



# NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

Office of Public Affairs

Telephone: 301/415-8200

Washington, D.C. 20555-0001

E-mail: [opa@nrc.gov](mailto:opa@nrc.gov)

Web Site: <http://www.nrc.gov/OPA>

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**“Are We There Yet?”**

**The Honorable Jeffrey S. Merrifield  
Commissioner  
U.S. Nuclear Regulatory Commission**

**at the**

**2005 Regulatory Information Conference  
Rockville, MD**

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## **Introduction**

In the six and one half years that I have been a member of the Nuclear Regulatory Commission (NRC), it has frequently been proclaimed that new nuclear reactor orders are just a few years away. And every time I hear such a proclamation, it seems that everyone, including the industry, public interest groups, and we at the NRC, are caught up with the expectation that this time the proclamation will come true. I would equate this level of anticipation to the emotions expressed by children traveling in the family car. As the father of three under the age of 11, I, like all parents, have been assaulted with the refrain of, “Are we there yet?” And it is with this question in mind that I would begin my 7<sup>th</sup> presentation before the Regulatory Information Conference.

I have noticed, after years of chauffeuring my children around in the backseat of our car, that the question “Are we there yet?” is asked for a variety of reasons. Sometimes it is the result of anticipation, such as the desire to see their grandparents. Sometimes it is posed due to anxiety, such as fearing our arrival at the family dentist. Other times I think they ask simply out of boredom, since it seems that children fervently believe that time travels more slowly in the rear of the car. Regardless of the motivation for this question, the end result remains the same—we inevitably reach our destination irrespective of the desire or lack of desire on the part of our children sitting in the backseat.

The circumstances faced by those who expect, desire or dread the possibility of new nuclear plant orders are not quite the same. It is not inevitable that a new plant order will come to fruition, and many individuals will have a direct and indirect impact on whether new plants will be ordered, licensed and built. As a regulator, the NRC's role is to remain neutral. We should be neither a cheerleader nor a stone thrower in the desire to build new units. Yet, the issue of neutrality is not to be equated with passivity when it comes to nuclear technologies. Like the people of Switzerland and Sweden who chose non-aligned roles for their nations, yet pursued robust defensive capabilities to defend that choice, our agency must be prepared for whatever comes our way, whether new plants are ordered or not.

Indeed, for us to remain passive about new plant orders would not only be a disservice to the American people, but it would be completely contrary to the legal mandate set before our Commission. Dating from the period just after the Second World War, through the early years of President Eisenhower's first term, there were extensive debates about how our country might harness the use of the atom. Congress made an explicit and deliberate decision that our country would use the atom for a variety of peaceful purposes including medical, industrial, research and power production needs. Beginning in the 1960's and continuing through the 1980's, as a result of the accidents at the SL-1 reactor at the National Reactor Testing station near Arco, Idaho, Three-Mile Island Unit 2 near Harrisburg, Pennsylvania, and the Chernobyl accident in the Ukraine, there was a continuing debate about whether our nation should continue in the direction it had chosen. Although the rhetoric frequently became heated, the result remained the same—our nation continued its longstanding, pro-nuclear policy when it came to harnessing the atom for its myriad of peaceful purposes.

One significant development, however, did emerge from these debates. Congress recognized that an independent regulator, one that could assure the protection of public health, safety, and the environment, was the key to the success of this pro-nuclear policy. It was the intention of Congress that the Commission would balance the desire of those who wished to exploit the atom against the need to protect the nation from any harmful effects of its use. Consequently, wielding neither a rubber stamp, nor a sledge hammer, the NRC is required to license this technology if it is demonstrated that it is safe.

So, where are we today? Well, the simple answer is that we are closer than we have been for a long, long time. That having been said, only time will tell whether new plant orders are more like a mirage in the desert that is always just out of reach, or an object in your side-view mirror that is much closer than it appears to be. Whatever happens, or doesn't happen, I think we should continue to reflect on lessons of the past in order to prevent pitfalls in the future. I would like to discuss several of these that I believe are particularly noteworthy at the critical juncture we now face.

### **Be Wary of Too Much Innovation**

The first lesson that we should pay heed to is the pitfall of too much innovation. I have had the opportunity to attend a number of conferences where papers have been presented about revolutionary technologies that would dramatically change the way nuclear power is produced today. Whether it is liquid metal, sodium, or high temperature, gas-cooled reactors, the proponents of these technologies, along with many of their supporters in research and academia, sometimes fail to remember the principle purpose of nuclear power plants—providing a predictable, reliable and safe way of turning on the lights.

I equate this behavior to automobile aficionados who drool over the concept cars introduced at local auto shows—entranced by the possibilities presented by the creative use of design, engineering, materials, and science. These vehicles frequently incorporate new, conceptual, or untested technologies, that may or may not represent the future. Yet, despite the allure of these new designs, those who actually purchase vehicles, the American consumers, have made the Ford F-150 pickup and the Toyota Camry the #1 selling vehicles in their respective classes. It seems common sense to me, that like the American public, industry executives and their Wall Street partners who will be in the driver's seat when it comes to future plant orders, will want a product that reliably fulfills its purpose in a predictable way. I doubt that they want the nuclear equivalent of a concept vehicle.

Now, before anyone accuses me of rejecting innovation, I will profess that I am an avid lover of technology. Just ask the IT folks at the NRC. I believe that innovations in technology are critically important in advancing the safety of our reactors, but I believe it is advisable that these changes should be made in an evolutionary, not a revolutionary way. While the use of innovative designs may pave the way for the future, public acceptance of these designs will take research and development, time, and a willingness to engage in a meaningful dialogue on their potential features and risks. Unlike the widespread adoption of innovative electronic devices like personal digital assistants or MP-3 players, the American public is much more wary of experimental designs when it comes to nuclear facilities.

### **Be Wary of Over-promising and Overreaching**

The second pitfall that must be avoided is the tendency to over-promise or overreach in describing the capabilities and risks associated with nuclear technologies. We have all heard the quote from Lewis L. Strauss, chairman of the U.S. Atomic Energy Commission (AEC) in 1954, that in the future, electricity from nuclear power will be “too cheap to meter.” This statement has been all too frequently thrown back at the industry by those critical of the high costs associated with building and operating the nuclear fleet in the 1980's and 1990's. While I am sure Chairman Strauss believed this at the time and intended for it to reassure the American public about the usefulness of nuclear power, the fact remains that it is this overzealous one-liner that people are still reminded of today.

From the standpoint of a safety regulator, the promise that nuclear power plants would not be subject to a major accident has also sadly been proven wrong on more than one occasion. C. G. Suits, the director of research for General Electric, in Congressional testimony dating to 1955, stated that the chances of a severe accident were “extremely improbable.” Given such statements, it is not surprising that Three Mile Island came as such a shock to the American public. When it comes to nuclear safety, we should only promise that which can realistically be delivered.

Similarly, today there are promises that some of the technologies under consideration are not subject to fuel melting, and thus, do not require 10 mile emergency evacuation zones as is required of currently operating reactors. While in concept this may be appealing to some proponents, I think it is unrealistic to expect that reductions in the current emergency planning requirements would be met with widespread acceptance by the majority of the American public, as well as Congress. While other technologies which envision using innovative designs to produce both energy as well as hydrogen may show some promise, one cannot dismiss the safety considerations associated with large amounts of volatile hydrogen being produced in the vicinity of a nuclear power plant. Finally, many of these new designs promise improvements in fuel efficiency and fuel disposal. Notwithstanding the uncertainties associated with the permanent disposition of our current fuel types, new technologies, with new and

more complex fuels may further complicate an already difficult policy challenge. Before we can even begin to think how we would regulate these new reactors, we need to understand and quantify the myriad of policy decisions that we may yet face.

### **Be Wary of the Burden You Place On Regulators**

The third lesson I would encourage you to consider is placing too much of a burden on the regulator. With three early site permits under review, a variety of consortiums and individual companies intending to submit combined license applications, and a multitude of vendors seeking certification of their plant designs, we have a significant amount of work on our regulatory plate. For those reactor designs of a traditional pressurized or boiling water type, the workload will be considerable, but it will also be predictable due to the vast experience we have obtained in the 30+ years we have been licensing and regulating these designs. This cannot be said for advanced gas cooled reactors, pebble bed reactors, so-called nuclear batteries, or even pressurized heavy water reactors. All of these technologies will take significant time and resources for our staff to be able to license and regulate, despite some of the promises being made by their proponents. Further, unlike PWR and BWR technologies, we do not have readily available facilities to independently verify the claims made by the vendors.

I recently gave a speech in which I defended the NRC as being a more predictable regulator than in times past. And I firmly believe this is true. Predictability is a two way street, however, and our predictability can be seriously challenged when we are dealing with unpredictable licensees. I would urge the industry to do as much advanced planning as possible and to provide us with concrete information upon which to make regulatory decisions. As a fiscal conservative, I need more than a flashy Power Point presentation before I can commit FTE to a proposed project. Despite our best intentions, we have been set back in the past when we committed significant resources to pre-review activities for the Pebble Bed Modular Reactor and the ACR-700 designs, only to have these projects subsequently withdrawn or delayed. With this in mind, it is my opinion that when planning how to utilize our limited agency resources, the NRC should focus its time and effort on those projects that have the greatest likelihood of resulting in real reactor orders.

As a regulator, I would be more comfortable expending resources on reactor design reviews if the Department of Energy and the industry could clarify which designs they will seek to certify. If there are vendors and utilities who wish for us to review non-traditional designs, we have an obligation to do so. We also have an obligation to the public to do a thorough analysis and review of any such designs. For this reason, potential applicants with non-light water designs should not expect that we will be able to conduct our reviews with the speed and efficiency in which we recently reviewed the AP-1000. The cost and time associated with reviewing non-light water designs could be significantly more extensive. In addition, at a time when we are faced with a potential bow-wave of new reactor orders, instituting a major effort to figure out how to regulate non-light water technologies may be pushing the bounds of what this Agency can reasonably handle. If the industry wants to jump start new reactor orders, it needs to understand how all of these pieces fit together.

### **Be Mindful of What Has Already Been Accomplished**

The fourth consideration I will leave you with is that despite these warnings, I believe that we must also be mindful of what has been accomplished in the way of design and safety enhancements. Today,

there are a number of advanced light water designs that have been proposed and built; some that we have licensed, and some that we have not. All of them have features that bring with them significant advancements in safety when compared with the designs that have their origins in the 1960's. As a safety regulator, it would be inappropriate for me to promote these reactors or their sale, yet, it would also be irresponsible not to recognize the basic fact that these designs incorporate considerable improvements in technology and safety. We know this having reviewed a number of these designs over the last ten years. As regulators, we want to see innovative changes to tried and true designs and technology.

Like a car owner looking for a reliable, predictable and safe vehicle, those who might wish to order a nuclear power plant need to weigh the positives and negatives associated with each design. Despite what the salesman says, the most cutting edge technologies don't always represent the right choice.

Are We There Yet?

Returning to my earlier comments on "Are we there yet?," I would like to end my time today by discussing a few items that remain on the NRC's "to do" list.

### **Fitness-For-Duty**

I cannot think of an area of regulation that is more suited to the question, "Are we there yet?" than fitness-for-duty. As you are all aware, the agency's attempts to complete a rulemaking in this area began way back in the 1990s, and we still have yet to successfully publish a final rule. Clearly, the terrorist attacks of 9/11 have caused the agency to rethink our fitness-for-duty criteria to ensure that licensee employees are reliable and fit to perform the crucial work at nuclear power plants. I know the NRC staff is working tirelessly to incorporate these concerns into a package for Commission approval, and I am hopeful that they will be able to conclude this task quickly. Nevertheless, we are still quite a ways from promulgating a final rule, issuing guidance to assist the industry with implementation of the new rule, and finally achieving some stability in this area.

They say hindsight is 20/20, and looking back, I seriously question whether the path we chose to resolve fitness-for-duty concerns was the right one. When we withdrew the OMB clearance request for the final rule package in 2001, we may have been better served to turn this effort back to the industry for a new proposal. As an agency, we are committed to risk-informing our regulations, but the proposed language is considerably more prescriptive than the current regulation. This is in part in response to comments from the industry that it needed that level of prescription in this controversial area in order to protect itself from employee lawsuits. For the NRC, this is a difficult line to walk and still achieve our goals as a regulator. At the end of the day, the staff will produce a final rule, but whether it is the right rule remains an open question.

### **ITAAC**

The next issue I would briefly touch upon which will affect combined license applicants is the issue of ITAAC - or for the uninitiated - inspections, tests, analyses, and acceptance criteria. ITAAC is what the NRC will use to ensure that future plants built using our Part 52 licensing procedures are actually built to the specifications approved in their licenses. This has been no small issue. While originally intended to serve a checklist-like function, our staff has, understandably, tried to incorporate previous

inspection lessons learned into this effort. One area of contention with industry is what programs will be covered by ITAAC. The Commission directed the staff that ITAAC are to be used only to address those aspects of program implementation that are needed to make an appropriate licensing decision. The staff originally believed programs such as emergency planning, fire protection, fitness-for-duty, and quality assurance should be covered by ITAAC, but they have recently been engaged in discussions with stakeholders to create a more narrowly focused approach. Overall, the goal for ITAAC is to provide a clear roadmap for both licensees and the staff to ensure that NRC requirements and license conditions have been met. While we have made progress in this area, there is more to be done, and the Commission must remain focused on this task.

## **Security**

Security is an area in which we must remain ever-vigilant. But it is also an area in which we desperately need stability and normalcy. Our agency has expended considerable time and resources in meeting security challenges head-on. The industry has also expended considerable resources in satisfying new security requirements ordered by the NRC in the aftermath of 9/11. I recently spoke at the Platts conference on nuclear energy, where I expressed my view that 2005 should be the year where we change our focus from requiring new security enhancements for licensees, to stabilizing our current security requirements for the new world we face. For me, the enhanced, robust security programs of our licensees have achieved just about everything we can reasonably demand of a civilian security force.

## **Conclusion**

In conclusion, to answer the question I posed at the beginning of this presentation, we are very close, but we are not quite there yet. But I do believe we are far closer to reaching that point than we have been in the past. While many wait for the arrival of the “second great bandwagon effect,” there may still be several bumps in the road on the way to new reactor orders and a variety of detours that the industry and the NRC should be wary of. As I was preparing my remarks for today, I was reminded of a book I was reading recently. It was written by Professor Henry Petroski of Duke University and is titled “The Evolution of Useful Things.” In it he discusses an inventor’s approach to life and states that while inventors pursue innovation, they are also supreme pragmatists and “realize that they must recognize limits to improvement and the trade-offs that must accompany it.” As we move into a new era for the nuclear industry, I would urge you to be supreme pragmatists when deciding how to pursue innovation and to be mindful of its limitations. I can promise you that we, as a regulator, will also employ this philosophy as we continue our “long road trip” into the future of nuclear power.