

NRC Finalizes Zion License Transfer to EnergySolutions Subsidiary

On September 1, in a first-of-a kind move, the U.S. Nuclear Regulatory Commission announced that it had finalized the transfer of the possession license for the Zion nuclear power station from Exelon Generating Co. to ZionSolutions, a subsidiary of EnergySolutions. This action was in response to a request first submitted in January 2008 requesting approval for a transfer of the possession license, management authority, and decommissioning trust fund to ZionSolutions for the purpose of decommissioning the Zion site. The deal also required the approval of the Internal Revenue Service over the transfer of tax-qualified decommissioning funds.

The license transfer means that ZionSolutions will acquire all of the station's assets and will then work as owner/licensee while it decommissions and dismantles the plant. When the work, currently scheduled to take 10 years, is completed, responsibility for the 200-acre site, located on the shore of Lake Michigan in Illinois, will revert to Exelon, and the site will be available for other commercial uses.

Under the license transfer, Exelon will retain ownership of the real estate and the spent nuclear fuel. ZionSolutions will construct a dry cask storage facility and transfer the spent fuel to dry cask storage as part of the decommissioning plan.

Zion's two pressurized water reactors were permanently shut down in 1998 when then owner Commonwealth Edison Co. decided that continuing operation of the two reactors was not financially feasible.

This is the first time an actual license transfer has taken place for decommissioning purposes. Previously, utilities have managed decommissioning themselves, or, in a few not entirely successful cases, hired a Decommissioning Operations Contractor to do the work.

According to Exelon, the cost of decommissioning the two units has been estimated at around \$1 billion, making it the largest decommissioning project yet undertaken at a U.S. nuclear power station. The work will require an average of 200 skilled workers each year, with a peak work force of 400. If ZionSolutions completes the decommissioning work under budget, any excess monies left in the decommissioning fund will be returned to ratepayers.

D&D Updates

- In late August, workers began making their first entry into one of the U.S. Department of Energy's most hazardous waste burial grounds at the Hanford Site in eastern Washington state. The work will help identify what is buried at the site, known as the 618-10 Burial Ground, located near the Columbia River. So far, workers have dug up several drums containing radioactive materials, such as depleted uranium chips in oil, a cask with unknown contents, and other miscellaneous debris. The burial ground contains low-level waste as well as some highly radioactive waste from Hanford's reactor fuel development and manufacturing facilities. Available records indicate that the buried wastes include radiologically contaminated laboratory instruments, bottles, boxes, filters, aluminum cuttings, metallurgical samples, electrical equipment, lighting fixtures, barrels, laboratory equipment and hoods, and high-dose-rate wastes in shielded (or concreted) drums. The wastes were buried in 12 trenches and 94 vertical pipe units from March 1954 through September 1963. Vertical pipe units are five 55-gallon drums welded end-to-end and buried vertically in the soil, into which radioactive wastes were disposed. Based on initial evidence, Hanford officials have revised their estimate of the number of drums they might find from 700 to 2000—containing uranium shavings, uranium oxide, and other highly radioactive materials. Cleanup of the burial ground must be completed by September 30, 2018, to meet a Tri-Party Agreement milestone.

- Washington River Protection Solutions, a prime contractor for the U.S. Department of Energy's Office of River Protection, has started removing radioactive and chemical waste from Tank C-111, one of the Hanford site's aging single-shell tanks, making it the 13th such tank to undergo waste retrieval. Tank C-111 is a 530 000-gallon tank, one of 16 tanks located in an area known as C Farm near the center of the Hanford site. The farm was constructed between 1946 and 1953. C-111 holds approximately 58 000 gallons of contaminated sludge and other radioactive and chemical waste materials left over from decades of producing special nuclear materials for the nation's defense. Removal of the C-111 pumpable liquids was completed in 1989 as part of an overall single-shell tank interim stabilization effort. Waste from C-111

is being transferred through temporary, above-ground hose-in-hose transfer lines to nearby double-shell tank AN-101, a distance of approximately 1600 feet (around 500 m).

- Cleanup at the Savannah River Site's K Cooling Tower, which in May was imploded to rubble (see "SRS Demolishes Massive K Cooling Tower," *Radwaste Solutions*, July/August 2010, page 41), was completed in September, a month ahead of schedule. Debris from the implosion was safely hauled away and deposited in an onsite landfill, and more than 800 tons of reinforced steel from the struc-

- At the International Atomic Energy Agency general conference in September, the agency's director of Nuclear Fuel Cycle and Waste Technology, Tero Varjoranta, stated that countries embarking on a nuclear program or activity should consider the decommissioning of any nuclear facility and remediation of the environment even before laying the first stone. With hundreds of aging and out-of-use nuclear facilities undergoing decommissioning and contaminated sites to be remediated through the world, the importance of dealing with the so-called "legacy issues" and ensuring that those building new facilities can avoid a repeat of previous mis-

takes is a priority for the nuclear community, he noted. The IAEA is in a unique position to facilitate dialogue and the sharing of experience among operators and regulators from across the world. "We want people to share what they have learned the each other and especially with those tackling these problems for the first time," said Varjoranta.

- The Government Accountability Office (GAO) thinks that emptying, cleaning, and permanently closing the 22 underground liquid radioactive waste tanks at the Savannah River Site is likely to cost significantly more and take longer than estimated in the December 2008 contract between the U.S. Department of Energy and Savannah River Remediation LLC (SRR). In its September report, "Actions Needed to Address Persistent Concerns with Efforts to Close Under-



The remains of the K Cooling Tower resemble an archeological site after SRS workers safely completed the project one month ahead of schedule.

ture were sent to a local scrap metal recycler. The video of the May 2010 controlled implosion has been viewed more than 335 000 times on YouTube.

- The Nevada Test Site has been officially renamed the Nevada National Security Site, and so we will have to get used to referring to the NNSS rather than the NTS. And it appears that the U.S. Department of Energy will be able to continue disposing of its mixed low-level waste at the site after all. Pit 3 at the site, which was the only federal facility accepting DOE Class B/C mixed waste, is due to close November 30 of this year. A new mixed waste disposal cell at the site is scheduled to be licensed in March 2011. For the four-month gap, the DOE is pursuing a storage permit, which it expects to have in place by December 1. At this writing, the location of the storage cell had not been determined.

derground Radioactive Waste Tanks at DOE's Savannah River Site" (GAO-10-816), the agency noted that the estimated costs had already increased 44 percent, or to \$4.6 billion, from the December 2008 number of \$3.2 billion. And closing the tanks may take longer than originally estimated because of delays in the construction schedule for the Salt Waste Processing Facility, which is intended to treat much of the waste removed from the tanks. The report also cited several other issues that could affect the project schedule and cost, including the fact that the enhanced chemical cleaning process that is a cornerstone of SRR's ability to close tanks on time has never been used in liquid radioactive waste tanks and, according to SRR officials, the DOE has not consistently funded additional research and development on the technology. The full report is available on the Internet at www.gao.gov.

DUF₆ Conversion Facility Starts Operations

Operations began September 9 at a recently completed conversion facility at the U.S. Department of Energy's Portsmouth Site in southern Ohio. The plant was constructed by Uranium Disposition Services LLC, a joint venture company consisting of Areva, EnergySolutions, and Burns and Roe. The facility converts depleted uranium hexafluoride (DUF₆), a by-product of the enrichment process, into uranium oxide. The Portsmouth facility will convert 13 500 metric tons of DUF₆ per year, and is expected to operate until 2037. Uranium oxide is a more stable form of uranium that is more suitable for disposal as waste or for possible re-use.

Over the years, limited amounts of depleted uranium have been used in different countries for such applications as blending down ex-weapons high-enriched uranium for nuclear fuel use or for blending with plutonium to make mixed-oxide fuel, or in applications that take advantage of the material's very high density. Most DUF₆, however, has been stored at the enrichment sites where it was made. After more than 50 years of operations at the enrichment plants in Portsmouth and Paducah, Ky., some 700 000 metric tons of the material has accumulated at the sites.

NRC Approves Updates to Waste Confidence Findings and Rule; Other Regulatory Actions

The U.S. Nuclear Regulatory Commission has approved final revisions to the agency's "Waste Confidence" findings and regulation, expressing the commission's confidence that the nation's spent nuclear fuel can be safely stored for at least 60 years beyond the licensed life of any reactor and that sufficient repository capacity will be available when necessary.

In a Staff Requirements Memorandum (SRM) approved and issued in mid-September, the commission approved the revisions to the draft final rule and, in addition, directed the staff to initiate a long-term rulemaking to address impacts of storage at onsite storage facilities, offsite storage facilities, or both for extended periods—periods as long as 100 to 300 years, according to some reports.

"Today the Commission affirmed our confidence that spent nuclear fuel can be stored safely and securely without significant environmental impacts for at least 60 years after operation at any nuclear power plant," said NRC Chairman Gregory B. Jaczko. "We also directed the NRC staff to conduct additional analysis for longer-term storage to ensure that we remain fully informed by current circumstances and scientific knowledge relating to spent

fuel storage and disposal. This decision was carefully considered by the Commission. It is an important step forward as it provides a measure of certainty to all of our stakeholders."

The commission made clear in its SRM that the revisions of the waste confidence findings and rule are not intended to signal an endorsement of indefinite storage of spent fuel at reactor sites.

The current Waste Confidence rule (10 CFR Part 51.23) and findings, which this new rule and findings will update, express confidence that commercial high-level radioactive waste and spent fuel generated by any reactor "can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor" in its spent fuel basin or at either onsite or offsite independent spent fuel storage installations.

The SRM gives the staff 60 days to incorporate these revisions to the Waste Confidence rule and findings before sending them to the *Federal Register* for publication. It also directs the staff to provide a plan to the commission for the long-term rulemaking by the end of the calendar year.

- The NRC is proposing to revise the regulatory guide issued in January 1999 on the standard format and content of license termination plans for power reactors, the agency announced in a *Federal Register* notice on August 10. The agency says that using the regulatory guide helps ensure the completeness of information included in a license termination plan and assists NRC staff and others in locating pertinent information and facilitating the review process.
- The NRC has submitted the second report of the Radiation Source Protection and Security Task Force to President Obama and Congress, outlining the federal government's efforts over the past four years to enhance the security of radioactive sources.

The task force was established by the Energy Policy Act of 2005, with the NRC as its chair, to evaluate and provide recommendations on the security of radiation sources in the United States from potential criminal or terrorist threats, including acts of sabotage, theft, or use in a "dirty bomb." The task force consists of representatives from NRC; the departments of Homeland Security, Defense, Energy, Transportation, Justice, State, and Health and Human Services; the Director of National Intelligence; the Environmental Protection Agency; the CIA and FBI; the Office of Science and Technology Policy; and the Conference of Radiation Control Program Directors and Organization of Agreement States.

The legislation required a task force report in 2006 and every four years thereafter. The 2006 report described efforts planned or under way to strengthen regulatory controls and made several recommendations to enhance the overall security of risk-significant radioactive materials,

such as sources used in irradiators, radiography, and certain radiation cancer treatments.

In the four years since the first report, the task force has met routinely to discuss progress and evaluate the protection and security of risk-significant radioactive materials. The 2010 task force report, submitted to the president and Congress on Aug. 11, presents the status of the recommendations and actions from the 2006 report as well as new recommendations in the following areas:

- Coordination and communication improvements among government agencies and the public.
- Advances in the security and controls of radioactive sources.
- Recovery and disposition of unused radioactive sources.
- Alternative technologies that could perform all or some of the functions of radiation sources.

The task force will continue to meet to implement and monitor the progress of efforts to improve the security of radioactive sources and identify any additional gaps that may arise.

More information about the task force, including the 2010 and 2006 reports, is available on the NRC web site at <http://www.nrc.gov/security/byproduct/task-force.html>.

MIT Study: Once-Through Fuel Cycle Good for Next Several Decades

A study conducted under the auspices of the Massachusetts Institute of Technology (MIT), "The Future of the Nuclear Fuel Cycle," concludes that "for the next several decades, a once through fuel cycle using light water reactors . . . is the preferred economic option for the U.S., and is likely to be the dominant feature of the nuclear energy system in the U.S. and elsewhere for much of this century." This recommendation is based on the assumption that there is no shortage of uranium resources.

Furthermore, planning for "about a century" of spent fuel management should be an "integral part of nuclear fuel cycle design," the report recommends. Therefore, the report continues, the U.S. should move toward centralized spent fuel storage sites, starting with fuel from decommissioned reactor sites.

In addition, systematic development of a geological repository needs to be undertaken, the report stated, and it listed the following characteristics of a "successful nuclear waste management organization":

- Authority for site selection in partnership with state and local governments.
- Management authority for nuclear waste disposal funds.
- Authority to negotiate with facility owners about spent fuel and waste removal.

- Engagement with policy makers and regulators about fuel cycle choices that affect the nature of radioactive waste streams.
- Long-term continuity in management.

These characteristics are not recognizable in the U.S. program to date, the report notes, and it recommends that a new quasi-governmental waste management organization be established to implement the nation's waste management program.

The MIT study was co-chaired by Mujid Kazimi, with the MIT Department of Nuclear Science and Engineering and Department of Mechanical Engineering, and Ernest J. Moniz, with the MIT Department of Physics and director of the MIT Energy Initiative; the executive director of the study was Charles W. Forsberg, with the MIT Department of Nuclear Science and Engineering. The study can be found on the Internet at <http://web.mit.edu/mitei/docs/spotlights/nuclear-fuel-cycle.pdf>.

International Briefs

- Groundbreaking ceremonies were held August 31 for Japan's interim spent fuel storage facility, the Recyclable Fuel Storage Center, located in Mutsu, Aomori prefecture. The facility is being constructed by Recyclable-Fuel Storage Co., a joint venture between Tokyo Electric Power Co. and Japan Atomic Power Co. The facility, which is expected to begin operating in July 2012, will have an initial capacity of 3000 tonnes of spent fuel. Capacity will increase to 5000 tonnes at a later date. The facility will store spent fuel assemblies until they can be reprocessed at the Rokkasho reprocessing plant.

- The government of Belarus has announced a master plan to resettle thousands of people in the contaminated areas covered by fallout from the Chernobyl accident 24 years ago. The \$2.2 billion plan will focus on the Gomel and Mogilev regions, from which more than 137 000 people were relocated. The plan, which covers the years 2011–2015 and up to the year 2020, involves removing previously buried contaminated materials; demolishing contaminated or unsafe buildings; reducing fire hazards in overgrown areas; refurbishing gas, potable water, and power supplies; construction of new roads; and the resumption of the agricultural and forestry industries.

- Finland's Olkiluoto plant will be adding three interim spent fuel storage pools, plant operator Teollisuuden Voima Oy announced in September. The €30 million (\$40 million) project will double the amount of interim storage space, and should be ready for use in 2013. Additional storage space is needed to accommodate spent fuel from Olkiluoto-3, currently under construction, and Olkiluoto-4, approved by the Finnish parliament this past summer. ■