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"NUCLEAR REGULATION IN THE UNITED STATES: POLICY DIRECTIONS AND FUTURE PROSPECTS"

BY

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INTRODUCTION

An Yung Ha Shim Nika.

Good morning. I very much appreciate the invitation to address this annual meeting of the Korea Atomic Industrial Forum (KAIF)/Korean Nuclear Society (KNS). I am delighted to have this opportunity to discuss with you the direction and future prospects of nuclear regulatory policy in the United States.

Nuclear regulatory policy is evolving in response to technological, governmental, and other developments. While not all nations with nuclear programs face the same issues at the same time, there is enough overlap from one nation to another that it may be useful to describe the challenges facing the NRC today, the ways in which we are seeking to address them, and the directions in which nuclear regulatory policy is moving. The challenges that we are dealing with at the NRC today may well be those which other nations will be confronting shortly -- if they are not doing so already.

In addressing the question of my vision for the NRC, I am sometimes asked whether it is possible to <u>have</u> a vision for the agency, given that no new nuclear plants are being built in the U.S. and none are on the immediate horizon. The answer, of

course, is that the original licensing of nuclear power plants is only a part of the job of the NRC -- an important part, to be sure, because safety must be built into nuclear plants from the beginning -- but nevertheless just one part. The task of the nuclear regulator is to ensure not only that plants are designed and constructed safely, but also that they are operated safely throughout an operating life measured in decades; that they are properly maintained as they age; and when the time comes to retire them from service, they are decommissioned safely.

In the United States today, numerous challenges face the nuclear power industry and its regulators. These include: (1) economic constraints and the restructuring of the electricity industry in accordance with market forces and competitive pressures; (2) the evolving role of government in American political life; (3) the special requirements posed by a maturing industry; and (4) technological developments. I would like to discuss each of these.

DOMESTIC CHALLENGES AND RESPONSES

Economic Constraints

The U.S. electric utility industry faces substantial challenges that will inevitably change its business practices. At present, the industry is restructuring in an effort to remain competitive, to lower electric rates to consumers, and to respond to Federal and state regulatory initiatives. One concern is that economic pressures might cause electric utilities to cut costs at the expense of maintenance and safety upgrades. In fact, during the 1990's, safety performance, reliability, and availability for U.S. power reactors have been good and generally continue to improve, albeit slowly. This is demonstrated by the key operational safety indicators monitored by the NRC. Improved management of operational safety has been accompanied by decreases in average plant operation and maintenance costs and increased plant availability. But the industry could find it challenging to maintain a proper focus on safety if good performance were to be taken for granted. We all know that creating and maintaining a true safety culture means resisting the temptation to become complacent in response to sustained success.

Therefore, as the business environment changes, the NRC must ensure that nuclear electric generators continue to maintain high safety standards, with sufficient resources devoted to nuclear operations and with decommissioning funding secure. To help ensure this, I have asked the NRC staff to analyze this changing business environment carefully to determine whether our current regulatory requirements are satisfactory. The staff has proposed

that the Commission initiate a rulemaking to provide adequate assurance of decommissioning funds for those power reactor licensees which are no longer economically regulated.

Role of Government

For some time, there has been public debate in the United States over the proper role of government, with many Americans believing that the government has become too large, expensive, and intrusive. Public concerns about the size and cost of government have resulted in reduced funding for all government agencies, including the NRC. Like many other agencies, we are having to carry out our responsibility to assure adequate protection of public health and safety with diminished resources. This tighter fiscal environment requires us to prioritize our programs and make some difficult choices about where the increasingly scarce funds should be spent.

At the same time, the NRC may be asked to assume new duties. An advisory committee was formed in 1994 by the U.S. Department of Energy (DOE) to examine and make recommendations on external regulation of DOE facilities, including national laboratories and weapons plants. DOE is currently studying the advisory committee’s recommendation, and this month expects to issue its findings. If full responsibility is assigned to the NRC, it would add significantly to the NRC's current nuclear regulatory responsibilities, requiring agency restructuring, and significant additional resources. Such a step also would require Congressional approval.

Regulating a Maturing Industry

Aging

One of the most obvious manifestations of the maturity of the nuclear power industry is that plants have been in operation long enough for reactor aging to become a major issue both for the NRC and the regulated industry. Aging affects all plant structures, systems, and components to varying degrees, and it can affect operations and safety, if not appropriately managed. The NRC believes that a "risk-informed, performance-based" approach is an important step in ensuring that licensees continue to focus on safety-important plant equipment. The Maintenance Rule, which will become effective in July, incorporates this approach. Licensees will be required to establish maintenance programs based on a risk-ranking of structures, systems, and components for their specific plants and performance monitoring based on preestablished goals. Through inspection, the NRC will monitor performance against the licensee's program.

We must examine the standards and operating procedures imposed on critical components to assure ourselves and the public that an adequate safety margin will be maintained. Two specific aging problems of great importance are reactor pressure vessel embrittlement and steam generator tube degradation. Some U.S. reactor pressure vessels may approach pressurized thermal shock (PTS) screening criteria before the end of their licensed terms. If so, licensees will have to perform plant specific analysis, mitigate the embrittlement, or shut down their reactors. Steam generator tube degradation is another area of concern. The Commission is considering a generic regulatory approach for dealing with steam generator tube degradation with a view to reducing plant-specific regulatory decisions, while ensuring defense in depth through a balance of protection, inspection, and mitigative measures. In the end, however, many plants may have to replace their steam generators; and, indeed, a number have done so already. Both of these issues can cause aging plants to be shut down before the end of their 40-year license terms, as was the case with Yankee Atomic Electric Company's Yankee Rowe and Portland General Electric Company's Trojan facilities.

Waste storage and disposal

The continued operation of many nuclear plants over a period of decades has meant a steadily mounting quantity of nuclear wastes to be stored and disposed of. The need to address and resolve this problem remains critically important, in the U.S. and elsewhere, including the Republic of Korea.

The NRC believes, based on what we know today, that a deep geologic repository is a technically feasible solution to the problem of permanently disposing of spent fuel and other high-level radioactive waste in the United States. The responsibility for constructing and operating such a facility rests with the U.S. Department of Energy; licensing it is the responsibility of the NRC.

The delays in developing permanent storage and disposal facilities, coupled with diminished space in spent fuel pools, has caused many utilities to turn to dry cask storage. NRC rules provide for generic approvals of dry cask designs, which allow a nuclear utility to purchase and use approved casks without the need for site-specific licensing action. Several such designs have already been approved, and the NRC's approach has been sustained by the U.S. courts.

The attractiveness of such casks as an interim solution to the waste storage problem, coupled with uncertainties in the repository program, has led to interest in the development of a centralized interim storage facility for the United States. Legislation to that effect has been proposed in the U.S.

Congress. The NRC believes that any such legislation should provide for an integrated high-level waste management plan, with three components: interim on-site storage; centralized interim off-site storage; and deep geologic disposal of high-level nuclear waste, primarily spent fuel. We are examining the NRC's existing licensing capabilities and staff resources, should we be called upon to license an interim centralized storage facility. It is important that statutory clarity on the direction of the U.S. high-level waste program be established as soon as possible, so that the NRC and the utilities can plan prudently.

While on the subject of nuclear wastes, let me touch briefly on low-level radioactive waste disposal, which remains a significant issue. In the Low-Level Radioactive Waste Policy Act of 1980 and its 1985 amendments, the responsibility for identifying sites and developing disposal facilities in the U.S. was given to the States. This authorized them to enter into compacts for the establishment and operation of regional disposal facilities for low-level waste. The NRC or, as appropriate, the 29 "Agreement States" (states which have signed agreements with the NRC to regulate the use of radioactive material within their borders) are responsible for licensing these facilities. It currently appears that most, if not all, low-level waste disposal facilities will be licensed by Agreement States. Nevertheless, the NRC must also maintain some level of licensing capability in case we are called upon to license a low-level radioactive waste disposal facility.

Technological Changes

Although in the United States, new nuclear electric generating capacity does not appear likely at this time, the possibility remains that U.S. electric
power generators will consider a standard nuclear power plant as a source for new generating capacity. The NRC has issued final design approvals for two standard reactor designs and is in the process of certifying these designs by rulemaking. We expect that the certification of the two standard reactor designs -- the General Electric Advanced Boiling Water Reactor and the Combustion Engineering System 80+ will be completed in 1996. The NRC is also reviewing the Westinghouse AP-600 standard design application, a light water reactor design which employs passive safety features and greater use of modular construction. While General Electric has announced that it was ending its simplified boiling-water reactor program, Westinghouse has confirmed its continued participation in the Department of Energy's Advanced Light Water Reactor effort.

INTERNATIONAL CHALLENGES

It is important that the nations of the world share their collective technological, operational, and governmental experience, to help keep the risks of accidents to acceptable levels in all countries. The NRC regards this part of our role as extremely important. Much of our focus in the past five years has been on the new governments formed in the aftermath of the breakup of the Soviet Union. Not only have these nations inherited Soviet-built reactors, they also may have limited experience with the concept of independent regulatory bodies, capable of shutting down plants when safety concerns warrant that step. World wide, the NRC has provided assistance to a number of nations -- some with existing nuclear programs, and others, particularly in Asia, which are studying their feasibility -- in establishing and strengthening regulatory bodies.

A major challenge in the international arena is safeguarding fissile materials. Every country with a nuclear program must have the means to prevent theft or misuse of dangerous materials through effective safeguards, including materials protection, control and accountability (MPC&A) programs implemented through a strong and effective regulatory system. Various agencies of the U.S. government are working closely with their counterpart organizations in Central and Eastern Europe to guard against such diversions, by assisting in the development of effective regulatory and safeguards programs.

A long-standing NRC international cooperative activity is regulatory research -- an area likely to assume even greater significance in the future. The NRC has over 60 research agreements with organizations in more than 20 foreign countries, including Korea. This cooperative approach not only makes good economic sense -- through the pooling of increasingly scarce resources -- but recognizes that no country or agency has a monopoly on good ideas. A diversity of perspectives and viewpoints on complex technical issues can only improve our understanding of how best to assure protection of public health and safety.

One specific area in which international cooperation is already bearing fruit is in the thermal annealing of reactor pressure vessels, which involves significant engineering issues and financial risk to nuclear power companies. Although thermal annealing of a reactor pressure vessel has not yet been attempted at a commercial nuclear power plant in the U.S., the Russians have had considerable success with their annealing procedures, and part of our cooperative safety program with Russia includes annealing technology. The NRC has created a regulatory framework to assess reactor pressure vessel integrity following annealing, and the Department of Energy is planning to conduct two annealing demonstrations using two different heating techniques, including the Russian technique which utilizes electrical heat. We will

carefully observe and evaluate these tests to strengthen our regulatory process in this area. The Palisades Nuclear Plant in Michigan is considering annealing its pressure vessel, and its decision will test our regulatory framework and its technical bases.

RESPONDING TO THE CHALLENGES: THE U.S. PICTURE

I have described today some of the challenges I see facing nuclear regulators in the U.S. and internationally. I now would like to discuss some of the ways I envision that these challenges can be addressed -- in the U.S., by the NRC, and internationally by the world community.

Review of Regulations

The NRC has been engaged in a reexamination of its regulations for a few years, with emphasis added by a government-wide initiative of the Clinton Administration -- the National Performance Review. The objective of this effort for the NRC can be summed up in the phrase "regulatory effectiveness." To achieve this goal, the NRC is currently looking not only at whether a particular regulation or set of regulations is necessary, but also considering the ease of its implementation, its consistency with other applicable statutes and regulations, its fairness, its cost-effectiveness, and its place within the overall regulatory program.

Also with regard to our regulations, I have requested that the NRC staff examine closely those regulations for which we have granted numerous exemptions. It seems to me that when exemptions from a particular regulation are routinely requested, one must at least ask whether the regulation needs amendment, or whether licensee performance needs improvement. We already have amended our regulation pertaining to containment leakage testing and plan to consider amending the other regulations as well.

Strategic Assessment and Rebaselining

To position us to effectively meet the challenges we face and to intelligently guide our activities and decision-making in the future, last year, I initiated a strategic assessment and rebaselining at the NRC for domestic and international activities. The first phase of the initiative, the "strategic assessment," involves reviewing, categorizing and examining the sources of the mandates that make up our regulatory mission -- statutes, Executive Branch directives, and Commission decisions. This phase is identifying key strategic issues to be addressed by the Commission. This will lead to a new NRC strategic plan and five-year plan. The subsequent rebaselining will reflect our

programmatic needs, their required resource levels and any agency-wide changes needed.

Probabilistic Risk Analysis (PRA)

In regulating a mature nuclear industry in the U.S., "risk-informed, performance-based regulation" uses Probabilistic Risk Analysis (PRA) as a tool. This technique allows the NRC to focus on the most safety-significant aspects of reactor operations and other licensee activities while maintaining the principles of defense in depth. Properly applied, it tends to relieve unnecessary regulatory burdens by focusing on those things that have the greatest safety significance. At the same time, however, it may also reveal vulnerabilities which could result in new requirements. In either case, a risk-informed, performance-based approach allows a sharpening of focus and a targeting of attention and resources in a way that should help the regulator, the industries we regulate, and the public.

To foster consistency in the use of PRA in NRC decision-making, the Commission in 1995 issued a PRA policy statement and related implementation plan. The NRC staff has been given the task of developing a basic structure for a risk-informed, performance-based regulatory framework, including standards development, a Standard Review Plan, and changes in the regulatory guidance documents.

Technical Specifications

Another area of focus involves technical specifications. Technical specifications are specific operational, testing, design and administrative constraints under which each nuclear power plant is required to operate. In this area, the NRC has implemented an improvement program designed to eliminate unnecessary license constraints and to improve understanding of the bases of the technical specifications, thereby substantially reducing the regulatory burden on licensees. Improved standard technical specifications are available for adoption by licensees. As of October 1, 1995 more than half of the operating units had converted or intended to convert to the improved standard technical specifications.

Embrittlement of Reactor Pressure Vessels and Nondestructive Testing

Let me turn to the embrittlement issue. From my perspective, we have not made adequate progress in measuring embrittlement changes in operating reactor vessels and relating those changes to microscopic models which give a stronger predictive capability, and allow an assessment of post-annealing properties.

The surveillance programs used by licensees for determining changes in toughness properties in the vessel materials of operating reactors have a number of shortcomings, especially for older plants. These programs use a simple, but indirect, conservative method that does not utilize improvements in fracture toughness technology. The results tend to have significant variability, making more difficult the assessment of plant-specific reactor vessel integrity.

To address this problem, we should pursue the use of advanced nondestructive examination techniques for measuring the embrittlement of irradiated reactor vessels. Several possible approaches have been proposed for such measurements, including magnetic, ultrasonic, and hardness measurement techniques. Additional research is required. This is an area with considerable promise, and significant potential safety benefits.

LOOKING TO THE FUTURE: THE INTERNATIONAL PERSPECTIVE

The United States is not alone in facing the problem of how to accomplish the health and safety objectives of government within the constraints of a limited budget. One obvious solution, for the numerous governments in this situation, is to pool their bodies of knowledge toward the common goal of enhanced nuclear safety in all countries. Already, a striking example of this is occurring in nuclear safety research, where many countries share their results. I believe that we should go further. Toward that end, I have proposed two international initiatives which would avoid duplication of effort, but meet the common challenges which we are encountering, and help to compensate for the pressures on our various safety research budgets.

First, I believe the world's nuclear regulators should consider establishing a better mechanism for coordinating their own efforts, through a structured forum for the exchange of information and views on topics of mutual interest. I know that significant exchanges already take place on an ad hoc basis, as well as in the context of meetings at the IAEA in Vienna or the NEA in Paris. However, these efforts do not always reflect the needs of regulators or their priorities. We do not need a multilateral nuclear regulatory organization with a secretariat and headquarters, but a more formal organization of nuclear regulators on the international level might help to identify common themes and approaches and provide greater support for safety.

My second proposal is that the international community consider new programs of cooperative research in areas where we face common challenges such as aging and risk assessment methodologies. In certain areas of mutual interest, coordinated

international research activity has already occurred, with excellent results. If existing international bodies can provide the necessary structure for such a program, this would be excellent; if not, the creation of other mechanisms should be considered.

CONCLUSION

I have attempted to describe this morning some of the many challenges the nuclear power industry and nuclear regulators currently face, in the United States and around the world. Despite their number and complexity, I believe that there is reason for considerable satisfaction. The same maturing process that has brought issues such as reactor aging to the forefront of our concerns has also provided us with a base of operating experience, helping to ensure the safety of reactors in the U.S. and abroad. In the safeguards area, although the problems are substantial, there is increasing cooperation of the world community in coping with these problems.

Nuclear energy and nuclear knowledge have long since ceased to be the preserve of just a few nations. Today the world's nuclear community has the benefit of the knowledge, the expertise, and the fresh insights of capable men and women around the world -- including those here this morning. As we approach a new century and a new millennium, we recognize increasingly our global interdependence. We must continue to work together to ensure a unified commitment to nuclear safety throughout the world.

Thank you for your attention.