FYI ...a Fluor Hanford publication for employees March 14, 2005

Closing in on Closure

Nearly all sludge out of weasel pit in K East Basin

Fluor Hanford workers have completed 99 percent of the cleanout of the K East Basin's "weasel pit," a tiny vestibule formerly plugged with more sludge and debris than any other portion of the K Basins. (The last fraction of sludge and debris will be removed before the last two sludge containers are installed.) "Weasel pit" is an historical term derived from a type of long-handled radiation-detection equipment deployed during the defense-production years to examine special fuel in the small containment (pit) just east of the main K East Basin. The K West Basin also had a similar weasel pit.

K East Basin's weasel pit comprises less than two percent of the basin's total area, yet held nearly the same amount of sludge as the entire K West Basin.

KBC Project

Sludge pumping mechanism and remote television camera mounted on a 22-foot pole.

Jim Gamin, a Fluor Hanford sludge project manager and long-time employee at the K Basins, said the sludge, varying from flighty and swirling to dense and heavy, had been relocated to the weasel pit from other basin areas during preparations for storing N Reactor fuel assemblies in the 1970s. "There was fuel in the main portions of the basin. It was necessary to maintain visibility in those areas and decisions were made not to place any additional sludge there," Gamin said. "When cleanout was needed in other basin areas – so fuel transfer system equipment could be installed, for example – the weasel pit was designated to receive that sludge." An underwater screen door was placed at the entry to the pit about 1990 to help contain the sludge that was accumulating.

"There are no magic technological breakthroughs. There are mini-breakthroughs. Every day we work on sludge, and every tool we develop, bring us closer to the finish line. We call it 'plug and chug,' but it works. I'm confident our crews will get us where we want to be."

Scott Sax, KBC Sludge Project director

In 2004, the weasel pit's "out of the way" attractiveness made it the ideal location for containers to receive and settle sludge for transfer out of the K East basin for eventual treatment and disposal. Randy Adkins, KBC Project construction director, is responsible for placing four large, rectangular sludge "tanks" (collection containers) in the KE Basin's weasel pit and nearby technical viewing pit. "We needed to keep the sludge tanks out of the way of Decontamination and Decommissioning work in the basin, because this whole project is on a fast track," Adkins said. "We chose the weasel and technical viewing pits at the far southeast edge of the basin so D&D work can be done in parallel with sludge retrieval with minimal interference."

"The weasel pit was designated to receive sludge when cleanout was needed in other basin areas."

Jim Gamin, Sludge Project

Fluor's KBC Project began cleaning out the weasel pit in 2004 to prepare it for the sludge tanks – an effort that became one of the most challenging evolutions of work undertaken in the long road to remediate the K Basins. The pit, 34-ft long by 5-ft wide by 20-ft deep, was filled with sludge four to six feet deep and an array of equipment, tools, and other debris concealed by the heavy sludge cover.

KBC Project

Left to right, Fluor Hanford nuclear chemical operators Linda Knowles, Laurie Parchen, Joanie Graves and Earl Jewett viewing grate pumping equipment in KE Basin.

Debris removed from the K West Basin is fairly uniform, mainly fuel racks, canisters, lids and identified tools. Debris in the K East Basin is more varied: hoses, discarded work gloves, welding "blankets," sheets of plastic, heavy metal screens, "spacers" (pieces of pipe used in reactor operations), long-handled pole tools, a long wood plank, "buggy springs" that once separated inner and outer portions of N Reactor fuel assemblies, and other items.

K East Basin weasel pit cleanout out revealed some hidden and unanticipated configurations. In January, cracks were found in the walls of the weasel pit. The cracks were thoroughly evaluated and determined to be a result of the facility's original construction. At

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nearly the same time, a hard "mound" was detected in the east end of the pit's floor, in a spot where at least two of the legs of a large container for collecting sludge were to be set. The mound was examined and found to consist of grout – presumably from an overflow in the 1970s when grout was poured into a floor drain valve to seal it in preparation for storing N Reactor fuel.

KBC's engineering team has designed a system to suspend two of the legs of the tank from above, rather than anchoring them to the uneven, mound. "It still makes sense to put the sludge tanks in the weasel pit and technical viewing pit," Adkins said, "so the sludge retrieval work and the D&D work in the larger basin can stay out of each other's way as much as possible." The final two of the four sludge tanks are expected to be placed in the weasel pit this month.

Retrieving the sludge from the weasel pit, originally planned to take nine working days, proved to be difficult, consuming approximately 50 working days. "We were trying to commit in advance to something that's never been done before," said KBC's Sludge Director Scott Sax. "We used best-estimates and personnel interviews to make the original estimates for the work, but now we have hard data that shows just how difficult this work is... the bottom line is that it is taking longer than we anticipated."

"The operators have definitely been imaginative in designing better tools"
Scott Sax, KBC Sludge Project director

KBC Project

Fluor Hanford nuclear chemical operators team to remove sludge from KE Basin weasel pit. Pictured from left to right are Linda Knowles (back to camera), Joanie Graves, Laurie Parchen, Jason Brooks and Earl Jewett.

Nuclear chemical operators retrieving sludge from the K East Basin weasel pit stand on grating 20 feet above the pit's floor where debris covers much of the sludge.

Sax praised the operators. "Working a shift retrieving sludge in the weasel pit has been like driving for nine hours straight in a thick fog, viewing the road only through the rear-view mirror. Operators 'see' the sludge through a camera – it's twice as difficult. Their success in emptying this pit is a triumph of elbow grease and ingenuity... of initiative over adversity. They performed incredibly hard work, coupled every day with the attitude of 'let's find a better way'… I am extremely proud of them."

Pete Knollmeyer, Fluor Hanford's KBC vice president, compares sludge retrieval to "vacuuming under the bed of your child's room with all the toys on the floor while working through a tiny hole in the roof."

Complicating the task was sludge-retrieval work in the K East Basin's north loadout pit at the same time, using a different retrieval process – the batch-fill process – requiring decant (drawing off vessel water) several times a day. Gamin said decanting at the other end of the basin clouded the water in the weasel pit, increasing cleanout difficulty.

Pat Schweiger, Fluor Hanford sludge retrieval project manager, said it was frustrating to not be able to see what had been accomplished each day in the weasel pit.

"During the movement of spent nuclear fuel, the crews liked to celebrate the amount of fuel they moved each day," Schweiger said. "In sludge retrieval, you could never see the bottom of basin."

Schweiger was frustrated by water clarity and working conditions faced by exasperated crews. "It was a humbling experience," he said. "When you care about the workers and respect them, and you see them trying so hard, it's more than disappointing not to be able to help more. ...It was hard to gain a sense of accomplishment at the weasel pit. Trying to capture sludge there has been like trying to capture smoke!"

Work teams devised an array of end effectors – vacuum attachment "wands" with strainers that attach to the hoses used to vacuum sludge. "The operators looked at the configurations of the debris, the varying depths of the sludge, the angles where they stand to reach the debris, and other factors, and their ideas started flowing," Sax said. "We now have end effectors that can suck from all sides and have various types of attachments: cones, rakes that look like flattened circles, wheels, and just about any other shape and attachment you can imagine. The operators have definitely been imaginative in designing better tools."

"Trying to capture sludge there (in the weasel pit) has been like trying to capture smoke!"
Pat Schweiger, Sludge Retrieval Project

Since crews in the K East Basin began vacuuming sludge from main areas of the larger basin late last year, they've captured about six and one half cubic yards (five cubic meters) of sludge from the main basin, just over one-half of a cubic yard (just under one-half of a cubic meter) from the technical viewing pit (100 percent of the sludge in that pit), and about three cubic yards (2.3 cubic meters) from the basin's north loadout pit. A total of about 23 cubic yards (18 cubic meters), or nearly 5,000 gallons (40 percent of the total) of the sludge in the K East Basin has been contained. A new flocculent system that begins operating this week in the K East Basin is expected to help clarify water and aid the retrieval work.

"There are no magic technological breakthroughs," Sax said. "There are mini-breakthroughs. Every day we work on sludge, and every tool we develop, bring us closer to the finish line. We call it 'plug and chug,' but it works. I'm confident our crews will get us where we want to be." The KBC project plans to finish containerizing sludge this summer.

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