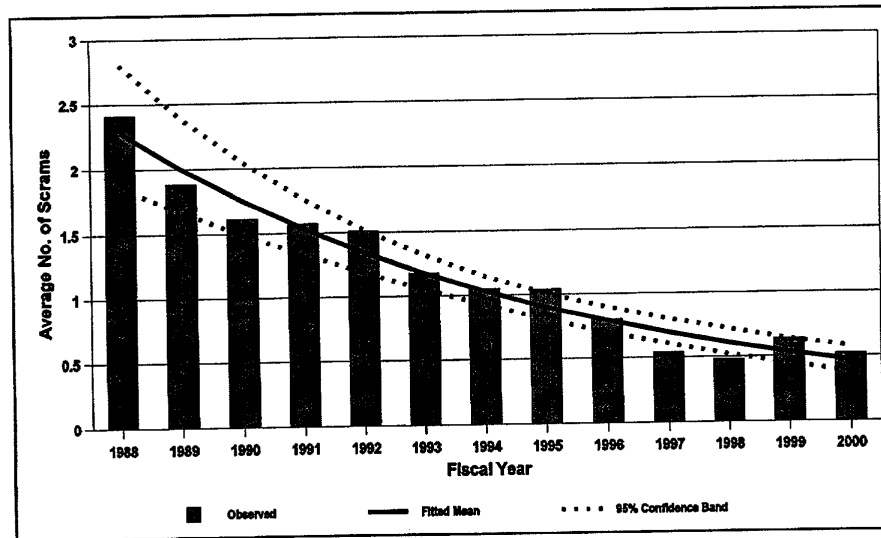
foreign participants, thereby making the ban on foreign ownership increasingly problematic. The Commission has authority to deny a license that would be inimical to the common defense and security, and thus an outright ban on all foreign ownership is unnecessary.

With the strong Congressional interest in examining energy policy, the Commission is optimistic that there will be a legislative vehicle for making these changes and thereby for updating the AEA. Indeed, I would note that these matters are included in the legislative proposals that NRC recently provided to this Committee.

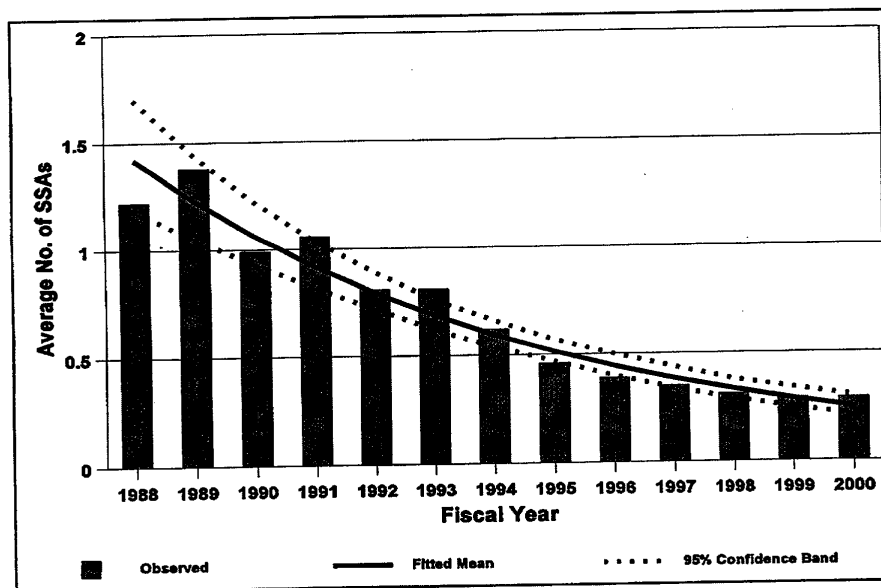
### **Summary**

The Commission has long been, and will continue to be, active in concentrating its staffs efforts to ensure the adequate protection of public health and safety, to promote the common defense and security, and to protect the environment in the application of nuclear technology and materials for civilian use. Within the bounds of those statutory mandates, however, the Commission is mindful of the need: (1) to reduce unnecessary burdens, so as not to inappropriately inhibit any renewed interest in nuclear power; (2) to maintain open communications with all of its stakeholders, in order to seek to ensure the full, fair, and timely consideration of issues that are brought to our attention; and (3) to continue to encourage its highly qualified staff to strive for increased efficiency and effectiveness, both internally and in our dealings with all of the Commission's stakeholders.

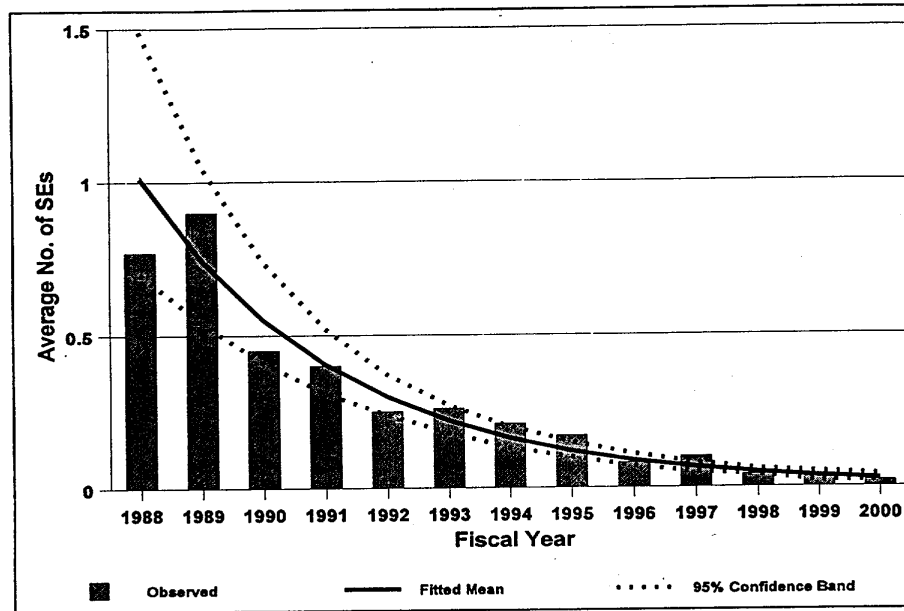
Thank you Mr. Chairman, I welcome your comments and questions.

**NRC Performance Indicators; Annual Industry Averages, 1988-2000**

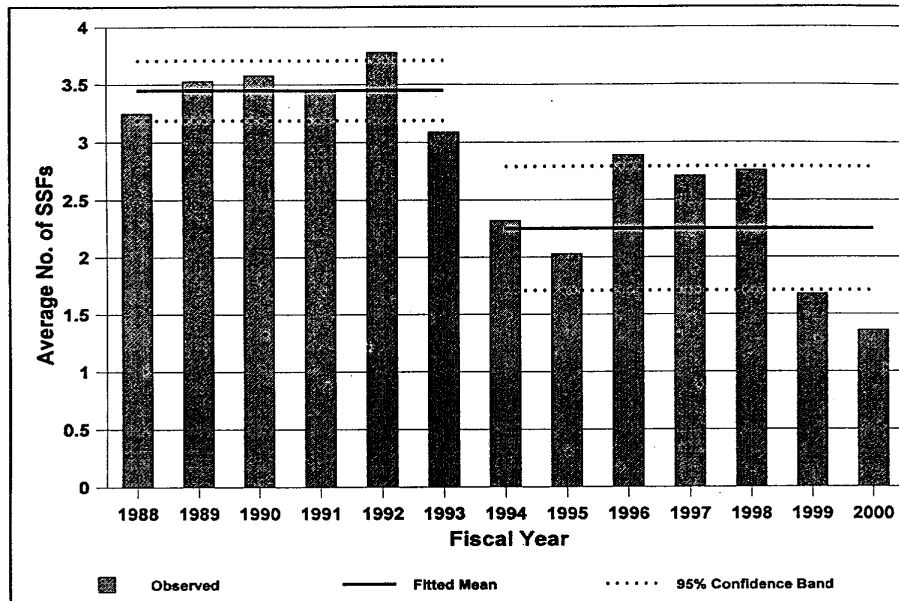
Automatic Reactor Scrams



Safety System Actuations

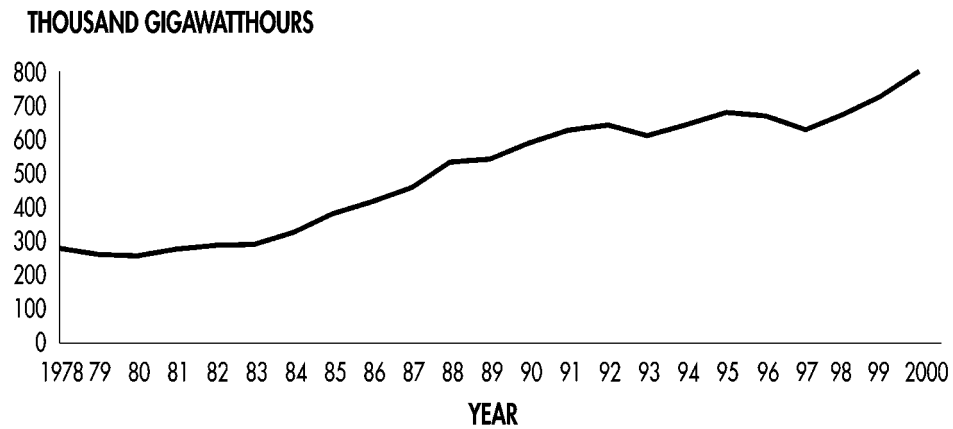


Significant Events



Safety System Failures

### Net Generation of U.S. Nuclear Electricity, 1978–2000



### U.S. Commercial Nuclear Power Reactor Average Capacity Factor

Year	Number of Reactors Licensed to Operate	Average Annual Capacity Factor	Percent of Total U.S.
1989	109	63	19.0
1990	111	68	20.5
1991	111	71	21.7
1992	110	71	22.2
1993	109	73	21.2
1994	109	75	22.1
1995	109	79	22.5
1996	110	77	21.9
1997	104	74	20.1
1998	104	78	22.6
1999	104	86	22.9
2000	104	88	23.4