

## Closing in on Closure

# Design of sludge treatment system progresses

The sophisticated system that will prepare the bulk of the sludge from the K Basins for final disposition passed important milestones in December, with the completion of the Fluor Hanford 60 percent design review of the treatment portion of the system. The system, which will operate in the Cold Vacuum Drying Facility (CVDF) in the 100-K Area, will handle over 90 percent (about 65 cubic yards or 50 cubic meters) of the most radioactive sludge now found in the K East and K West Basins. The system will not handle a small portion of sludge from the KE Basin that is currently being treated in T Plant with a smaller and simpler system.

The main sludge treatment system will consist of three main components: a 2,400-gallon "corrosion vessel" (sometimes called an oxidation tank), to be located in Bay 1 of CVDF; and a grout-mixing station with a decontamination station and a radionuclide assay system in Bay 2. A temporary storage area for drums filled with the grouted sludge will be established in Bay 3. Bays 4 and 5 of the CVDF – where 386 multi-canister overpacks (MCOs) of wet spent fuel were dried between 2000-2004 – will remain as processing areas for the last few MCOs of fuel that will be removed from the K Basins near the end of the K Basins Closure (KBC) Project.

The shielded corrosion pressure vessel, the primary component of the system, will receive sludge through a robust hose-in-hose transfer system from the K West Basin beginning in spring 2008. In the vessel, a "batch" of sludge (about 1,600 gallons) will be heated to 365 degrees Fahrenheit under pressurized, controlled conditions for about three days.

During that time, the metallic uranium particles in the sludge will oxidize – or bind with oxygen from the watery mixture – to chemically "burn up" the uranium. At the same time, the hydrogen in the water will be liberated. Under the wrong conditions, this hydrogen could become explosive, so nitrogen will be bubbled through the solution during the heating process, to safely remove the hydrogen. The nitrogen will also be used to control

the rate at which water evaporates from the system during cool-down.

Once the oxidized sludge has cooled, it will proceed to the assay system and then the grout mixing station. If the process were performed at room temperature, each batch would take months to react or oxidize.

BNG America (BNGA) has designed (design is 100 percent complete) and is supplying the grout mixing station, known as the MOSS (mobile solidification system). MOSS, a remote handled system where the oxidized sludge will be mixed with grout poured in 55-gallon drums, is a version of a proprietary BNGA design that has been modified for use at Hanford.

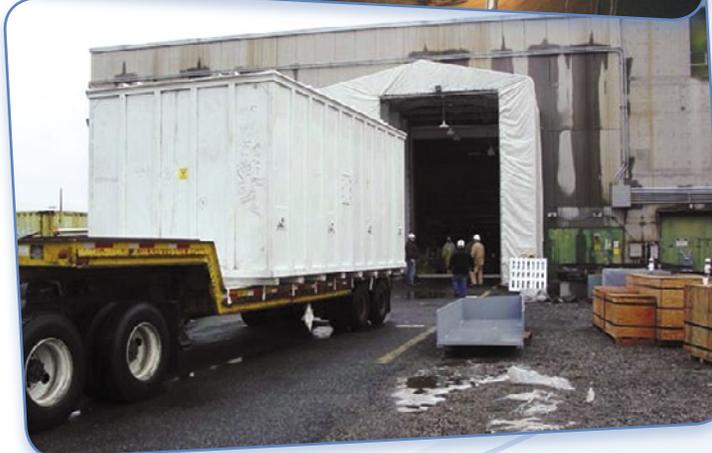
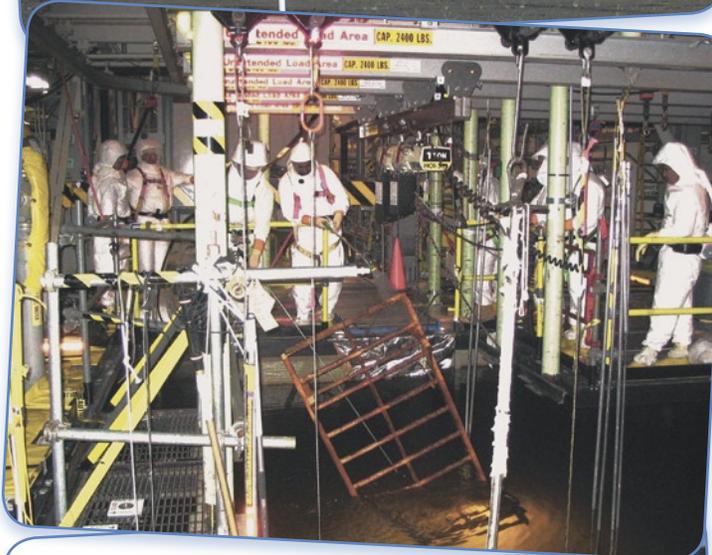
Design for the radionuclide assay, or measurement, system, known as the IPAN (imaging passive/active neutron) system reached 90 percent. The IPAN will be installed between the corrosion vessel and MOSS, and will measure selected radionuclides in each portion of sludge, to assure that each drum receives only an amount within specified, acceptable parameters.

Design for the retrieval and transfer system that will bring the sludge to the CVDF from the K West Basin was not examined in the recent design reviews, but will be reviewed with BNGA later this winter.

According to Bob Bromm of Fluor Hanford's Central Engineering, chairman of the December design reviews, "the reviews went well.... We had good, focused comments and the issues raised are manageable. I have confidence in the system being designed here, and BNGA is managing the project well. They have assigned many highly competent people to this important work."

Jim Kelly, Sludge Treatment Project director for the KBC Project, says that Fluor Hanford is carefully examining the designs to ensure a safe, effective system. "The corrosion system 60 percent design review gener-

*K Basins ... Continued on page 3*



The bulk of the sludge from the K Basins will be treated at the Cold Vacuum Drying Facility (top).

In December 2005, Fluor Hanford workers at the K Basins removed the last of nearly 200 heavy fuel racks from the KE Basin (middle).

Wrapped and packaged fuel racks readied for disposal emerge from KE Basin Building (bottom).

*K Basins (Continued from page 2.)*

ated a number of comments and issues that Fluor Hanford must resolve before the design is finalized. Identifying these issues now, while the design is in progress, is a good thing because it gives us time to resolve them and incorporate needed changes into the final design while minimizing cost and schedule impacts to the project."

Fluor Hanford is currently weighing the possibility of performing tests with real sludge in a hot cell to help validate the system. BNGA is currently conducting tests with simulants whose corrosion, erosion and hydraulic characteristics imitate those of the sludge.

The sludge treatment system is expected to be installed in CVDF in calendar year 2007, with operational readiness reviews slated for early 2008. Completion of processing and solidification of the approximately 1,300 drums of K Basins sludge to be treated in this system is projected in summer 2009. At the present time, approximately one cubic meter of less radioactive sludge from the North Loadout Pit in the K East Basin has been successfully treated in Hanford's T Plant. Sludge processing in T Plant is expected to finish in March of this year.

**Michele Gerber, Communications**

*WSCF (Continued from page 1.)*

Analytical Services and Strategic Planning, has been at WSCF since 1998. "Working here is one of the best jobs I've ever had," he says. "The organization is a real team, pulling toward the common objectives of satisfying customers and performing high-quality analytical work. ... We're somewhat remote here at WSCF, and I think that promotes a sense of identity and cohesion as a facility. The safety culture is driven by the people here."

Hart expects WSCF's mission to be important for a long time. Waste characterization and soil crib samples from decontaminating and decommissioning (D&D) the 880 identified waste sites in Hanford's Central Plateau in the next 30 years will keep the laboratory more than busy. Even beyond Hanford's expected closure in 2035, Hart anticipates long-term sampling needs from legacy-management programs that will monitor Site areas. WSCF has approximately 12,000 square feet of analytical laboratory space in the North Lab building, and about 7,000 square feet in the Nuclear Spectroscopy Laboratory (NSL). In addition,

**Racks removed from K East Basin...sludge pumping resumed**

On Dec. 20, the KBC Project completed removing approximately 40 tons of racks that once held fuel canisters from the K East Basin. It took a dedicated crew of 15 people three months to remove and package the nearly 200 large steel racks. The effort was intense and the process prescriptive, requiring that each rack be pressure washed, rigged, profiled for dose, and then packaged.

"Having the racks out of the K East Basin clears the way for other important work to move forward," said Pete Knollmeyer, Fluor Hanford's vice president for the KBC Project. "This accomplishment represents a team effort, and I'm grateful to everyone who had a part in getting this hazardous work done without any injuries or skin contaminations." DOE Richland Operations Office Manager Keith Klein congratulated the KBC Project on the achievement, saying, "... not only is it a significant physical accomplishment, but it also helps build confidence in our [schedule] ... and your ability to execute it."

While several tons of other debris is still being removed from the K East Basin, Fluor Hanford has resumed limited vacuuming of sludge from that highly contaminated basin. Pumping sludge, which was temporarily suspended in early September due to extreme congestion of debris and cloudiness in the basin, has resumed so that the effectiveness of the new K East Sludge Container Overflow Pumping System (SCOOPS) can be evaluated.

SCOOPS consists of a weir box and low-velocity pump over the basin



*Fluor Hanford crews removed 40 tons of old fuel racks from the KE Basin during the last three months of 2005.*

pit (weasel pit) that holds the containers for collecting the sludge. SCOOPS collects tiny particles of sludge in the water that swirl up when the sludge is transferred from the vacuum wands into the containers. It then discharges the flighty particles into an existing filter system in the basin. Collection of the bulk of the sludge in the K East Basin is expected to finish in the summer.



*Vacuum wands, also called "end effectors," are used to retrieve elusive sludge underwater in the KE Basin.*

there are eight other support facilities on the WSCF campus. WSCF anticipates expanding its footprint and upgrading the facility's infrastructure in the next few years.

In addition to attaining the outstanding safety record at WSCF, Wilde's entire SW/GWVZ/WSCF Projects achieved one-million work hours without a day lost to an accident this past year, and are still counting at just over 1.116-million safe work hours. At a

potluck lunch at Christmas to celebrate the achievements, GRP safety specialist Andy Foster made good on his June promise to have his head shaved into a "Mohawk" cut if the Projects were not involved in any vehicle accidents for the remainder of the year. The GRP has now gone more than 200 days without a recordable injury or a vehicle accident.

**Michele Gerber, Communications**