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Office of Public Affairs

Telephone: 301/415-8200

Washington, D.C. 20555-0001

E-mail: opa@nrc.gov

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

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Asking the Tough Questions – Making the Tough Calls: Regulatory Issues in Challenging Times

**Dr. Peter B. Lyons, Commissioner
U.S. Nuclear Regulatory Commission
at the**

**19TH Annual NRC Regulatory Information Conference
March 14, 2007**

It is a pleasure to be participating with all of you - Chairman Klein, fellow Commissioners, NRC staff, industry and public stakeholders, and international visitors at this Regulatory Information Conference (RIC).

This is the third time I have participated in and addressed the RIC. Just as in the last two times, I'm tremendously impressed with the breadth and diversity of topics addressed here, as well as with the depth in which subjects are analyzed. All of the participants in this Conference have my compliments and thanks for your outstanding contributions. I especially want to recognize the efforts of the NRC staff in the planning and execution of an excellent Conference.

Today, plant safety performance is good; the Continuing Resolution was resolved to provide new financial resources to the NRC; plant security challenges have been met; many challenging licensing issues were resolved with appropriate attention to safety in a timely way; and a strong NRC recruitment program is demonstrating success. But in spite of these positive realities, these are very challenging times for the NRC and the industries relying on nuclear technologies. Some of these challenging areas that have required us to ask the tough questions and make the tough calls include:

- Retaining an unrelenting focus on the safety and security of all operating plants, while preparing to concurrently review any license applications for new plants and overseeing new construction activities to assure the safety of any future generations of plants.
- Evaluating issues associated with plant aging that may present potential challenges to safety.

- Continuing to remain as transparent as possible in our actions and operations. Public and Congressional stakeholders remain very interested in the NRC's discharge of its responsibilities, interest that can certainly be positive but also challenging.
- Fulfilling our human capital needs. We have the fiscal resources to succeed in a possible nuclear renaissance, but adequate funding alone does not guarantee success. We must continue to hire capable, new technical staff; train them to accomplish the Agency's missions; provide them with a professional work environment; challenge them with interesting assignments; and retain them.
- Continuing national discourse on security issues.

I'll focus my remarks today on safety, security, and human capital, areas of emphasis that I've used in past RIC speeches. These areas continue to represent the greatest challenges for the Agency and will remain my focus. In addition, I'd like to discuss the role of international interactions and some new insights I have developed.

Safety

Safety of the existing NRC-regulated reactor and materials licenses, along with about 17,500 materials licenses regulated by the Agreement States, continues to be my top priority. Today, in the United States, reactor safety performance continues to be sound, with a low number and generally low severity of plant events. Safety performance measures, including performance indicators and inspection findings, are strong for most plants.

Of course, these measures of performance are only manifestations of something much deeper: commitment. It is essential that both the entities we regulate and the NRC itself remain continuously committed to safety and maintaining the technical competence to achieve it. Commitment to safety requires a "top down" focus. It must be reflected in the vision and expectations for success by licensee's management and modeled to their staff through actions to place safety ahead of profit. Commitment to safety means that everyone in the nuclear field must understand the safety implications of his or her job and be personally dedicated to maintaining that safety.

When we discuss commercial nuclear power plants the phrase "reactor safety," refers to plant design and operational characteristics that provide protection against design-basis accidents and features to mitigate beyond-design-basis severe accidents and to the training and capability of the operators at the controls. Thus, reactor safety embraces systems, structures, and components; programs, practices, and procedures; and knowledge, skills, and abilities. It also includes a factor not always measurable in numbers, but, nevertheless, crucially important: safety culture. Safety culture is what drives an organization's commitment to safety. Safety culture extends well beyond equipment and procedures; it includes questioning attitudes and resulting conservative decisions, asking the tough questions and making the tough calls.

I've been pleased to note excellent progress on initiatives addressing safety culture at the operating nuclear power plants in this past year. Through the staff's extensive involvement of stakeholders, the Agency has enhanced the reactor oversight program to include evaluation of safety culture. This new feature is being implemented at our nuclear power plants to assess any indications of a weakening safety culture. Feedback from the initial use of these evaluations should be invaluable as we "fine-tune" this vital initiative.

As an Agency, we need to encourage more attention to safety culture beyond just reactors. All too often, I read of accidents or incidents involving medical and industrial users of risk-significant sources. Focus on a strong safety culture is just as important for these non-reactor licensees. Between the NRC and the Agreement States, we need to find better ways to encourage the materials licensees to maintain a strong safety culture.

In addition to our progress on the safety culture program, I want to highlight the Agency's progress on the operating experience program and on implementation of a strong lessons-learned program. As I've visited plants over the last year and talked with licensees, I've been pleased with the respect in which they hold our operating experience program and the benefits they cite from the insights the program provides. Just as we expect licensees to institutionalize lessons learned, the NRC must do the same. To that end, this past year has seen the initiation of an important new NRC program to do just that.

Next, I want to provide special mention of the very informative and detailed report our staff prepared comparing the safety-related activities conducted as part of the Independent Safety Assessment of the Maine Yankee plant and the activities now conducted as part of our Reactor Oversight Program or ROP. This report clearly demonstrates to me that we are accomplishing the necessary safety oversight activities through the ROP. This is an excellent testimonial to the evolution in our ROP and the Agency's focus on continuous improvement.

Improved safety was also noted this last year as two plants exited from Column 4 of the ROP, although unfortunately one plant moved into Column 4. Through the Institute of Nuclear Power Operators and their own internal programs, licensees must strive to demonstrate strong performance that does not require the additional oversight that the Agency provides for plants with indications of degraded safety performance. But the public should be reassured that where the performance of a plant warrants further intervention, the NRC is ready to provide that additional effort.

Our staff's focus on safety was also highlighted this year by the effort invested in activities associated with the restart of Browns Ferry 1. This strong effort should further reassure the public that this Agency will not compromise safety. At the Commission briefing on this subject, we heard that 13,000 hours were invested in review of the license amendment with another 8,000 hours expended on review of generic letters, bulletins, and applicable special program requirements. In all, 50,000 staff hours were invested in both the licensing reviews and the inspection program. This substantial effort exemplifies the Agency's focus on safety and serves as a test bed for new plant construction. While

construction of new plants is anticipated to follow paths quite different from Browns Ferry 1, these activities are now providing an opportunity to strengthen our construction inspection capabilities.

And as you well know, there are continuing challenges with the operating plants. For example:

- Questions still remain on the potential extent of chemical effects on sump performance and on fuel pin cooling. Plans for larger sump areas are now in place with increases in sump area typically well over a factor of 10. While plants are now in the process of making these improvements, we must continue to ask the tough questions regarding potential chemical effects.
- The recently discovered circumferential weld faults at Wolf Creek were not expected by the Agency or by industry. I'm pleased that industry has stepped up its surveillance and refurbishment activities to ensure that no such weld faults compromise safety at any of our plants.
- Grid stability remains a challenge as our nation's electrical grid continues to experience seasonal stresses due to transmission bottlenecks and the need for additional new generating capacity. Increased interactions between the Federal Energy Regulatory Commission (FERC) and the NRC are helping to assure that grid issues are foreseen and minimized.
- Also, emergency planning communications and coordination remain a challenge. Coordination of on-site and off-site responses through interactions involving the local, state, and federal response capabilities is a complex multi-dimensional program. As one excellent example, in the last year I visited the Waterford plant for discussions about its emergency planning and its relevance during Hurricane Katrina. The activities at Waterford, in coordination with the emergency planning team of St. Charles Parish, and their careful response to the challenges associated with Hurricane Katrina demonstrate the benefits that can accrue to an entire community through careful planning of responses to potential safety challenges.

In closing my comments on safety, I want to reiterate that the NRC's and industry's greatest continuing, shared challenge related to maintaining safety is to avoid complacency at any level. It's fine to congratulate ourselves on another year of excellent safety performance for nuclear power plants, but we should occasionally remind ourselves of the severe degradation of the Davis Besse pressure vessel and its root causes of complacency and inattention.

In addition, I want to again commend the NRC's licensing and inspection staff and to specifically acknowledge the resident inspectors for their "front line" vital role in asking the tough questions regarding the safety of our nuclear power plants and fuel facilities. With each of my visits to sites, I've spent time with the resident inspectors. They have immense responsibility, and I've been most impressed with the skill and dedication they bring to their jobs. Their daily contributions and those of all the NRC staff are essential to the Commission's ability to assure the American public of adequate protection of public health and safety.

Security

Turning now to the topic of security, I continue to focus attention on the security programs at every nuclear power plant and other sites that I visit. While implementation of security enhancements differs from site to site, I am convinced that appropriate actions have been taken at every site since 2001 to greatly enhance security.

Our cooperation and coordination with other federal agencies increased significantly this year. As an Agency, we've worked with the Department of Homeland Security (DHS) on each of its Comprehensive Reviews, or CRs, of nuclear power plants. To date, 47 out of 65 CR site visits have been completed. Of course, DHS is conducting CRs at many other critical infrastructure sites around the country. In my view, the nation will derive the full benefit of the CR process as the Department completes its work across all sectors of critical infrastructure such that appropriate evaluations of risk and required response can be determined for the full spectrum of sites.

In the course of each CR, the plant's defenses in coordination with off-site response capabilities are evaluated for a wide range of possible terrorist scenarios. The combination of the CR process of the DHS and the Design Basis Threat process of the NRC should be viewed as an integrated national evaluation of the ability of each plant to withstand terrorist attack.

Security at any element of our nation's critical infrastructure should be evaluated as part of our integrated capabilities to defend this nation. No one element of our critical infrastructure can or should be expected to defend itself in isolation. Our intelligence, military, state and local capabilities work together to provide integrated, multi-dimensional, barriers to any individuals or groups working to harm our nation. With this view as a background, I regard the stronger coordination between the NRC and the DHS to be a very positive enhancement in the security of our citizens.

Plant security continues to be regularly tested at every nuclear power plant through drills conducted by the licensee. In addition, we exercise the NRC DBT through the force-on-force exercises, and I'm very pleased that the 21 plants that were subjected to this exercise in Calendar Year 2006 performed very well against very capable and creative mock adversaries. Specifically, in no case last year did the mock adversaries succeed in accessing a critical target set.

The Commission moved in the last year toward codification in regulations of some of the Orders issued in the post 9/11 days. These actions, including the most recent change to Part 73 on the Design Basis Threat, are positive steps that enhance the security requirements for all commercial power reactor licensees in a very deliberative manner, contributing to stability.

The Commission has also wrestled with the issue of the extent to which new plants should incorporate features against the impact of a commercial airliner. For the existing fleet, the Agency has carefully evaluated potential vulnerabilities and required many actions from our licensees to mitigate this possible threat. While the existing plants are adequately prepared, we have an opportunity with new plants to design more of the protective features into the plants from the start and to require fewer

mitigative actions from the operators in response to such threats. In my view, it is appropriate and consistent with our approach to beyond design basis severe accidents to ensure new plants provide this protection with reduced reliance on operator actions.

Security issues are not solely focused on reactor licensees. Both the NRC and the Agreement States continue to issue enhanced security requirements for licensees authorized to possess certain types and quantities of radioactive materials. The NRC and the Agreement States inspect and enforce the requirements for their licensees. The Agency should continue to coordinate with the States to assure consistent implementation of security requirements.

In addition, many of the requirements from the Energy Policy Act of 2005 have a security nexus, and the Agency has made progress toward implementation of its provisions. We've implemented, after consultation with the Justice Department, Section 653 that enabled use of heavier weapons by the plants' guards. We've implemented Section 652 related to fingerprinting and background checks for those with access to Safeguards Information, and we are implementing Section 652 related to fingerprinting requirements for individuals with unescorted access to radioactive material quantities of concern.

Human Capital

Human capital issues were one of my primary concerns as I joined the NRC, and they remain so today. Nuclear technologies continue to benefit us in many ways and, therefore, will continue to be a critical focal point of many national security, foreign, energy, and environmental policies for the foreseeable future. With this assumption, it follows that we require an educated, well-trained work force. Although we are making some progress in this vital area since I last addressed the RIC, far more work is needed.

Focusing specifically on the nuclear energy needs, the employment outlook has certainly gyrated during my professional career. I remember the enthusiastic, optimistic days of the 1960s and 1970s. By 1974, the government had approved operating licenses for 52 nuclear reactors with plans for dozens more to be built. However, several events in the 1970s, including Three Mile Island, contributed to cancellation of the application process for 93 reactors. In 1997 when I joined Senate staff, I was appalled to watch the nuclear R&D program receive zero budget authority in the 1998 fiscal year.

How times have changed! With a forecast for 50 percent growth in electricity consumption by 2030 and increased recognition of the potential impacts of global warming, the industry projects strong growth. But in a December 2006 report, the American Nuclear Society (ANS) estimated that almost one-third of the current nuclear workforce will reach retirement in the next 10 years. The report notes that the Department of Energy (DOE), the national laboratories, other federal and state agencies, nuclear technology companies, and university nuclear engineering departments are currently experiencing a significant shortage of qualified people for new hires. The report further recommends that the U.S. government, specifically the DOE, serve as steward for national nuclear research and

educational enterprise. I could not agree more strongly with the view of the ANS that the DOE must provide this support.

The human capital needs of many federal, state, and local government agencies, as well as medical, manufacturing, research and development, and energy industries, for an educated and well-trained workforce are widely recognized. The Nuclear Energy Institute (NEI) estimates that 26 percent of engineers working in U.S. nuclear utilities will be eligible for retirement in the next 5 years.

The NEI also estimates that 90,000 entry-level workers will be needed to support existing industry operations through 2011. That figure doesn't include the workers needed to supply the materials for any new plants and then to build the plants themselves. After construction, additional workers will be needed to staff those new units. Furthermore, this is not just a phenomenon in the United States; many countries are planning major expansions of nuclear power, and some of the workers they need may be attracted to relocate from our nation.

The National Organization of Test, Research, and Training Reactors has noted the decline in the number of research reactors for more than 20 years. The number of university and non-academic-based research reactors has fallen from 63 facilities to the current number of 27. I strongly support the ANS report, which emphasizes that the DOE must continue to monitor these facilities and provide support to assure long-term strength of the national educational infrastructure for nuclear science and engineering and related fields, like health physics.

I can highlight this last point by my experience in Australia a few months ago. I had the opportunity to tour its new OPAL reactor, built by INVAP of Argentina. That reactor is far more modern than any research reactor that I've seen in this country. The OPAL reactor is the type of facility that we should have in this country to encourage new students to explore nuclear engineering and related specialities. Most of the research reactors I've seen in this country do not have the modern instrumentation and high technology that will interest new students in this profession. There is no federal agency other than the DOE that can rectify this situation.

In preparation for our expanding workload, the NRC plans to hire about 300 new technical staff a year through 2008. Through outstanding staff efforts, the NRC was highly successful in recruitment during this past year. We added 371 new staff last fiscal year, offset by attrition of 211, for a net gain of 160. As of early-March, we had brought 189 new staff on board and lost 101 for a net gain of 88 in the current fiscal year. Both the new recruiting tools provided by Congress and the staff's use of those tools have helped with this success. It is encouraging that the average age of our staff has dropped from somewhat over 49 a few years ago to closer to 48 today, and, most important, that the average age has not increased by one year per year!

The Agency's management and its staff also deserve compliments for creating the work environment that has led to the Agency's superb placement in the recent survey done by the Office of Personnel Management. In that survey, the NRC placed first in Talent Management and Leadership

and Knowledge Management, two of the four major categories of the survey. The NRC was second in the Job Satisfaction Index, and fourth in the Results-Oriented Performance Culture Index. This performance speaks very well for the caliber of our staff and management.

The challenge of long-term workforce development is faced by every industry and every organization represented in this room. For that reason, every one of your organizations should be actively helping students to develop an interest in nuclear science and technology careers, as early in their education as possible. I challenge each licensee to strongly support basic science and technical educational programs at all levels. I recognize that many of you already have programs in place to foster these goals; however, all of us need to personally redouble our efforts in conveying to students the excitement and opportunities that await them in science and technology.

International interactions

Over the last year, I had several opportunities to represent the Agency and our nation at international conferences and meetings. Such visits impress upon me the extent to which nuclear energy is a global enterprise, with countless contributions from a very wide range of countries. At the same time, such visits are a sobering reminder that while the United States originated much of the nuclear technology in use around the world, there are many situations where the most modern applications of these technologies are now abroad.

Answers to, or expertise in, all our technical challenge areas no longer reside totally within our country. We have a great deal to learn from the international community in areas ranging from construction techniques, to reactor safety experiments, to technologies applicable to new domestic plants. I don't mean to imply that we in the United States do not have much to contribute to the global community in these areas, but the inescapable truth is that we have much to gain from interactions with the international community in terms of improving the safety and security of our nation's power reactors and nuclear materials.

This global interest is hardly surprising given that the DOE recently estimated that the global demand for energy may increase by 50 percent by 2030, with more than half of that growth coming from the world's emerging economies. For electricity, the growth is projected to be particularly steep, increasing more than 75 percent over the next two decades. Several countries are discussing expansion of nuclear power with construction of numbers of plants comparable to those being discussed in the United States.

As nuclear power expands around the globe, the NRC must constantly encourage that this expansion be accomplished with strict attention to safety. Through our global interactions, we can and do exchange regulatory practices and technical information that enable safer operations in other countries; and it is equally true that we obtain information and data in these exchanges that enhance the safety of plants in this country as well. No one involved with this industry, whether as a regulator, a utility, a vendor, or another stakeholder wants to see an incident anywhere in the world that

compromises the reputation for safety that nuclear energy has developed over the past two decades.

I fully support a strong commitment from the NRC to utilize international collaboration to deal with the realities of the increasing “globalization” of nuclear technology. We must recognize that changes in the marketplace, technology, and regulation have taken place around the world, and international partnerships of industry and international partnerships of independent regulators are the optimum path toward success.

One specific aspect of international collaboration involves the “Multinational Design Evaluation Program” (MDEP). As you know, this is a multinational program to leverage worldwide nuclear knowledge and operating experience in a cooperative effort to establish common regulatory standards for new reactor designs and to share resources in completing the necessary regulatory reviews. The first stage of the MDEP has already begun. It involves cooperation with the regulatory authorities in Finland and France to assist the NRC’s design certification review of the Areva EPR. Stage 2 consists of the efforts of participating nations (Canada, China, Finland, France, Japan, Russia, South Africa, South Korea, United Kingdom, and United States) to achieve convergence on certain safety codes and standards and other technical matters. A key concept is that, while seeking to improve regulatory effectiveness and efficiency, national regulators retain sovereign authority for all licensing and regulatory decisions.

To the extent that other nations explore licensing of any of the designs that the NRC has certified or is in the process of design certification, I support creation of additional collaborations to share our knowledge. In the same way that our work with Finland and France may provide additional insights to them, it would be my goal that any interactions we have with other nations also lead to mutual sharing of technical knowledge relevant to safe performance.

Additional Challenges

In addition to the challenges I have already discussed, priority should be given to minimizing regulatory uncertainty. This is an issue faced by any new regulated industry and, despite the operating history of U.S. nuclear power spanning more than 40 years, the NRC review of new license applications will be new, by virtue of the fact that 30 years have passed since the last nuclear orders were placed. There is no doubt that the NRC is going to be challenged to respond to the number of applications that have been advertised by industry. On the one hand, the NRC is doing all it can do to build the human capital resources and the infrastructure to accommodate this number. But there are many actions that industry should be taking if its expectation is that the NRC can evaluate this number of license applications in a timely manner.

Industry must maximize standardization of license applications, designs, and construction activities so that the NRC can leverage, to the extent practicable, similar standardization in its review process. This “design-centered” approach will directly contribute to the success of the NRC as we strive to operate with a “one issue-one review-one position” approach. Timelines will be impacted if industry does not follow this model. The NRC must docket only applications meeting very high

quality standards, and we will not compromise our standards to expedite approvals. The burden is on industry to provide that level of quality.

The challenges in the NRC are far greater than just acting on license applications for new plants. On the one hand, we must assure safety of operating plants. Creation of the Office of New Reactors (NRO) was a vital step to enable NRO and NRR to focus exclusively on challenges associated with new and operating reactors, respectively. In addition, both the NRC and the nuclear industry have a lot of work ahead of us in gearing up for the new construction in the United States. In this area, the NRC will be implementing its new Construction Inspection Program that we recently centered in the Atlanta Regional Office. Here too, our response will partly depend on industry. We will do a better job if industry establishes reliable schedules for its construction activities.

Digital instrumentation and control have been identified as one of the “longest poles” in the tent covering new plant activities. The NRC is challenged to improve regulatory guidance and review standards in this area and industry is challenged to specify with finality the systems it will use. I support stronger regulatory research in this area to address the Agency’s needs. This may also stimulate research outside of the NRC that may lead to even safer designs.

Both high- and low-level waste initiatives may challenge the Agency. We face a monumental task to review a license application for a potential Yucca Mountain waste repository. Nevertheless, we stand ready to initiate this review when DOE submits its license application. Low-level waste issues may also present special challenges, especially if the Barnwell site closes to out-of-compact wastes as planned in 2008. The nation could then be without storage for Classes B and C wastes, a far from ideal situation. The NRC would be faced, in all probability, with assuring that the absence of disposal capacity for such wastes doesn’t translate into unsafe storage of such wastes by organizations generating it.

New approaches to management of the fuel cycle are being proposed and may significantly challenge the NRC. The Global Nuclear Energy Partnership (GNEP) proposed by the DOE is intended to develop the systems, technologies, and policy regimes to allow recycling of used light water reactor fuel and, to a large extent, eliminate the actinides in fast-spectrum reactors in a way that enhances proliferation resistance. The resulting waste streams are envisioned to have characteristics that would lessen the volume and thermal challenges for a geologic repository. If this program progresses, the NRC will need to be heavily involved. However, as the DOE is formulating this program, it is not yet clear at what stage in its evolution the Agency will be participating.

Finally, in closing, I want to recognize that the Commission faces the departure of Commissioners Edward McGaffigan and Jeffrey Merrifield later this year. Commissioner Merrifield began his service at the NRC on October 23, 1998. I appreciated his guidance as I began my service here. He has always been available to provide solid advice to me on the myriad responsibilities that a new Commissioner faces.

I’ve known Commissioner McGaffigan for at least 20 years and probably quite a bit longer. We first began interacting when he worked for Senator Bingaman, when my visits with him were

divided between Los Alamos National Laboratory and Los Alamos Schools issues. From our earliest interactions, Ed has been a role model to which I aspire. His dedication to decades of public service is inspirational. His photographic memory and keen mind have helped me better understand countless issues we face on the Commission.

When these two great Commissioners leave the Commission, they will be sorely missed. It is a very sobering challenge that the three remaining, and eventually two new, Commissioners will confront.

In spite of, and perhaps because of, these challenges, this is an exciting time to be at the NRC, and I welcome the opportunity to serve here. This is a time of change, and it is during unsettled times that we must take particular care to ensure the future. There is a lot of hard work to do; and I will do everything in my power to assure that the NRC is ready to meet these changing times and future challenges.

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