附錄一　美國能源部於拉斯維加斯舉辦核設施除役專業訓練課程表

		ANL Decommissioning Training Course	Rev 1	
		November 14-17, 2016	2016/10/26 00:00	
		The Tuscany Suites & Casino		
		Las Vegas, NV, USA		
Date	**Time Slot**	**Activity**	**Speaker**	**#**
M, 11-14-16	8:00 - 8:15 AM	**Registration / Sign-In / Opening Remarks**	Larry Boing, ANL	
M, 11-14-16	8:15 - 8:45 AM	**Attendee Introductions**	Participants	
M, 11-14-16	8:45 - 10:15 AM	Introduction to Decommissioning	Larry Boing, ANL	1
M, 11-14-16	10:15 - 11:15 AM	Environment Safety & Health in Decommissioning	Joe Carignan, Carignan & Assoc	2
M, 11-14-16	11:15 AM - 12:15 PM	**LUNCH (on your own)**		
M, 11-14-16	12:15 - 1:30 PM	Waste Management in Decommissioning	Mark Kirshe, ReNuke	3
M, 11-14-16	1:30 - 1:45 PM	**GROUP PHOTO**	Exact Location & Timing TBD	
M, 11-14-16	1:45 - 2:30 PM	Site / Facility Characterization	Tom Hansen, Ameriphysics	4
M, 11-14-16	2:30 - 2:45 PM	**BREAK**		
M, 11-14-16	2:45 - 3:50 PM	Planning and Management	Joe Carignan, Carignan & Assoc	5
M, 11-14-16	3:50 - 4:50 PM	CS-Georgia Tech Characterization	Tom Hansen, Ameriphysics	6
M, 11-14-16	4:50 - 5:00 PM	Q&A / Discussions / Videos	ALL	
Tu, 11-15-16	8:25 - 8:30 AM	Opening Remarks	Larry Boing, ANL	
Tu, 11-15-16	8:30 - 9:30 AM	Decontamination Technologies	Larry Boing, ANL	7
Tu, 11-15-16	9:30 - 10:45 AM	Cost Estimates for Decommissioning	Joe Carignan, Carignan & Assoc	8
Tu, 11-15-16	10:45 - 11:00 AM	**BREAK**		
Tu, 11-15-16	11:00 - 11:55 AM	CS - Shield Source - a Canadian Tritium Self-Luminous Sign Manuf D&D	Dave Tucker, McMaster University	9
Tu, 11-15-16	11:55 AM - 1:00 PM	**LUNCH (on your own)**		
Tu, 11-15-16	1:00 - 2:00 PM	CS - DOE/NNSS Radioactive Waste Management Program	Scott Kranker, NSTec	10
Tu, 11-15-16	2:00 - 3:00 PM	Historical Hazard Identification	Paul Corrado, Consultant	11
Tu, 11-15-16	3:00 - 3:15 PM	**BREAK**		
Tu, 11-15-16	3:15 - 4:30 PM	CS - Marcoule UP1 & Bldg 324 Decommissioning	Didier Equilbec, AREVA	12
Tu, 11-15-16	4:30 - 5:00 PM	Q&A / Discussions / Videos	ALL	
W, 11-16-16	8:25 - 8:30 AM	Opening Remarks	Larry Boing, ANL	
W, 11-16-16	8:30 - 9:30 AM	Evolving Technologies	Didier Equilbec, AREVA	13
W, 11-16-16	9:30 - 10:40 AM	Dismantling Technologies	Larry Boing, ANL	14
W, 11-16-16	10:40 - 10:55 AM	**BREAK**		
W, 11-16-16	10:55 - 11:55 AM	Final Status Surveys/License Termination	Tom Hansen, Ameriphysics	15
W, 11-16-16	11:55 AM - 12:45 PM	CS - Reactor Vessel Disposition	Mark Kirshe, ReNuke	16
W, 11-16-16	12:45 - 1:45 PM	**LUNCH (on your own)**		
W, 11-16-16	1:45 - 2:30 PM	Decommissioning Community & Knowledge Management Resources	Larry Boing, ANL	17
W, 11-16-16	2:30- 2:45 PM	**BREAK**		
W, 11-16-16	2:45 - 3:45 PM	CS - Decommissioning Activities at the DOE-NNSS	Reed Poderis, NSTec	18
W, 11-16-16	3:45 - 4:15 PM	Key Concepts to Take Home	Larry Boing, ANL	19
W, 11-16-16	4:15 - 4:30 PM	Q & A / Discussions	ALL	
W, 11-16-16	4:30 - 4:45 PM	**Distribution of Certificates / Closing Remarks / Book Drwg**	Larry Boing, ANL	
Th, 11-17-16	7:30 AM - 5:00 PM	**TOUR OF NNSS (the old NEVADA TEST SITE)**	An NSTec Representative	20
		Internet Resources for Decommissioning	Larry Boing, ANL	21
		ACRONYM Listing	Larry Boing, ANL	22
		International Decommissioning	Larry Boing, ANL	23
		Soil Clean-Up	Larry Boing, ANL	24
		Case Study - JANUS Reactor Decommissioning	Larry Boing, ANL	25
		Deactivation Process	Larry Boing, ANL	26
		For NTS/NNSS Souvenirs		
		NTS Historical Foundation's "Atomic Testing Museum"		
		755 East Flamingo Road		
		Las Vegas, NV 89119-7363		
		Phone: 702-794-5151		
		http://www.ntshf.org/		
Note - Limited hours of operation - great visit / souvenirs - visit Sunday or Friday				

附錄二　內華達州國家安全場址廢棄物參訪行程表

NEVADA NATIONAL NNSS SECURITY SITE

AGENDA

Welcome to the Nevada National Security Site (NNSS)

Argonne Decommissioning Training Course

Thursday – November 17, 2016

7:00 a.m.	Ryan's Express bus arrives at C-1 Building, rear entrance, North Las Vegas Facility (far northeast corner of B-3 parking lot). Meet Robert Keller, Institutional Affairs, National Security Technologies (NSTec) at flag pole.
7:05 a.m.	Depart for the Tuscany Suites & Casino, 255 East Flamingo Road.
7:30 a.m.	Arrive at the Tuscany Suites & Casino. Meet Larry Boing, Course Director, Argonne National Laboratory and visitors at valet entrance.
7:45 a.m.	Depart for Mercury.
9:00 a.m.	Arrive at Mercury Badge Office for badging. **Photo identification is required at time of badging. Foreign nationals must provide a passport at time of badging.**
9:20 a.m.	Depart for Gate 100.
9:25 a.m.	Arrive at Gate 100 for badge check.
9:30 a.m.	Depart for Engine Maintenance Assembly and Disassembly Facility (E-MAD).
10:00 a.m.	Arrive at E-MAD. Briefing by Reed Poderis, Environmental Restoration Program Manager, NSTec.
10:30 a.m.	Depart for Mercury Cafeteria.
11:00 a.m.	Arrive at Mercury Cafeteria. No host lunch.
12:00 Noon	Depart for Area 5 Radioactive Waste Management Complex (RWMC).

A camera is authorized on tour for a group photo at Sedan Crater and will be controlled by Robert Keller. Briefings are unclassified.

FOUR FOREIGN NATIONALS

Managed and Operated by National Security Technologies, LLC

12:15 p.m.	Arrive at Area 5 RWMC. Meet Tom Hergert, Facility Manager or Jon Yonko, NSTec.
12:40 p.m.	Depart for Icecap Ground Zero (GZ) via drive-by briefing of Area 3 Radioactive Waste Management Site.
1:20 p.m.	Arrive at Icecap GZ. Briefing by Robert Keller.
1:45 p.m.	Depart for Sedan Crater.
2:00 p.m.	Arrive at Sedan Crater. **Group photo**
2:15 p.m.	Depart for Apple II houses. Optional
2:35 p.m.	Arrive at Apple II houses. Drive-by briefing.
2:45 p.m.	Depart for Mercury, Building 600 (Blue Box).
3:25 p.m.	Arrive at Mercury Building 600. Rest stop
3:40 p.m.	Depart for Gate 100.
3:45 p.m.	Arrive at Gate 100 for badge check.
3:50 p.m.	Depart for Tuscany Suites & Casino, Las Vegas.
5:05 p.m.	Arrive at Tuscany Suites & Casino.
5:10 p.m.	Ryan's Express bus and escorts depart for C-1 Building, rear entrance North Las Vegas.
5:35 p.m.	Arrive at C-1 Building, rear entrance. Bus released.

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附錄三　內華達州國家安全場址相關業務資料介紹

Regulatory Requirements

safety ❖ performance ❖ cleanup ❖ closure

Activities relating to an ongoing Environmental Management campaign at the Nevada National Security Site (formerly the Nevada Test Site) are subject to a number of federal and state regulations. These requirements govern environmental cleanup, emergency response, waste disposal, and other operations.

State requirements are in place to address the environmental, economic, and safety concerns of Nevadans; while *federal* laws ensure sites throughout the U.S. Department of Energy Complex (DOE) are pursuing responsible and practical measures to reduce environmental liabilities on federally-controlled land. These *state* and *federal* regulations work together to reduce risk to workers and the public while protecting the environment.

Federal Facility Agreement and Consent Order

In 1996, the State of Nevada Division of Environmental Protection (NDEP) negotiated an agreement with the DOE's National Nuclear Security Administration Nevada Site Office called the *Federal Facility Agreement and Consent Order*, or *FFACO*. The agreement established a strategy for managing sites and facilities on the Nevada National Security Site and parts of the Nevada Test and Training Range (which includes the Tonopah Test Range) that were affected by years of nuclear research, production, and testing. Under the agreement, the Environmental Management program must:

- Identify and group sites according to the nature of the contamination;
- Investigate cleanup alternatives;
- Establish specific sampling and monitoring requirements;
- Ensure coordination and communication among participants (includes federal, contractor, and State representatives); and,
- Develop cost effective approaches to site management.

The State of Nevada Division of Environmental Protection maintains regulatory responsibility over Environmental Management activities at the Nevada National Security Site.

Agreement in Principle

Under an *Agreement in Principle*, the DOE has agreed to provide financial support to the State of Nevada for enhanced environmental and health oversight, as well as associated monitoring activities. The Agreement also spells out the Nevada Site Office's commitment to assist in emergency management initiatives to protect the health and safety of citizens throughout Nevada.

Although the State of Nevada does not have regulatory authority over radioactive waste, the Nevada Site Office and the State of Nevada entered into a *Joint Low-Level Waste Oversight Agreement* (attachment to the *Agreement in Principle*), which increases NDEP's involvement in activities

Definitions

Hazardous Waste: Solid waste, or a combination thereof, containing constituents that are toxic, corrosive, reactive, ignitable, or specifically identified by the U.S. Environmental Protection Agency as "hazardous."

Low-Level Waste: Radioactive waste that cannot be characterized as high-level, transuranic, spent nuclear fuel, or by-product materials.

Mixed Radioactive Waste: Waste that contains both hazardous and radioactive constituents.

Radioactive Waste: Materials with no future use that have been contaminated by a nuclear process, thereby containing unstable elements (such as hydrogen, plutonium, or uranium) which emit radiation.

Regulatory Requirements

associated with low-level radioactive waste disposal at the Nevada National Security Site. By entering into the Agreement, the Nevada Site Office and the State agree to share all pertinent information concerning waste types and quantities. In addition, the Agreement authorizes the State to conduct prompt reviews of documents and site management procedures.

The *Atomic Energy Act*, first passed in 1946, is the basis for all regulations governing the use of nuclear material in the United States. This includes authority over the disposal of radioactive waste.

National Environmental Policy Act

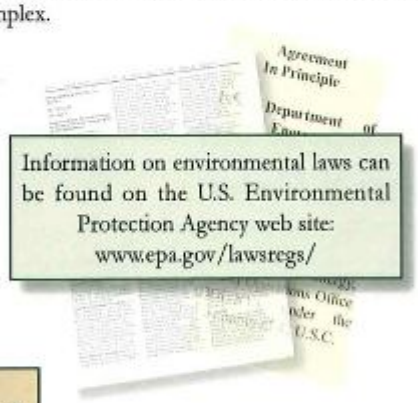
The *National Environmental Policy Act (NEPA)* requires federal government agencies to evaluate the environmental consequences of past, present, and future activities at their respective sites and pursue actions that lessen or reverse these consequences. As part of the NEPA process these agencies must prepare an *Environmental Assessment*, or the more comprehensive *Environmental Impact Statement (EIS)*.

In accordance with NEPA, the Nevada Site Office published an *EIS for the Nevada Test Site and Other Off-Site Locations* in 1996. This document established a baseline analysis of how site activities affect land use, geology, air quality, groundwater, biological and cultural resources, and public health and safety. The Nevada Site Office is currently drafting a new EIS, which will provide updates in all of these areas. The EIS process involves several formal steps, including a draft period, a public comment period, and a decision period prior to publishing the final document and record of decision.

Resource Conservation and Recovery Act

The *Resource Conservation and Recovery Act (RCRA)* authorizes the U.S. Environmental Protection Agency to regulate the management of hazardous wastes, which includes waste generation, transportation, treatment, storage, and disposal. To ensure waste management activities at the Nevada National Security Site are *RCRA*-compliant, the U.S. Environmental Protection Agency has delegated its authority to NDEP.

The Nevada Site Office operates under RCRA permits for the storage and disposal of hazardous and mixed hazardous materials at the Nevada National Security Site. Much of this material is waste generated as part of ongoing cleanup activities at the Nevada National Security Site and throughout the rest of the DOE Complex.



Information on environmental laws can be found on the U.S. Environmental Protection Agency web site: www.epa.gov/lawsregs/

For more information, please contact:
U.S. Department of Energy,
National Nuclear Security Administration
Nevada Site Office
Office of Public Affairs
P.O. Box 98518
Las Vegas, NV 89193-8518
(702) 295-3521
envmgt@nv.doe.gov
www.nv.energy.gov

For information on all Nevada Site Office Environmental Management activities visit:
www.nv.energy.gov/envmgt

DOE/NV--631 REV2 • January 2011

Radioactive Waste Management

safety ❖ performance ❖ cleanup ❖ closure

The NNSS

For decades, the Nevada National Security Site (NNSS) has served as a vital waste disposal resource in the nation-wide cleanup of former nuclear research and testing facilities. State-of-the-art waste management facilities at the NNSS offer a safe, permanent disposal option for U.S. Department of Energy/U.S. Department of Defense sites generating cleanup-related radioactive waste.

LLW and MLLW

Waste management operations at the NNSS focus on the disposal of low-level (LLW) and mixed low-level (MLLW) radioactive waste, which typically consists of containerized debris, trash, soil, equipment, tools, and discarded personal protective clothing. LLW and MLLW containers can generally be handled without any special equipment or clothing, as the level of radioactivity is relatively low and the packaging provides the necessary protection. MLLW is disposed separately from LLW in a cell constructed with a multi-layered lining and a special leachate collection system, required under a Resource Conservation and Recovery Act permit.

Disposal Location

A combination of conditions, such as arid environment, deep groundwater, and site remoteness, make the NNSS a favorable location for LLW and MLLW disposal. Designated as a DOE Regional Disposal Site, the NNSS is permitted to accept LLW and MLLW at one of two approved waste management sites. The Area 5 Radioactive Waste Management Site, which is currently active, contains 200 acres of land developed for LLW and MLLW waste storage and burial-style disposal. The Area 3 Radioactive Waste Management Site, a 128-acre disposal area previously used for the disposal of larger or bulk-type LLW packages, became inactive in 2006.

Waste Acceptance

As part of the NNSS commitment to safety and the protection of workers and the environment, it is a required practice for Nevada Field Office personnel to review and approve waste prior to shipment. Approval is granted only after waste generators undergo a rigorous certification process and demonstrate compliance with the NNSS Waste Acceptance Criteria, a formal document that outlines specific requirements for LLW waste treatment, packaging, documentation, transportation, training, etc. Separate criteria are in place for MLLW, which contains hazardous components governed by the Resource Conservation and Recovery Act. The State of Nevada Division of Environmental Protection, with authority delegated by the U.S. Environmental Protection Agency, has issued special permits to the NNSS for activities involving hazardous waste.

Definitions

Low-Level Waste: Radioactive waste that cannot be characterized as high-level, transuranic, spent nuclear fuel, or by-product materials, such as uranium mill tailings.

Mixed Low-Level Waste: Waste that contains both hazardous and radioactive constituents. Hazardous constituents are toxic, corrosive, reactive, ignitable, or specifically identified by the U.S. Environmental Protection Agency as "hazardous."

Radioactive Waste: Materials with no future use that have been contaminated by a nuclear process, thereby containing unstable elements (such as tritium, plutonium, or uranium) which emit radiation.

Waste Generator: U.S. Department of Energy and U.S. Department of Defense sites or projects that generate low-level or mixed low-level radioactive waste.

Radioactive Waste Management

Transportation

Prior to waste acceptance at the NNSS, generators and their contracted shipping carriers must exhibit full compliance with NNSS Waste Acceptance Criteria, DOE Orders, and U.S. Department of Transportation guidelines. Once this information has been verified, NNSS waste personnel conduct surveys of all trucks, trailers and containers entering Area 5 to ensure security seals are in place and packages are intact and appropriately labeled. If further verification is needed, waste packages may be inspected using on-site x-ray technology. Any waste found to be out of compliance will be rejected pending corrective action.

Waste packages are positioned in a disposal cell at the NNSS Area 5 Radioactive Waste Management Site

Disposal Method

Once incoming waste passes final inspection, waste trucks are allowed access to one of several excavated disposal cells within the Area 5 Radioactive Management Site. Following off loading, waste is scanned and then stacked, one upon the other, in a stair-step configuration. Waste cells are organized using a 20' x 20' grid system, in which letters and numbers designate the location of waste packages. This tracking system helps waste personnel monitor the accumulation of radionuclide levels, and, if need be, retrieve specific waste packages once they are covered with soil.

Monitoring

Area 5 personnel use special equipment to perform ongoing air, groundwater, and soil monitoring. Such monitoring activities provide early detection in the unlikely event contamination migrates from the immediate disposal area. Monitoring results to date have shown no radiological releases above regulatory limits. Regular performance assessments of the disposal facilities serve as an additional safety measure. Experts use computer modeling software to perform these assessments and make determinations about the potential short-term and long-term risks associated with disposal.

For more information, please contact:
U.S. Department of Energy,
National Nuclear Security Administration
Nevada Field Office
Office of Public Affairs
P.O. Box 98518
Las Vegas, NV 89193-8518
(702) 295-3521
envmgt@nnsa.doe.gov
www.nv.energy.gov

For information on all Nevada Field Office Environmental Management activities visit:
www.nv.energy.gov/envmgt

DOE/NV--540 REV8 • June 2013

Transporting Radioactive Waste to the Nevada National Security Site

safety ❖ performance ❖ cleanup ❖ closure

Safety is paramount for the Environmental Management mission at the U.S. Department of Energy (DOE), National Nuclear Security Administration Nevada Field Office. In fact, this commitment to safety is integrated into all work procedures at DOE sites that generate and transport low-level and mixed low-level waste to the Nevada National Security Site (NNSS).

Waste generators are responsible for ensuring that waste is packaged and transported in a safe and compliant manner. These generators and the contracted commercial carriers must comply with U.S. Department of Transportation regulations, NNSS Waste Acceptance Criteria, and other applicable federal, state, and local regulations and requirements.

Routing Preferences

U.S. Department of Transportation regulations require carriers to select routes which minimize radiological risk. In addition, the NNSS Waste Acceptance Criteria requires low-level and mixed low-level waste shipments avoid the O'Callaghan-Tillman Memorial Bridge and Las Vegas.

In combination with these requirements, the Nevada Field Office has identified routes (see map on reverse side) and advises generators to conform to the following guidelines:

- Avoid heavily populated/congested areas in the state of Nevada (including the Las Vegas Beltway, I-215)
- Direct carrier drivers to complete the mandatory driver questionnaire

The Nevada Field Office may suspend generator shipments if waste is not transported in compliance with the identified requirements and guidelines.

The Nevada Field Office also strives to accommodate a request by the State of California to limit the number of shipments that travel along California Highway CA-127 due to extremely limited and remote emergency response capabilities (see blackout dates on reverse).

Emergency Response

A Nevada Field Office grant funds emergency preparedness activities and resources in counties near the NNSS. The grant is funded by charging a fifty-cent fee for every cubic foot of waste disposed at the NNSS. The Nevada Division of Emergency Management administers the grant.

Since 2000, nearly $13 million has been awarded to Clark, Elko, Esmeralda, Lincoln, Nye and White Pine counties to enhance emergency response capabilities.

Definitions

Carrier: The trucking company which transports radioactive waste from the generator site to the Nevada National Security Site.

Waste Generator: U.S. Department of Energy and U.S. Department of Defense sites that generate low-level and mixed low-level radioactive waste.

U.S. Department of Transportation: The federal agency that regulates the packaging and transportation of radioactive materials in accordance with the Code of Federal Regulations, Title 49.

Transporting Radioactive Waste to the Nevada National Security Site

Nevada Field Office low-level and mixed low-level waste transportation routes to the Nevada National Security Site

2016 Black-Out Dates for CA-127

Generators must advise their carriers to avoid transporting low-level and mixed low-level waste shipments along CA-127 on the following dates:

Jan. 1-4; Jan. 15-18; Feb. 13-15; Mar. 19-20; Mar. 25-27; Apr. 27-30; May 28-30; July 1-5; Sept. 2-6; Oct. 28-31; Nov. 9-13; Nov. 10-14; Nov. 24-28; Dec. 24-31; Jan. 1-8, 2017

Permitted Shipments

In addition to any required hazardous material permits and prior to movement in Nevada and any neighboring state, overweight and/or oversized shipments must possess the appropriate state-issued permits. When applying for such permits, all carriers to the NNSS must declare that the load is radioactive material and specify intended routes. Annual permit holders carrying radioactive materials to the NNSS are also limited to specific routes. Approved routes, such as NV-160, may be further restricted due to bridge weight capacities, width/height limits, or work zone lane restrictions. Carriers should be aware of all current postings on: www.nevadadot.com/business/trucker.

For more information, please contact:
U.S. Department of Energy
National Nuclear Security Administration
Nevada Field Office
Office of Public Affairs
P.O. Box 98518
Las Vegas, NV 89193-8518
(702) 295-3521
envmgt@nnsa.doe.gov
www.nv.energy.gov

For information on all Nevada Field Office Environmental Management activities visit:
www.nv.energy.gov/emprograms

DOE/NV--990 REV12 (2016-024) • February 2016

Nevada National Security Site Groundwater Program

safety ❖ performance ❖ cleanup ❖ closure

The goal is to develop an advanced, reliable monitoring network that ensures the long-term protection of the public.

Background

From 1951 to 1992, the United States government conducted 828 underground nuclear tests at the Nevada National Security Site. About one-third of these tests occurred near, below, or within the water table–the very top portion of the groundwater layer where rock and soil are completely saturated with water. As a result, some groundwater was contaminated.

The U.S. Department of Energy (DOE) began exploring the effects of groundwater contamination in the 1970s. Though contamination from underground testing has never been detected on public land, the DOE was committed to developing an advanced, reliable monitoring network that ensures the long-term protection of the public. An intensive groundwater investigation program was launched in 1989.

Program Approach

Understanding contaminant movement at the Nevada National Security Site is a challenge, given the geologic complexity and sheer magnitude of the site. Risks associated with contamination remain low, however, due to the immobility of some contaminants and the extremely slow movement of others. Scientists considered these and other factors when designing the groundwater approach, which integrates the following elements:

Drilling and sampling – Dozens of groundwater characterization wells have been drilled throughout the site. "Characterization" refers to the process of testing well samples to gauge groundwater chemistry, pressure levels, temperature, and geologic properties.

Data interpretation – Samples are sent to Nevada-certified, independent laboratories for analysis. Results become data points in a highly sophisticated computer database.

Computer modeling – When experts gather enough data points from sampling, the database can start building a computerized model – a three-dimensional representation of the Nevada National Security Site subsurface.

Monitoring – Groundwater characterization wells supplement an existing network of more than 60 water supply locations on and off the site that are part of routine monitoring activities.

Underground Test Areas

Scientists explored groundwater flow patterns on a regional scale before focusing on specific underground test areas, grouped by geographic location (see map). Groundwater experts are creating computerized contaminant flow and transport models at each of these underground test areas. The models help experts make projections about where contaminants are moving and how quickly.

Nevada National Security Site Groundwater Program

Agreement with the State

The objectives of the Nevada National Security Site groundwater program are outlined in an agreement between the DOE and the State of Nevada Division of Environmental Protection. Under this agreement, work will proceed over a period of years following a phased strategy:

Year 1989

Investigation Stage - Drill wells; gather new data to build transport models for each of the historical underground test areas; review results; and supplement as necessary.

Decision/Action Stage - Develop a model evaluation plan to challenge and refine model projections; use model evaluation plan to identify location for new wells.

Year 2030

Closure Stage - Negotiate use restrictions and regulatory boundary; establish institutional controls and requirements; and initiate long-term closure monitoring program (to remain in place for the foreseeable future).

Status

The State of Nevada has accepted the flow and transport model for the Frenchman Flat underground test area, which has now moved on to the Decision/Action Stage. The remaining underground test areas are progressing within the Investigation Stage as scheduled.

For more information, please contact:
U.S. Department of Energy
National Nuclear Security Administration
Nevada Field Office
Office of Public Affairs
P.O. Box 98518
Las Vegas, NV 89193-8518
(702) 295-3521
envmgt@nnsa.doe.gov
www.nv.energy.gov

Field personnel collect groundwater samples at a Yucca Flat well.

Peer Reviews

Over the years, the Nevada Field Office has maintained an open-minded approach, often seeking the input of industry experts. Feedback from two independent peer reviews of the Frenchman Flat approach helped DOE scientists build greater confidence in model results. A Yucca Flat Peer Review is currently underway.

Public Involvement

To encourage an open dialogue with the public and share the program's most recent results, the Nevada Field Office invites community members to attend regular groundwater open house events in rural Nevada. In addition, groundwater-focused tours of the Nevada National Security Site are offered on a periodic basis.

Stakeholders may apply to be a member of the Nevada Site Specific Advisory Board, which provides recommendations directly to the groundwater program. The Board has been influential in decisions relating to peer reviews as well as the selection of a well location in Pahute Mesa.

For more public involvement opportunities, educational resources and social media links, visit www.nv.energy.gov.

For information on all Nevada Field Office Environmental Management activities visit:
www.nv.energy.gov/envmgt

DOE/NV--915 REV5• October 2014

Environmental Management

safety ❖ performance ❖ cleanup ❖ closure

In 1950, President Truman established what is now known as the Nevada National Security Site (NNSS), to perform nuclear weapons testing activities. In support of national defense initiatives, a total of 928 atmospheric and underground nuclear weapons tests were conducted at the NNSS between 1951 and 1992, when a moratorium on nuclear testing began.

Environmental Management

The U.S. Department of Energy's Environmental Management (EM) Program was established in 1989 to identify and address areas impacted by historical nuclear research, development, and testing across the United Sites. In Nevada, EM activities focus on:

- Groundwater, soil, and on-site facilities;
- Radioactive, hazardous, and sanitary waste management and disposal; and
- Environmental planning, compliance, and monitoring.

Workers take a water sample from a well drilled in the northwest portion of Yucca Flat - an area on the NNSS where hundreds of underground nuclear tests were conducted.

Groundwater Characterization

As a result of historic underground nuclear testing, some of the groundwater beneath the NNSS is contaminated. At this time, there is no proven, cost-effective technology that removes deep, extensive contamination from complex geology. Therefore, the NNSS is forecasting the location, potential direction and flow of contaminants. This is accomplished through strategically-placed well drilling and extensive sampling which provides data for computer models. All this information is used to enhance and expand the monitoring network which ensures the protection of the public and environment.

Radioactive Waste Disposal

The low-level radioactive waste disposed at the NNSS is generated by cleanup activities at the NNSS and other U.S. Department of Energy and U.S. Department of Defense sites across the country. Examples of this waste include contaminated construction debris, scrap metal, soil, and equipment. Some of this waste includes hazardous constituents. Waste is disposed in engineered cells

Workers place a metal box containing mixed low-level radioactive waste in a disposal cell at the Area 5 Radioactive Waste Management Complex located in the southeast portion of the NNSS.

excavated to various depths. Continuous monitoring of air, groundwater, and soil serves as an early detection system in the unlikely event that contamination migrates from the immediate disposal area.

Definitions

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.

Closure in Place: Occurs when contaminants of concern (i.e. radioactive or hazardous constituents) are left in place at the site. This method is used when exposing and moving the contaminants has the potential for greater safety risks than leaving the materials in place. Access to these sites is controlled through administrative actions such as land use restrictions and physical barriers (i.e., fencing).

Monitoring: System established to collect and analyze sampling information to track the quality of air, water, geologic material, plants, animals, etc.

Environmental Management

Protecting People and the Environment

NNSS activities are conducted in a manner which adheres to all environmental protection standards and regulations in order to safeguard the public and environment from any existing or potential contamination. These activities include environmental planning, compliance and monitoring.

Infrastructure Remediation

Hazardous and radioactive contamination found in the historic NNSS infrastructure must be characterized and cleaned up in accordance with the Federal Facility Agreement and Consent Order. Sometimes the contaminants can be easily removed and, in some cases, portions of entire facilities must be demolished and properly disposed.

Surface Soil Remediation

Contamination has been identified in portions of the surface soil near historic atmospheric tests. The EM Program evaluates the extent of soil contamination resulting from atmospheric nuclear tests, safety experiments, and earth-cratering experiments. After the evaluation is complete, a remediation process is implemented upon approval by the State of Nevada.

Outreach Activities

EM has a dedicated public outreach program which includes the development and distribution of fact sheets, publications, news releases and exhibits. EM not only keeps the public informed, but also offers the opportunity to participate through the Nevada Site Specific Advisory Board (NSSAB) and considers recommendations from the NSSAB. The NSSAB is comprised of volunteers from southern Nevada who review EM activities and provide stakeholder feedback and recommendations. More information on the NSSAB, including meeting details, is located at www.nv.energy.gov/NSSAB.

Workers close-up a container of low-level radioactive waste debris from the demolition of the Reactor Maintenance, Assembly, and Disassembly Facility used for nuclear rocket development at the NNSS in the 1960s.

For further information about the Environmental Management program contact:

U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office
Office of Public Affairs
P.O. Box 98518
Las Vegas, NV 89193-8518
(702) 295-3521
nevada@nv.doe.gov
www.nv.energy.gov

Scan with your smart phone and take the Nevada National Security Site mobile.

For information on all Nevada Site Office Environmental Management activities visit:
www.nv.energy.gov/envmgt

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Environmental Restoration

safety ❖ performance ❖ cleanup ❖ closure

The Environmental Management (EM) Program was created to address the environmental legacy of contamination resulting from decades of nuclear weapons research, production, and testing at the Nevada National Security Site (NNSS) and other federal facilities across the United States. The U.S. Department of Energy (DOE), National Nuclear Security Administration Nevada Field Office (NNSA/NFO) is responsible for remediation efforts at the NNSS and at some locations on the surrounding Nevada Test and Training Range, to include the Tonopah Test Range.

Tackling this legacy, are experts in the fields of geology, engineering, hydrology, and computer modeling. This team is working together to develop effective strategies to address contaminated soils, industrial facilities, and groundwater sites.

These strategies, and completion of this environmental restoration mission are governed by the Federal Facility Agreement and Consent Order, a legally-binding agreement among the DOE, the State of Nevada, and the U.S. Department of Defense. This Consent Order establishes a framework for identifying, prioritizing, investigating, remediating, and monitoring the contaminated sites covered by the agreement.

In accordance with this agreement, once the extent of contamination (*if any*) is determined, an appropriate closure approach is selected to complete the corrective action. Closure approaches may entail the removal and disposal of debris (such as old batteries and paint containers), complete excavation and clean closure of the site, decontamination and decommissioning activities, closure in place, and/or subsequent monitoring.

Map showing the location of the Nevada National Security Site and the Nevada Test and Training Range (including the Tonopah Test Range).

Hydrologists conduct water sampling at Well ER-6-2

Radiation Control Technicians (RCTs) survey old radium dials in Area 5

Environmental Restoration

Industrial Sites

Industrial Sites are facilities and land that may have become contaminated as a result of activities conducted in support of nuclear testing. The facilities and land include disposal wells, inactive tanks, contaminated waste sites, inactive ponds, muck piles, spill sites, drains and sumps, and ordnance sites. As of September 2014, Industrial Sites closures are 99% complete.

Building demolition at the Engine Maintenance, Assembly and Disassembly Facility.

Soils Sites

Surface and shallow subsurface soils were contaminated by historical atmospheric nuclear tests, weapon storage/transportation tests and support activities on the NNSS and adjacent U.S. Air Force land. Soils site closures are 70% complete as of September 2014.

Groundwater

Scientists study the effects of historical underground nuclear testing on the groundwater at the NNSS and locations contiguous with the underground testing areas. Investigations focus on the geology and hydrology of the NNSS to determine how contaminants are transported by groundwater flow. A regional three-dimensional computer groundwater model has been developed to aid in identifying any risk to the public, the workers, and the environment. Results to date indicate contaminated groundwater is not expected to reach publicly accessible locations due to the relative slow movement of groundwater combined with the ongoing process of radioactive decay, which reduces contamination levels. To ensure public health and safety, groundwater monitoring is expected to continue in perpetuity.

Wells are drilled to collect groundwater samples, aiding scientists in determining contaminant boundaries and movement.

Definitions

Computer Groundwater Model: A computer program that can integrate various geologic and water samples to produce three-dimensional representations of the subsurface environment.

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

Corrective Actions: Actions taken to characterize, remediate, and/or isolate sites. Examples include investigation, excavation and removal, demolition, dismantlement, entombment, fencing and posting, or a combination of these techniques.

Decontamination and Decommissioning: A closure process used for facilities with no current or future mission. The process involves collecting information to determine possible contamination (characterization), choosing the appropriate cleanup method (e.g., decontamination and reuse or demolition and disposal) and site closure (completion of closure method).

Remediate: The process of cleaning, removing and/or isolating contaminates that may present a risk to human health and/or the environment.

For more information, please contact:
U.S. Department of Energy,
National Nuclear Security Administration
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For information on all Nevada Field Office Environmental Management activities visit:
www.nv.energy.gov/emprograms

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National Security

Radiological/Nuclear Countermeasures Test and Evaluation Complex

The complex will test and evaluate sensors that will be deployed to U.S. border crossings, such as this one.

Introduction

The Radiological/Nuclear Countermeasures Test and Evaluation Complex (RNCTEC) is a multi-use test and evaluation platform that will serve the U.S. homeland security mission.

Background

The Department of Homeland Security's Domestic Nuclear Detection Office (DNDO), with assistance from the U.S. Department of Energy National Nuclear Security Administration, has established the RNCTEC at the Nevada National Security Site, formerly known as the Nevada Test Site, to support all federal agencies to develop, acquire and support the deployment of a domestic nuclear detection system to detect and report any attempt to import or transport a nuclear explosive device, fissile material, or radiological material intended for illicit use. The complex will be comprised of several operating areas, with the capacity to conduct high fidelity test and evaluation on detection systems.

Capabilities

The testing and evaluation complex is designed on a campus model, and is comprised of new primary testing components, including:

- A vehicle choke point where detection systems for land-border crossings, toll plazas, entrances to tunnels and bridges can be evaluated.
- A radiography and "active interrogation" facility enabling the evaluation of the latest detection technologies to intrusively interrogate trucks and/or transports, thereby enhancing the sensitivity for detection of nuclear materials and overcoming the effects of materials that can shield their presence.
- A wireless data transmission and collection system.
- A large instrumented outdoor testing area to support testing of systems designed to screen transports and mobile detection systems.
- A test support facility with control rooms and secure data processing areas.

Customers

The complex supports a wide spectrum of users that include, but is not limited to:

- Department of Homeland Security Domestic Nuclear Detection Office
- The Department of Homeland Security Science and Technology Directorate (DHS S&T)
- Department of Energy National Laboratories that support the Department of Homeland Security mission including the test and evaluation of detection systems for the international portion of the global nuclear detection architecture
- Private companies and universities engaged in radiation detector development and production under contract to the Department of Homeland Security and other federal agencies
- Operational agencies and organizations within the Department of Homeland Security, such as Customs and Border Protection, the United States Coast Guard and the Transportation Security Administration

National Security

For more information, contact:
U.S. Department of Energy
National Nuclear Security Administration
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September 2013

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ATOMIC ENERGY COUNCIL

On the successful completion of the Argonne National Laboratory

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Argonne NATIONAL LABORATORY

Lawrence E Borrg, ANL Facility Decommissioning Training Course Director