



# NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

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**Prepared Remarks  
by Chairman Dale Klein**

**to the  
Women in Nuclear  
Washington, D.C.**

**September 7, 2006**

Good evening. As you may know, I am in my third month as Chairman of the Nuclear Regulatory Commission. The NRC Chairman is, by law, the agency's principal executive officer, and one of the interesting things I get to do is sign paperwork of every sort – a lot of it. Much of the output of the agency must go under my pen to be official.

Among my duties last month was to sign an agency announcement in honor of Women's Equality Day on August 26, commemorating the ratification of the 19<sup>th</sup> amendment, which granted women the right to vote. This year's theme for Women's Equality Day is "Women: Builders of Communities and Dreams." That's an inspirational theme, but I think a more practical one for next year might be: Women, building and operating nuclear plants.

As you well know, many in the current nuclear workforce are headed toward retirement just at the time when the useful lives of the current generation of nuclear plants are being extended and when those plants may be joined by many more. The potential work force of the future will likely be predominantly female and minority, and we must harness all of the talent in that workforce to replace and augment the nuclear pioneers who are now completing their careers.

I want to speak to you today about the industry's workforce needs and what must be done. But first let me speak a bit about the future of nuclear power and the NRC's role.

Today we hear predictions that nuclear power can make a pivotal contribution to the world in the 21<sup>st</sup> century. But when I hear it said we're going to build 50 nuclear plants in the next 20 years, I react like any other native of Missouri. I say, – show me – show me the designs, and then show me the hardware and the construction, and then show me you have the people and procedures in place to run those plants in a way that protects public health and safety. And as importantly, show me that you are maintaining the capability of running the current fleet of plants at the same high level.

I think a questioning attitude is an absolute necessity for a regulator, particularly at this time when the nuclear industry appears to be headed toward a period of resurgence. Both the NRC and the industry have enormous and complex challenges facing us for the foreseeable future. Vision is a fine thing, but it will take a lot of hard work to realize the vision. The U.S. nuclear sector must recreate a nuclear design and construction industry that essentially has been dormant for the past 20 years.

I have a vision for the NRC. First and foremost, NRC needs to be a strong regulator. We will hold our licensees accountable, we will articulate our requirements clearly, we will be demanding, and we will be responsive to our licensees' legitimate needs and concerns. In other words, the industry needs to show the NRC the attention to detail and the focus on quality necessary to protect the public health and safety. And in turn, the NRC needs to provide the industry, the financial community – and above all, the public – with assurances of regulatory stability as we all play our roles in this massive new venture.

The nuclear industry itself has more than 40 years of operating experience that are serving it well in its current operations. All of the measures of productivity and safety in nuclear plants reached impressively high levels starting in the mid-1990s and have been maintained there since then.

As you know, 103 operating nuclear plants currently supply about 20 percent of electricity in the U.S. That number will increase to 104 within the next two years, as a long-shuttered Browns Ferry unit is restarted. The Browns Ferry restart underscores the change now under way in the nuclear power industry in the U.S. Nuclear plants, once considered too costly, are now among their owners' most valued assets. Half the nation's nuclear plants already either have had their licenses extended for another 20 years or are under NRC review for extension. Most of the rest are expected to apply in coming years.

In addition, 13 companies – either individuals or consortia – have to date announced plans to apply to the NRC for combined operating licenses for a total of 27 reactors. That number may be joined by several more projects.

Nuclear plants are tremendously complex industrial facilities. Their construction must be robust enough not only to contain radiation, but to control steam temperatures in excess of 500 degrees and to channel the high-voltage electricity on its way to consumers. Most of the technology to accomplish those difficult tasks was developed in the United States after World War 2. The planning, design, and construction of the first generation of nuclear facilities, was an effort that occupied industrial giants such as Westinghouse and GE for decades, at a total cost well up in the hundreds of billions in today's dollars.

In the three decades since the last nuclear plant order and the two decades since the bulk of nuclear plant construction was completed in the U.S., the nuclear design, manufacturing, and construction industry in the U.S. has withered on the vine. The leading U.S. firms have either ceased operation, consolidated, or become subsidiaries of non-U.S. parent companies. The companies that remain have survived on retrofits and maintenance of existing U.S. plants and plant construction outside the U.S., where new nuclear construction has continued to flourish.

If the U.S. is going to build new nuclear plants, the architect-engineers, construction and component supply industries must reestablish themselves. NRC's primary charge as a regulator is to

protect public health and safety, and those planning to build these new plants must come to us with quality designs and hardware, and workable construction and operational plans to meet our rigorous regulatory standards.

Restoring the U.S. supplier network needed to provide components – from the steam generators and vessel heads to the thousands of valves, pumps, heat exchangers and other parts used in a nuclear plant – would have advantages. There are now 442 nuclear plants in operation worldwide and 27 more under construction. The most ambitious construction projects are in China, India, and Russia – all of whom have announced plans for further expansions in their nuclear power production capabilities. There will be competition for materials, and a home-grown manufacturing industry should benefit those building U.S. plants.

Whatever this country does, it is clear that nuclear power is growing elsewhere in the world. The nation would be well served if our own energy needs serve as a springboard to rebuild U.S. technology and manufacturing capabilities to something approaching the leadership the nation once enjoyed, contributing to foreign markets as well as supporting our own.

Not only does the U.S. industry need additional infrastructures to supply the components for future nuclear plants, it also needs to ensure that the skilled workforce needed to manufacture them exists. The lack of a skilled workforce is a problem that goes far beyond the manufacturing and construction segments. The nuclear industry must answer a fundamental question regarding new plants: who will run them? What are their educational qualifications? What is their training? As a regulator, the NRC has the responsibility of asking these questions, and of determining the adequacy of the answers.

The problem is a broader one than just staffing new plants. Both the nuclear industry and government are going to have difficulty even maintaining the workforce at their current facilities.

Nearly half of the current nuclear industry workers are over 47 years old, and nuclear energy companies could lose as many as 23,000 workers over the next five years – about 40 percent of the total jobs in the sector. That is a tremendous brain drain. To some degree, the knowledge is institutional and is transferable to future operations. But to a large extent, the knowledge is in the minds of older workers. How do we transfer the knowledge to their replacements, who will form the core of skilled workers as the next generation of plants starts up?

At the same time, the key suppliers to the industry – the architect/engineering firms, fuel suppliers and reactor manufacturers, anticipate that 32 percent of their workers will be eligible to retire within the next three years. Retiring workers must clearly be replaced and the existing workforce augmented if the nation is to restore its manufacturing capability sufficiently to supply the components for and to build the new plants.

I might add that the government also will be competing for the same nuclear-related skills. The NRC alone will hire 300 and 400 professionals per year through 2008 to handle the increased workload of new plant applications and other business, and to replace retirees. The U.S. Department of Energy, national laboratories, National Nuclear Security Agency and other government agencies also have urgent personnel needs.

I could quote you more numbers, but since most of them originate with Carol Berrigan, you are probably already familiar with them. The nuclear industry is working on many fronts to address this critical need – it has launched major programs to provide scholarships, establish training programs, conduct recruitment drives, and promote other activities. But I have the sense that it's just nibbling around the edges of an enormous challenge.

My background is in academia, running a university nuclear engineering program. During my time in the University of Texas program, I fought constantly against budget erosion and declining interest both by students and school administration.

Many of my nuclear colleagues at other universities fought the same fight – and some lost. The number of four-year nuclear engineering programs now stands at about 25, nationwide – down from 38 in the 1970s. That is a matter of extreme concern at a time when we need to increase the numbers of academic training programs to meet sharply increasing needs. Moreover, the potential for increased student interest has not influenced all remaining schools. Recently the University of Cincinnati announced that it would close its nuclear engineering study. Many concerned industry and government officials, I included, are hoping that they remain open.

The potential student interest is clearly there. A Department of Energy survey shows that undergraduate enrollment at 23 reporting institutions in nuclear engineering, health physics, and radiological and related fields nationwide has increased from 668 in 2001 to 1,520 last year. Graduate enrollment has risen above 1,000.

One other data point must also be taken into account in this context. The Navy nuclear program is not as large as it was in the past and will not supply the workforce in the same percentage.

In my brief tenure at the NRC, I already have spoken to events sponsored by NEI and INPO. I told them, I repeat now, and I will continue to say in my public appearances that a major industry effort is necessary to build a viable nuclear workforce and that it must address every level of education in this country, starting with a commitment to fostering the interest in science and engineering of elementary and middle school children.

We also must concentrate our efforts on women and minority students, who now represent the majority of potential candidates, but less than a quarter of the students currently enrolled in nuclear-related undergraduate programs. When I arrived at the NRC, I was pleased to note the diversity of the professional workforce. While women hold just 16 percent of our scientific and engineering positions and minorities 24 percent, I believe those numbers compare favorably with industry. More important, they are increasing and will likely continue to do so.

Scholarships, training centers, and recruitment efforts are commendable ways to steer the technically-inclined toward careers in the nuclear industry. So are beefed-up internship programs with meaningful work. And once new recruits are on board, mentoring programs will help to augment their training as we engage in generational knowledge transfer.

Every segment of the nuclear industry needs to work to increase the talent pool, though, so that we are not competing for a small number of candidates. If we all spend the next 20 years offering incentives to the same people, there will be winners and losers. And if the industry wins and the NRC

loses, or the industry wins and the manufacturers lose, we all lose. This is an issue that should be addressed, urgently, at the CEO level at every company with any involvement in the nuclear industry.

I hope that I don't sound unduly alarmist or negative. We have work to do to build an infrastructure and our workforce. But our glass is half full and not half empty. As I said, I have spent my career in the nuclear field, and I am personally excited by the possibilities ahead of us. I think the Nuclear Regulatory Commission has a very important and very positive role to play. We are gearing up for a vastly increased workload, and I am convinced that the NRC can discharge our obligation to provide rigorous regulatory scrutiny of the new reactor applications and associated duties without unnecessary delays. In fact, I believe that we will be able to reduce the lead times for regulatory approvals from their current duration while ensuring public health and safety.

I assure you that the NRC will do the hard work of creating the needed framework of regulatory stability. We, in turn, must be assured that the manufacturers, builders, owners, and operators of the projected new plants are prepared to meet their obligations to the public. When they show us good applications, we should show them a timely response.

Finally, in closing, I would like to offer a few brief observations from my brief time at the NRC.

- First, I have been very impressed by both the competence and the dedication of the staff. I have been pleased with the quality of the work I have seen. They come early, stay late, and focus on the job to be done.
- That said, the NRC itself places too much emphasis on process. I would like to see us concentrate more on progress, with no compromise on safety.
- We need to develop more milestones and deliverables, and articulate them clearly to those we regulate.
- I also would like to see the NRC focus more on real risk and less on risk that is simply perceptual.

Thank you. I will be pleased to answer your questions.

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