Yucca Mountain: QA Data Falsification Alleged, Program Delays, Other News

● Several government entities, including the U.S. Department of Energy, the Federal Bureau of Investigation (FBI) and the U.S. Congress, are investigating allegations that some quality assurance (QA) documents associated with computer modeling for water infiltration and climate studies for the DOE's proposed Yucca Mountain repository were falsified by scientists with the U.S. Geological Survey (USGS). The DOE and the USGS disclosed in mid-March that several e-mails written by a USGS scientist in the 1998–2000 time frame suggested that workers were concocting facts and were failing to document what computer software was being used. According to the DOE, all the alleged falsifications were software-related. The data involve estimates of how much of the precipitation that falls on Yucca Mountain reaches down to the repository level. The USGS had validated DOE conclusions that water seepage was relative slow, making radiation escape less likely.

The DOE is investigating whether the alleged falsification compromised any related scientific data and other technical work that related to the site recommendation, draft license application, and other program documents. The state of Nevada is claiming that the problem is one more reason to scuttle the project and has asked for a halt in all work at the mountain until an independent investigation has been completed. Representative John Porter (R-Nev.) has said he will recommend that House appropriators cut the Yucca Mountain fiscal 2006 budget to reflect a suspension of all work, and a similar move is expected from repository opponent Sen. Harry Reid (D-Nev.) in the Senate.

At a congressional hearing on the issue in April, the House Subcommittee on Federal Workforce & Agency Organization, chaired by Rep. Porter, called for the creation of an independent, special commission to investigate all aspects of the repository project, including the integrity of all of the program's scientific data. Porter said he wanted the commission to be modeled after the Kemeny Commission that investigated the 1979 accident at Three Mile Island-2. Commission members, Porter said, should come from outside the federal government and should have no association with the Yucca Mountain project.

DOE representatives responded that the U.S. Nuclear Regulatory Commission will be subjecting the repository program to just such an independent evaluation during the licensing effort.

Additional congressional hearings were scheduled later in April, at which time USGS representatives were to testify.

● The U.S. Department of Energy is hoping to submit a repository license application to the U.S. Nuclear Regulatory Commission by the end of this year, the DOE announced at budget briefings in February. Depending on future funding, DOE officials continued, a repository could be available by 2012. The DOE is seeking $651 million for the repository project for fiscal 2006.

In March, however, the DOE acknowledged that a new repository operation date is still uncertain. The dates the agency has discussed, according to a DOE official, are in the 2012–2017 range, depending on resolution of the U.S. Environmental Protection Agency radiation standard issue.

● Future funding for Yucca Mountain continues to be a source of concern for the U.S. Department of Energy. In March, DOE Deputy Director Theodore Garrish testified at congressional budget hearings on the importance of continuing support for the establishment of a single, remote, safe, and secure location for storage of high-level waste and spent fuel—a strong priority of the Bush administration.

Garrish testified that the $651 million requested is sufficient for fiscal 2006, but that any reduction in that amount could have adverse consequences. The Bush administration and the DOE continue to support reclassification of the Nuclear Waste Fund as a user fee that can be used only for the repository program. Under current rules, the fund can be used for other discretionary spending, leaving the Yucca Mountain project in danger of underfunding. The fund collects some $749 million per year from nuclear utilities.

● The judicial panel of the U.S. Court of Appeals for the District of Columbia has ruled that the U.S. Department of Energy does not have the authority to give the state of Nevada more money than Congress appropriated. Nevada had requested $5 million from the DOE to help build the case that Yucca Mountain is not suitable for permanent storage of high-level waste. The DOE, however, gave the state just $1 million for fiscal 2004, the amount that Congress appropriated. Nevada sued for the additional funds.

The state maintains that it will need at least $10 million annually to participate whenever Yucca Mountain licensing hearings get under way at the U.S. Nuclear Regulatory Commission.

● The DOE's selection of the Caliente rail corridor, a new 319-mile route within the state of Nevada to the Yucca

Mountain repository, should be thrown out because the underlying environmental review was fundamentally flawed and legally defective, the state of Nevada asserted in a brief filed with the U.S. Court of Appeals for the District of Columbia in late March. Nevada argued that the U.S. Department of Energy's final Environmental Impact Statement on the selection was inadequate and that the DOE usurped the Surface Transportation Board's exclusive jurisdiction over common carrier rail projects.

● According to a study released in late April by the Electric Power Research Institute, the radiation protection standard for the Yucca Mountain repository should be fundamentally different for the periods exceeding 10 000 years. The report, "Yucca Mountain Licensing Standard Options for Very Long Time Frames," evaluates the technical issues related to establishing a national radiation protection standard for a compliance period of up to one million years, and recommends regulatory approaches that the U.S. Environmental Protection Agency and the U.S. Nuclear Regulatory Commission could take to assess compliance with the standard over such long time periods.

The report notes that many other standard setting organizations allow for exposure limits in the range of 100 millirems per year, or higher, to take into account increasing uncertainty over very long time periods. The report also recommends that a "stylized" approach be taken to regulation and compliance assessment, which is consistent with the international approaches to long-term radiation protection standards. A stylized approach involves using a limited set of scenarios and allows for a more straightforward evaluation of the details of the models. EPRI says that this approach is useful because otherwise it becomes impossible to provide accurate estimates of the details of the evolution of natural and human systems over very long time frames. This approach is also consistent with the National Academy of Sciences' comments in 1995 about the use of "bounding" approaches for some features and events, and with approaches recognized in federal regulations, the study said.

In addition, a fixed set of climate scenarios should be specified in the regulations so that peak exposure rate estimates are not dominated by the largely arbitrary assumptions that the DOE would otherwise have to make about the details of future climate states without such guidance. This is similar to the stylized approach to establishing future human behavior recommended by the NAS and already adopted by the EPA and the NRC.

The report notes that the remanded 10 000-year regulations already provide a high degree of protection for future human populations, as evidenced by the DOE's move to a robust engineered design to assure compliance.

No B, C Waste at Envirocare of Utah

The new owners of the Envirocare of Utah low-level waste disposal facility have said they will withdraw an application to accept the more radioactive classes of LLW at the company's disposal site in Utah.

The announcement was made when the new owners, led by New York–based Lindsay Goldberg & Bessemer, closed the deal in early February. Utah investors in the company are Creamer Investments and Peterson Partners.

Envirocare can take most types of Class A LLW, the least radioactive of the U.S. Nuclear Regulatory Commission's categories of LLW. In order to accept the B and C wastes, the company would have had to get approval of both the governor and the legislature of Utah. In January, Utah's new governor, Jon Huntsman Jr., vowed to keep such waste out of the state.

In a separate action, in February, both houses of the Utah legislature approved a measure banning the state from accepting B and C waste, and the governor signed the legislation at the end of the month.

ASLB Rejects Utah Arguments Against PFS

Private Fuel Storage LLC, an eight-utility consortium that wants to build a spent fuel storage facility in the Utah desert, won a long-fought legal battle in a 2–1 decision handed down in late February by a U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (ASLB) panel. The ASLB rejected arguments advanced by the state of Utah, which is fighting the siting of the facility, that there was too high a risk of a radiation release from an accidental F-16 military jet crash into the casks. The panel found that the probability of such a crash causing the breach of a spent fuel canister was less than one per million per year, which meets the NRC's regulatory standards.

The licensing board also rejected another Utah contention regarding remarks made by a U.S. Department of Energy official about the unacceptability at Yucca Mountain of spent fuel in containers with inner canisters (the type of container proposed for the PFS facility). The

board determined that at this late stage, and in light of DOE documents that contradicted the remarks, it would not reopen the hearing record to adjudicate the matter. Rather, the ASLB noted that the matter is worth of the Commission's attention.

Weeks later, however, in response to a request by Utah for reconsideration of the February decision, the panel agreed to hear oral arguments on April 6 from attorneys from Utah and PFS and from the NRC staff. The presentations were to be general and were to refrain from discussing specific information concerning the impact of accidental military jet crashes into the PFS casks, the ASLB directed.

PFS has been working on licensing a 4000-cask aboveground storage facility on Skull Valley Band of Goshutes Tribal land in Tooele County, Utah (about 50 miles southwest of Salt Lake City), since 1997. The facility would operate for some 40 years, and would be open to all utilities, not just members of the consortium.

Antinuclear groups, including Public Citizen and the Nuclear Information & Resource Service, have argued that the PFS facility could become a de facto permanent spent fuel storage facility if the DOE fails to open a permanent repository at Yucca Mountain.

Two Reports Weigh in on Security of Spent Fuel Storage

Two recent reports, one from the National Academy of Sciences (NAS) and the other from the Government Accountability Office (GAO, the investigatory arm of the U.S. Congress), have weighed in on spent fuel storage security issues.

- In early April, the NAS finally released an unclassified version of its study on the safety and security of spent fuel at U.S. nuclear power plants. (The classified report was provided to Congress in July 2004.) The report, "Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report," says the U.S. Nuclear Regulatory Commission must do more analyses so it can understand the potential risks and ensure that plant operators take effective measures to reduce the possible consequences of terrorist attack. It noted, however, that an attack on a spent fuel pool (which was acknowledged as "difficult, but possible") that might damage a power plant or its spent fuel storage facility would not necessarily result in a release of any radioactivity to the environment.

The report was prepared at the request of Congress by the NAS's Nuclear and Radiation Studies Board. It reviewed analyses performed by the NRC, the Department of Homeland Security, the nuclear power industry, and others. Topics that NAS recommended for additional study include security of spent fuel rods not contained in assemblies, zirconium cladding fires, and resistance of spent fuel storage facilities to terrorist attack. The NAS also recommended studies of individual plant vulnerability to assess whether spent fuel should be removed from pools and placed in dry storage.

In the meantime, while such studies of individual plant spent fuel pools are being conducted, the study recommended that the NRC work with the industry to reduce the consequences of a pool breach by reconfiguring the fuel in the pool or by adding water spray systems that could be deployed from a location other than the pool building.

The NRC has told Congress that current spent fuel storage systems are safe and secure. The NRC has also stated that it considers the likelihood of a zirconium fire capable of causing large releases of radiation to be extremely low.

NEI Chief Nuclear Officer Marvin Fertel noted that "The NAS report does not recommend unloading of [spent] fuel from storage pools into dry storage containers," and that "The nation needs to appreciate that the best way to protect the nation's entire critical infrastructure, which includes nuclear facilities, is to place a high priority on prevention of airliner attacks by terrorist organizations. It is far more effective, and less costly to the nation, to prevent attacks rather than try to protect the entire critical infrastructure."

- The GAO report, "NRC Needs to Do More to Ensure that Power Plants Are Effectively Controlling Spent Nuclear Fuel" (GAO-05-339), charged that nuclear power plants' performance in controlling and accounting for their spent fuel has been uneven. It noted that in recent years, three plants (Vermont Yankee and Humboldt Bay in 2004 and Millstone in 2000) have reported missing spent fuel.

The report found that while NRC regulations require plants to maintain accurate records of their spent fuel and to conduct a physical inventory of the material at least once a year, these regulations do not specify how physical inventories are to be done, nor do they specify how individual fuel rods or segments are to be tracked. As a result, the report says, plants employ various methods for storing and accounting for this material, and the NRC stopped inspecting plants' material control and accounting programs in 1988. According to the report, the NRC said that there was no indication that inspections of these

programs were needed until the Millstone incident.

The GAO report recommends that the NRC (1) establish specific requirements for the control and accounting of loose rods and fragments and plants' conduct of their physical inventories, and (2) develop and implement appropriate inspection procedures to verify plants' compliance with the requirements.

In its response to the report, the NRC stated that while the agency generally agreed with the conclusions reached by the GAO, it pointed out that significant NRC attention had been directed to the material control and accounting area prior to the commencement of the GAO review. Since September 11, 2001, the agency said, the NRC has significantly modified its requirements for spent fuel control, and licensees have significantly increased their resources to improve security at spent fuel facilities and nuclear power plants.

And in fact, the NRC noted, the report's conclusion that plants' efforts to account for and control spent fuel are uneven came from knowledge gained from NRC inspections and from responses to a temporary instruction on material control and accounting.

The NRC stated that the current regulations are clear and do not appear to need revision. The agency agreed with the GAO, however, that implementation guidance does need to be enhanced to address loose rods and pieces of spent fuel, and the NRC is working to complete the guidance.

D&D Updates

● For the first time since the Fernald cleanup began, a large portion of the former uranium production area has been restored to remediation levels established by the U.S. and Ohio Environmental Protection Agencies. In December, Fluor Fernald completed a massive four-year effort that involved removing 467 000 cubic yards of contaminated soil and debris from 27 acres in the heart of the site. With this 27 acres, more than 700 of Fernald's 1050 acres are now certified as clean.

Also at Fernald, as of March 18, the Waste Pits Project had sent 142 trains totaling 8430 railcars and almost 908 000 tons of waste to Envirocare of Utah for disposal. In addition, the site has emptied all the waste from Silos 1 and 2 into four 750 000-gallon tanks. Although there is no final disposition site for the Silos 1 and 2 waste, operators will continue to prepare for the startup of waste treatment operations. Finally, the Silo 3 waste retrieval and packaging operations began March 21. The conditioned waste will be loaded in soft-sided packages, placed in sealand containers, and shipped to Envirocare of Utah.

● In addition to three 18-inch fuel rod segments that appear to have gone missing from the Humboldt Bay-3 spent fuel pool, one complete and three partial in-core detectors also appear to be missing from the pool, according to a report plant owner Pacific Gas & Electric Co. made to the U.S. Nuclear Regulatory Commission. The findings came during an extensive search of the pool made between last December and early February for the missing fuel segments. The Humboldt Bay-3 plant shut down in 1976, and the partial in-core detectors were apparently size-reduced for storage during the next decade. The utility assured the NRC that the lost in-core assemblies are likely to be in monitored and restricted radiological control areas, and that there is no risk to the public.

● The schedule for removing transuranic (TRU) waste from Los Alamos National Laboratory has slipped, according to a report from the U.S. Department of Energy's inspector general, Gregory Friedman. The highest-risk TRU waste was supposed to be moved from the lab by December 2004, but that process will most likely take until October 2005. All remaining TRU waste was scheduled to be disposed of by 2010, but it now appears that the disposal process will take until 2014.

● At the direction of Congress, in March a National Academy of Sciences panel has begun studying the U.S. Department of Energy's plans to dilute some residual high-level waste at several former weapons production sites, converting it to low-level waste that will be grouted and disposed of in place. The DOE is considering this waste conversion at the Savannah River Site, in South Carolina; at the Hanford site, in Washington state; and at the Idaho National Laboratory. The NAS committee is to report on the SRS proposal within six months, and on all three sites within a year.

● The U.S. Department of Energy cannot ship transuranic (TRU) mixed waste to its Hanford site for storage until it deals with the TRU mixed waste already there, a federal district court ruled in late January. The decision by the U.S. District Court for the Eastern District of Washington confirms Washington state's authority to limit the continued storage of TRU mixed waste at the Hanford site. The DOE began shipping TRU waste to Hanford from other DOE site in 2002. Washington state sued in March 2003, stating that the DOE had not lived up to its agreement with the state to ship two drums of Hanford TRU waste to the Waste Isolation Pilot Plant for disposal for every new drum of TRU waste shipped to Hanford.

The federal district court agreed with the state's argument that regulations under the Resource Conservation and Recovery Act and the Washington state Hazardous Waste Management Act apply to both TRU mixed waste already at the site and to TRU mixed waste that would be shipped there.

The case is part of a larger lawsuit filed by the state to stop all TRU waste shipments to Hanford until the DOE lives up to the 2002 agreement. The mixed waste portion of the case was separated from the rest of the case because different regulations apply.

● According to reports in local media in Washington state, the U.S. Department of Energy's inspector general has reported that the DOE should reevaluate its plans for deactivating and decontaminating the Fast Flux Test Facility. The inspector general said the DOE's existing plan may not be the most effective approach to shutting the reactor down, in part because the final end state of the reactor remains uncertain, given that the required environmental impact statement has not been completed. The U.S. Environmental Protection Agency and the state of Washington have argued that the money for deactivating the FFTF could be better spent on cleaning up other Hanford projects that pose a greater risk to the environment. In addition, the closure work has been held up because of a challenge brought by a losing bidder on the contract awarded last fall to SEC Closure Alliance. The Government Accountability Office upheld the challenge, and the DOE has agreed to reopen the contract for bids, but has said there is no change in policy regarding the shutdown and dismantling of the reactor.

International Updates

● On April 1, the British Nuclear Group (originally British Nuclear Fuels plc) began making the transition from owner-operator of most of the United Kingdom's nuclear site to being manager and contractor to the U.K. Nuclear Decommissioning Authority, the new owner. The NDA was set up by the government under the 2004 Energy Act and is focused on management and cleanup of the United Kingdom's public sector nuclear facilities.

● The town council of Kincardine, Ontario, in Canada, has accepted an Ontario Power Generation proposal to site in the area a deep (660-meter; more than 2100 feet) underground storage facility to hold the low- and intermediate-level waste from Ontario's 20 nuclear power reactors. The town is already home to the Bruce power complex. The proposal must still undergo an environmental review and approval by the Canadian Nuclear Safety Commission. At the current time, LLW is stored above ground at the utility's Western Waste Management Facility at the Bruce site, and ILW is stored in metal containers set in the ground in steel-lined silos.

● Japan Nuclear Fuel Ltd. and Japanese utilities are planning to construct a third low-level waste disposal facility at Rokkashomura in Aomori Prefecture, according to Japanese officials. The new facility is expected to be in place when the contaminated core internals from the Tokai-1 reactor are removed (between 2011 and 2017). The facility would also be available when other aging Japanese power reactors begin decommissioning. Two near-surface concrete pit–type repositories began operating at Rokkashomura in 1992. Each has room for a total of 40 000 cubic meters of LLW packed in 200-liter drums. The third facility would be designed to contain core structures from reactors decommissioned in the future.

● Both Mol and Dessel in Belgium would be willing to hold a repository for low- and medium-level wastes. The two Flanders communities already host much of Belgium's nuclear research and industrial infrastructure, including the SCK/CEN nuclear research center and interim storage facilities for both LLW and vitrified high-level and transuranic waste from reprocessing of Belgian nuclear fuel. A third partnership, involving the communities of Fleurus and Farciennes in French-speaking Wallonia, has also been formed to consider the LLW repository. Fleurus already hosts the national institute for radioisotopes, IRE.

● Having failed to find support among local communities for hosting a disposal facility for intermediate- and high-level waste, the government of South Korea is upping the ante, reportedly proposing legislation to pay local governments hosting such a facility $290 million (U.S.) up front, at the start of construction, and allowing them to collect user fees as well.

● The U.K. Committee on Radioactive Waste Management has come up with four options it considers viable for the disposal of nuclear waste. These include deep disposal (between 300 m and 2000 m underground in an area of suitable geology; phased deep disposal, the same process, except the waste would be retrievable; shallow burial of short-lived waste; and interim storage on a temporary basis. No recommendations on sites for any or all of the facilities were made. The committee excluded such technologies as shooting the waste into space, storing it on ice sheets, or disposal below the ocean floor. The final report will be submitted to the U.K. government in the summer. The only existing disposal site in the country is the low-level waste disposal facility at Drigg. ■