



NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

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**Session Remarks
As Prepared
The Honorable Gregory B. Jaczko
Chairman
U.S. Nuclear Regulatory Commission
at the
International Forum on Nuclear Safety Challenges
in the Flat, Mixed, and Open World
Seoul, South Korea
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Just a decade ago, few people inside or outside the Nuclear Regulatory Commission would have foreseen a significant increase in applications to build and license new nuclear reactors in the United States. Even five years ago, the outlook for new applications remained uncertain. Shortly after I was appointed to the Commission in 2005, I recall a discussion with NRC staff in which we talked about the potential arrival of one or two new reactor applications. Today, the NRC is reviewing 13 applications for 22 new reactors.

This dramatic growth of interest in new nuclear reactors has significantly increased the agency's licensing and regulatory workload. And it has led to a lot of changes at the agency. The NRC's budget has increased by more than 50 percent, the staff size has grown by more than 30 percent, and the NRC has added two new offices in a short span of time. Those changes were necessary to ensure that the NRC continued to maintain its critical focus on the safety of existing reactors, while also making sure that any new reactors would be licensed and constructed in line with our safety, security, and environmental requirements.

The changes required to meet the many challenges of regulating mixed reactor generations tend to get the lion's share of attention from government leaders, stakeholders, and the public. But today, in my remarks, I would also like to talk about what has not changed, what has stayed fundamentally consistent.

Above all, the NRC's mission has remained clear and constant: "to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment." The NRC requires that old and new reactors meet the same safety, security, and environmental objectives. That is crucially important. An operator of an old or a new reactor must meet essentially the same NRC safety standards to ensure adequate protection of the public and

environment. The means by which new reactor applicants and existing reactor operators meet those standards may differ. New reactor applicants can focus on design-centric approaches, while existing reactor operators necessarily must focus on mitigative measures. But the safety and security objectives are the same for both existing and new reactors.

Take for example the issue of fire protection. The core safety objectives in the area of fire protection are the same: 1) to minimize the potential for fires and explosions; 2) to rapidly detect, control, and extinguish fires that do occur; and 3) to ensure that operators can shut down the reactor safely and minimize the risk of significant radioactive releases to the environment despite a fire. Those safety objectives are no different for new reactor designs than for currently operating reactors.

With decades of government, industry, and academic research, we now have a much better understanding of how fires can potentially start in plants, how they can spread, and their potential risks to safety systems. That knowledge was not available when most existing reactors were designed and constructed, and it has been a real challenge for operators to bring their plants in line with the NRC's safety standards. This is an issue some operators have struggled with for more than 35 years. In part because of the significant challenges that existing reactors have experienced in implementing those mitigative measures, the NRC now expects vendors to deal with these issues at the design stage where they can be more easily and effectively addressed.

Fire protection is a long-standing issue for existing reactors. I will also illustrate my point through a more recent example: the threat of aircraft impact on reactors. Following the September 11, 2001, terrorist attacks, the NRC issued several important orders that required operators to put new security measures in place in response to the evolving threat environment. Among those orders were mitigative actions for operators to take to reduce the potential consequences of a large fire or explosion. Those mitigative measures were sufficient to meet the NRC's high standards for protection of public safety. But in moving forward, the agency could expect new reactors to achieve the same safety objectives through design improvements, rather than through those mitigative strategies.

Moreover, I believe it is important that regulators focus on the aspects of our work that are not design-dependent, that are unlikely to vary regardless of the type or size of reactor at issue. I'll discuss two of those areas: the *centrality of human performance* and the importance of a *positive safety culture* to the safe and secure operation of plants.

Despite the significant safety gains that developments in reactor technology have achieved, every regulator must be mindful of the importance of human performance for nuclear safety and security. That was one of the important lessons that the NRC learned from the Three Mile Island incident. As regulators, we all have to contemplate the possibility that plant personnel may not follow procedures, may not understand the indications on their instruments, or may not perform their duties with a focus on safety. All of those factors can contribute to errors and compromise safety.

It is critical that regulators rely on the latest research, practices from other relevant industries, and stakeholder input in developing regulations to enhance human performance. The NRC just recently completed a significant revision of the agency's drug testing procedures, fatigue management programs, and other fitness-for-duty requirements for plant personnel. These programs need to be supported by well-trained inspectors who are also alert to human performance

issues. Inspectors are typically known for their scientific and engineering expertise and their essential role in identifying and resolving technical declines in plant performance. They are, however, the NRC's eyes and ears, and therefore are also responsible for helping to identify and resolve issues in human performance.

The NRC's initiatives on human performance programs will apply to both new reactors and existing plants. That is because – no matter the redundancies, the mitigation measures, or passive safety mechanisms that are designed into reactors – it will always be critical that plant employees remain unimpaired, alert, fit, and qualified to perform their important safety responsibilities. Despite the improvements that regulators have made in promoting higher human performance at plants, I believe that this is an area in which we all still have some work to do.

A related issue to human performance is safety culture. This is an area that the NRC has increasingly focused on, in recent years, for the simple reason that the agency has found that a deteriorating safety culture is often associated with safety problems. Sound rules and procedures are necessary, but not sufficient by themselves, to achieve our shared safety objectives. The NRC continually works to strengthen its rules, update its guidance, and enhance its inspection and enforcement programs to meet the agency's safety mission. But the regulator can't be everywhere, and it can't inspect everything. The operator always retains the primary day-to-day responsibility for ensuring that a plant operates safely and securely. That is why it is critical that operators develop and maintain a positive safety culture that ensures that safety and security are always the top priorities.

Operators must continually focus on cultivating an open, collaborative organizational culture where employees feel comfortable coming forward with questions and, when necessary, presenting dissenting views. There are no easy answers on how best to establish a strong safety culture. It requires that the top management of an organization set the right priorities, that they have a strong commitment to establish the right type of work climate, and that employees at all levels of the organization demonstrate a real dedication to those priorities. What is challenging for the leaders of any organization is to identify the concrete steps that are necessary to build that organization-wide commitment to safety. Some aspects of safety culture are perhaps unavoidably subjective, and that presents some challenges for a regulator in determining how best to evaluate this issue.

It's the NRC's responsibility to identify violations and take the appropriate corrective actions, but it always would be better if those violations had not occurred in the first place. That should be any regulator's goal. Safety culture is a challenging issue for regulators, but its tremendous potential to enhance safety and security should always keep it at the forefront of our regulatory agenda, no matter the developments or changes in reactor technology.

Regardless of how significantly one thinks new reactors will alter the regulatory landscape, I can assure you that the NRC is well-prepared to address those issues. The NRC has demonstrated its ability to adjust to changing circumstances in the past. For example, in response to the operator requests to extend the operation of plants beyond their initial 40-year license, the NRC established an effective and efficient license renewal process. This effort required the NRC to develop new approaches to examine age-related degradation issues, establish clear requirements to assure plant operation for up to another twenty years, and verify that important systems, structures, and components would continue to perform their intended safety functions.

Likewise, the agency has been prepared to address new challenges that have arisen in response to operator requests for power uprates. Depending on the original equipment design and desired increase in power level, this can involve major modifications to the plant. Operators must demonstrate that the proposed new configuration remains safe and that the necessary measures remain in place to protect public health and safety. As has been shown in recent years, the NRC has done excellent work in performing the necessary analyses, which can be highly complex and can span many technical disciplines.

Remaining vigilant about the safety and security of the existing reactors while also implementing the changes necessary to oversee the construction and operation of new reactors presents a host of challenges. Our agencies may grow in size to meet the new regulatory workload that the interest in new reactors generates. Our agencies may need to develop new technical expertise to make sure that new reactors are being licensed, constructed, and operated in line with our high standards. But much of our work, in areas such as safety culture and human performance, is critical for both the current plants and for future plants. Learning from the present, applying those lessons to the future, and always staying focused on our safety and security missions – those are our strategies for meeting the responsibilities of today and the challenges of tomorrow.

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