BEGINNING A NEW ERA IN NUCLEAR REGULATION

Remarks of

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INTRODUCTION

Thank you, Mr. Chairman. I am very pleased to participate in the American Nuclear Society Annual Meeting.

The theme of this meeting, "Beginning a New Era," is particularly timely for the NRC. As we move into the 21st century, the agency is facing many changes and challenges. We confront the restructuring of the utility industry – in terms both of electricity price deregulation and of the consolidation of nuclear utilities through mergers, plant sales, and formation of multi-plant operating companies. In the last few years we have embarked on a significant, long-term effort to revamp our regulatory processes by risk-informing our regulations and oversight activities. And we are simultaneously engaged in the renewal of power reactor operating licenses; we have issued the first two renewed licenses, for Calvert Cliffs and Oconee. I will discuss the impacts of these changes further in a few moments, but, before I do so, I want to set the stage by putting our activities in a global context.

Nuclear technology is now pervasive throughout the world. Over 400 nuclear power plants are currently operating in more than thirty nations, supplying about one-sixth of the

world's electricity. In several countries, nuclear power provides over 70% of domestic electricity production. Serious consideration is being given to the impact that nuclear power may have on global warming and in reducing toxic emissions. New nuclear capacity is planned or is being considered in a range of nations: some with established civil nuclear programs, such as Japan and the Republic of Korea; some with mid-size programs, such as India and China; and some that do not currently have nuclear power, such as Turkey, Bangladesh, Vietnam and the Democratic People's Republic of Korea.

Although we are not building new nuclear capacity in the U.S., environmental and economic considerations are nonetheless compelling us to take a fresh look at nuclear power. We are, as I mentioned previously, beginning to renew plant operating licenses to permit operation beyond their original 40-year lifetimes. A few years ago, we heard dire forecasts that one-half or more of our operating plants might be shutting down before the expiration of their licenses. In spite of these predictions, the NRC moved ahead to establish a process for reviewing applications for license renewal. This process involves a comprehensive, systematic examination of the plant and of the licensee's programs to manage the effects of aging over the. I believe that our success in meeting the goals for these reviews has helped to set the new era of license renewal into full motion. In contrast to those "gloom and doom" predictions of a few years ago, we expect to receive more than 20 applications for license renewal over the next five years, and we understand that up to 85% of our currently operating plants may ultimately seek to renew their licenses. We also understand that our activities in license renewal are being watched closely by other countries with mature nuclear programs, as they begin to deal with their own aging plants.

Whether we are considering the deployment of new nuclear plants or the continued operation of existing plants -- or, for that matter, any civilian use of radioactive materials -- we are engaged in a common enterprise with other nations. The use of nuclear technology in each country is integrally connected with that in other countries. Regulators have frequent interactions on policy matters and leverage research money through joint international activities. Construction consortia drawn from multiple countries build the plants. And, foreign ownership of plants, while often limited by national laws, is becoming more common. As a practical matter, the nuclear enterprise is now a global undertaking.

We are linked with each other, however, in an even more fundamental way. As we have all experienced, a nuclear accident can have consequences that transcend national borders and, in any event, will assuredly affect public attitudes everywhere. If nuclear power is to continue to make a significant contribution to the world's energy supply in the coming century, we -- utilities, vendors, researchers, regulators, and policy makers -- must all work together to ensure that those who use the technology have safety as their primary goal. Moreover, we must ensure that they have the necessary resources and technical capabilities to achieve that goal.

With that as the backdrop, let me return to discuss some of the aspects of the "new era" in which the U.S. NRC is operating.

THE NEW ERA FOR NUCLEAR REGULATION

The NRC's responsibility is to protect the health and safety of the public in virtually all aspects of the civilian use of nuclear technology. This includes not only nuclear power plants,

but also non-power reactors, nuclear fuel cycle facilities, waste disposal, and the industrial and medical uses of nuclear materials. Although there are only about 40 U.S. companies that own nuclear power plants, the number of licensees in the materials and waste areas is in the thousands. Nonetheless, roughly 65% of the NRC's budget for regulatory activities goes to nuclear reactor safety, and I will focus my remarks primarily on that aspect of our work.

The foundation of the NRC's regulatory philosophy is that our licensees are responsible for the safe use of the technology. The NRC establishes a regulatory framework; verifies through inspections and other types of reviews that the framework is being followed; ensures that problems that arise are identified and their "root causes" are established, are corrected, and are kept from recurring; and in those instances in which serious violations of our regulations occur, the NRC takes enforcement action to require licensees to focus on significant problems. But it is a fundamental obligation of nuclear power plant operators to ensure safe operations. In rare instances, the Commission may determine that a licensee's operation of a plant does not ensure adequate protection of the public, and order the plant to be shut down until remedial measures are taken.

In the last few years, the NRC has begun a fundamental change in the way in which it regulates. We have established a set of four strategic objectives for our regulatory program: (1) maintain safety; (2) increase effectiveness and efficiency; (3) reduce unnecessary regulatory burden; and (4) increase public confidence. The objective of maintaining safety is our foremost obligation and reflects a recognition of the established safety record and maturity of the nuclear power industry in the United States. The objectives of increasing efficiency and reducing burden respond directly to the deregulated business environment in which some utilities must now operate, and which we expect will become dominant in the next few years.

As for the fourth objective, increasing public confidence, I cannot stress too strongly the need for all of us to communicate effectively with the national and international public about nuclear technology. It is the public that will determine the future for nuclear power.

I would like take a moment now to expand on the context for achievement of these objectives. Deregulation of electricity pricing in many parts of the U.S. means that electricity generators must compete in an open market in which the cost of generation will determine what types of plants are built and operated. We recognize that our regulatory system has an economic impact on our power plant licensees – not only because of the costs of regulatory compliance, but also because, under U.S. law, the costs of NRC's operations are largely recovered from our licensees. In a deregulated electricity market every form of electricity generation must compete with all others, and thus the costs of regulation come directly from the bottom line. As a result, we make every effort not to impose excessive burdens on licensees.

Coupled with the deregulation of electricity prices has come a significant restructuring of the utility sector of the U.S. economy. In contrast to many countries that have only a few nuclear plant operators or one national utility, we have over 40 companies that operate nuclear power plants. Some of those companies own as many as 10 plants, but many own only 1 or 2. In an environment of price deregulation, many utilities are choosing to sell their generating assets and become distribution companies. This has created an active market in "used" nuclear plants as some smaller utilities get out of the nuclear business, and several plants have already been sold at prices far below their original capital costs. We anticipate that this trend will continue, and the consolidation process will result in a few large nuclear operators, which may be either single companies, partnerships, or operating consortia.

The NRC views these developments with cautious optimism. The companies that are acquiring these plants are generally good performers, and we expect that consolidation will bring their good operating practices into more plants. We must, however, ensure that, as these large operators acquire more plants, they devote adequate resources to fixing any existing problems and that they do not stretch themselves too thinly by taking on more facilities than management can handle.

Consideration of our strategic objectives is also causing the NRC to change the ways in which we undertake our mission. In the early 1990s, the Commission determined that the science of quantitative risk assessment had matured sufficiently, and that the underlying database on equipment reliability arising from approximately 2000 reactor-years of operation was sufficiently robust, as to permit the use of probabilistic safety assessment in "risk-informing" our regulations. By "risk-informed," we mean that risk insights are considered, along with more traditional deterministic assessments, in evaluating licensee performance and proposed actions, such as in-service inspection and technical specification changes. We are also making our regulations more "performance-based," so that licensees are given more latitude in how they meet regulatory requirements. These new directions have, for example, been applied in the overhaul of our plant oversight process; we now use objective performance indicators (e.g., such as the number of SCRAMs in a year) along with risk-informed inspection techniques to provide a better focus on safety. We believe that these changes directly address the goals of maintaining safety and increasing efficiency and effectiveness, by permitting us to focus on the most risk-significant safety issues. However, I must also point out that this new focus on risk has not affected other aspects of our regulatory philosophy, such as the concept of "defense-in-depth," which is still a fundamental part of the NRC's approach to safety.

The technical bases for accomplishing our new regulatory approach rest largely on the work of our Office of Research. It might have been difficult to foresee in the early 1970s, but the NRC's pioneering work in probabilistic risk assessment–the WASH-1400 study – has ultimately led to our capability to incorporate quantitative risk evaluation into our decision-making processes. Our research program is currently preparing to support new agency work in areas such as mixed-oxide and high-burnup fuels; it is providing the basis for adoption of new technology, such as digital instrumentation and control systems; and it is continuing to provide the foundation for risk-informed regulation and our new reactor oversight process. The thermal-hydraulics program, which sponsored development of the widely-used RELAP and TRAC computer codes, is using state-of-the-art techniques to develop new analytical tools that will remove excess conservatism from reactor safety analyses while maintaining adequate safety margins.

The fourth of our strategic objectives, increasing public confidence, may be the most challenging task of all. It is essential that our regulatory actions both be fair and be perceived as fair. This does not mean that outcomes of our actions will be completely satisfactory to all interested parties, but rather that those parties must be confident that their concerns have been heard and taken into consideration as the NRC reaches its conclusions. A key to achieving this perception of fairness is to be open and accessible. New initiatives we have undertaken in this connection include establishing a website on the Internet through which the public may get information about our activities, and increasing our interactions at all levels with our "stakeholders" - those with an interest in the NRC's activities – through public meetings, workshops, and other outreach efforts.

As I indicated previously, much of the initial work in implementing these new initiatives has focused on nuclear power reactors. However, we are extending these basic concepts to our materials and waste regulatory activities as well. This is neither an easy task nor a small one. We estimate that it could take as long as 10 years to implement our new regulatory structure fully.

We believe that the NRC's efforts to apply our strategic objectives, as perhaps best revealed by our efforts to risk-inform our regulations, will serve to focus our regulatory activities on the issues of highest safety significance. In this way, we expect to meet the challenge of the changing economic environment for nuclear power in the U.S. and to assure that our licensees maintain a vigilant approach to nuclear safety. At the same time, our approach to regulation should permit the U.S. to retain nuclear power as a part of its energy strategy, thereby helping to meet the challenges associated with reducing greenhouse gas emissions. It is also important to note that many of the activities underpinning our new regulatory approach are international in scope. We could not accomplish our objectives without the participation of our international partners. This leads me back to the subject of international cooperation in meeting the challenges of the future.

INTERNATIONAL COOPERATION IN THE NEW ERA

Whether or not to use nuclear power; the number, size, and location of the plants; and the methods used both by plant operators and regulatory agencies to ensure their safe operation are matters for each country to decide for itself. But there is a vital need for international cooperation to ensure that safety is ***the*** fundamental consideration in the use of nuclear technology. As we have seen many times over the years, an accident involving nuclear

power or nuclear materials can have a psychological impact far beyond the physical consequences of the event. In some instances, such as the Chornobyl accident, the physical consequences are international as well.

When we speak of international exchange and cooperation, the two organizations that usually come to mind first are the International Atomic Energy Agency and the Nuclear Energy Agency of the Organization for Economic Cooperation and Development. Both of these agencies play crucial roles in fostering the exchange of technical information in areas as diverse as safety, safeguards, materials and waste. However, this is just the beginning of the story. As important as the programs of the IAEA and the NEA are in helping to ensure nuclear and radiation safety, the extent and scope of international cooperation go far beyond the activities of these two bodies.

As I mentioned earlier, nuclear power has clearly become an international business in every aspect: design, construction, operation, and regulation. Most of the major nuclear steam supply system vendors are now multinational corporations or have international partners. Of the vendors operating in the U.S., B&W is owned by Framatome, and Westinghouse and Combustion Engineering are owned by BNFL. Outside the U.S., Siemens and Framatome are in the final stages of joining their nuclear businesses. There are French plants operating in China, Canadian plants operating in the Republic of Korea, and the ABWRs in Japan are a product of a cooperative venture between Japan's Toshiba and Hitachi and GE Nuclear Energy from the United States. The deregulation of the utility sectors in the U.S. and in other parts of the world has resulted in numerous acquisitions and joint ventures. One of the most prominent partnerships, Amergen, formed by British Energy and the Philadelphia Electric Company, is actively engaged in buying U.S. nuclear plants.

The nuclear industry also has clearly recognized the need for and value of international cooperation and technical information exchange. Organizations such as the World Association of Nuclear Operators (WANO) promote the exchange of information on operating experience to improve nuclear plant operations. The International Nuclear Forum represents international industry interests in such matters as the consideration of nuclear power in contributing to a reduction in greenhouse gases under the Kyoto Protocol. We also see broad international participation in industry organizations based in the U.S. For instance, the Nuclear Procurement Issues Committee, or NUPIC, originally consisting of representatives from all U.S. nuclear utilities, was formed to promote a coordinated approach on oversight of nuclear vendor quality assurance. NUPIC now includes members from Mexico, Brazil, Spain, Slovenia, and Sweden. The Nuclear Energy Institute, based in Washington, D.C., has developed a substantial international membership, including more than a dozen countries and international organizations, and is active in international exchanges and cooperation on many levels.

International information exchange is also fundamental to the mission of the professional societies in the nuclear field. This society, along with the European Nuclear Society, the Atomic Energy Society of Japan, and many other such groups hold numerous international conferences every year covering virtually every aspect of nuclear technology. They promote free and open discussion of research, operational experiences, emerging technical and safety issues, development of new technologies, and other related topics.

In a similar fashion, nuclear regulation has become international in scope. Cooperation between the national regulatory agencies has grown, and it is imperative that this type of cooperation continue and expand. For countries with mature nuclear programs, exchanging information on operating experiences and regulatory issues and approaches helps to promote

good safety practices and to discourage poor ones. Information on emerging safety issues with regard to a particular reactor type or design may be relevant to reactors in many different countries, as well. Even more important, perhaps, is international cooperation involving countries with small programs, those considering acquiring nuclear plants for the first time, or those with relatively weak or inexperienced regulatory organizations. For these countries, international cooperation can help develop the regulatory infrastructure and strong safety culture that are essential to assuring safe plant operation.

I am firmly committed to continuing the U.S. NRC's role in international cooperative exchanges at all levels. NRC staff members participate in international conferences, such as the professional society meetings that I previously mentioned, and on many international working groups, such as those organized by the IAEA and NEA. On the Commission level, my fellow Commissioners and I have met with many of our counterparts around the world to discuss perspectives on nuclear regulation and ways in which to promote adherence to the highest degree of safety assurance. The NRC's Office of International Programs coordinates technical information exchange agreements with 34 other nations. One of the most valuable methods for sharing information and experiences is through the assignment of staff to other organizations, and the NRC is proud to have hosted regulatory staff from many other countries who work at the NRC for periods ranging from a few weeks to many months. We have also sent our regulatory staff to other countries, both to provide assistance in building and improving regulatory infrastructure, and to learn from the valuable experiences of our international colleagues. NRC staff have also been key members of U.S. delegations negotiating the instruments composing the international nuclear legal regime.

One other subject in the area of international cooperation deserves special attention: the role of international cooperative research programs. One challenging aspect of our changing environment–particularly in the United States–is the tightening of the NRC's budget, in general, and of the research budget in particular. In my meetings with representatives from many other countries I have heard that this is the situation almost everywhere. However, the need for research continues: to provide the technical foundation for new regulatory initiatives, such as risk-informed regulation; to position nuclear safety regulators to deal with new technology and new industry initiatives; to develop state-of-the-art analytical tools; and to respond to emerging technical and safety issues as our operating reactors grow older. Under these circumstances, cooperation with international research partners is an essential means to leverage our research expenditures.

The NRC currently maintains 45 bilateral or multilateral cooperative research agreements with more than 25 other countries, and thereby is able to increase greatly the value of the research in which we participate. While I could not possibly list all of the international cooperative programs in which the NRC takes part, some of the more prominent multilateral efforts include the Halden project in Norway, the Cabri program in France, severe accident-related testing at the Kurchatov Institute in Russia, the Surtsey program that was conducted in the U.S. A good example is our collaboration with the Japan Atomic Energy Research Institute. Confirmatory testing on Westinghouse's AP600 advanced reactor was conducted in the ROSA-Large Scale Test Facility at JAERI's Tokai laboratory. This extensive series of tests, simulating design-basis accidents and transients, as well as multiple-failure scenarios, provided valuable data for the validation of the NRC's thermal-hydraulic analysis codes, and provided the NRC staff with insights into the way in which the AP600's unique passive safety systems would

behave during such events. This work provided the foundation for the NRC's certification of the AP600 design.

While I have again focused on the issue of nuclear power plant safety, I must add that our concerns regarding the safe use of nuclear technology extend beyond nuclear power plants. The use of nuclear materials and sources in industrial and medical applications is growing rapidly, and we have seen the tragic consequences that can occur when these materials are not properly controlled and handled, as was recently the case in Thailand. These types of events can also have international repercussions, as for instance when radioactive material is accidentally incorporated into finished metal products, which are then exported to other countries. International cooperation in dealing with materials and waste issues is also essential to ensure that radioactive materials are handled in a manner that protects worker safety, public safety, and the environment. We must all make our best efforts, both individually and in collaboration, to ensure that these objectives are achieved.

SUMMARY AND CONCLUSIONS

I have tried in these remarks to give you an appreciation for the NRC's perspectives – and my own – on some of the important issues that the NRC has begun to address as we move into the 21st century. I cannot state too strongly that the assurance of safety is our foremost obligation. I hope that you share this view, and that the ANS, both as an organization and through the efforts of its individual members will redouble efforts to enhance nuclear safety in the coming years.

Thank you.