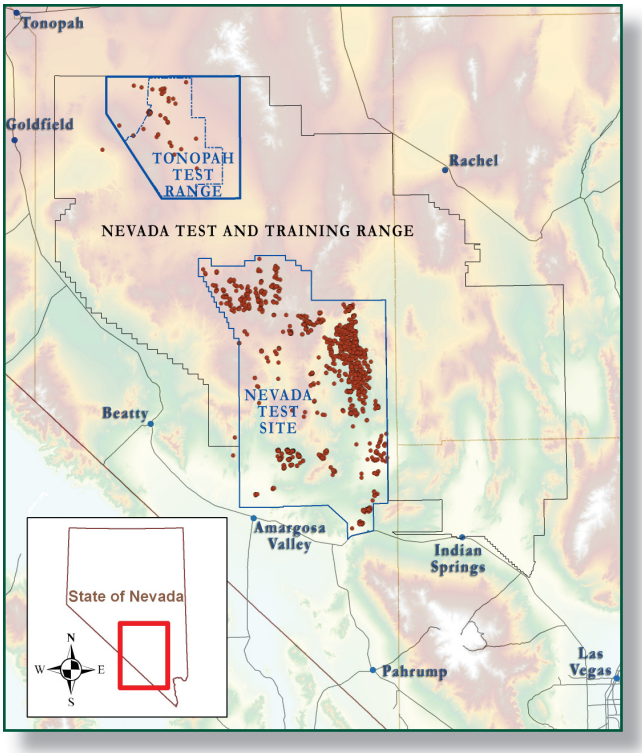
Industrial Sites ... an Approach to Cleanup

safety ❖ performance ❖ cleanup ❖ closure



The red dots on the Nevada Test Site, Tonopah Test Range, and Nevada Test and Training Range represent Industrial Site locations.

Background

The Environmental Management (EM) Program was established in 1989 at U.S. Department of Energy (DOE) offices around the country to address the environmental liabilities associated with more than 50 years of nuclear weapons production and testing. More than 15 years later, EM is the world's largest environmental cleanup effort. As part of that effort, the DOE Nevada Site Office is responsible for remediating portions of the Nevada Test Site and the Tonopah Test Range, which is located within the Nevada Test and Training Range (previously known as the Nellis Air Force Range).

The Nevada Test Site and the Tonopah Test Range played important roles in advancing the nation's nuclear testing program, functioning like small towns with a variety of facilities such as gas stations, motor pools, worker housing, and research buildings. Some of the facilities and land were used in direct support of nuclear testing, resulting in environmental contamination and subsequent hazardous and radioactive waste generation. These sites are collectively known as Industrial Sites and require varying types of remediation and/or cleanup. Cleanup activities include identifying the nature and extent of contamination, determining its potential risk to the public and environment, and performing the necessary corrective actions in compliance with guidelines and requirements.

Nearly 1,900 Industrial Sites have been identified, verified, and inventoried for characterization, closure and/or restoration. Of these, more than 1,700 sites have been formally closed. The remaining sites are grouped according to the source of contamination, location, and other technical characteristics. A group of these sites are referred to as a Corrective Action Unit.

Approach to Closure

To ensure compliance with the Federal Facilities Agreement and Consent Order, a specific closure approach is chosen to investigate and remediate an Industrial Site. The three methods for achieving closure are:

Definitions

Closure Approach: The method selected to remediate a site.

Contamination: The presence of substances that are not naturally found in a particular environment. Examples include radioactive materials, oils, solvents, gasoline, heavy metals (such as lead), and unexploded ordnance.

Corrective Actions: The necessary steps taken to remediate and/or characterize contaminated sites. Examples include excavation and removal, demolition, dismantlement, entombment, administrative controls, or a combination of these techniques.

Federal Facility Agreement and Consent Order: An agreement between the State of Nevada, DOE Environmental Management, DOE Legacy Management, and the U.S. Department of Defense which governs the remediation of sites in Nevada that were affected by historic nuclear testing.

Remediate: The process of cleaning, removing and/or isolating materials contaminated by historic nuclear testing activities.

- **Housekeeping**
  Housekeeping activities consist of closing each site by removing debris and/or material, disposing the waste generated, and verifying that each site is clean. The site is then closed by visual inspection and/or laboratory analysis of soil samples.

- **Complex Closure**
  Sites requiring a greater level of precaution are considered Complex Closure sites. These sites may include septic tanks, sewage lagoons, landfills, mud pits, or even facilities previously used in testing and support activities. As a result, these sites may be more complex to remediate than a Housekeeping site containing, for example, a discarded vehicle battery. The Complex Closure approach includes the following steps:
  – Corrective Action Investigation Plan
  – Site Investigation
  – Corrective Action Decision Document
  – Corrective Action Plan
  – Plan Implementation
  – Closure Report

- **Streamlined Approach for Environmental Restoration (SAFER)**
  In order for sites to qualify for the SAFER process, there must be a significant amount of existing process knowledge (that is knowing how the facility was contaminated) and sampling data already in place. This process bypasses portions of the Complex Closure approach including the Corrective Action Plan, Corrective Action Investigation Plan, and Correction Action Decision Document. In this approach, a SAFER plan is prepared, the corrective action is implemented, and a Closure Report is completed. An example of the SAFER process could be a building that has detailed historical documentation. In this case, remediation crews know what to expect in terms of contaminants at the site and how to properly remediate them.

These methods may be accomplished through a variety of activities, such as excavation and removal, demolition, dismantlement, entombment, administrative controls, or a combination of these techniques. Corrective Action Units are placed within one of 12 organizational categories called source groups, which are categorized by site type. Examples of site types include tunnel muckpiles and inactive ponds, drains and sumps, disposal wells, inactive tanks, contaminated waste sites, septic tanks and lagoons, spill sites, and decontamination and decommissioning facilities.

A radiation control technician surveys debris at a Complex Closure site on the Nevada Test Site.

Federal Facility Agreement and Consent Order (FFACO)

The Federal Facility Agreement and Consent Order outlines cleanup and monitoring commitments for sites and requires State of Nevada approval for the remediation activities selected to achieve closure. Once the State has approved closure, a public notice of completion is issued to mark the end of the closure process.

The Pluto Facility (exterior, above, and an interior work area, left) will be closed using the SAFER approach. Although Pluto is a D&D facility, current plans are to complete remediation and leave the building in place for potential future use.

Technology is not the only way Industrial Sites activities can be streamlined and save money. Available resources are also used in a variety of new ways. Here are several examples of cost savings achieved for an Industrial Sites project on the Tonopah Test Range:

- Due to a large amount of process knowledge, the Industrial Sites team requested and received permission from the State of Nevada Division of Environmental Protection to prepare only two of the normal four documents needed to adequately characterize and close a site (SAFER - see page 2)
- Construction debris was disposed at the Tonopah Test Range construction landfill instead of being shipped to the Nevada Test Site
- The Industrial Sites team conducted simultaneous remediation activities at different sites with similar contaminants of concern, reducing mobilization and demobilization costs
- Unexploded ordnance was detonated by U.S. Air Force personnel, eliminating this task from the U.S. Department of Energy remediation scope of work, and reducing the overall cost of the project to the U.S. Department of Energy

Members of the 820th Red Horse Squadron install C-4 plastic explosives during the demolition of unexploded ordnance at Antelope Lake on the Tonopah Test Range.

Decontamination and Decommissioning (D&D)

The goal of decontamination is to reduce risks to site workers, the public and the environment, and limit the long-term cost of surveillance and maintenance. Decommissioning simply means to remove from service, which, in most cases at decontamination and decommissioning sites, means to demolish the facilities and properly dispose of the generated waste.

D&D activities at the Super Kukla Facility included demolition of the High Bay using hydraulic shears.

Facilities that have no current or future mission often undergo decontamination and decommissioning, using characterization and remediation techniques that are slightly different than those used at other sites. The sites generally implement swipe sampling, decontamination, dismantlement, and other related activities. Despite these differences, the method used to reach closure at decontamination and decommissioning facilities is either Complex Closure or SAFER.

While contaminated soil is the most common waste encountered at remediation sites, contaminated building debris and equipment is prevalent at decontamination and decommissioning sites. There are a total of eight facilities designated as decontamination and decommissioning sites – Pluto Disassembly; Super Kukla; Reactor Maintenance, Assembly and Disassembly (R-MAD); Engine Maintenance, Assembly and Disassembly (E-MAD); Test Cell A; Test Cell C; Junior Hot Cell; and the U.S. Environmental Protection Agency (EPA) Farm. To date, five facilities (R-MAD, Junior Hot Cell, EPA Farm, Test Cell A, and Super Kukla) have achieved closure with the approval of the State of Nevada Division of Environmental Protection. Both the Pluto Disassembly and Test Cell C Facilities are undergoing decontamination and decommissioning using the SAFER method. However, the Pluto Facility will remain standing for potential future use. D&D activities at E-MAD are scheduled to begin in fiscal year 2009.

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Safer, Cheaper, Faster

Industrial Sites Sub-Project staff are always looking for new and innovative methods to improve the cleanup process, reduce cost, and speed remediation. Two such methods that have been used are an alternative landfill cover and hydraulic shears.

An alternative landfill cover was designed to cover and close a mixed low-level waste disposal cell at the Nevada Test Site. Traditional landfill covers are not appropriate in this region due to the arid conditions. Therefore, project planners developed an innovative approach that received approval from the State of Nevada Division of Environmental Protection and also met Resource Conservation and Recovery Act (RCRA) requirements. The project team decided upon a solution known as an evapotranspiration cover that is a top performer in arid conditions. The cover consists of a compacted soil barrier layer topped with a layer of native vegetation. The process of plant transpiration (i.e., movement of moisture through a plant from the roots to the atmosphere) facilitates evaporation of moisture from the disposal unit. Another key element of the design is the use of time-domain reflectometry sensors to measure soil-water content. Using this innovative approach, the mixed low-level waste disposal site is now closed, saving millions of taxpayer dollars.

A worker sprays water for dust suppression as the hydraulic shears dismantle a building at the Test Cell A Facility on the Nevada Test Site.

Hydraulic shears were used at a Nevada Test Site facility with two 500,000 gallon tanks that previously stored gasoline and diesel fuel. Industrial Sites Sub-Project staff were tasked with demolishing the tanks after they were deemed inactive with no plans for future use. The use of hydraulic shears helped crews conduct the work safely, and enabled workers to remotely dismantle piping, pumps, fill stands, and other nearby equipment. The hydraulic shears decreased the potential for worker exposure to potential contaminants and sped completion of the project. Using this efficient technology, and practical recycling techniques, the Industrial Sites team successfully completed yet another corrective action site ahead of schedule and under budget. Hydraulic shears have since been used to successfully dismantle Test Cell A and Super Kukla.

Path Forward

The ultimate goal of the Industrial Sites Sub-Project is to complete all corrective actions to ensure that any necessary long-term surveillance and maintenance programs are in place to protect the safety of the public and the environment. The Industrial Sites Sub-Project is scheduled to be completed in 2012.

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