

Finland Submits License Application for Spent Fuel Repository

In late December, Finland's spent fuel management company Posiva (jointly owned by Finnish nuclear utilities Fortum and TVO) submitted an application to construct a final spent fuel repository and waste encapsulation plant at Olkiluoto. The application was submitted to the Ministry of Employment and the Economy (MEE).

The complex will include the above-ground encapsulation plant, an underground spent fuel repository (some 400–450 meters—1310–1475 feet—deep), and facilities for the disposal of waste generated during the operation and decommissioning of the encapsulation plant.

MEE has stated that once several ministries have commented on the application and its safety aspects have been reviewed by the Finnish Radiation and Nuclear Safety Authority, the construction license application will be submitted to the Finnish government toward the end of 2014. In addition, a public consultation will be launched this year. If construction is approved, an operating license must also be granted by the government before the facility can go into service. If both licenses are granted, final disposal operations could begin as soon as 2020.

The repository, with a capacity for 9000 tonnes of spent fuel, will be used for disposal of fuel from Finland's four

existing reactors (Olkiluoto-1 and -2 and Loviisa-1 and -2), as well as upcoming plants Olkiluoto-3 and -4. However, fuel from the proposed Hanhiviki nuclear plant, which would be owned and operated by a different utility, Fennovioma, would not, at this point, be eligible for disposal at the facility, although MEE has urged Posiva to cooperate with Fennovioma with the idea of expanding the repository, a concept that Posiva has thus far resisted.

Private Fuel Storage Requests Project License Termination

In late December, Private Fuel Storage LLC (PFS), a consortium of eight utilities that proposed to build a spent fuel storage facility in the Utah desert, asked the U.S. Nuclear Regulatory Commission to terminate the facility's license immediately so that PFS can avoid any additional license maintenance fees. The license had been granted in early 2006, and the consortium had been paying several hundred thousand dollars annually to maintain it. The facility would have been able to store up to 40 000 tonnes

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of spent nuclear fuel on land owned by the Skull Valley Tribe of Goshute Indians.

Even though the company had received a license, it still needed lease and other approvals from the U.S. Department of Interior's Bureau of Indian Affairs. These approvals had been denied during the George W. Bush administration—for political reasons, PFS alleged—but while PFS filed suit and a court remanded the decision back to Interior, no approvals appeared to be forthcoming. In addition, the state of Utah had strongly protested against the facility, and had made internal law changes to prevent PFS from building a rail spur to the proposed facility site.

With all eight utility-owners of PFS now having their own dry spent fuel storage facilities at the reactor sites, the need for the PFS facility became less critical. The eight PFS members are: American Electric Power, Entergy, FirstEnergy, Florida Power and Light, Genoa Fuel Tech, Southern California Edison, Southern Nuclear Operating Co., and Xcel Energy.

DOE: Centralized Spent Fuel Storage Possible by 2021

In a report issued on January 11, the U.S. Department of Energy states that the Obama administration plans to have a “pilot” interim spent fuel storage facility in operation by 2021. That facility would store spent fuel from decommis-

sioned power reactors. In addition, a larger interim storage facility (presumably for spent fuel from operating reactors) is planned for operation beginning in 2025. A final repository could be available by 2048. These dates, of course, are contingent upon “appropriate authorizations” from the U.S. Congress, the DOE adds.

The report, titled *The Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste*, provides what the DOE calls a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of spent fuel and high-level radioactive waste from civilian nuclear power generation, defense, national security, and other activities, and serves as the DOE's response to recommendations made last year by the Blue Ribbon Commission on America's Nuclear Future (BRC). The DOE states in the report that the Obama administration endorses the BRC's recommendations and believes that they provide a good starting point for a new national program for the management and disposal of commercial spent nuclear fuel.

The BRC's eight major recommendations are listed on page 26 in this issue. In part, they call for a consent-based process to be used to site both storage facilities and a final repository; a new management entity—that is, not the DOE—to control the program; and unimpeded access to the Nuclear Waste Fund, rather than relying on congressional appropriations.

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Congress Fails to Act**

The U.S. Court of Appeals for the District of Columbia Circuit, which is hearing the lawsuit filed by several parties over the U.S. Nuclear Regulatory Commission's cessation of licensing activities regarding the Yucca Mountain repository project, on December 12 granted the NRC's motion for an extension in the case, giving parties until January 4 to file status reports on the congressional appropriations process. One reason given for the extension decision was to give Congress a chance to decide whether or not to fund Yucca licensing activities for fiscal year 2013. Congress, however, finished the year out with no funding bill that would cover the NRC activities.

On January 4, the lawsuit's petitioners filed a motion urging the appeals court to immediately order the NRC to resume its work on the application. The petitioners include Aiken County, S.C.; The National Association of Regulatory Utility Commissioners; Nye County, Nevada; the states of South Carolina and Washington; and three private individuals. For its part, the NRC filed a motion stating that Congress's failure to add funds for the license review and the lack of changes in control of the White House or Congress means that there is no reason to force it to resume the review. The NRC said that the \$10.5 million it has on hand for the review would be insufficient for any long-term restart of the effort.

**Japanese Government Earmarks
Funds for Fukushima
Decommissioning R&D**

Japan's government, under new Prime Minister Abe, is earmarking some 80 billion yen in this fiscal year's supplementary budget for research and development into decommissioning the damaged reactors at the country's Fukushima Daiichi nuclear power station. Tokyo Electric Power Co. (Tepco), which owns the Fukushima units, has allocated about 900 billion yen for the work. This is the first time the government has earmarked funds specifically for reactor decommissioning.

In addition to aiding the decommissioning of the Fukushima reactors, the R&D work will support other electric power companies as they begin to phase out some aging reactors in Japan. Japan has three nuclear reactors that are more than 40 years old, and 14 additional ones that are more than 30 years old.

In addition, to help with the decommissioning work, Tepco has opened a new headquarters near the Fukushima plant. Some 30 employees, including a company vice president, have been assigned to the new headquarters, located in Haraha, about 20 kilometers south of the Fukushima plant. Tepco will eventually increase the number of its staff within Fukushima Prefecture by about 500 at the end of this year, for a total of about 4000.

Closing Nuclear Facilities May Lead to More Decommissioning Work Ahead

- Dominion surprised the nuclear world in October when it announced that it was planning to close the Kewaunee nuclear power plant in Wisconsin in mid-2013, after failing to find a buyer for the single-unit plant. Dominion bought the 574-MWe pressurized water reactor in 2005, paying \$220 million in cash, including \$36.5 million for the fuel. However, then Dominion failed in its efforts to buy up additional plants in the region, making the ownership of the single unit less strategically attractive. After failing to find a buyer for the plant, despite the fact that the plant's license had just been renewed and would extend to 2033, Dominion decided to simply close the plant. Decommissioning activities are expected to begin shortly after shutdown. Dominion says the plant's decommissioning trust is fully funded.
- In Canada, the license for Hydro Quebec's 635-MWe pressurized heavy-water reactor, Gentilly-2, expired at the end of December 2012, and the provincial government said it will be spending \$1.8 billion (Canadian) over the next 50 years to decommission the reactor. Phase one of the decommissioning involves defueling the reactor, treating the heavy water, and deactivating several systems. Phase two

will involve leaving the plant dormant for 40 years, then removing the spent fuel, and dismantling the facility. Hydro-Quebec expects the site to be fully restored by 2062.

- In mid-December, Spain's Garona nuclear power plant, the country's oldest, shut down ahead of new tax assessments that would have rendered the plant unviable. Spain is introducing higher taxes on electricity generation as a measure to address an energy tariff deficit of more than €24 billion (\$31 billion) after years of selling power below costs. The energy reform law would have added €153 million (almost \$200 million) in taxes on Garona in 2013, its operator stated.
- U.S. Enrichment Corp. (USEC) is expected to shut down the Paducah uranium enrichment plant in May 2013, relying instead on sales of Russian-sourced fuel and current inventories to meet its contract commitments until the Advanced Centrifuge Enrichment Plant comes on line in several more years. Last May, USEC signed an agreement with the U.S. Department of Energy and a few public utilities to keep the plant open, and its 1000 workers employed, for one year. With that deal coming to an end in mid-May, USEC may be forced to close the Paducah plant, which is inefficient compared with its competitors. Plant shutdown would mean the possibility of decommissioning work ahead.

D&D Updates

● At the end of fiscal year 2012 on September 30, the U.S. Department of Energy released impressive statistics on the progress of cleanup work at the Hanford Reservation in southeastern Washington state. At the end of September, the once 586-square-mile footprint of active cleanup at the site had been reduced to a 164-square-mile footprint of active cleanup. All 2300 tons of spent nuclear fuel stored near the Columbia River have been moved to dry storage; 20 tons of leftover plutonium in the Plutonium Finishing Plant have been stabilized and shipped offsite; 705 (of 999) waste sites near the Columbia River have been remediated, 365 (of 522) facilities there have been demolished, and 6 of 9 production reactors along the Columbia have been cocooned, with one more cocooning under way; 81 (of 850) waste sites on the Central Plateau have been remediated, and 344 (of 970) facilities have been demolished; and construction on the Waste Treatment Plant is 66 percent completed.

● As part of a \$200-million cleanup of the 287-acre Hematite facility in rural Jefferson County, Mo., contaminated soil removal began in March 2012 and is expected to be completed in the summer of 2013. By that time, about 2.3 million cubic feet of soil will have been removed. The facility dates back to the 1950s, when Mallinckrodt Chemical Works built it to produce highly enriched nuclear fuel for the U.S. Navy and other reactor programs. The plant

also produced fuel for commercial nuclear plants. Past owners of the facility had buried radioactively contaminated waste on the property in at least 40 unlined pits, the deepest of which is about 25 feet. Westinghouse Electric Co. acquired the plant in 2000 and shut it down the following year. Westinghouse is conducting the cleanup. The contaminated soil is being shipped to a disposal site in Idaho.

● In November, URS|CH2M Oak Ridge LLC (UCOR) announced that some of the highest risk components remaining in the East Tennessee Technology Park's K-25 building—five NaF traps—had been removed in a successful crane operation. The NaF traps were part of the final uranium-removal process when the K-25 uranium enrichment facility was running, and were in the part of the building known as the Tc-99 area, which is undergoing deactivation in preparation for demolition. Each trap was the size of a household water heater, and ranged in weight from 150 pounds to 800 pounds. To remove the vessels, workers cut a hole in the roof of the building, and a crane lifted them out. The removal activity was completed in two days. K-25 demolition is ahead of schedule and on budget, UCOR has reported.

● Even though the Barnwell low-level waste disposal facility in South Carolina contains tritium at a level higher than that permitted by federal safe drinking water standards, the state of South Carolina has no plans to excavate waste from the facility, because removal could be more dangerous than leaving it in place. The state's Department of Health and

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Environmental Control says the site is generally stable and no one is drinking the polluted water. Regulators were concerned that pumping tritium out of the groundwater or from a nearby creek might contribute to air pollution as the tritium was expelled. Regulators may consider phytoremediation as a strategy, planting trees with deep tap roots to suck up the polluted water, but no final decisions have been made.

- The Oak Ridge site's Toxic Waste Substances Control Act (TSCA) incinerator, which ceased operations some three years ago after burning more than 35 million pounds of hazardous and radioactive waste, has been placed in "safe shutdown" mode, UCOR (URS|CH2M Oak Ridge LLC), the site's environmental contractor, announced in late December. The final boxes of waste from the cleanup of the incinerator were shipped out on December 13. In a few areas where polychlorinated biphenyl (PCB) contamination could not be reduced to legal levels, special fixative paints were applied to the surfaces to prevent any potential spread of contamination, UCOR said.

- The Maxey Flats Project, a low-level waste disposal facility in Fleming County, Ky., that operated between 1963 and 1977, is gearing up for its "final closure period," which will involve putting a final cap on the waste. The cap, made up of clay with layers of plastic, will be covered with soil and vegetation when finished. The \$35 million project was funded by the Kentucky General Assembly in 2012. Once

the final cap is in place, the facility will continue to be monitored for another century or so.

- In five years, the cost estimates to clean up the nuclear waste at the Shallow Land Disposal Area in Parks Township, Pa., have risen from about \$45 million to nearly \$500 million as the complexity of the waste being excavated has become apparent. Federal Superfund law that governs the cleanup of hazardous waste sites requires a review process when a project exceeds its original cost estimate by 50 percent. In the meantime, the Army Corps of Engineers will seek a new contractor to oversee site cleanup, after allegations that employees of the previous contractor violated safety procedures by placing excavated radioactive materials too closely together, creating a risk of criticality. Some 24 300 cubic yards of radioactively contaminated waste is estimated to be buried at the 44-acre site, stemming from the days in the 1960s and early 1970s when the site received wastes from nuclear fuels processing plants in Parks and Apollo operated by NUMEC and its successor, Atlantic Richfield Co. BWX Technologies is the current owner of the site.

International Briefs

- Sweden's new spent fuel and radioactive waste transport ship, *M/S Sigrid*, was launched at the end of October 2012.

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The ship is set to enter service this year, replacing the *M/S Sigyn*, which has been in service since 1982. *Sigrid* is equipped with a double hull, four engines, and redundant systems for safety and security. It is designed to be more fuel efficient and environmentally friendly than its predecessor. And, at 99.5 meters long and 18.6 meters wide, *Sigrid* is slightly larger than *Sigyn*. It is capable of carrying 12 nuclear waste containers, compared with the 10 that *Sigyn* could hold. *Sigyn*'s future fate is still undecided.

- Decommissioning work on the nuclear island of Italy's Trino Vercellese nuclear power plant began in October, and is expected to take 12 years to complete, at a final cost of €234 million (\$304 million). Trino Vercellese, a single-unit 270-MWe pressurized water reactor, was Italy's first nuclear power plant. Construction began in 1961, and the plant started generating electricity in 1964. It was permanently shut down in 1990 in the wake of the Chernobyl accident. Some decommissioning work has already been completed, and €52 million (\$67 million) of the total decommissioning cost estimate has been spent on waste storage facilities.

- The giant cover being constructed over the damaged Chernobyl-4 reactor in Ukraine reached a milestone in late November with the raising of the first arch. Construction of the New Safe Confinement structure was officially launched in April. The first segments of the arch structure were preassembled on the ground in a construction area near the damaged reactor. The structure is being assembled in two halves. Once the first half is completed, it will be

pushed onto a holding area, while the second stage will involve installing infrastructure, such as cranes, for dismantling the shelter, structures, and the removal of fuel. Final assembly of the structure is expected to be completed by the end of 2014, while installation of systems will take place during 2014 and 2015. Once this second stage is completed, the entire structure will be pushed over Unit 4 and part of its turbine hall. This sliding operation is expected to take three days, and is currently scheduled to take place at the end of 2015.

- Taiwan's Atomic Energy Council has stated that Taiwan Power Co. (Taipower) should draft a plan by 2015 for the decommissioning of the first reactor at the Chinshan nuclear power station, which is the oldest nuclear power plant in the country. The reactor is scheduled to be shut down permanently in 2018, with decommissioning beginning the following year. The unit has been operating since December 1978. Taiwanese officials have stated that once the reactor is shutdown, it should be dismantled within 25 years.

- The 60-tonne skip handler at the First Generation Magnox Storage Pond at Sellafield in the United Kingdom has been refurbished and is ready to begin work for the first time since the 1990s. The skip handler had been in such poor condition that it was condemned in 2002. The complex refurbishment program took several years and involved the work of scores of engineers. The machine will be used to remove and relocate skips from the pond, so that fuel and sludge can be removed and placed in safe storage. ■