



# NRC NEWS

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## CHALLENGES AND OPPORTUNITIES: REGULATORY PERSPECTIVE

**Global Spent Fuel Management Summit  
Washington, DC  
Commissioner Jeffrey S. Merrifield  
US Nuclear Regulatory Commission**

December 5, 2000

### Introduction

Good morning ladies and gentlemen. It is my pleasure to address this conference today with my thoughts on the important topic of spent fuel management. Today I will focus on three distinct areas. First, I will provide my views on the state of what has become a very dynamic nuclear industry in the United States. Second, I will discuss challenges and opportunities surrounding the management of high-level radioactive waste in the United States, and specifically, spent fuel from commercial power reactors. Finally, I will share my perspective on how I believe we must do a better job leveraging our international initiatives and enhancing international cooperation in the area of spent fuel management.

### Industry Overview

As I have said on many occasions, I believe the outlook for nuclear power in the United States is arguably the brightest its been since the Three Mile Island accident. Competitive market forces have led to a resurgence of nuclear power by forcing dramatic improvements in the manner in which nuclear plants are managed and operated. Licensees have improved operator training, made significant process improvements, developed sound maintenance and corrective action programs, shortened refueling outages, and as a result, significantly increased both the safety and generation of power within the nuclear fleet. Plants are operating better than ever before, with forced outage rates at an all time low and capacity factors at an all time high. By almost any measure, most of our licensees are doing a very good job of managing the business of nuclear power in a safe manner.

The dynamic state of the electric industry is also creating many challenges for the NRC. First, the consolidation of nuclear utilities through mergers, plant sales and the formation of multi-plant operating companies has resulted in an influx of license transfers. The PECO/Unicom merger, the acquisitions by Entergy, Amergen and Dominion, and the Nuclear Management Company formed by several midwest utilities, all reflect the financial importance being placed on large nuclear fleets by our licensees. In

addition, projections indicate that the NRC will face a significant number of license renewal applications in the coming years. Earlier this year, the NRC renewed the Calvert Cliffs and Oconee licenses for another 20 years. We currently have under review the license renewal applications for the Hatch, ANO Unit 1, and Turkey Point plants. We expect to receive more than 20 applications for license renewal over the next 5 years. Based on my discussions with industry executives, I am hard-pressed to identify more than a handful of currently operating plants that may not seek to renew their licenses. Finally, I am sure you are aware that several utilities are exploring the option of building new nuclear plants in the United States. Joe Colvin, the President of the Nuclear Energy Institute, recently told a gathering in London that a new plant may be ordered in the United States within 5 years, but that conditions for doing so may be ready in as little as 2 years. In addition, commercial development of the pebble-bed technology by Eskom of South Africa with its reliance on new technology and non-traditional ways to accomplish defense-in-depth could significantly challenge the technical and licensing capabilities of the NRC. So, as you can see, the U.S. nuclear industry and the NRC face many challenges and opportunities; challenges I am confident we can overcome, opportunities I am confident we can seize.

### Management of Spent Fuel

#### HIGH-LEVEL WASTE DISPOSAL

While industry performance and the outlook for nuclear power in the U.S. has never been better, one should not underestimate the challenges presented by the high-level waste disposal issue. Clearly, for currently operating plants as well as for potential new plants, the resolution of how to dispose of high-level waste remains a priority. At several of the 62 plants I have visited in the last two years, finding a solution to the problem of limited spent fuel pool capacity is a significant issue for top executives who are trying to reach a decision regarding whether to pursue license renewal. I doubt that many would disagree that the high-level waste disposal issue is a top tier concern in the minds of those assessing the merits of new plant construction.

As you know, last April, President Clinton vetoed high-level waste legislation sent to him by Congress. While it would be inappropriate for me to comment on the merits of that decision, I doubt that many would dispute that the nuclear industry is bearing the burden for the federal government's failure to provide a repository for high-level radioactive waste. However, let there be no doubt, the next President, fairly early in his tenure, will be faced with several major decisions associated with site selection for a high-level waste repository.

DOE is the lead federal agency for the selection and development of a proposed site for a high-level waste repository. The NRC is responsible for licensing the repository after determining whether DOE's proposed repository site and design comply with EPA's environmental standards and with the NRC's implementing regulations. Although no site has been selected, Congress has mandated that DOE focus its characterization efforts on one site, Yucca Mountain in Nevada.

I am proud to say that the NRC has met all of its commitments to date and stands ready to fulfill its role associated with Yucca Mountain. The NRC's existing generic regulations for high-level radioactive waste disposal were developed in the mid-1980's and are found in 10 CFR Part 60. However, the NRC is in the process of revising its standards to apply specifically to the Yucca Mountain site and these standards will be located in a new 10 CFR Part 63 that the Commission should complete within the next month. As I am sure you are aware, there is a continuing debate between the NRC and the EPA

regarding the appropriate environmental standards for protection of human health at Yucca Mountain. While I will not go into specifics of the differences between our two agencies, this remains an issue that divides us, and one that I expect will engender renewed attention by our new President.

### CENTRALIZED INTERIM STORAGE

There has been considerable discussion, and even a few proposed legislative solutions, concerning the establishment of a centralized interim storage facility for spent fuel in the United States. Congressional action would be necessary for DOE to develop such a facility. The NRC official position, as communicated to Congress, is that centralized interim storage of spent fuel can be done safely and will allow economies of scale; but that the current storing of spent fuel at existing power reactor sites is also safe. Since the NRC would be responsible for licensing an interim storage facility, it would be inappropriate for me to take a position regarding if, or where, a storage facility should be constructed.

Absent a federal government proposal for an interim storage facility, private industry is actively pursuing some initiatives for centralized interim storage of its own. Currently, the NRC is reviewing an application from Private Fuel Storage to store spent fuel on land owned by the Skull Valley Band of Goshute Indians in Utah. The related licensing action is in the hearing process, and thus, I must demur from going into any detail on the technical or environmental issues at this time. However, I can say that the hearing on the technical issues was held last June and the hearing on the environmental issues is scheduled for mid-2001. With the current timeline, it would now appear that the NRC's Atomic Safety Licensing Board Panel could make its decision on this matter around the end of 2001 and, pending appeals, a final licensing decision could be issued by the middle of 2002. Waiting in the wings is another potential application from Nu Corp for a consolidated spent fuel storage facility in Wyoming, referred to as the Owl Creek Energy Project. The current projection for the Owl Creek license application is somewhat fluid; but the NRC is not currently expecting an application until January 2002, at the earliest. While I can't take a position on the merits of either proposal, I can say that I am committed to ensuring that these projects are reviewed by the NRC in a fair, prompt, thorough, and disciplined process.

I now turn to the main portion of my presentation, mainly casks used for storage and transportation of spent nuclear fuel. The NRC addresses storage and transport as separate regulatory functions. I will start my presentation addressing storage casks.

### DRY CASK STORAGE

The NRC regulations in 10 CFR Part 72 authorize dry cask storage under a site specific license but also allow commercial power reactors the option of using a general license if they use certified casks listed in the NRC regulations. In the past, the NRC has been criticized for having a certification process that was inefficient, untimely, and unnecessarily burdensome. Over the last several years, my fellow Commissioners and I have demanded that the staff make significant internal procedural changes as well as some regulatory changes to improve the overall regulatory program for spent fuel casks. Today, technically sound casks are being certified in a reasonable, thorough, and timely manner and we appear to have a firm grasp on the immediate task of meeting licensee needs for the short term. This is a compliment to the hard work by the NRC staff and many active stakeholders over the last several years.

Despite our recent successes, this is no time to celebrate. I firmly believe that additional process improvements are essential. The challenge of having a sufficient number of certified casks is not over as the need for certified storage canisters will certainly grow further over the next twenty years. As of August 2000, there were approximately 200 loaded storage casks containing commercial fuel in the United States. A rough estimate is that, with license renewal, by the year 2010, there could potentially be the need for almost 1,000 loaded spent fuel storage casks. In theory, you could argue that all you need is one certified cask design. But the reality in our society is that this increase in demand for certified casks will result in an increase in the number of certification applications as private industry competes for available cask orders. The NRC responsibility is to ensure the public health and safety is maintained, no matter how many applications we receive. If we are to meet these challenges, it is absolutely essential that we make additional process and regulatory improvements, while at the same time continuing to achieve our mandate of protecting the public health, safety, and the environment. I will note that NRC's Office of Research, at the request of the Office of Nuclear Materials Safety and Safeguards, is currently evaluating the application of probabilistic risk assessment techniques to storage casks. Although this effort is just in its early stages, if successful, it should aid in making the Part 72 regulations more risk informed and allow the Certificates of Compliance to be less prescriptive. Quite frankly though, that is simply not enough. In my opinion we should also reassess the way we issue our Certificates of Compliance. While I believe that it is vital that we allow sufficient time for public input, I believe we must also consider new methodologies in approving these cask certifications so that sound regulatory decisions can be made in a more timely manner, and so vendors and licensees can make non-risk significant cask modifications without the need for formal NRC approval.

In addition, there are two significant technical areas that need to be addressed: specifically damaged, or unique fuel, and burnup credit. I expect significant progress to be made in the next year in resolving both of these technical concerns. To date, the focus by both the NRC and the industry has been on casks certified for storing only normal, undamaged fuel. The NRC purposely gave priority to certifying enough casks for "normal" spent fuel to address the short term crisis of a lack of sufficiently qualified casks that we faced just a few years ago. However, I believe that now we have made some headway, it is time to focus greater attention and additional resources on cask designs associated with handling damaged fuel and fuel with unique characteristics. It would be irresponsible for the NRC to not to tackle this problem promptly, aggressively, and thoroughly to address the emerging needs of the decommissioning community.

I also believe it is time to address the question of how much credit can be allowed for the burnup of the spent fuel in analyzing criticality concerns for casks involved in either transportation or storage. Our current regulatory guidance, which is based on the assumption that spent fuel has the same characteristics as new fuel, is designed to prevent achieving criticality as a result of placing too many new fuel rods too close together in a cask. The idea behind burnup credit is that some of the individual fuel rod's excess reactivity is used, i.e., burned, during the fission process in the reactor core. By conducting a more thorough analysis which considers credit for burnup, one should be able to place the spent fuel rods closer together and still meet our requirements that prevent a criticality. Therefore, allowing credit for the burnup of the fuel could allow more fuel to be safely packaged in one cask for either transportation or storage.

I have seen projections, perhaps overly optimistic, that indicate that with burnup credit, shipments by rail could be reduced by 25 percent and shipments by truck could be reduced by 50 percent. I do not know what, if any, actual reduction will take place in the number of casks. Nevertheless, resolving this issue could result in two significant outcomes. First, from a regulator's perspective, placing more fuel

elements in each cask means that fewer casks will be shipped and therefore the overall risk to the general public may be lower because there will be fewer casks on our nation's highways and rails. As I will demonstrate later, the transportation of current casks is being accomplished safely. However, reducing the overall volume of cask shipments will further reduce the risk that a transportation accident with potentially serious radiological consequences will occur. From the industry's perspective, fewer casks results in lower costs. As a Commissioner and as regulator, my primary responsibility is to protect public health, safety, and the environment. But this includes the responsibility to ensure that our regulations do not unnecessarily hinder industry initiatives designed to increase efficiencies of their operations or provide additional safety enhancements. The Commission has directed our staff to give a higher priority to the resolution of concerns associated with allowing burnup credit, and the staff has been actively engaged with industry and our international partners on this effort. Currently, the NRC allows some credit for burnup, but with some fairly severe restrictions. This month (December), the NRC Office of Research is scheduled to issue draft guidance for public comment which will reassess some of the current major NRC restrictions on burnup credit. I intend to closely monitor the staff's progress in this area, and it is my hope that we can work through these issues in an expeditious manner.

All of the NRC efforts to improve the regulatory process and address technical issues associated with dry cask storage will be for naught if industry fails to uphold its responsibilities in this area. Industry cannot afford to repeat its mistakes of the past. There have been entirely too many instances where casks have had design deficiencies, such as incompatible materials resulting in generation of hydrogen gas; others where the casks have been improperly maintained, such as inadequate weld repair documentation; or instances where casks were improperly loaded with fuel without adequate procedures in place to unload the cask. Until about a month ago, industry could have argued that poor performance was a thing of the past; however, in November, we learned that a cask at the Palisades plant in Michigan was improperly loaded with fuel that had not been in the spent fuel pool for the minimum required period of five years. Clearly, events such as this only serve to undermine public confidence in the industry and in the NRC; and, in light of efforts to receive credit for high burnup, are absolutely unacceptable. Industry must demonstrate more initiative to ensure casks are properly designed, constructed, maintained, and loaded with fuel, and simply cannot afford to repeat the mistakes of the past.

Do not get me wrong, I believe the vast majority of the nuclear cask industry is currently doing a good job managing their product. But when the number of loaded dry casks are projected to increase by a factor of five over the next ten years (i.e., 200 loaded casks in August 2000 and a projected 1,000 loaded casks in 2010), good performers must not become complacent and allow the quality of their product or procedures to decline to unacceptable levels. Those that cannot live by the highest standards have no business operating in this industry and, quite frankly, pose threats to even the best performers in the nuclear arena.

## TRANSPORTATION

Now I will turn the discussion from casks used for storage and focus on casks used for transportation. The industry record to date for transportation in the United States of spent fuel has been very good. From 1979 to 1997 there were approximately 1,300 commercial shipments of spent fuel transported in the United States. Roughly 1,453 metric tons of spent fuel was shipped 850,000 miles during this time frame. However, there were only four transportation accidents involving loaded spent fuel casks through 1997. Of those four accidents, three were trucking accidents with loaded spent fuel casks, and one was a train accident with a cask loaded with the Three Mile Island core debris. Of these four

accidents, only one cask (on a truck) suffered some damage only to its outer surface, but in no instance was radioactive material damaged or released. By any measure, this is very good performance both by the transportation industry and the transportation casks.

Although the history of transportation casks in the United States is a record of clear success, neither the industry nor NRC can rest on its laurels. One should not underestimate the critical role that public confidence will have on the future of the nuclear program. I fully expect that as the nation comes closer to a decision on whether or not a permanent high-level waste repository should be licensed at Yucca Mountain, issues associated with the transportation of spent fuel will be a top public concern from a national perspective. Even with the past record of accomplishments, there is a valid concern being raised that all of the spent fuel shipments to date in the United States are only a very small fraction (3% or less) of the number of shipments that will need to be made once a final repository is licensed for spent fuel, no matter where the repository is located. When these shipments occur, both the industry and the NRC will need to be ever diligent to ensure that appropriate licensing standards are maintained; that casks are constructed, loaded, and maintained properly; and that transporters, i.e., truck drivers and train engineers, remain responsible for their actions. We cannot afford to lose confidence on the safety of spent fuel transportation because the costs associated with losing public confidence cannot be overstated.

As part of our effort to address Yucca Mountain issues, I strongly believe that the NRC and the industry need to do a better job communicating with the public and other stakeholders along proposed transportation routes to ensure we are adequately addressing their concerns. I take our public responsibility in this area very seriously, and I challenge both our staff as well as industry to be fully committed toward responsibly, thoroughly, and honestly answering their questions and addressing the concerns of the public who live and work along the proposed transportation routes. I assure you that shortcuts will only lead to time consuming problems for our agency and for the industry for many years to come.

Since this is an international conference, the final portion of my presentation will briefly touch on a few observations I have had as a result of my recent foreign visits.

### International Involvement

The international management and regulation of nuclear materials is occurring in a very dynamic marketplace. For example, the reprocessing of spent fuel is becoming more common on an international basis even though there are significant nuclear non-proliferation issues to address. Both Russia and the United States are actively negotiating the down-blending of weapons grade nuclear stockpiles to produce mixed oxide fuel for commercial power reactors. Russia has recently announced that it will consider accepting spent fuel for disposal on an international basis and some countries are entertaining this as a method to address spent fuel management concerns. International shipments of spent nuclear fuel are occurring more frequently. Some countries are shutting down their nuclear programs, but these same countries have major corporations that want to remain active in the nuclear industry. Clearly, these are major challenges that face the industry, challenges that affect both technical concerns as well as public confidence on the international level.

To address these technical challenges, there are multiple research programs in progress. An area where I personally place a high priority is on leveraging our limited financial resources through increased international cooperation in research affecting the nuclear industry. Countries such as the United

States, Sweden, Finland and others are actively sharing information on permanent nuclear waste disposal activities. In addition, there are internationally sponsored research efforts, such as the Halden Reactor in Norway, which I visited last July, where countries are pooling their resources on common research goals and reaping common research benefits. To date, France has been a leader in research on the use of mixed oxide fuel (MOX); and as time goes on more countries are getting involved in this effort. I have visited the MOX fuel production facilities in France and I have also observed and handled MOX fuel during a visit I made to Chalk River in Canada. It is clear to me that as we attempt to address the issues of plutonium disposition in the United States, potentially through the use of mixed oxide fuel, we will need to look to our international partners for insights and assistance. In addition, the Japanese are conducting extensive research on high burnup fuel, which is directly related to matters being evaluated by the NRC. These are just a few examples of areas where I believe that it is essential that international cooperation could result in significant benefits for each nation involved.

There are several areas where I believe the U.S. should continue or increase its efforts over the next several years within the international community.

- ! First, we should enhance the dialog between the U.S. and our international counterparts on spent fuel storage and disposal issues. We have much to learn from our counterparts on how to deal with these matters. Clearly, the technical issues and public concerns are similar, and how we address them should rely on common solutions. We simply must find a way to capitalize on the best practices in the international community so that we may forge consensus on international solutions.
- ! Second, as I have stated on many occasions, we must leverage our limited research budget and expand our cooperative efforts to share research with our international counterparts. For example, there is no reason why each country should have to reinvent the wheel on the safety issues associated with spent fuel cask designs. The fact remains that this technology is not extraordinarily complex and the differences between one fuel and another simply do not justify significant differences in how we regulate the casks.
- ! Third, we must work cooperatively with the IAEA and other international partners to foster a more efficient process for the design and licensing of new generations of dual purpose cask systems. As one would expect, a more efficient process should maintain the protection of the public health and safety as its highest priority, but it should also seek to reduce unnecessary burden and avoid unnecessary regulatory hindrances to innovation. The issue of cask safety is one that we could easily overstudy. We need the discipline and foresight to recognize when we have conducted enough research and to move forward with regulatory standards and make regulatory decisions with reasonable assurance that the public health, safety, and the environment will be protected.
- ! Fourth, we must capitalize on the inherent momentum of the information age to improve international cooperation and our ability to communicate effectively with our respective stakeholder groups. The fact is that when these casks make their way into interstate commerce, either by road or rail, it will result in a larger percentage of our public coming in close proximity to spent fuel casks. Although this is not in itself a health and safety concern, we must recognize the increased challenges to public confidence that this represents; and we must take appropriate steps to enhance the public's confidence that their regulatory bodies are being vigilant in protecting public health, safety, and the environment.

## Closing:

In closing, I would like to reiterate that these are very dynamic times for the NRC and the nuclear industry associated with casks, and the future promises to be even more dynamic. As I have outlined, even with our current successes, there are still many challenges on the horizon. In order for the nuclear industry and the NRC to successfully meet these challenges and to seize these opportunities, our visions of the future must benefit from the lessons of the past. Communication of knowledge on an international level is expanding at an unprecedented rate and the nuclear community must keep pace with these advancements. In these dynamic times, cooperation on an international level, for all of the reasons I previously listed, is absolutely vital.

I want to thank you for giving me this opportunity to share some of my thoughts this morning. At this time, I'd be pleased to address any questions you may have.