

A report on the 2001 ANS Executive Conference on Nuclear Facility Decommissioning and Used Fuel Management.

Engaging and Exchanging in Connecticut

It's a safe bet (a little casino joke there) that attendees at the American Nuclear Society (ANS) Executive Conference on Nuclear Facility Decommissioning and Used Fuel Management, held July 8–11 at Foxwoods Center in Mashantucket, Conn., found enough excitement during the meeting's tours, social events, and technical sessions to keep them away from the lavish Foxwoods casinos (if they *wanted* to be kept away, that is).

Russell Mellor, president and CEO of Connecticut Yankee (CY) and Yankee Atomic Power Co., served as general chair of the conference. Mike Cavanaugh, communications manager at CY, was program chair, and serving as technical program co-chairs were Richard Sexton, health and

safety manager at CY, and Stephen Routh, D&D market sector manager for Bechtel Power Nuclear. The meeting theme was "Engaging and Exchanging for Safety: How to Share in a Competitive Environment."

The conference began with a tour of the CY plant, which is being decommissioned. After a lunchtime clambake and lobster feast, the majority of the attendees enjoyed a river cruise, while a few hardy souls hopped on another bus and traveled to the Millstone nuclear station, where they toured the shutdown Unit 1. Technical sessions began on Tuesday and extended through Wednesday afternoon.

THE KICKOFF

Greta Dicus, a commissioner with the U.S. Nuclear Regulatory Commission, commented first on the meeting theme, noting that the NRC doesn't consider itself part of a competitive environment—"with the possible exception of the EPA," she added wryly.

Recalling the agency's increasing focus on decommissioning since the early 1990s, Dicus stated that today, given the increasing interest in plant relicensing, it appears that fewer stations will experience early or end-of-life decommissioning. "Does this mean the NRC should stop focusing on decommissioning?" she asked rhetorically. Not at all, she reassured the audience, because there *are* decommissioning plants.

There are currently many technical issues with decommissioning that concern the NRC, Dicus said. One issue she expounded on was the possibility of zirconium fires in the spent-

fuel pool. If all the water in a pool is lost suddenly (because of a seismic event) and all refill routes are lost as well, fire risk can be considerable. "It's a very low probability event with very high risk factors," she said.

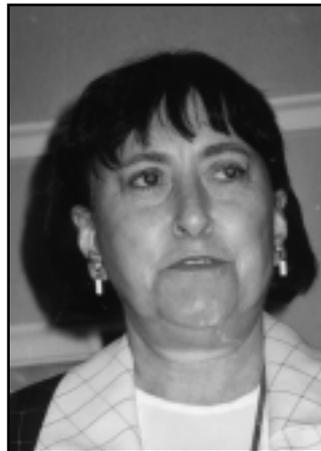
Other issues she addressed included waste management and spent-fuel storage. On the problems regarding low-level waste, she stated that the compact system in the United States does not work, has never worked, and probably never will work. This could affect whether a site can be decommissioned in the future, she said, and could affect routine operations as well.

During the question period after her presentation, an audience member noted that it currently takes 18 months to achieve an amendment to a design for a dry spent-fuel storage cask, the same amount of time that it takes to renew a nuclear power plant license. Dicus responded that the agency should be able to streamline the process in the future.

Samit Bhattacharyya, chair of the ANS Decommissioning, Decontamination, and Reutilization Division, gave an overview not only of the division, but also of the status of decontamination and decommissioning (D&D) work worldwide. There's a lot going on outside of the commercial arena these days, he noted. For example, 50 percent of the world's research reactors have been shut down, and there are 2700 facilities of various



Russell Mellor



Greta Dicus

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sizes on the U.S. Department of Energy's D&D list. The D&D landscape is changing, he said, in that commercial activity will decrease as the current generation of decommissioning plants completes the work, but the other elements in the landscape should remain steady.

In view of the changing world of D&D, Bhattacharyya said, the division plans to place greater emphasis on reutilization, to integrate its activities closely with overall nuclear development, and to promote closer links among commercial, government, and international D&D activities.



Samit Bhattacharyya

PROJECT UPDATES

CY and Yankee Row

Ken Heider, vice president of Operations and Decommissioning for CY and Yankee Rowe, gave the first of several updates on various commercial and federal decommissioning projects around the country. In the case of CY, Heider stated that current issues the project is dealing with include high alphas (compared to the beta and gamma contamination on-site) and the greater-than-Class-C (GTCC) waste-cutting campaign just completed. The plant used abrasive water jets to cut up these internals, one of the first applications of this technology in this area. The technology "still needs some work," Heider said, and CY has been left with a lot of debris to clean up from the operation.

One other major issue at CY is the siting of the independent spent-fuel storage installation (ISFSI). Construction of the ISFSI is currently on hold, pending resolution of several issues with the local zoning board.

A small area of the site is probably going to be used for a 750-MW gas-fired station to be run by AES. There are still a few issues to be resolved before the site turnover can take place, Heider said, including partial site release of about 30 acres

of the site to AES, integration of D&D and construction activities, and final location of the ISFSI. Most of the remaining portion of the site, along the Connecticut River, will not be developed, but will be used for conservation.

At Yankee Rowe, further along in its D&D work, the mission today is moving fuel to the ISFSI.

Other than that, the decommissioning work is nearly complete. Some buildings are still standing, but they are empty and the concrete has been scabbed. D&D activities will resume once all the fuel has been moved.

RFETS

Dave Shelton, from the Rocky Flats Environmental Technology Site (RFETS), noted that in 1995 the DOE initially estimated that closure of the site would take 60 years and cost \$36 billion. Today, he said, Kaiser-Hill, the cleanup contractor, is working toward a cleanup deadline of December 2006 at a cost of under \$4 billion. Between now and closure, he said, "more D&D work will be accomplished at Rocky Flats than anywhere else in the world." The site is also shipping more

radiological waste to disposal sites than any other site in the nation—or in the world, he suspects. They hope to work up to between 12 and 14 shipments per week to the Waste Isolation Pilot Plant by year's end and to maintain that rate afterwards. One key challenge to closure is getting consistent availability of approved sites to take RFETS waste. "We need places to send our materials," Shelton said.

Maine Yankee

Wayne Norton, president of Maine Yankee Atomic Power Co., said that the company's mission is to have the Maine Yankee plant fully decommissioned by the end of 2004. The work is about 50 percent completed, he said, and all large components except the reactor vessel (RV) have been shipped offsite. The GTCC cutting is completed as well, and the RV is ready for removal. Fuel loading was scheduled to begin in August, he said, and the RV should be shipped to Barnwell in the winter of 2001–02. Building demolition will follow in 2003, and the 150 million pounds of concrete remaining after demolition will be shipped offsite. The final site survey and grading is scheduled for 2004. Decommissioning costs remain on target, he said.

Big Rock Point

Cost estimates at the Big Rock Point Restoration Project have risen about \$75 million to about \$401 million, reported Kurt Haas, site general manager. But the project remains slightly ahead of schedule, he said. The site is looking to ship its reactor vessel in 2003, to complete building demolition in 2004, and to conduct the final survey in 2005.

One aspect of a decommissioning project that Haas specifically addressed was worker morale. Recognizing that the D&D work is a project where the employees are working themselves out of a job, he said, the site makes sure it puts a positive spin on the work being done. One way they do this is to "celebrate successes," spending "about \$100 000 a year on these celebrations," which give workers an opportunity to demonstrate pride in their work.

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Trojan

Mike Lackey, general manager of engineering and decommissioning for Portland General Electric's Trojan plant, commenting on previous presentations on reactor internals cutting operations, stated that the best thing the industry could do for the next generation of decommissioning plants is to eliminate the need to cut out the reactor internals. Trojan benefited from its location in the Northwest Low-Level Waste Compact and access to the LLW disposal site operated by US Ecology on the Hanford Site in Washington State. This site, unlike the Barnwell, S.C., site, allowed the disposal of the Trojan reactor vessel with its internals intact. But only one plant currently operating—the Columbia plant operated by Energy Northwest—will benefit from this type of disposal.

Turning to decommissioning progress at Trojan, Lackey said that the "Field of Dreams" approach ("If you build it, they will come") to ISFSI building didn't work for Trojan, which lost about two years on its schedule for fuel movement because of problems with Sierra Nuclear casks and with basket coatings. The plant now hopes to begin fuel movement in September 2002, with plans for the operation to be completed in the fall of 2003. The plant is now going with a hybrid approach in spent-fuel storage, Lackey said, using BNFL concrete casks and Holtec canisters.

Rancho Seco

Steve Redeker, manager of plant closure and decommissioning at Rancho Seco, compared the decommissioning work at his plant to eating an elephant. "How do you eat an elephant? One bite at a time." The Rancho Seco decommissioning schedule covers a longer period than other currently decommissioning plants; the utility envisions being finished around 2008. This low-level effort is being driven primarily by funding constraints, Redeker said. At the end state of the decommissioning process, many plant facilities will remain onsite, for possible use by a 1000-MWe gas plant now in the planning stage.

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San Onofre-1

Mark Price, manager of decommissioning programs at San Onofre-1, noted that the original plan for the unit, shut down in November 1992, was to put it in SAFSTOR condition. The utility planned to wait until the other two units on the site shut down and then decommission all three at once. This plan changed in 1997, when the utility decided that immediate decommissioning would lower fuel storage costs. Also, costs of LLW burial were a known factor in 1997, compared with unknown disposal cost many years into the future.

Future milestones on the project include the following: large component removal in 2002-03, ISFSI loading in 2004, and structure and building removal in 2008.

Among the lessons learned thus far in the decommissioning process, Price cited three: First, asbestos may be "lurking" in unsuspected areas—they even found some on underground tanks, he stated. Also, industrial safety requires vigilance on the part of everyone. Finally, he said, industry information exchange among the projects around the country has been beneficial.

WHAT'S IN THE REGS?

A session on regulatory hot topics began with a look at the NRC's NUREG-1738 on decommissioning spent-fuel pools. Mike Meisner, from Maine Yankee, noted that the rule represents a major step backwards in many areas. As an example, he cited the emergency preparedness portion of the rule, which envisions eliminating offsite emergency planning after five years. Today, he said, most plants do it in two years. On the other hand, he noted, the rule recommends insurance relief after only 60 days from shutdown (to account for iodine decay). Compare the 60 days to the five years, he said. Where is the consistency

here? he asked. The rule, he said, is neither risk informed nor based on defense-in-depth.

The NRC staff must do it right, Meisner said. Since there are no new decommissionings in the pipeline and the rule will not affect plants currently being decommissioned, they have the time to get it right. Otherwise, he said, the cost of meeting the new rule may be so high that a plant just beginning decommissioning may choose not to work under it, but will choose the exemption route instead.

Paul Genoa, from the Nuclear Energy Institute, echoed Mike Lackey's comments on reactor vessel internals: "Why are we cutting this stuff up and removing it?" he asked. A reactor vessel is the most robust container possible for this material. And, he continued, if we have to cut it up, what size pieces should we have? Decommissioning plants need a hint here as they try to integrate the GTCC into their plans, he said. The current practice of cutting reactor internals into pieces and placing them in assembly-sized containers is a huge expense and a radiological challenge.

The DOE, Genoa said, is looking into alternatives for GTCC disposal. Disposal of GTCC has been factored into the Yucca Mountain environmental impact study, but the department is looking at alternatives as well. One very real fear that decommissioning utilities have is that the DOE may not take the GTCC at the same time it takes the spent fuel, leaving utilities with the burden of storing GTCC long after the fuel has left the site. Thus, Genoa concluded, the GTCC issue must be closed out during the current round of decommissioning, before the next one begins.

SHARING INSIGHTS

Clegg Crawford, who led the decommissioning effort at Fort St. Vrain, noted that the biggest challenge for anyone involved in decommissioning work is communication—whether local, with state and federal governments, with the media, or with the NRC. And there is a major lack of communication among DOE sites. For example, he said, the Savannah River Site has no idea what Rocky Flats is doing, and Rocky Flats "is leading the industry in many, many areas." In addition, for the

most part, the DOE is not communicating with the commercial decommissioning projects, and so advances or cutting edge technologies used at a commercial site may never be tried at a DOE site, and vice versa.

But sometimes even communicating well will not save you from one pitfall of decommissioning work: whistleblowers. Decommissioning is a "whistleblower opportunity," he said. As you lay people off, he explained, some of them will use the whistleblower route to fight it. Thus, he said, good communications are mandatory, and you must outline work needs and required staffing levels continuously and make that information readily available. Doing this won't completely stop the whistleblower efforts, but it can keep them manageable.

James Reinsch, president of Bechtel Power Nuclear, looked at decommissioning projects from the standpoint of whether they make good "lump sum," or fixed price, projects. His answer—"maybe." There are many issues in decommissioning that are not yet clearly defined, including the effects of local politics and the current regulatory situation, and anytime you have issues not clearly defined, he said, that's not good for the lump sum.

"Every Project a Success"

Bob Thomas, from the Electric Power Research Institute (EPRI), reported that a major focus of EPRI programs in the area of decommissioning is to "capture the lessons learned from organizations already involved in decommissioning." He foresees a 15- to 20-year lull in decommissioning starts, so the industry must make an effort to capture what was done right and what was done wrong in the current work so that we don't have to reinvent the wheel.

But according to Thomas LaGuardia, president of TLG Services Inc., the problem with efforts to capture such information is that many organizations want to put only their best foot forward, to prove to regulators or upper management that they have the project well in hand. Thus, he said, when they make a report, it turns out that "every project is an outstanding success." Even if problems are encountered, they are "minor." Or else, problems are reported in terms of a company's outstanding ability to solve

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them. Thus, detailed technical information of root causes and resolution may be lacking. Little constructive information can be exchanged in this kind of environment, LaGuardia said.

Vendors and subcontractors especially can fall into this trap, since future business depends on good current performance. Vendors also often prefer to consider problems and solutions as proprietary information; after all, they point out, "You don't want to train your competition."

LaGuardia said one solution to this problem would be a national or international database similar to the one the European Commission has organized on nuclear installation decommissioning. This database tracks activity worker hours, exposures, waste quantities, and costs from all international decommissioning projects, whether for power or research reactors or for process facilities.

WASTE CHARACTERS

Instead of waste *characteristics*, one session focused rather on *waste characters*, as panel chair Paul Genoa termed them. These characters are executives from companies involved in all aspects of the nuclear waste management industry, from LLW to spent-fuel storage. They told about where their companies were five years ago, where they are now, and some looked into the future as well.

Positive Change

Bob Prince, president of the waste processing company Duratek, noted that five years ago, his was a \$40-million company, compared to its status today as a \$300-million company. "We have experienced a huge change, but a positive change," he said. As customers have consolidated, he commented, vendors have consolidated as well. (Duratek has purchased several other waste processing and management companies in the past five years.)

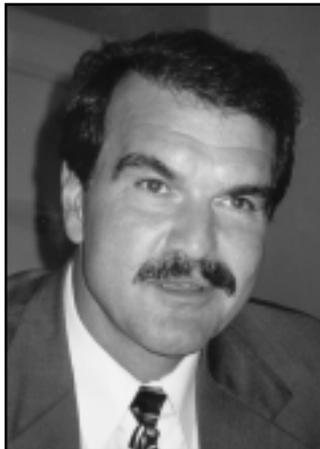


Bob Prince

But Duratek's growth has not been completely trouble-free, Prince said. In response to a question on the projected decline in the amount of decommissioning wastes (as operating plants that once thought about shutdown and decommissioning instead look at relicensing and continuing operation), Prince said that the decommissioning waste had been a good news/bad news situation. "The growth has been so great," he said, "that the company has had trouble dealing with it."

Al Rafati, executive vice president of Envirocare of Utah Inc., noted that when he began working at Envirocare, the company was the country's disposer of naturally occurring radioactive materials (NORM). It took a while to convince people that Envirocare could take wood and concrete as well as soil, he said. Today, the company provides Class A LLW disposal for much of the nation. In fact, he said, today DOE contracts provide only about half the company's business, with the commercial nuclear industry providing the rest. The company has also continued to add to the services it offers, Rafati said, often at customer request.

Responding to a question from the audience, Rafati explained the latest wrinkle in the company's request to expand its services to include Classes B and C waste disposal. The state has approved the license request, he reported, but the company has decided not to use it at the current time because of public confusion between the Envirocare facility and the proposed Private Fuel Storage (PFS) facility, which the Utah state government strongly opposes. However, he noted, Envirocare's Class A containerized facility should begin operations in August, and that will be "a major step in completing the LLW cycle." Perhaps the Classes B and C disposal services will be offered sometime in the future, he stated. In response to another question, he said the facility will "stay clear of Barnwell-style pricing," preferring to operate on volume, not price. And



Al Rafati

even if the commercial portion of the company's work decreases, the DOE will continue to supply enough waste from its cleanup work to keep Envirocare up and running, he concluded.

Tim Blythe, from MHF Logistical Solutions, noted that four years ago, his company began to think differently about waste disposal—to make it safer and more efficient. Since that time, he said, his company has grown from a \$2-million per

year company to a \$40-million per year company. And the company's efforts have borne fruit with, for example, more emphasis placed on rail shipments and with waste processors shipping in larger containers. One of their most recent successes, he said, is arranging for the CY pressurizer to be shipped to Envirocare.



Tim Blythe

And Not So Positive

A somewhat different story came from John Christian, vice president of D&D Operations for BNFL Solutions Inc. As recently as two-and-a-half years ago, he said, BNFL "considered itself in clover." Since then, however, several elements of BNFL's business have fallen on hard times. The company's purchase of the old Sierra Nuclear dry-cask storage line has been problematical, with many of the old Sierra Nuclear contracts becoming loss producing. BNFL is working with the customers to solve the problems, but often it means the customers must switch cask system vendors. In the area of metals recycling, the economics have changed (it is now less expensive to dispose of the metals than to recycle them, he said), and public acceptance has diminished significantly. In

addition, the DOE has suspended its metals recycling programs, and, as a result, the BNFL Metals Recycling Facility at Oak Ridge is closing permanently.

Ed Davis, president of NAC International, a cask vendor, praised the work of the "New England plants" (Maine Yankee, CY, and Yankee Atomic) in their "pioneering demonstrations of decommissioning and spent-fuel storage." Their good efforts may "pave the way for new plant orders," he confidently stated. The spent-fuel storage industry has been "remarkably successful in bringing new technologies on line."



John Christian

That being said, however, Davis noted that leaving spent fuel on the shores of Lake Michigan or along the Connecticut River is not an ideal situation. "The DOE must live up to its side of the bargain," he said. Still, he hedged, the DOE may not be the best caretaker or operator of a spent-fuel disposal facility, and "there may be a role for the private sector in transport, operation, and caretaking."

Ed Davis

Ed Davis

will fit in today's licensed casks. We need more research on high-burnup fuel, he said, to address that problem. But he hesitated to look further into the future, since "we sure missed predicting where we'd be today." However, in 10 years' time, he said, he hopes the industry is shipping more fuel to Yucca Mountain and storing less on-site. Even with those shipments to a repository, however, the industry will be generating fuel faster than we can ship it, he cautioned.

In conclusion, he noted that this is a "watershed" year for Yucca Mountain. "We cannot let the process fail. It if breaks down over politics today, we'll *never* get there," he concluded.

Wrapping up the session was John Parkyn, CEO of PFS, which is working to site a dry fuel storage facility in Utah. Five years ago, he said, the company was preparing its license application. Today, it is moving ahead on the licensing process, holding discussions with the NRC to close some of the final licensing issues. Right now, they are looking at getting their license in 2002 and beginning operations in 2004. And then, he said, PFS will be operating an interim fuel storage facility, a job that people once thought the DOE would do.

The facility will be open to any utility and any vendor, he stated, although PFS consortium members

will get the right of first refusal. In addition, the company has a bid out on the railcar, which is being tested in Pueblo, Colo. PFS will accept *only* rail shipments, he said.

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John Parkyn



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The Two-Edged Sword

After all the presentations were completed and in response to a question about reprocessing, Christian said that BNFL would "love to see"

the United States begin reprocessing. Davis and Hanson, however, were less enthusiastic. "Reprocessing is a two-edged sword," Davis stated, in that it might be the cause of a postponement of a decision on Yucca Mountain. Better to "stay the course" and not "muddy the waters," Davis said. Besides, he added, given the economics of reprocessing, with

uranium at \$10 a pound, compared to the cost of reprocessing at about \$5 million per ton, it simply is not economically viable. Hanson added that even if the price of uranium rose to \$40 per pound, the only justification for reprocessing would be for waste management purposes.

In response to another question, this one on streamlining spent-fuel storage licensing, both Hanson and Davis agreed that the NRC's Spent Fuel Project Office is facing many tough issues today that it appears reluctant to address. The amount of time and money going into regulating dry-cask storage is "way out of line," and the NRC needs to start taking a risk-informed approach at the project office, they concurred.—

Nancy J. Zacha, Editor ■



Alan Hanson