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Worker feedback leads to safe deactivation and path forward for major demolition

Photo provided

Workers completed the deactivation of the Product Purification Cell-South and have applied fixative for contamination control as part of the deactivation process (floor to ceiling view). The cell had previously contained high levels of contamination from former fuel reprocessing operations. This effort has contributed to an overall reduction in radiological hazards that will support the demolition of the Main Plant, an EM CY2022 Priority.

The Department of Energy and its prime contractor CH2M HILL BWXT West Valley completed the deactivation of the Product Purification Cell-South, which contained very high levels of contamination from former nuclear fuel reprocessing operations. This effort has contributed to an overall reduction in radiological hazards that will support the demolition of the Main Plant Process Building, an DOE CY2022 Priority.

The PPC-S measures 5 ft. x 16 ft. x 57 ft. high and during nuclear fuel reprocessing was used to house the vessels associated with plutonium separation, concentration, material controls and batching for shipping. Due to its

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configuration, this cell was a potentially oxygen-deficient confined workspace that required additional planning and work controls, including a trained and ready confined space rescue team.

"Safety is our priority throughout any and all work activities at the site," Stephen Bousquet said, DOE-WVDP Federal Project Director for the Main Plant Process Building Demolition. "This led to an impressive decontamination effort that involved a confined workspace, requiring layers of protective clothing, and numerous industrial and radiological hazard controls."

After decades of deactivation work in the Main Plant, the PPC-S remained the largest source of radioactive material. Due to the source material and the configuration of the cell, the PPC-S provided unique challenges. After reviewing several different methods for deactivation and working with Radiological Engineering, a decision was made to utilize liquid nitrogen (at -320oF) at pressures up to 60,000 psi to provide an aggressive, yet safe, cleaning application. Decontamination was accomplished by removing at least 1/8" of the surface (scabble) and safely collecting the material in a vacuum system for disposal. One of the unique benefits of the technology was that it did not create a secondary waste stream.

A team visited the technology owners' shop to evaluate the operation of the liquid nitrogen technology prior to its implementation. A base model was leased, which included an operation skid, shroud and decontamination wand. The site workers designed several mockups which were used to train employees on the system. This extensive use of mock-ups led to several improvements in safety, work controls and equipment. This included a secondary shroud which was built in-house to provide additional worker protection and control.

An in-cell mast climber was used to allow employees to safely access all areas of the 57 ft. tall cell, which resembled an elevator shaft. In addition to the primary and secondary shrouds of the liquid nitrogen decontamination system, portable ventilation units were used to provide appropriate air exchanges to ensure a safe work environment. Even with all of these controls, operators were still required to perform work in air-supplied bubble suits with air-supplied respirators.

Work plans were developed using previous site experience and corporate experience, industry best practices and lessons learned from similar deactivation projects to anticipate and mitigate potential adverse events. This also included work controls to reduce radiation exposure to workers during deactivation and waste packaging.

"This accomplishment demonstrates the importance that planning, work control, and worker feedback have when it comes to high-hazard work activities," Tom Dogal said, CHBWV Facility Disposition Manager. "Working closely with employees, management and DOE, feedback was used to further improve processes and safety controls during the deactivation. It was this employee engagement that led to a safe, compliant and successful outcome."