



# NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

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**“Regulating a Renaissance:  
Adapting to Change in a Globalized, Environmentally-Conscious,  
Security-Focused and Economically-Uncertain Century”**

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Ask many people for their choice for the single most successful technology organization in the post-World War II era and I would be very surprised if most did not answer “NASA” – the National Aeronautics and Space Administration. When President Eisenhower signed the National Aeronautics and Space Act in July 1958, the U.S. space effort was little more than an afterthought. However, by 1970, NASA had developed and deployed the technologies for the Mercury, Gemini, and ultimately Apollo programs.

By the time the Apollo program ended in 1972, 12 NASA astronauts had visited the lunar surface. The end of Apollo immediately raised significant questions about America’s next ventures in space, but Skylab, the Shuttle, and the International Space Station followed. Along the way, NASA’s unmanned science missions expanded human knowledge. Despite these successes, the political consensus that propelled the incredible progress of NASA’s earlier years fragmented, making the last twenty years a trying time for the agency. Today, despite the lack of a U.S. vehicle to carry astronauts into space, the orbiter *Atlantis* will fly the last Shuttle mission in June of this year. There are many unanswered questions about what will come next.

While NASA earned public attention and captured the imagination of a generation, another organization experienced a similar trajectory of success. When President Eisenhower ushered in the “Atoms for Peace” era, the organization that was charged to implement his vision was the Atomic Energy Commission(AEC). In the twenty years to 1970, the AEC developed and deployed a series of successful liquid metal reactors, gas reactors, gaseous diffusion uranium enrichment plants, and PUREX reprocessing facilities just to name a few of its accomplishments. And in its spare time, the AEC developed and commercialized light-water reactor technology.

Then came the 1970s. Important work continued, but the political winds shifted. Whereas NASA had to deal with life after Apollo, the AEC had to adjust to changing public attitudes toward both nuclear energy and the power of the AEC itself. The AEC became increasing

embattled as it engaged in losing battles over radiation standards, thermal pollution, and its application of the National Environmental Policy Act. A child of the Cold War, the AEC's diverse missions inculcated a culture of secrecy that was ill-suited to the challenge of overseeing commercial nuclear activities in America of the early 1970s. Eventually, after considerable debate, Congress passed the Energy Reorganization Act in 1974, separating the regulatory and promotional functions of the AEC.

The promotional side of nuclear technology was managed first by the Energy Research and Development Administration and later by the Department of Energy (DOE). These organizations left the commission structure behind and were led by the more standard politically appointed leadership structure. They inherited the AEC's massive infrastructure and for many years pursued the technology agenda laid out in the 1960s—principally, the development of advanced liquid metal reactors and recycling technologies. Much of this effort culminated under the Integral Fast Reactor program. While a lot of good work in many areas followed between 1990 and 2010, the salient technology decision of this period was the termination of large-scale U.S. efforts to develop fast reactor technology. Many questions about the future remain—but today, I'm very happy to see my friend Dr. Peter Lyons now at the helm to chart a new course.

There are lessons to be drawn from this history that deserve reflection as we embark on a new era. First, I observe that the progress made by AEC and NASA proved to be highly reliant on a strong and consistent political consensus. Unfortunately, such consensuses are much harder to build and maintain today than was possible at the height of the Cold War. Strong support in Congress and the public made it possible for these agencies to spend billions each year, apply the country's most talented scientists and engineers, and obtain whatever natural resources were needed to accomplish their missions.

Once this support waned, missions changed and evolved to adjust, groping for a formula to move forward if only a step at a time. In such circumstances, the strategies adopted and the decisions made by managers can be influenced by what is seen as politically acceptable. Ironically, this can feed a perception among policymakers and stakeholders that the projects promoted by agencies are not rooted in the best science and are, therefore, of limited value.

The Nuclear Regulatory Commission has in large measure successfully avoided this vicious cycle. Even when policymakers and stakeholders disagree with judgments made by the NRC, they rarely question the motivation or technical quality of those judgments. NRC emerged from the fission of the AEC as a focused, single-mission agency that reflected the transparency of decision-making the public demanded. Of all its attributes, none has been more important to its success than its independence.

NRC's decisions, methods, plans, and approaches are not policies to be negotiated in political arenas. While the courts and Congress—through its legislative powers—can have the final say in any matter, we at the NRC are free to conduct our work while basing our actions on the scientific and technical facts as we find them, the laws and precedents as we interpret them, and our overarching mission to protect the health and safety of the public we serve.

As an example, I reflect on the 1990s as a time when many experts in this country dismissed the idea that nuclear energy had a viable future in the U.S. The debate of the day focused on the likelihood of nuclear plants becoming “stranded assets”—too expensive to operate and likely to become a crushing financial burden on the companies that owned them. Far from any discussion of new construction, few believed that U.S. nuclear plants would be relicensed—including the government’s own Energy Information Administration. During this period, DOE’s nuclear technology research funding evaporated, eventually reaching zero funding in 1998.

During this very challenging period, rather than retrenching, the NRC proceeded to improve its regulatory approaches. The agency implemented more effective regulation of nuclear power plants, established the requirements for the relicensing no one thought would happen, and established a modern process for licensing new plants. The NRC, in point of fact, launched a host of ground-breaking decisions that would have been inconceivable had it not been for the agency’s independence—from both nuclear skeptics and nuclear proponents.

That is not to say that the NRC has not been buffeted by events. The accident at Three Mile Island had an immediate and massive impact on the nascent NRC. The American people demanded a strong nuclear regulator after TMI and the government responded accordingly. The agency’s staff grew by about 50% in the five years after TMI. Later came the revelations concerning Millstone Unit 1 and their aftermath. The very public revelation of bad management practices at that plant and NRC’s response was a major embarrassment for the agency.

The General Accounting Office assessed NRC’s performance at the time and made this searing comment:

*NRC does not have an effective way to quantify the safety of plants that deviate from their approved designs or violate regulations. Determining a plant's safety condition is, therefore, a subjective judgment.*

I don’t know if there is a harsher comment that could be made about a nuclear regulator. Obviously, this led to significant soul-searching NRC within the agency. It also fed a frustration held by powerful members of Congress such as Pete Domenici of New Mexico, that NRC was simply not an effective, predictable, or consistent regulator. Senator Domenici threatened to slash the NRC budget by a third unless he saw improvements. Even today, members of the staff recall those times as a “near-death experience.”

But sometimes near-death experiences are a good thing. The agency that emerged from these difficulties was a better, smarter organization than the one that spawned from the AEC’s Division of Licensing and Regulation. I congratulate and thank Chairman Jackson, Chairman Meserve, Chairman Diaz, and Chairman Klein and the Commissioners who served with them for their vital leadership in managing this change and bringing this agency to its current state of excellence. As I approach the end of my first year as an NRC Commissioner, I am pleased to say that I am very impressed with the agency, its fantastic staff, and the way it does business. I am also proud to serve alongside my colleagues on the Commission as we grapple with the myriad

complex issues facing the agency. The American public is indeed fortunate to have such exceptional people serving their interests. The NRC is 4000 people wholly vested in and passionate about the mission of protecting the health, safety, and security of the American people and I see this every day.

I'm also pleased to say that the Commission structure serves us well. While no strategy is without its flaws and vulnerabilities, the Commission structure both reflects the broad policy direction of elected government and preserves the vital independence and credibility of the technical work of the NRC. Our structure also fosters the development of a highly professional technical staff and very stable long-term planning, both of which are much more difficult to achieve in the standard agency governance model. It occurs to me that other Federal agencies might benefit from such a structure.

That said, we are entering a new era in the United States—an era that holds much promise but also considerable uncertainty. I suspect that the differences between 2011 and 2051 will be far greater than the differences between 2011 and 1971. Changes in the global landscape, technology, as well as many social, economic, and security issues will present a host of challenges to the NRC as it considers a future that may include not only the operation of Generation III+ reactors, but the continued operation of existing reactors longer than we imagined. We may see the first nuclear plants built in the U.S. based on overseas designs. We may see the advent of small modular reactors. We may see new technologies for the production of medical isotopes and the very long-term storage of spent fuel. Beyond all this may be further advances in nuclear technology that we cannot yet predict. Whatever the future holds, we must be prepared. And we must adapt to the changes ahead without waiting for the next Millstone nuclear plant event or the next near-death experience.

As I have considered these future challenges, I have asked myself how the NRC might need to evolve to meet the challenges ahead. While I believe we are an excellent regulator, I believe the lessons of the past provide clues. For today's discussion, I highlight three general areas of potential change for consideration: structural, regulatory, and communications.

First, the structural. As I've discussed, NRC's independent status is elemental to its success. It is likely that in the flux and change ahead, this independence will come under increasing pressure. While it is left to responsible individuals in government to protect that independence, there are additional measures we can consider.

It has been decades since the last significant revision of the Energy Reorganization Act. While it has served us exceptionally well, it is my opinion that the time may have arrived when a review of this legislation could be considered.

Of particular interest to me is the NRC's relationship vis-à-vis other elements of the government. While we continue to assert our independence with regard to White House Council on Environmental Quality (CEQ) requirements, for example, the debate within the government never ceases. And what might Congress' judgment be concerning the role of the Office of Management and Budget in our budget formulation? This question seems particularly relevant when you consider the programs in our budget funded by fees on licensees.

Another item that might benefit from additional clarity is the operation of the Commission itself. While I believe that Congress' expectations associated with the Commission's roles and responsibilities are well documented in the legislative history, multiple interpretations have been advanced. I also think it would enhance the organization if the law provided additional guidance regarding the responsibilities of the Executive Director for Operations, the Chief Financial Officer, and the General Counsel independent of the Commission. Bill Borchardt and the senior staff currently in place at the agency are doing a fantastic job under often difficult circumstances. I believe it essential to ensure that they and their successors have the all the tools and authorities they need on a consistent basis to be successful and effective managers of the NRC. Finally, I also think it may be appropriate to consider a new model for the Office of General Counsel to further enhance the independence of that organization in assuring the legal quality of the agency's work and in providing advice to the Commission and the staff.

Next we should consider ways to further the development of performance-based, risk-informed regulation. There has been considerable discussion at this conference regarding the IAEA-sponsored Integrated Regulatory Review Service (IRRS) Mission report on the U.S. nuclear safety regulatory framework. I personally appreciate the tremendous effort put forth by the IRRS team and the very comprehensive report they've provided. While I did not agree with all the team's conclusions, I found the entire report very well prepared and thought-provoking.

One IRRS observation in particular caught my attention. The team noted that in the absence of a "direct legal statement about the prime responsibility for safety," the NRC must take action to assure that licensees assume "safety responsibility."

When I first heard this comment, I resisted the suggestion that there is any question that the NRC, and not our licensees, is responsible for nuclear safety in this country. I have long believed that the model we should have is one where licensees are responsible for safety and NRC confirms safety. However, the more I've thought about this over the last several months, the more I wonder whether we have created a culture in which NRC has, in effect, taken more and more of the responsibility and left licensees, increasingly, in the position of responding to us. When presented with an innovative approach to improve operations, is a plant manager's first question "How does this improve safety?" or is it "What will NRC say?"

To the degree that the latter response appears first, I have to wonder whether this is a sustainable regulatory approach. How can we be a "performance-based" regulator if we are, directly or indirectly, making the decisions? While we talk the talk of risk-informed regulation, do we not still take many actions that are deterministic and at least arguably subjective? How many inspections lead to nontrivial changes at plants in pursuit of relatively minor improvements to safety and security? How many plants make changes simply to avoid an elongated discussion with NRC? What are the safety consequences of the actions not taken while plants pursue such activities? One hears the echo of Government Accountability Office's (GAO) 1998 assessment in these questions.

Nevertheless, let me stress that these are questions and not conclusions. Questions that I hope will challenge us to consider how we must adapt to the future.

I hasten to add that there is a law of conservation of responsibility. If NRC is to become more performance-based, licensees must become more proactive. We have heard a lot about the cumulative impact of regulations on licensees in recent months, but less about the cumulative risk of plant conditions. You can't responsibly consider one without the other. Further, while I appreciate the nuclear utility industry's voluntary efforts, I note that some plants go much further than others. In the voluntary effort to address concerns about buried pipes and groundwater issues, for example, there are a wide range of industry responses. While I recognize that not all licensees will find the need to follow the Oyster Creek example regarding underground pipes, I hope all licensees at least take note.

There are many questions. At bottom, I wonder whether a more extensive use of probabilistic risk assessment might be the path for the future. In that, I fully support the Chairman's recent remarks concerning the need to develop the infrastructure to support Level III PRAs. Perhaps advancements in this area will allow us to objectively determine plant safety and security on a continuous basis, allowing licensees greater flexibility and choice as they meet NRC-determined standards for the overall safety of individual plants. That may sound favorable from an industry perspective, but the corollary may be a much harsher regulatory response to plants that don't meet expectations.

Finally, it is quite clear that problematic communications with the public was one of the factors that consigned the mighty Atomic Energy Commission to the pages of history. At NRC, we strive to be a better servant to the public by making as much information available as in practical. The culture of NRC is a culture of openness. Unfortunately—like many organizations in and out of government—we continue to struggle when it comes to communicating technical and scientific information to the public. I held a public meeting in Braidwood, Illinois last year and found that the very well-informed, sophisticated participants from the public did not have a clear understanding of what the Environmental Protection Agency (EPA) drinking water standard means, where it come from, and how it is used. We spent several minutes reviewing this background and several people thanked us, noting that in the years of public meetings with NRC and other officials, that was the first time anyone had explained it in a comprehensible fashion.

We have to do a better job. We cannot be successful in our mission to protect the public if the public doesn't know what we're talking about—especially if we leave the impression that we don't care that they don't know. When new health and safety issues arise, as they inevitably will, it is often too late to close the gap; at least not with very much credibility.

We cannot surrender this ground. We should perhaps find a way to bring public stakeholders, including representatives of interested Non-government Organizations (NGO) into the conversation of how we can communicate more effectively. I've often thought that government organizations should have advisory committees to review and comment on their public communications. But I think this problem also goes to the need to educate the public on complex concepts such as risk and radiation effects. While it seems that many of us in government and industry have talked about this for decades, we continue to miss the mark. The issues facing us in the future will become more complex, not less. Having a meaningful public

debate on issues related to nuclear safety means assuring that interested members of the public have a full, accurate, and credible information and background on the issues. Whether addressing this issue is a role for NRC, DOE, industry, NGOs, or all the above, it is a challenge that affects all that we do.

I hope we prove able to evolve to the complex future ahead. The NRC is an excellent organization that has successfully adapted to many changes over the years, but the global changes facing us now are far more difficult to predict and far more complex to manage than anything that has come before. It is vital that we stay ahead of the curve.

Thank you for your attention.

Note: Click [here](#) to view the slides accompanying Commissioner Magwood's speech.