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MIXED-WASTE LANDFILL INTEGRATED DEMONSTRATION

The Mixed-Waste Landfill Integrated Demonstration (MWLID) has recently been assigned to Sandia National Laboratories by the DOE Office of Technology Development. The mission of the MWLID is to assess, implement and transfer technologies and systems that lead to quicker, safer, and more efficient remediation of chemical and mixed-waste landfills in arid environments. The MWLID will focus on two landfills at Sandia National Laboratories in Albuquerque, New Mexico: the Chemical Waste Landfill (CWL) and the Mixed-Waste Landfill (MWL).

There are five principal goals for the MWLID:

1. Plan - Develop a strategic plan (Roadmap) for the Mixed-Waste Integrated Demonstration that includes regulatory requirements, issue identification, root-cause analysis, and issue resolution. The plan will include strategies for regulatory interactions and public acceptance as well as technology development.
2. Characterize - Characterize quantities and distributions of contaminants and site properties and conditions associated with the Chemical and Mixed Waste Landfills while minimizing disturbance of the landfills. Apply innovative technologies to monitor changes in select parameters.
3. Remediate - Demonstrate remediation technologies at the Chemical and Mixed Waste Landfills emphasizing in situ technologies (transformation, containment, and stabilization) in addition to retrieve and treat options.
4. Evaluate - Compare demonstrated technologies against the baseline of conventional technologies, including consideration of cost as well as efficacy, risk reduction, and feasibility of implementation.
5. Integrate - Enhance the application of technologies to the Chemical and Mixed Waste Landfills through collaboration and communication among the DOE complex, other federal agencies, private industry, universities, and the public. Transfer technologies to other DOE sites and industry.

The CWL and MWL sites which compose the MWLID are located in Area III of Sandia National Laboratories on Kirtland Air Force Base in Albuquerque, New Mexico. These landfills received chemical, radioactive and mixed wastes from many Sandia operations. During the time of use of these landfills, the central Sandia mission was the development of the non-nuclear portions of nuclear weapons. Research programs that generated waste included radiation effects testing; initiation and detonation characteristics of high explosives; component development using plastics, glass and metals technology; and blast, shock and impact simulations on weapon systems.

The 1.9-acre CWL site was operated from 1962 to 1985, during which time a wide array of inorganic and organic chemicals were disposed of at the site. There is believed to be about 450,000 cubic feet of contaminated material in the CWL, including oxidizers, reducers, solvents, acids, organics, alkali metals, alkali earths, and heavy metals. To date, two subsurface releases have been detected beneath the CWL: trichloroethylene (TCE) and chromium. In April 1990, TCE was detected in the ground water at a maximum concentration of 23 ppb, resulting in a RCRA Compliance Order from the State of New Mexico. The source of the TCE is presumably one or more of the disposal pits in the chemical waste landfill that received at least 900 gallons of TCE or TCE mixes. An unlined pit was used for the disposal of oxidizers including 2000 gallons of waste chrome plating solutions. Soil borings in 1981, 1983, and 1987 reveal chromium has migrated to a depth of at least 75 feet beneath this pit.

The MWL received both hazardous and radioactive waste from 1959 until the CWL opened in 1962. After 1962, the MWL was restricted to receive only radioactive waste (including classified radioactive waste). The MWL site, closed in 1988, covers 1.6 acres and contains 50 cubic feet of uranium/thorium waste, 12,000 cubic feet of fission products, 55,000 cubic feet of induced-activity materials, and 11,000 cubic feet of tritium containing waste. In 1967, 270,000 gallons of primary reactor coolant water was dumped into one MWL trenches. Soil borings taken in 1989 indicate elevated tritium concentrations up to 100 feet beneath the MWL.

Both the CWL and MWL are located in the diverse hydrological setting that surrounds Albuquerque. The landfills are situated on an alluvial deposit about 12,000 feet thick of alternating sands, gravels and clays. A complex fault system controls ground water flow and in some cases the hydraulic connection across the faults is unknown. The aquifer under the landfills is believed to be over 10,000 feet thick, with the top of the aquifer lying approximately 500 feet below the soil surface. The arid Albuquerque climate yields less than eight inches of precipitation annually, resulting in a very high potential evapotranspiration rate and a natural areal recharge rate that is only a few percent of the precipitation rate.

The MWLID is to take a phased, parallel approach. Once characterization is underway at the CWL, lessons learned can be directly transferred to the more challenging problem of radioactive waste in the MWL. The MWL characterization can then proceed in parallel with the remediation work at the CWL. The MWLID organization is structured for input from the Advisory Council, Planning Group and Technology Support Groups. Success of the MWLID requires cooperative and productive interactions with the State of New Mexico and the ongoing SNL ER program.