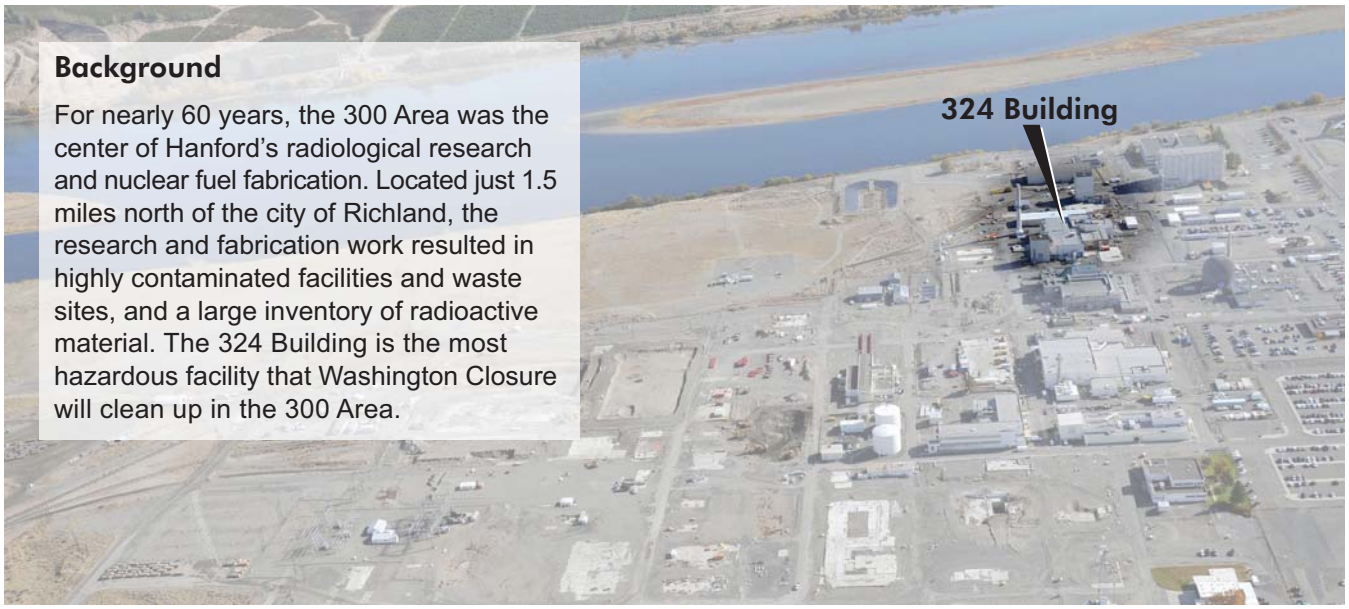
November 2010

324 Building B-Cell Contamination



Background

For nearly 60 years, the 300 Area was the center of Hanford's radiological research and nuclear fuel fabrication. Located just 1.5 miles north of the city of Richland, the research and fabrication work resulted in highly contaminated facilities and waste sites, and a large inventory of radioactive material. The 324 Building is the most hazardous facility that Washington Closure will clean up in the 300 Area.

In 2005, Washington Closure assumed the River Corridor Closure contract and began deactivation, decontamination, decommissioning and demolition (D4) activities in the 300 Area. The work is full of risks associated with heavy equipment, hazardous substances and highly contaminated radioactive facilities.

One of the most complex and hazardous projects Washington Closure has confronted is the 324 Building. The three-story building, which includes one story below ground and covers 102,000 square feet, was completed in 1965 to support materials and chemical process research and development activities. Research operations at the 324 Building ceased in 1996.

Washington Closure has been preparing for the demolition of the 324 Building by stabilizing and preparing for removal of five highly contaminated hot cells. The hot cells were built to allow Hanford personnel to work with highly radioactive materials without being exposed to radiation. Workers stood outside the hot cells and observed through leaded-glass windows as they conducted activities with remotely operated equipment. The greatest level of contamination is in a two-story hot cell called the Radiochemical Engineering Complex B-Cell.

During preparations to demolish the 324 Building, Washington Closure discovered that highly radioactive materials have migrated into the soil beneath B-Cell. The presence of these contaminants has the potential to affect plans and schedules for the removal of the hot cells. Washington Closure is working to ensure that the contaminated soil is not exposed to the environment and that water does not drive existing contaminants further into the soil where they could impact groundwater.

How did the radioactive materials reach the soil?

Washington Closure previously removed radioactive grout from the B-Cell's sump and trench. During the process, a visible breach was identified in the stainless steel liner at the floor of the sump, which is believed to have occurred at some point in the past operation of the facility. Some contaminated material might have historically leaked through the breached liner and concrete floor through corrosion or by following an expansion joint or crack in the concrete floor slab.

Where did the radioactive materials come from?

Research activities in B-Cell included test projects for waste vitrification (the transformation of a substance into glass) and grouting methods for stabilizing highly radioactive materials. A report by Pacific Northwest National Laboratory in 1993 referenced a large spill of concentrated cesium and strontium into the cell. Other smaller spills also have occurred.

324 Building B-Cell Contamination

How was radioactive material identified?

To characterize the soil beneath the B-Cell without exposing personnel directly to the soil, Washington Closure pushed Geoprobe sample tubes below the floor slab of B-Cell. A Geoprobe is a 2¾-inch diameter steel tube containing radiological instrumentation that is pushed into the soil using a hydraulic ram. Initially, Washington Closure pushed a sample tube 65 feet horizontally approximately 12 feet beneath ground level, resulting in a measurement location several feet under the B-Cell's sump. The initial sample probe indicated a maximum reading of 6,700 Rad/hr (+/- ~1340 R/hr) at a location near the sump. Washington Closure has placed additional sample tubes to gain a better understanding of the extent of contamination under B-Cell. To date, the additional probes also indicate an apparent localized high level of radioactive material under B-Cell with readings up to 8,900 R/hr. Special controls must be devised before direct samples of the material can be retrieved.

Initial characterization of the soil was performed by pushing sample tubes below the concrete floor slab of B-Cell.

How will the contamination under B-Cell be removed?

Work is under way to develop plans for safely remediating the radioactive materials. Depending on the selected disposition pathway, these plans may affect the plans and schedules for demolition of the 324 Building.

B-cell is the most contaminated of the 3-story hot cell research labs in 324. Experiments included stabilizing high-level radioactive waste into glass.

How much radioactive material is under B-Cell?

The initial dose rate measurements indicate multiple thousands of curies of radioactive material are present. Modeling of the radioactive material, and a determination of how far it might have migrated, will be performed as characterization data become available.

What is the status of the 324 Building?

Recent decontamination efforts removed approximately 20,000 curies of radioactive material from the B-Cell's sump and trench. The material was packaged into containers and was shipped to storage facilities on the Hanford Site. A layer of clean grout was then placed to cover the floor, sump and trench. The grout was used to stabilize the approximately 8,500 curies of radioactive material that are believed to remain on the floor of the cell, and to prepare for the further stabilization of materials on the cell walls and in ductwork by application of fixatives.

The 324 Building is one of the largest and most hazardous facilities along the Columbia River.

What are the risks associated with the material under B-Cell?

The primary concerns for radioactive material in soils or facilities at Hanford are direct exposure to workers, dispersion of material into the air, and migration of material into the groundwater. In this case, the material under B-Cell appears to represent relatively low risk in its current configuration. Workers are not directly exposed to the material because it is located below grade beneath a concrete slab and portions of the 324 Building. And because the contamination remains underground, there is not a dispersion pathway for the material to reach the atmosphere. Migration of the material through the soil into groundwater requires a driving force (source of water to push the contamination). Historically, some amount of water may have been present in the cell to provide a motive force, but to date groundwater monitoring wells in the vicinity of 324 Building have not identified the building as a source of radioactive contamination in groundwater. At present, intrusive activities and activities likely to result in water discharge to the soil column at the 324 Building are being curtailed to ensure no new migration pathway is created.