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The Nuclear Horizon: What is the Future?

by

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I. Introduction

Good morning, ladies and gentlemen! I am pleased to participate in your National Institute of Standards and Technology (NIST) 1998 Colloquium series. In looking over the other presentations in the series, I see topics like “The Jungles of Randomness” and “The Physics of Whales,” and I am reminded that, if I had been addressing you several years ago, my topic would likely have been something fascinating like “Transition Metal Dichalcogenides,” or “The Optical Properties of Semi-Magnetic Semiconductor Strained-Layer Superlattices.” However, as physicist turned Chairman of the U.S. Nuclear Regulatory Commission (NRC), I believe you will find that my topic today has its own elements of complexity, as well a high degree of relevance. I have entitled this address, “The Nuclear Horizon: What is the Future?”

No matter how we try to escape it, the future is always the product of the past, and the nature of existence leaves us stuck in the middle, trying to understand the one while we prepare for the other. So in speaking to you today about the future of nuclear energy, my “crystal ball” is illuminated by my understanding of pivotal past events that have helped to shape the present state of nuclear energy and nuclear regulation. Within that context, I would like to address several topics that fall within the overall scope of a domestic energy strategy and an international energy strategy. These topics include (1) the role of the regulator domestically; (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; and (6) the role of the regulator internationally.

II. The Role of the Regulator Domestically

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 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 1960's and early 1970's, 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).

However, 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 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 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 operation. This action eventually took the form of legislation, which became known as Reorganization Plan No. 1 of 1980.

The Reorganization Plan emphasized the importance of clear communication lines and Commission access to information. In addition, 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 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 developed 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 of 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 is also focused, not on promoting or discouraging the role of nuclear power as part of this country’s energy mix, for instance, but rather on ensuring safety in the civilian use of nuclear energy through the implementation of a sound regulatory program. 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 1991 Operation Desert Shield and Desert Storm. 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 1970's, the increased U.S. attention on urban smog, acid rain, and other effects of pollution was reflected in public and private efforts to lower emissions. More recently, the focus on greenhouse gases and global warming concerns has prompted ambitious commitments toward additional emission 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.

A. The Renewal of NRC Licenses for Existing Nuclear Power Plants

Based on the Atomic Energy Act of 1954, the operating licenses issued to nuclear power plants are 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 not based on extensive technical evaluation or operating experience, 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 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 NRC task 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, originally published in 1991, and amended in May 1995.

The amended rule is based on two key principles. The first principle is that maintaining the current regulatory process and the current licensing basis into the extended operating period will support and help to maintain an acceptable level of safety, with the possible exception of detrimental aging effects for certain systems, structures, and components. 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 current industry approach to license renewal is to submit for NRC approval plant-specific and Owners' Group technical reports on specific topics, prior to submitting complete license renewal applications. This approach is intended to establish 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. The NRC is reviewing a number of plant-specific technical reports, as well as generic reports prepared by owners' groups. The current level of activity on the part of the nuclear power industry clearly reflects a serious interest in license renewal.

Some members of the U.S. nuclear power industry have expressed concerns related to the efficiency of NRC license renewal processes, and in particular the possibility of lengthy hearings. When the Commission adjudicatory review process was revamped several years ago to make the Commission the sole appellate body, it gave the Commission greater opportunity and flexibility to exercise oversight of its adjudicatory processes. The Commission always has the authority to exercise its inherent supervisory authority over the conduct of adjudicatory proceedings, and has done so in the past, both to provide guidance on novel issues to its Atomic Safety Licensing Board (which conducts adjudicatory licensing proceedings) and to direct the use of expedited schedules. In addition, we may be able to modify certain NRC procedures in a way that would increase the efficiency of reviews, safety evaluations, or other aspects of the license renewal process. Our Office of the General Counsel has provided its views on ways the Commission can expedite adjudicatory processes. These considerations are under current Commission review. We remain confident that we can address current and future challenges in this area, and that we can craft a clear and stable regulatory process for domestic license renewal.

B. <u>The Development of Advanced Reactor Designs</u>

The second NRC focus area relates to the industry development of advanced reactor designs. 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, streamlined licensing process that provides for combined licenses, early site permits, and certified standard design approvals.

Last May I had the unique experience of presiding over the

NRC certification of the General Electric Advanced Boiling Water Reactor (GE ABWR) design and the ABB Combustion Engineering System 80+ design. This certification marked the final step in the design certification process, an effort that encompassed both the development and promulgation of Part 52, and that involved the most rigorous technical and safety reviews ever performed for a nuclear plant design. The goals of this process included design standardization, enhanced safety and reliability features, and a more predictable licensing process.

Both the ABWR, a 1,350-megawatt boiling water reactor, and the System 80+, a 1,400-megawatt pressurized water reactor, incorporate features that would mitigate the effects of severe accidents. In addition to these two designs, the NRC staff is continuing to review for certification a third advanced reactor design, the Westinghouse AP600--a 600-megawatt pressurized water reactor that uses passive safety features, employing the principles of gravity, natural circulation, convection, evaporation, and condensation for plant protection.

Even given the advantages of these advanced 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.

C. <u>The Economic Deregulation of Electric Utilities</u>

The next area of NRC focus relates directly to the economic deregulation of electric utilities. As you may be aware, 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. Federal legislation to bring about economic deregulation of the retail electricity generation market has 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 State of California currently is implementing its legislative mandate, and is scheduled to begin open retail competition as of March 31, 1998. In addition, a number of New England and Mid-Atlantic States either have passed legislation or are beginning pilot programs under the direction of their Public Utilities Commissions.

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 the NRC is 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 challenges related to electric utility restructuring fall under three general headings: (1) the availability of funds for decommissioning; (2) electrical grid reliability; and (3) any impact of cost-competitiveness on safe nuclear operations.

1. 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. Existing NRC decommissioning regulations require power reactor licensees 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, 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 re-evaluate 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 NRC actions have resulted:

a. Commission Policy Statement

On August 19, 1997, the Commission issued its 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 Federal Energy Regulatory Commission (FERC) and the State Public Utility Commissions (PUCs); and
- will re-evaluate the adequacy of its regulations in this area.

b. Rulemaking Activities

On September 10, 1997, the NRC issued for public comment a Proposed Rule on decommissioning funding. The public comment period has now expired, and the comments are under staff evaluation. The proposed rule would modify NRC decommissioning regulations in four areas:

- First, it would revise the NRC definition of "electric utility," to ensure that decommissioning funding assurance requirements are clarified for all responsible licensee entities.
- Second, it would allow credit on the earnings from decommissioning trust funds.
- Third, to keep the NRC informed of licensee decommissioning fund status, it would require periodic licensee reports on the status of such funds and any changes to licensees' external trust agreements.
- Fourth, to ensure adequate licensee accumulation of decommissioning funds, the NRC would take additional action as needed on a case-by-case basis, either independently or in cooperation with the FERC and the State PUCs, including the modification of a licensee schedule for accumulation of decommissioning funds.

c. Related Actions

Several other significant NRC actions have taken place in this area, including the development of staff guidance for reviews of licensee financial qualifications and decommissioning plans, as well as in the area of antitrust reviews. In addition, numerous meetings have been held with industry representatives, State and Federal rate regulators, the financial community, and other stakeholders. Staff-level liaisons have been established where appropriate. The overall effect of these measures has been to improve NRC, licensee, and public awareness on issues related to electric utility restructuring.

2. Electrical Grid Reliability

An equally important area of NRC focus has been electrical grid reliability, or security. 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. While Station Blackouts have been extremely rare to date, the possibility of a Station Blackout continues to be an area of NRC focus.

In 1996, within a 5-week period, two electrical disturbances on the United States' Western Grid caused 190 power generating plants to trip off-line, including several nuclear units. In reviewing the electrical disturbances, the Western Systems Coordinating Council listed the following contributing factors: high Northwest transmission loads; equipment out of service; inadequate maintenance of right-of-way; operation in a condition in which a single failure would overload parallel lines, triggering cascading outages; communication failures to neighboring utilities, prior to the disturbances; and the lack of response to earlier events.

The analysis of these events and other studies tell us two things: (1) nuclear generating stations are robust in design and operational standards, allowing them to help stabilize the electrical grid; and (2) they, nonetheless, are vulnerable to grid disturbances, and especially to Loss-of-Offsite-Power events. Grid reliability governance structures must take account of these factors. Standards of performance, operational criteria, and training of personnel are critical oversight issues that all must be factored in and

properly addressed as deregulation goes forward.

To address issues in this area, the Department of Energy (DOE) has created a working advisory committee on the reliability of the U.S. electric system. In July 1997, this committee issued a 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, and governance organization of reliability entities. The committee has also issued two draft reports, one relating to technical transmission issues, and the other addressing the roles and responsibilities of Independent System Operators. The NRC has been coordinating with DOE, and will continue to monitor closely the impact of electric utility restructuring on grid reliability.

3. Cost-Competitiveness and Safe Nuclear Operation

The NRC also continues to focus on any possible impact of cost-competitiveness pressures on safe nuclear operations. The overall safety performance of the U.S. nuclear power industry has, on average, continued to improve. However, 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 improvements. The NRC is developing measures that could help to identify plants where economic stress may be adversely impacting safety. In addition, the NRC is conducting an integrated review of reactor-related assessment processes, to enhance our existing program for plant performance assessment.

In addition to the potential impact on safe operations, 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.

D. The Disposal of High-Level Radioactive Waste

A final key issue that will continue to influence the role of nuclear energy in a domestic energy strategy is the disposal of high-level radioactive waste (HLW). The Nuclear Waste Policy Act of 1982 and the Nuclear Waste Policy Amendments Act of 1987 specify a detailed approach for the disposal of HLW, with the Department of Energy (DOE) having operational responsibility, and the NRC having regulatory responsibility for the transportation, storage, and geologic disposal of the waste. The Amendments Act directed the DOE to investigate only one potential high-level waste repository, at Yucca Mountain, Nevada. In addition, the Environmental Protection Agency (EPA) was given the responsibility to develop standards for off-site release from radiological material in repositories.

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, with the viability assessment to be submitted to the President and the Congress later this year.

Consistent with existing law, any high-level waste repository will require an NRC license. Prior to issuing such a license, the NRC will need to perform several key analyses: (1) a review of the DOE viability assessment; (2) a review of the DOE site suitability recommendation; and (3) an assessment of Key Technical Issues (KTIs) related to the long-term performance of the repository.

As an overall strategy to resolving HLW issues, the Commission supports a three-faceted approach, which includes: (1) on-site interim storage; (2) centralized interim storage; and (3) eventual deep geologic disposal. The NRC currently is focused on resolving the key technical issues most important to performance of a high-level repository, to provide early feedback to the DOE on potentially significant site, design, or assessment flaws as they are identified during site characterization. In addition, we will continue to maintain the regulatory framework and capability to regulate the transportation and storage of nuclear fuel.

In the Congress, both the House and the Senate have approved versions of the Nuclear Waste Policy Act of 1997. Both versions would require operation of an interim storage facility. Further action on the waste bill is expected early this year.

III. The Role of the Regulator Internationally

Finally, our view of the "nuclear horizon" must include a look at the international nuclear energy scene and the role of the regulator internationally. The 1986 accident at Chornobyl gave resounding emphasis to the fact that the safety of nuclear power is an issue that transcends national boundaries. In the decade that followed, the substantial increase in international high-level political attention on nuclear safety issues was coupled with the maturing of national nuclear regulatory organizations--as well as the creation of new regulatory bodies occasioned by the break-up of the Soviet Union. Among the elements considered central to nuclear safety in each country, the importance of a technically competent, independent regulatory agency with adequate resources has been affirmed repeatedly.

A. The Formation of the International Nuclear Regulators Association

Early in my tenure as the NRC Chairman, in my early interactions with senior regulators from other countries, I became convinced of the need for a free-standing, independent international organization that would focus specifically on the needs of national nuclear regulatory bodies and their fundamental role as part of a nuclear infrastructure.

In May of 1997, the senior nuclear regulators from eight countries--including Canada, France, Germany, Japan, Spain, Sweden, the United Kingdom, and the United States--met in Paris to establish and to adopt the initial terms of reference for the International Nuclear Regulators Association (INRA). The INRA was formed to provide a forum in which senior regulators could identify nuclear regulatory challenges, exchange views on broad regulatory policy issues, and make recommendations to strengthen nuclear regulation worldwide. The INRA seeks to accomplish the following basic objectives: (1) to build a global nuclear safety culture; (2) to seek international consensus on approaches to nuclear regulatory issues; (3) to facilitate international cooperation in implementing sound solutions, working cooperatively with other international and national organizations involved in nuclear safety; and (4) to encourage the most efficient use of resources in areas of common interest.

The membership of this newly created body is based on a series of criteria related to the size and scope of the

national nuclear program, the existence of a well-established, independent nuclear regulatory authority, and a commitment to the provisions of the Convention on Nuclear Safety. As such, the initial membership was limited to eight countries, with a consciously controlled approach to expansion during the initial period of establishing foundational guidelines and objectives.

As part of the constituting meeting in May 1997, I was elected the first INRA chairman for a period of two years. Last month, in Walnut Creek, California, I hosted the first regular meeting of the INRA, where our focus was on the commonalities and differences in national regulatory approaches. The goal of this particular effort is to define a set of fundamental safety elements that make up an effective nuclear regulatory infrastructure. We also outlined and promulgated important elements of a nuclear regulatory infrastructure for consideration at the Moscow Energy Ministerial Meeting to be held in May 1998.

B. Bilateral and Multilateral Activities

The NRC has long maintained a wide-ranging program of international cooperative exchanges to ensure the peaceful, safe, and environmentally acceptable uses of nuclear energy in the U.S. and abroad. This cooperation is conducted through a variety of bilateral and multilateral relationships. As the regulator of the world's largest civilian nuclear program, the NRC has broad capabilities to contribute to international programs in nuclear power safety, radiation protection, safeguarding and physical protection of nuclear materials, waste management, and decommissioning of nuclear facilities. At the same time, the Commission can benefit from the experience and expertise gained by foreign nuclear operations.

Currently, the NRC is involved in 33 bilateral safety arrangements with other countries on five continents. These relationships provide the framework for providing technical advice and assistance to other countries, as well as for exchanging significant safety and research information. As a notable example, I will be traveling to South Africa later this month, as a member of the U.S.-South Africa Binational Commission, which is co-chaired by Vice President Gore and South African Deputy President Mbeki. This Commission meets approximately every six months, alternating between the U.S. and South Africa. I am involved in efforts to strengthen the nuclear safety infrastructure in South Africa.

The NRC also has played an important pioneering role in U.S. safety and security assistance to the republics of the former Soviet Union. Under the U.S.-Russian Joint Commission on Economic and Technological Cooperation--which is chaired by Vice President Gore and Russian Prime Minister Chernomyrdin, and is commonly known as the Gore-Chernomyrdin Commission--I serve as Vice-Chair of the Energy Committee, where we are focusing on nuclear safety and non-proliferation in the conversion of the cores of three Russian plutonium production reactors to allow them to produce district electricity and heat, using a core conversion design that would not allow production of weapons-grade plutonium.

In addition to these and other bilateral agreements, the NRC participates strongly in various multilateral arrangements--working with the International Atomic Energy Agency (IAEA) and the OECD/Nuclear Energy Agency (NEA) across a broad spectrum of nuclear safety and nuclear safeguards issues. In a notable effort, the NRC worked extensively in the development of the Convention on Nuclear Safety--the first instrument to address directly the safety of nuclear power plants worldwide. This convention obliges contracting parties to establish and maintain proper legislative and regulatory frameworks to govern safety. The Convention on Nuclear Safety has been transmitted to the U.S. Senate for review and action during the upcoming session.

C. Recent Actions on China Certification

Among its less well-known responsibilities, the NRC has statutory responsibility to license the exports of nuclear facilities, components, and materials--including source, special nuclear, and byproduct materials. The stringency of the requirements governing these export reviews relate to the perceived nuclear proliferation or explosive risk of the item being exported. The general statutory finding that the NRC must make is that the nuclear export will not be inimical to the common defense and security. In addition, all applicable export criteria from 10 CFR Part 110 must be met. No export license for nuclear facilities, special nuclear material, or source material may be issued by the NRC unless the U.S. Government and the country of export have in place an “agreement for cooperation” that meets specific Atomic Energy Act requirements.

As you likely have heard, on January 12 the President submitted to the Congress the formal certification that

> China has met nuclear non-proliferation requirements, thereby making China eligible to receive exports of nuclear facilities and materials. By statute, the Congress has 30 days to take action on the certification. If, within that period, Congress does not block the implementation of the U.S.-China trade accord, U.S. companies will be cleared to compete for nuclear power plant sales to China.

IV. Summary and Conclusion

As the 21st century looms on the horizon, the nuclear power industry faces a complex spectrum of challenges and opportunities. In the mix of considerations influencing the U.S. domestic energy strategy, the viability of nuclear energy as a contributor is neither a sure thing nor a dead issue. The interaction of economic, environmental, political, and technical safety considerations creates a complex picture. The efforts to control operating and maintenance costs, to deal with increased competition, and to recover stranded costs have suggested to some that certain plants may not be financially viable. On the other hand, the emerging emphasis on reducing carbon dioxide and other emissions, and the overall reevaluation of a domestic energy strategy may signal the advent of change. I remain convinced that nuclear power is and can continue to be both economic and safe, if properly managed for reliability and safety. With that in mind, the NRC will continue to focus on maintaining its primary health and safety mission, seeking to increase regulatory effectiveness, and positioning for change.

In closing, let me quote a former Chairman of the Atomic Energy Commission, Glenn Seaborg. Writing in 1963, he said:

> The sheer magnitude and complexity of the national nuclear energy effort make difficult the task of anyone seeking a better understanding of the scientific and technical developments involved and the administrative environment in which they take place. Responsible citizenship requires the layman to acquire a grasp of nuclear matters if [he or she] is to pass intelligent judgments on pressing domestic and international issues.

Given that the situation hardly has become less complex in the 35 intervening years, I find Chairman Seaborg’s words more true than ever. I hope that our discussion today has stirred your interest, and has improved your understanding of the factors that will influence the future of nuclear energy.

Thank you.