Nevada Test Site Tour Booklet

EM Site-Specific Advisory Boards
Chairs' Meeting
March 28, 2007

Prohibited Articles On Nevada Test Site Public Tours

The following items are prohibited on the Nevada Test Site public tours. Tour escorts are required to do random checks.

- **Transmitting & Receiving Devices**
- **PDA, BlackBerry, etc.**
- **Laptops & Associated Media**
- **Alcohol**
- **Chemical Irritants**
- **Pets & Animals**
- **Global Positioning System (GPS)**
- **Recorders**
- **Portable Data Storage Devices**
- **Cameras**
- **Cellular phones**
- **Weapons**
- **Explosives**
- **Any Item Prohibited by Law**
- **Controlled Substances**
- **Ammunition**
- **Incendiary Devices**
- **Binoculars**
- **Optical Devices**

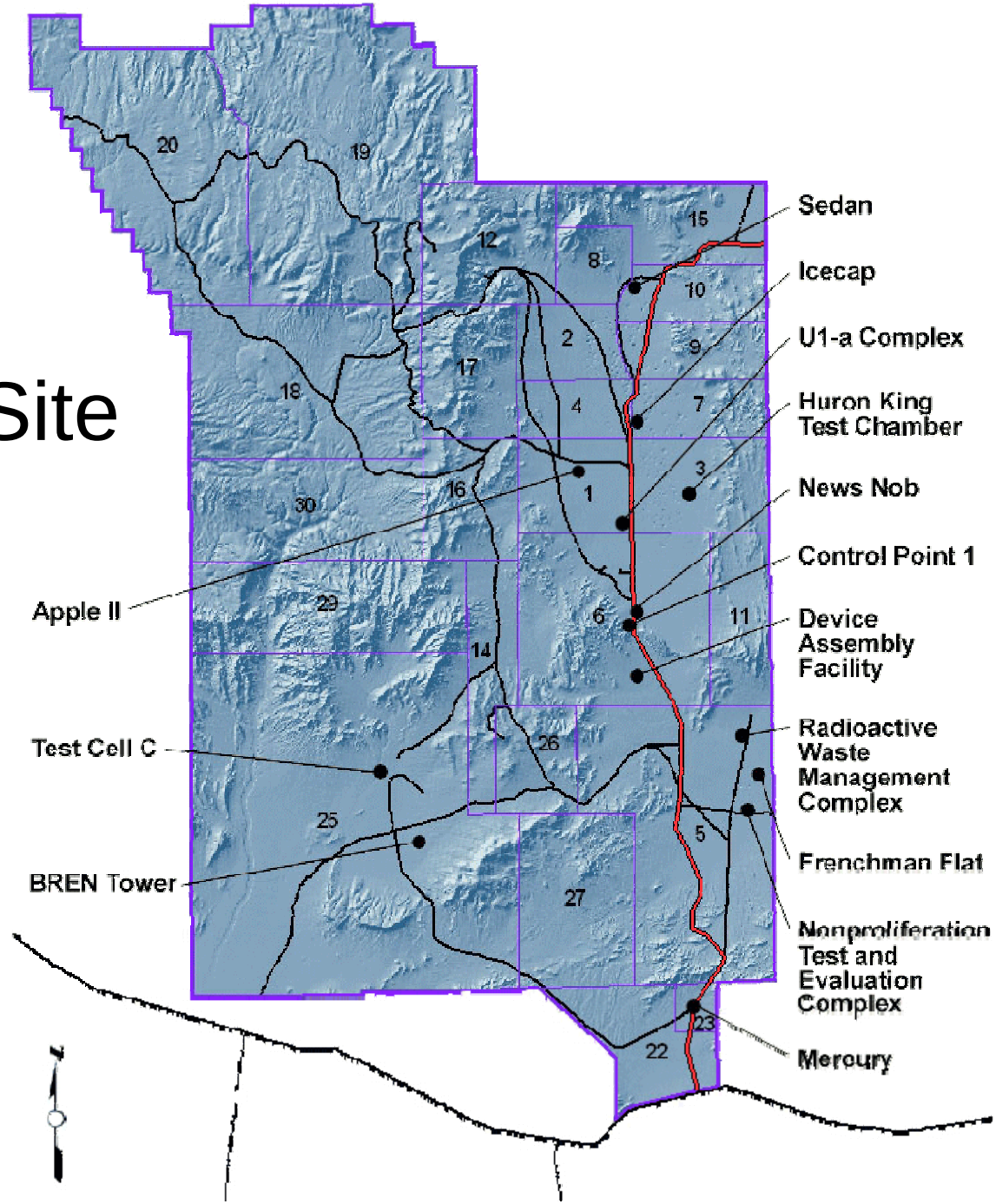
Possession of these items may delay the tour and prevent your participation.

If at any point during the tour these items are discovered, the tour may be terminated.

Tour Agenda

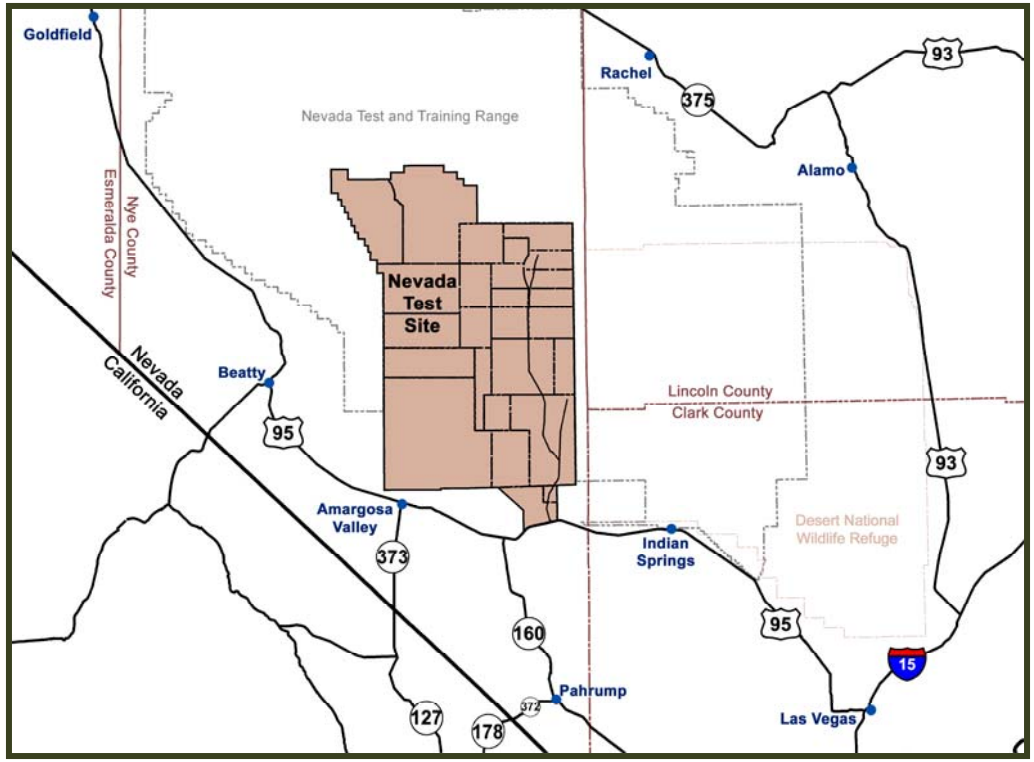
7:45 a.m.	Depart for Mercury
9:00 a.m.	Arrive at Mercury Badge Office
9:20 a.m.	Depart for Gate 100
9:25 a.m.	Arrive at gate for badge check
9:30 a.m.	Depart for Area 5 Radioactive Waste Management Complex (RWMC)
9:50 a.m.	Arrive at RWMC (Rest stop)
11:10 a.m.	Depart for Icecap Ground Zero
11:40 a.m.	Arrive at Icecap Ground Zero
12:05 p.m.	Depart for Sedan Crater (Lunch en route)
12:20 p.m.	Arrive at Sedan Crater
12:35 p.m.	Depart for Apple II houses
12:55 p.m.	Arrive at Apple II houses
1:05 p.m.	Depart for Area 25, Test Cell C
1:40 p.m.	Arrive at Area 25, Test Cell C
2:00 p.m.	Depart for Bren Tower
2:05 p.m.	Arrive at Bren Tower
2:15 p.m.	Depart for Mercury Cafeteria
2:45 p.m.	Arrive at Mercury Cafeteria (Rest stop)
3:00 p.m.	Depart for Gate 100
3:05 p.m.	Arrive at gate for badge check
4:25 p.m.	Arrive at Suncoast Hotel & Casino

Nevada Test Site Tour Map

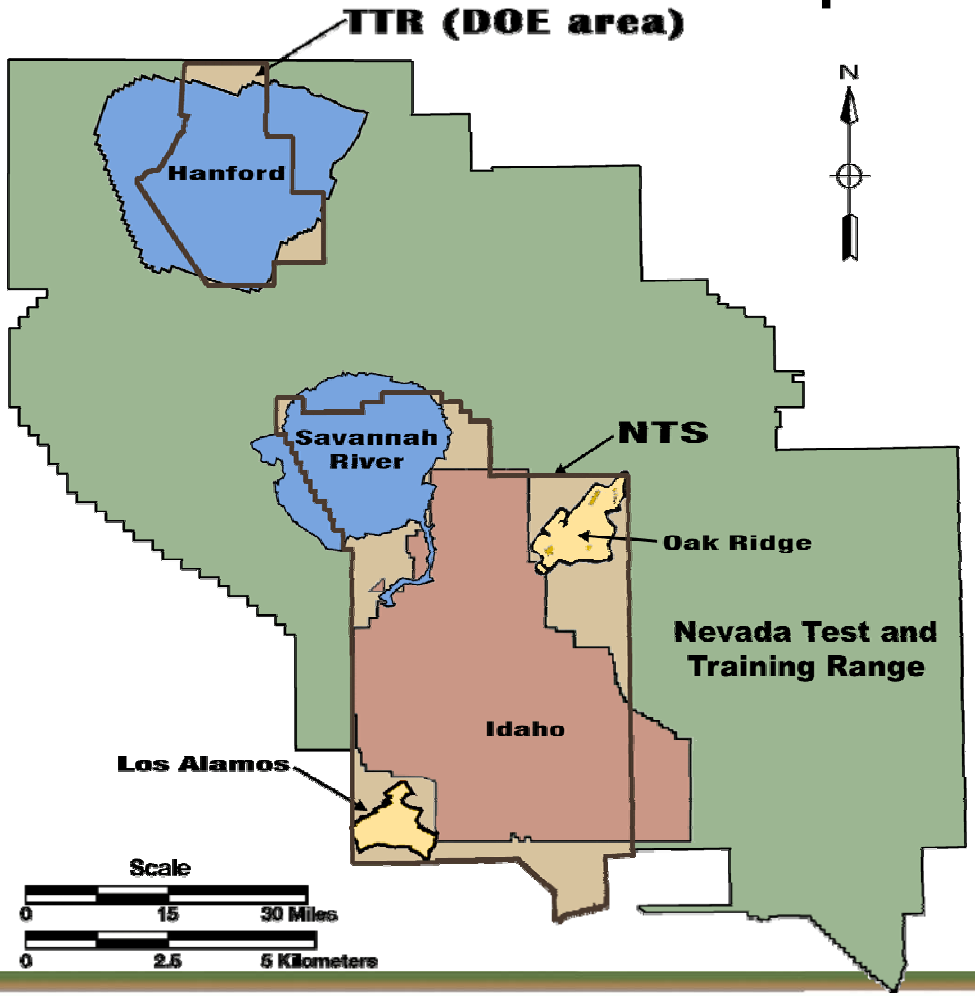


The Nevada Test Site (NTS)

- Approximately 1,375 square miles of U.S. Department of Energy (DOE) controlled land
  - Surrounded by approximately 4,500 square miles of federally-controlled land
- Located approximately 65 miles northwest of Las Vegas, Nevada



DOE Site Comparisons



Site	Sq. Mi.
Hanford	*560*
Idaho	*893*
Savannah River	*310*
Oak Ridge	*53*
Los Alamos	*43*
TOTAL	***1859***
NTS	*~1375*
TTR (DOE area)	*~280*
TOTAL	***~1655***

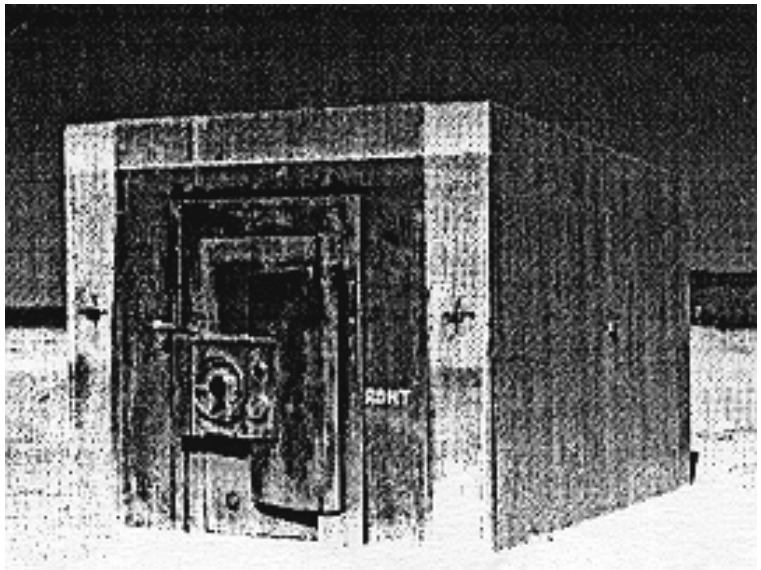
Historic Activities

- First NTS atmospheric nuclear test detonated on January 27, 1951
- Conducted 928 atmospheric and underground nuclear tests between 1951 and 1992
- Development and testing of nuclear weapons generated radioactive waste

Nonproliferation Test and Evaluation Complex (NPTEC)

- World's largest facility for open air testing of hazardous toxic materials and biological simulants
- Available to private and public sector sponsors on a user-fee basis

Atmospheric Test Relics



Bank Vault prior to the 1957 Priscilla test

Effect of the test on the vault

Atmospheric Test Relics
(continued)

Concrete shelter domes prior to the 1957 Priscilla test

Effect of the test on the concrete shelter dome

Area 5
Radioactive Waste Management Complex

- 732 acres available for disposal – 160 acres currently used
- Low-Level Waste (LLW) and Mixed LLW disposal cells are excavated pits and trenches
- Thirty-two (32) engineered disposal cells
  - Nine (9) Active
  - 23 operationally closed
  - One (1) under construction

Area 5 Radioactive Waste Management Complex

Total Disposed Volume:
More than 13 million cubic feet
(more than 370 thousand cubic meters)

Number of Existing Disposal Cells:
Active (open) - 9
Closed - 23

Available Capacity (existing cells):
Approximately 9 million cubic feet
(approximately 250 thousand cubic meters)

Number of Monitoring Locations:
Air - 2
Groundwater - 3
Meteorology - 1
Radon - 20
Soil Gas - 1
Soil Moisture - 8
TLD* - 12

Depth to Groundwater:
Approximately 800 feet
(Approximately 240 meters)

*TLD = Thermoluminescent Dosimeters

Area 5 Disposal Capabilities

- Diverse DOE and defense-related radioactive waste streams and package types handled
  - Asbestos
  - Contact-handled LLW heavy monoliths
  - High-concentration thorium
  - Remote-handled LLW heavy monoliths
  - Thorium nitrate
  - High specific activity LLW
  - Non-standard packaging

  - Mixed LLW
  - Classified material
  - High radon emanation

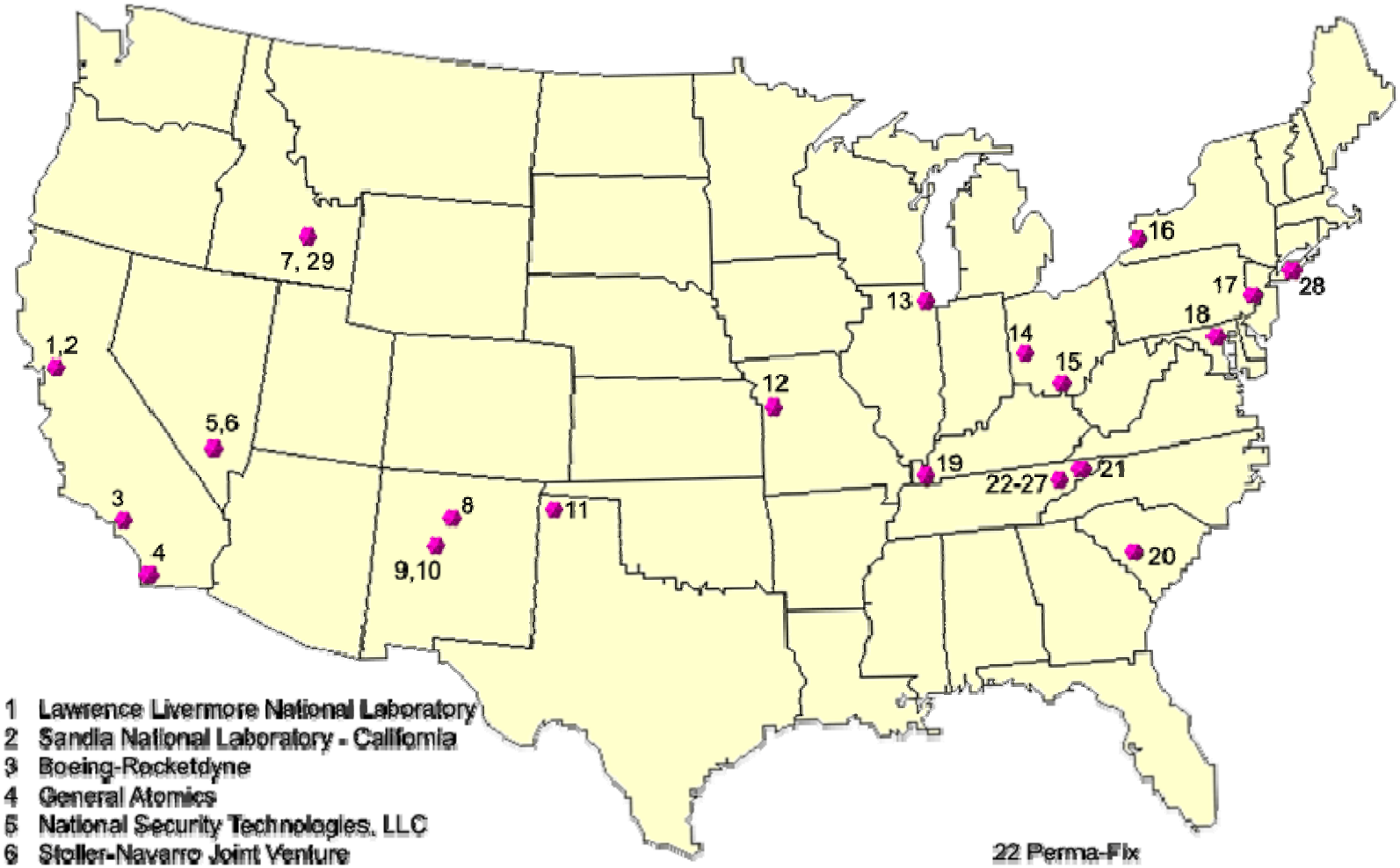
Area 5 Disposal Cells – Waste Container Configuration

Boxes containing LLW are placed in a stair-stacked configuration within an engineered grid

Area 5 Capacity

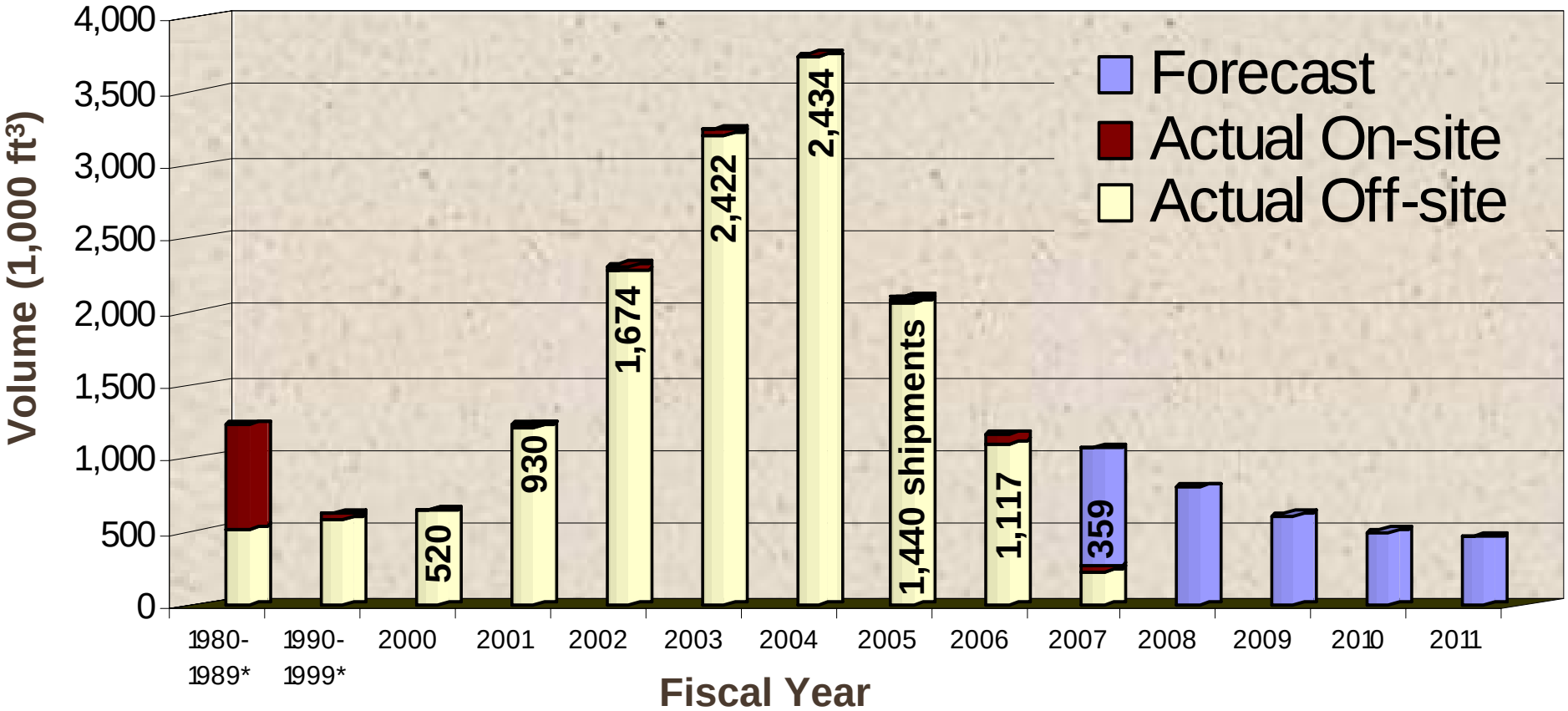
- Total current disposed volume is more than 15 million cubic feet of LLW and Mixed LLW
- Available open capacity in existing cells: approximately seven (7) million cubic feet
- Available capacity in the undeveloped areas of the 732 acre site: estimated at 116 million cubic feet

NTS Approved Generators



1 Lawrence Livermore National Laboratory
2 Sandia National Laboratory - California
3 Boeing-Rocketdyne
4 General Atomics
5 National Security Technologies, LLC
6 Stoller-Navarro Joint Venture
7 Idaho National Laboratory
8 Los Alamos National Laboratory
9 Lovelace Respiratory Research Institute
10 Sandia National Laboratory - New Mexico
11 Pantex Plant
12 Kansas City Plant
13 Argonne National Laboratory
14 Fernald
15 Portsmouth
16 West Valley Demonstration Project
17 Princeton Plasma Physics Laboratory
18 Aberdeen Proving Grounds
19 Paducah
20 Savannah River Site
21 Nuclear Fuel Services
22 Perma-Fix
23 Duratek
24 Foster-Wheeler
25 Oak Ridge National Laboratory
26 Oak Ridge Reservation
27 BWXT Y-12
28 Brookhaven National Laboratory
29 Advanced Mixed Waste Treatment Facility

NTS LLW Disposal History



FY 2004 (total) – 3,743,572 ft^3
FY 2005 (total) – 2,091,771 ft^3
FY 2006 (total) – 1,166,433 ft^3
FY 2007 (total received as of 03-01-2007) – 264,394 ft^3
**Indicates average per year for that decade*

LOW-LEVEL WASTE OPERATIONS
FY 2007
WEEKLY WORKING REPORT*

		W/E: 03/01/2007			FY 2007 TOTAL			WMP TOTAL	
DOE APPROVED GENERATORS	Disposal Location	Weekly Shipments	Volume (Ft^3)	Volume (M^3)	FY 2007 Shipments	Volume (Ft^3)	Volume (M^3)	Volume (Ft^3)	Volume (M^3)
ABERDEEN****	Area 3	0	0.00	0.00	0	0.00	0.00	120	3.40
	Area 5	0	0.00	0.00	33	42246.40	1,196.28	146,136	4,138.12
ARGONNE NATIONAL LABORATORY	Area 3	0	0.00	0.00	0	0.00	0.00	0	0.00
	Area 5	0	0.00	0.00	0	0.00	0.00	2,358	66.77
	Mixed	0	0.00	0.00	0	0.00	0.00	0	0.00
BECHTEL JACOBS (ORR)	Area 3	0	0.00	0.00	0	0.00	0.00	171,554	4,857.87
	Area 5	0	0.00	0.00	10	9096.20	257.58	388,060	10,988.64
	Mixed	0	0.00	0.00	0	0.00	0.00	0	0.00
BROOKHAVEN NATIONAL LABORATORY	Area 3	0	0.00	0.00	0	0.00	0.00	0	0.00
	Area 5	0	0.00	0.00	0	0.00	0.00	2,959	83.79
	Mixed	0	0.00	0.00	0	0.00	0.00	0	0.00
BWXT Y-12	Area 3	0	0.00	0.00	0	0.00	0.00	1,610	45.59
	Area 5	3	3796.29	107.50	41	47171.37	1,335.74	132,603	3,754.91
	Mixed	0	0.00	0.00	0	0.00	0.00	0	0.00
DURATEK, INC.	Area 3	0	0.00	0.00	0	0.00	0.00	0	0.00
	Area 5	0	0.00	0.00	0	0.00	0.00	934	26.45
FERMCO	Area 3	0	0.00	0.00	0	0.00	0.00	3,792,355	107,387.52
	Area 5	0	0.00	0.00	0	0.00	0.00	2,791,860	79,056.66
FOSTER WHEELER (ORR)	Area 3	0	0.00	0.00	0	0.00	0.00	0	0.00
	Area 5	0	0.00	0.00	0	0.00	0.00	30,471	862.84
	Mixed	0	0.00	0.00	0	0.00	0.00	0	0.00
GENERAL ATOMICS	Area 3	0	0.00	0.00	0	0.00	0.00	42,424	1,201.31
	Area 5	0	0.00	0.00	0	0.00	0.00	38,004	1,076.15
IDAHO NATIONAL LABORATORY AMWTP (BBWI)	Area 3	0	0.00	0.00	0	0.00	0.00	0	0.00
	Area 5	0	0.00	0.00	0	0.00	0.00	0	0.00
	Mixed	0	0.00	0.00	0	0.00	0.00	0	0.00
IDAHO NATIONAL LABORATORY ICP (CWI)	Area 3	0	0.00	0.00	0	0.00	0.00	0	0.00
	Area 5	0	0.00	0.00	3	900.36	25.50	900	25.50
	Mixed	0	0.00	0.00	4	970.34	27.48	970	27.48
IDAHO NATIONAL LABORATORY BEA	Area 3	0	0.00	0.00	0	0.00	0.00	9,683	274.19
	Area 5	0	0.00	0.00	6	4913.70	139.14	54,351	1,539.04
	Mixed	0	0.00	0.00	0	0.00	0.00	990	28.03
LOS ALAMOS NATIONAL LABORATORY	Area 3	0	0.00	0.00	0	0.00	0.00	4,803	136.01
	Area 5	0	0.00	0.00	0	0.00	0.00	0	0.00
	Mixed	0	0.00	0.00	0	0.00	0.00	0	0.00
LAWRENCE LIVERMORE NATIONAL LABORATORY	Area 3	0	0.00	0.00	0	0.00	0.00	343,230	9,719.19
	Area 5	3	4035.45	114.27	25	21933.26	621.08	125,184	3,544.82
	Mixed	1	392.00	11.10	2	405.90	11.49	406	11.49
LRRI	Area 3	0	0.00	0.00	0	0.00	0.00	10,213	289.20
	Area 5	0	0.00	0.00	0	0.00	0.00	6,974	197.48
MOUND	Area 3	0	0.00	0.00	0	0.00	0.00	525,435	14,878.66
	Area 5	0	0.00	0.00	0	0.00	0.00	2,159,150	61,140.31
NELLIS RANGE (NSTec)	Area 3	0	0.00	0.00	0	0.00	0.00	0	0.00
	Area 5	0	0.00	0.00	0	0.00	0.00	0	0.00
NSTec	Area 3	0	0.00	0.00	0	0.00	0.00	349,600	9,899.57
	Area 5	1	39.73	1.13	80	29925.61	847.40	136,762	3,872.66
	Mixed	0	0.00	0.00	0	0.00	0.00	16,776	475.04
NUCLEAR FUEL SERVICES, INC.	Area 3	0	0.00	0.00	0	0.00	0.00	13,440	380.58
	Area 5	3	3199.54	90.60	26	32873.12	930.86	44,464	1,259.08
	Mixed	0	0.00	0.00	0	0.00	0.00	0	0.00
PADUCAH	Area 3	0	0.00	0.00	0	0.00	0.00	236,166	6,687.48
	Area 5	0	0.00	0.00	0	0.00	0.00	409,006	11,581.76
	Mixed	0	0.00	0.00	0	0.00	0.00	0	0.00
PANTEX	Area 3	0	0.00	0.00	0	0.00	0.00	34,950	989.67
	Area 5	0	0.00	0.00	0	0.00	0.00	133,506	3,780.47

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FY 2007
WEEKLY WORKING REPORT*

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DOE APPROVED GENERATORS	Disposal Location	Weekly Shipments	Volume (Ft^3)	Volume (M^3)	FY 2007 Shipments	Volume (Ft^3)	Volume (M^3)	Volume (Ft^3)	Volume (M^3)
PERMAFIX	Area 3	0	0.00	0.00	0	0.00	0.00	0	0.00
	Area 5	3	2015.71	57.08	15	14566.87	412.49	14,702	416.31
	Mixed	0	0.00	0.00	0	0.00	0.00	2,656	75.21
PORTSMOUTH***	Area 3	0	0.00	0.00	0	0.00	0.00	51,628	1,461.94
	Area 5	0	0.00	0.00	2	1156.60	32.75	658,040	18,633.60
	Mixed	5	6796.37	192.45	12	18711.37	529.85	18,711	529.85
PRINCETON	Area 3	0	0.00	0.00	0	0.00	0.00	25,322	717.04
	Area 5	0	0.00	0.00	0	0.00	0.00	3,405	96.42
RMI ENVIRONMENTAL SERVICES	Area 3	0	0.00	0.00	0	0.00	0.00	38,597	1,092.95
	Area 5	0	0.00	0.00	0	0.00	0.00	14,901	421.95
ROCKETDYNE BOEING	Area 3	0	0.00	0.00	0	0.00	0.00	188,240	5,330.36
	Area 5	1	1408.01	39.87	16	9790.97	277.25	71,770	2,032.30
SANDIA NATIONAL LABORATORIES	Area 3	0	0.00	0.00	0	0.00	0.00	72,766	2,060.50
	Area 5	0	0.00	0.00	1	974.74	27.60	98,961	2,802.26
	Mixed	0	0.00	0.00	1	15.97	0.45	413	11.69
SAVANNAH RIVER	Area 3	0	0.00	0.00	0	0.00	0.00	92,761	2,626.70
	Area 5	0	0.00	0.00	20	1815.90	51.42	42,868	1,213.88
	Mixed	0	0.00	0.00	1	622.00	17.61	3,094	87.61
STOLLER-NAVARRO JOINT VENTURE	Area 3	0	0.00	0.00	0	0.00	0.00	427	12.09
	Area 5	0	0.00	0.00	1	8.00	0.23	14,351	406.38
	Mixed	0	0.00	0.00	0	0.00	0.00	56	1.59
UT-BATTELLE (ORNL)	Area 3	0	0.00	0.00	0	0.00	0.00	1,276	36.13
	Area 5	0	0.00	0.00	0	0.00	0.00	4,115	116.52
WEST VALLEY	Area 3	0	0.00	0.00	0	0.00	0.00	89,618	2,537.70
	Area 5	1	719.05	20.36	80	47021.53	1,331.50	94,721	2,682.19
	Mixed	0	0.00	0.00	0	0.00	0.00	0	0.00
INACTIVE OFFSITE WASTE GENERATORS	Area 3	0	0.00	0.00	0	0.00	0.00	5,522,126	156,369.18
	Area 5	0	0.00	0.00	0	0.00	0.00	7,039,231	199,328.81
	Mixed	0	0.00	0.00	0	0.00	0.00	283,372	8,024.20
INACTIVE ONSITE WASTE GENERATORS	Area 3	0	0.00	0.00	0	0.00	0.00	8,211,495	232,523.62
	Area 5	0	0.00	0.00	0	0.00	0.00	76,538	2,167.31
GRAND TOTAL**		21	22402.15	634.36	379	285120.21	8,073.70	34,894,568	988,104.04

Total offsite waste received in FY07 =	255186.60	Ft^3	7,226.08	M^3
Total onsite waste received in FY07 =	29933.61	Ft^3	847.63	M^3
Offsite waste comprises approximately	74.77%	of the total waste inventory		
Onsite waste comprises approximately	25.24%	of the total waste inventory		
Number MLLW shipments in FY07 =	6	this week	20	this year
Total mixed waste received in FY07 =	20,726	Ft^3	586.88	M^3
Total mixed waste capacity remaining =	679,053	Ft^3	19,228.63	M^3

*Subject to revision

**MLLW is a subset of GRAND TOTAL

***Mixed waste capacity reduced by 529.85 m3 from Portsmouth. Waste disposed is LLW containing regulated PCBs

****Aberdeen volume includes Sequoyah Fuels waste shipped by NSTec

Original NTS Transuranic (TRU) Waste Origin and Inventory

- Lawrence Livermore National Laboratory shipped TRU to the NTS for temporary storage between 1974-1990
- Small quantity of TRU waste generated by environmental restoration projects on the NTS and Tonopah Test Range
- Completed 48 shipments (1,860 drums) from the NTS to Waste Isolation Pilot Plant (WIPP) between January 2004 and November 2005
- Remaining inventory includes 58 oversize boxes, 139 drums, and 2 spheres

Oversize Boxes Disposal Path

- Management and Operating contractor will segregate and repackage oversize boxes within a contained area of the Visual Examination and Repackaging Building (modification required)
  - Identify and separate LLW and Mixed LLW items (will be disposed onsite) from TRU/Mixed TRU waste
  - Remove prohibited items and prepare waste for the appropriate treatment and disposal
  - Ship TRU waste to another DOE site for characterization and certification prior to disposal at WIPP

Drums Disposal Path

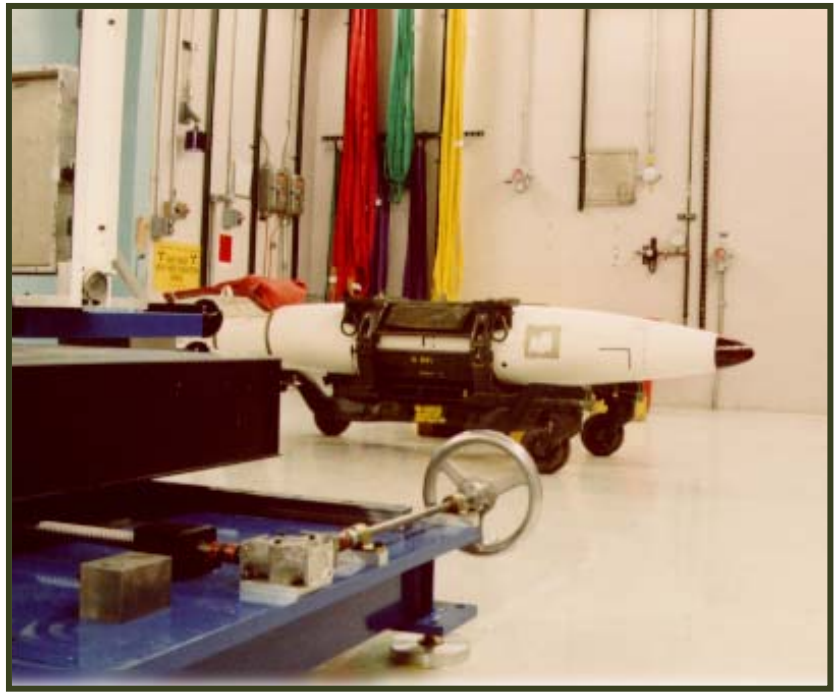
- Contents of 139 drums did not comply with WIPP Waste Acceptance Criteria
  - Some of the drums contain LLW or Mixed LLW which will be disposed on-site once WIPP provides the documentation obtained during characterization
  - Contents of some drums require additional characterization which will occur at another site within the DOE complex

Spheres Disposal Path

- Currently stored at the Area 5 Radioactive Waste Management Complex
  - Possess substantial "*Acceptable Knowledge*" documentation to be used in lieu of characterization
  - Level of radioactivity currently exceeds the certification limit of the TRUPACT-II shipping container
  - Pending regulatory changes managed through the Carlsbad Field Office will determine disposal path

Device Assembly Facility (DAF)

- Original purpose: consolidate all nuclear explosive assembly functions
- Current mission: support National Security initiatives
- Entire complex covered by compacted earth



Control Point-1 (CP-1)

- Command post used for conducting nuclear tests

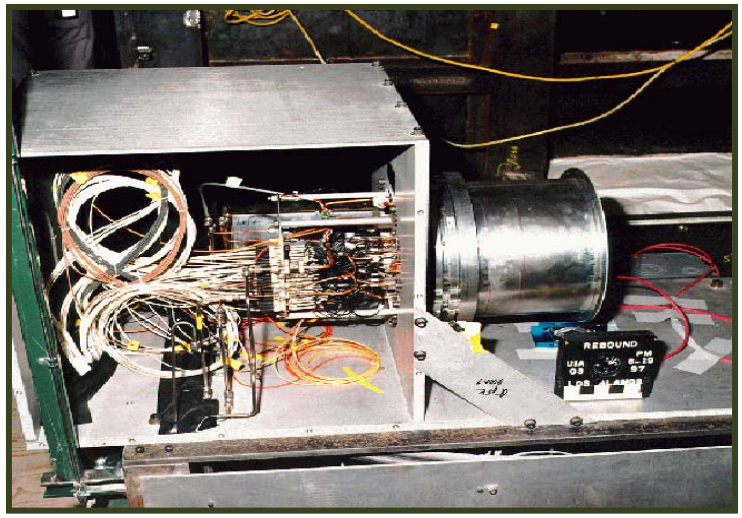
News Nob

Soldiers pose by News Nob, a vantage point for atmospheric tests established for the media

Journalists set up on News Nob to witness an atmospheric test in March 1953

U1a

- Underground laboratory for subcritical experiments
- Data for National Laboratories
- Safety and reliability of stockpile



Huron King Test Chamber

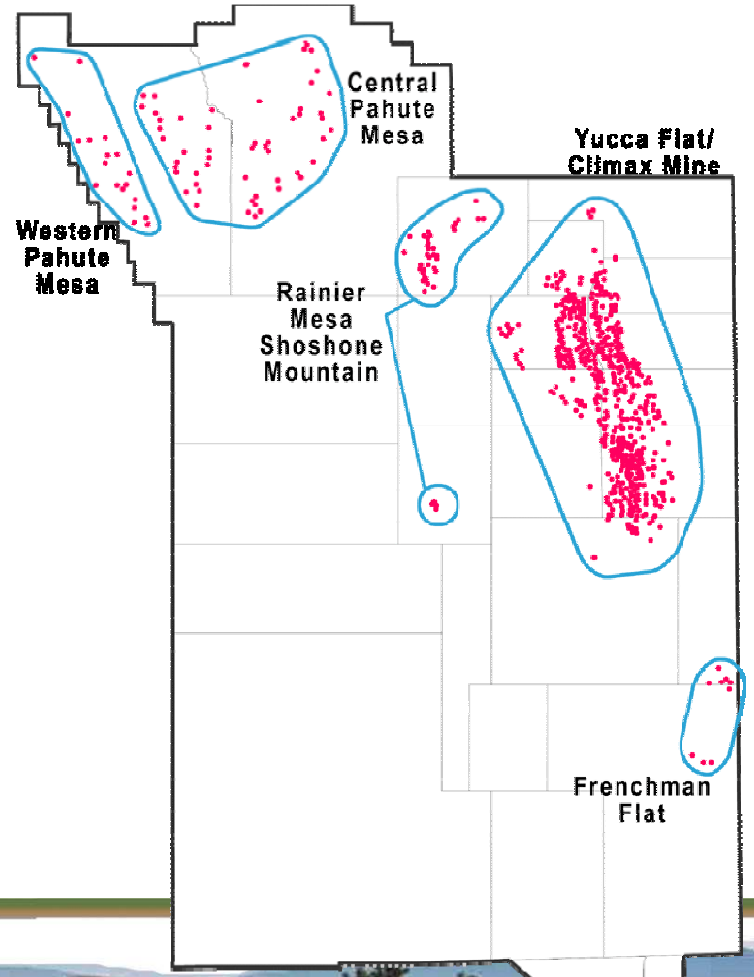
- Visual Line of Site underground nuclear test (yield less than 20 kilotons) conducted June 24, 1980
- Tested the effects of a system generated electromagnetic pulse on a full-scale operating military Defense Satellite Communications System

Icecap Ground Zero

- Location for underground nuclear test scheduled for the spring of 1993
- Moratorium on nuclear weapons testing on September 23, 1992
- Planned test range was 20 - 150 kilotons and would have been conducted 1,557 feet underground
- Tower is 152-feet tall
- Inside is a 500,000 pound diagnostic canister suspended from the top of the tower

Underground Test Area Sub-Project

- Conducted 828 underground nuclear tests at depths ranging from approximately 90 to 4,800 feet below the ground surface
- About one-third of tests occurred near or below the water table, which resulted in groundwater contamination



Underground Test Area Sub-Project

- The Underground Test Area (UGTA) sub-project evaluates the historic testing impacts on groundwater resources and study the extent of contaminant migration
- The scope includes collection of multiple sources of field data in order to create a 3-D computer model
  - This model includes groundwater, flow and transport parameters
- The models will be used to create a monitoring network

Sedan Crater

- Excavation experiment using a 104-kiloton thermonuclear device (part of the Plowshare Program)
- Conducted on July 6, 1962
- Detonated 635 feet underground

Sedan Crater
(continued)

- Displaced 12 million tons of earth
- Crater is 1,280 feet in diameter and 320 feet deep
- Released seismic energy equivalent to a 4.75 magnitude earthquake
- Listed on the National Register for Historic Places on April 1, 1994

- Currently part of the Soils Sub-Project

Soils Sub-Project

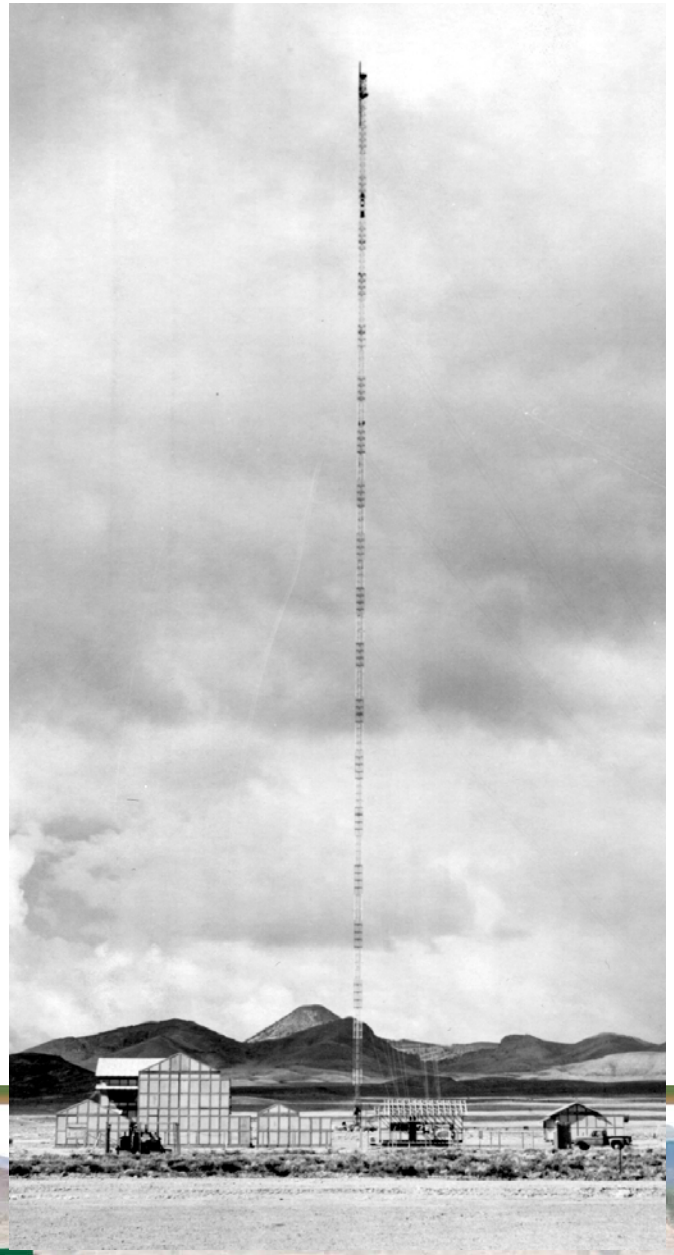
- Atmospheric nuclear tests conducted at the Nevada Test Site and Nevada Test and Training Range resulted in the radioactive contamination of surface soils
- Soils sub-project is responsible for:
  - 100 Corrective Action Sites
  - Characterizing and/or remediating surface soil contamination
  - Ensuring appropriate controls (i.e. postings, barriers, etc.) are in place at the sites
  - Conducting long-term site monitoring

Apple II Houses

- 29-kiloton test was detonated from a 500-ft tower on May 5, 1955
- 6,600 ft to the east of the tower are the remains of a wooden two story house
- Part of a Civil Defense exercise

Bare Reactor Experiment Nevada (BREN)

- Part of research project to estimate radiation doses received by survivors of the Hiroshima and Nagasaki atom bomb blasts
- A 1,527 ft steel tower erected in 1962
- Unshielded mobile reactor mounted on tower
- Simulated Japanese style houses located at the base were subjected to varying intensities of radiation
- Scheduled for Decontamination and Decommissioning in FY 2008

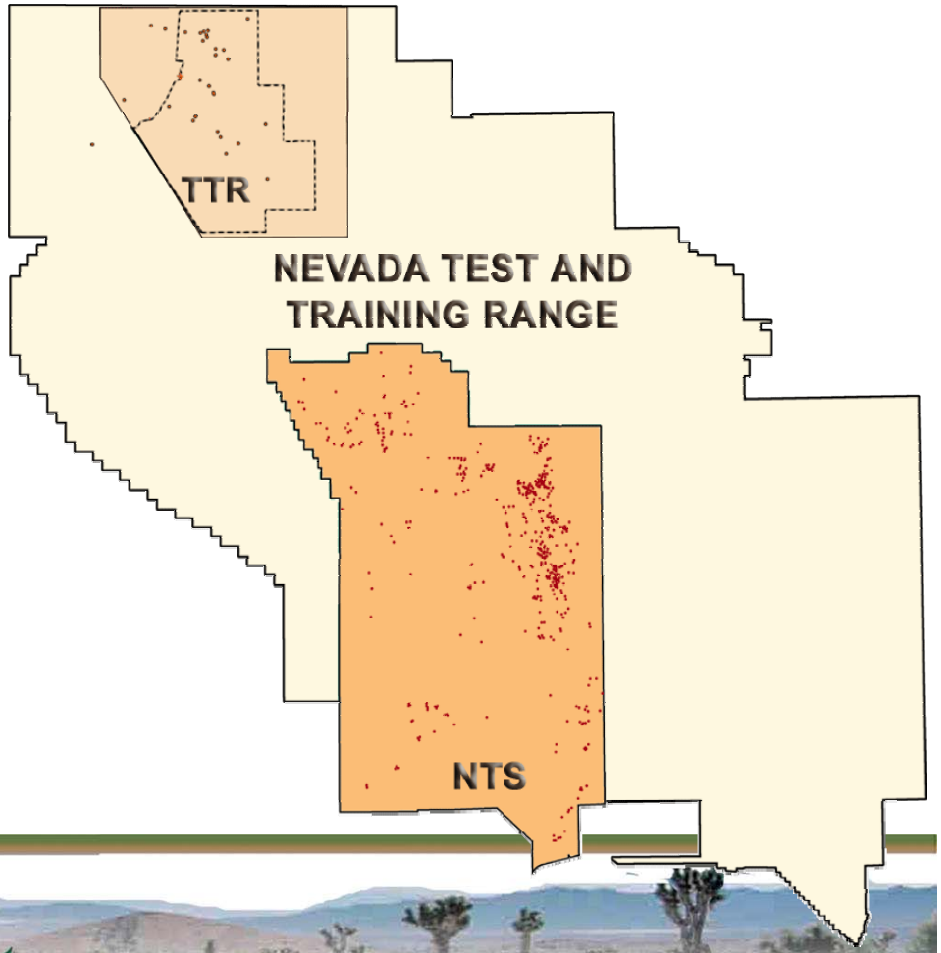


Industrial Sites Sub-Project

- Portions of the facilities and land at the Nevada Test Site and Tonopah Test Range were used in direct support of nuclear testing
  - Facilities included gas stations, motor pools, worker housing, and research buildings
- Activities resulted in some environmental contamination and subsequent hazardous and radioactive waste generation
  - Contaminants of Concern may include hazardous chemicals, unexploded ordnance, and low-level radionuclides

Industrial Sites Sub-Project
(continued)

- The Industrial Sites sub-project remediates the contaminated sites
  - Sites include leach fields, sumps, disposal wells, tanks, contaminated waste piles, ordnance sites, etc.
- 1,848 Corrective Action Sites
  - 1,579 formally closed



Test Cell C

- Industrial Sites Corrective Action Site
- Built in 1961 and used until 1973
- Designed for the testing of nuclear rocket reactors
- Reactors were mounted on railroad cars from the assembly building and “plugged” into the test cell
- Constructed with piping and systems required to handle gas and liquids
- Decontamination and Decommissioning planned for FY 2008

- Currently a Corrective Action Site within the Industrial Sites Sub-Project