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Policy Matters That Affect Your Business

In This Issue...

The U.S. Energy Department's used nuclear fuel management program is under new leadership. New approaches to the fuel cycle are afoot, and the federal government still is responsible for managing used fuel from commercial nuclear power plants. The national repository at Yucca Mountain, Nev., has broad support but vocal opponents. Given these complexities, what can the nuclear energy industry expect next? This issue of Nuclear Policy Outlook answers that question.

Nuclear Energy's Growth Prospects Drive New Strategies for Used Nuclear Fuel Management

In four decades of nuclear technology experience, Acting Undersecretary of Energy Dennis Spurgeon has advised a U.S. president, served as a senior industry executive and a reactor developer. But these experiences pale in comparison to the opportunity and challenges that confront Spurgeon as chief nuclear technology officer for the federal government.

*Dennis Spurgeon*

Well-schooled in nuclear engineering at the U.S. Naval Academy and the Massachusetts Institute of Technology, Spurgeon served in the U.S. Navy before beginning his civilian career. He managed the N-reactor at the federal government's Hanford site, advised President Ford and Atomic Energy Commission Chairman Glenn Seaborg on nuclear matters, and, more recently, served as chief operating officer at USEC Inc.

"To have the chance to make a meaningful contribution to the rebirth of nuclear energy in the United States is a once-in-a-lifetime opportunity," said Spurgeon, now the acting undersecretary of energy and assistant secretary for nuclear energy.

Spurgeon is the first assistant secretary for nuclear energy in more than a decade. The recreation of the position in 2005 was in itself a statement on the resurgence of nuclear energy in America. Spurgeon's ultimate challenge, however, is as point man on the administration's policy to develop advanced used nuclear fuel recycling in the United States. Capturing a significant percentage of the energy content remaining in reactor fuel after it has been used once seems only logical in this era of recycling, but it comes with certain political, technological and economic challenges.

The federal government has the legal and contractual responsibility to take full responsibility for, and dispose of, used fuel from commercial nuclear power plants. The government's plan of record is to develop a national repository for the disposal of commercial used fuel and high-level radioactive defense waste at Yucca Mountain. The repository has encountered delays and funding shortfalls, yet the administration has taken concrete steps over the past two years to move the program forward. Even with a change in policy to review the option of recycling used nuclear fuel, continued progress toward licensing Yucca Mountain is vital.

Fast-growing electricity demand and nuclear energy's role in reducing greenhouse gases are prompting strong bipartisan support for expansion of nuclear energy and leading policymakers and industry leaders to consider new approaches to the nuclear fuel cycle. Putting the government's used nuclear fuel management programs on the right path, Spurgeon said, is one of his top priorities.

Key Elements of Integrated Used Fuel Management Strategy

- ▶ Interim storage until recycling or permanent disposal—or both—are available
- ▶ Research and development of advanced fuel treatment technologies
- ▶ Developing a permanent disposal facility

“The priority for the industry is for the government to live up to its responsibility to manage commercial used fuel.”

— Scotty Hinnant
 Senior Vice President and
 Chief Nuclear Officer
 Progress Energy

USED FUEL SAFELY MANAGED ON SITE

Used fuel is safely managed at nuclear plant sites today and can be stored there for up to 100 years, according to the Nuclear Regulatory Commission. Although the Department of Energy has yet to remove used fuel from nuclear plant sites and is creating a multibillion-dollar liability for the federal government, it is not a roadblock to new nuclear plant construction. In fact, the nuclear renaissance has contributed to the emergence of a new policy on the entire nuclear fuel cycle—leading to a comprehensive program for advanced recycling of used fuel in a responsible way.

The nuclear energy industry advocates a comprehensive strategy that maximizes the energy content in the uranium fuel yet demonstrates convincingly that the government will manage the byproducts of the process. Such an integrated strategy includes three key elements: interim storage until recycling or permanent disposal—or both—are available; research and development of advanced fuel treatment technologies; and developing a permanent underground disposal facility.

“The priority for the industry is for the government to live up to its responsibility to manage commercial used fuel,” said Scotty Hinnant, senior vice president and chief nuclear officer at Progress Energy.

Centralized interim fuel storage at one or more sites could be an effective short-term option leading to one of two paths—recycling used nuclear fuel if new proliferation-resistant technology is developed by DOE or direct disposal at Yucca Mountain.

DOE is developing advanced nuclear fuel treatment technologies that could allow for recycling and reuse of used fuel while reducing proliferation risks. This advanced recycling could vastly decrease the heat, volume and radiotoxicity of byproducts that must be stored at Yucca Mountain and obviate the construction of additional repositories.

Congress has funded this technology development for several years. For fiscal 2008, DOE is requesting \$395 million in funding for the research, development, demonstration and commercialization of these technologies. This Advanced Fuel Cycle Initiative will take years and billions of dollars to accomplish. DOE is seeking public-private partnerships to carry out the effort.



Edward Sproat

Meanwhile, progress toward a repository has been delayed by political, legal and funding challenges, and has experienced numerous course corrections.

DOE is working to reinvigorate the Yucca Mountain project under another former industry executive, Edward “Ward” Sproat, director of the Office of Civilian Radioactive Waste Management since last year.

In March, the administration sent a legislative proposal to Congress nearly identical to a bill submitted last year. This legislation would allow for expansion of the Yucca Mountain facility, resolve regulatory issues related to the project and help facilitate its development. It also contains used fuel management provisions relating to new nuclear plant construction. However, as of this writing, no member of Congress has introduced the legislation.

MAINTAINING THE FOCUS ON YUCCA MOUNTAIN

Used fuel recycling aside, the Yucca Mountain project will face challenges even if a member of Congress introduces the administration’s legislation. No doubt, it will face tough opposition from Senate Majority Leader Harry Reid (D-Nev.), a longtime

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 Acting Undersecretary
 Department of Energy

opponent of Yucca Mountain. As the Senate’s top Democrat, Reid wields considerable influence and has pledged to use it to stop the project.

DOE remains committed to the Yucca Mountain project and to submitting a license application for the repository no later than June 2008. “The plan to develop Yucca Mountain has not changed. The idea that we need a repository has not changed,” Spurgeon said. “There has been no change to DOE’s commitment to accept used fuel.”

In DOE’s best-case scenario, the Yucca Mountain facility would open in 2017. However, Sproat has told Congress that 2021 may be a more realistic estimate. Originally, the agency was to begin accepting used fuel in 1998, and Spurgeon acknowledges that the repeated delays associated with the repository have saddled the project and DOE with a “credibility issue.”

“We need people to have confidence that the management of used fuel is something we can do now and as we move toward the future,” Spurgeon said. By focusing on permanent disposal at Yucca Mountain, “we have taken the harder route,” he said. Other nations have moved used fuel to interim storage facilities while developing repositories using a different approach than the United States.

Two-thirds of Americans support the continued development of Yucca Mountain as long as it meets NRC regulations, according to an April survey by Bisconti Research Inc. of 1,000 U.S. adults. The public is even more sanguine on recycling. Seventy-seven percent said that U.S. plans to recycle used fuel to make more electricity and reduce the amount of nuclear waste would make them more inclined to support new reactor projects.

DOE’s inaction has led to numerous lawsuits by the industry against the federal government for breach of contracts it signed with electric utilities to manage used fuel. Courts have awarded judgments to utilities in six cases. Sproat estimates that the total cumulative liability will be \$7 billion if the repository opens in 2017. Each additional year of government delay will cost taxpayers some \$500 million as a result of the continuing breach of contract.

Despite the court actions, industry leaders say the status quo is unacceptable.

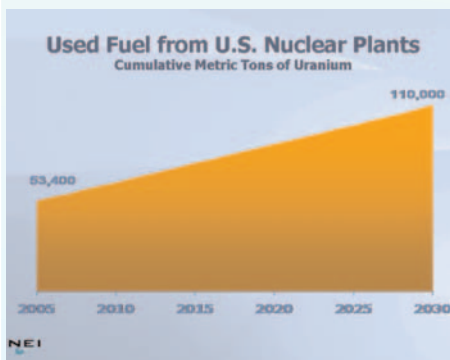
“Even if we can recover our cost, that does not yield the long-term answer to managing used nuclear fuel,” Hinnant said. “While you can store it safely at our plant sites, storing the material at one or two locations is better than leaving it at many sites across the country.”

Spurgeon stressed that his goal is to put a spotlight on Yucca Mountain to address the needs of the program and move it forward. “A good program can stand the light,” he said.

By law, the capacity of Yucca Mountain is artificially constrained to 70,000 metric tons of fuel or high-level radioactive waste. The legislative proposal by the Bush administration would remove that statutory limit. America’s nuclear power plants already have produced more than 55,000 metric tons of used fuel. In addition, DOE plans to deposit high-level radioactive waste from defense programs at Yucca Mountain. Under the current capacity limitation, Yucca Mountain’s entire capacity will be committed before the repository opens.

An independent analysis by the Electric Power Research Institute last year found that the actual safe capacity of Yucca Mountain is six to nine times greater than the 70,000-metric-ton limit, assuming direct disposal of used fuel. Using advanced fuel cycle technologies, which would reduce the volume and radiotoxicity of the waste, a single, expanded national repository could be sufficient until the next century.

“Over the long term, we need to recycle nuclear fuel—the same way we recycle





Yucca Mountain, Nevada

“If DOE were to take used fuel from one site, it would provide proof of the principle that the government will meet its commitment.”

— Alan Hanson
Executive Vice President
AREVA

newspapers or aluminum cans. In the end, it gives us less material to deposit in the repository,” Spurgeon said.

DOE expects to spend \$447.5 million on Yucca Mountain in fiscal 2007 and has requested \$494.5 million for the program for fiscal 2008. Beginning in fiscal 2009, however, funding could near \$2 billion per year. According to DOE budget estimates released in March, the cost of developing and operating the repository will total \$26.9 billion between fiscal 2009 and 2023. Most of this funding will be provided by the Nuclear Waste Fund, financed by a surcharge of 1/10 of one cent per kilowatt-hour on all nuclear-generated electricity, not by taxpayers.

Construction of a repository is not a prerequisite to new reactor construction, but policymakers must have confidence that policies are in place that ensure the safe and secure disposal of used nuclear fuel. The NRC uses a “waste confidence” determination in considering used fuel management issues for new-reactor licensing.

A provision in the administration’s legislative proposal would have Congress declare its confidence in used fuel management as a matter of national policy. As a result, the NRC would not have to make a public policy waste confidence ruling as it licenses new reactors. The NRC has endorsed this approach.

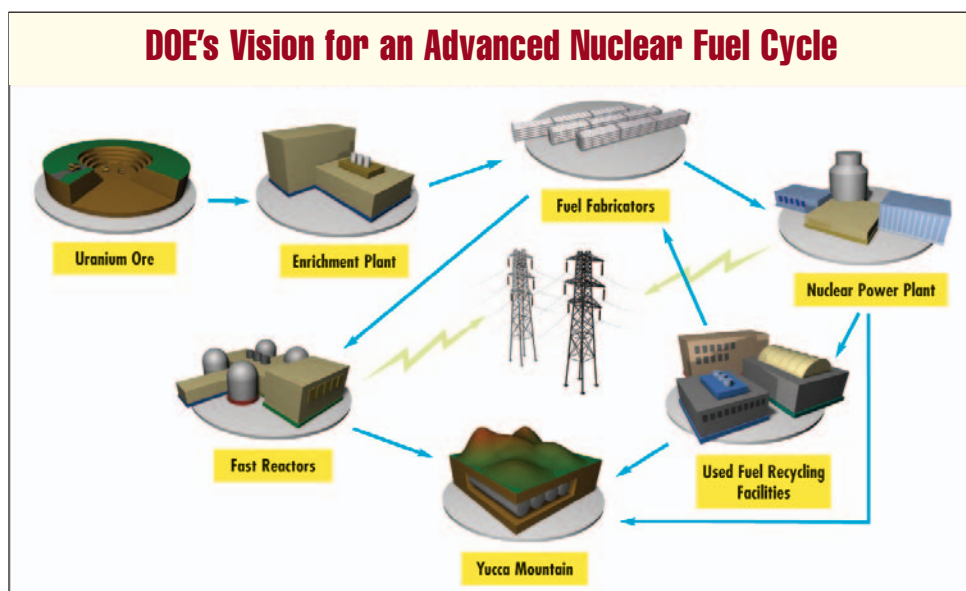
“The industry believes that this confidence already is evident in national law for managing used fuel. By underscoring and reaffirming this confidence, Congress can prevent frivolous legal actions that could slow the completion of new reactors,” said Alex Flint, senior vice president for governmental affairs at the Nuclear Energy Institute.

REDUCE, REUSE, RECYCLE

Even if the United States recycles used fuel, a repository is still necessary for the disposal of byproducts. Nations such as France that reprocess fuel also are developing repositories.

One advantage of the French model is that used fuel is moved directly from the small used fuel pools at the reactors to storage at the reprocessing facility at La Hague, which is operated by AREVA. “Consequently, stakeholders see the fuel leaving the plant sites,” said Alan Hanson, executive vice president of AREVA’s U.S. subsidiary.

DOE has been holding public hearings in 11 communities from South Carolina to New Mexico interested in hosting an advanced fuel cycle facility. Such facilities would



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include interim storage facilities, advanced recycling, advanced fuel fabrication and perhaps advanced reactors.

The industry supports the development of advanced fuel treatment facilities and interim storage facilities and encourages DOE, in the near term, to develop a flexible, phased and sustainable program to pursue this goal.

In the medium term, the industry expects DOE to move used fuel to one or more temporary storage facilities, preferably located at volunteer sites adjacent to advanced fuel cycle facilities.

The industry broadly supports a centralized storage facility until the repository or recycling is available. Hanson adds that even a nominal program to begin moving used fuel would help build public confidence. "If DOE were to take used fuel from one site, it would provide proof of the principle that the government will meet its commitment," Hanson said.

Community opposition could be a roadblock to establishing an independent storage facility site, Hanson noted. DOE's approach of seeking volunteer communities willing to host a storage facility in conjunction with an advanced recycling facility is one way of addressing this concern.

BUILDING TOWARD THE FUTURE

Even as DOE moves forward with the NRC licensing process to build the Yucca Mountain facility, finding the optimal management structure for the project is another major challenge.

"How does the government put a structure in place to ensure that a used fuel management strategy will maintain momentum from one administration to the next?" asked Progress Energy's Hinnant. "Perhaps setting up a public-private model like those used for the national laboratories would be better suited than DOE to manage the Yucca Mountain program."

NRC Commissioners Edward McGaffigan and Jeffrey Merrifield proposed a similar approach recently.

Merrifield agrees that reconsidering the project's management structure may be in order. "We need to follow the course of our counterparts in Sweden and Finland and create a public-private partnership to bring this issue to a final resolution," Merrifield said at an NRC conference in March.



Scotty Hinnant

Some congressional observers say attention may turn to used fuel management issues later this year. Consideration of climate change legislation is bolstering the re-examination of nuclear energy in Congress and in state legislatures because it is the only expandable baseload electricity source that does not produce greenhouse gases.

Government and industry leaders view the drive toward building new plants as a major factor in resolving used fuel management issues. "Clearly a resurgence of nuclear power brings a focus on used fuel management," Spurgeon said.

The industry also plays an important role in helping the public understand the importance of nuclear energy to our nation's energy future.

"Unless the country sees the importance of building new nuclear plants, then it is difficult to convey the importance of addressing used fuel management issues," Hinnant said. "From the perspective of the public, we need to communicate better the connection between new nuclear plants, the benefits of nuclear power, and the importance of plausible sustainable progress toward managing used fuel."