



NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

Office of Public Affairs Telephone: 301/415-8200

Washington, D.C. 20555-0001

E-mail: opa_resource@nrc.gov Site: www.nrc.gov

Blog: <http://public-blog.nrc-gateway.gov>

No. S-11-014

**Science and Nuclear Safety
Prepared Remarks for
The Honorable Gregory B. Jaczko
Chairman
U.S. Nuclear Regulatory Commission
at
American Association for the Advancement of Science (AAAS)
Washington, D.C.
May 6, 2011**

Thank you for the introduction. It's an honor to address the American Association for the Advancement of Science (AAAS). I am especially pleased to be here today because it was AAAS that gave me my start here in Washington through its Science and Technology Policy Fellowship. I've always felt very appreciative to AAAS for providing me that initial opportunity to work in government, and for helping to open doors in public policy that might have otherwise been difficult for a scientist to come across.

During my brief remarks today, I want to discuss an issue that is at the heart of AAAS's mission—the role of scientific knowledge in the development of sound and effective public policy. The mission of the U.S. Nuclear Regulatory Commission (NRC) is a regulatory one, focused on ensuring the safe and secure use of nuclear materials and technology. While the safety and security focus of our mission is clear, the question of how we go about meeting that mission has always been a more open question, subject to vigorous debate throughout the history of the agency.

I know that the tragic events in Japan are foremost on your minds right now. As one of the most serious nuclear accidents ever to occur, there is no question that this is a seminal event in the history of nuclear power. Before discussing the events in Japan and the NRC's ongoing response, I want to take a step back and provide some historical perspective on the development of nuclear regulation in the United States. By doing so, I hope to place the agency's ongoing safety review in response to the events in Japan in a broader context—as part of a decades-long effort to learn, adapt, and make our regulatory approaches more scientifically rigorous and effective.

In my discussion today, I'll focus on a few of the key events that have served as catalysts for dramatic changes in the way we approach nuclear safety and security. I should emphasize that my focus on these important events does not suggest that the NRC's regulatory environment remained static in the intervening years between them. Far from it. While the safety and security

focus of the agency has never wavered, the way we go about meeting that mission has necessarily responded to new research, information, and experience. But these events were paradigm-shifting, as they precipitated some of the most dramatic developments in our understanding of nuclear technology and its risks, as well as how we address those challenges.

Browns Ferry Fire

The first of these events was the Browns Ferry Fire in 1975, a mere two months after the NRC's creation as an independent regulatory agency. This serious incident fundamentally transformed how we viewed fire safety. Whereas it was before seen as primarily an insurance concern or an industrial hazard, it was properly understood after Browns Ferry as an important nuclear safety issue.

The circumstances that led to the Browns Ferry Fire suggest how little we understood the potential risks of fire to reactor safety at that time. The incident started when a plant employee, using a candle to search for air leaks, accidentally set a temporary cable penetration seal on fire. This practice was used in coal-fired power plants as a common method for checking for leaks around the main condenser seals, and it was carried over to the nuclear industry. The idea behind this practice was that, if the flame of the candle flickered, then that suggested the presence of an air leak. That seems reasonable as far as it goes. It begs the question, however, of how it ever became an accepted practice to routinely bring an open flame into rooms filled with electrical cables. It reflected to an extent an ethos that viewed fire safety as a matter for insurance underwriters rather than nuclear safety regulators. It will probably not surprise you to learn, as a result, that fires at nuclear power plants were not considered all that uncommon back then. It may surprise you to learn, however, that one of the preferred methods for plant personnel to extinguish fires that they ignited in the temporary cable penetration seals was by beating them out with their flashlights. This all seems astonishing from today's perspective, but that was the reality in the early days of commercial nuclear power.

Much progress has been made since then to enhance fire safety at nuclear power plants. In the aftermath of the Browns Ferry fire, the NRC instituted a number of changes to ensure that licensees more effectively prevented fires from breaking out in the first place and could mitigate their potential consequences if they did happen. At a more fundamental level, this event raised key questions about how we evaluate risk, not just related to fire protection, but across the spectrum of potential accidents at a nuclear power plant. How do we determine the potential likelihood of accidents in the first place? How do we assess the potential consequences of different types of accidents? And how do we account for the inevitable limitations and uncertainties in our information? By crystallizing the importance of these types of questions, the Browns Ferry Fire contributed to the development and incorporation of modern risk analysis into the NRC's nuclear safety program.

This long-term trend toward risk-informed regulation has been borne out across a number of important safety issues over the last 35 years, especially in the area of fire protection. At this time, nearly half of operating reactor licensees are moving forward with implementing a risk-informed approach that will allow them to deploy more effective approaches for fire safety that are tailored to the specific circumstances of their facilities. Because of developments like this one, it is no exaggeration to say that the NRC is a world leader among regulators in using modern risk tools.

Three Mile Island

The second of these seminal events was the Three Mile Island accident in 1979. As the most serious accident in the history of the U.S. nuclear industry, this event precipitated changes to nuclear safety in this country in scope and magnitude that are difficult to overstate. Specific changes included an overhaul of our approach to emergency management, the development of systematic approaches to evaluating operational experience, a continued shift toward risk-informed regulation, a significant expansion of the agency's resident inspector program, and a statutory reorganization of the NRC Commission structure.

I could discuss any of these important issues at some length today. They are all significant changes that helped strengthen the safety of the Nation's nuclear power plants and made the NRC a stronger, more effective regulator. But I'll instead focus on another issue that I did not mention, though one that is perhaps the most important insight we took away from Three Mile Island. That is the central role of people in ensuring plant safety. In fact, the Presidential Commission on Three Mile Island concluded that the "equipment was sufficiently good that, except for human failures, the major accident at Three Mile Island would have been a minor incident." The operators at Three Mile Island, however, did not have the necessary training or the clear operating procedures that might have enabled them to mitigate rather than exacerbate the situation. Although the plant equipment was functioning properly, they at times did not trust or understand the admittedly complex and confusing information that the plant equipment was providing them.

Before the Three Mile Island accident, if you asked nuclear power plant operators or regulators the first word that came to mind when they heard phrase "nuclear safety," they would have likely responded with the word "engineering" or "equipment." And with good reason, since prior to the accident, the overwhelming focus of the NRC and the nuclear industry was on the role of nuclear plant hardware in preventing accidents. The Three Mile Island accident changed that. The world of nuclear safety was no longer the same, and the new world was one in which people's attitudes and actions—in the form of operator errors, management deficiencies, and complacency—posed the greatest threats to plant safety.

In the words of the Presidential Commission, the NRC and the industry had "failed to recognize sufficiently [sic] that the human beings who manage and operate the plants constitute an important safety system." This simple yet important insight led to dramatic changes, including an increased focus on human performance and the consequent revamping of training and staffing requirements for operators. Even today, more than 30 years later, the central importance of people to plant safety continues to resonate throughout the NRC and the nuclear industry. That is evidenced by the NRC's continued focus on human performance, but also by our increased focus in recent years on the role of safety culture in ensuring the safe and secure operation of nuclear facilities. That grows out of the recognition that the best training isn't enough on its own to ensure safety if workers don't view safety as an overriding priority above other considerations.

September 11, 2001

The third major event that I will discuss briefly today is the September 11, 2001, terrorist attacks. Although not a nuclear event like the other two I have discussed today, the 9/11 Commission Report detailed the extent to which our adversaries had contemplated potential attacks against the Nation's nuclear facilities. In the aftermath of the September 11th attacks, the NRC took aggressive actions aimed at ensuring the immediate security of the Nation's

nuclear facilities and materials in light of our enhanced understanding of the threat environment. Those actions included requirements for operating reactors to implement mitigative measures to address the potential consequences of large fires and explosives. Changes were also made to the NRC organization itself, with the creation of a separate office within the agency focused on security and incident response.

The long-term effect of September 11th, however, extends far beyond the specific steps we took in the immediate aftermath of the attacks to strengthen nuclear security. By keeping us focused on the ever-evolving and highly dynamic nature of the threat environment, it has left an enduring imprint on our approach to nuclear security. In the years since September 11th, we have expanded our security work in areas beyond our traditional nonproliferation focus. Of course, our nonproliferation activities remain related to safeguarding nuclear materials, and dual-use technologies remain a critical part of our mission. It's safe to say, however, that over the past decade the NRC has expanded its efforts in other areas, most notably source security and cyber security, which were not as prevalent a decade ago. While these issues are high priorities today, we never forget the central lesson of September 11th—that new issues with different and complex challenges can always emerge.

Japan

I hope that this discussion has demonstrated how our nuclear safety and security mission requires us to evolve in response to new information and experience. Among the most important in the history of nuclear power, these events served to transform in fairly fundamental ways how we understand the nature of nuclear safety and security, and what we need to do in order to protect the public. The recent events in Japan have potentially raised new concerns and the possibility that our understanding of nuclear safety may further evolve, based on what we learn from those events. While we don't have the information yet to definitively say what those lessons may be, we have the responsibility to the American people to conduct a comprehensive safety review to determine whether there are lessons and what they are. I can assure you that this safety review will be systematic and methodical and will be conducted with the appropriate sense of urgency. I expect there will be lessons learned and changes made as a result.

To conduct this review, the Commission has established a senior-level task force to help us determine whether there are areas for the agency to make improvements to our regulatory system based on lessons learned from the events in Japan. The task force review will be conducted in a short-term and a longer term timeframe. The short-term, 90-day review has already begun and will identify potential or preliminary near-term operational or regulatory issues. A longer term review will begin as soon as we have sufficient information from Japan and will be completed in six months from the beginning of the evaluation. During this longer term review, we expect to be able to engage key stakeholders in a way that the time constraints of the short-term review do not allow. Both the 90-day and final reports will be made publicly available.

I understand the urgency that many feel to move quickly on this safety review. It is important, however, that we take the time to fully understand the situation in Japan, identify the full range of questions that we need to answer, and develop the appropriate responses. As the task force completes its initial review and the Commission begins to decide how to best move forward, I believe it is vital that stakeholders remain actively engaged throughout this process. With the benefit of the NRC staff's expert review and the dialogue with our stakeholders that will follow, I am confident we will take the actions necessary to ensure the continuing safety of the American people.

Conclusion

As we move forward with this review and other initiatives, I believe it's important that we always keep an open mind. We should never grow complacent, and we should always remain open to new information and experience that may challenge our existing assumptions and views. It's precisely that open and questioning attitude that enabled us to learn from Browns Ferry, Three Mile Island, and September 11th, and it's what will allow us to learn whatever lessons there may be from the events in Japan. Thank you.