Regulatory Perspective on Nuclear Renaissance

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Opening

Good morning. I am pleased to be here and to have the opportunity to share my views on the much anticipated nuclear renaissance, and on the U.S. Nuclear Regulatory Commission's activities in both the domestic and international arenas. Let me emphasize that my remarks today are my personal views and they do not necessarily represent Commission positions or policies.

Nuclear Renaissance

In the past few years, we have witnessed a renewed interest in nuclear power generation around the world. For the first time in a generation, electric power generating companies are giving serious consideration to building new nuclear power plants in the United States. Around the world, 33 new nuclear power plants are under construction today. This revival in the development of nuclear power is driven by a complex set of circumstances not the least of which is the strong growth of energy demands worldwide.

Several organizations, including the International Atomic Energy Agency, are forecasting a significant increase in energy and electricity demands around the world. The IAEA has estimated that by 2030 the world's energy demands will increase significantly, with the estimates ranging from 40 percent to as much as 70 percent increase over today's demand. In order for nuclear power to maintain its current share of electric generation, the industry will need to add as many as 50 nuclear power plants in the U.S. alone, with nearly 300 more around the world, with an average of 1,000 megawatts.

In addition to strong power demands, several other factors are contributing to the reconsideration of nuclear power as a viable energy supply option. For example, fossil fuel costs have increased resulting in a competitive life-cycle cost for nuclear power. Oil prices and sources are often volatile continuing to raise economic and energy security concerns. Today, nuclear power enjoys an excellent operating experience and is viewed favorably in light of increased global concern over climate change. It is also evident that while energy conservation and further improvements in renewable sources like wind and solar will be important, these simply will not be enough to meet the world's future demands, particularly in major developing nations.

With this anticipated growth in energy demands, the development of innovative nuclear technologies in addition to the traditional large power plants will be vital. Technologies like smaller, "grid-appropriate" plants, and modular designs that can be expanded to support growing energy needs will have to be developed and perfected. These advanced reactors may offer some safety enhancements over current larger light-water reactor technologies, enable the efficient use of nuclear power where larger reactors may not be appropriate or affordable, and also provide a source of process heat in industrial applications or the production of hydrogen. These smaller reactors may be especially valuable in the developing world—where access to reliable electricity can greatly enhance living standards. In fact, economists have shown that access to reliable energy is the single most important factor for economic growth.

With regard to advanced reactors in the U.S., our Department of Energy is leading the Next Generation Nuclear Power Plant project, which was originally established to provide the research, design, construction, and operation of a prototype nuclear reactor plant to efficiently generate electricity, produce hydrogen, or both. The Department of Energy's current plan is to move forward with a very-high-temperature gas-cooled reactor, or VHTR, optimized for the production of electricity, process heat, and hydrogen. The design performance goals of the VHTR are to provide high-temperature process heat, up to 950 degrees Celsius. As the program has developed, it was recognized that the high-temperature heat from a VHTR can be used as a substitute for

the burning of fossil fuels for a wide range of commercial applications beyond producing electricity or hydrogen.

So, for now it is safe to say that the world's energy needs are growing rapidly and nuclear power is likely to be considered as a viable option along with a variety of other energy sources.

US Regulatory Activities on Renewed Interest in Nuclear Power

Turning now to the NRC's activities in response to this revived interest in nuclear power – I would like to start by saying that, as a regulatory body, it is not the NRC's job to advocate or encourage the use of nuclear power. However, it is our job to be prepared to evaluate the industry's proposals for new reactors, and to do so in an effective and efficient manner with a clear emphasis on safety.

The U.S. Congress has expressed interest in nuclear activities and demonstrated this interest in passing the Energy Policy Act of 2005. That Act incorporated significant funding for research and development to support the next generation nuclear power plants, as well as incentives for the construction of new, advanced reactors. As a result, the NRC has received expressions of interest in the licensing of nearly 34 new nuclear plants over the next decade. To date we have received applications for 15 new reactor licenses. In reviewing these applications, we are implementing a licensing process that is significantly different form the process used to license the current fleet of 104 operating reactors in the U.S. This process is the product of regulatory reform efforts that culminated in the late 1980s in response to criticism of the agency's original licensing approach.

The current fleet of nuclear power plants in the US has been licensed under a 2-step process. In this process, the NRC would first issue a construction permit, based on an evaluation of preliminary safety and design information, to allow construction of the plant to begin, and then issue an operating license upon completion of construction,

based on evaluation of the final design and other operational programs. The applicant was not required to submit a complete design at the construction permit phase. Before the scheduled completion of construction (typically when the plant was about 50% constructed) the applicant filed an application for an operating license. At this point, the applicant provided the complete design bases and other information related to the safe operation of the plant, technical specifications, and description of operational programs.

In carrying out the licensing process, the Commission assessed the environmental impacts at both stages. Additionally, the Atomic Energy Act requires that the Commission grant a hearing on a construction permit and on an operating license application if it is requested.

This 2-step process was criticized by the applicants, the NRC and the public as it resulted in a lack of standardization and a “design as you go” approach to construction; it deferred resolution of important safety issues until plant construction was well underway; it created uncertainty due to changes in regulatory requirements; and it appeared as an inefficient and a duplicative review and hearing process.

The deferral of design details until start of construction allowed for the construction of commercial reactors with an “unusual degree of variability and diversity” – in effect, a set of custom-designed and custom-built plants. This lack of standardization posed challenges monitoring the safety of plant operations as well as the ability to learn from operating experience. In addition, the “design-as-you-go” approach resulted in variability in the design implementation contributing to the escalating cost and lead times –as long as 12 to 16 years, to bring a planned facility into operation. The two-step process was often criticized as “one lengthy safety review that is conducted too early to be useful and too late to be fully effective.”

In 1989, after a deliberative process, the NRC issued its alternative licensing process in Part 52 of the Code of Federal Regulations, which was further refined and updated last year. Instead of the 2-step process, Part 52 allows an applicant to seek a combined

license which authorizes construction based on an essentially complete design and provides conditional authority to operate the plant, subject to verification that the plant has been constructed in accordance with the license, design, and the Commission's regulations. Part 52 provides two other significant procedures:

(1) review and approval of standardized designs through a Design Certification rulemaking; and
(2) review and approval of a site's suitability, prior to a decision whether to build a particular plant, through an Early Site Permit.

The NRC's goals in establishing Part 52 included standardization, enhanced safety, and a more predictable licensing process by resolving safety and environmental issues before authorizing construction. In addition, Part 52 goals include providing for timely and meaningful public participation, encouraging standardization of nuclear plant designs and reducing financial risks to licensees. The NRC created these new processes to provide applicants and the public with the opportunity to resolve site and design issues before large commitments of resources are made and to reduce the financial risks associated with the construction of new nuclear plants.

With regard to the next generation plants, we have been working with the Department of Energy to develop a licensing framework which was delivered to Congress last month. We recognize that it has been many years since the NRC has licensed a gas-cooled reactor. This fact, combined with the many advances in material sciences that have been made during that time, means that we must re-learn and focus on the applicable science needed to perform our safety reviews.

For the foreseeable future, I believe that the agency is well-equipped and on track to handle the expanded workload we have been anticipating and planning for. We have always been committed to being an effective and a timely regulator, and that has not changed.

International Activities in Licensing

Let me share some thoughts with you on international regulatory cooperation. Today's global economy distributes technical and manufacturing expertise among many countries, rendering international cooperation increasingly important. The challenges faced by the NRC in maintaining safety and security, preserving and enhancing technical competence, and improving the effectiveness of our communications with the public, are not different from the challenges faced by nuclear regulators and the nuclear industry around the world. Today the NRC is learning and contributing internationally through our exchanges of technical information and discussions of regulatory practices. These exchanges and discussions with other countries are highly valued by the NRC and have been of great benefit to the agency.

Through our membership in the "Multinational Design Evaluation Program", or MDEP, we are having valuable exchanges and sharing information with other member nations including South Africa. Our common goals are to enable and encourage safer, standardized reactor designs, facilitate effective and efficient design reviews of new reactors in many countries, and further the public understanding and acceptance of safety goals on an international basis. We are sharing operating and construction experience, review insights of standard designs, and technical and programmatic insights in may areas including codes and standards, quality assurance, analysis methods, and digital instrumentation and controls.

This multinational program is also placing great emphasis on vendor inspection. This is an area where we all could benefit greatly from exchanging knowledge and experience, establishing a framework for multinational oversight activities, sharing resources in completing the necessary regulatory reviews, and supporting and fostering high quality standards and a strong safety culture. With this understanding, we have expanded the scope of our vendor inspection program and are pursuing strong cooperative activities with international regulators to leverage our knowledge and resources.

Speaking of a strong safety culture and quality standards — these are areas of great importance in view of the current nature of the marketplace. Today, the supply stream for nuclear components is global in nature, with only a small number of suppliers equipped to manufacture the major components. Certainly this will create challenges in lead times, but will also create opportunities for new suppliers in the marketplace. It is essential, however, to recognize that the safety culture in non-nuclear markets is not the same as that required in the nuclear arena. I believe one of our highest priorities and biggest challenges—regulators, licensees and vendors alike—in supporting the new reactor construction, is to instill nuclear-grade quality assurance and a strong safety culture in suppliers, particularly those that are new to the nuclear field.

The global economy is here in full force and its features are clearly evident in the nuclear industry. Vendors are from around the world, regulators are sharing information on a much expanded scale, and the global supply chain is expanding.

But, as the nuclear industry is transformed into a global enterprise, safety must also become a global enterprise. We must always remember that an accident anywhere affects everyone—social, environmental, economical, and political consequences of nuclear events do not yield to boundaries and borders. The rapidly expanding markets will create opportunities for both legitimate and illegitimate businesses. And, as I said before, it is our common duty to be vigilant and deliberate in instilling high-quality standards and a strong safety culture in companies entering the nuclear marketplace.

To that end, the NRC is committed to ensuring the quality of parts that will be used in the construction of new reactors. We have and will continue to dedicate significant efforts in our inspection and oversight activities to the areas most vulnerable to fraudulent and counterfeit parts including procurement and commercial-grade dedication programs. We continue to work with the industry and our international partners to improve the process for identifying fraudulently marketed products and to share our knowledge and experience with all the stakeholders.

Closing

Ladies and gentlemen, let me close by saying that a global nuclear renaissance appears to be taking hold. Those of us in the nuclear technical community can support the desire to use nuclear power, but we must always balance that desire against our obligation to protect public health and safety and our environment.

Thank you for the opportunity to speak to you this morning.