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STATUS AND FUTURE OF NUCLEAR REGULATION FOR FUEL CYCLE FACILITIES

by

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Good Morning. I appreciate the contribution that those involved in fuel supply make to the success of the U.S. civilian nuclear power program. It is a pleasure to speak with you today.

I would like to begin my presentation by providing a brief overview of the current state of nuclear power in the U.S. and of possible future developments. This will provide the context for my remarks on the current state and future of regulation of fuel cycle facilities.

Current Status and Recent History of the U.S. Nuclear Power Program

With 103 operating reactors providing a total of almost 100,000 megawatts, the United States nuclear fleet currently accounts for about 20 percent of our electrical supply. The nuclear plants operated in 2001 at a record capacity factor of approximately 90 percent. Preliminary data for 2001 show that the average production cost of nuclear electricity was around 1.8 cents per kilowatt-hour, lower than that for coal or natural gas. And it is estimated that the U.S. avoids over 160 million tons of carbon emissions by virtue of displacing fossil-fired generation with nuclear plants.

What accounts for these impressive statistics? I believe that they reflect attention over the course of a decade by the industry and the NRC to the importance of improved plant operations. In 1990, electricity from nuclear sources was more expensive than that from coal and the industry's safety performance was unimpressive. In that year, more than 50 events were classified as "significant," or

almost one for every two units, and each unit, on average, experienced one safety system actuation. In 2000, however, the number of significant events had decreased by more than an order of magnitude, and the average number of safety system actuations per year decreased from one per unit to about one for every three units. Other safety performance data show similar trends.

Today's situation tells a success story -- one that demonstrates a correlation between plant safety performance and plant economic performance. A plant that operates safely also operates reliably, and is thus able to contribute to the financial bottom line. The same correlation between safe operation and the financial bottom line exists in the operation of all civilian nuclear facilities.

Improvements in nuclear plant safety and economics do not mean, however, that either the NRC or the industry can become complacent about operations. Indeed, we have seen time and again that failure to maintain safety as a first priority can cause rapid degradation in plant performance. Moreover, we have learned that we can still be surprised – often unpleasantly – by unanticipated events or plant behavior. The recent, well-publicized experience with severe corrosion of the reactor vessel head at the Davis Besse plant demonstrates clearly that we are still learning about the things that can go wrong at a nuclear plant, reinforcing the need for continued vigilance both in licensee operations and maintenance programs and in NRC oversight.

Outlook for the Future

Currently operating plants are the subject of two major initiatives: power uprates and license renewal. Power uprates are not new: licensees can seek to increase power output by taking advantage of improved power measurement techniques and better analytical methods to demonstrate that reactor power can be increased, in some cases substantially, without unacceptable reduction in safety margins. The NRC has previously approved more than 80 applications to increase reactor power, resulting in an increase in generating capacity of almost 4000 megawatts electric. Our licensees tell us that they expect to submit at least 51 applications for power uprates over the next 5 years, resulting in the addition of almost 2000 megawatts of electrical generating capacity. Thus, power uprates may cumulatively contribute generation capacity equal to six large power plants.

License renewal is a relatively recent initiative. The first application was submitted to the NRC in 1998 and was approved in 2000. We have continued to receive applications at a steady pace, and to date, five plants, comprising 10 units, have had 20-year license renewals approved. Twelve applications (covering another 20 units) are currently under review, while approximately 14 applications (covering 25 units) are expected to be submitted over the next 3 years. All told, approximately half of the operating nuclear units in the U.S. are currently involved at some stage in the license renewal process, and we ultimately expect that almost all operating plants will eventually apply for license renewal.

One other factor affecting nuclear power is the disposition of spent fuel. Last year, the Secretary of Energy formally recommended proceeding with the Yucca Mountain site for a high-level waste repository. His recommendation was accepted by President Bush and approved by the U.S. Congress. Although we expect this issue to be the subject of ongoing legal challenges that may take several years to resolve, the NRC has begun to move forward in planning to review DOE's application to construct the Yucca Mountain repository. We have completed our site-specific regulation for a potential repository and are well on the way to finalizing the associated review plan.

The licensing proceeding for the Yucca Mountain repository will present the NRC with a formidable challenge. For example, without prejudging the outcome of the licensing process, let me just note that the technical challenges involved in the review are substantial; we must find that strict standards will be satisfied for a period of 10,000 years, which is longer than recorded history. Moreover, no single NRC decision or set of decisions since the response to Three Mile Island is likely to be scrutinized as closely, from a technical, legal, and public confidence standpoint, as those concerning this one-of-a-kind facility at Yucca Mountain.

Now let me turn to the regulation of fuel cycle facilities.

Overview of Fuel Cycle Regulations

At the time of the original promulgation of most of our regulations, the NRC (or its predecessor the AEC) had limited experience with nuclear facilities. Accordingly, the regulations reflect engineering conservatism and a philosophy of addressing uncertainty by providing an ample safety margin. In the years since the Rasmussen Report was issued in 1975, we have developed a much deeper insight into risk and into the failures that might lead to untoward events. We are now using risk insights to guide modification of our regulations. Risk is the tool by which we simultaneously can improve safety and reduce undue burden. Our principal efforts in this regard have been in the reactor and high level waste arenas, but risk should serve as our guide in fuel cycle regulation as well.

In 1991, a near-criticality incident at a low enriched fuel fabrication facility prompted the NRC to re-evaluate its safety regulations for licensees that possess and process large quantities of special nuclear material. The Commission recognized the need for revision of its regulatory base for these licensees and, specifically, for those possessing a critical mass of SNM. We concluded that such a licensee should perform an integrated safety analysis (ISA) to analyze systematically plant and external hazards, potential accident sequences, and the physical and human assets relied on for safety. And subsequently, following a petition for rulemaking by the Nuclear Energy Institute, we issued Subpart H of 10 C.F.R. Part 70. The required ISAs will provide both the NRC staff and individual facility management teams with a comprehensive and in-depth look at the risks inherent to each facility.

We have thus now taken the first steps at emphasizing risk-informed and performance-based regulation at fuel cycle facilities. I expect this to be the continuing thrust of the regulatory program.

Two years have now elapsed since Subpart H of Part 70 became effective. ISA plans have been received from the six operating fuel fabrication plants and approved by the staff. In addition, the first site-wide ISA summary was received from BWX Technologies in December of last year and currently is undergoing review. I have been informed by staff that the process is going well, but we have learned that the ISA process requires more staff resources than originally estimated. Moreover, the submittals vary significantly in terms of completeness and level of detail. I welcome your perspective on the implementation of the new requirements.

Outlook for the Future

The future promises both additional changes to the regulatory framework and significant challenges associated with new construction. Success in both areas will require a commitment to safety, as well as efficient and timely actions on the part of industry and the NRC.

Let me briefly discuss the expected changes in the regulatory framework.

Consistent with the application of risk as the central tool for revision of our regulatory program, the NRC staff has begun its application to the NRC's fuel cycle inspection program. This initiative follows the lead set by the reactor oversight program. It reflects the consideration of risk as the basis for allocation of inspection resources.

Working with the industry, the staff has revised the fuel cycle oversight program by taking a qualitative approach to risk assessment. The safety risks at a particular facility are dependent upon the type and quantity of hazardous materials involved, while safeguards and security risks are focused mainly on material attractiveness. Inspection resources are budgeted in accordance with the relative safety and safeguards risk posed by individual facilities. Of course, the core inspection effort can be supplemented, as necessary, based on licensee performance and events.

Although the staff has updated the oversight program, it still needs to revise many individual inspection procedures. This was originally scheduled to occur last year, but the shift of resources and priorities due to events of September 11th have made that impossible. We expect that the revision process will be pursued over the next 2 years. This respite does have a beneficial aspect in that it will allow the NRC to incorporate insights gained from the ISAs that are due to be completed for each facility by October 2004.

We also see substantial new construction on the horizon. The industry and the NRC staff will be challenged as license applications for the MOX facility and for two gas centrifuge facilities are completed and submitted for NRC review.

The MOX facility is the farthest along in the process. The NRC staff is currently reviewing the revised construction authorization request for the MOX facility and is projecting that it will issue a revised draft safety evaluation report in April of this year. We anticipate receiving a license application for possession and use of SNM at the MOX facility in the last quarter of calendar year 2003.

In parallel with the licensing of a MOX facility in this country, we are involved in aspects of the bilateral agreement between the U.S. and Russia to dispose of Russian weapons-grade plutonium declared excess to national security needs. The NRC is providing support to the Gosatomnadzor (GAN) -- the Russian counterpart to the NRC -- regarding the licensing of a Russian MOX facility. Russia has recently decided to adopt the Duke Cogema and Stone and Webster design for the Russian MOX facility, and thus we expect these cooperative activities to grow. I should add parenthetically, that I view this cooperation as an enormous opportunity. By working shoulder-to-shoulder with our Russian colleagues on a parallel facility, we are hopeful that lessons will be learned that bear on the entirety of each country's regulatory program.

As I am sure you know, the staff also anticipates receiving license applications from both Louisiana Energy Services (LES) and U.S. Enrichment Corporation for gas centrifuge enrichment facilities in the next 3 months. Both applicants have ambitious schedules for the completion of the licensing process and the commencement of operations.

In sum, the NRC staff will be reviewing three major fuel cycle facility license applications and working with Russian regulators simultaneously. This is an unprecedented demand on our resources and will present a significant challenge.

Security

Before closing, I would like to briefly touch on the physical security of nuclear facilities and materials. As all of you know, the events of September 11th have added a special urgency and intensity to these aspects of our regulatory program. On that day in September, my colleagues and I looked out from the windows of the NRC headquarters building and, on the horizon to the South, saw the plume of smoke rising from the Pentagon. It is an image that none of us will ever forget. The attacks of September 11 brought home to us, to the American people, and to our elected leaders just how vulnerable a modern society is to the actions of malevolent enemies.

The NRC has taken a number of steps to strengthen NRC-licensed facilities. The Commission has issued over 30 safeguards and threat advisories to the major licensed facilities, placing them on the highest security level. Many of these strengthened security measures have now been elevated into requirements. As a result, security at nuclear facilities is far stronger than at other parts of our civilian infrastructure posing equivalent (or greater) risks.

Let me note one abiding challenge. In mandating higher levels of preparedness at nuclear facilities, we face the question of where the licensees' responsibility leaves off and the government's obligations begin. The Commission directed licensees to increase their capacity to deal with acts of terrorism, but at the same time, we recognize that some attacks might exceed the capability of a private guard force to repel. Government must fill the gap. This same issue arises for infrastructure of all kinds and addressing it will be an important challenge for the new Department of Homeland Security.

As most of you know, the NRC issued immediately effective Orders to our Category I fuel facility licensees -- BWX Technologies, Inc. (BWXT) and Nuclear Fuel Services, Inc. (NFS) -- on August 21, 2002. These Orders contained interim compensatory measures (ICMs) regarding safeguards and security measures. The NRC determined that these ICMs were necessary to provide reasonable assurance that the public health and safety and common defense and security are adequately protected in the current threat environment. We are satisfied with the adequacy of the defenses as we undertake revision of the Design Basis Threat.

The Commission has approved final ICMs for Category III fuel cycle facilities. There is a meeting with industry to discuss implementation of the ICMs at NRC Headquarters on January 30, 2003. The staff intends to issue the Orders following that meeting.

In sum, the security at nuclear facilities is strong as a result of our licensees' actions and our Orders and Advisories. The nuclear industry is far ahead of the rest of the economy in the level of security available today. But as broader societal changes on security matters are introduced, our regulatory framework will no doubt require modification as well. It will be difficult to ensure regulatory stability until broader societal issues – such as the allocation of responsibility between the public and private sectors – are resolved.

Conclusion

I hope this lightning-fast tour of the regulatory environment has been illuminating. Again, I would like to express my appreciation to the organizers of this conference for inviting me to participate.

Thank you.