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Forecast for the Future:
Nuclear Energy and the Role of the Nuclear Regulatory Commission

by

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at the

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Introduction

Good afternoon, ladies and gentlemen. I am pleased to participate in the Nuclear Engineering and Health Physics Seminar Series here at the Georgia Institute of Technology. Given my training as a theoretical elementary particle physicist, my work at Bell Labs in condensed matter theory research, and my tenure as a Rutgers University Professor of Physics, I actually feel quite at home in this type of academic setting. However, as the presidentially appointed Chairman of the U.S. Nuclear Regulatory Commission (NRC), I find myself in a somewhat different role–the role of a nuclear safety regulator. Therefore, in my discussion today on the future of nuclear energy, I will speak from that perspective. The regulatory role is to license those who operate nuclear power plants and conduct other civilian nuclear activities, and to ensure that they do so in a manner that is protective of public health and safety. You, as students and faculty involved in the study of nuclear engineering and health physics, will, in many ways, shape the future of nuclear energy uses in the United States. As such, it is important that you understand the NRC role in this possible future, and the current issues that will impact the future of nuclear energy.

To plan for the future, we must know not only our current status, but also how we got here. I would like to outline briefly some pivotal past events that have helped to shape the present state of nuclear energy and nuclear regulation, and then to focus on several current issues that will be influential in shaping the future. These issues include (1) the evolution of the NRC regulatory role; (2) the renewal of NRC licenses for existing nuclear power plants; (3) the development of advanced reactor designs; (4) the economic deregulation of electric utilities;

(5) the disposal of high-level radioactive waste. I also will discuss the status of current NRC activities to improve the accountability for generally licensed devices.

The Evolution of the NRC Regulatory Role

The starting point for the commercial use of nuclear energy came with the passage of the Atomic Energy Act in 1954. At that time, the NRC did not exist. The Atomic Energy Commission (AEC), created in 1946, had the dual responsibilities of both promoting the growth of nuclear power and regulating its use.

Over the ensuing years, as nuclear power progressed from an experimental technology to an established source of electricity production, concern grew over the conflict of interest inherent in having promotion and regulation vested in the same agency. In the 1960s and early 1970s, the rapid growth in the number of nuclear power plants brought a corresponding increase in concern over nuclear safety, waste disposal, and the role of the regulator. In 1974, the Congress abolished the Atomic Energy Commission and created two new agencies: the Nuclear Regulatory Commission, led by a 5-member Commission, with an exclusively regulatory mandate; and the Energy Research and Development Administration (ERDA), which later became the Department of Energy (DOE).

Concern over the role of the regulator was not limited to separating promotion from safety oversight. Congress perceived two additional needs: (1) to eliminate the aura of secrecy associated with the AEC; and (2) to establish clearly how a 5-member Commission should function efficiently. This second issue, related to the NRC organization and management, was still not well understood or resolved at the time of the 1979 accident at Three Mile Island.

The TMI accident clearly was a watershed event that cut across all aspects of nuclear energy and nuclear regulation. Multiple investigations, both internal and external to the NRC, called for drastic change across a broad spectrum of issues--including the demand for profound improvements in severe accident analysis and the need for more clearly spelled-out reactor safety objectives. One of the key focus areas for both of the major TMI investigations--the President's Commission on the Accident at Three-Mile Island, known as the Kemeny Commission; and the NRC Special Inquiry Group, headed by Mitchell Rogovin--was the lack of clarity in the NRC governance, and the adverse safety impact that could result from confusion and the lack of role definition.

Both the Kemeny Commission and the Rogovin group recommended replacing the Commission with a single administrator and placing the agency in the Executive Branch, under the President. President Carter rejected both recommendations; however, he took strong action to define how the NRC would function--both during emergencies and in day-to-day operations. This action eventually took the form of legislation, which became known as the Reorganization Plan No. 1 of 1980.

The Reorganization Plan emphasized the importance of clear communication lines and Commission access to information. It defined the role of the Commission as one involving policy formulation, rulemakings on non-administrative matters, and orders and adjudications. Certain responsibilities formerly assigned to the Commission were moved specifically to the Chairman: the role of Principal Executive Officer and official agency spokesperson; the responsibility for day-to-day operation of the agency through the Executive Director for Operations; the ultimate responsibility for all the NRC emergency response functions; the

development of policy planning and guidance; and rulemaking for administrative matters.

This hybrid arrangement is fairly unique among Federal agencies--an independent agency in which policy matters are formulated by Commission consensus, but with a Chairman leadership role designed to increase efficiency and define responsibility. Within this arrangement, the mission of the NRC remains the adequate protection of public health and safety, the environment, and the common defense and security, in the civilian use of nuclear materials. Our mission encompasses the regulation of not only nuclear power reactors, but also research, test, and training reactors, fuel cycle facilities, low-level and high-level radioactive waste facilities, and the use of radionuclides in medicine, research, and industry.

Given this focused role as nuclear regulator, the NRC input to a domestic energy strategy also is focused, not on promoting or discouraging the role of nuclear power as part of the domestic energy mix, for instance, but rather on ensuring safety in the civilian use of nuclear energy through the implementation of a sound regulatory program. Our licensing authority is enabling. Our regulatory role is to ensure safety. However, this is not to say that the NRC functions in a vacuum, unaware of the economic, environmental, political, or technical challenges that could impact the future of nuclear energy in this country. As part of my discussion today, I would like to examine some of the factors that influence the viability of nuclear energy, and to outline the ways in which the NRC responds to emerging issues that fall within its regulatory purview.

In considering both historical and recent factors that significantly influence the U.S. domestic energy outlook, three specific areas deserve mention. First of all, the past several decades have included several events that emphasize U.S. dependence on foreign energy resources, such as the 1973 Arab oil embargo, the 1978 revolution in Iran, and the 1990 Operation Desert Shield, followed by Desert Storm in early 1991. These events highlighted the vulnerability of oil-importing economies to disruptions in supply. They brought attention to the importance of energy security--the need for strategies that ensure reliable fuel sources--and diversity of supply--the importance of not relying too heavily on any given energy resource, but rather maintaining multiple technologies, as well as developing new technologies and improving end-user efficiency.

A second area that has influenced the U.S. domestic energy outlook is the increasing awareness of the environmental consequences of energy use. In the 1970s, the increased U.S. attention to urban smog, acid rain, and other effects of pollution was reflected in public sector and private sector efforts to lower emissions. More recently, the focus on greenhouse gases and global warming has prompted ambitious commitments toward additional emissions reductions. Among the strategies being proposed for reduced emissions are further development of renewable energy technologies, more efficient use of the electricity infrastructure, and the continued operation and optimization of existing nuclear power plants.

The third area is an economic influence--the pursuit of market-based, competitive approaches to energy generation, transmission, and use. The influence of this factor is complex, with increased consumer options, globalization of markets and ownership arrangements, and the demand for greater flexibility in relevant government policies.

Given the impact of these factors on a domestic energy strategy, what effect do they have on nuclear energy and nuclear regulation? Within the context of the NRC role, as I described it earlier, several areas of focus result, which I will discuss in turn. The first area is the renewal of licenses for existing nuclear power plants.

The Renewal of NRC Licenses for Existing Nuclear Power Plants

Based on the Atomic Energy Act of 1954, the operating licenses are issued to nuclear power plants in the United States for a period of 40 years. About 10 percent of the existing U.S. nuclear plant licenses will expire by the end of 2010 (the first expires in 2006), and more than 40 percent will expire by 2015. Given that the original 40-year limitation was based on financial and antitrust considerations rather than any technical limitations, both the NRC and the nuclear power industry have devoted extensive study to aging considerations, the feasibility of plant life extension, and a technically sound process that would allow the renewal of a nuclear plant operating license for up to 20 years.

For nuclear power plant licensees, license renewal can be a two-edged sword. The financial benefits of gaining 20 years on the existing investment must be weighed against the uncertainties associated with renewal costs–based on economic, political, regulatory, and environmental factors. Uncertainties also may be associated with future operation and maintenance costs. The timing of the replacement of major plant components, such as steam generators–or of conducting major maintenance operations, such as thermal annealing of the reactor vessel--are major factors to be considered.

Ultimately, the decision on whether to seek license renewal rests with a licensee. The task of the NRC is to establish a reasonable process and clear safety standards, so that licensees can make informed decisions about whether to seek license renewal. For our part, the NRC has created the regulatory structure to support license renewal in 10 CFR Part 54 (for the safety review) and 10 CFR Part 51 (for the environmental impact review).

The amended Part 54 is based on two key principles. The first principle is that the regulatory process is adequate to ensure that the licensing basis, (i.e., the information and commitments provided by the applicant on which NRC bases the issuance of a license) provides and maintains an acceptable level of safety, with the possible exception of detrimental aging effects for certain systems, structures, and components in the period of extended operation. The second key principle is that the licensing basis for each plant must be maintained during the renewal term. This assumes that adjustments will be made, as needed, to address aging effects identified during the license renewal review, and to take into account relevant operating experience.

The past nuclear power industry approach to license renewal was to submit, for NRC approval, plant-specific and Owners' Group technical reports on specific topics, prior to submitting complete license renewal applications. This approach established a foundation of technical information that a licensee can use to evaluate the feasibility of a license renewal application, and that the NRC staff can use to establish an efficient and predictable review process. Earlier this year, however, with the submittal of formal license renewal applications from Baltimore Gas and Electric Company for its Calvert Cliffs facility, and from Duke Energy for its Oconee facility, the attention of the nuclear power industry has turned to the efficiency and timeliness of the renewal review process itself. The NRC staff has established an aggressive review schedule for the review of the license renewal applications, and has implemented a process to ensure that lessons from the initial reviews, and that the resolution of generic technical and process issues are clearly communicated to the nuclear power industry, and incorporated into appropriate guidance documents. A growing number of licensees have expressed an interest in license renewal, and have affirmed their willingness to support the process improvements.

Under the Atomic Energy Act, the NRC must offer an opportunity for public hearing on applications for license renewal. The Commission has heard criticisms that its adjudicatory process can lead to protracted hearings that unduly prolong the decision-making process on license applications. The Commission has been working diligently to improve its adjudicatory process to ensure a proper balance among the interests of all the stakeholders in our process. In July of this year, the Commission issued a policy statement that provides guidance on the conduct of adjudicatory proceedings to the NRC Atomic Safety and Licensing Board, which conducts these hearings. The policy statement seeks to balance the legitimate interests of parties to these proceedings, by providing a meaningful opportunity for hearing when disputes arise over agency actions, while also ensuring for license applicants the prompt resolution of such disputes and a decision on their applications.

The Commission will continue to look for ways to enhance the effectiveness of its adjudicatory process and to improve the efficiency of associated NRC staff reviews. We remain confident that we can address current and future challenges in this area, and that we can provide a clear and stable regulatory process for domestic license renewal. Our purpose is not to guarantee a particular outcome to any participant, but to ensure that the process is open, fair, and designed to produce an informed record to support agency decision-making.

The Development of Next-Generation Reactor Designs

The second NRC focus area relates to the development of next-generation reactor designs by the nuclear power industry. By the late 1970s and early 1980s, the experience gained in licensing existing U.S. nuclear power plants indicated that the licensing process for new nuclear power plants could be improved in ways that would enhance safety, improve efficiency, and reduce industry and agency uncertainty by achieving earlier resolution of technical and policy issues. Taking advantage of this insight, however, proved to be an arduous effort that included attempts at legislative reform, a Commission Policy Statement on Standardization, extensive litigation, and rulemaking. The overall result has been 10 CFR Part 52, a reformed licensing process that provides for combined licenses, early site permits, and certified standard designs.

In May 1997, I had the unique experience of presiding over the NRC certifications of the General Electric Advanced Boiling Water Reactor (ABWR) design and the ABB-Combustion Engineering System 80+ design. Both the ABWR (a 1,350-megawatt boiling water reactor) and System 80+ (a 1,400-megawatt pressurized water reactor) are evolutionary designs that incorporate features to prevent and mitigate the effects of severe accidents. These certifications marked the final step in a 10-year effort that encompassed the development and promulgation of Part 52, the implementation of the design certification process, and, overall, the most rigorous technical and safety reviews ever performed for a nuclear plant design. The goals of this process included standardization, enhanced safety and reliability features, and a more stable and predictable licensing process.

In September of this year, I presented a Final Design Approval (FDA) to Westinghouse Electric Company for the AP600 design (a 600-megawatt pressurized water reactor). The issuance of this FDA marks the completion of a 9-year technical review phase, and signifies the NRC readiness for initiation of the design certification rulemaking phase. This safety review was particularly challenging for the staff because the AP600 uses many design features that are not found in current operating reactor designs. The most significant design difference is the use of safety systems that rely primarily on passive systems, using basic forces such as gravity, natural circulation, and stored energy for plant safety and accident mitigation. The AP600 was

one of the first designs submitted for NRC approval that employs such passive safety systems.

Even given the advantages of these next-generation designs, the timing and likelihood of renewed demand for nuclear construction in the U.S. remains unclear. The design certification process, however, has been effective in providing enhancements to safety in design, drawing from experience in a manner that will increase the efficiency of the licensing process, and has positioned the NRC for change.

The Economic Deregulation of Electric Utilities

The next NRC focus area relates to the economic deregulation of electric utilities. The Energy Policy Act of 1992 included provisions that enabled wholesale competition in electricity generation. In 1994, the Federal Energy Regulatory Commission (FERC) issued a Notice of Proposed Rulemaking promoting wholesale competition through open access transmission. The final rules, known as FERC Order 888 and Order 889, were issued in 1996 and, in response to requests for re-hearing, were reaffirmed in November 1997. Rule 888 requires that a public utility will provide transmission services to its wholesale competitors on the same terms as it provides those services to itself. Rule 889 supports wholesale competition by requiring that the availability and cost of transmission be public, current, and posted on the Internet via a common database.

This movement transitioned quickly from the wholesale to the retail environment. At the Federal level, several bills have been introduced in the 104th and 105th Congresses. Although Federal legislation has not yet become law, many States already are moving to deregulate the retail electricity generation market. The States of California, New Hampshire, Pennsylvania and Rhode Island have been leaders in enacting rate deregulation and restructuring legislation. Most recently, Connecticut, Illinois, Massachusetts and Virginia have enacted such legislation.

As this transition to a competitive market has begun to take shape, several areas of NRC focus have emerged. You know from my earlier description of the NRC mission that we are not an economic or rate regulator. However, as utilities restructure internally, as ownership changes, as mergers occur, and as licensees work to control and reduce costs, the NRC must understand and respond appropriately to the effects of the changing business environment on nuclear safety. NRC areas of focus related to electric utility restructuring fall under three general headings: (1) any impact of cost-competitiveness on safe nuclear operations; (2) electrical grid reliability; and (3) the availability of funds for decommissioning. We believe that the NRC regulatory framework is generally sufficient, at this time, to address the restructuring and reorganization that likely will arise as a result of electric utility deregulation. However, several specific actions have been taken in this area.

Cost-Competitiveness and Safe Nuclear Operations

The NRC continues to study possible impacts of cost-competitiveness pressures on safe nuclear operations. NRC safety assessments at some reactor facilities have identified deficiencies that may stem from the economic pressure on a licensee to be a low-cost energy producer, which in turn may limit the resources available for corrective actions and plant maintenance. However, the NRC has not found an overall correlation between cost cutting and a decline in safety performance. Rather, in general, the best managed and most cost–efficient facilities are those with the best economic and safety performance.

Cost-competitiveness could become a factor in nuclear plant license renewal. The impacts here can be complex. In an effort to make nuclear facilities competitive in a deregulated market, in some instances, State PUCs have taken steps toward offering limited-time opportunities that would allow utilities to recoup sunk investments in generation. For licensees with a longer-term focus, the financial benefits of license renewal may make the option of continued operation attractive. As I indicated earlier, capital investments needed for certain systems, structures, and components may factor into this consideration.

Electrical Grid Reliability

Another important area of NRC focus has been electrical grid reliability. In recent years, NRC probabilistic risk assessments have made it clear that a "Station Blackout" at a nuclear power station is a major contributor to core damage frequency. The term "Station Blackout" is used, in the nuclear power industry, to refer to an event in which a loss of offsite power is coupled with the inability of the onsite emergency diesel generators to provide vital power to plant safety equipment. While the estimated frequency of these events is very low, because of the potential consequences, the possibility of a Station Blackout continues to be an area of NRC focus.

The analysis of power reactor experience in this area shows that nuclear generating stations are robust in design and operational standards, allowing them to help stabilize the electrical grid. However, analysis also makes clear that nuclear generating stations are vulnerable to grid disturbances, and especially to loss-of-offsite-power events. Grid reliability governance must take account of these factors. Standards of performance, operational criteria, and training of personnel all must be addressed. The NRC has established a grid reliability action plan to address concerns regarding the impact of utility deregulation on the reliability of the grid in supplying offsite power to nuclear power plants. As part of the plan, the NRC has been working with other agencies with jurisdiction over grid reliability to address our concerns.

The DOE has created a working advisory committee (task force) on the reliability of the U.S. electric system. Just last month, this group submitted a final report to the Secretary of Energy. The report recommended that Federal legislation be considered to clarify the authority and responsibility for setting reliability standards, and that the FERC should review the policy, standards, governance, and organization of reliability entities. The report also identified the need to take planning and operating actions that support the unique power requirements of critical facilities such as nuclear power plants. The task force also has issued two position papers–one related to technical transmission issues, and the other addressing the roles and responsibilities of Independent System Operators. Currently, there are no legislative proposals in Congress; however, grid reliability was discussed at a recent Senate Energy Committee hearing on electricity pricing abnormalities. The NRC will continue its coordination with the DOE and other agencies, and will continue to monitor closely the impact of electric utility restructuring and evolving legislative initiatives on grid reliability.

Decommissioning Funding Assurance

Under the Atomic Energy Act, the NRC has general authority to regulate the decommissioning of the nuclear facilities and materials that it licenses. NRC

decommissioning regulations required power reactor licensees either to set aside funds periodically in external trust fund accounts or to provide third-party guarantees for estimated decommissioning costs. As such, by the time a licensee permanently ceases operations at the end of its licensed term, the total amount of funds estimated as needed to complete decommissioning is expected to be available. In the emerging environment of electric utility restructuring, the NRC has had to reevaluate certain aspects of these provisions for decommissioning funding assurance, including the NRC definition of "electric utility," the potential impact of new ownership arrangements, and the problem of above-market or "stranded" costs. Several specific actions have resulted.

On August 19, 1997, the Commission issued a final policy statement on electric utility restructuring and deregulation. The policy statement indicates that the NRC will continue to conduct its financial qualifications, decommissioning funding, and antitrust reviews; will identify all direct and indirect owners of nuclear power plants; will establish and maintain working relationships with rate regulators (including the FERC and the State PUCs); and will reevaluate the adequacy of its regulations in this area.

On September 22, 1998, the NRC amended its regulations on decommissioning funding for nuclear power plants to reflect the conditions expected from rate deregulation. The amended rule, which will take effect later this month, modifies the NRC decommissioning regulations in four areas.

- First, it identifies which licensees may use the external sinking fund method of financial assurance for decommissioning exclusively, and identifies additional financial assurance mechanisms that may be used for decommissioning.

- Second, it permits nuclear power plant licensees to take credit on earnings for prepaid decommissioning trust funds.

- Third, to keep the NRC informed of licensees' decommissioning fund status, it requires licensees to report periodically to the NRC on the status of their decommissioning funds and on any changes to their external trust agreements.

- Fourth, it adds a definition of "Federal Licensee" to further clarify the issue of which licensees may use statements of intent.

The NRC has taken several other significant actions in this area, including the development of staff guidance for antitrust reviews, licensee financial qualification reviews, and decommissioning plan reviews. We also have seen an increase in license transfer applications, primarily as a result of corporate restructuring in anticipation of electric utility industry deregulation. To ensure that license transfers are conducted effectively and promptly, the NRC has issued a proposed rule (which will become final in December 1998) that would provide uniform rules of practice for handling hearing requests associated with license transfer applications. We also are developing guidance documents for use in evaluating these transfers, to determine whether a proposed transferee is technically and financially qualified, as well as to guide the evaluation of foreign ownership and control limitations. Numerous meetings have been held with nuclear power industry representatives, State and Federal rate regulators, the financial community, and other NRC stakeholders. The overall effect of these measures

has been to improve the awareness of the NRC, the licensee, and the public on issues related to electric utility restructuring.

The Disposal of High-Level Radioactive Waste

Another key issue that continues to influence the role of nuclear energy in a domestic energy strategy is the disposal of spent nuclear fuel and high-level radioactive waste (HLW). The Nuclear Waste Policy Act of 1982 and the Nuclear Waste Policy Amendments Act of 1987 specify a detailed national program for deep disposal of spent fuel and HLW in a geologic repository. Under these statutes, the Department of Energy (DOE) was given responsibility for characterizing a repository site, developing a design, and for constructing, operating, and eventually sealing, a repository. The Amendments Act directed the DOE to investigate only one potential location for this repository–at Yucca Mountain, Nevada.

In 1992, the Energy Policy Act directed the Environmental Protection Agency (EPA) to develop environmental standards specifically for the proposed repository at Yucca Mountain, that are to be based on, and consistent with, recommendations of the National Academy of Sciences. Under existing law, the NRC is obligated to implement the environmental standards for Yucca Mountain, to consult with the DOE prior to licensing, to comment on the adequacy of the DOE site characterization activities, and, if warranted, to issue a license to the DOE to construct and operate the repository.

To implement the site-specific health and safety standards mandated by the Congress, the NRC is developing its own implementing regulations, which will specify the licensing criteria for the proposed repository at Yucca Mountain. The primary responsibility for safety and demonstration of compliance with environmental standards rests with the DOE. The NRC task, prior to issuing a license, will be to determine that reasonable assurance exists for compliance with applicable standards and regulations.

In April of last year, the DOE tunnel-boring machine completed a 5-mile exploratory tunnel into Yucca Mountain. DOE scientists now are using the exploratory facility to assess the viability of the site as a permanent repository. We understand that the DOE viability assessment is to be submitted to the President and the Congress later this year.

As a part of its pre-licensing role, and to prepare for the evaluation of the repository license application, the NRC intends to review the technical basis of the DOE viability assessment. The focus of this review, as well as of the NRC HLW regulatory program as a whole, is the NRC attempt to understand (and, eventually, to resolve) those key technical issues most important to performance of a high-level waste repository. As we work toward this objective, the NRC will continue to provide early feedback to the DOE on potentially significant site, design, or assessment issues as they are identified during site characterization. In addition, we will complete the development of regulations for geologic disposal at Yucca Mountain, and continue to maintain our capability for regulating the transportation and storage of spent nuclear fuel.

Generally Licensed Devices

Another recent NRC focus area has been improving the accountability for generally licensed devices–devices that contain varying amounts of radioactive material authorized under 10 CFR Part 31. While not related directly to the future of nuclear energy, this issue provides a good example of NRC efforts to protect the public health and safety in the use of radioactive

materials.

In 1959, the AEC amended its regulations to include within its general license program the use of byproduct material contained in certain luminous, measuring, gauging, or controlling devices. Under current regulations, certain persons may receive and use these devices under a general license, as long as the device has been manufactured and distributed in accordance with the specifications of a specific license issued by the NRC or by an Agreement State. An Agreement State means any State with which the Commission has entered into an effective agreement under subsection 274b of the Atomic Energy Act, in which the NRC relinquishes, and the State assumes, regulatory authority over licensees using certain radioactive materials covered by the agreement.

A specific license, authorizing the distribution of generally licensed devices, is issued based upon the regulatory determination that the safety features of the device and the instructions for safe operation of that device are adequate to meet regulatory requirements. The general licensee is required to comply with the safety instructions contained in, or referenced on, the label of the device, and to have the testing or servicing of the device performed by an individual authorized to manufacture, install, or service these devices. A generally licensed device usually consists of radioactive material, contained in a sealed source, within a shielded device. The device is designed with inherent safety features so that it can be used by persons with no radiation training or experience. Thus, the general license is intended to simplify the licensing process, so that a case-by-case determination of the adequacy of the radiation training and experience of each user is not necessary.

The NRC general license program accounts for about 45,000 general licensees, who possess a total of about 600,000 devices that contain byproduct material. In the past, general licensees have not received routine, direct NRC oversight, because of the relatively small radiation risk posed by these devices and the very large number of general licensees. However, in a number of recent occurrences, generally licensed devices containing radioactive material have not been handled properly or disposed of properly, resulting in radioactive contamination or radiation exposure to the public. Although no significant public health and safety hazards are known to have resulted from these incidents, they would not have occurred at all if proper handling, disposal, and accountability procedures had been followed. In particular, the U.S. metals recycling industry has been impacted. From 1983 to 1998, 125 radioactive sources subject to the Atomic Energy Act have been reported as discovered in recycled scrap metal. Radioactive sources have been melted accidently in U.S. mills on 31 occasions, and 27 of these events involved sources subject to the Atomic Energy Act.

As a result of some of these incidents, and in order to assess the effectiveness of the general license program, the NRC conducted a 3–year sampling of general licensees, from 1984 to 1986, to determine whether accounting problems existed with users of these devices, and if so, to decide what remedial action might be necessary. The general licensees that were contacted were identified from the quarterly reports submitted by vendors of generally licensed devices. The sampling revealed several areas of concern with the general license program. The NRC concluded (1) that general licensees lacked an awareness of the relevant regulations; and (2) that these devices were being handled and accounted for inadequately. The sampling indicated that 15 percent of all general licensees sampled could not account for all of their generally licensed devices. The NRC concluded that these problems could be remedied by more frequent and timely contact between general licensees and the NRC.

In 1990, the NRC staff recommended to the Commission that the NRC should modify its general license program and establish a registration and response system for all general licensees that would include the periodic mailing of verification letters. The Commission approved the recommendation, and in 1991 the staff submitted a Proposed Rule. The resultant Proposed Rule was published in the Federal Register in December 1991; however, in 1993, the Executive Director for Operations placed the Final Rule on hold pending a review of the resource needs of this program in relation to other priorities.

In June 1995, the Commission approved the formation of a joint NRC/Agreement State Working Group to further evaluate the problem and propose solutions. The Working Group held public workshops and sought input from stakeholders. In October 1996, the recommendations of the Working Group were published. The group recommended that regulatory oversight be increased for general and specific licensees who possess and use devices containing a prescribed minimum amount of cesium-137, strontium-90, cobalt-60 and any transuranic. This increased oversight would include a comprehensive periodic registration program to track these sources, as well as other changes to help identify the existence of radioactive material.

In November 1996, the NRC staff briefed the Commission on its evaluation of the Working Group recommendations. The staff proposed that a registration program be created for implementation in FY 2001, by which time the necessary rulemaking could be completed. In November 1997, based on further direction from the Commission, the staff completed an action plan that outlined the need for an automated registration system, and offered several options for the scope of the general licensees to be included in the program. In April 1998, the Commission directed the staff to draft a proposed rule that would (1) implement a registration and follow-up program for the generally-licensed sources/devices identified by the NRC/Agreement State Working Group; (2) assess fees on these general licensees, and (3) incorporate requirements for permanent labeling of sources/devices.

Just last month, the Commission approved the publication of an initial rulemaking that will provide a regulatory basis for gathering information from general licensees. The NRC staff also is developing a comprehensive rulemaking, to be submitted to the Commission by February 1999, that will enhance accountability by clarifying current regulations and specifying the types of information to be reported for the general license registration program. In addition, the staff is developing an automated data information system for the registration of generally licensed devices, with a goal for completing this system by mid- to late 2000.

Summary and Conclusion

As the 21st century looms on the horizon, the nuclear industry, and the nuclear power industry, in particular, faces a complex spectrum of challenges and opportunities. As students and faculty involved in the study of the principles of nuclear engineering and health physics, I am sure that many of the issues that face the nuclear power industry appear technically interesting. However, as you can see from this discussion, many of these challenges have a mixture of technical, economic, and political dimensions, and must be addressed as a whole. I hope that my discussion today has provided you with insights regarding these issues, and has clarified the role that the Nuclear Regulatory Commission will play in the future of nuclear energy.

Thank you.