

Low Water Levels in the Containment at Fukushima Daiichi Unit 2

Preliminary results of an endoscopic examination of the interior of Fukushima Daiichi Unit 2 carried out in mid-March indicated that the water covering the damaged fuel at the bottom of the containment vessel was only two feet deep. Tokyo Electric Power Co. (TEPCO) said they were expecting the water level to be higher, although the company said it is satisfied that the damaged fuel is being adequately cooled. TEPCO says it also will measure radiation levels inside the vessel to develop equipment needed to eventually decommission the reactor.

In the meantime, Japan has relaxed restrictions on entering some parts of the Fukushima evacuation area, so that residents can visit their homes and businesses without protective equipment. As of early April, two towns had opened, and a third was planning to be opened by the middle of the month. Residents will soon be able to make repairs on structures that were damaged during the March 11, 2011, earthquake. In addition, authorities are working to restore infrastructure needed for normal life to resume. Residents will still be unable to spend the night in the area, however.

For updates on the Fukushima plant, see articles in this magazine's sister publication, *Nuclear News*.

Blue Ribbon Commission Issues Final Report

The administration's Blue Ribbon Commission on America's Nuclear Future, established two years ago to determine an alternative to the Yucca Mountain Project for disposition of the nation's spent nuclear fuel and high-level nuclear waste, issued its final report on January 26, 2012.

The report centered around eight recommendations:

1. A new, consent-based approach to siting future nuclear waste management facilities.
2. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed.
3. Access to the funds nuclear utility ratepayers are providing for the purpose of nuclear waste management.
4. Prompt efforts to develop one or more geologic disposal facilities.

5. Prompt efforts to develop one or more consolidated storage facilities. (Note: As used in the report, the term "disposal" is understood to mean permanent disposal; the term "storage" is understood to mean storage for an interim period prior to disposal or other disposition.)

6. Prompt efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available.

7. Support for continued U.S. innovation in nuclear energy technology and for workforce development.

8. Active U.S. leadership in international efforts to address safety, waste management, non-proliferation, and security concerns.

The major difference between the final report and the draft report issued last July (see "Draft Report from the Blue Ribbon Commission on America's Nuclear Future—Executive Summary," *Radwaste Solutions*, September-October 2011, pp. 46–55) is the addition of a recommendation on preparing for the eventual large-scale transport of spent fuel and HLW when disposal and/or storage facilities become available. The draft report had included transportation in its discussion of storage, but comments received by the commission after publication of the draft report led the commissioners to give transportation more emphasis.

On February 15, Energy Secretary Steven Chu said that he had set up a task force within the U.S. Department of Energy to prepare an administration strategy on nuclear waste, in response to the commission report, and the administration's \$27.2 billion energy budget request for fiscal 2013 includes \$60 million for work associated with the BRC's recommendations.

For more information on the final report, see the "Executive Summary," published in this issue on page 45. In addition, for a discussion by industry experts of the key points of the report, see "Analyzing the Blue Ribbon Commission Report," this issue, page 55.

Texas Compact Commission Votes to Allow Waste Imports

In late March, the Texas Low-Level Radioactive Waste Compact Commission, by a 5–2 vote, approved rules governing the process for accepting out-of-compact waste at the Texas Compact disposal site in Andrews County, in western Texas. The site, operated by Waste Control Spe-

cialists (WCS), held its official opening last November. Prior to the vote, the commission agreed to reserve 20 percent of the disposal space at the facility for waste from the state of Vermont, the other partner in the Texas Compact.

According to WCS, after setting aside space for estimated Texas and Vermont nuclear waste, the site will have some 300 000 cubic feet of space for imported waste, and most of that waste will be Class B and C waste, which, WCS stated, “will be disposed of at a premium price.” WCS continued: “The disposal of this waste will significantly lower the cost of disposal for Compact generators, make the Compact facility economically viable, protect jobs for Andrews County, and produce significant revenue to the state of Texas and Andrews County, who will each receive 5 percent of the gross revenues generated by disposal operations annually.”

● In other LLW-related news, in March the U.S. Nuclear Regulatory Commission reported that it has concluded that the former Breckenridge Disposal Site in Breckenridge, Mich., is acceptable for unrestricted public use. The site was used by the former Michigan Chemical Co. to dispose of waste containing elevated levels of radioactive uranium and thorium generated during the processing of rare earth oxides. The company operated a chemical plant in nearby St. Louis, Mich., between 1967 and 1970. Its license from the U.S. Atomic Energy Commission was terminated in 1971, and the disposal site was declared suitable for public use. Several years later, however, radiation levels above NRC limits were detected at the site. Title for the disposal site fell into a custodial trust established to remediate the property to NRC regulatory levels. The trust and its contractor, EnergySolutions, completed remediation in October 2011.

Will New Mexico Host a Spent Fuel Repository?

According to the state’s former U.S. Sen. Pete Domenici, New Mexico is open to the possibility of hosting a national repository for commercial spent nuclear fuel. Domenici, a Republican, served as chairman of the Senate Committee on Energy and Natural Resources for many years during his Senate tenure. He was speaking in late February on an all-energy Sunday talk show sponsored by Platts.

Domenici stated that the salt formations in which the Waste Isolation Pilot Plant is located appear to be ideal for

a high-level nuclear waste repository. The WIPP disposal cells, which are used for the disposal of defense transuranic waste, are located in geologically stable salt caverns half a mile below the surface. Domenici said he would be willing to help lobby for a New Mexico repository project in Washington. He added, however, that the same salt formations exist in other states as well, including Texas and Kansas.

Speaking at the Waste Management 2012 conference that same week, former Carlsbad, N.M., Mayor Bob Forrest also proposed southeastern New Mexico as the perfect medium for either a centralized spent fuel storage facility or a geologic repository for spent fuel and HLW—or both. Forrest even showed a model for a storage facility, which he said could be sited in an area roughly 10 miles north of the WIPP facility that lies between the New Mexico towns of Hobbs and Carlsbad. The two towns have even published a request for proposals for the facility design, and have winnowed the applicants down to Areva and Fluor.

For more on Mayor Forrest’s comments, see “Analyzing the Blue Ribbon Commission Report,” this issue, page 55.

Conflict Arises over Finnish Repository

For years, Finland has been the poster child for progress in spent nuclear fuel repository planning and siting. The nation’s two nuclear utilities, Fortum and TVO, together created a waste management company, Posiva, to manage the repository program. Posiva plans to build a repository adjacent to the Olkiluoto nuclear power plant and has already begun work on an underground rock laboratory.

But a potential third nuclear utility, Fennovoima, which plans to build a nuclear power plant at a new site in the northern part of the country (and must have a plan in place for spent fuel disposal before it can receive a construction license), wants to be able to use the repository for its own spent fuel. The repository’s two owners, however, say that the repository was planned for their spent fuel only, and enlarging it would be neither practical nor safe.

Now the Finnish government is getting involved, with the country’s energy department establishing a working group, with representatives from the three utilities, to study the situation and come up with a solution. The group, led by Herkko Plit, who heads the energy depart-

ment's nuclear division, will look at several options, including adding Fennovoima's spent fuel to the Posiva repository as well as Fennovoima's building its own repository. A final report from the working group is due at the end of the year.

Court Rules in Favor of Continued Vermont Yankee Operation

On January 19, U.S. District Court Judge J. Garvan Murtha ruled that the federal Atomic Energy Act preempts any attempt by the Vermont legislature to give the state the right to shut down Entergy Nuclear's Vermont Yankee nuclear power plant after the expiration of its original 40-year operating license on March 21, 2012. The judge also ruled that the Atomic Energy Act preempts the state from enforcing a law requiring the state to approve the plant's continuing storage of spent nuclear fuel onsite after that date.

Vermont's concerns with tritium leaks at the plant, as well as Entergy's plan to construct an independent spent fuel storage installation at the plant site, had led the state legislature to pass laws giving the state the right to approve continued operation of the plant.

The U.S. Nuclear Regulatory Commission renewed the plant's license to operate for another 20-year period in March of 2011. The plant is now operating under the renewed license, but Entergy's efforts to get a new state permit remain unresolved. The utility's request for a new state permit, called a certificate of public good, is pending before state regulators.

D&D Updates

- The U.S. Department of Energy has determined that the melter used at the West Valley Demonstration Project to vitrify liquid radioactive waste can be managed as low-level radioactive waste and can be permanently disposed of at a offsite facility. The DOE consulted with the U.S. Nuclear Regulatory Commission and considered NRC comments as well as public comments before making the determination. The DOE plans to dispose of the melter either at the LLW disposal facility at the Nevada National Security Site or at the Waste Control Specialists facility in Texas.

- In April, a £600 000 (\$960 000) demolition project be-

gan at the United Kingdom's Dungeness A site. Targeted for teardown are the former administration building, mail site offices, and the site canteen, plus a number of smaller ancillary buildings. The site is scheduled to enter the "care and maintenance" state by 2022.

- The U.S. Department of Energy has developed a plan to clean up a cesium and strontium spill dating from the 1980s that leaked through a hot cell in the 324 Building at the Hanford Site in Washington State and into the ground below. The cleanup plan involves bringing the massive 30-foot-tall, 47-year-old Radiochemical Engineering Complex B-Cell back into service, taking out the hot cell's floor, digging up the contaminated soil beneath it, and transferring the soil to other nearby hot cells to be grouted in place. These hot cells will then be transported to the site's Environmental Restoration Disposal Facility for disposal. The 324 Building was used between 1965 and 1996.

- The Waste Encapsulation Treatment Plant (WETP) at Winfrith has been decommissioned and demolished, following a successful five-year sludge retrieval and treatment program. The WETP was designed and built to receive and process radioactive sludge from the Steam Generating Heavy Water Reactor. Operations began in mid-2005 to empty the External Active Sludge Tanks storing the sludge and stabilize it in cement in 500-liter stainless steel drums at WETP. The resulting stabilized sludge—encased in 1068 drums—was then transferred to the site's Treated Radwaste Store, where it will sit until it can be disposed of offsite.

- Hanford's K East Reactor will be subject to a new U.S. Department of Energy cocooning plan: wrapping it up in a steel shell. The DOE has cocooned the other plutonium production reactors at the Hanford site by tearing down reactor structures to the radioactive shield walls around the radioactive cores, sealing any openings, and reroofing them before welding the doors shut. For K East Reactor, however, the DOE is planning to build a steel enclosure around the unit. Worker safety is cited as the main reason for switching to a new plan. Because K East is larger than the other reactors, grouting piping and reroofing would expose workers to added risks. The planned enclosure will be constructed of steel sheeting and have a roof designed at an angle to direct rain water runoff away from adjacent waste sites. The steel enclosure would also cost about \$3.6 million less than the \$20 million that conventional cocooning would cost. Work is scheduled to begin in 2013, and should be completed by May 2014.

- The cleanup of the Dounreay site will cost £1 billion (\$1.6 billion) less than previously expected, and could be

finished in about 10 years, according to the site's new operators, Babcock Dounreay Partnership (BDP), which took over management of the site on April 2. The first site restoration plan, published in 2000, projected a cleanup that would take until 2063 to complete, at a cost of £4 billion (\$6.4 billion). A revision of that plan in 2005, when the U.K. Nuclear Decommissioning Authority was established, looked at a 2036 end date and a cost of £2.7 billion (\$4.3 billion). BDP now says it hopes to complete decommissioning by 2022–2025 at a cost of £1 billion less than the previous estimate.

- At the end of March, Babcock had completed the construction and commissioning of the Local Sludge Treatment Plant (LSTP) at the Sellafield site, which will play an important role in the decommissioning of the Pile Fuel Storage Pond facility, the largest open-air fuel storage pond in the world. The LSTP will provide interim storage for sludge removed from the pond. Babcock was awarded the LSTP contract in 2005, and delivered the finished facility 10 months ahead of schedule.

International Briefs

- The U.K. Nuclear Decommissioning Authority shut down its Oldbury-2 magnox reactor at the end of February, and planned to shut down the Wylfa-2 magnox reactor on April 30, due to "limited fuel stocks." This will leave just one magnox unit, Wylfa-1, generating electricity in the United Kingdom. That unit is expected to operate until 2014.

- Decommissioning France's fleet of 58 reactors would cost some €18.4 billion (around \$24 billion), according to the country's state auditor, although it cautioned that the final cost could vary because such a massive decommissioning program had not been carried out anywhere in the world. Handling the nuclear waste will cost Electricite de France about €23 billion (\$30 billion), the auditor stated.

- The Japan Atomic Energy Agency announced in late March that it is postponing the planned decommissioning of the Fugen prototype advanced converter reactor by five years, to fiscal 2033. The Fugen reactor shut down in 2003. The postponement is necessary, the agency said, because it had not been able to transport the spent fuel from Fugen to the reprocessing facility in Tokaimura. That transport has been postponed until fiscal 2017. Decommissioning of the reactor is expected to take 16 years.

- The reactor buildings at the United Kingdom's shutdown Bradwell nuclear power plant will be sealed in a £20

million (\$31 million) weather-tight envelope while they await final dismantling. Bradwell has two 123-MWe magnox reactors that operated between 1962 and 2002. The nuclear fuel was removed by 2005, and last year the shared turbine hall was demolished, leaving only the reactor buildings. These will be sealed in the weather envelope by 2015, and will stay sealed until possibly as late as the 2070s, when final dismantling work resumes.

- In March, a batch of steel targeted for the cover to be built over the damaged Unit 4 arrived at the Chernobyl site in Ukraine. Assembly of the structure was scheduled to begin in April. The arched structure will be assembled on rails and slid into place over the crumbling buildings of Unit 4. Once sealed, it will allow workers to remotely dismantle the "sarcophagus" that was hastily constructed over the unit shortly after the April 1986 accident. Completion of the structure was planned for in 2015.

- In December of last year, Russia commissioned a new centralized dry interim storage facility in Zheleznogorsk. The first batch of RMBK fuel was expected to be delivered by the end of the first quarter of this year. VVER-1000 fuel will also be stored at the facility at a later date. The fuel will be kept in storage for up to 50 years, during which time reprocessing capacity should be developed. A geological repository for high-level waste is also planned.

- A new nuclear cooperation agreement between Japan and the United Kingdom announced in April focuses in particular on "mutually beneficial" cooperation in new plant design and construction (where Japan has technical expertise) and decommissioning and waste management experience (where the U.K. has more experience). The joint statement also recorded Japan's appreciation for the United Kingdom's "heartfelt assistance and measured response" to the accident at Fukushima.

- Australia has passed the National Radioactive Waste Management Bill to establish a single-site facility for managing the waste arising from Australian use of radioactive materials in medicine, industry, and research. The bill repeals an earlier radioactive waste management act and is based on volunteerism, followed by a decision-making process based on "natural justice." This means that no site can be considered as the location for the facility unless it is voluntarily nominated, and decisions will be made according to a code of fair procedure, including a right to a hearing before any decision is reached. Australia has relatively modest amounts of radioactive waste, currently stored at numerous sites at universities, hospitals, and laboratories. ■