Nevada National Security Site (NNSS) Tour Booklet

Nevada Site
Specific Advisory Board

October 26, 2016

Prohibited Articles On NNSS Public Tours

The following items are prohibited within the boundaries of the NNSS public tours. Tour escorts are required to do random checks.

- Cellular Phones
- Bluetooth Enabled Devices
- PDA, BlackBerry, etc.
- Computers
- Portable Data Storage Devices
- Global Positioning System (GPS)
- Cameras/Camcorders
- Binoculars
- Optical Instruments
- Geiger Counters
- Recording Devices
- Pets and Animals
- Explosives
- Ammunition
- Incendiary Devices
- Chemical Irritants
- Alcoholic Beverages
- Controlled Substances
- Any Item Prohibited by Law

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.

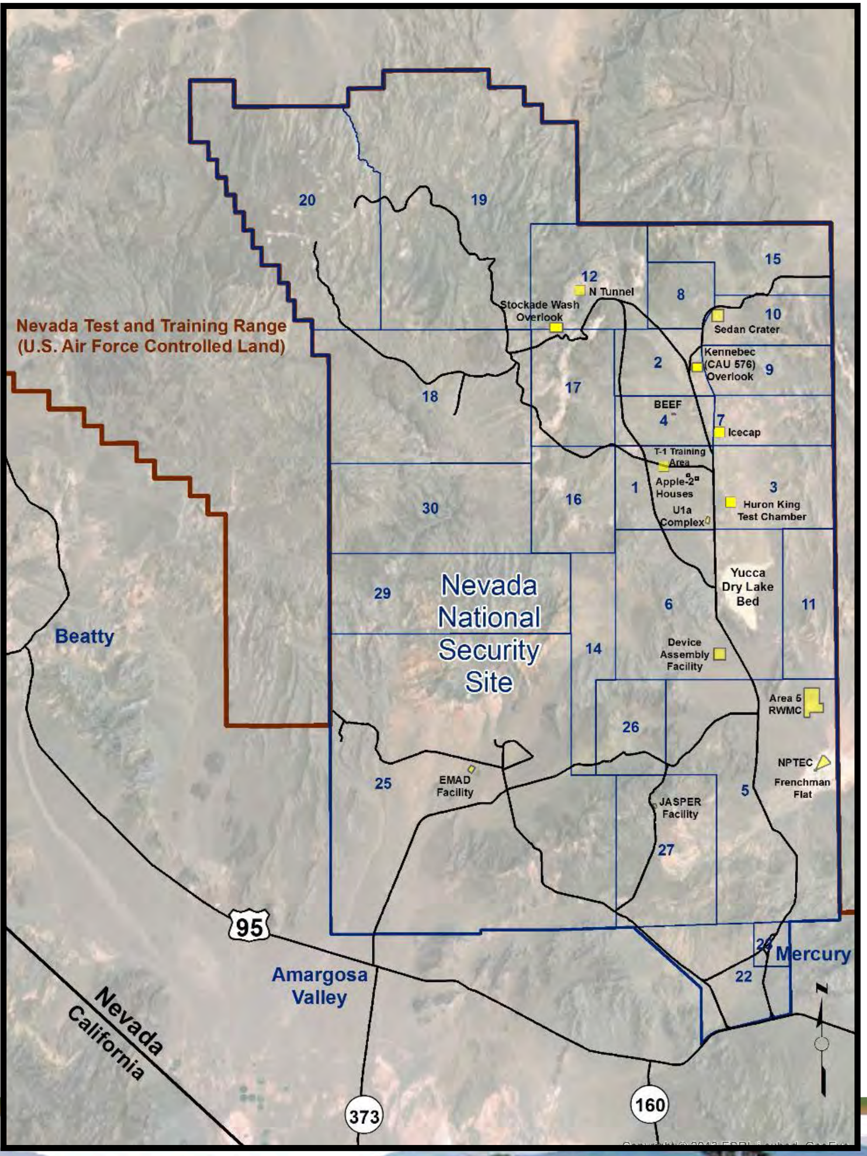
NNSS Tour Agenda*

7:30 a.m.	Depart for NNSS
8:40 a.m.	Arrive at Gate 100 for badge check
8:45 a.m.	Depart for Frenchman Flat
9:00 a.m.	Frenchman Flat Groundwater Briefing (photo opp) ~ Work Plan Items 5 & 6
9:45 a.m.	Depart for Area 5 Radioactive Waste Management Complex (RWMC)
9:50 a.m.	Area 5 RWMC Briefing and Drive-Through ~ Work Plan Item 4
10:50 a.m.	Depart for Stockade Wash Overlook
11:00 a.m.	Rainier Mesa Groundwater Briefing. Lunch break. ~ Work Plan Items 5 & 6
11:45 a.m.	Depart for Sedan Crater
12:10 p.m.	Sedan Crater Briefing (photo opp)
12:40 p.m.	Depart for Corrective Action Unit (CAU) 576
1:15 p.m.	CAU 576 Briefing ~ Work Plan Item 1
1:40 p.m.	Depart for Icecap Ground Zero (GZ)
1:50 p.m.	Ice Cap GZ Briefing (photo opp)
2:15 p.m.	Depart for Mercury
3:15 p.m.	Mercury Building 600 for rest stop and photo briefings and extended questions and answers
3:50 p.m.	Depart for Gate 100
4:05 p.m.	Depart for Las Vegas
5:05 p.m.	Arrive Centennial Hills Park and Ride

** Subject to change*

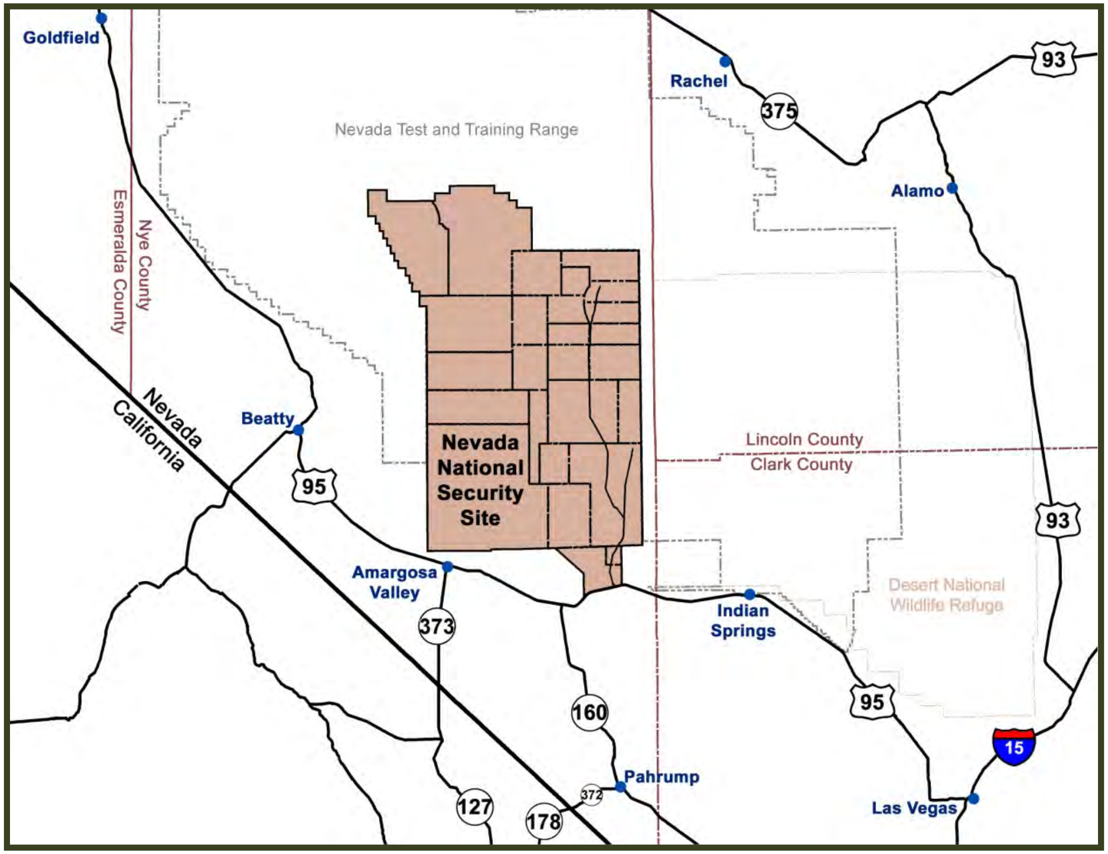
NNSS

Tour Map

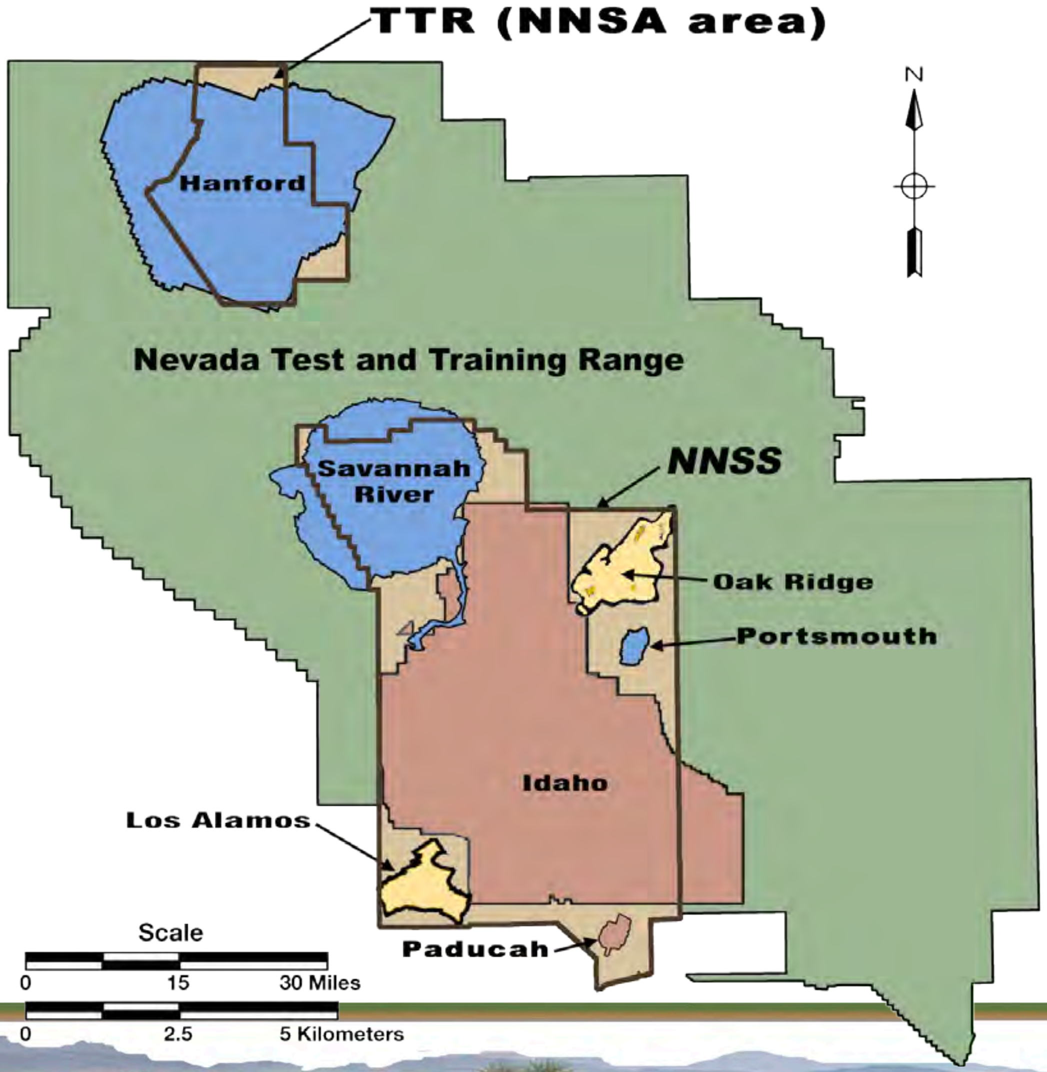


Nevada National Security Site (NNSS)

- Approximately 1,360 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
Los Alamos	43
Oak Ridge	53
Paducah	5
Portsmouth	6
Savannah River	310
TOTAL	**1,870**
NNSS	~1,360
TTR (NNSA area)	~280
TOTAL	**~1,640**

Life in Mercury

Life in Mercury
(continued)

Nuclear Testing Road to the NNSS

- U.S. enters World War II in 1941 after Japanese attack Pearl Harbor
- U.S. Manhattan Project begins developing first atomic bomb in 1942 to influence the outcome of the war
- Manhattan Project tests first atomic bomb in New Mexico on July 16, 1945, called “Trinity”
- U.S. drops two atomic bombs on two cities in Japan on August 6 and 9, 1945 – Japan surrenders August 14, 1945
- Nuclear testing begins in the South Pacific Ocean in 1946

NNSS Established in 1950

- Atomic testing in the South Pacific presented challenges
  - Logistics
  - Weather
  - Security
  - Safety
- Urgent need for continental test site
  - Top secret feasibility study, code named *Nutmeg*, commenced to search for a continental test site
  - Study concluded arid, southwest section of U.S. as an ideal location
- President Truman officially established Nevada Proving Grounds, now the NNSS, on December 18, 1950

Historic Activities

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

U.S. Nuclear Tests

Location	Tests	Detonations
South Atlantic	3	3
Pacific	106	106
Alamogordo, NM	1	1
Amchitka, AK	3	3
Carlsbad, NM	1	1
Central, NV	1	1
Fallon, NV	1	1
Farmington, NM	1	1
Grand Valley, CO	1	1
Hattiesburg, MS	2	2
Nellis Range	5	5
Rifle, CO	1	3
NNSS Atmospheric	100	100
NNSS Underground – U.S. NNSS Underground – U.S./U.K.	804 24	921
	1,054	1,149

A test is defined in the Threshold Test Ban Treaty as either a *single underground nuclear explosion* (detonation) or *two or more underground nuclear explosions* (detonations) conducted within an area delineated by a circle having a diameter of 2 kilometers and conducted within a total period of time not to exceed 0.1 second.

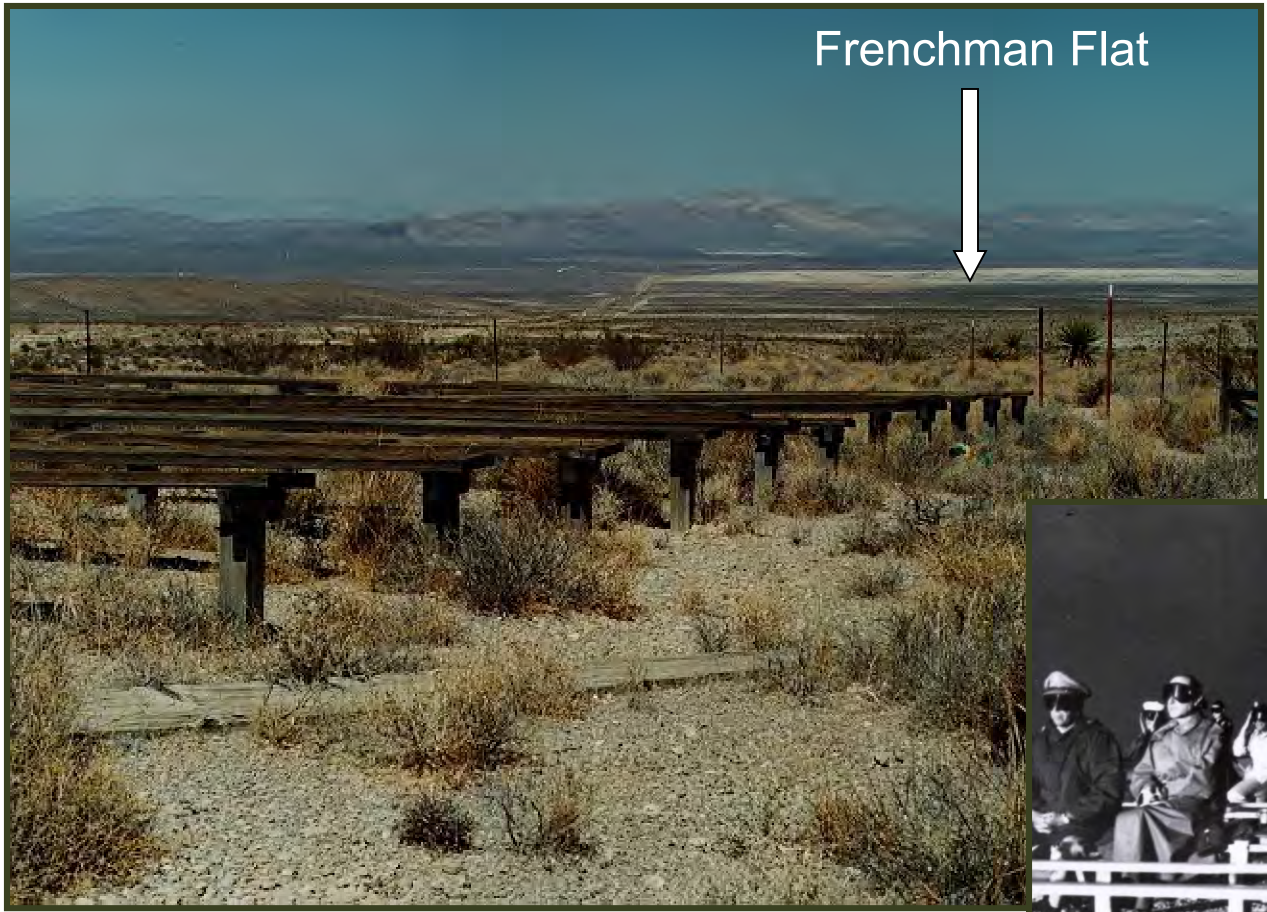
Source: NV-209 Rev 15

Atmospheric Testing at the NNSS

- 100 atmospheric tests conducted at the NNSS from January 1951 through July 1962 to study weapons-related effects, as safety experiments, and to study peaceful effects of nuclear explosions

- Conducted aboveground in the atmosphere
  - Tower 43
  - Balloon 23
  - Airdrop 19
  - Surface 13
  - Rocket 1
  - Airburst 1

Climax – an airdrop test at the NNSS on June 4, 1953



Seated at these bleachers, located alongside the Mercury Highway, official observers viewed the detonation of 14 atmospheric tests in Frenchman Flat

37-kiloton *Priscilla* test detonated on June 24, 1957 on the NNSS Frenchman Flat

Nonproliferation Test and Evaluation Complex (NPTEC)

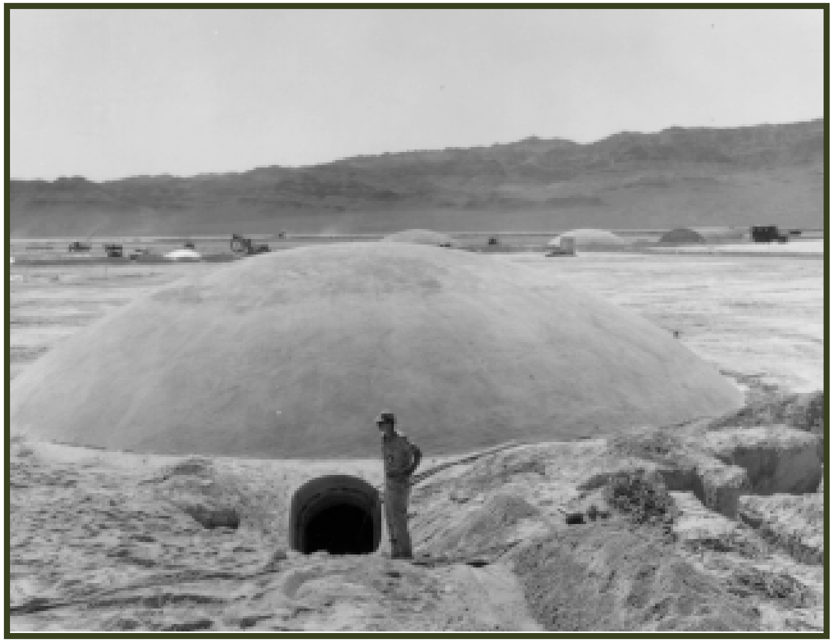
National Nuclear Security Administration
Nevada Field Office

- Unique 67-acre facility equipped to test sensors using a variety of release methods, including chemical releases, wind tunnel releases, and portable release systems
- Provides sensor arrays for ground truth data, an explosives pad, weather data instrumentation, calibrated release systems, and 24-hour release capability
- Environmental Impact Statement allows release of hazardous materials for training, field-testing of detectors, plume dispersion experimentation, and equipment and materials testing
- Includes activities at various other locations on the NNSS

Soils

- Atmospheric nuclear weapons tests, nuclear safety experiments, surface releases from underground tests, nuclear testing done in support of nuclear rocket development in Area 25, and evaluation tests for peaceful uses of nuclear explosives conducted at the NNSS and Nevada Test and Training Range (operated by the U.S. Air Force) resulted in the radioactive contamination of surface soils
- Soils Activity includes 148 Corrective Action Sites (~83% closed as of June 30, 2016)
  - Characterizing and remediating surface soil contamination
  - Ensuring appropriate controls (e.g. postings, barriers) are in place at the sites and conducting long-term site monitoring, as needed

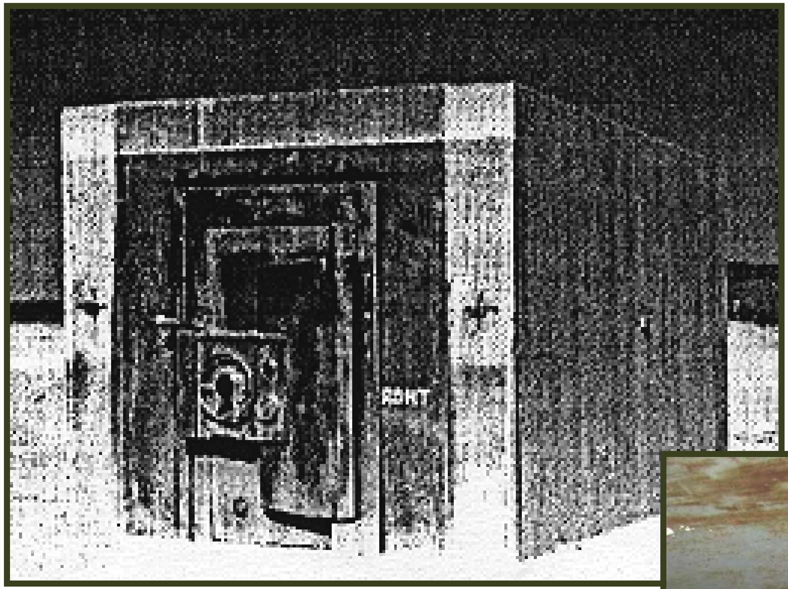
Atmospheric Test Relics

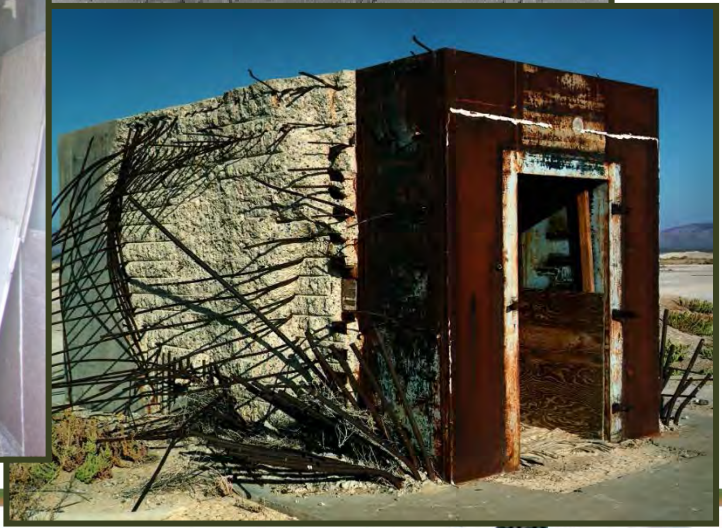


Concrete shelter domes prior to the 1957 *Priscilla* test

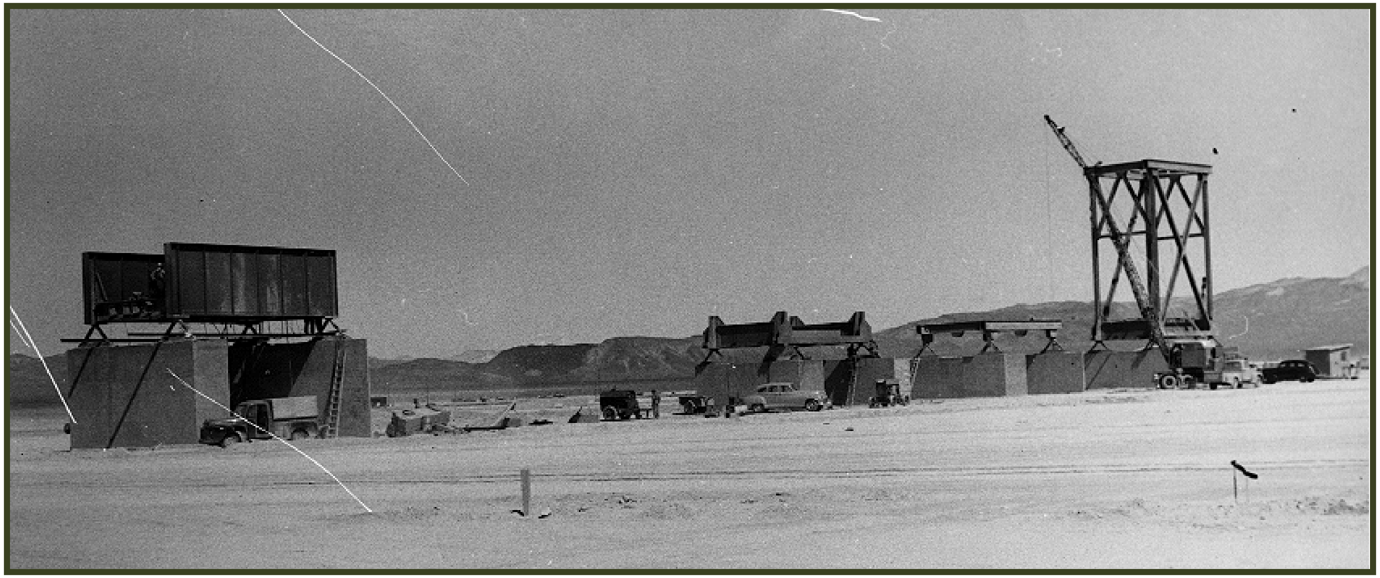
Effect of the test on the concrete shelter dome

900-square-foot underground dual purpose garage and mass shelter built and tested for *Priscilla* in 1957





Mosler Safe Company designed a 12-foot-by-8-foot reinforced concrete vault for the *Priscilla* test in 1957; trim on the steel door was loosened by the blast, but the door itself was not damaged – contents placed within the safe remained intact



Four railroad trestles constructed for *Operation Plumbbob* in 1953 – only one structure remains in place today with visible significant bowing of the steel "I" beams

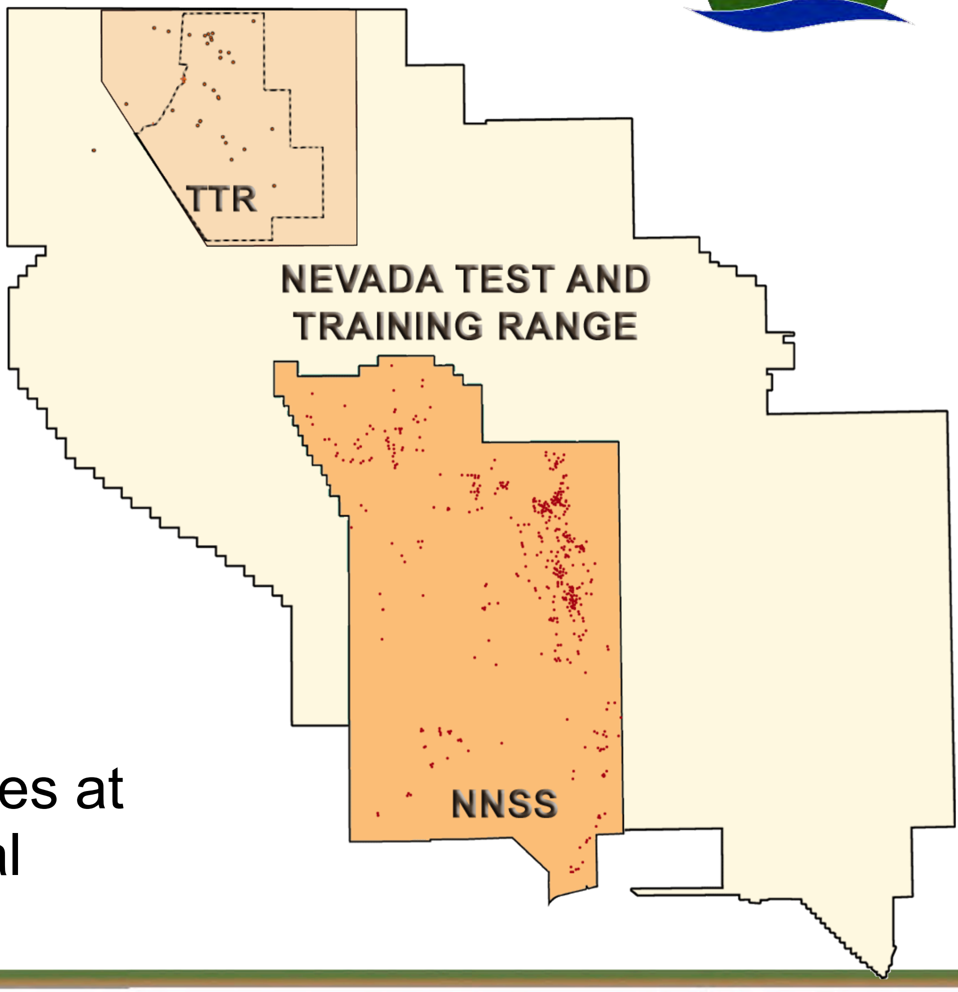
The End of Atmospheric Testing

- U.S. agreed to observe Limited Test Ban Treaty in October 1963, effectively ending atmospheric testing

Little Feller I test location 46 years after the last atmospheric test on the NNSS was detonated on July 17, 1962

Industrial Sites

- Industrial Sites are facilities and land used in direct support of historic nuclear testing, which resulted in environmental contamination
  - – Sites include leach fields, sumps, disposal wells, tanks, contaminated waste piles, and ordnance sites
- 1,126* Corrective Action Sites
  - – Completed remediation activities at 1,124* sites with state approval



* Does not include Defense Program funded sites

Low-Level Waste (LLW) Disposal at NNSS

Tom Hergert
Area 3/5 Nuclear Facility Manager
National Security Technologies, LLC

NNSS Area 5 Disposal Facility

- Located in Frenchman Flat, near first atmospheric nuclear test in Nevada (24 nuclear tests conducted within 4 miles of Area 5 RWMS)
- Arid and isolated disposal facility with no groundwater pathway and deep groundwater
- Supports ongoing cleanup activities at NNSS and across the DOE complex
- Can safely dispose of classified waste that requires additional security


NNSS Area 5 Radioactive Waste Management Site (RWMS)

Geographic and Geologic Isolation of Disposed Waste

- Protection against intrusion
  - 740 acres owned by DOE
  - Protected by armed security force and security devices 24/7
  - Surrounded by ~4,500 miles of Air Force controlled land
  - More than 8 feet of soil covers disposal cells
- No groundwater pathway
  - Rainfall either evaporates or is used by plants (evapotranspiration 12 times average precipitation)
  - No recharge of upper aquifer (located ~800 feet deep) in more than 25,000 years
  - Little to no lateral movement of groundwater (estimated at 10 cm per year in 2016)

Geographic and Geologic Isolation of Disposed Waste
(continued)

- No surface pathway
  - Frenchman Flat is a hydrographically closed basin where runoff moves through normally dry washes toward a dry lakebed
    - Any water that accumulates eventually evaporates or is taken up by the native vegetation
  - Depositional basin geology and arid environment provides for a slow accumulation/layering of soil (or other loose, solid rock material) through natural agents, such as wind and gravity
  - Berms around the facility provide protection against storm water events and erosion
    - Most of the alluvial fan surfaces near the Area 5 disposal facility are 3,000 to 128,000 years old

Ongoing Monitoring to Ensure the Safe Performance of the Disposal Facility

- 30 monitoring locations sample for air, groundwater, meteorology, radon flux, soil moisture and temperature, evapotranspiration, and direct radiation exposure
  - No health risk to the public
  - Potential health risk to workers is minimized through programmatic controls
    - 2016 (1st and 2nd Quarters) monitoring results show that the total cumulative dose for all disposal facility workers (50) was less than half of the limit for one worker (187 mRem for entire crew vs. 500 mRem limit for one crew member)

Ongoing Monitoring to Ensure the Safe Performance of the Disposal Facility
(continued)

- Long-term vadose zone monitoring data indicate no drainage through bottoms of vegetated lysimeters (more than 6 feet deep)

- More than 20 years of groundwater sampling results indicate hydrologic conditions remain stable and there is no contamination in the aquifer from waste disposal activities

LLW Disposed at NNSS

- 1.05M cubic feet of waste disposed in fiscal year 2016
- Types include:
  - Soils and debris (i.e. concrete, piping and building)
  - Equipment, clothing and tools
  - Solidified liquids and sludges
  - Laboratory waste
  - Irradiated metal
  - Depleted uranium
  - Sealed sources (radioisotopes used in equipment for power and medical)
  - Uranium wastes
- Waste acceptance criteria limits free liquids to less than 1% for LLW and none for mixed LLW
- Mixed LLW disposed under a state-issued permit
- Non-rad hazardous and non-hazardous classified components and parts also disposed

NNSS Waste Acceptance Process

- NNSS uses a structured/stringent waste review and acceptance process that must be met by all on-site and off-site waste generators
  - Rigorous reviews, inspections and certification processes conducted for waste characterization, packaging and transportation
  - Proposed waste streams detail radionuclide action levels to ensure there is no compromise to the safety of the disposal facility
  - NNSS auditors conduct reviews at generator sites to confirm all disposal requirements are met
  - Disposal operations and monitoring activities are factored into the review process

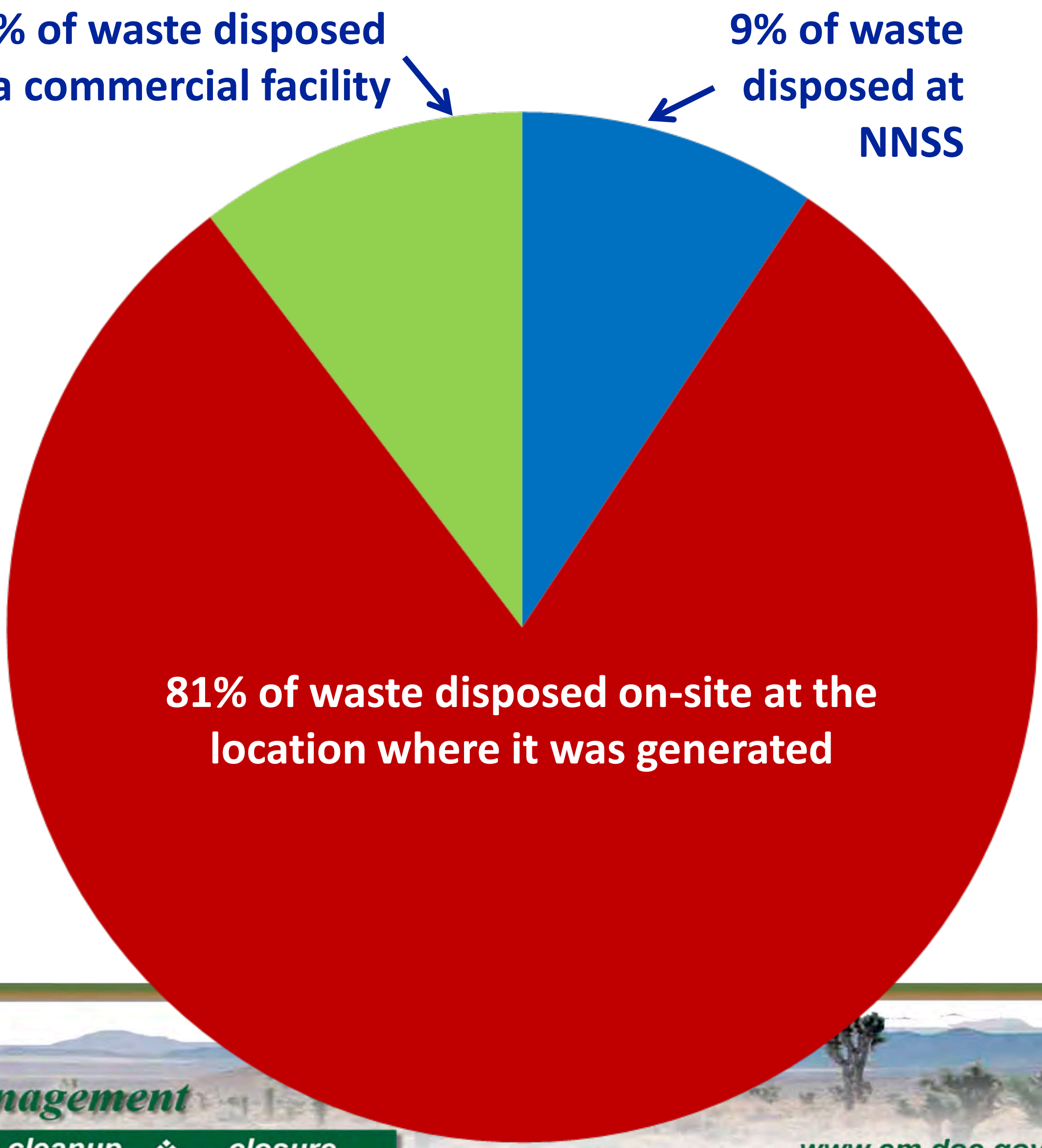
NNSS Waste Acceptance Process
(continued)

- Waste streams are approved for disposal at NNSS only after successfully demonstrating compliance with waste acceptance requirements

- At NNSS, State of Nevada participates directly in the waste acceptance review process

Overview of DOE Complex Disposal

- 13.9M cubic feet of LLW disposed throughout the DOE complex in fiscal year 2015



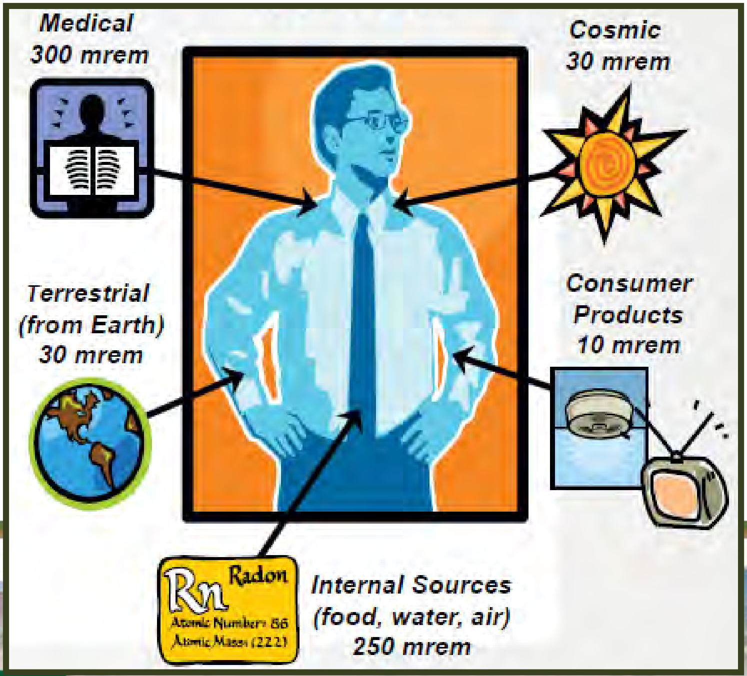
Transporting Waste to the NNSS

- Packaging and transportation of all radioactive waste must comply with U.S. Department of Transportation (DOT) regulations, including dose limits for worker and public exposure
- Routing includes prohibiting use of the I-15/US-95 interchange and Hoover Dam bypass bridge, preferences for summer and winter months, and CA-127 blackout dates
- Transportation of radioactive waste shipments to/from the NNSS are summarized and reported quarterly
  - Includes maps depicting routes
  - Online at www.nnss.gov/pages/Programs/RWM/Reports.html

As Low As Reasonably Achievable (ALARA)

- ALARA practices (time, distance and shielding) reduces worker dose during LLW disposal operations – DOE annual dose limit for each radiological worker is 500 mRem
- Approximately 6% of shipments require workers to implement additional ALARA procedures and personal protective equipment beyond the standard hard hat, safety boots and glasses, and reflective vest
- Annually, a cumulative radiation dose limit is established for the Disposal Operations crew (53 workers in 2015 and 47 in 2016)
  - 2015 limit was 809 mRem and the cumulative crew dose was 203 mRem

Average Annual Radiation Source and Dose*



The average person receives ~620 mrem of radiation per year from all sources

Emergency Management Grant Funding

- Radioactive waste disposal program contributed more than $13M (2000 to August 2016) to fund enhancement of emergency response capabilities in Nevada counties (Clark, Elko, Esmeralda, Lincoln, Nye and White Pine)
- Nevada Division of Emergency Management administers the funding, which is needs-based and distributed according to applications submitted by the counties
- Provides for updating/ recalibrating radiological equipment/detectors, communications equipment, emergency operations and hazardous material plans, and more

Funding Provided to Counties for Emergency Preparedness

Public Outreach Activities

- Opportunities for the public to obtain information on and become involved in Environmental Management activities include:
  - Nevada Site Specific Advisory Board Meetings (www.nnss.gov/nssab)
  - E-Mail News Subscription (Articles, Newsletter, Press Releases)
  - Educational Outreach (Speakers/ Demos, Operation Clean Desert,)
  - Social Media (NNSANevada on FaceBook, Twitter, and YouTube; NNSANevadaSiteOffice on Flickr)
  - Presentations for Civic Organizations
  - Intergovernmental Meetings
  - Open Houses/Public Meetings
  - Internet Website (www.nnss.gov)
  - Kiosks
  - Fact Sheets
  - Displays
  - Public Reading Rooms

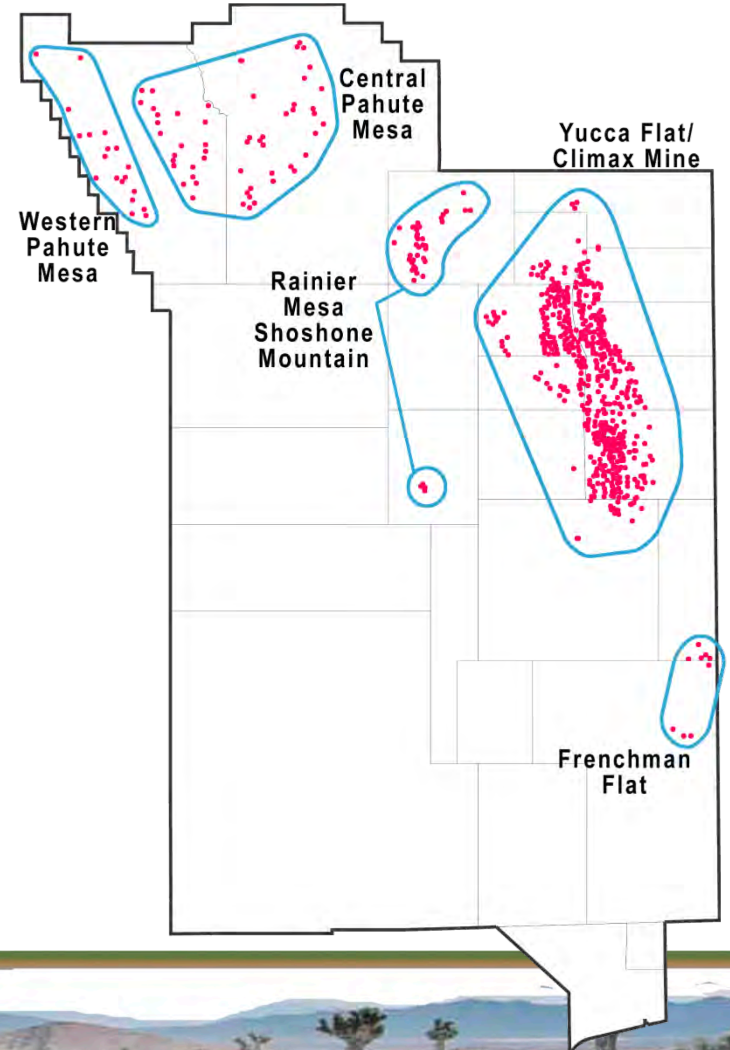
LLW Disposal at the NNSS In Summary…

- Waste acceptance, transportation and disposal at the NNSS is conducted responsibly and safely to protect workers, the public and environment
- NNSS infrastructure and environmental conditions provide for the long-term protection of disposed waste
- DOE is committed to conducting its low-level radioactive waste disposal activities in an open and transparent manner

NNSA National Nuclear Security Administration
Nevada National Security Site

Underground Test Area (UGTA)

- 828 underground nuclear tests conducted at depths ranging from approximately 100 to 4,800 feet below the ground surface
- About one-third of tests occurred in, near, or below the water table, which resulted in some groundwater contamination



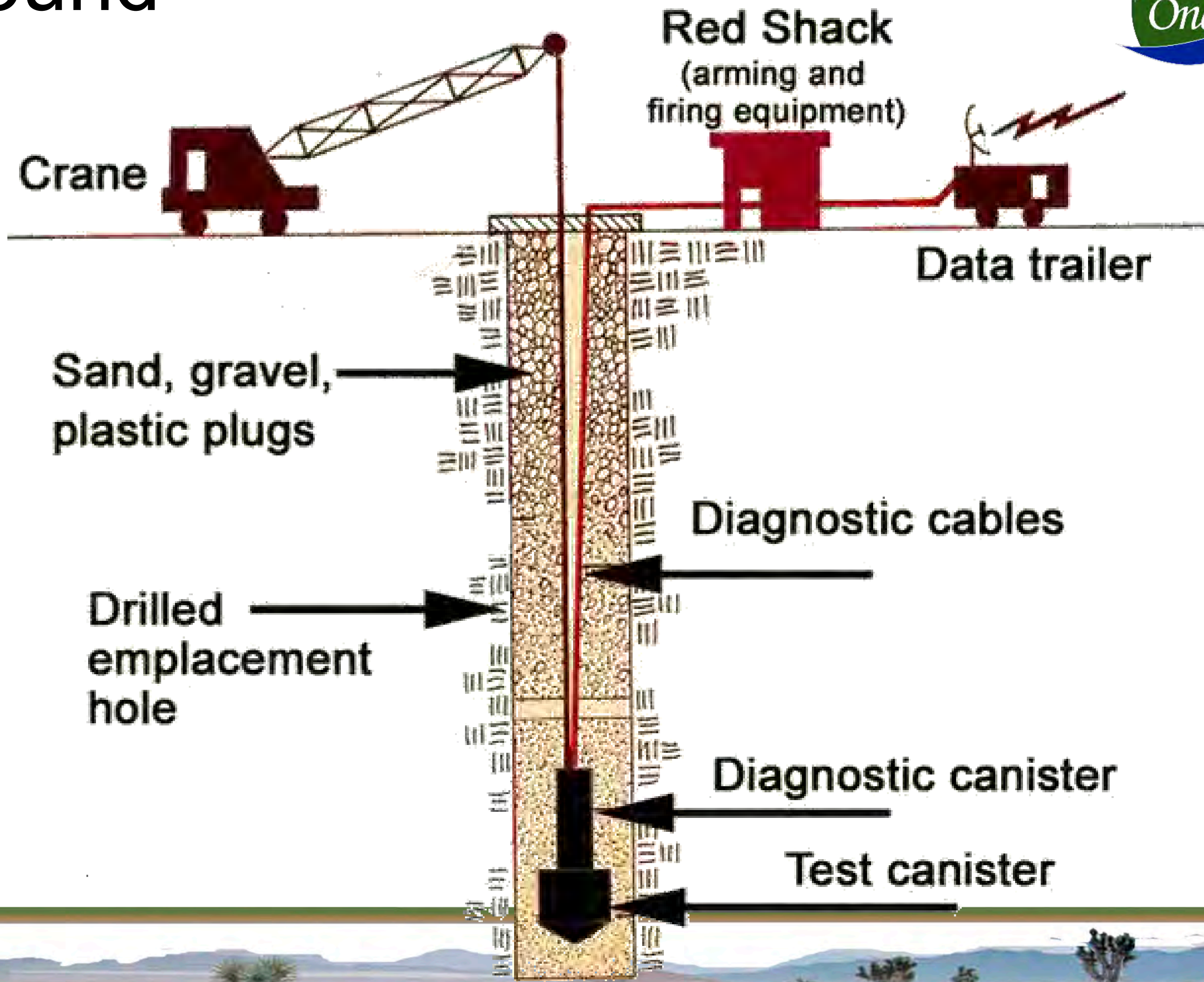
Underground Testing at the NNSS

- First underground nuclear test was *Uncle* on November 29, 1951
- Last underground nuclear test, *Divider*, detonated on September 23, 1992

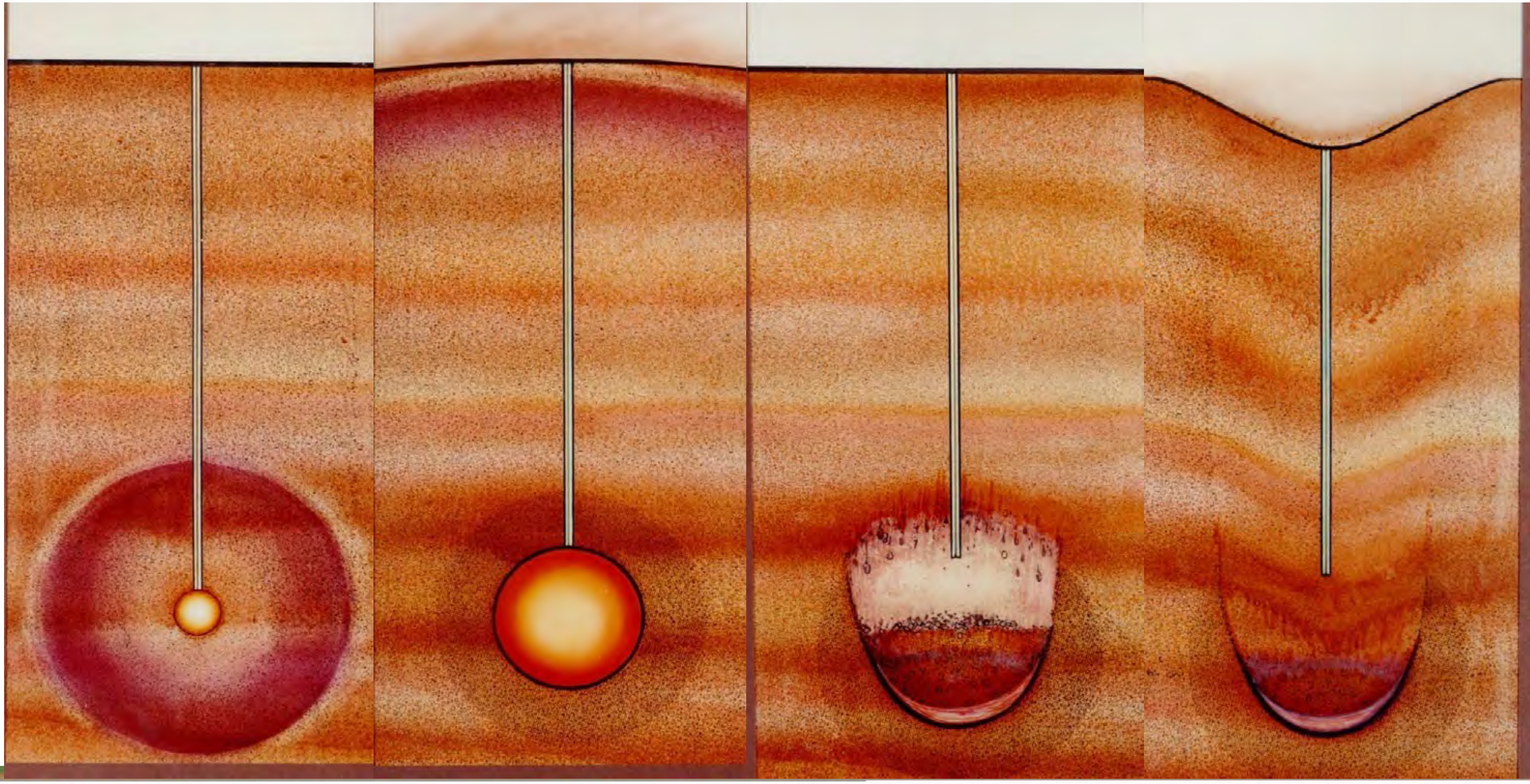
Underground Testing at the NNSS
(continued)

- Holes were 3 to 12 feet in diameter
- A large hole required the removal of more than 4,280 cubic yards of soil
- If the depths of holes drilled for underground nuclear tests since 1961 were combined, it would total about 280 miles
- Drilling techniques developed at the NNSS continue to be used throughout the world

Underground Test

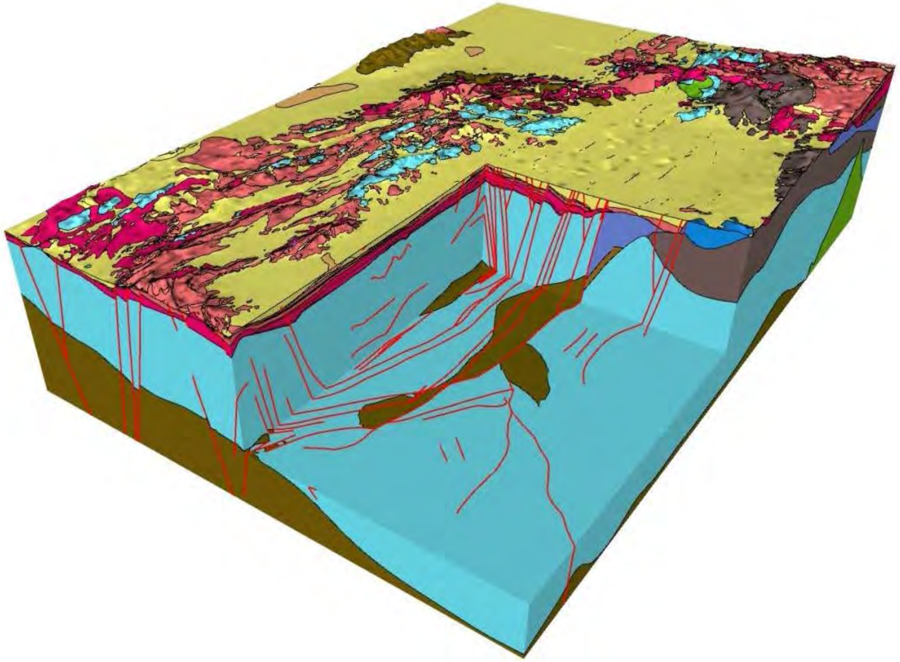


Underground Testing at the NNSS – Subsidence Crater Formation



UGTA Groundwater Characterization

- UGTA evaluates historic testing impacts on groundwater resources and studies the extent of contaminant migration
- Groundwater characterization scope includes collection of multiple sources of field data in order to create 3-D computer models
  - Models include groundwater, flow and transport parameters
- Models will be used to aid in the selection of monitoring well locations

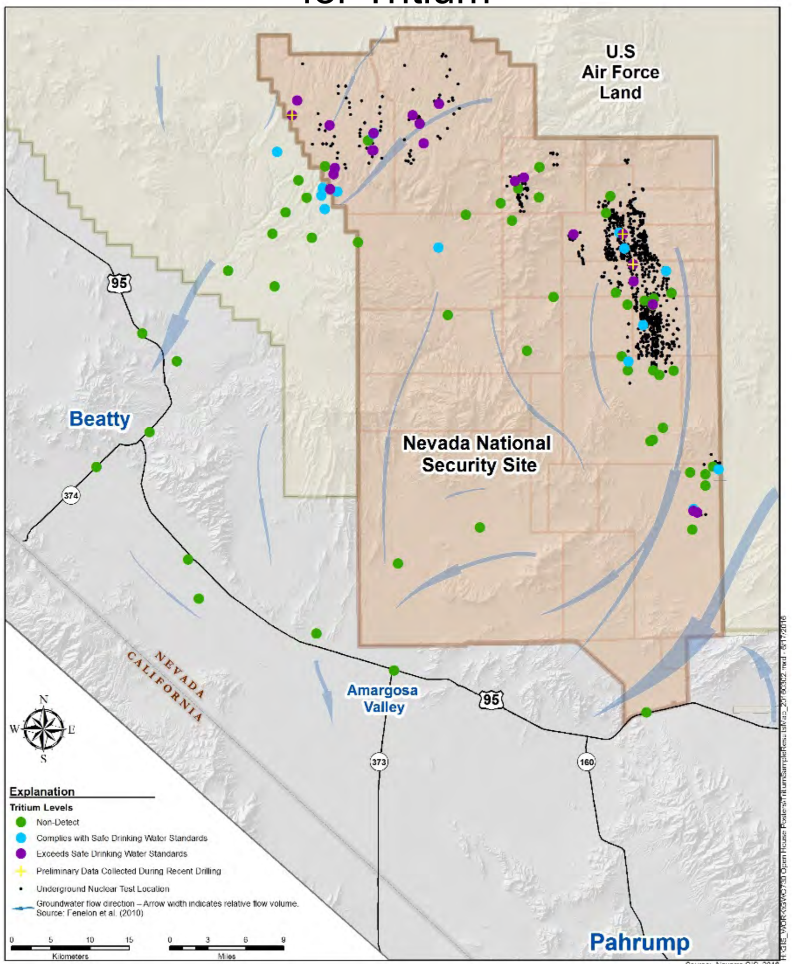


Groundwater at the NNSS

- Finnegan Inventory records more than 40 million curies of radionuclides released during testing (decay corrected to September 30, 2012)
- No proven, cost-effective technology to remove or stabilize the radiological contaminants
- Current scientific data available show there is no risk to the public from contaminated groundwater at the NNSS
- UGTA works with the State of Nevada to identify contaminant boundaries and implement an effective long-term monitoring system

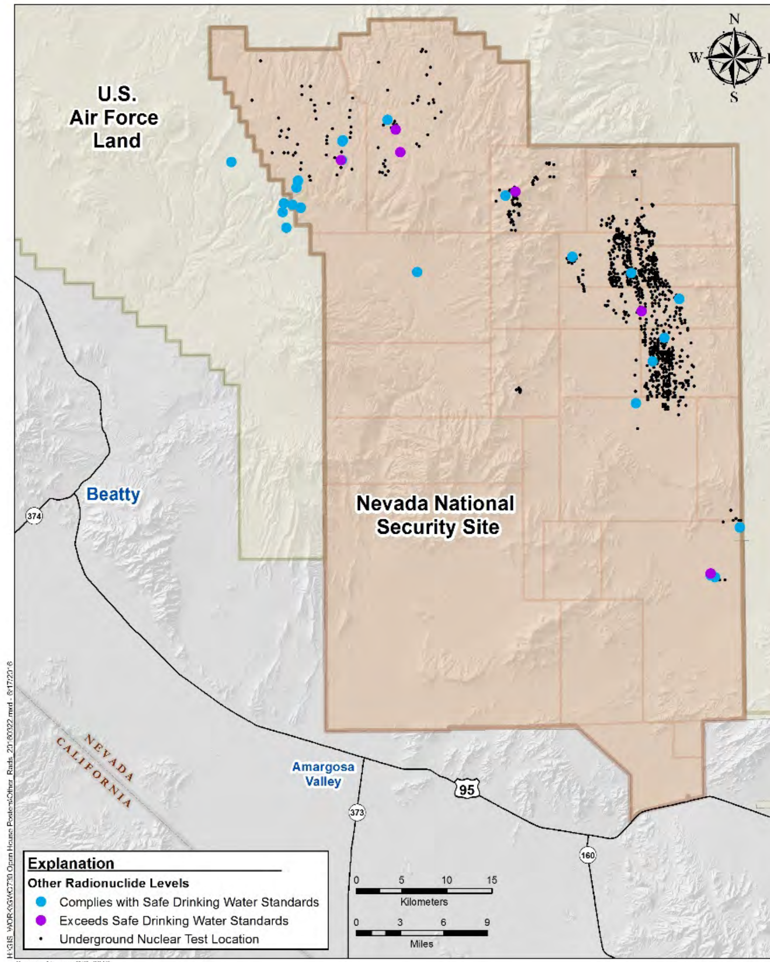
Locations of Groundwater Contaminants

Groundwater Sample Results for Tritium



Contamination from historic underground nuclear testing has not been found in any wells beyond the U.S. Air Force land surrounding the NNSS

Groundwater Sample Results for Other Radionuclides



Movement of Contaminants

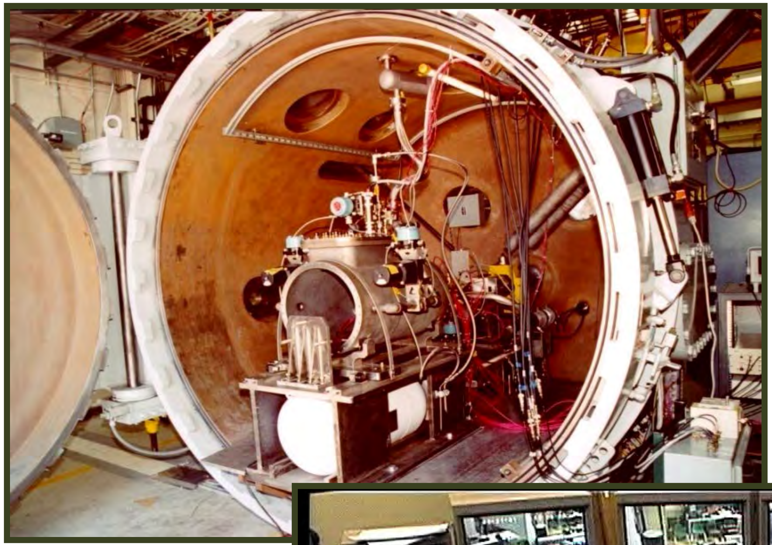
- Many of the radionuclides produced by nuclear tests are relatively immobile:
  - 29 radionuclides are trapped in the melt glass formed by the detonation of the underground nuclear device
  - Tritium, carbon, iodine, chlorine, technetium are mobile in most subsurface environments
  - Cesium and strontium are mobile in some subsurface environments
  - Plutonium is transported a limited distance on small particles
  - Samples are analyzed for other radionuclides once tritium has been detected through standard analyses

Joint Actinide Shock Physics Experimental Research (JASPER)

National Nuclear Security Administration
Nevada Field Office

- Study properties and responses of special nuclear materials under high pressure
- 143 shots to date (65 plutonium shots)*
  - First shot: JAS001 March 19, 2001
  - First plutonium shot: JAS021 July 8, 2003

*as of August 16, 2016



National Nuclear Security Administration
Nevada Field Office

Homeland Security
Increasing Activity at the NNSS

- Radiological Nuclear Countermeasures Test and Evaluation Complex
  - National test bed for radiation detectors/sensors
  - Realistic operational environment allows use of significant quantities of nuclear material
- Advanced Spectroscopic Portal (ASP monitoring)
- Aerial radiological surveys

Device Assembly Facility (DAF)

National Nuclear Security Administration
Nevada Field Office

- 100,000-square-foot facility
- Assembly cells designed to withstand effects of explosions
- Glovebox for JASPER and U1a target assembly
- Current location for National Criticality Experiments Research Center

News Nob

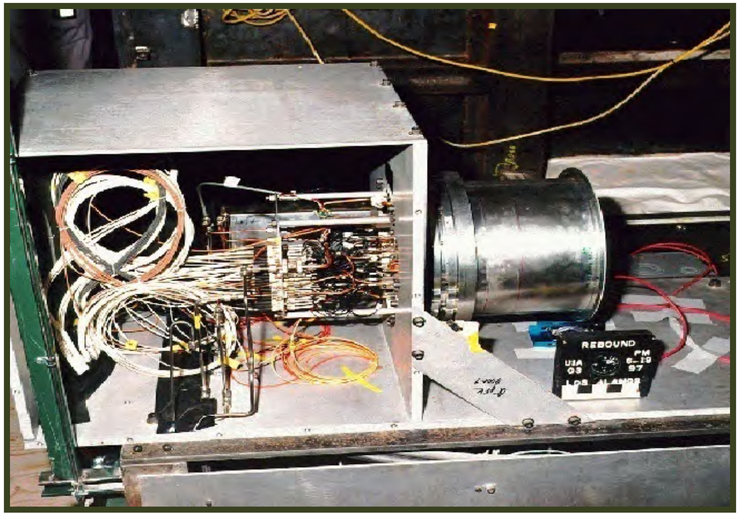
Soldiers pose by News Nob, a vantage point for atmospheric tests established for the media

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

U1a

National Nuclear Security Administration
Nevada Field Office

- Underground laboratory for subcritical experiments
- Data for National Laboratories
- Safety and reliability of stockpile
- 48 experiments conducted at U1a

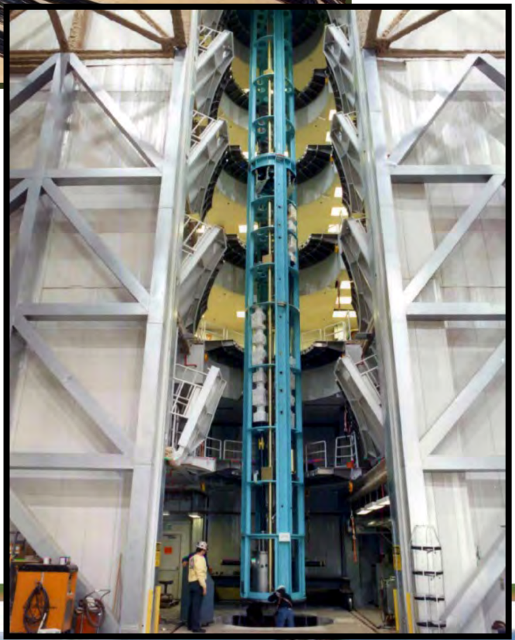


Huron King Test Chamber

- Visual line of sight underground nuclear test (yield less than 20 kilotons) conducted June 24, 1980
- Tested 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 Spring 1993
  - Moratorium on nuclear weapons testing on September 23, 1992
- Planned test range was 20 - 150 kilotons and would have been conducted 1,550 feet underground
- Tower is 157 feet tall
- Inside is a 300,000-pound diagnostic canister suspended from the top of the tower



Big Explosive Experimental Facility (BEEF)

National Nuclear Security Administration
Nevada Field Office

- Non-nuclear high-explosive tests
- Capable of 70,000 pounds of explosives

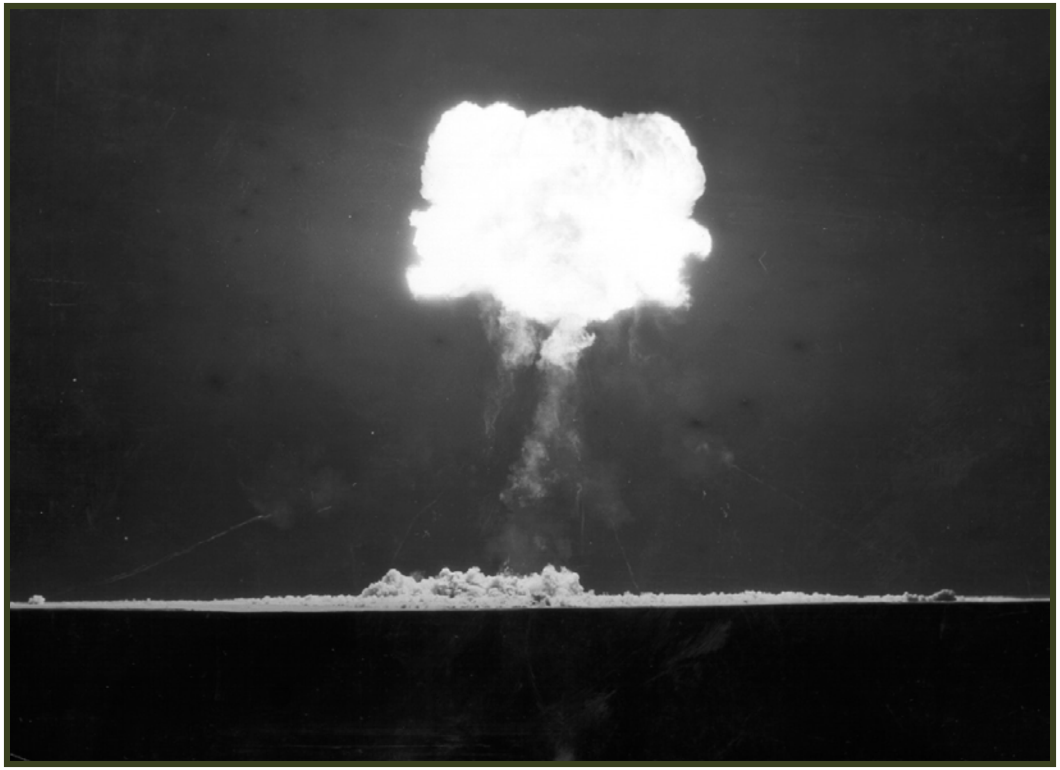
Tower Test Example

Smoky – tower soars 700 feet into the air above Yucca Flat at the NNSS; first atomic tower test of this height (*Smoky* detonation below)

Balloon Test Examples

Balloon used in the detonation of *Charleston* on September 28, 1957

Fireball of *Charleston* lights Yucca Flat at the NNSS; 12-kiloton device was suspended by a balloon at a height of 1,500 feet



Sedan Crater

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

Sedan Crater
(continued)

- Listed on the National Register for Historic Places on April 1, 1994
- Completion of remediation activities and implementation of a closure in place with a use restriction and posting, approved by the State of Nevada in July 2011

EPA Farm

- Operated 16 years
- Studied radionuclide uptake in cows, horses, pigs, goats, chickens, and crops
- Closed in December 1981

Atomic Energy Commission had its own brand

Corrective Action Unit (CAU) 576, Miscellaneous Radiological Sites and Debris Overview

- CAU 576 includes sites discovered during other Soils investigations and while researching potential Corrective Action Sites (CASs) as part of the Soils Activity closeout
  - Over 80 sites were evaluated, resulting in six CASs and the creation of CAU 576
  - The six CASs consist of
    - Rad-chem piping, surface and subsurface
    - Rad-waste dump
    - Debris (lead bricks, battery, etc.)

Log No. 2016-191

CAU 576, Miscellaneous Radiological Sites and Debris Overview (continued)

- Field activities scheduled for early FY 2017:
  - Terrestrial radiological surveys
  - Radiological soil sampling and thermoluminescent dosimeter placement
  - Geophysical surveys

Log No. 2016-191

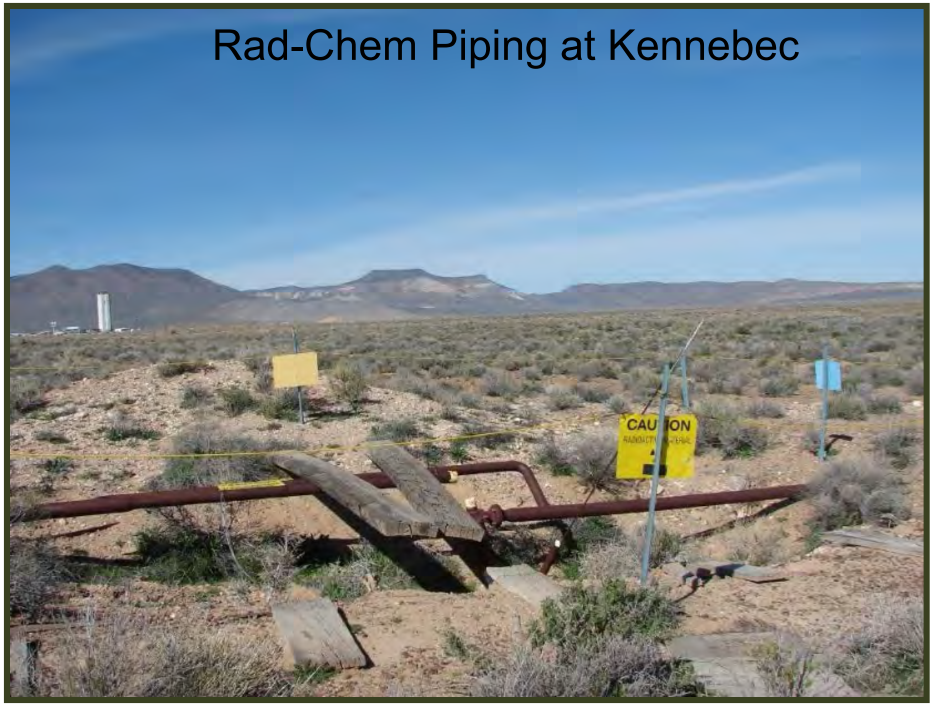
Kennebec Rad-Chem Piping

- Kennebec, a weapons-related test (type of test conducted for the purpose of testing a nuclear device intended for a specific type of weapon system) on June 25, 1963
- Engineering drawings reflect a rad-chem piping layout
- Historically, rad-chem piping systems (gas-sampling assemblies) were designed to collect test gases for radiochemical analysis
- Current field conditions reflect subsurface piping coming from emplacement borehole, past a vault area, to the surface at the gas-sampling assembly and then continue west to where the exhaust pipe ends near a soil mound
- Interior of piping contains radioactive material

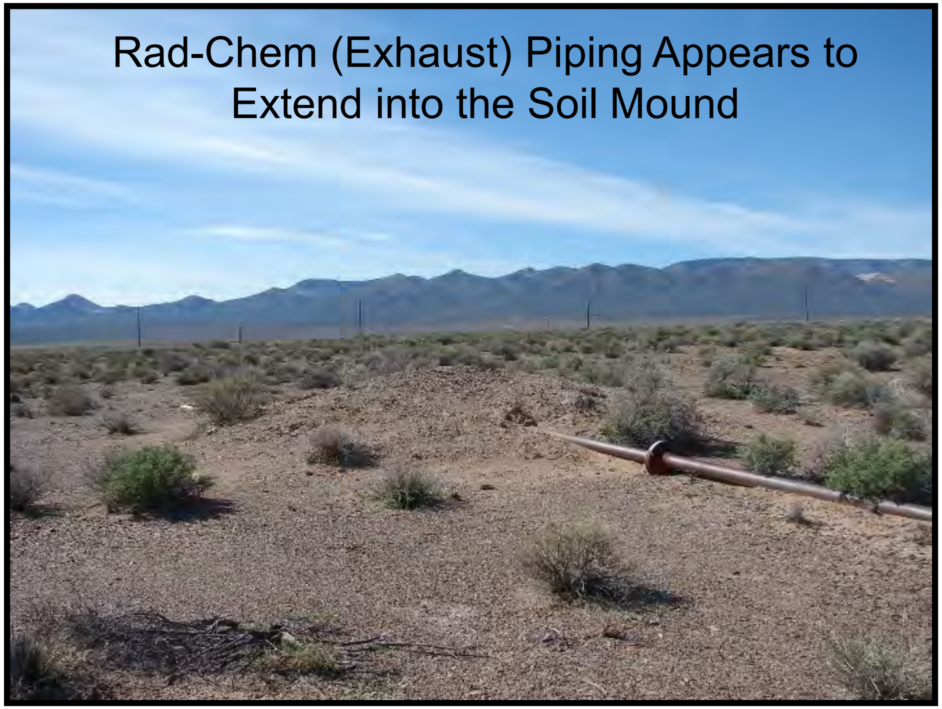
Log No. 2016-191

Kennebec Rad-Chem Piping
(continued)

Rad-Chem Piping at Kennebec



Rad-Chem (Exhaust) Piping Appears to Extend into the Soil Moound



Log No. 2016-191

NSSAB Work Plan Item 1 Corrective Action Alternatives for CAU 576

- In January 2017, the Nevada Field Office will provide a briefing that outlines the nature and extent of contamination, the potential risk to human health and the environment, and an overview of the Corrective Action Alternatives
- From a community perspective, the NSSAB will provide a recommendation on which Corrective Action Alternative (closure in place or clean closure) should be selected by DOE for CAU 576

Log No. 2016-191

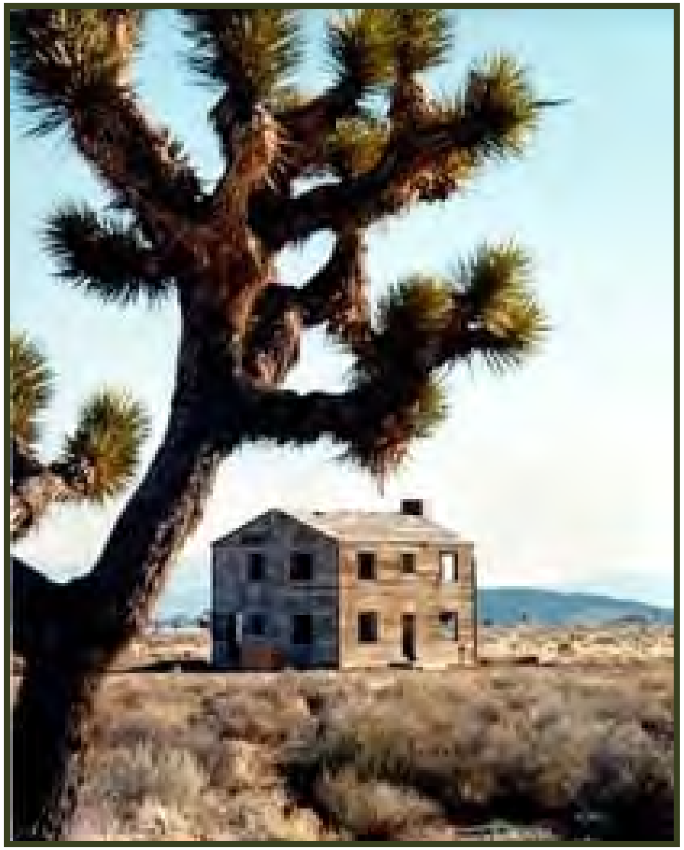
T-1 Training Area

National Nuclear Security Administration
Nevada Field Office

- Counter Terrorism Operations Support (CTOS)/Center for Radiological Nuclear Training
- Includes more than 10 acres with more than 20 separate training venues
- First-responder training to take action in preventing or mitigating terrorist use of radiological or nuclear devices
- More than 190,000 first responders trained since 1999

Apple-2 Houses

- 29-kiloton test was detonated from a 500-foot tower on May 5, 1955
- 7,800 feet to the east of the tower are the remains of a wooden two-story house
- Part of a Civil Defense exercise

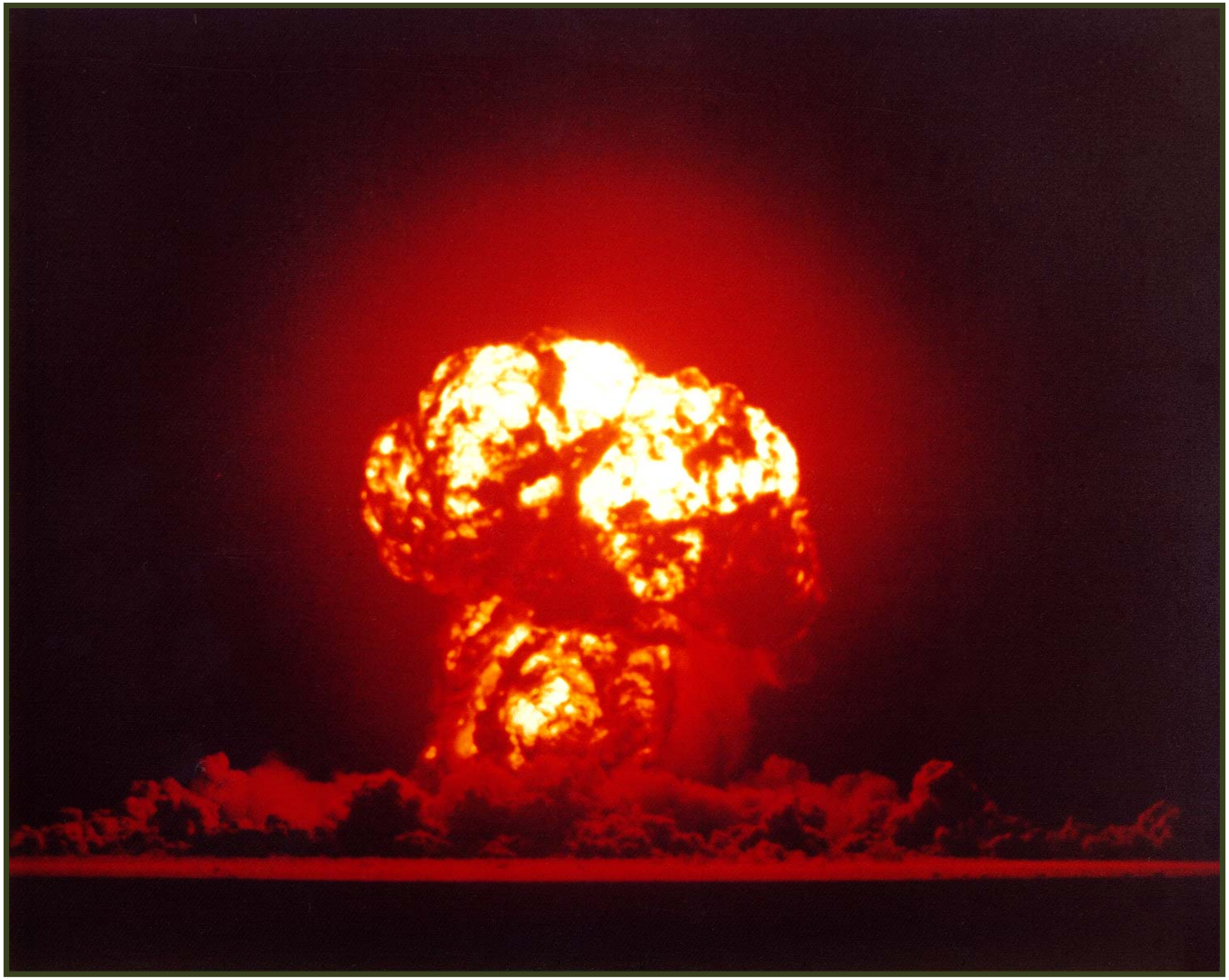


Located 7,800 feet from *Apple-2* ground zero, this existing two-story wooden house was one of two identical structures erected for civil effects tests; the other one, located 5,500 feet from ground zero, was severely damaged

Located 10,500 feet from *Apple-2* ground zero, this existing two-story brick house was one of two identical structures erected for civil effects tests; the other house located 4,700 feet from ground zero was demolished beyond repair

Apple-2 – 29-kiloton nuclear test detonated from the top of a 500-foot tower at the NNSS on May 5, 1955

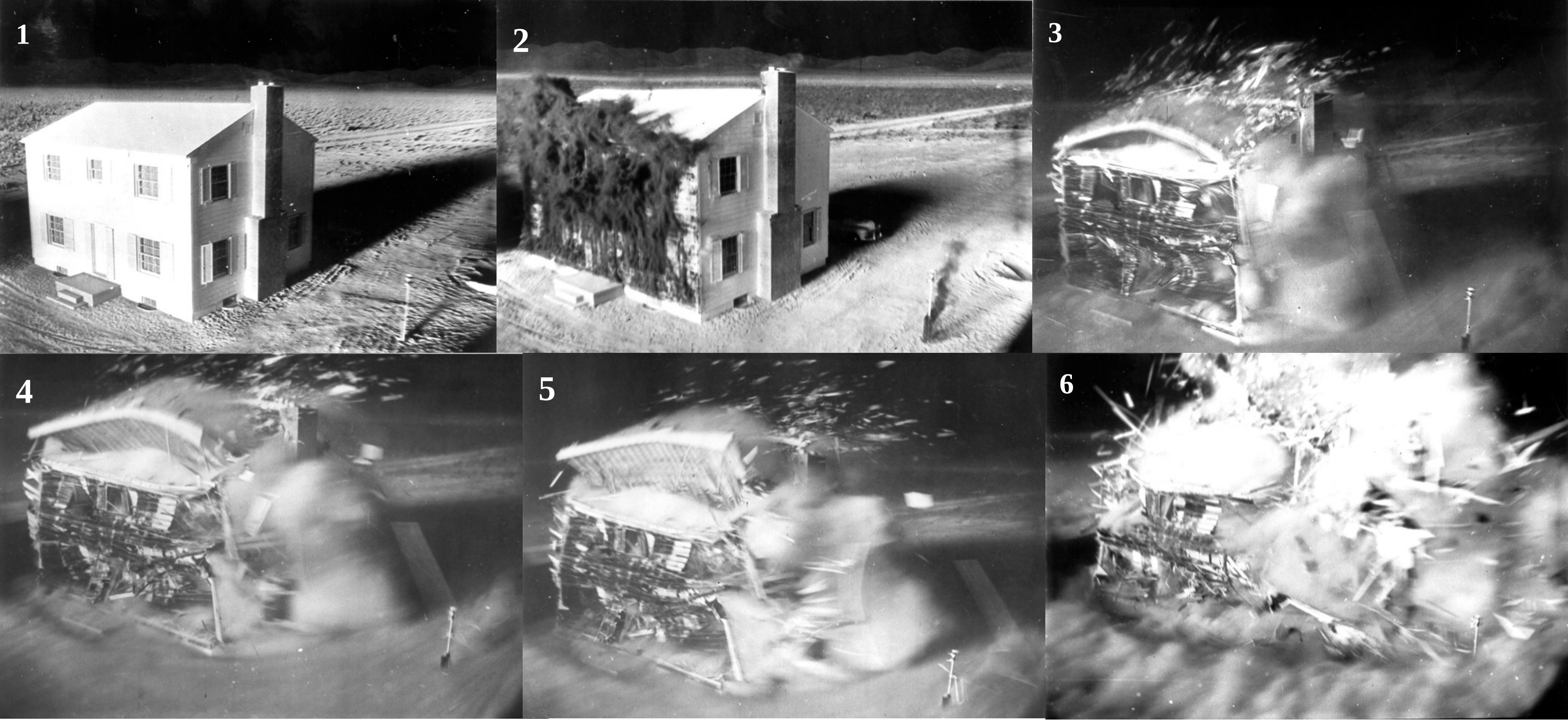
65 associated experiments conducted at various distances from ground zero, including 48 civil effects tests on different types of typical American homes



Two colonial, two-story homes were erected at 3,500 feet and 7,500 feet from *Annie* ground zero

House at 3,500 feet was completely destroyed

House at 7,500 feet was badly damaged



Sequential photos show the complete destruction of the colonial style house located 3,500 feet from *Annie* ground zero

Nuclear Rocket Development at the NNSS – Project Rover

- U.S. launched nuclear rocket development program in 1955
- Ground tests conducted at facilities in southwest corner of NNSS
- Four basic segments:
  - KIWI tested non-flyable nuclear test reactors
  - PHOEBUS Extension of KIWI, designed to produce higher power levels and longer duration operations than KIWI reactors

Nuclear Rocket Development at the NNSS – Project Rover

(continued)

- PHOEBUS 2A was the most powerful, non-flyable nuclear rocket reactor ever built
- Reactor operated for about 32 minutes; 12 minutes at power levels more than a million watts

Nuclear Rocket Development at the NNSS – Project Rover
(continued)

- NERVA (Nuclear Engine for Rocket Vehicle Applications) developed the first nuclear rocket engine suitable for space flight
- RIFT (Reactor In-Flight Test) objectives were to design, develop, and flight-test a NERVA-powered vehicle as an upper stage for a Saturn V launch vehicle

Project Rover, a technical success, terminated in 1973 as a result of the cancellation of Saturn V launch vehicle program in 1969

March 1963

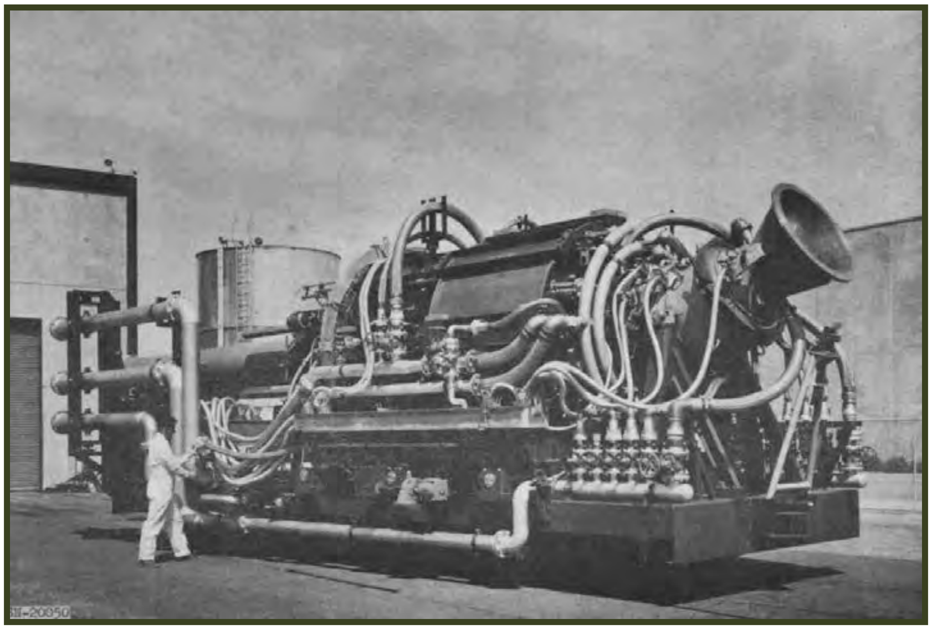
President Kennedy visits Nuclear Rocket Development Station in Area 25

Engine Test Stand 1

Nuclear Rocket Development at the NNSS – Project Pluto

- Code name for the project to develop a nuclear powered ramjet for a Supersonic Low-Altitude Missile (SLAM)
- Principle was to draw in air at the front of the vehicle under ram (great pressure), heat it to make it expand, and then exhaust it out the back, providing thrust
- Reactor designed for experiment named *Tory* and was capable of 35,000 pounds of thrust
- Testing conducted at the Pluto Facility in NNSS Area 26

On May 14, 1961, the world's first nuclear ramjet engine, Tory II-A, mounted on a railroad car, roared to life for just a few seconds



Three years later, Tory II-C was tested for 5 minutes. Despite its success, the Pentagon and Pluto sponsors had second thoughts about the project and on July 1, 1964, seven years after its inception, Project Pluto was cancelled.

Homeland Security and Defense

National Nuclear Security Administration
Nevada Field Office

- Train responders in prevention/ response to terrorist radiological/ nuclear material
- Unique NNSS training complexes and capabilities simulate realistic scenarios in radiation and chemical environment

COUNTER TERRORISM
OPERATIONS SUPPORT

U.S. DEPARTMENT OF HOMELAND SECURITY

NNSS Plays Central Role in National Emergency Response

National Nuclear Security Administration
Nevada Field Office

- Remote Sensing Laboratory (RSL) provides technologies, equipment, and national response teams to search for improvised nuclear devices and radiation dispersal devices ("dirty bombs")
  - RSL-Andrews provides the national capital region response
  - RSL-Nellis provides other national response
- Also provides consequence management teams if a device were to detonate
- Provides support during other emergencies including response to the Nuclear Power Plant disaster in Fukushima, Japan

NSSAB FY 2017 Work Plan

Item 1	Work Plan Item:	***Corrective Action Alternatives for Corrective Action Unit (CAU) 576, Misc. Radiological Sites and Debris***
	Deadline for Recommendation:	February 2017
	Description:	In January 2017, the Nevada Field Office will provide a briefing that outlines the nature and extent of contamination, the potential risk to human health and the environment, and an overview of the Corrective Action Alternatives. From a community perspective, the NSSAB will provide a recommendation on which corrective action alternative (closure in place or clean closure) should be selected by DOE for CAU 576.

Item 2	Work Plan Item:	***Clean Slate II Path Forward***
	Deadline for Recommendation:	November 2016
	Description:	In November 2016, the Nevada Field Office will provide a briefing to the NSSAB describing the history of Clean Slate II at the Tonopah Test Range and potential path forward options. From a community perspective, the NSSAB will provide a recommendation as to which path forward option should be pursued for Clean Slate II.

NSSAB FY 2017 Work Plan
(continued)

Item 3	Work Plan Item:	***Proposed Changes to Long-term Monitoring at Closed Industrial and Soils Sites***
	Deadline for Recommendation:	August 2017
	Description:	In June 2017, the Nevada Field Office will provide a briefing to the NSSAB on proposed changes to some of the current long-term monitoring requirements for closed Corrective Action Sites on the NNSS. From a community perspective, the NSSAB will provide a recommendation regarding the proposed changes to current long-term requirements.

Item 4	Work Plan Item:	***Radioactive Waste Acceptance Program (RWAP) Assessment Improvement Opportunities***
	Deadline for Recommendation:	June 2017
	Description:	In April 2017, the Nevada Field Office will provide a briefing to the NSSAB on the RWAP assessment process. The NSSAB will send 1-2 members to observe a RWAP assessment and look for improvement opportunities. Those members will present their observations to the Full Board. From a community perspective, the NSSAB will develop a recommendation for ways to improve the RWAP assessment process.

NSSAB FY 2017 Work Plan
(continued)

Item 5	Work Plan Item:	***Groundwater Sampling Techniques***
	Deadline for Recommendation:	April 2017
	Description:	In February 2017, the Nevada Field Office will provide a briefing to the NSSAB describing the various groundwater sampling techniques that can be used, including the pros and cons of each technique. Additionally, a groundwater sampling tour will be offered. From a community perspective, the NSSAB will provide a recommendation regarding use of existing and potential sampling techniques.

Item 6	Work Plan Item:	***Internal Peer Review Process Improvement***
	Deadline for Recommendation:	August 2017
	Description:	In January 2017, the Nevada Field Office will provide a briefing to the NSSAB explaining the purpose of an internal peer review and how the Underground Test Area (UGTA) activity currently conducts them. The Board will be invited to send representatives to observe multiple internal peer review meetings. From a community perspective, the NSSAB will provide a recommendation as to how the internal peer review process could be enhanced.

NSSAB FY 2017 Work Plan
(continued)

Item 7	Work Plan Item:	***Groundwater Interactive Map***
	Deadline for Recommendation:	August 2017
	Description:	In June 2017, the Nevada Field Office will provide a briefing to the NSSAB explaining the intent of creating a groundwater interactive map and resources for similar tools within the Department of Energy. From a community perspective, the NSSAB will provide a recommendation as to what type of tool should be developed to help communicate groundwater related topics to the general public.

Item 8	Work Plan Item:	***FY 2019 Baseline Prioritization***
	Deadline for Recommendation:	March 2017
	Description:	In March 2017, the Nevada Field Office will provide briefings on planned FY 2019 baseline activities. From a community perspective, the NSSAB will provide a recommendation ranking the activities.

NSSAB FY 2017 Work Plan
(continued)

Item 9	**Work Plan Item:**	***Communication Improvement Opportunities***
	Deadline for Recommendation:	September 2017
	Description:	From a community perspective, the NSSAB will provide recommendation(s) at each Full Board meeting on ways that DOE can improve/enhance communication to the public (i.e. presentations, open houses, documents, fact sheets). These interim recommendations would be documented in the official minutes of each Full Board meeting with a final recommendation letter submitted to DOE at the end of the fiscal year.

For More Information

For more information on

U.S. Department of Energy,

National Nuclear Security Administration

Nevada Field Office programs and activities:

visit our website at www.nnss.gov

or call the

Office of Public Affairs at

(702) 295-3521