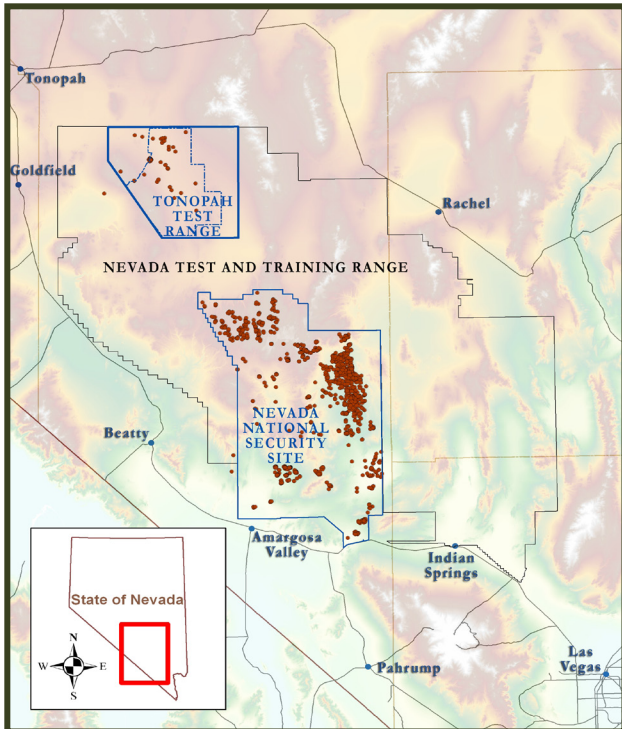


Industrial Sites ... an Approach to Closure

safety ❖ performance ❖ cleanup ❖ closure



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

The Environmental Management (EM) Program at the Nevada Site Office was created by the U.S. Department of Energy (DOE) to address the environmental legacy of contamination resulting from more than 50 years of nuclear weapons research, production, and testing. The U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office (NSO) is responsible for remediating portions of the Nevada National Security Site (formerly the Nevada Test Site) and the Tonopah Test Range, which is located within the Nevada Test and Training Range.

The Nevada National Security 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 include drains and sumps, disposal wells, inactive tanks, contaminated waste sites, septic tanks, lagoons, ordnances, and spill sites which require varying types of remediation. Industrial Sites activities include identifying the nature and extent of contamination; determining its potential risk to the public, site workers and the environment; and performing the necessary corrective actions in compliance with federal and state requirements. In total, 1,852 Industrial Sites have been identified, verified, and inventoried for characterization, closure and/or restoration. All but 72 of these sites have been formally closed.

Methods for Closing Industrial Sites

To ensure compliance with the *Federal Facility Agreement and Consent Order* (a legal agreement with the State of Nevada), a specific closure approach is chosen to investigate and remediate an Industrial Site. The three processes for achieving closure are Housekeeping, Complex, and Streamlined Approach for Environmental Restoration (SAFER).



Definitions

Contaminant: Substance that is found at a location or concentration that is not naturally occurring. Examples include radioactive materials, oils, solvents, gasoline, heavy metals (such as lead), and unexploded ordnance.

Federal Facility Agreement and Consent Order: A legally binding document between the State of Nevada, the U.S. Department of Energy, and the U.S. Department of Defense which outlines a schedule of remediation and monitoring commitments for sites contaminated by historic nuclear testing activities in Nevada.

Remediate: Corrective actions taken to clean, remove, and/or isolate materials contaminated by historic nuclear testing activities. Examples include excavation and removal, demolition, dismantlement, entombment, fencing and posting, or a combination of these techniques.

- **Housekeeping**

The Housekeeping Process is applicable to small sites that are easily addressed and involves the closure of each site by removing debris and/or material (such as batteries or drums), 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**

The Complex Process involves a greater level of complexity requiring multiple steps and documents to close a site. 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 are more complex to remediate than a Housekeeping site, which may contain only a discarded vehicle battery. The Complex Process requires that the following documents be written:

- Corrective Action Investigation Plan
- Corrective Action Decision Document
- Corrective Action Plan
- Closure Report

- **Streamlined Approach for Environmental Restoration (SAFER)**

In order for sites to qualify for the SAFER Process, there must be extensive process knowledge (which means understanding how the facility became contaminated) and/or existing sampling data. This process combines the first three documents of the Complex Process into one plan, a SAFER Plan. The SAFER plan is prepared, remediation conducted, and a Closure Report completed. The SAFER process might be appropriate, for example, when detailed historical documentation exists on the nature and extent of contamination activities with little or no additional investigation. In this case, remediation crews know what to expect in terms of contaminants at the site and can identify the required corrective actions and complete closure.

These three processes may be accomplished through a variety of activities, such as excavation and removal; demolition; dismantlement; entombment; administrative controls, such as construction barriers (for contamination left in place); fencing and posting; or a combination of these techniques.



A crane removes an ordinary 6-by-20-foot steel pipe at a Housekeeping site on the Nevada National Security Site



Sample collection with a backhoe at a Complex Process site on the Nevada National Security Site



The Pluto facility was closed using the SAFER process. (before demolition, above, and during demolition, left)

Here are several examples of cost-saving measures that were achieved for an Industrial Sites closure activity 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 National Security Site
- The Industrial Sites team conducted simultaneous remediation activities at different sites with similar contaminants of concern, reducing mobilization and demobilization costs
- Unexploded ordnance treatment was coordinated with Sandia National Laboratories on-site support, reducing the overall cost to the U.S. Department of Energy



Unexploded ordnance prepared for demilitarization on the Tonopah Test Range, Nevada

Decontamination and Decommissioning (D&D)

Closure at Industrial Sites D&D facilities is accomplished through the SAFER process. The goal of D&D is to reduce risks to site workers, the public, and the environment, and limit the long-term cost of surveillance and maintenance. D&D removes the Industrial Site from service and in most cases means to demolish the facilities and properly dispose of the generated waste.



D&D activities at the Reactor Maintenance, Assembly, and Disassembly (R-MAD) facility using a hydraulic hammer.

Facilities that have no current or future mission often undergo D&D, using characterization and remediation techniques that are slightly different from those used at other sites. The sites generally implement radiological surveys, sampling, decontamination, dismantlement, and other related activities.

Contaminated soil, building debris, and equipment is prevalent at D&D sites. A total of eight facilities have been designated as D&D sites – Pluto Disassembly; Super Kukla; Reactor Maintenance, Assembly and Disassembly (R-MAD); Engine Maintenance, Assembly and Disassembly (EMAD); Test Cell A; Test Cell C; Junior Hot Cell; and the U.S. Environmental Protection Agency (EPA) Farm. To date, closure of six facilities (R-MAD, Pluto, Junior Hot Cell, EPA Farm, Test Cell A, and Super Kukla) has been achieved with the approval of the State of Nevada Division of Environmental Protection under the *Federal Facility Agreement and Consent Order*. Test Cell C facilities are currently undergoing closure with an expected completion in fiscal year 2011. The EMAD facility is planned for closure by fiscal year 2022.

Industrial Sites ... an Approach to Closure

Safer, Cheaper, Faster

Industrial Sites staff are always looking for new and innovative methods to improve the closure 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 National Security 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 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 sophisticated sensors to measure soil-water content. Using this innovative approach, the mixed low-level waste disposal site was closed, saving millions of taxpayer dollars.

Hydraulic shears were used at a Nevada National Security Site facility with two 500,000-gallon tanks that previously stored



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

gasoline and diesel fuel. Industrial Sites 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 possibility of 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 Industrial Sites is to protect the safety of the public and the environment and to close contaminated sites, ensuring that any necessary long-term surveillance and maintenance programs are in place. All Industrial Sites are scheduled to be closed by 2013, except for the EMAD Facility which is scheduled to close by 2022.

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