

**Sandia National Laboratories**

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**PROPOSAL FOR ADMINISTRATIVE  
NO FURTHER ACTION  
ENVIRONMENTAL RESTORATION  
SITE 165, BUILDING 901 SEPTIC SYSTEM  
OPERABLE UNIT 1303**

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August 1994

Environmental  
Restoration  
Project



United States Department of Energy  
Albuquerque Operations Office

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**SITE 165, Bldg. 901 Septic System  
OU 1303**

**SANDIA NATIONAL LABORATORIES/NEW MEXICO**

## 1.0 INTRODUCTION

Sandia National Laboratories/New Mexico (SNL/NM) is proposing an administrative No Further Action (NFA) decision for Environmental Restoration (ER) Site 165, Bldg. 901 Septic System, Operable Unit (OU) 1303.

The septic system at Building 901, the Systems Analysis Facility, was added as an ER Site in 1991. Building 901 was built in 1948 and is located at the western entrance to Technical Area (TA)-II. The building was used as the personnel entry and exit checkpoint during the time that nuclear devices were assembled in TA-II.

## 2.0 HISTORY OF UNIT

Building 901, the Systems Analysis Facility, was constructed in 1948 and is located near the entrance to TA-II (Attachment 1). In the late 1940s and early 1950s, Building 901 was an entry and exit checkpoint for personnel working on nuclear weapons assembly in TA-II. It was also an administrative building and contained a shower facility, a laundry for worker coveralls and clothing, and office space.

In the early 1960s, after weapons assembly projects were terminated, the building reportedly was used as a High Explosive (HE)-synthesis laboratory. The laboratory was not used for production, but was used only as a secondary HE-pressing facility for research and development. Since about the mid-1960s, the building has been used for office space and as a workshop.

The floor drains in Building 901 discharge into three 700-gallon septic tanks which subsequently lead into a seepage pit and a series of seepage lines that are 2 feet by 600 feet. The sanitary leachfield lines consist of 4-inch diameter vitrified clay; the infiltration area is approximately 80 feet in width and 350 feet in length and is located outside TA-II, southwest of the perimeter fence. The septic system was designed to handle the large volume of water generated by the employees that showered and washed their work clothes in the building.

During the late 1940s and mid 1950s, the amount of effluent discharged into the septic system is unknown, but it reportedly may have received millions of gallons of effluent. Because all floor and shower drains reportedly discharged into the septic system, the septic tank and leachfield probably received contaminants, including degreasing solvents, HE residue, and phosphate detergents generated by laundry washing and showering. Metal complexing may have occurred because of the formation of soluble phosphate complexes. However, radionuclides, such as depleted uranium (D-38) and tritium, reportedly were not used. The septic system was shut down in late 1992.

Although it was not a production-scale facility, HE compounds and other chemicals reportedly were used at the HE synthesis laboratory. The HE compounds included pentaerythritol tetranitrate (PETN), hexanitroazobenzene (HNAB), cyclotetramethylenetetranitramine (HMX), cyclotrimethylenetrinitramine (RDX), Compound B, Baratol, and black powder. Some mercury, used in manometers, may have been accidentally spilled on the floor. Other

potential constituents of concern (COCs) that may have been discharged include lead azide, acetone, and heavy metals. Cobalt may have been used with the lead azide, but reportedly was not washed down the floor drains. Former SNL/NM employees also have stated that degreasers were typically used to clean the floors in the building.

### 3.0 EVALUATION OF RELEVANT EVIDENCE

In order to determine that no potential threats exist to human health or the environment at this site, environmental testing was conducted. Testing included a surface radiation survey, passive soil-vapor survey, septic tank sampling, and borehole drilling and soil sampling. As summarized below, results indicate that further investigation is not necessary and that Site 165 should be removed from the ER Site List.

On June 25, 1992, a sludge sample and a liquid sample were collected from the Building 901 septic tank. The sludge sample was analyzed for tritium, total gamma, gross alpha/gross beta, and metals. It contained low concentrations of various metals but no tritium or gross alpha/gross beta were detected above background activities.

The liquid sample was analyzed for HE compounds, metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and other miscellaneous analytes, including phenolics and oil and grease. It was not analyzed for tritium. The liquid sample contained phenol compounds at 0.068 ppm, above the New Mexico State Discharge Limit of 0.005 ppm, and 6.2 ppm 2,4,6-trinitrotoluene (TNT). No other analytes were detected above state criteria.

Between August 18 and September 22, 1992, ten boreholes (LF-01 through LF-10) were each drilled to approximate depths of 50 feet below ground surface (BGS) in the vicinity of the Building 901 septic system leachfield. The boreholes were spaced at intervals of 50 feet in three linear transects (Attachment 1). A total of 70 soil samples were collected at intervals of zero to five feet BGS and, subsequently, at 30, 40 and 50 feet BGS. The soil samples were analyzed for Target Analyte List (TAL) metals, VOCs, SVOCs, and HE compounds.

All soil samples were field-screened for VOCs with a HNu photoionization detector (PID) using the headspace test method. In addition, the soil samples were field-screened for alpha, beta, and gamma radiation using alpha scintillation and a Geiger-Mueller (G-M) pancake probe. No VOCs were detected with the PID in any soil sample collected from the Building 901 septic system leachfield area. Results of the radiation field screening were within the background levels of 80 to 120 cpm for beta and gamma; no alpha radiation was detected.

Several VOC and SVOC compounds were identified in laboratory method blanks and trip blanks. The primary laboratory contaminants detected include methylene chloride, acetone, and phthalates. Di-n-butyl and bis(2-ethylhexyl) were detected in some soil samples and one equipment rinsate sample. Carbon disulfide was identified in a trip blank sample. Concentrations of methylene chloride detected in soil samples, method, and trip blank samples ranged from 5 to 65 ppb. Most of the soil samples typically contained methylene chloride concentrations less than 10 times the amount detected in the analytical method blank,

suggesting suspect results as specified in EPA 1991 guidance. Concentrations of acetone detected in soil samples and trip blanks ranged from 11 to 32 ppb. Di-n-butyl was detected in soil samples collected from borehole LF-05 at concentrations ranging from 640 to 1,700 ppb. However, this VOC was also detected in the method blank at 890 ppb. Bis(2-ethylhexyl) was detected in one equipment rinsate sample at 48 ppb. QC samples included matrix spike/matrix spike duplicate, duplicate, field blanks, trip blanks, and equipment rinsate blanks.

The anomalous concentrations identified in the leachfield soil samples have been attributed to laboratory contamination. The soil data with detectable concentrations of methylene chloride, phthalates, and acetone have been discounted because of the analytical results of the method and trip blanks. Even if analytical results did not result from laboratory contaminants, the total concentrations of VOCs are all below the proposed EPA Subpart S Corrective Action Limits (EPA 1990).

Soil samples collected in the vicinity of the Building 901 septic system leachfield contained two metals of concern, based on background information: lead, with a maximum concentration of 18.6 ppm; and mercury, with a maximum concentration of 0.32 ppm. SNL/NM background concentration for lead is 15 ppm. RCRA proposed Subpart S action level for mercury is 20 ppm. Concentrations of metals in soil from the Building 901 leachfield were evaluated using STATGRAPHICS™, a standard statistical analytical technique. Cumulative probability plots were constructed to characterize background levels and to determine concentration distributions (SNL/NM 1993). The evaluation of data for metals concentrations in soil at the leachfield suggests that, except for barium, no elevated metals concentrations are evident. The concentrations of barium may indicate anthropogenic soil contamination. The highest concentration of barium was measured at 928 ppm. All total metals concentrations are below respective proposed EPA Subpart S Corrective Action Limits (EPA 1990).

No HE compounds were detected in any soil sample collected in the vicinity of the Building 901 septic system leachfield or from equipment rinsate.

Between November 2 and December 17, 1992, a deep borehole was drilled in the vicinity of the Building 901 septic system leachfield. The borehole was drilled to 330 feet BGS and subsequently completed as monitor well TA2/SW1/320 (Attachment 1). The initial depth of the borehole was planned to be 500 feet BGS; however, it was completed in the first water-bearing zone, located from 299 to 320 feet BGS.

Soil samples collected at depth intervals of 2, 10, 20, 30, 40, 50, 89, 97, and 150 feet BGS were analyzed for TAL metals, VOCs, HE compounds, PCBs, pesticides, SVOCs, gamma-emitting radionuclides, gross alpha/gross beta, tritium, isotopic uranium and plutonium, total uranium, total cyanide, total phosphates, and nitrate/nitrite. Soil samples were collected at depth intervals of 200, 250, and 300 feet BGS and were analyzed only for TAL metals, VOCs, HE compounds, gamma emitting radionuclides, gross alpha/gross beta, tritium, total uranium, total cyanide, total phosphates, and nitrate/nitrite. QC samples included matrix spike/matrix spike duplicate, duplicate, field blanks, trip blanks, and equipment rinsate

blanks.

All soil samples were field-screened for VOCs with a HNu PID using the headspace test method. They were also field-screened for alpha, beta, and gamma radiation using an alpha scintillation probe and a G-M pancake probe. Soil samples were submitted for cation-anion exchange capacity, soil organic matter, soil organic carbon, particle size distribution (i.e., sieve analysis), pH, specific conductance, and soil moisture.

Measurements recorded from the groundwater samples include pH, specific conductance, temperature, turbidity, VOCs with a PID using the headspace test method, and radiation screening.

No potential COCs were identified by field screening or in collected soil samples. A nitrate reading of 15 ppm was the only potential COC detected in groundwater.

Between November 11 and December 2, 1993, a passive Soil Vapor Survey (SVS) investigation was conducted in portions of the Building 901 septic system leachfield area. Except for low levels of benzene, toluene, ethylbenzene, and xylene (BTEX), no other VOCs or SVOCs were identified by the SVS investigation. Based on the experience of NERI (1994), the BTEX levels are considered background or low, which probably does not reflect contamination from the leachfield area but possibly surface spills and drips from heavy equipment and vehicles. In support of this observation, none of the borehole samples contained BTEX or any other VOCs or SVOCs, except when associated with trip blank or laboratory contamination. No significant VOCs were detected in liquid samples collected from the septic tank or the water-bearing zone.

#### **4.0 CONCLUSION**

Historical records and interviews indicated that contaminants possibly discharged through the Building 901 septic system were degreasing solvents, including acetone, dichloromethane (methylene chloride), TCE, 2-butanone, tetrachloromethane (carbon tetrachloride), toluene, xylene, hexane, and alcohols; HE compounds, including PETN, HNAB, HMX, RDX, Compound B, Baratol, and possibly black powder, phosphate detergents, and metals, including mercury, lead azide, and possibly cobalt. Based on the analytical sampling results, there appears to be no contamination resulting from the use of the above chemicals. Therefore, this site does not present a potential hazard to human health or the environment and is proposed for an NFA determination.

## **5.0 REFERENCES**

Northeast Research Institute LLC (NERI 1994), "PETREX Soil Gas Survey Results Conducted at Technical Area II," June 9, 1994.

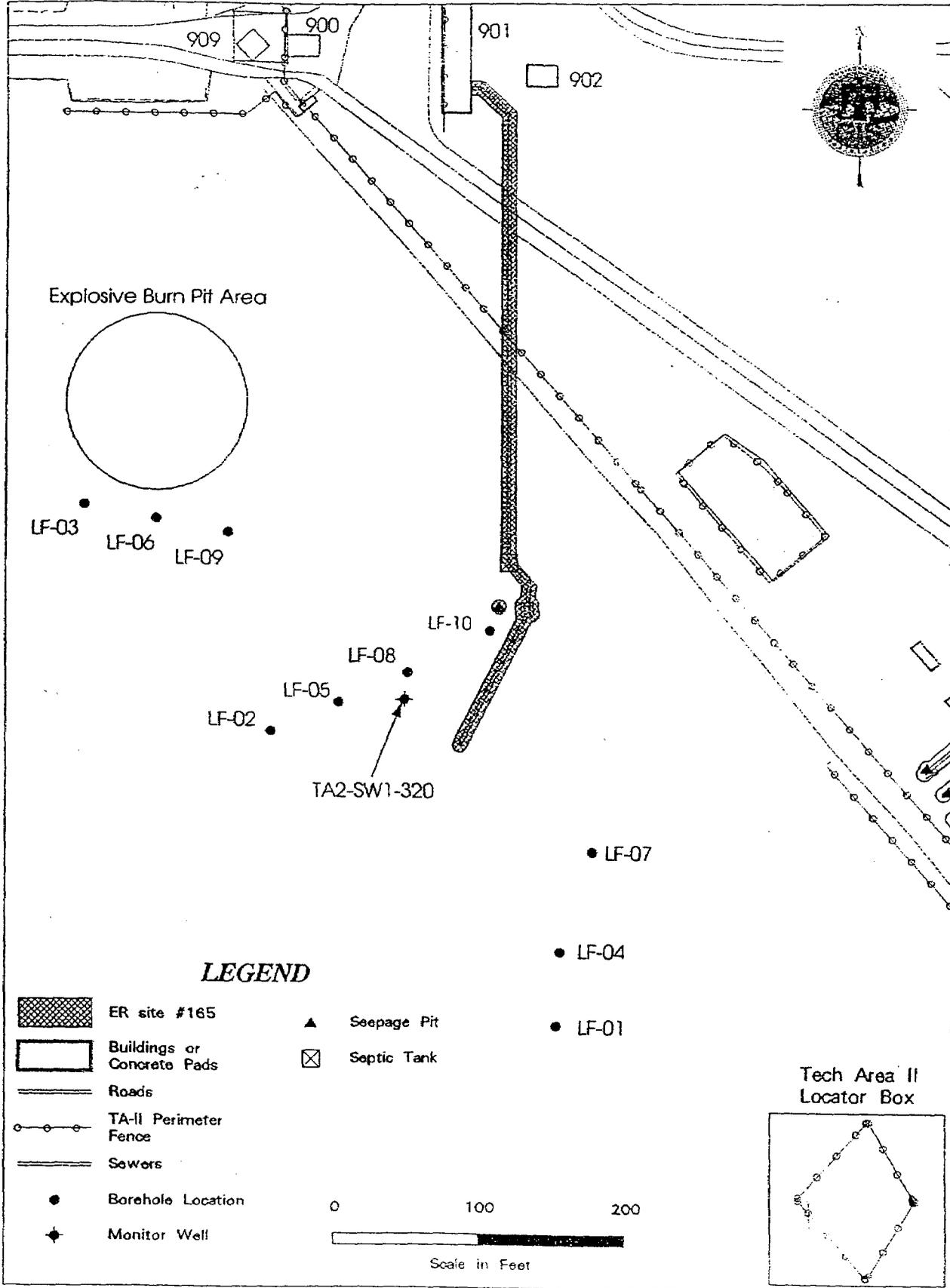
Sandia National Laboratories (SNL/NM, 1993), "Septic System Leachfield and Former High-Explosives Burn Pits Site Investigation West of Technical Area II," December 1993.

40 CFR 264 Subpart S Corrective Action Limits (EPA 1990), "Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities," 1990.

## **6.0 LIST OF ATTACHMENTS**

Attachment 1

Map showing the locations of boreholes drilled at the Building 901 Septic System Leachfield Area, Technical Area II, SNL/NM



Map showing the locations of boreholes drilled at the Building 901 Septic System Leachfield Area, Technical Area II, SNL/NM