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Views on the Future Role of Nuclear Power in the Global and U.S. Markets
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Good morning. I would like to thank Jane Allen for her kind introduction. It is a pleasure to be here.

The published theme for this conference is: ***Energy: Bridge to a New Global Economy*** and the theme for this plenary session is **Views on the Future Role of Nuclear Power in the Global and U.S. Markets**.

The emphasis on "global" in both of these themes is most appropriate. The United States has 104 operating nuclear power reactors, but there are 332 other nuclear plants operating beyond our borders. U.S. nuclear plants provide about 20% of our electricity, but 16 nations depend on nuclear for a greater percentage than we do, with France topping the list at three-quarters or more.

Before I continue, though, I should note here that I speak from the perspective of a nuclear regulator. In the federal government – by law – the Department of Energy is responsible for promoting the use of nuclear technology and materials, and the Nuclear Regulatory Commission – my agency – is responsible for regulating the safe and secure civilian use of nuclear technology and materials. I should also note that my remarks today are my own personal views, and that they may not represent the collective view of the Commission.

In the U.S., there have been – and continue to be – a great many references to "The Nuclear Renaissance" to describe the creation of new reactor and plant designs, the filing of applications for new plant licenses, and the general interest in putting new nuclear generation on line in the United States. This renewed interest in domestic nuclear energy has resulted in a major increase in licensing activity at the NRC. So far, the NRC has received 17 license

applications for 26 new nuclear power plants. These are the first licensing applications to be submitted for new plants in decades. NRC has also experienced a significant increase in licensing activities related to uranium recovery and fuel processing facilities.

The licensing and the safety reviews of nuclear designs involve significant time and resources for both the applicants and the regulator. Historically, all of those 104 nuclear plants in the current operating fleet were different enough so that the NRC had to analyze and review nearly every one practically from scratch, and the operating license reviews had to be done while the plant was under construction with a public hearing after completion.

In 1989, the NRC began establishing a new combined construction permit and operating license – or "combined license" – application process which was further refined and updated with a rule-making last year. The new licensing process – which is now codified in NRC regulations referred to as "Part 52" – was envisioned as involving three steps: certifying a plant design, obtaining an early site permit, and then a combined license application pairing those first two.

The intent was that reactor vendors would develop and finalize designs and get them certified by the NRC, while utilities would identify and analyze candidate sites, get them approved by the NRC, and bank them for future use. Utilities would then select a certified design, and apply to build at an already approved site. Since the NRC would already have reviewed both the site and the plant design, the combined license reviews would be reduced in scope potentially eliminating the need for a post-construction hearing.

That hasn't quite happened yet, as none of the combined license applications received by the NRC – so far – reference both a certified design and an approved early site permit. Some do, though, reference an already certified design and all the others reference a design still undergoing NRC certification review. So, the effort to gain efficiencies with the one step licensing process have borne fruit to some extent.

Despite the significant number of new reactor applications and associated licensing activities, only one nuclear unit is currently under construction in the U.S., and that is Tennessee Valley Authority's Watts Bar Unit 2, which is a previously deferred unit now being completed. Both Watts Bar units received their construction permits in 1973. After a number of delays, Unit 1 went into operation in 1996, but the construction of Unit 2 had remained suspended since 1985. In late 2007, TVA decided to complete Unit 2 and construction resumed in 2008. Nuclear plant construction has, however, continued elsewhere. Over 40 more nuclear units are currently under construction in a dozen or more countries around the globe.

The decades-long absence of new nuclear plant construction in the U.S., however, led to significant attrition within the domestic infrastructure that built the previous generation of nuclear plants. Many of the companies active in the field decades ago have closed down, reorganized, or otherwise exited from the industry, while many of those that remained survived, in part, by down-sizing to a fraction of their former size and capabilities. One of the clearer examples of this involves nuclear plant reactor vessels. Of the current and previously operating U.S. plants, approximately 90% of the reactor vessels were manufactured in the United States.

Following the Davis-Besse corrosion event, many U.S. utilities recently elected to replace the heads of those same reactor vessels. None of those replacement heads have been manufactured in the United States. The replacement vessel heads came from various international manufacturers; in other words, they came from elsewhere in the global economy that now supports the nuclear supply chain.

The declines in U.S. domestic capability were not limited to heavy forgings, however. According to data compiled by the American Society of Mechanical Engineers, the number of ASME Nuclear Certificates held by companies fell worldwide from nearly 600 in 1980, to under 200 in 2007. That decline was due almost entirely to the loss of American-held certificates, as the number of certificates held in other nations remained fairly steady at around 100.

On the future role of nuclear in the global economy, I noted that there were over 40 nuclear units currently under construction in other nations. As for the future role of nuclear in this country, the Department of Energy's Energy Information Administration estimates that electricity demand in the United States will increase by 50 percent in the next 30 years. Although these estimates predate the recent economic downturn, under these projections, if nuclear power were to maintain its current share of the electricity supply in this country, the industry would need a fleet of about 150 nuclear power plants, with an average output of 1,000 megawatts each. To reach that level, it would be necessary to build and bring on line nearly 50 more large, commercial power reactors to add to the 104 that are currently operating. And although I noted the EIA demand forecasts did not take into account the current economic slump, they also do not reflect possible carbon control legislation, which would, if enacted, certainly impact supply side planning and decisions by U.S. utilities.

I noted a few moments ago that there was only one nuclear unit currently under construction in the U.S. Upon satisfactory completion of construction, the NRC issues an operating license good for 40 years. Earlier this month, the Oyster Creek Generating Station, a nuclear plant located in Ocean County, New Jersey, began its 41st year of operation after having its operating license renewed for an additional 20 years. Looked at another way, the nuclear generating capacity represented by Oyster Creek would have ceased, if the plant operator had not been able to satisfy and demonstrate compliance with the NRC's rigorous license renewal standards.

This license renewal process represents the fruition of nearly three decades of work by the regulator, the regulated, and the public. Development began in 1982 when the NRC formally initiated a comprehensive nuclear plant aging research program to determine the feasibility of extending operating licenses, and the information that would be required to support it. Several public rulemakings followed over the next 14 years resulting in the highly structured process currently in use.

Three more nuclear units will begin their 41st year of operation in 2009 (Nine Mile Point Unit 1 in August, Ginna in September, and Dresden Unit 2 in December). Next year, two additional plants will join them (H. B. Robinson Unit 2 and Point Beach Unit 1). In all, 52 nuclear units have been approved for license renewal and 20 more are currently under review by the NRC. Many others have announced their intention to seek license renewal, and already there

is some discussion of whether a second round of license renewals might be pursued by plant operators, and what research might need to be done to support it.

Nonetheless, license renewal is not being relied upon by industry as the sole means of serving future electricity demand. Consequently, the "Nuclear Renaissance" will still require new people and new infrastructure to replace both human and physical capital.

There are some signs that both are being regained. To begin with, the nuclear engineering programs at U.S. universities are graduating many more engineers and scientists than their low graduation rates of the late 1980s and early 1990s. Several utility companies and architect engineering firms have begun supporting or even partnering with educational institutions, including local technical colleges, to help assure a steady source of trained personnel. The current count of such institutions, according to industry representatives testifying before the Commission, is 42 technical colleges, as well as another 19 state-based workforce development efforts.

The number of ASME certificates has also risen, from the less than 200 figure I mentioned earlier to about 225 today. In the area of physical infrastructure development, industry officials have also announced investments. For example, Northrop Grumman and AREVA announced that they would partner to build a 300,000 square foot manufacturing and engineering facility in Newport News, Virginia, to support what the owners hope will become a significant demand for AREVA's new reactor design – the EPR. If they stay on schedule, they would be breaking ground this year. An even larger facility has been announced by another joint partnership – Westinghouse and the Shaw Power Group – to be built in Louisiana to support the new Westinghouse reactor design – the AP-1000.

At the NRC, we have established the Office of New Reactors and have been staffing up – which means our offices are getting a little cramped and we have had to locate some temporary office space – but we are meeting our goals. The NRC used to hire 30-50 new people per year. Recently, we have been hiring a net of 200 people per year over a three-year period. With the median age in the nuclear industry close to 50, retirement attrition makes sustaining any increase in staffing especially challenging. The personnel challenges may be even tougher for federal agencies, however, as the Office of Personnel Management projects that, over the next five years, more than half a million federal employees – one-third of the entire workforce – are eligible to retire from government service.

So far we've been able to meet our staffing and recruitment goals, helped in our efforts by a recent ranking of the NRC as the "best place to work" in the federal government. Our objective is to be ready to fulfill our responsibilities as a regulator to review new license applications, and new construction and plant operations, when and if they move forward.

Before I conclude, I would like to stress one key point.

The resurgence in interest in new nuclear power plants has only been made possible by the sustained safe and reliable performance of the current fleet of operating reactors. We must never lose sight of that fact. The NRC considers the oversight of the 104 currently licensed, operating reactors to be – by far – our essential mission. The great majority of our resources – inspections, reviews, and oversight – remain focused on those facilities. We maintain resident inspector staffs at each operating reactor site, and vigorously monitor licensee performance. Just as a chain is only as strong as its weakest link, so, too, is the reputation and credibility of the nuclear industry dependent upon the continued safe operation of every one of its plants. The nuclear industry is now, and may always remain, just one accident away from retrenchment. We all – regulator and regulated alike – must remain vigilant and focused on safety. Our standards must consistently demand rigorous analyses, conservative designs, careful maintenance, thorough testing, robust construction, and safe operation. Without a dedication to these standards, any **Future Role of Nuclear Power in the Global and U.S. Markets** will be at risk.

Thank you.

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