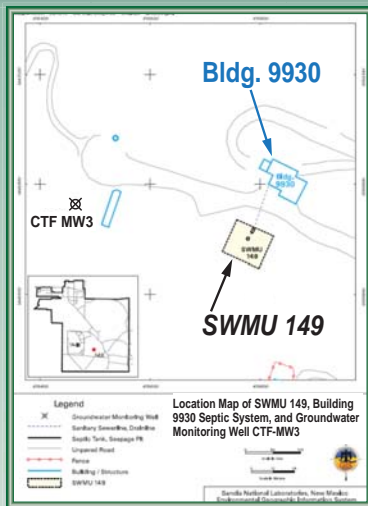


# Solid Waste Management Unit 149 Building 9930 Septic System

## Part 1

### Site History

- Solid Waste Management Unit (SWMU) 149, Building 9930 Septic System is located in the Coyote Test Field on Kirtland Air Force Base and is approximately 0.9 miles east of Technical Area III.
- Building 9930 was constructed in 1961, and included a dark-room, lab, shop area, bathroom and a compressor room. These facilities were served by a 750 gallon septic tank and 4 foot diameter seepage pit. In 1993 Building 9930 was connected to the City of Albuquerque sanitary sewer system.
- The following operations occurred at Building 9930 from 1961 to 1993, photographic reproduction, explosives testing, and general lab operations.



### Depth To Groundwater

- Depth to the regional aquifer is 305 feet below the ground surface (October 2013).

### Constituents of Concern

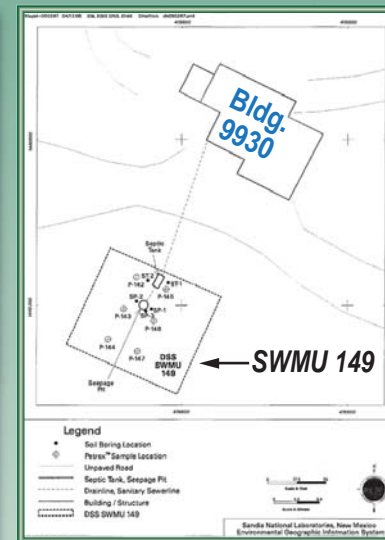
- Petroleum fuel compounds: Volatile Organic Compounds (VOCs) and Semivolatile Organic Compounds (SVOCs)
- Metals ■ Cyanide ■ Chromium VI ■ Radionuclides

### Conductivity and Soil Gas Surveys

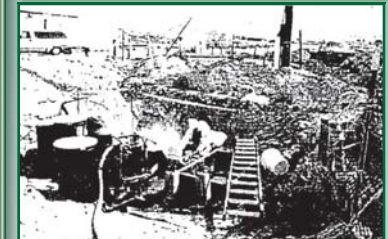
- A ground conductivity survey was performed in May 1994 for areas of high moisture surrounding the seepage pit. Results were inconclusive due to scrap metal interference. A PETREX passive soil gas survey was performed in 1994 for VOCs and SVOCs with six samplers placed in a grid pattern around the seepage pit and septic tank. Aliphatic and/or BTEX (benzene, toluene, ethylbenzene, and xylene) compounds at potentially detectable concentrations were identified in soil gas at three of the six sampling locations. There were no detectable levels of perchloroethene or trichloroethene at any of the sample locations.

### Confirmatory Soil Samples

- Confirmatory shallow and deep soil sampling was attempted in October 1994 and January 1995 using a Geoprobe™ sampler near the seepage pit and septic tank. In both attempts it was impossible to obtain any samples below 11 to 14 feet because of bedrock or well cemented alluvium. Shallow soil samples were collected on two borings located on the opposite sides of the seepage pit, and the septic tank.
- Samples were analyzed for VOCs, SVOCs, metals including Chromium VI, Cyanide, 2,4,6 - trinitrotoluene (TNT) screening, gamma and tritium spectroscopy analysis. Results of all analysis were Non Detects or values below the Sandia National Laboratories/New Mexico (SNL/NM) Soil Background Range, except for tritium. Tritium was detected at a level of 510 pCi/L in a seepage pit composite sample. The radiation dose from this tritium activity was calculated to be 2.8E-08 mrem/yr which was much less than the 15 mrem/yr maximum annual effective dose set by the Environmental Protection Agency (EPA).



Attempting to collect soil samples on the west side of the septic tank with the Geoprobe™ - 10/14/94. View looking northwest.



Steam cleaning the septic tank following removal of contents - 10/16/95. View looking east.

### No Further Action Proposal

- In June 1996, a No Further Action proposal was submitted to the New Mexico Environment Department (NMED) for SWMU 149. NMED responded with a Request for Supplemental Information (RSI) (NMED June 1998). The general and site-specific comments were addressed in the Environmental Restoration (ER) Project Responses to the RSI in November 1998, and a Sampling and Analysis Plan (SAP) was submitted to NMED. The SAP was approved by the NMED in January 2000.
- In June 2000 the NMED issued a second RSI that required the collection of additional samples for high explosive (HE) analysis, and the collection of a deep soil sample. If samples could not be collected as specified in the SAP (SNL October 1999), a downgradient groundwater monitoring well would be required. Sandia responded to this second RSI and agreed to collect one or two samples for HE analysis, and install a groundwater monitoring well at a location agreed upon by the NMED.

### Confirmatory High Explosive Compound Soil Sample Analysis

- In October 2002 one additional soil sample for HE compounds was collected. The intent was to sample beneath the center of the seepage pit. However, underground utilities had been installed across the location of the abandoned seepage pit, and the borehole was shifted 3 feet to the south. Refusal due to shallow bedrock occurred at 12 feet. No HE compounds were detected in the sample.

(SWMU 149 continued)...

# Solid Waste Management Unit 149 Building 9930 Septic System

## Part 2

### Septic Tank Decontamination and Decommissioning

- The SWMU 149 septic tank contents were removed and the tank cleaned in October 1995. The tank was inspected by NMED to verify the tank contents had been removed, and the tank was closed in accordance with applicable State of New Mexico regulations.

### Summary of Groundwater Monitoring History - July 2002 to June 2004

- Monitoring well CTF-MW3 was installed in August 2001 and sampled on a quarterly basis from July 2002 to June 2004 for eight quarters required by the NMED. The groundwater samples were analyzed for VOCs, HE compounds, Target Analyte List (TAL) metals, and cyanide. Although not required by the NMED, additional samples were also collected and analyzed for nitrate plus nitrite (NPN) and anions and cations. These additional samples were collected to further characterize the general ion chemistry of groundwater in this well and for purge water waste characterization purposes. Results for the eight quarters of groundwater sampling are as follows:



Drilling the borehole for groundwater monitoring well CTF-MW3 west of DSS SWMU 149 with Building 9930 in the background - 8/20/01. View looking northwest.

- VOCs:** Trace amounts of five VOCs were detected in the groundwater samples collected. Acetone was detected in the July 2002 sample. Bromodichloromethane was detected in two samples collected in March and June 2004. Dibromochloromethane was detected during three of the eight sampling events. Chloroform was detected in samples collected during six of the eight sampling events. Toluene was detected in the sample collected in June 2004 and the associated trip blank (TB) sample. No other VOCs were detected in the TB samples associated with these samples.

- HE Compounds:** A trace amount of 2-amino-4,6-dinitrotoluene was detected in the sample collected in July 2002. No HE compounds were detected in any subsequent groundwater sample collected from this well.
- TAL Metals:** Selenium was detected in all eight groundwater samples, slightly above background levels. All other metal concentrations were below both background levels and regulatory limits.
- Total Cyanide, NPN, Anions, and Cations:** Cyanide was detected in one of the eight groundwater samples collected. NPN was detected at concentrations slightly above background in the first five samples collected. Fluoride was reported at concentrations slightly above background. The fluoride detected is most likely naturally occurring and derived from Paleozoic and Precambrian bedrock (Skelly August 2013). None of the known activities conducted at Building 9930 would have produced wastewater containing fluoride.

### Groundwater Monitoring - March 2011 to October 2014

- In March 2006, a Class 3 Permit Modification Request was submitted to the NMED. In April 2010, the NMED responded to the Permit Modification Request with a letter requiring further corrective action at SWMU 149 in the form of an additional eight quarters of groundwater monitoring at monitoring well CTF-MW3. In June 2010, a SAP for monitoring well CTF-MW3 was submitted, which the NMED approved.
- Quarterly groundwater sampling resumed at monitoring well CTF-MW3 in March 2011. The eighth quarter of required groundwater monitoring was conducted in December 2012. In October 2014 DOE and Sandia notified NMED that after 14 quarters, groundwater monitoring at SWMU 149 had been completed, and would be discontinued. Results for the 14 quarters of groundwater sampling are as follows:
  - VOCs:** No VOCs were detected at concentrations above established Maximum Contaminant Levels (MCLs) in any CTF-MW3 groundwater samples.
  - Nitrate Plus Nitrite:** NPN was detected at levels slightly above background, and all values were below the MCL of 10 mg/L.
  - Alkalinity and Anions:** No measured values exceeded MCLs. Fluoride was reported at concentrations slightly above background. The likely source of fluoride is the Paleozoic and Precambrian bedrock, and not related to Sandia site activities.
  - Perchlorate:** Was not detected above the NMED specified screening level/method detection limit of 4 µg/L.
  - TAL Metals:** None were detected above established MCLs.

### Data Used for No Further Action Justification

- A total of 5 confirmatory soil analyses were used in the final risk assessment. Two samples were collected adjacent to and beneath the septic tank, and three samples were collected adjacent to and beneath the seepage pit.
- The types of confirmatory and Quality Assurance/Quality Control samples collected are summarized as shown:

#### Number of Confirmatory Soil and Quality Assurance / Quality Control Samples Collected from SWMU 149

Sample Type	VOCs	SVOCs	High Explosive Compounds	TAL Metals	Hexavalent Chrome	Total Cyanide	Tritium	Gamma Spectroscopy Radionuclides
Confirmatory	4	4	1	4	4	4	1	1
Duplicate	1	1	0	1	1	1	0	0
EBs and TBs <sup>a</sup>	2	1	0	1	0	1	0	0
<b>Total Samples</b>	<b>7</b>	<b>6</b>	<b>1</b>	<b>6</b>	<b>5</b>	<b>6</b>	<b>1</b>	<b>1</b>

TBs for VOCs only  
 EB<sup>a</sup> = Equipment blank  
 SVOC = Semivolatile organic compound  
 TAL = Target Analyte List  
 TB = Trip blank  
 VOC = Volatile organic compound

(SWMU 149 continued)...

# Solid Waste Management Unit 149

## Building 9930 Septic System

**Part 3**

### Human Health Risk Assessment Values for SWMU 149 Nonradiological Constituents of Concern

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario <sup>a</sup>		Residential Land-Use Scenario <sup>a</sup>	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
<b>Inorganic</b>					
Chromium VI	0.5 <sup>b</sup>	0.00	1E-9	0.00	2E-9
Cyanide	0.5 <sup>b</sup>	0.00	--	0.00	--
<b>Organic</b>					
Acetone	0.0091 J	0.00	--	0.00	
Methylene Chloride	0.0022 J	0.00	1E-8	0.00	3E-8
<b>Total</b>		<b>0.00</b>	<b>1E-8</b>	<b>0.00</b>	<b>3E-8</b>

<sup>a</sup> Environmental Protection Agency 1989

<sup>b</sup> Nondetected concentration (i.e., one half the maximum detection limit is greater than the maximum detected concentration)

COC = Constituent of concern

J = Estimated concentration

mg/kg = Milligram(s) per kilogram

-- = Information not available

#### For More Information, Contact:

**U.S. Department of Energy**  
Sandia Field Office  
Environmental Restoration  
David Rast  
Telephone: (505) 845-6867

**Sandia National Laboratories**  
Environmental Restoration Project  
Task Leader: Clinton Lum  
Telephone: (505) 284-3602

### Results of Risk Analysis

- Risk assessment results for the residential scenario are calculated per NMED risk assessment guidance in 2003 as presented in the "Supplemental Risk Document Supporting Class 3 Permit Modification Process."
- Because Constituents of Concern (COCs) were present in concentrations greater than background-screening levels or because constituents were present that did not have background-screening levels, it was necessary to perform a risk assessment for the site. The risk assessment analysis evaluated the potential for adverse health effects for the residential land-use scenario.

#### Industrial Land-Use Scenario:

The incremental Hazard Index (HI) is 0.00 and the estimated incremental excess cancer risk is 1.54E-8 for the industrial land-use scenario. These incremental risk calculations indicate insignificant risk to human health from non-radiological COCs under an industrial land-use scenario.

For the radiological COCs under the industrial land-use scenario, the incremental Total Effective Dose Equivalent (TEDE) is 2.1E-2 mrem/yr, which is significantly lower than the Environmental Protection Agency's (EPA's) numerical guideline of 15 mrem/yr. The estimated incremental excess cancer risk is 2.4E-7.

#### Residential Land-Use Scenario:

The calculated HI for the non-radiological COCs under the residential land use scenario is 0.00, which is below numerical guidance. The estimated excess cancer risk is 3E-8, this is less than the NMED numerical guidance of 1E-5. Thus the excess cancer risk for this site is below the suggested acceptable risk value. The incremental HI is 0.00 and the estimated incremental cancer risk is 3.27E-8 for the residential land-use scenario. These incremental risk calculations indicate insignificant risk to human health from non-radiological COCs under the residential land-use scenario.

The incremental TEDE for a residential land-use scenario was 5.3E-2 mrem/yr, which is significantly lower than the EPA numerical guideline of 75 mrem/yr. The estimated excess cancer risk is 5.1E-7. Therefore, SWMU 149 is eligible for unrestricted radiological release.

- Using the SNL ecological risk assessment methodology, the ecological risk for SWMU 149 is predicted to be low.
- In conclusion, human health risk under a residential land-use scenario and ecological risk are acceptable per NMED guidance. Thus, SWMU 149 is proposed for Corrective Action Complete without controls.