

# Cleanup MissionArea Definitions



Three different D&D end states for reactors: (From left to right) interim stabilization at Hanford, in-situ decommissioning at SRS, and complete reactor removal at Idaho

## Deactivation and Decommissioning (D&D)

One of the six EM cleanup missions is D&D of facilities no longer needed to support weapons production. During the Cold War, tens of thousands of industrial, radiological and nuclear facilities were built ranging from large production reactors to complex nuclear chemical processing facilities, massive uranium enrichment plants, and highly hazardous and highly contaminated labs, support and disposal facilities. Many facilities are no longer needed, have far exceeded their safe design lives, and require significant upkeep and maintenance to ensure safe containment of radioactive and hazardous contamination inside while awaiting demolition. EM has an aggressive program to deactivate and decommission facilities no longer needed to support ongoing missions including a range of D&D options ranging from in-situ (in-place) decommissioning, to complete demolition and removal of all facilities.

## High Level Waste/Tank Waste

Processing Liquid Tank Waste and High Level Waste is another of the six EM mission cleanup areas. DOE generated roughly 92 million gallons of liquid radioactive waste as a byproduct of processing spent nuclear fuel (SNF) to produce nuclear weapons. This work represents some of the most hazardous, challenging and expensive work across the entire EM complex to stabilize this liquid waste into a vitrified glass product which can be safely stored for thousands of years. While SRS has started vitrifying its liquid tank waste at the Defense Waste Processing Facility (DWPF), the Hanford site still has 55 million gallons of liquid tank waste/HLW to treat once the Waste Treatment Plant (WTP) is completed and operational. Following removal of liquids, tanks must be emptied of the remaining solids (called saltcake and sludge), and then these large underground storage tanks must be cleaned and closed with regulatory approval after which the large tanks are filled with grout and stabilized in-place while smaller tanks are removed.



A liquid waste tank and its separate components



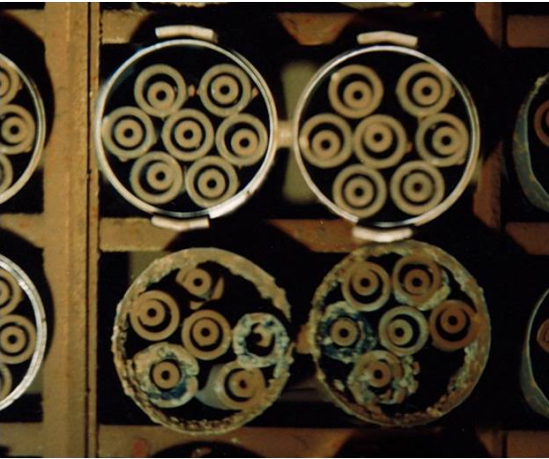
The Rocky Flats site before and after cleanup

## Site/Area Closure

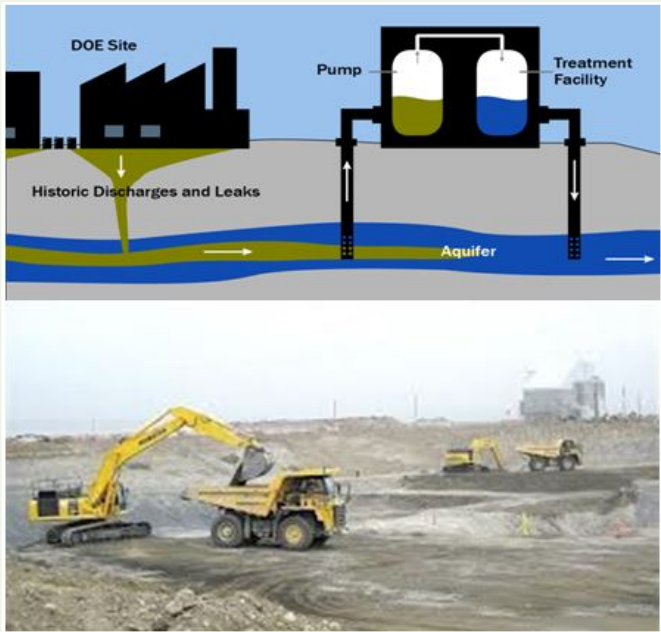
EM has made significant progress in cleaning up and closing 90 sites or areas to date. When reference is made to a site being cleaned up or closed, this refers to active EM cleanup work being completed and the EM mission being closed at a particular site or in a particular area of a site. In many cases, there are long term monitoring or stewardship responsibilities that may continue in perpetuity including monitoring of groundwater, air and soil on and around the site and around any closed waste disposal cells. As of 2013, five sites with significant contributions to nuclear weapons production have been cleaned and closed with regulatory approval including Rocky Flats, Fernald, Mound, Pinellas, and Weldon Spring. 85 smaller sites have been cleaned up, closed, and transferred to DOE's Office of Legacy Management or another federal or state agency for long term stewardship and monitoring.

## Spent Nuclear Fuel/Nuclear Material Disposition (SNF/SNM)

SNF/SNM stabilization is another of the six EM cleanup mission areas. Surplus weapons materials including plutonium, uranium and SNF have historically been used and stored across the DOE complex. Following the abrupt shutdown of much of the nuclear production complex at the end of the Cold War, thousands of metric tons of nuclear materials were left mid-process in aging and poorly maintained facilities not meeting current safety or security requirements. EM is stabilizing, through treatment, and safely repackaging nuclear materials into containers designed for safe and secure long-term storage awaiting ultimate disposition. Significant progress has been made in this cleanup area.



SNF stored in underwater pools at Hanford in 1994 which had deteriorated and presented a threat to the Columbia River. All fuel has been repackaged into dry safe interim storage by 2004



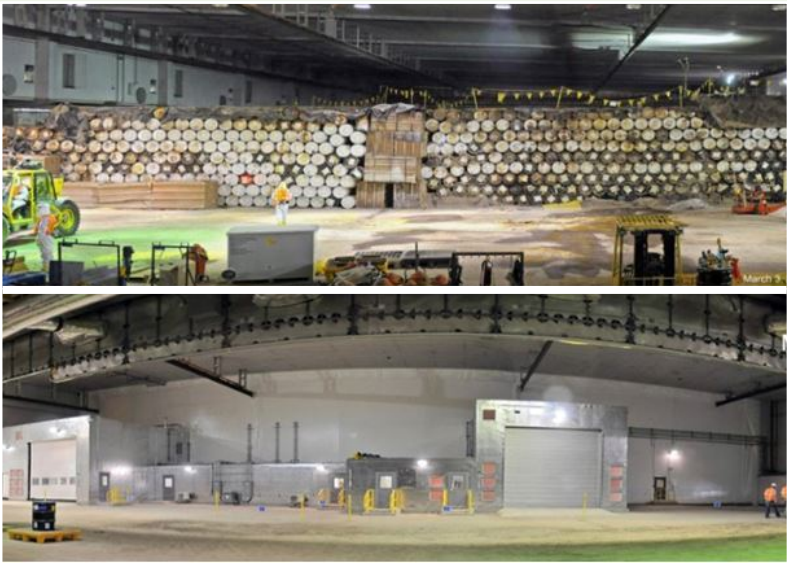
Typical groundwater pump and treat system used at many sites (above) and contaminated soil removal at Hanford destined for permanent disposal (below)

## Soil and Groundwater Remediation

Soil and Groundwater Remediation is one of six mission cleanup areas for EM. 60 years of weapons production during the Manhattan Project and the Cold War resulted in significant environmental discharges and releases of radioactive and contaminated liquids and solids into the soil and groundwater. EM has made significant progress in remediation and cleanup of soils and groundwater across the country thorough removal of the source of contamination and then removal of the surrounding contaminated soil and redispersing of that soil in approved monitored disposal cells that comply with today's strict environmental regulations and monitoring requirements. Groundwater is remediated by various pump and treat options which removes the contaminated groundwater, treats the water, and then returns the cleaned water back to the aquifer.

## Waste Disposal: Transuranic Waste (TRU), Low Level Waste (LLW), and Mixed Low Level Waste (MLLW)

Another cleanup mission area for EM is disposition of millions of cubic meters of radioactive waste. The production of nuclear weapons resulted in the radioactive contamination of items such as liquids, clothing, tools, rags, process equipment, soil and groundwater. Waste also includes newly generated waste from the demolition of excess nuclear facilities. EM's goal is to develop and implement safe, compliant, and cost effective disposition paths for all stored and newly generated radioactive wastes. While much progress has been made in disposal of LLW/MLLW, there is much work to be done to complete the waste mission. With the opening of the Waste Isolation Pilot Plant in 1999, TRU waste now has a final disposition path and EM is now aggressively pursuing disposal of TRU waste at WIPP.



Transuranic Storage Area Pad 1 in Idaho, in March 2010 and following retrievals in March 2012. Waste was repackaged and shipped to WIPP for permanent disposal