# NRC NEWS

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**The Leadership Challenge Shaping Our Future**

**Challenges Facing the NRC**

**By**


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**of the**
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Good morning, ladies and gentlemen. I am pleased to have the opportunity to address today's conference on "The Leadership Challenge - Shaping Our Future."

As we move into the 21st century, both the nuclear industry and the Nuclear Regulatory Commission (NRC) are facing many profound challenges. My purpose today is to provide a perspective on the challenges facing the NRC in the coming years and the potential paths to the resolution of those challenges. But before I touch on the direction in which the agency is headed, I would like to briefly discuss how we arrived where we are today.

## INTRODUCTION

### Remarkable Nuclear Industry Performance in Last Decade

Over the last 10 years, the nuclear industry has achieved remarkable gains in safety and operational effectiveness. For example, the average number of automatic scrams has declined by approximately a factor of 3 in the past decade. Similar good news is evident when looking at sharp

declines in safety system failures, safety system actuations, and collective radiation exposure. This is the product, I believe, of improved training, better maintenance, and careful attention to detail.

At the same time, there has been a counterpart improvement in operational performance. Nuclear plants in the United States operated with an overall capacity factor over 87 percent in 2000, up from approximately 58 percent in 1980, and 68 percent in 1990. Although the number of licensed power reactors in the U.S. has declined from 111 in 1990, to 104 today, the total power produced has increased to an all-time record of 754 billion kilowatt-hours in 2000. Thus, although we have not had new construction of nuclear plants, the nuclear sector has continued to provide about one-fifth of the total electricity generation in the nation. The data show that excellent safety performance in fact goes hand-in-hand with excellent economic performance.

**The Nuclear Power Option**

The primary credit for these changes must go to the nuclear industry. Morever, the gains in economic and safety performance over the past decade have created a changed context for consideration of the nuclear option. Rather than decommissioning plants prematurely, as many pundits predicted just a few years ago, licensees are interested in life extension. In fact, it appears that licensees for virtually all of the existing fleet of plants will seek to extend the licenses beyond the initial 40-year term specified in the Atomic Energy Act. Moreover, there is a stirring of interest in new construction.

There are other indications that the nuclear option may be on the verge of a renaissance. You are aware, of course, that the Energy Plan developed under the leadership of Vice President Cheney discusses the importance of nuclear energy as a major electric power contributor. There is also bipartisan interest in the Congress in preserving and expanding the contribution that nuclear power can make to our energy security. This includes not only Senators and Representatives who have traditionally supported nuclear power, but also–as noted in a recent *Wall Street Journal* article–a growing number of members who are generally identified as "environmentalists." They are prepared to reconsider nuclear power in the face of concerns about the impacts of greenhouse gas emissions.

But the interest in nuclear power goes well beyond Capitol Hill and the White House. In recent months, we have seen articles in major newspapers and news magazines on new reactor technologies; radio interviews with the leader of the MIT effort to design a high-temperature gas-cooled pebble bed reactor; and opinion poll results that indicate an increased willingness on the part of the public to at least consider new nuclear power plants.

I would like to believe that the NRC has helped to set the stage for the current re-evaluation of nuclear power by its efforts to establish a regulatory system that is technically sound, that is fair, that is predictable, and that reaches decisions with reasonable dispatch. I believe that the agency's performance over the last several years has demonstrated that we are capable of meeting ambitious schedules and targets for our regulatory activities, while conscientiously fulfilling our primary responsibility to protect the health and safety of the public. However, the new economic environment in which the nuclear industry finds itself translates to a new regulatory environment for the NRC, and a new set of challenges that we must confront as we shape the agency's future. Let me now turn to just a few of the specific challenges ahead of us.

## CHALLENGES AHEAD OF US

**Establish Infrastructure for New Construction**

The contribution of nuclear power over the coming decades depends, first and foremost, on the continued safe operation of the existing fleet of plants. Beyond that, I have already noted the upsurge of interest in the possible construction of new nuclear power plants. The realization of this possibility will hinge on the resolution of a number of issues, including the capability of nuclear power to compete in a deregulated marketplace with other forms of electric generation and the willingness of the American people to allow new plants to be built. Nonetheless, it seems clear that the conditions necessary to move forward with new construction are more favorable now than has been the case for more than 20 years.

This poses a significant challenge to the NRC: if new plants are going to be proposed, the NRC must be ready to perform comprehensive licensing reviews and, if licenses are issued, to oversee construction and operation. While some of the regulatory and technical resources needed to meet these challenges are already in place, we recognize that the successful accomplishment of these tasks will require both the establishment of new capabilities and the revitalization of programs that have been nearly dormant for many years. For example, it has been some time since the NRC has had to engage in oversight of new construction.

Part of the regulatory basis for new plant licensing has been in place for several years. 10 CFR Part 52 was promulgated in the late 1980s so as to provide an alternative process for licensing that differs from the procedures followed in authorizing the current operating fleet. Part 52 allows for the certification of standardized designs and the early approval of sites for reactor construction, either or both of which may be referenced in an application for a combined construction permit and operating license. To date, three plant designs have been certified: Combustion Engineering's System 80+, General Electric's Advanced Boiling Water Reactor, and Westinghouse's AP600. We may receive application to certify the Westinghouse AP1000 design in the coming year. Neither the Early Site Permit or Combined License aspects of Part 52 have yet been exercised, but we have been advised that it is likely we will receive applications for early site permits by next year. And, as has been widely reported, Exelon may, and I emphasize may, apply for a combined license for the pebble bed modular reactor in 2003.

Although the basic regulatory framework for new construction may be in place, we have an aggressive effort underway to identify any regulatory impediments that would needlessly complicate or delay the processing of new applications. But more will be needed to establish the necessary regulatory and technical infrastructure. To this end, the NRC staff has engaged in a comprehensive assessment of the agency's readiness for future plant licensing and inspection of new plant construction. Although the assessment will not be complete until later this year, we have already moved forward to establish groups in each of our program offices to deal with new construction. A "Future Licensing Organization" has been put in place in the Office of Nuclear Reactor Regulation, to manage and coordinate NRC's regulatory initiatives and interactions between the industry and the NRC on new plant licensing issues. The Office of Nuclear Materials Safety and Safeguards has a Special Projects Branch, which will look at issues such as fuel fabrication, transportation, and waste. And an Advanced Reactors Group has been established in the Office of Nuclear Regulatory Research, to develop the technical basis needed to support the NRC's regulatory activities in dealing with new reactor technologies and related policy issues.

The rapidity of change has been brought home to me recently in the context of the NRC's budget. Our submission to OMB of the NRC budget for FY2002 was made about this time a year ago. It did not include any funds for new construction for the simple reason that the Commission had absolutely no reason at that time to prepare for possible new applications. As a result of the changed environment in which we now find ourselves, we have reprogrammed funds for the current fiscal year and I am extraordinarily pleased that both the Senate and House have added $10 million beyond our request for FY2002 to enable the NRC to prepare for new world in which we find ourselves.

This is clearly an exciting time for both the industry and the NRC. But let me sound a note of caution: neither the NRC nor the industry should lose sight of the fundamental responsibility to protect public health and safety and the environment. This must be the guiding principle as we move ahead in developing the necessary infrastructure for new plant licensing and construction.

**Reform The Regulatory Structure**

We also are in a period of dynamic change in our regulatory system as a result of a change in philosophy. We seek to move from a prescriptive, deterministic approach to a risk-informed and performance-based paradigm. This effort is extraordinarily ambitious, because it involves rethinking the underpinnings for our entire regulatory structure. Nonetheless, we need to make this change to take advantage of what we have learned over the past 40 years, employing that knowledge both to focus on concerns that are truly significant for safety and to reduce needless regulatory burdens. This is a challenge to all of us, both the NRC and the regulated industry.

Perhaps the most visible aspect of our efforts to apply a risk-informed philosophy to our regulatory system – and the one with which this audience may be most familiar – is the new reactor oversight process. The process was developed to focus our assessment of operating plants on those areas involving the greatest risk, while simultaneously providing a more objective and transparent process. Although our recent evaluation of the first year's application of the system reveals the need for further reform, both licensees and other stakeholders – including NRC and industry critics – are in agreement that the new approach is a dramatic improvement of our oversight process.

It is clear, however, that we have taken only the first steps in risk-informing our regulatory system. Other current efforts include the revision of special treatment requirements so as to assure that the categorization of a component is guided by consideration of its risk significance. Last Friday we announced that we had granted an exemption for the first plant to apply risk insights in this way – the South Texas Project – and we are continuing to develop a rule to make such an option available to all power reactor licensees. We are also continuing our initiative to risk-inform the technical requirements of selected regulations, including modification of the combustible gas rule (50.44) and the regulations governing the performance of emergency core cooling systems (50.46 and Appendix K). I have emphasized before that this process will not be easy or rapid, and our experience to date demonstrates this. If we are ultimately to move to a risk-informed regulatory system, the road will be long and complex, and we will require informed input from the industry and other stakeholders.

I must also mention in this context the challenges that confront us in dealing with some of the new reactor concepts that are being considered for future deployment. Much of our current regulatory basis assumes that the plant has a nuclear steam supply system with a light water-cooled and -moderated reactor. Designs such as the pebble bed modular reactor and the gas turbine modular helium reactor have gas coolant and a graphite moderator, and – since they employ Brayton cycles – no steam system at all. Implementation of a risk-informed regulatory approach for such plants requires much more than

simply modifying current regulations. We are currently studying the options for developing appropriate criteria for such designs, and the staff will present recommendations for consideration by the Commission in about a year.

**Re-licensing of Existing Plants**

The Atomic Energy Act limits the initial license term for reactors to 40 years. This limitation was not established on the basis of technical limitations, but rather was driven by antitrust and financial considerations. The AEA also allows license renewal, however, and the Commission has established regulations governing the renewal of operating licenses in 10 CFR Part 54. The first license renewal applications were received in 1998, and, as I am sure that many of you know, we have since approved 20-year operating license extensions for Calvert Cliffs, Oconee, and Arkansas One Unit 1. There currently are five pending applications involving the Hatch, Turkey Point, Surry and North Anna, Catawba and McGuire, and Peach Bottom units. The staff expects to receive twenty more applications for license renewal over the next four years. In fact, we understand that licensees for most, if not all, of our currently operating plants may ultimately seek to extend their licenses.

The Commission recognizes that the simultaneous review of many renewal applications presents a considerable challenge. Moreover, we recognize the importance of license renewal and are committed to provide high-priority attention to this effort. Accordingly, we have set deadlines for the processing of applications -- 25 months if a hearing need not be held and 30 months if there is a hearing. As you know, we encourage licensees to notify us well in advance of their intentions to seek renewals and to establish a queue for applications so as not to create unmanageable demands on staff resources.

**Disposition of Spent Nuclear Fuel**

Many press editorials concerning the renewed interest in nuclear power have emphasized the need to establish a means for disposal of spent fuel as a precondition for any new construction. Viewed solely from a technical and regulatory perspective, I do not fully share this view. I am confident that storage of spent fuel in spent fuel pools or in dry casks is safe and provides an acceptable solution for decades. For the longer term, although I do not prejudge whether Yucca Mountain is an appropriate disposal site, I also am confident that siting and designing a deep geological disposal facility for high-level waste that will be adequately protective of public health and safety is well within the technical and institutional capability of the country. This view is supported by the National Academy of Sciences, which recently reaffirmed that deep geological disposal is a feasible means for handling high-level waste.[1] Therefore, because both storage and disposal options are available for the disposition of spent fuel, I do not believe, purely from a technical perspective, that the establishment of a disposal site need be a precondition for new construction.

Nonetheless, I recognize that factors other than science and engineering may dominate decisions concerning spent fuel. The practical reality is that progress toward demonstration of means to handle the back-end of the fuel cycle may be necessary if the nuclear option is to be acceptable to the public.

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[1] National Research Council, Committee on Disposition of High-Level Radioactive Waste Through Geological Isolation, *Disposition of High-Level Waste and Spent Fuel -- The Continuing Societal and Technical Challenges,* National Academy Press, June 2001.

Progress on the regulatory side of spent fuel disposal is being achieved: EPA has announced its standards for Yucca Mountain and the NRC should soon promulgate its conforming standards. Thus, the legal framework for the licensing of the Yucca Mountain site, if society decides to proceed with it, will soon be in place. But progress on the social side has been slow. If anything, the concerns about the transport of spent fuel seem to be expanding and the political opposition to Yucca Mountain appears to be growing more powerful and becoming more aggressive. This growing opposition will make the decisions confronting the Secretary of Energy, the President, and the Congress in deciding whether to proceed even more difficult. And, if an application for a repository at Yucca Mountain is filed, the litigation before the NRC will no doubt constitute one the largest administrative proceedings in which any agency has ever engaged. We are preparing for that possibility.

All should recognize the many difficult challenges that we face in finding an acceptable means for the disposal of high-level waste. I believe that the technical challenges are solvable. But we should all recognize that the societal challenges are profound and intractable.

**Maintaining NRC's Core Competence**

This brings me to my last challenge. Probably the most fundamental challenge we all face is the narrow talent pool in the nuclear enterprise. The essential ingredient that must undergird all of the NRC's actions is the core technical competence of our staff. It is in the interest of both the public and industry that the NRC should be able to reach sound technical judgments in an efficient manner. In order to change and adapt to the changing world – not just change in the nuclear power industry, but also in other civilian uses of radioactive materials, such as in nuclear medicine – the NRC has to be both knowledgeable and agile.

Most of your operations are subject to NRC regulations and, in turn, depend on the NRC's ability to write technically sound, risk-informed rules; to make sound licensing decisions without undue delay; and to conduct fair and meaningful oversight. The efficiency and effectiveness of the implementation of our regulations, of our licensing reviews, and of our oversight and inspections are a direct reflection of the core technical capabilities of our staff. Moreover, the Commission relies on the sound and independent technical judgment of the staff. As our experience in seeking to risk-inform our regulatory processes shows, the ability of the agency to address new and emerging issues depends on a staff that can understand, analyze, and use scientific and technical information at the cutting edge.

The staff's reputation for technical competence is also a crucial element in building public confidence and trust. In order to establish this confidence, we must be -- and must be perceived to be -- scientifically and technically knowledgeable and able. In short, for the NRC to continue to be effective and efficient into the future, we must ensure the agency's core competence.

Why am I concerned? Although we have made some improvement in the last year, the ratio of NRC employees who are over 60 years of age to those under 30 is 5:1. Moreover, many of our employees may leave in the near future. Seventeen percent of NRC's engineers are already eligible for retirement and another four percent of the current workforce of engineers will become eligible for retirement each year for the next few years. Twenty-five percent of the employees in the Office of Nuclear Regulatory Research and twenty percent of the employees in the Office of Nuclear Reactor Regulation are eligible for retirement today. We hope these individuals will continue to contribute, but nonetheless we must prepare for the reality that critical skills and knowledge may soon walk out the door.

The demographics of our workforce are the result of several intersecting factors. First, we have experienced declining real budgets over a number of years (until the slight upturn in FY2001). We have lost technically skilled personnel not only because of reductions in Full Time Equivalents (FTEs) in the budget process, but also because budgetary retrenchment adversely affects morale.

Second, we have been affected by the diminishing supply of new engineering graduates. Although there is anecdotal evidence of a possible recent upturn, student interest in nuclear engineering declined sharply during the 1990s. A recent study indicated that the current annual average supply of nuclear engineers with B.S. and M.S. degrees is about 160 new graduates, whereas the annual demand is estimated to be at least 300 and possibly as high as 600.

The combination of these long-term trends raises a red flag: how will NRC be able to maintain its core technical competence into the future? We need to plan for turnover and retirements, as any employer would, but we also need to judge carefully what expertise we must have among our employees. The NRC is actively engaged in strategic workforce planning and related human-capital initiatives on a high-priority basis. We have a program to identify current skills, future needs, and strategies to fill any gaps. We are aggressively seeking to recruit new staff in critical areas and to retain existing staff. In short, we are seeking to address the human capital challenge that is in front of us. I am raising this issue with you because the current situation deserves careful attention and you should be aware of it.

## CONCLUSION

**Forging a new future**

Let me conclude where I began. We are living in a remarkable period of change in the nuclear sector. This time presents many challenges, but they are the challenges associated with new opportunities. We should welcome these challenges.

Because the viability of the nuclear option is absolutely dependent on the maintenance of safe operations, the NRC's -- and the industry's -- highest priority must be the protection of public health and safety. If we fail in ensuring safety, the emerging optimism about nuclear energy will quickly disappear. I pledge that the NRC will keep its focus and I urge the industry to continue to do so as well.

Thank you.