NRC NEWS

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"Practical not Perfect"

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

at the

Nuclear Safety Research Conference
Washington, D.C.

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Good Morning. It is a pleasure to be here at the Nuclear Safety Research Conference and to have the opportunity to share my views with you today on several of the topics on the agenda. I want to acknowledge the important work of the NRC staff as well as our international colleagues who have traveled great distances to be here.

As a regulator, it seems quite obvious to me that research is an area that cannot be ignored. Without sophisticated and state-of-the-art solutions to our regulatory challenges we could not successfully accomplish our safety mission. To me, there is no doubt that timely, credible, and well documented research is critical to ensuring that our regulatory activities are based on sound science and are focused on the most risk-significant issues. Having said this, it is equally important that our research program remain focused on those areas that are vital to our regulatory mission. Our limited research budget must be targeted toward those areas that will ensure that we are ahead of the technological curve of future reactor and material licensing matters, but it must also provide answers to today's safety, security and environmental concerns. I take every opportunity that I can to remind Ashok Thadani and our research staff to ensure that they are striking the right balance. Our ability to succeed as a regulator depends on the discipline to focus on what is most important. Too much anticipatory research aimed at issues that may never materialize is fiscally unacceptable, and brings with it the risk of diverting research dollars and attention from matters that need to be resolved today.

This morning, I will focus on four significant technical areas where research has played an important role in the past and, in some cases, may have an equally important future role as well. The areas I will briefly address are decommissioning, advanced reactors, fuel performance, and materials degradation.

Decommissioning

We are currently in the most active period of decommissioning ever experienced by the NRC. Considering the fact that the Atoms for Peace program is celebrating its 50th Anniversary this year, this level of activity should not be a surprise. Just a sampling of the sites currently in the decommissioning process includes: 19 power reactors, 15 research reactors, 18 uranium mills, 27 complex sites under the NRC Site Decommissioning Management Plan (SDMP)[1], 12 former Atomic Energy Commission licensed sites requiring further decommissioning and dozens of smaller facilities undergoing decommissioning on a routine basis.

Given the broad scope of this program, we need to focus on the lessons learned from this decommissioning process and determine what major policy and technical areas need to be addressed to make the site remediation more efficient and practical. In particular, we need to find methods to efficiently decontaminate facilities and return the property into a productive reuse for society. Research has an appropriate role in this effort, but the research will need to be focused to address specific policy and technical issues and trade-offs will need to be made to accommodate budgetary realities.

Based on our experience to date, we have identified several areas requiring major policy decisions. One example is developing a standard for the release of formally contaminated solid material, sometimes referred to as the clearance standard. It is an understatement to say that this is a controversial and complex matter. It is politically thorny because it ultimately raises the question of whether the solid material will eventually end up in consumer products. Our European counterparts allow a different release standard for natural radiation as opposed to so-called “man-made” radiation, even though from a technical perspective there is virtually no difference. In Europe however, there is virtually no public outcry over the shipment of ore with radiation levels as much as ten times higher than that allowed for the shipment of material with “man-made” radiation. Conversely, the IAEA has developed a one millirem release standard for solid materials that has been adopted by some countries. This is an achievement that we in the United States have yet to accomplish.

I do not agree with those who are tempted to seek further research to determine if we can find a “silver bullet” to resolve what is a straightforward, but tough policy choice. I believe that further research is unwarranted and we must “bite the bullet” and move forward with a realistic practical standard.

Another area where major policy choices are necessary is implementation of the NRC’s licensing termination rule. The NRC license termination rule has standards for unrestricted release of a facility or site upon decommissioning as well as standards for decommissioning a site under restricted

[1] primarily sites in a complex decommissioning process - many of which were not being adequately managed in the past

release conditions. Unfortunately, to date, no site has been able to utilize the NRC's restricted release criteria and the Commission is evaluating how to make restricted release a more viable option.

The Commission is considering a graded approach to institutional controls based on a risk-informed process. On one level, if the risk is low enough, nothing more than a deed restriction may be necessary. As the risk increases, more legally enforceable controls may be required. In some cases, either a government agency assuming long-term custody or perhaps a possession-only NRC license for an indefinite period may be what is needed.

Another problem with institutional controls is the assumption made about future use of the land. The NRC has traditionally used a conservative scenario that assumes the land will be used as a farm with the farming family living on the land and receiving a significant portion of their food grown on-site. This is an overly conservative approach that does not reflect modern realities. The fact is, some land may never be suitable for farming; but productive and safe use of the site may be accomplished if it is restricted to an appropriate industrial or commercial application. This is an approach that has been applied by EPA and many States, and the Commission is considering adopting a similar approach. To fully utilize this important redevelopment option, research efforts will need to focus on improving various calculation techniques to take into account real world land use scenarios and identify practical and realistic outcomes.

What is clear about decommissioning is this simple fact: people who work and live around these sites want them to be useful and productive parts of their communities. Whether the land is used for recreational, industrial, commercial or conservation purposes, stakeholders do not want to have to "worry" about these sites in the future. Our research can and must help us attain this goal.

Advanced Reactors

Now let me transition from one side of the spectrum to the other and talk about our efforts on advanced reactors. The political climate has certainly changed in the past few years and nuclear power has gained some prominence in the nation's future energy planning. While there is active work taking place in the House and Senate to conclude the Energy Bill conference, this measure may include incentives for encouraging new reactor orders in the United States. Further, it may also create an experimental nuclear reactor program to produce electricity and hydrogen.

The new reactor designs bring with them many new technical and policy challenges that will have to be addressed by the NRC staff, particularly the Office of Research, and the Commission. To prepare for these challenges, the staff developed an Advanced Reactor Research Plan Infrastructure Assessment. This plan focuses on development of the necessary tools, data and technical bases for supporting an effective advanced reactor licensing process. The scope of the advanced reactor research plan currently includes six advanced reactor designs: Westinghouse's Advanced Pressurized Water Reactor AP1000, General Electric's ESBWR, Atomic Energy of Canada's Advanced CANDU Reactor ACR-700 and General Atomic's Gas Turbine-Modular Helium Reactor (GT-MHR), among others.

Specifically, as many of you know, the NRC staff is currently reviewing the Westinghouse AP1000 design certification application with the final design approval scheduled for September 2004. In addition, pre-application reviews of General Electric's ESBWR, and Atomic Energy of Canada's ACR-700 are targeted for completion on or before mid-2004.

In addition to the design certification and pre-application activities, there are several licensees actively considering their options for new nuclear plant construction in the United States. On September 25, 2003, the staff received the first two Early Site Permit (ESP) applications from Exelon Generating Company for their Clinton site and Dominion Generation for their North Anna site. Similarly, Entergy is expected to submit an ESP application any day now for their Grand Gulf site.

The resurgence of interest in advanced reactor designs and new reactor licensing, also poses very real, near-term resource challenges. Though the new reactor licensing pace is not the same as we experienced in the 1970's, there are new and different challenges before us. While it is important for us to be prepared for the real possibility of a new build and licensing program, any trade-offs will not come at the expense of the current operating fleet. It is imperative that we maintain our focus on the safety of these reactors first, then effectively manage and balance our remaining resource expenditures on new design reviews and orders. Our choices have to be well thought out, focused on those areas that are likely to materialize and those research activities that are absolutely necessary to support our future licensing decisions. I believe a simple, but practical approach is needed. Two areas where our current research efforts will certainly support our future decisions are fuel performance and materials issues.

Fuel Performance

In comparison to where we were 20 years ago, the performance of fuel is greatly improved. The number of light-water-reactor fuel failures has steadily declined during this time. I believe a strong contributor to this improved performance is the increased market competition between the current fuel vendors here in the United States: Framatome-ANP, Westinghouse, and Global Nuclear Fuel/General Electric. Increased competition has forced these companies to review their manufacturing processes and focus on process improvements in the area of new technologies to identify issues such as, chipped fuel pellets and flawed tubes before they are put in service. In addition, vendors are focusing on performance improvements in fuel and cladding design, and other areas to support higher fuel burnups, longer operating cycles, and power uprates.

Yet, despite these successes, the number of fuel failures in the past two years has noticeably increased. Fuel issues are back on the radar screen of many plant operators and calls for improved reliability are common. Thus, the fuel vendors are left with balancing their resources to remain competitive, but still perform the needed research to safely advance their designs.

From where I sit, it appears that industry may be overly focused on the economic issues and may be pushing the fuel too hard. I get concerned when I hear industry folks question whether fuel manufacturers have budgeted sufficient research dollars toward meeting the demand of the new, more aggressive operating environment. From my perspective, increased burnup, longer operating cycles and power uprates are key drivers for the fuel performance desired by our licensees. The fuel environment is going to be more challenging but, as a safety regulator, we need to be assured that the plants can continue to operate safely under these new conditions. To continue to insist on rock bottom fuel prices at the expense of debilitating and costly fuel failures is penny-wise and pound foolish. The industry must leverage its overall experience and utilize initiatives such as the Electric Power Research Institute (EPRI) Robust Fuel Program to effectively deal with fuel reliability.

For our part, the NRC developed a research program to confirm the current fuel burnup limit of 62 giga-watt days per metric ton and to develop a strategy for assessing future requests for burnup extensions beyond the current NRC limit to ensure the adequate protection of public health and safety at our operating reactors. Utilizing a variety of U.S. and international facilities, the NRC research effort is appropriately focused on demonstrating that recent increases in energy output for new cladding alloys can meet our regulatory expectations for postulated accidents. Nonetheless, given the recent spike in fuel failures, I think that both the NRC and industry need to consider additional research to determine how we can get a better handle on new designs and materials that can reverse the recent increase in fuel failures.

Materials Degradation

In a similar way, the NRC has maintained an active research effort for many years that is focused on the management of age-related degradation in nuclear power plants. However, the effectiveness of this program has been recently challenged. Akin to the upswing in fuel failures, materials degradation issues have been pushed to the forefront of the nuclear industry in the past few years. None is more prominent than the reactor pressure vessel head degradation at Davis-Besse. It is nearly 20 months since the discovery of the pineapple-sized cavity in the vessel head at Davis-Besse. What is disturbing to me, is how this was missed. Our attention was focused on the potential for cracks propagating, turning circumferentially and thus leading to an ejection of a control rod. No one expected the significant erosion of the vessel head itself.

Since this discovery, the NRC and industry have spent a considerable amount of resources reflecting on this event and pondering how it happened. Some in industry believe it is merely one data point and not a reflection of the entire industry. Others question the NRC's oversight and understanding of materials degradation issues, and our ability to effectively manage them. As many of you are aware, the NRC formed a nine-person, lessons-learned task force that spent more than 7000 hours reviewing the NRC's regulatory processes and activities, and provided specific recommendations to the Commission for areas of improvement. Action plans to address these recommendations have been initiated, including recommendations to evaluate plant experience with stress corrosion cracking and boric acid corrosion in order to enhance our inspection requirements and guidelines. In addition, the industry through the EPRI Materials Reliability Project (MRP) is leading the industry's actions to respond to materials degradation issues.

I believe the NRC and industry are very effective at swiftly reacting to these issues when they are discovered. We aggressively search out the root cause and develop action plans to correct identified gaps. However, this reactive approach comes at a cost. When we put ourselves at the mercy of these degradation issues and are forced to react to them, the public loses confidence in the industry and in the NRC as a regulator. In addition, this places significant unanticipated resource strains on our organizations.

As plants continue to mature and more plants pursue license renewal, thereby extending their effective operating life out to 60 years, age-related degradation issues will continue to challenge both the NRC and the industry. These challenges will manifest themselves in new forms of degradation and new locations. Chairman Nils Diaz has said, "we will never have another Davis-Besse." I can't agree more. While we are very good at preventing reoccurrence of issues we have experienced in the past, our research efforts should be focused on identifying emerging and unexpected materials challenges.

Like a good physician, we do not expect to merely guess what the future problems of our charges will be. Instead, we need the experience, training and understanding to recognize, diagnose and treat age-related issues before they become critical. The development of the right tools and methodologies to better predict these age-related degradation mechanisms, so we can become more predictive, rather than reactive, is extremely important. Similarly, like our counterparts in the military, we cannot be fighting our last battle. We must be focused toward our future regulatory challenges, and our research must be well placed to meet that call.

To conclude, it is evident as ever that research plays a critical role in providing the technical advice, tools and information necessary to identify and resolve safety issues. However, our research must be managed in an efficient and effective manner so we can leverage our past experience to further our understanding of potential areas of concern. We must become more proactive in our research efforts and improve our ability to anticipate problems of potential safety significance, thereby limiting the amount of costly reactive work. The resource challenges I mentioned today not only impact us in the United States, but extend beyond our borders. Continuing our collaborative efforts is vital to enhancing our ability to make sound practical decisions based upon our collective worldwide experience.

In closing, let me again express my appreciation for the opportunity to share my views with you this morning. I hope you continue to have a successful conference. I would be pleased to answer any questions you may have at this time.