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New Hopes, New Dreams - A New Future

By

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Good morning! I am pleased to have been asked to speak at this important workshop and to be amongst such good friends and colleagues from the nuclear and radiation protection community. I always look forward to this event and the opportunity to share with you the exciting news about the future of nuclear science and engineering initiatives in Congress and at the U.S. Nuclear Regulatory Commission. In my previous talks to your society, I have addressed issues concerning the changing nuclear workforce and some of the challenges that were ahead of us. It now appears that we are on a new path of opportunity and discovery in the fields of nuclear engineering, health physics, and radiation protection. Now, more than ever before, it is truly exciting to be a part of this changing attitude toward nuclear energy. I would like to take this occasion to share with you my thoughts on "New Hopes and

Dreams for the Future" concerning NRC's plans for ensuring it meets its human capital challenges and ensuring excellence in the Federal workforce in the 21st century.

In my presentation today, I will briefly look back at what has transpired over the past few years, but will focus primarily on the prospects for the future. I have intentionally kept my remarks brief so as to allow time for discussion.

THE TIMES: THEY ARE A-CHANGIN'

During the past several years, the NRC has undergone a period of considerable change as part of our agency-wide efforts to increase the efficiency and efficacy of nuclear safety regulations. At the same time, increased demand for energy across the country and rolling blackouts in California have prompted Congress and the President to address the serious challenges that an energy crisis can bring. In doing so, we find ourselves right in the middle of an opportunity of a lifetime -- to help educate and provide an opportunity for the country to ask questions and learn about the advanced technology of nuclear energy to help meet society's demands and needs. As you are aware, the Commission's mission is to ensure the adequate protection of public health and safety, the common defense and security, and the protection of the environment in the application of nuclear technology for civilian use. The Commission does not have a promotional role for nuclear energy, but rather the NRC seeks to ensure the safe application of nuclear technology if society elects to pursue the nuclear energy option.

In my years as a State Regulator and an NRC Commissioner, I have come to know quite well the challenges associated with maintaining our human capital and in addressing the public's confidence and perception of our ability to regulate. Critical to our success is having technically competent staff available to effectively address new issues and challenges in the nuclear safety and materials arenas.

It may surprise some of you to know that as of this year, the supply of undergraduate-trained nuclear scientists and engineers is at a 35-year low. As highlighted by two recent bills introduced to Congress, S. 242 and H.R. 2126, called the "Department of Energy University Nuclear Science and Engineering Act," the number of undergraduate programs across our nation to train future scientists has declined to approximately 25, which is a 50 percent reduction since the 1970s. In addition, two-thirds of the nuclear engineering and radiation science faculty are over age 45 with little ability to attract and draw new and young talent to replace them in academia. With these statistics, the NRC has become increasingly mindful that the agency faces a significant challenge in maintaining the NRC staff's core scientific, engineering and technical competencies. Based on the demographics of the current workforce, I grow greatly concerned that over the course of the next decade, the net technical capability of the NRC will decline as a result of the loss of specific expertise through attrition.

Our ability to attract new talent does not equal the outflow of experienced workers. Even when we are able to attract talented young men and women, the lack of upward mobility or lack of variety in career paths may result in segments of the workforce moving outside the nuclear area. Maintaining and cultivating core competencies in nuclear-related areas is a key concern for the industry and the NRC.

OUR MATURING WORKFORCE

With a tight labor market for nuclear engineers and a workforce with a large percent of personnel eligible to retire, the NRC is faced with some significant workforce challenges. I suspect that

these challenges are not unique, and in fact, are shared with some other nuclear-related government agencies and with industry.

Current projections are that 76 percent of the nation's professional nuclear workforce can retire within 5 years. At the NRC, there are six times as many staff over the age of 60 as staff under 30; a ratio of 6:1. For comparison purposes, the same ratio at NASA is only 2:1. Moreover, 17 percent of NRC's engineers are already eligible for retirement and another 4 percent of the current workforce of engineers will become eligible for retirement each year for the next few years. At NRC's Office of Nuclear Regulatory Research, one in four employees is eligible for retirement today; in the Office of Nuclear Reactor Regulation, whose office is responsible for the licensing and inspection of commercial nuclear power plants in this country, one in five employees is currently eligible for retirement.

Despite our efforts to hire new engineers, we have experienced a net loss of engineers over the past five years. That loss is equivalent to roughly 8 percent of our engineering workforce. The bottom line is that we are losing expertise and, along with it, valuable institutional knowledge.

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. This has become so serious an issue that now Congress has also been asking us similar questions, and in a May 3, 2001, hearing on "The Future of the Nuclear Power Industry and How it Fits into a National Energy Strategy," our statement to the Senate Subcommittee on Energy and Water Development Committee on Appropriations and the Committee on Energy and Natural Resources said that NRC is systematically identifying future staffing needs and developing strategies which will address how to fill these gaps. Simply stated, we need to be able to respond to new technology, deal with emerging issues, and effectively participate in the international community. Our credibility as an effective competent regulator hinges on maintaining a strong technical base of expertise. So now, let's look ahead into the future....

RECENT NUCLEAR LABOR MARKET STUDIES

Annually, NRC and DOE contract with the Oak Ridge Institute for Science and Education to prepare labor market trends for nuclear engineers and health physicists. I am sure some of you, as new graduates, were included in its latest update of October 2000. This latest report provides some important insights that I would like to share with you.

First for nuclear engineers, the current labor market continues to improve substantially since the mid-1990s. Employers seeking to hire nuclear engineering graduates currently face a labor market where competition from other employers is quite strong. Starting salaries for nuclear engineers in the nuclear energy/nuclear weapons fields increased 6.0% for Bachelor's of Science level graduates, and 5.5% for both Master's of Science and Ph.D. degrees between 1999 and 2000. According to this report, this was the third consecutive year that annual salary increases for new nuclear engineering graduates were larger than any of the annual increases experienced between 1991 and 1997. That is certainly good news for you indeed!

The not-so-good news for employers, however, is that there continues to be a continual decrease in the supply of new nuclear engineering degrees (undergraduate and graduate) for a fifth consecutive year. In 1999, total enrollment in undergraduate and graduate nuclear engineering programs across the

country had slightly more than 1250 students, with only 427 degrees earned and almost 50 percent of these degrees being Bachelor's degrees. Over the past five years, there has been almost a 50% decrease in the number of nuclear engineering degrees earned. The supply continues to decrease, and the country's university reactors and research programs are continuing to close, just as we begin to see light at the end of the tunnel.

There is good news, however. The decline in the employment of nuclear engineers in the nuclear energy fields during the 1990s appears to have stopped. In addition, there are improved career opportunities and emerging positions within the nuclear engineering occupation that include work in radiation and radiological health, plasma studies, medical application, materials, and the food industries. For many employers, such as the NRC, other opportunities arise outside the traditional nuclear fields, and new nuclear engineering graduates are accepting positions in such as activities in electronics, mechanics, computing, and metallurgy.

For health physicists, by 1999, the profession experienced a decrease of over one-third in just two years on the number of degrees earned. Enrollments also decreased in a similar manner. During the middle 1990s, the estimated number of job openings for new graduates decreased drastically to less than 100 annually. During the same period, the available supply of new graduates seeking health physics positions was about 175. Both the Health Physics Society and 15 of the contractor-operated DOE facilities confirmed that job opportunities in this field had decreased dramatically, and that health physics-related positions were few and far between. The good news as we look ahead, is the number of job openings during the 2000-2005 time frame should increase in this field to about 100 to 135 per year. Thus, after several years of somewhat excess supply of new graduates, the demand for and supply of new graduates in health physics now appears to be fairly balanced.

As with many other Federal agencies, the Commission is currently challenged to meet its existing workload with available resources. We confront an aging workforce, potential shortages of staff with critical skills, the challenge of succession planning, and adverse external market trends in critical skill areas. But with an increased interest in planning for future energy needs of the country, I see that there is a great opportunity to succeed in building a new competent workforce which is adequately trained as nuclear scientists, engineers, and health physicists that will help maintain and strive to resolve many of our future challenges.

If we are to adapt our workforce to this changing environment, then we as nuclear regulators and employers must reassess and make available new ideas to seek, find, employ, and continue to train technically competent employees. Legislative proposals, such as those introduced by the Senate and the House of Representatives, if approved, will help to reverse a serious decline in our nation's capability to produce nuclear scientists and engineers. NRC, in its planning, budgeting and performance management process, is actively addressing and planning for ways to ensure that adequate attention is devoted to addressing and resolving our core competency issues.

As a result, the NRC has implemented a systematic strategic workforce planning process that will address the need to hire personnel with the knowledge skills, and abilities necessary to conduct the safety reviews, licensing, research and oversight actions that are essential to our safety mission. In order to meet the needs of the agency now, the Commission has implemented the following short-term strategies to retain and attract new employees:

- Hire employees prior to the departure of experienced, technical staff to facilitate knowledge transfer

- Increase compensation and the number of higher level positions
- Increase permanent entry-level interns and cooperative education students
- Provide grants for college students
- Implement student loan repayment programs
- Increase the use of recruitment bonuses
- Continue training and retraining efforts

In addition to these strategies to recruit and retain staff with critical skills, we will continue to provide training opportunities, flexible work schedules, up-to-date technology tools, on-site day-care, and health and fitness programs. Through the use of these strategies and an expanded recruitment program, we believe that NRC is striving to meet it needs and is positioned well to address the human capital challenges of today and the future.

CONCLUSION

As you can see, the NRC, nuclear industry, and you as nuclear engineers and scientists, are at an exciting time in history. Excitement brings new challenges. A resurgence in the nuclear-industry has already begun to make the labor market tight. As recent trends show, the labor market is beginning to place a demand that is outpacing supply - - particularly for nuclear engineering expertise. And even if there isn't a resurgence, NRC is deeply concerned about the loss of experience and expertise as our workforce ages and retires and is taking steps to proactively address our human capital issues. As our workforce changes in response to needs of the future, there will be many opportunities for nuclear scientists like yourselves to be at the right place at the right time to help meet the needs and demands of our country. I wish you all the best success for the future challenges you face, and salute you for accepting and making a difference!

Again, thank you for this opportunity to be a part of your exciting workshop. I would be pleased to answer any questions that you may have at this time.