6.6 Tank Treatment Technologies

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In 2004, Pacific Northwest National Laboratory provided analyses, reviews, testing, and new tools to assist CH2M HILL Hanford Group, Inc. in accomplishing their River Protection Project objectives. These objectives are safe storage, retrieval, and treatment of radioactive waste from Hanford's underground waste storage tanks, closure of tanks, and disposal of treated waste.

While certain portions of the waste in Hanford's 177 tanks will be vitrified at the Waste Treatment Plant, DOE has given CH2M HILL Hanford Group, Inc. the task of evaluating supplemental treatment processes to immobilize part of the less radioactive or low-activity waste. CH2M HILL Hanford Group, Inc. and their contractor, AMEC Earth and Environmental Inc., are conducting tests to determine if bulk vitrification can be used to supplement the treatment capacity of the Waste Treatment Plant. This process creates large glass blocks, greater than 6.1 meters (20 feet) in length. In 2004, Pacific Northwest National Laboratory developed a simulated waste and used it in tests to evaluate and refine the glass formula and bulk vitrification process.

After the bulk of the waste is removed from the tanks, CH2M HILL Hanford Group, Inc. prepares the tanks for closure, marking the end of their time as storage vessels. In 2004, Pacific Northwest National Laboratory assisted CH2M HILL Hanford Group, Inc. in assessing the fate of the small fraction of remaining waste. Using residual waste samples and more than 40 years of experience with Hanford's geochemistry, Pacific Northwest National Laboratory developed computer models that predicted how and under what conditions contaminants would be released from the residual waste. In addition, Pacific Northwest National Laboratory is conducting detailed studies on the soil under the tanks to assess waste migration pathways if a leak occurred during retrieval.

Vitrified low-activity waste and other solid waste will be disposed at the Integrated Disposal Facility, a landfill being built in Hanford's 200-East Area. In 2004, Pacific Northwest National Laboratory provided data on the geology, hydrology, and geochemistry of the area. Pacific Northwest National Laboratory also tested waste glasses that will be in the facility, looking at how technetium and other contaminants would behave when the glass is placed in a disposal environment.

Chemical vapors from the tanks are a concern when retrieving waste from the tanks, as well as during day-to-day operations. Supporting CH2M HILL Hanford Group, Inc.'s efforts to protect its workers, Pacific Northwest National Laboratory provided data and analyses on the vapors emitted through the ventilation systems on each tank and how the vapors were dispersed. In addition, Pacific Northwest National Laboratory tested the accuracy, precision, and response time of several commercially available industrial hygiene field instruments potentially to be used by tank farm workers.

To help CH2M HILL Hanford Group, Inc. achieve the accelerated schedule for retrieving double-shell tank waste, a new software tool called the Compatibility Assessment Automation Tool was developed. Using existing data within the Tank Waste Information Network System, this software simplifies solving a number of calculations regarding tank waste transfers.

Because the River Protection Project schedule requires waste be held in the double-shell tanks beyond their original design life, CH2M HILL Hanford Group, Inc. is evaluating the tanks to ensure they are fit for duty. In support of this evaluation, Pacific Northwest National Laboratory analyzed the tanks' interiors and evaluated the potential effects of temperature changes, tank waste, and earthquakes. *Environmental Solutions, A Summary of Contributions for FY04: PNNL Contributions to CH2M HILL Hanford Group, Inc.* (PNNL-15094) provides greater detail on the technologies provided for tank technology improvements.