TA-21

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Date: September 19, 2002
Refer to: RRES-~~WQH: 02-356~~

Mr. Mark V. Coffman
Environmental Scientist
New Mexico Environment Department
DOE Oversite Bureau, MS J993
Los Alamos, New Mexico 87544

SUBJECT: TA-21-57 AST DIESEL FUEL OIL ENVIRONMENTAL ASSESSMENT AND CHARACTERIZATION REPORT

Dear Mr. Coffman:

In February 2002, the Laboratory notified the U.S. Environmental Protection Agency (EPA), New Mexico Environment Department (NMED), and the National Response Center (NRC) of a potential discharge of Type-2 diesel fuel from the above-ground storage tank (AST) at TA-21-57 into the environment. Up to approximately 48,000 gallons of diesel was unaccounted for. An assessment into the potential for fuel oil leaking into the surrounding soil and environment has been completed. Soil removal and sampling were performed in accordance with Laboratory and regulatory requirements to determine the presence and extent of the leak from the underground fuel-oil supply and return lines from the AST. Per your request, the following information is provided for your review:

- TA-21-57 Aboveground Storage Tank Diesel Fuel Oil Environmental Assessment and Characterization Report (Enclosure 1)
- TA-21-57 Characterization Data, Data Packages, and Data Validation Reports on Compact Disc (Enclosure 2) Carolyn
- Waste Profile Form for the Disposal of Contaminated Soil (Enclosure 3)

Please contact me at (505) 665-6085 should you have questions or need additional information regarding this matter.

Sincerely,

Mike Saladen
Water Quality & Hydrology Group

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ENCLOSURE 1

LA-UR-02-4007

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Title: TA-21-57 Aboveground Storage Tank Diesel Fuel Oil Environmental Assessment and Characterization

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TA-21-57
ABOVEGROUND STORAGE TANK DIESEL FUEL OIL ENVIRONMENTAL ASSESSMENT AND CHARACTERIZATION

LAUR-02-4007, Revision 0

September 2002

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CONTENTS

Section **Page**

ACRONYMS iii
CERTIFICATION STATEMENT iv
1.0 INTRODUCTION 1
2.0 SCOPE OF WORK 1
3.0 HISTORY OF STEAM PLANTS AND FUEL TANK 2
4.0 SITE-SPECIFIC GEOLOGY AND GROUNDWATER 3
4.1 Regional Geology 3
4.2 Site-Specific Lithologic Descriptions 3
4.2.1 Unit 3 3
4.2.2 Unit 2 4
4.2.3 Fractures 4
4.3 Site-Specific Groundwater 5
5.0 STATUTORY REQUIREMENTS 5
5.1 Soil Collection Methodology and Sampling Protocols 5
5.2 Handling and Disposal of Contaminated Soil 6
6.0 ASSESSMENT AND CHARACTERIZATION (POTHOLES, TRENCH, GEOPROBE, VERTICAL AND ANGLED CORE DRILLING, GROUNDWATER WELLS, AND AIR QUALITY) 6
6.1 Pothole Assessment 6
6.2 Trench Assessment 7
6.3 GeoProbe Assessment 7
6.4 Vertical and Angled Core Drilling Assessment 10
6.5 Groundwater Assessment 12
6.6 Air Quality Assessment 12
6.7 Analytical Results 12
7.0 RADIATION REPORTS 14
7.1 Analytical Reports 14
8.0 DISCUSSION 14
8.1 Saturation with Respect to Diesel Flow 14
8.2 Role of Fractures 15
8.3 Capillary Barriers within the Bandelier Tuff 15
8.4 Final Plume Configuration 15
9.0 CONCLUSIONS 16
10.0 REFERENCES 16

Appendices

1 Timeline
2 Sampling and Analysis Plan
3 Radiation, Water Quality, and Air Quality Survey Documentation
4 Analytical Results
5 Point J Characterization
6 Figures

FIGURES

Figure **Page**

1 Overview of the TA-21 Building 357 Site 1
2 Sample Locations Taken from Potholes During Preliminary Sampling and Analysis 7
3 GeoProbe Sample and Analyses Locations and Layout 8
4 Vertical and Angled Borehole Core Sampling and Analyses Locations 11

TABLES

Table **Page**

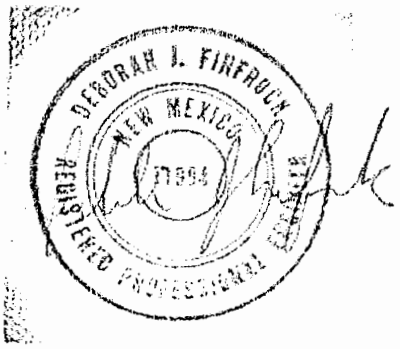
1 Analytical Data from GeoProbing Assessment 9
2 Pertinent Information on Hollow-Stem Auger Boreholes 10
3 Maximum Hazardous Constituents Concentrations Detected During Characterization Activities 13

ACRONYMS

AST	aboveground storage tank
BGL	below ground level
BTEX	benzene, toluene, ethylbenzene, and xylenes
DOE	U.S. Department of Energy
DRO	diesel-range organics
EPA	U.S. Environmental Protection Agency
FWO-SWO	Facility Waste Operations–Solid Waste Operations
HENV	Health and Environmental
HSR-1	Health Safety and Radiation Protection
JCNNM	Johnson Controls Northern New Mexico
LANL	Los Alamos National Laboratory
Ma	million annum or million years
NMED	New Mexico Environment Department
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
ppm	parts per million
RRES-WQH	Risk Reduction and Environmental Stewardship–Water Quality and Hydrology
SAP	Sampling and Analysis Plan
TA	Technical Area
TCLP	toxicity characteristic leaching procedure
TPH	total petroleum hydrocarbons
UST	underground storage tank
VOC	volatile organic compound

Certification Statement

This certifies that the activities described in this report were conducted according to good engineering practice and were reviewed by the undersigned.



Debbie Finfrock, P.E. 11994

1.0 INTRODUCTION

Benchmark Environmental/Johnson Controls Northern New Mexico (JCNNM) Health and Environmental have prepared this summary of results from the environmental assessment associated with soil contamination from leaking underground fuel-oil lines connecting the aboveground storage tank (AST) at Technical Area (TA)-21-57 with the TA-21-357 Steam Plant at Los Alamos National Laboratory (LANL) (see Figure 1 below and Appendix 6, Figure 1). Up to approximately 48,000 gallons of No. 2 fuel oil (diesel fuel) from the AST was unaccounted for. An assessment into the potential for fuel oil leaking into the surrounding soil and environment has been conducted. Soil removal and sampling were performed in accordance with the requirements of LANL, the U.S. Department of Energy (DOE), the New Mexico Environment Department (NMED), and the U.S. Environmental Protection Agency (EPA) to determine the presence and extent of the leak from underground fuel-oil supply and return lines from the AST.

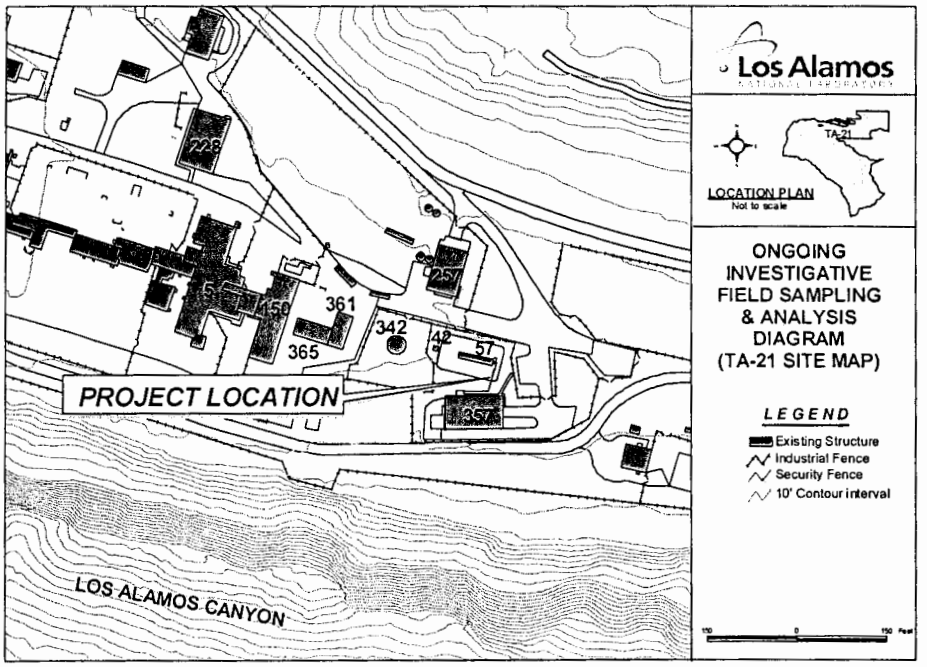


Figure 1. Overview of the TA-21 Building 357 Site

2.0 SCOPE OF WORK

The scope of work for this assessment is described in detail in the Sampling and Analysis Plan (SAP) and Amendments 1 through 4 contained in Appendix 2. The following description is a summary of this scope of work.

The purpose of the SAP is to document the objectives, rationale, and procedures for collecting, analyzing, and managing environmental samples taken from this site. Sampling methods for the investigation of the fuel-oil lines are in accordance with the objectives and procedures described in the *UST Soil/Water Sampling and Disposal Guidelines* (NMED 1995). The SAP outlines the methods and procedures

proposed to collect samples and gather data of sufficient quality and quantity to adequately verify the presence and extent of the release that may have occurred from the lines. It provides information necessary to identify the quantity of contaminated soil to be removed. The project received appropriate LANL reviews and was performed in accordance with approved site health and safety plans and emergency response plans. The project was performed in accordance with applicable DOE, LANL, and state of New Mexico requirements. The primary investigations performed to assess the site were ten potholes, a trench of the pipelines, 23 GeoProbes, and ten continuously cored boreholes.

3.0 HISTORY OF STEAM PLANTS AND FUEL TANK

The TA-21-57 No. 2 fuel-oil AST is a 50,000-gallon, one-section, nonbaffled tank that was installed in early 1945 to store No. 2 fuel oil to supply the old Central Steam Plant, TA-21-9. In 1986 the new Steam Plant, TA-21-357, was commissioned. No. 2 fuel oil reaches the New Steam Plant boilers via an aboveground pumping system located inside the building and through underground supply and return lines from the AST. The underground fuel lines leading to the old Steam Plant have been decommissioned and capped.

The AST provided fuel oil as a backup source to fire boilers at TA-21-357, but the system is no longer in service. The normal source is natural gas. The tank was filled through an aboveground line and the supply and return lines to the TA-21-357 boilers were buried between the AST and the Steam Plant (a distance of about 80 ft.). The tank supply line has a 3-inch standpipe inside the tank with a 9-inch strainer, and the return line penetrates the tank at the top. The tank contained No. 2 fuel oil. The fuel oil in the TA-21-57 AST was mixed with fuel oil transferred from the TA-16 Steam Plant during the Dome Forest Fire in 1996. Below is a synopsis of events that led up to the present characterization operations at the TA-21 Steam Plant. A full timeline is presented in Appendix 1.

estimate amount lost. This can not be good!!

Define small

In 1989, a small leak in the line occurred in the north-south section of the underground fuel-oil piping about 15 ft. south of the north elbow. The leak was noticed when fuel oil was observed surfacing at that location. The north-south section of the piping was replaced. New piping was installed with welded joints and wrapped from the tank to the south 90-degree elbow. The piping that was removed had been installed in 1986 and had screwed fittings, which were called for in the specifications. However, the specifications also stated that the piping was to be wrapped, and the removed piping was not. Additionally, there were no indications that the fuel-oil supply and return lines had cathodic protection. The east-west section of the piping was not replaced. A pipefitter stated that during installation the entire line should be replaced due to corrosion on the replaced portion, and because the line had screwed fittings.

In 1991 a fuel-oil leak occurred on the south side of the TA-3-22 Power Plant. This prompted an occurrence report (LANL 1991). One of the corrective actions listed required that annual leak testing be conducted in accordance with NMED underground storage tank (UST) regulations.

In 1995 a project was proposed to move the underground piping above ground to facilitate leakage detection. Because of funding concerns and the expected decommissioning of TA-21, the project was not initiated, but the design was performed in 1996 and with PI#16333. It was decided not to go to construction with this design.

Because of the presence of a continuing sheen of oil, the valve pit area on the east end of the AST was reworked in 1997 to remove strainers and two valves. Two valves remained. The pit was cleaned, filled with sand, and capped with concrete.

Due to the Cerro Grande forest fire, the TA-21 Steam Plant was shut down and evacuated on May 10, 2000. On May 12, 2000 a sounding was performed by R. Montano, who verified a level of 48,357 gallons (128 inches) in the tank. On November 14, 2001 an entry in the fuel records logbook indicated that there were still 48,357 gallons in the tank.

On January 16, 2002, the Steam Plant tried to start using diesel fuel. This attempt failed because no fuel was available at the boiler. Plant operators checked the pumps and filters, which were found to be functioning. They then pumped air to the tank to check for gelling of fuel. It was discovered at that time that there were only three inches of fuel in the tank. Subsequently, pressurized air testing detected small leaks in both the supply and return fuel-oil pipelines between the tank and the plant. On February 21, Risk Reduction and Environmental Stewardship–Water Quality and Hydrology (RRES-WQH) notified NMED, EPA, and the National Response Center that a potential spill had occurred. Below is the scope of work to determine the extent of diesel-fuel contamination in the soil and underlying tuff in the region of the TA-21 Steam Plant.

4.0 SITE-SPECIFIC GEOLOGY AND GROUNDWATER

4.1 Regional Geology

The geology at this portion of TA-21 is fairly straightforward. The stratigraphic units of the Bandelier Tuff described in this report are largely according to Broxton and Reneau (1995). The Bandelier Tuff is dominantly composed of a complex sequence of nonwelded to welded ignimbrites that were erupted from the Valles-Toledo cauldera complex (Smith and Bailey 1966; Gardner et al. 1986). In the region of Los Alamos, the Bandelier Tuff consists of two members: the lower Otowi member (1.61 Ma) and the upper Tshirege member (1.22 Ma) (Izett and Obradovich 1994), separated by a unit of volcaniclastic rocks and tuffs of the Cerro Toledo interval, which is approximately 300 ft. below TA-21-357 (Heiken et al. 1986; Broxton and Reneau 1995; Lavine et al. 1997). The Tshirage member consists of four identified units (Units 1 through 4). The bottommost portion of Unit 1 is the Tsankawi pumice bed, which is the basal pumice fall of the Tshirege member. The two units of the Tshirage Tuff positively encountered at the TA-21 Steam Plant site are Unit 3 (the top layer) and Unit 2 (the lower layer).

4.2 Site-Specific Lithologic Descriptions

All descriptions were performed at the drill site with the help of a 10X hand lens. With the exception of differences in texture and induration brought about by the variations in welding (which were qualitatively determined by the degree of pumice flattening), the lithologic descriptions of Units 3 and 2 are consistent from borehole to borehole. The lithologic descriptions are arranged from youngest to oldest rocks. Specific stratigraphic unit characteristics for each borehole are depicted in Appendix 6, Figures 2 and 3.

4.2.1 Unit 3

Unit 3 is a nonwelded to moderately welded, phenocryst-rich, moderate pumice-bearing, devitrified tuff. This unit has been penetrated to its lower contact with Unit 2 in nine of the ten boreholes.

Phenocrysts in Unit 3 are abundant at 15 to 25 volume percent, with quartz and alkali feldspar in subequal amounts. The quartz and feldspar phenocrysts have distinctive physical characteristics. The quartz has a bipyramidal shape, and the alkali feldspar is chatoyant (flash of blue color observed). Plagioclase and mafic phenocrysts are extremely rare.

Pumice lapilli in the Unit 3 ash flow range from 10 to 20 percent by volume. Unit 3 is nonwelded to slightly welded at the top, but rapidly grades downward to partly welded tuff over a short interval (approximately 10 ft.). The pumices are fully inflated and vesicular at the top of the ash flow, but with increased welding, the tubular pumice structures become progressively more flattened and deformed. All pumices are devitrified in this unit. Colors of the pumice are of three modes. At the top of the flow, they are predominantly dark gray and brown with white stripes. Progressing down section, the brown lapilli gradually disappear and are replaced by large white pumice. The pumice ranged in size from 5 mm to over 10 cm.

The matrix of Unit 3 is composed of ash, devitrified glass shards, crystal fragments, and very small pumice fragments. The matrix color of this unit ranges from purple gray to medium gray, and the matrix makes up approximately 65 percent by volume of the ash flow.

4.2.2 Unit 2

Unit 2 is a nonwelded to densely welded, very phenocryst-rich, moderate pumice-bearing, devitrified tuff. The contact between Unit 3 and Unit 2 was determined by the abrupt increase in phenocryst content. In most boreholes, coring was continued through the nonwelded portion of Unit 2 until there was an increase in welding at 100 ft. below ground level (BGL). The majority of these vertical assessment holes were finished at 105 ft. BGL

However, three holes were extended to greater depths in Unit 2. Borehole V2 went to 110 ft. BGL, where Unit 2 was partly welded. Borehole V5 was drilled to 125 BGL, where Unit 2 was densely welded. The deepest borehole, Borehole V1, was drilled to 175 ft. BGL and probably went below the bottom of Unit 2 and penetrated Unit 1. The Unit 2/Unit 1 contact was impossible to locate precisely, due to high core losses in the sampling. The assumption that the contact was passed (at approximately 165 ft. BGL) is dependent on three factors: the regional stratigraphy delineated by Broxton and Reneau (1995), the change from densely welded to nonwelded tuff in the 155- to 165-ft. interval, and a Plinian air fall pumice deposit observed in this borehole from 165–170 ft. BGL. It should be noted that in Borehole V1 the densely welded portion of Unit 2 extends from 105–155 ft. BGL.

Phenocrysts in Unit 2 are abundant at 35 to 45 volume percent, with quartz and alkali feldspar in subequal amounts. The quartz and feldspar phenocrysts have the same distinctive physical characteristics as described in Unit 3 (bipyramidal quartz and chatoyant alkali feldspar).

Pumices in Unit 2 range in volume from 10 to 20 percent. The color of these devitrified pumice range from white to gray. The gray pumice darkened in color as the degree of welding increased. The white pumice was not observed in the densely welded portion of the unit (110–155 ft. BGL). The pumice varied in size from 1 cm to more than 10 cm. The larger pumice are common in the upper nonwelded portion.

The matrix of Unit 2 is composed of ash, devitrified glass shards, crystal fragments, and very small pumice fragments. The matrix color of this unit ranges from light gray to dark gray, and the matrix makes up approximately 45 percent by volume of the ash flow.

4.2.3 Fractures

Twenty-eight fractures were identified in the ten boreholes used during this assessment phase. Of those fractures, 25 (90 percent) were encountered in the upper 35 ft. of Unit 3 of the Tshirege member. The remaining three fractures were identified in the lower portion of Unit 3 (52 ft. and 56 ft. BGL) and the very top of Unit 2 (68 ft. BGL).

The fractures observed were dominantly high angle, that is, 18 (67 percent) of the fractures were 70 degrees or more. Another two were fractures with 45-degree angles. The third major subset included fractures with 0-degree angle (i.e., horizontal), which accounted for seven (25 percent) of the observed set.

The petrography of the fracture linings and surrounding wall rock is extremely varied. Some of the fractures show no fill material and unaltered surrounding ash flow. Other fractures are lined with red-brown clay, often with caliche veinlets included, and also with unaltered wall rock. A third common fracture type is one in which the fracture walls are lined with iron-oxides. There is no obvious fill material in these, but the wall rock is oxidized for up to 2 cm beyond the fracture wall.

A few fractures in the boreholes were noteworthy. In Unit 2, Borehole V8 had a 1.5-ft. fracture that extended from 68 ft. to 69 ft. 6 inches BGL, and had both wall-rock and fracture-face oxidation. In Unit 3, Borehole A1 had a 2-ft. 1-inch fracture from 24 ft. 6 inches to 26 ft. 7 inches BGL, and a 4-inch-thick clay filling that was saturated with water. This borehole had six distinct fractures from 17 inches to 33 inches BGL.

Borehole V5 has a fracture with unusual characteristics (both visual and olfactory) that may have diesel transport ramifications. The fracture is located from 25 ft. 6 inches to 25 ft. 8 inches and has a dip of 45 degrees. The fracture is heavily discolored, as is the ash-flow material below the fracture. Samples above the fracture contain no diesel odor, but the sample directly below the fracture (35 ft. BGL) has a very strong diesel contamination smell. These observations indicate that the diesel flow to the west is being constrained above 25ft. 6 inches by this particular fracture in borehole V5.

4.3 Site-Specific Groundwater

The regional aquifer is typically separated from the alluvial groundwater and intermediate perched zone groundwater by 350–620 ft. of tuff, basalt, and sediments (LANL 1993). The regional aquifer beneath TA-21 is at an elevation of approximately 5,900 ft. or approximately 1,100 ft. BGL and is located chiefly within sediments of the Puye and Tesuque Formations (Broxton and Eller 1995). Thus, for mesa-top sites at TA-21, more than 1,100 ft. of tuff and volcaniclastic sediments separate the surface from the regional aquifer. The aquifer is generally believed to flow easterly toward the Rio Grande (Birdsell 2002, personal communication).

5.0 STATUTORY REQUIREMENTS

Sampling methods for the assessment of the diesel lines were done in accordance with the objectives and procedures described in the *UST Soil/Water Sampling and Disposal Guidelines* (NMED 1995).

5.1 Soil Collection Methodology and Sampling Protocols

In the case of this assessment, under requirements of the UST regulations, soils were sampled where holes or releases had occurred in tanks and underground piping, or where overfills/spills had occurred. Characterization of the contamination boundary was defined as levels of total petroleum hydrocarbons (TPH) less than 100 mg/kg; total benzene, toluene, ethylbenzene, and xylenes (BTEX) less than 50 mg/kg (or benzene alone less than 10 mg/kg); and hazardous constituents less than regulatory limits (toxicity characteristic leaching procedure [TCLP] metals, polynuclear aromatic hydrocarbons [PAHs], volatile organic compounds [VOCs], and semivolatile organic compounds). For the purpose of this assessment, samples were taken at a minimum of 10 ft. below the contamination boundary from field measurements for verification.

For diesel-contaminated soils, samples were collected in 4-ounce or larger jars. Jars were filled completely, leaving no headspace in the jar. Jars were placed on ice and shipped to a certified laboratory for analysis. Amber glass jars with Teflon® seals were required as containers for analytical purposes. Data generated by certified laboratory analysis are the only data accepted by the UST Bureau. Acceptable laboratory analyses are:

- Analyzed for TPH by infrared spectrophotometry; freon extraction (for waste oil or diesel) (EPA Method 8015 modified by methylene chloride extraction)
- Analyzed for aromatic VOCs by gas chromatograph and a photo-ionization detector (EPA Method 8020)
- Analyzed for VOCs by gas chromatograph and mass spectrophotometry (EPA Method 8240)
- Analyzed for nonhalogenated VOCs by gas chromatograph and a flame-ionization detector (EPA Method 8015 modified by purge-and-trap sample preparation)

See Appendix 2, Section 4.0 (Analyses and Quality Control) of the SAP for specific analyses conducted during the characterization of this site.

5.2 Handling and Disposal of Contaminated Soil

During the assessment process, all soil was segregated (contaminated versus uncontaminated) during soil removal and placed in covered roll-off bins or 55-gallon drums. Uncontaminated soil will be managed as reusable fill material. Excavated soil will be sampled and analyzed for characterizations of TPH, PAH, BTEX and TCLP metals. Contaminated soil with TPH levels higher than 1,000 mg/kg will be managed as New Mexico Special Waste. Contaminated soil with hazardous constituent levels greater than regulatory limits will be managed and disposed of as hazardous waste. All soil removed during this assessment will be properly characterized (waste profiles) and disposed of in accordance with LANL, NMED, and DOE requirements through Facility Waste Operations–Solid Waste Operations (FWO-SWO).

See Appendix 2, Section 2.0 (Work Plan) of the SAP for additional information on the handling and disposal of contaminated soil from this site characterization.

6.0 ASSESSMENT AND CHARACTERIZATION (POTHOLES, TRENCH, GEOPROBE, VERTICAL AND ANGLED CORE DRILLING, GROUNDWATER WELLS, AND AIR QUALITY)

6.1 Pothole Assessment

The first investigative method used was a series of ten potholes dug on February 21, 2002. The locations of the potholes are depicted in Figure 2 (see also Appendix 6, Figure 5a). Potholes were distributed along the line in varying intervals for initial assessment of the extent of contamination. Composite samples were taken at a depth of six inches below and between the fuel-oil supply and return lines to determine the extent of contamination near and under the fuel lines in each pothole. Soil samples were analyzed using Petroflag to measure levels of total petroleum hydrocarbons—diesel-range organics (TPH-DRO), and verification samples were sent to a state-certified laboratory (Assaigai Analytical Laboratory) for analysis. Two samples (Pothle #5 and Pothole #8) showed minor hydrocarbon contamination (120 parts per million [ppm] and 280 ppm).

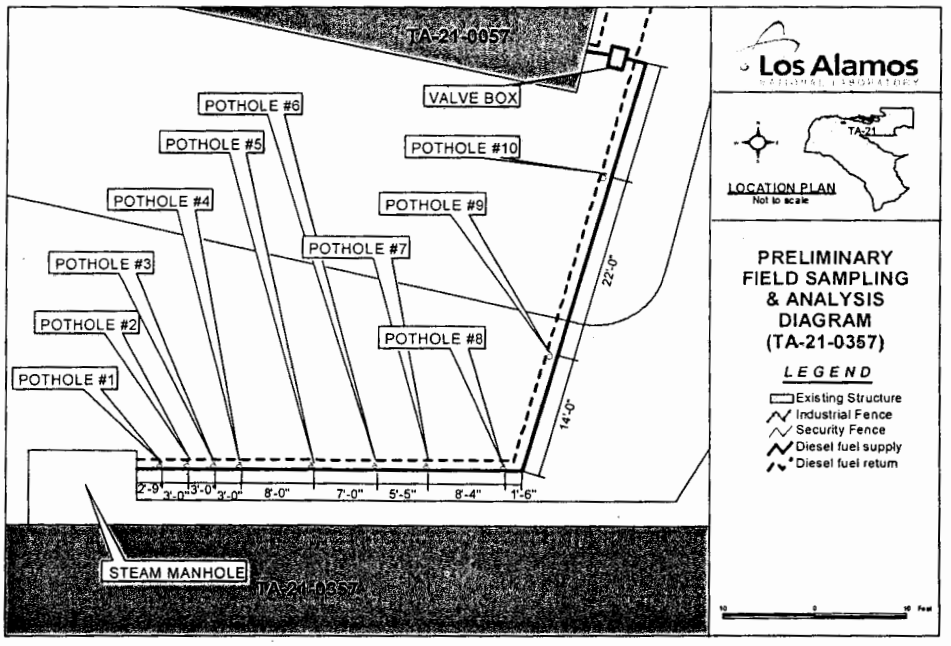


Figure 2. Sample Locations Taken from Potholes During Preliminary Sampling and Analysis

6.2 Trench Assessment

On February 23, 2002, a trench was dug to expose the pipeline from the tank to the Steam Plant. Sixteen soil samples were taken from different points along the trench (see Appendix 6, Figure 5b). In the valve pit area (S/R-9), samples from the trench showed minimal contamination of 1,100 mg/kg TPH-DRO. At approximately 10 ft. along the line from the valve pit (S/R-10), samples showed 29 mg/kg TPH-DRO. Maximum contamination of 26,000 mg/kg TPH-DRO was found about halfway between the elbow and the manhole (S/R-5). This high value sample was obtained from an area of visible contamination approximately 36 inches in diameter near a series of pinholes in the pipeline.

6.3 GeoProbe Assessment

On March 13, 2002, a GeoProbe unit was used to collect subsurface samples at the tuff/topsoil interface. The GeoProbe was advanced until rejection was reached, at which point a sample was collected. The samples were retrieved, packaged, and shipped to an independent laboratory (General Engineering Laboratories) for analysis. Photo-ionization-detection field analyses were used to establish contamination levels of the volatile diesel organics. These data helped provide immediate indications of contamination and were used to guide the depth of coring. This sampling scheme provided data that would encircle the tank and all associated piping, bounding the fuel-oil leak of concern. The 23 GeoProbe hole locations are illustrated in Figure 3 (see also Appendix 6, Figure 6). Primarily, contamination greater than 1,000 mg/kg diesel-range organics was found in the sample locations C, D, U, and V (see Table 1). Some contamination was found in sample location J, which is believed to be an historic spill unrelated to this assessment. Further characterization of sample location J is summarized in Appendix 5.

These sampling investigations led to the determination to bring in a hollow-stem auger drill rig. The drill rig would provide continuous core and allow systematic sampling to be done.

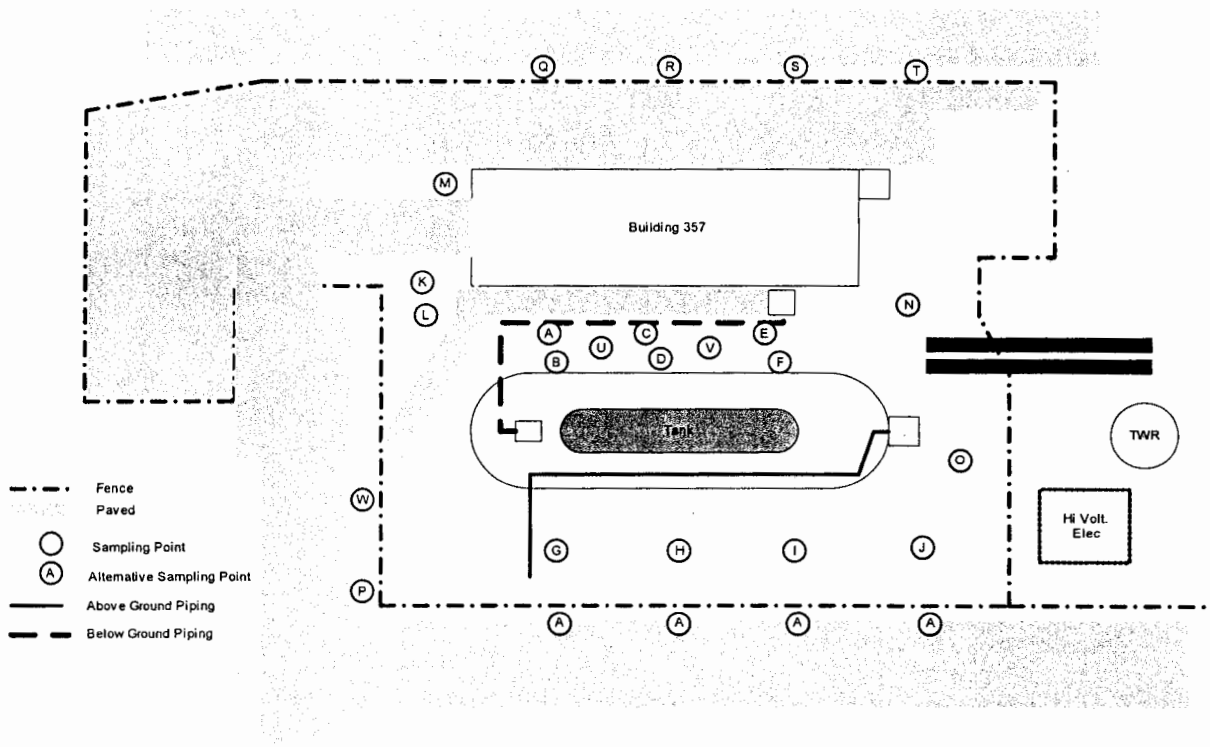


Figure 3. GeoProbe Sample and Analyses Locations and Layout

Table 1. Analytical Data from GeoProbing Assessment

Sample Point	Sample Depth Range (feet)	General Engineering Laboratories Analytical Data (TPH Diesel-Range Organics [mg/kg])
A	2 to 4	1.690
B	4 to 6	0.906
C	2 to 4.3	1,170.000
D	6 to 8	8,140.000
	8 to 12	1,260.000
	14 to 16	15,400.000
E	2 to 6.2	2.070
F	0 to 2.2	23.300
G	4 to 6	1.750
H	0 to 2	0.881
I	2 to 4	0.637
J	0 to 2	196.000
	2 to 5	1,080.000
K	0 to 3	36.800
L	2 to 4	0.763
M	2 to 4	2.920
N	2 to 4	1.310
O	0 to 2	1.340
P	2 to 4	2.080
Q	0 to 2	13.600
R	2 to 4	38.200
S	2 to 4	4.060
T	2 to 4	4.450
U	2 to 4	9.840
	4 to 6	15,500.000
	6 to 8	30,900.000
	8 to 10	51,500.000
	10 to 12	45,000.000
V	0 to 4	595.000
W	2 to 4	9.670

6.4 Vertical and Angled Core Drilling Assessment

On March 29, 2002, drilling at the TA-21-357 site began with a Central Mine Equipment 75 hollow-stem auger unit. During a three-week interval, ten continuous-core boreholes were completed. The core was obtained by two different methods, depending on the degree of welding of the tuffs and the depth involved.

The first method of sample collection for shallow rocks was by 4-inch hollow-tube split spoons driven by gravity. For samples over 110 ft. in depth, which coincided with the densely welded portion of Unit 2, samples were collected by 2-inch hollow-tube split spoons driven by hammer. Borings were advanced through the area identified with the highest levels of contamination from the GeoProbe sampling and analyses results. Borings were advanced through the contaminated area, the first near the trench, and additional core sampling was stepped out toward the tank and parallel to the Steam Plant building (TA-21-357) in intervals that were based on previous boreholes (10–20 ft.). Coring commenced in a sequence (see Figure 4 and Appendix 6, Figure 2) to assess the horizontal and vertical extent of the contamination. Samples were taken at depth intervals of 5–15 ft., depending on the contamination encountered, using photo-ionization-detector field-screening methods. The vertical holes provided data on the depth and horizontal extent of contamination in the most contaminated area between the AST and the Steam Plant.

A total of eight vertical holes were bored (V1 through V8). Boreholes V1 through V7 were located on the north side of Building TA-21-357. Borehole V8 was drilled on the south side of the building. The depths of these drill holes are shown in Table 2. Two angled boreholes (A1 and A2) were drilled on the north side of the building. The intent of these boreholes was to penetrate the tuffs beneath the building and intercept the diesel plume. Borehole A1 was drilled to the south at 35 degrees from vertical and reached a drill length of 40 ft. Borehole A2 was also drilled to the south, but with an angle of 25 degrees from vertical, and was drilled to a length of 95 ft.

Table 2. Pertinent Information on Hollow-Stem Auger Boreholes

	Hole Number									
Contact Feet Below Ground Level	**V1**	**V2**	**V3**	**V4**	**V5**	**V6**	**V7**	**V8**	**A1**	**A2**
Soil/Unit 3	3	5	3.4	5	4.5	4.5	4.5	3	?	4
Unit 3/Unit 2	65	65	61(?)	65	65	63	63	65		67
Unit 2/Unit 1	165(?)									
Termination Depth	175	110	105	105	125	105	105	105	33	86

? = Contact identification imprecise due to core loss in relevant interval

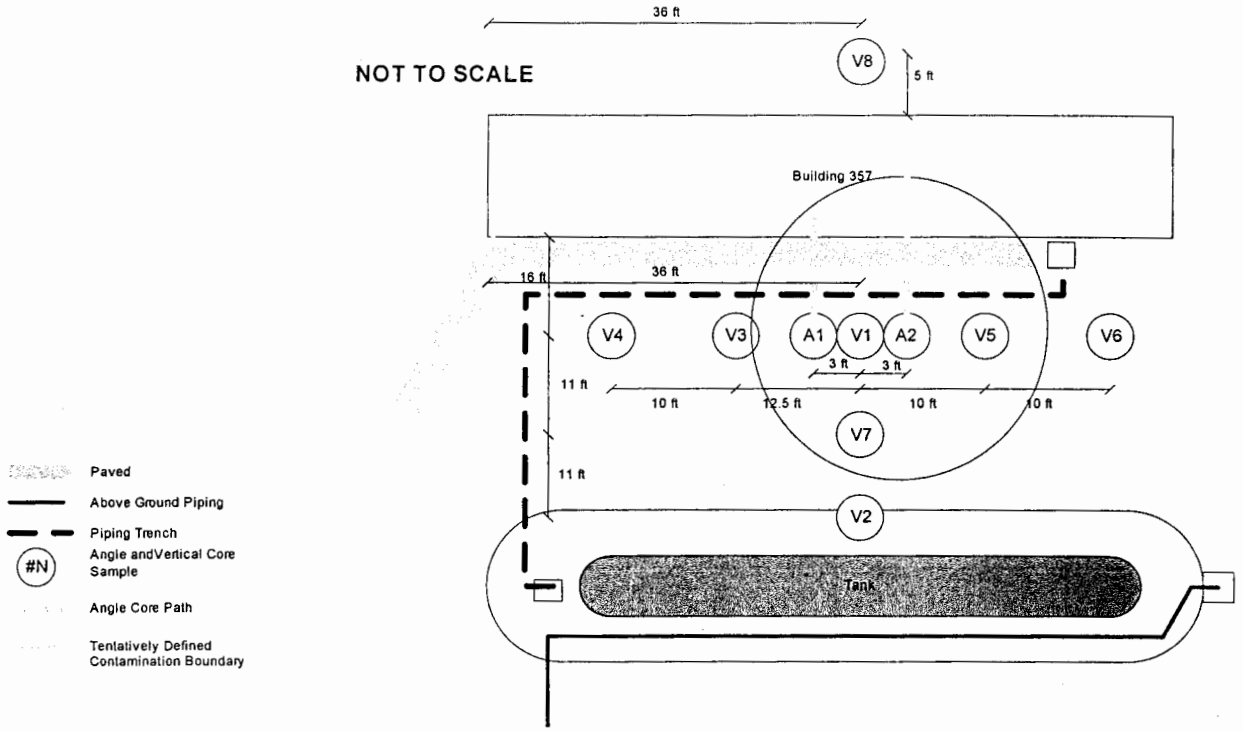


Figure 4. Vertical and Angled Borehole Core Sampling and Analyses Locations

6.5 Groundwater Assessment

As part of the preliminary assessment for this site characterization, RRES-WQH conducted sampling and analyses in the nearest groundwater wells. On May 18, 2002, LANL sampled water-supply wells PM-1, PM-3, O-1, and O-4 for DRO analysis by General Engineering Laboratories. Copies of the analytical reports can be accessed in the RRES-WQH Water Quality Data Base. All DRO results are summarized in Appendix 3. All results were nondetect for DRO compounds, with the exception of a single result from O-1 of 0.076 mg/L (MDL=0.05 mg/L). Three samples collected from O-1 in February, March, and April were all nondetect for DRO. A DRO confirmation sample was collected from O-1 on July 16, 2002. Monthly sampling will continue at these four water-supply wells for DRO compounds.

6.6 Air Quality Assessment

Personal and area air sampling for total hydrocarbons has been conducted continuously on a weekly basis at the TA-21 Steam Plant since May 21, 2002. Sampling has consisted of employees wearing a passive organic vapor badge in their breathing zone throughout their entire work shift. In addition, one badge was placed on a tree branch several hundred yards away from the Steam Plant during the same work shift. This served as an area/background sample. All samples were analyzed for total hydrocarbons (as hexane), by NATLSCO Laboratory. Hexane is used as a reference because it has chemical properties that are very similar to many other hydrocarbons such as benzene, ehthylbenzen, toluene, and xylene. High hexane levels would indicate that sampling for individual hydrocarbons might be necessary. On the other hand, low levels of hexane (below 10 ppm) would indicate that hydrocarbon concentrations are not a health issue.

All personal samples thus far have been well below 1 ppm (see Appendix 3). Furthermore, area samples located several hundred yards away from the TA-21 Steam Plant have resulted in similar concentrations, suggesting that workers have only been exposed to hydrocarbon concentrations that occur naturally. Detection limits resulting from sample analyses have ranged from 0.054–0.099 ppm.

6.7 Analytical Results

All analytical results for TPH-DRO are compiled in Appendix 4. The data received Level-4 verification and can be accessed through LANL's RRES-WQH information management systems (the RRES-WQH Water Quality Database). TPH-DRO analyses were requested for both the GeoProbe samples and the hollow-stem auger core samples.

Most of the GeoProbe results were lower than 50 mg/kg; however, five of the GeoProbe locations had significantly higher readings. GeoProbe locations C, D, U, and V (see Figure 3) contained high TPH readings. All four of those locations were in the vicinity of the pinhole leaks in the pipeline. GeoProbe hole U had the highest sample value of the four, at 51,500 mg/kg, while probe hole V had the lowest sample value of the four, at 595 mg/kg. Some contamination (approximately 1,080 mg/kg) was also found in sample location J. Further characterization was conducted for sample location J, and is summarized in Appendix 5.

At no point during the characterization did soils/rock cuttings showed visible evidence of contaminant saturated soil as described in the NMED regulations (20 NMAC 5 and 20.5 NMAC Petroleum Storage Tank Regulations). Analytical results of the vertical boreholes were used to establish the extent of the plume. Vertical Boreholes V3 and V7 (see Figure 4) never registered TPH values above 80 mg/kg, and vertical Boreholes V2, V4, V6, and Borehole V8 did not contain TPH values above 100 mg/kg. Of the eight vertical holes, only V1 and V5 had high TPH values. The highest recorded analytical results in those boreholes are 141,000 mg/kg at 85 ft. (Borehole V1) and 25,200 mg/kg at 45 ft. (Borehole V5). The

angled boreholes (A1 and A2) had highest recorded TPH values at 30 ft. (25,000 mg/kg) and 25 ft. (27,300 mg/kg), respectively. These results indicate that there is some small fraction of fugitive diesel located under the northern portion of Building TA-21-357. Based on the borehole concentration data, plume volume estimates suggest that the entire tank volume of 48,357 gallons may have drained into the subsurface at this site (Stauffer 2002).

Other analytes that were sampled in the assessment (as a subset of the TPH analyses) included TCLP metals, PAHs, VOCs, and semivolatile organic compounds. Maximum hazardous constituents levels detected during sampling activities are presented in Table 3. Boreholes V1 and A2 showed some constituents above the Universal Treatment Standards. In particular, Naphthalene was detected in Borehole V1 (24.2 mg/kg at 8 ft. deep) and in Borehole A2 (25.4 mg/kg at 10 ft. deep), as well as Fluorene in A2 (8.450 mg/kg at 20 ft. deep). There was also detection of Phenanthrene (13.2 mg/kg) and Acenaphthene (5.85 mg/kg) in Borehole A2 at 10 ft. These hazardous constituents are only slightly over the Universal Treatment Standards regulatory standards. For landfill disposal purposes, the above constituents are below regulatory concern.

Table 3. Maximum Hazardous Constituents Concentrations Detected During Characterization Activities

Contaminant of Concern	Universal Treatment Standards (mg/kg)	Maximum Site Concentration Detected (mg/kg)
Benzene	10	0.311
Ethyl benzene	10	7.570
Naphthalene	5.6	25.400
Toluene	10	5.670
Xylene	30	24.500
Acenaphthene	3.4	5.850
Acenaphthylene	3.4	ND
Anthracene	3.4	1.920
Benzo(a)anthracene	3.4	ND
Benzo(a)pyrene	3.4	ND
Benzo(b)fluoranthene	6.8	ND
Benzo(ghi)perylene	1.8	ND
Benzo(k)fluoranthene	6.8	ND
Chrysene	3.4	ND
Dibenzo(a,h)anthracene	8.2	ND
Fluoranthene	3.4	ND
Fluorene	3.4	8.450
Indeno(1,2,3-cd)pyrene	3.4	ND
Phenanthrene	5.6	13.200
Pyrene	8.2	1.400

7.0 RADIATION REPORTS

Because of the proximity to material disposal areas at TA-21 (approximately 400 yards to MDA-A), it was decided to have radiation surveys performed on the borehole spoils. Surveys were conducted from March 11 through March 20, 2002, and again on April 2 and 3, 2002. Direct surveys were taken for alpha, beta, and gamma radiation using Ludlum model #139 and Health Safety and Radiation Protection (HSR-1) instruments. In addition, some of the cuttings were submitted to the HSR-1 laboratory for further analysis. According to HSR-1, all readings were at background levels and required no further action.

7.1 Analytical Reports

The analytical information provided by HSR-1 is presented in Appendix 3 as part of the radiation survey documentation. The documentation includes emails and radiation survey reports. All surveys and analyses indicated no radiation above natural background levels.

8.0 DISCUSSION

The combination of geology, analytical results for TPH-DRO at the TA-21 Steam Plant, and the plume volume estimate provide interesting points for discussion. Items that will be covered in this discussion are as follows: the relationship between diesel flow and saturation in tuffs; the role that fractures play in directing diesel transport; the role of capillary barriers in the Bandelier Tuff; and predictions on the final volume of rock necessary to contain the plume.

8.1 Saturation with Respect to Diesel Flow

To understand what the measured diesel concentrations mean with respect to transport, we must examine the interaction between diesel saturation and flow. In a water-wet porous medium, diesel flows over more tightly bound residual water (2 percent saturation or less) through larger pores (Testa 1994; Blunt et al. 1995). The mean saturated diesel conductivity for Unit 3 is on the order of 500 ft./yr (using an estimated diesel viscosity and density) (Rogers and Gallaher 1995). Because the rock is not fully saturated with diesel, the in-situ conductivity is unknown, but generally drops to between 10–20 percent of the saturated value at 50 percent diesel saturation (Testa 1994). As the residual saturation is approached, conductivity approaches zero and the remaining diesel is trapped as unconnected clumps. Flow of diesel in the subsurface occurs until the residual saturation is achieved (Fetter 1999). Residual diesel saturation for these rocks is not known; however, typical values from the literature suggest a value of between 1 percent to 20 percent (Fetter 1999; Cohen and Mercer 1993). Assuming a grain density of 2.65 g/cm^3 and a diesel density of 0.85 g/cm^3, the saturation of diesel at 85 ft. BGL (141,000 mg/kg) is approximately 44 percent. In the densely welded portion of Unit 2, the maximum saturation is predicted to be approximately 40 percent at 105 ft. BGL (44,500 mg/kg). Because the estimated saturation is above 20 percent from 85 ft. to 105 ft. BGL, it is likely that the diesel in this region is currently moving under the influence of capillary forces and gravity (Stauffer 2002). Concentrations of TPH below 145 ft BGL rapidly tail off from 22,000 mg/kg to 1.7 mg/kg over the last 35 ft. of Borehole V1. Thus, the leading edge of the plume has migrated to approximately 145 ft. BGL. Some portion of the plume has been drawn laterally from the main spill in the direction of Borehole V5, while the bulk of the plume lies in the 85-ft. to 105-ft. depth range, centered within a few feet of Borehole V1.

8.2 Role of Fractures

Fractures in Unit 3 can act as conduits through which diesel can move, and this transport pathway has been shown to be active at another potential release site (PRS-21-029), located just west of the current site (LANL 2001). The fractures allow lateral spreading, providing sub-vertical pathways away from the main plume. One fracture of considerable interest was observed in Borehole V5. The fracture had a dip of 45 degrees and was located from 25 ft. 6 inches to 25 ft. 8 inches. The fracture was heavily discolored, as was the ash-flow material below the fracture. Samples taken above the fracture indicated negligible diesel contamination. Directly below the fracture at a depth of 35 ft. BGL, the sample taken for diesel was highly contaminated (12,900 mg/kg). This geometry of contamination suggests that the fracture dipped to the west, and that the material below the fracture was contaminated from the leak point to the east. This particular fracture is acting as a barrier for migration across the fracture. However, the increased diesel seen below the fracture is most likely creating a flow path that follows the lower fracture face. Such flow along the planes of fractures in this setting would spread the diesel laterally from the source region. Although not detected in the drilling, a near-vertical fracture or fractures may have helped to control the depth to which Borehole V1 was contaminated. Appendix 6, Figure 7 shows that the plume of contamination is skewed to the west from Borehole V1 and does not extend to Borehole V3, which is just 15 ft. east of Borehole V1. If a deep, continuous fracture striking north-south exists just east of Borehole V1, it may extend the depth of diesel transport in Borehole V1 and inhibit diesel transport to Boreholes V3 and V4 east of the fracture. Such a fracture could be discerned by extending an angled east-west borehole to intercept the proposed fracture. Fortunately, fractures in Unit 2 rarely continue more than a few feet into Unit 1 (Broxton and Reneau 1995), leading to the conclusion that fracture flow should be limited to the upper 150 ft. of the unsaturated zone at this site.

8.3 Capillary Barriers within the Bandelier Tuff

Another interesting aspect of the PRS 21-029 study is that the subsurface diesel was laterally diverted at a clay-rich contact within Unit 3 (LANL 2001). This diversion can be explained by a change in material properties that results in a capillary discontinuity. Such a discontinuity would necessitate a large pressure (head) to force the diesel into the underlying unit. With small increases in pressure due to slow downward flow, the tendency of the diesel is to move laterally at such a capillary boundary. Because the data of this study show virtually no diesel below 155 ft., the capillary gradient between the welded base of Unit 2 and the underlying nonwelded Unit 1 may be causing such a diversion between 155–165 ft. at this site.

The presence of a capillary barrier at 155–165 ft. is of great importance for estimating both the current plume shape and the future behavior of the diesel plume. First, the expected depth of migration is more well constrained if such a barrier exists. Second, the presence of such a barrier would require Boreholes V2 through V5 to be extended to determine if lateral transport has created lateral flow at this depth. The absence of diesel ponding at the estimated Unit 3/Unit 2 contact suggests that this horizon is not marked by a capillary barrier.

8.4 Final Plume Configuration

Transport of diesel in the Bandelier Tuff at this site is controlled by four physical factors. These are: 1) gravity, 2) capillary barriers, 3) residual saturation, and 4) fractures in the ash-flows. Originally, we believe that gravity was the major transport mechanism. Effectively, gravity moved the diesel down to the capillary barrier at the Unit 2 / Unit 1 contact (165 ft. BGL). The barrier, most probably created by the pore size differential at the contact, allowed upper portions of the tuff (interval 85 to 105 ft. BGL) to exceed the residual saturation of the rocks and allow the diesel to spread laterally. The lateral spread of the diesel has been constrained by fractures in some areas of the site. Evidence for this is seen in

borehole V5 at 25 ft BGL (as described in Section 8.3), and the absence of the contamination plume in borehole V3, wherein a so far undetected near vertical fracture is proposed.

A useful calculation concerns the point in time when residual diesel saturation is achieved everywhere, and the plume stops moving by either gravitational or capillary forces. If we take the total plume estimate of 50,000 gallons, an average Bandelier Tuff porosity of 50 percent, and an optimistic residual diesel saturation of 20 percent, the volume of rock necessary to contain the plume is calculated to be on the order of 2,000 m^3 (70,000 $ft.^3$). The optimistic estimate corresponds to a block of tuff that is 145 ft deep by 22 ft x 22 ft at the surface. This calculation scales directly by the residual saturation.

Of particular significance for the vertical transport of diesel below TA-21 are the Cerro Toledo, Tsankawi, and Otowi units. These are poorly fractured, highly porous rocks with capillary properties that would tend to laterally divert a non-wetting fluid such as diesel fuel (Broxton and Eller 1995; Rogers and Gallaher 1995; Blunt et al. 1995).

9.0 CONCLUSIONS

From February to April of 2002, an assessment was conducted regarding a potential fuel-oil leak into the soil and environment surrounding the underground fuel-oil pipelines from the TA-21-57 AST. The assessment was performed in a stepwise fashion, starting with ten potholes and PetroFlag spot analyses, followed by excavation of the pipelines and sampling within the excavated trenches. After this initial analysis, a decision was made to perform 23 GeoProbe samples, followed by eight vertical and two angled continuous-core, hollow-stem auger boreholes. Soil removal and sampling were performed in accordance with LANL, DOE, NMED, and EPA requirements to determine the presence and extent of the leak. Borehole concentration data and plume volume estimates suggest that the entire tank volume of 48,357 gallons may have been released into the subsurface at this site (Stauffer 2002). Diesel saturation estimates imply that at least some portion of the plume may continue to migrate under the combined forces of gravity and capillary suction. Other than the diesel contamination in the soil, additional air and water sampling indicate that there are no other hazardous conditions related to this diesel release.

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APPENDIX 1

Timeline

FUEL LOSS AT TA-21

Background Information

In July 1945, an approximately 48,000-gallon above ground fuel oil tank was installed at theTA-21 steam plant. This tank has been taken out of service and a smaller capacity replacement tank is planned for the west side of the Steam Plant. The normal fuel source is natural gas. The tank was filled through an above ground line. The fuel oil supply line and return line to the TA-21 boilers were buried between the tank and the steam plant (a distance of about 80 ft.). The tank supply line has a 3-inch standpipe inside the tank with a 9-inch strainer. The return line penetrates the tank at the top. The tank contains #2 fuel oil (diesel fuel). The fuel oil in the TA-21-57 Tank was previously mixed with fuel oil transferred from the TA-16 Steam Plan during the Dome Fire in 1996. In 1986 a new steam plant was built and the tank was tied in to the newly installed fuel oil lines to the new plant by cutting the lines to the old plant just east of the tank. The lines to the old tank were capped at the point where the lines were cut in. Approximately 7 people are required to operate and maintain the plant, covering 3 eight-hour shifts seven days a week. During the Swing shift and Graveyard shift, the plant is manned with a single operator.

TIMELINE

Note: Unless otherwise indicated, the entries below are believed to be factual. Where there are contradicting or uncertain facts, a qualitative assessment of the validity is given.

1945 July – 50,000-gallon capacity tank installed

1980s Sometime during the late-eighties Robert Patton became foreman of steam plant.

1986 Tank was tied into new plant. Lines to the old plant (below ground) were cut and capped. Steam plant is operated primarily on natural gas, with only occasional use of fuel oil for short periods (~15mins). Fuel used in 15 minutes is ~10 gallons.

1989 Containment (basin) liner designed and installed around the TA-21-57 Tank.

1989 A small leak in the pipe occurred in the north-south section of the underground fuel oil piping about 15 feet south of the elbow north elbow. The leak was noticed when fuel oil was observed surfacing at that location. (Leak confirmed by Kevin Graham of the Johnson Controls Northern New Mexico [JCNNM] Utility Department) The north-south section of the piping was replaced. The new piping was installed with welded joints and was wrapped. The piping removed was the piping installed in 1986. It had screwed fittings, which are called for in the specifications. However, the specifications stated that it was to be wrapped, which it was not. The east–west section was not replaced. Leak in the line was due to several small holes in one area. There was corrosion along the pipe. Kevin did state that he commented to his fellow pipefitter that the entire line should be replaced because of the corrosion on the portion replaced and that the line had screwed fittings.

1991 A fuel oil leak occurred on the south side of the TA-3-22 Power Plant. This prompted Occurrence Report ALO-LA-LANL-PHYSTECH-1991-1007. Of the five corrective actions listed, the first four were completed. The fifth required that that annual leak testing be conducted in accordance with NMED UST Regulations.

1991 On 12/3/91 work order WS00381 was written to install a temporary fuel oil line at TA-3-22 Power Plant until a permanent line could be designed and installed.

1992 October – A design was completed on October 26, 1992 to allow pressure testing of the TA21 Steam Plant underground fuel oil lines. Plans were drawn up for modifications to test/monitor the tank, but did not proceed to construction.

10/26/92 – Underground fuel oil line leak testing design completed by JCWS Engineering for TA-16 and TA-21 Steam Plants.

On 8/20/1992, the design to replace the fuel oil at TA-3-22 was completed. PI#12702. Shortly after design it went to construction.

1993 Occurrence Report ALO-LA-LANL-PHYSTECH-1991-1007 Corrective Action #5 was closed out as completed on 8/31/1993. This action was not implemented but was shown as completed on the date fore mentioned.

1995 A project was proposed by JCWS to move the underground piping above ground to facilitate leakage detection. Because of funding concerns and the expected decommissioning of TA-21, the project was not completed. The design was performed in 1996 and with PI#16333. It was decided not to go to construction with this design.

1996 In May of 1996, approximately 7,080 gallons of fuel oil transferred from S-site to TA-21 during the Dome Forest Fire.

1997 Because of the presence of a continuing sheen of oil, the valve pit area on the east end of the tank was reworked to remove strainers and two valves. Two valves remained. The pit was cleaned, filled with sand, and capped with concrete.

1998 Boilers were operated on fuel oil for approximately 24 hours to repair a natural gas line leak, using approximately 750 gallons of fuel oil.

August – Shifted from natural gas to oil for about 15 minutes for training/testing

1998 Bobby Montano initiated the work to remove the four valves and strainers in the pit just east of the fuel oil TA-21-57. In their place, two new valves were installed in the pit. The pit was cleaned of oil, filled with sand and capped with concrete. Prior to this work, Robert Patton stated that valves buried and located outside the pit were usually kept closed when not burning fuel oil. When these valves became hard to operate they were kept open. At that time, the west valves in the pit, one on the oil supply and the one on the oil return lines were closed when not burning oil. When these valves were replaced with the new valves in 1998, Robert Patton stated that these were then kept closed when not burning oil. Apparently, when Robert Bustos took over, these valves were opened at sometime, and left open.

1999 In November, Robert Bustos replaced Robert Patton as foreman.. Bustos instructed the operators to check the fuel level once a month. It should be noted that, when asked, essentially all craftsman at the TA-21 Stream Plant understood the requirement of the Spill Prevention, Containment and Control Plan (SPCC) to take monthly readings on the tank. A copy of the SPCC was available at the plant. No evidence from craftsmen who took the readings indicates these measurements were taken up to the time of the Cerro Grande Fire. Thereafter, with the exception of one reading in November 2000 (discussed below), no craftsmen took tank readings. When questioned, Bustos said he stopped taking readings because R. Montano had told him it was unsafe to go up on top of the tank to take tank levels. What Montano said was not to go up when it was icy, fully expecting that the readings would be taken when it wasn't

icy. Bustos made no apparent effort to clarify the direction from Montano or to put in place compensatory measures.

During the time Bustos was the foreman (~November 1999-February 2002), the tank was reported to R. Mantano as full.

2000 May 10th – Due to Cerro Grande forest fire, TA-21 steam plant was shut down and evacuated.

May 12th – Sounding performed by R. Montano, who verified a level of 48,357 gallons (128 inches) in tank

May 22nd – Steam plant was restarted, but no reading was taken at this time.

Since the Cerro Grande fire, there have been three periods of boiler operation using the diesel fuel in the tank, for a total of approximately 45 minutes (estimated use of less than 100 gallons of fuel).

November (date uncertain) David Lovato and Linda Sena (steam plant operators) reported they performed a sounding (with R. Bustos present and providing instruction) and are reasonably certain that the level in the tank was approximately 33 to 37 inches, which would indicate a level of 8,800 to 9,300 gallons. They tried to use the new stick to measure but it was difficult to read, so used an old stick instead. They gave the information to Robert Bustos who said he would call it in to Robert Montano. When questioned, Bustos stated there was a level taken about this time but said the tank was full. Robert Bustos reported the tank full to Robert Montano.

2000-2002 Montano states that each month, the metering section would call him for fuel oil status at TA21 Steam Plant. Robert Montano would then call Robert Bustos for the fuel oil status. Robert Montano never got any reported reading other than full. He used those reports as the basis for reporting the tank full to the metering section each month. Other than the January 2000 and November 2001 readings, there was no documentation for tank levels in inches or temperature.

2001 November 14, 2001 there is an entry in the fuel records (logbook) kept by Robert Montano indicating that R. Bustos called to report 48,357 gallons in the fuel tank.

2002 January 15th – TA-21 Steam Plant notified Health and Environmental (HENV) that they would need someone to perform opacity readings for the next day when operating on fuel oil for testing.

January 16th – Tried to start up using fuel oil. Attempt failed due to no fuel available at boiler. Initiated work order to investigate the reason for no fuel flow. Dave Plant (HENV) was on site to perform opacity checks on the stacks, operations unable to light boiler on fuel. Work request submitted to check strainers and filters, they could be dirty or plugged.

January 30th – Work Ticket 72123-28 was in planning stage by scheduler.

February 4th – Work Ticket was approved for work.

February 8th – Work Ticket was issued for craft to begin work.

February 12th thru 14th – Maintenance performed on tank to determine cause of fuel not pumping: Changed filters, tried to determine if fuel was gelled, blew air in tank to see if there was actually any fuel in the tank, but heard only air.

February 13th – Started working on pumps, strainers, completed work on strainers and filters.

February 14th – Still unable to get fuel to the boilers. In the afternoon, three fitters broke the lines in the plant at the pumps to enable them to push air back into the tank (suspect possible gelling of oil).

February 15th – Resumed putting air back into tank. Steam Plant foreman and the fitter went on top of tank to see if they could hear bubbles in the fuel tank. They reported that they heard air, and Robert Montano asked them to perform the test again, since they should hear bubbling – not just air. The second test had the same result. R. Montano instructed workers to sound the tank, with the result being only 3 inches of oil in tank. Work was stopped, and R. Montano reported to Gary Blauert and Paul Parker that there was no oil in the tank. Paul Parker notified Armond Standley. Per the JCNNM Spill Response Procedure, Stanley called EMR (George Vantiem) to notify them of discrepancy in inventory only – not to notify them of a spill. R. Montano submitted a change of scope work ticket (#72123-28) to test the fuel lines further. Blew lines with air – no pressure held. Had UGAS test soil for hydrocarbons.

February 19th – Air test conducted on underline line (supply line). A small leak was detected. An emergency excavation permit for probing was obtained. Probing was done and nothing was found. Excavation of fuel oil line pit permit submitted (02X0105) to inspect and identify and leaks in the lines.

February 20th – Excavation permit 02X0106 to check fuel oil lines and potential soil contamination submitted.

February 21st – Excavation permit 02X0108 submitted for hydrocarbon leak testing

February 21st – ESH-18 notified New Mexico Environment Department, U.S. EPA, and the National Response Center.

February 21st – Started potholing to a depth of 3½ ft. A sheen of fuel oil on water in the hole and an odor of diesel fuel was detected at pothole #5. Dropped back to pothole # 6 and #7, and continued, but found nothing else.

February 22nd – Additional testing done at pothole #8. Dug out to expose and pressurize the supply line. It did not hold pressure. Dug out entire line from manhole to manhole to prepare for trenching.

February 23rd – Started trenching. Potholing completed and excavation of fuel oil lines begins.

February 25th – Retested the return line. Very little oil detected. Isolated the line. Generated work tickets for HENV and outside contractor.

February 26th – Roll-off dumpsters delivered to plant to hold excavated soil.

February 27th – Removed pipe from inside trench onto the berm.

February 28th – Capped oil lines at the valve pit adjacent to the fuel oil tank.

March 1st – Per FWO-UI, JCNNM Construction Department to take over the work at TA-21. Potholing samples sent to ASSAIGAI in Albuquerque for analysis.

March 4th – Locating information obtained by GPS to get sample locations for mapping. Potholes were dug at several points near building 357.

GPR took readings on the floor inside the building in preparation of drilling to search for leaks under the building.

March 7th – Core drilled floor in the plant, (plant outage).

March 13th – Geoprobe unit on site utilizing a small rig and performing core drills.

March 14th – Mesa Oil on site and pumped the remaining oil from the tank approximately 254 gallons.

March 18th – Geoprobe on site to continue with drilling utilizing big rig.

March 19th – AA-4 (Nannett Mayfield) scheduled a meeting and met with steam plant operators, David and Linda. Started drilling first hole, went to depth of 130 ft, and stopped for the day.

March 21st – First hole drilled to depth of 170' showed traces of contamination, drill rig located to hole # 3 (north of first hole).

Summary of reporting and initial efforts to determine if a spill occurred

On February 21, 2002, at approximately 1500 hours, Water Quality and Hydrology (ESH-18) notified the New Mexico Environment Department, the EPA, and the National Response Center of an ongoing investigation of an unexplained discrepancy in the volume of diesel fuel in a diesel storage tank at TA-21-57. Approximately 48K gallons of diesel fuel was reported as unaccounted for. JCNNM, ESH-18 and ESH-DO have conducted field investigations to search for leakage. Total excavation of the underground lines and subsequent sampling shows minimal evidence of fuel oil contamination along the pipeline trench. There is no visual evidence of discharge to Los Alamos Canyon and DP Canyon watercourses. However, pressure tests on the tank's supply and return demonstrated that the lines failed to hold static pressure (80 psig test). It is possible that the leaks found in the supply line were caused by the pressure tests, since the normal operating pressure is less than 15 psig and the piping was heavily corroded. Evidence of a leak was found in the fuel oil return line just east of the manhole on the north side of the steam plant. A sampling plan has been developed to determine the presence and extent, or absence, of contamination. The plan is in the process of approval and will be implemented by JCNNM and FWO-(UI)

Summary of tank levels and associated information

May 12, 2000 –Tank reading taken by R. Montano indicated ~48K gallons

August 2000 – January 2002: Monthly readings of "tank full" reported by R. Bustos to R. Montano. This information was used by Montano to report fuel on hand at TA-21 Steam Plant to the metering section. Montano would be asked each month by the metering section the fuel oil status at TA-21. He would then

call Robert Bustos for the information. With two exceptions, Montano did not record these readings anywhere except on the monthly report to FWO (UI).

June 2000 – January 2002: With the exception of the November 2000 entry below, no one actually measured the tank.

November 2000 – Tank level measured during training conducted by R. Bustos. The operator taking the reading remembers a level of ~9K gallons. Bustos states the tank was full when this reading was taken.

January 16, 2002 – An attempt to run a TA-21 boiler on fuel oil (vice natural gas) failed. Since subsequent measurements indicate the tank was essentially empty, this is the first date we can say with certainty the tank was empty (~3 inches of fuel remaining).

APPENDIX 2

Sampling and Analysis Plan

TABLE OF CONTENTS

Section — Page

ACRONYMS A2-2

1.0 PROJECT DESCRIPTION A2-3
- 1.1 Scope of Work A2-4
- 1.2 Project Organization and Responsibilities A2-5
- 1.3 Key Individuals A2-5
- 1.4 Site Characteristics A2-6
  - 1.4.1 Initial Site Analysis and Investigation A2-6

2.0 WORK PLAN A2-7
- 2.1 Field Mobilization A2-7
- 2.2 Excavation and Visual Inspection A2-8
- 2.3 Confirmation Sampling A2-8
- 2.4 Sample Analysis A2-8
- 2.5 Site Restoration A2-8
- 2.6 Report on Sample Results A2-8
- 2.7 Material Management A2-9

3.0 QUALITY CONTROL AND SAMPLING PROCEDURES A2-9
- 3.1 Soil Sampling Procedures A2-9
  - 3.1.1 Field Test Kit Screening A2-9
  - 3.1.2 Confirmatory Analytical Samples A2-10
  - 3.1.3 Quality Assurance/Quality Control A2-10
- 3.2 Decontamination A2-10
- 3.3 Sample Handling Protocol A2-10
  - 3.3.1 Custody and Shipping A2-11
  - 3.3.2 Sample Preservation A2-11
  - 3.3.3 Custody Seals A2-11
- 3.4 Field Logbook A2-11

AMENDMENT 1 ..... A2-12

AMENDMENT 2 ..... A2-15

AMENDMENT 3 ..... A2-18

AMENDMENT 4 ..... A2-21

ACRONYMS

AST	Aboveground storage tank
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
HENV	Health and Environmental
JCNNM	Johnson Controls Northern New Mexico
LANL	Los Alamos National Laboratory
NMED	New Mexico Environment Department
PAH	polynuclear aromatic hydrocarbons
SAP	Sampline and Analysis Plan
TA	Technical Area
TCLP	toxicity characteristic leaching procedure
TPH	Total Petroleum Hydrocarbons

1.0 PROJECT DESCRIPTION

Benchmark Environmental/Johnson Controls Northern New Mexico (JCNNM)-Health and Environmental (HENV) has prepared this site Sampling and Analysis Plan (SAP) to describe sampling contaminated material handling activities associated with soil contamination from leaking underground fuel oil lines connecting the above ground storage tank (AST) (Technical Area [TA-21-57]) with the TA-21-357 Steam Plant at the Los Alamos National Laboratory (Figure 1). Up to 48,357 gallons of No. 2 Fuel Oil from the AST is unaccounted for. An assessment into the potential for fuel oil leaking into the surrounding soil and environment is being conducted. Soil removal and sampling is continuously being performed in accordance with Los Alamos National Laboratory (LANL), U.S. Department of Energy (DOE), New Mexico Environment Department (NMED) and U.S. Environmental Protection Agency (EPA) requirements to determine the presence and extent of the leak from underground fuel oil supply and return lines from the AST. This SAP will be implemented in conjunction with a detailed Quality Control Plan.

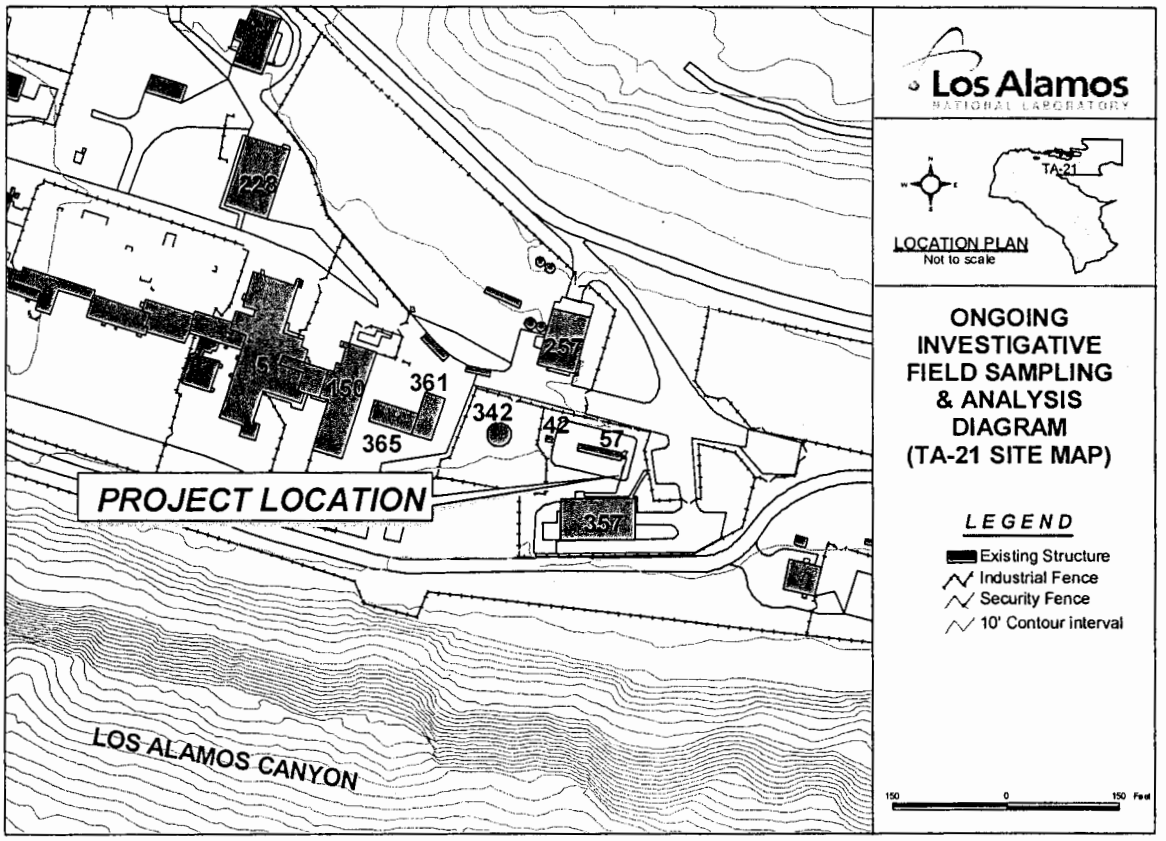

Figure 1. Site Location Map

The TA-21-57 No. 2 Fuel Oil AST is a 50,000 gallon, 1 section, nonbaffled tank which was installed in early 1945 to store No. 2 Fuel Oil to supply the Old Power Plant (TA-21-9). In 1987, the New Steam Plant was commissioned. No. 2 Fuel Oil reaches the Steam Plant boilers via an aboveground pumping

system located inside the building and through an underground supply line and return line from the AST. The underground fuel lines leading to the Old Steam Plant (TA-21-9) have been decommissioned and capped.

A field assessment to determine the horizontal and vertical extent of soil contamination started February 26, 2002 and is planned to be completed by Benchmark Environmental/JCNNM-HENV by the end of March 2002. An initial site contamination characterization was conducted to determine Total Petroleum Hydrocarbons (TPH), Target Analytes (Table 1), and toxicity characteristic leaching procedure (TCLP) Metals. The analytical results are pending analysis. This initial assessment is summarized in section 1.4.1 Initial Site Analysis and Characterization. Initially, soil was removed to expose all underground fuel oil lines and mechanical devices to visually inspect the soil and fuel lines. Sampling and analysis will be used to confirm any contaminated soil areas associated with the buried piping. If the extent of the contamination is larger than expected, further actions will be taken to determine the extent of the leak. This will be presented in an amended SAP. Contaminated soil removed during this investigation will be managed accordingly under 20NMAC9.1. Confirmation sampling will be conducted through field-testing for TPH using PetroFLAG and verification samples will be analyzed by a state certified laboratory for TPH, Target Analytes and TCLP Metals.

Table 1. Target Analyte to be analyzed

Target Analytes
Benzene
Toluene
Ethyl benzene
Xylene
Naphthalene
2-methyl naphthalene
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Chrysene
Dibenz(a,h) anthracene
Indeno(1,2,3-c,d) pyrene

If the extent of the contaminated soil goes beyond the parameters of this SAP, further actions will be taken to determine the extent of the contamination and path forward action. This Contingency Plan information to follow will be presented in an amended SAP. Additional environmental assessment may include extensive probing (i.e. Geo Probe) and boring or core drilling (i.e. Geo Test) into surrounding soil areas and geological matrices for sampling and analyses. Sampling and analyses may also be completed within building TA-21-357 to determine the extent of contamination under the building. Sampling and analysis locations will be contingent upon utility locations and obstructions in the building.

1.1 Scope of Work

The purpose of this SAP is to document the objectives, rationale and procedures for collecting, analyzing and managing environmental samples taken from this site. Sampling methods for the investigation of the diesel lines are in accordance with the objectives and procedures described in the *UST Soil/Water*

Sampling and Disposal Guidelines (NMED April 1995). This plan outlines the methods and procedures proposed to collect samples and gather data of sufficient quality and quantity to adequately verify the presence and extent of the release that may have occurred from the lines. It will provide information necessary to identify the quantity of contaminated soil to be removed. The project will receive appropriate LANL reviews and will be performed in accordance with approved site health, safety, and emergency response plans. The project will be performed in accordance with applicable DOE, LANL, and State of New Mexico requirements.

1.2 Project Organization and Responsibilities

This SAP is organized into 3 main sections: project description, a work plan and a Quality Control and Sampling Plan. The work activities for this SAP are organized into four main areas:

- Initial site analysis and investigation
- Excavation and visual inspection
- Confirmation sampling (field and analytical laboratory sampling and analysis)
- Material Management

LANL Facility Management (FMU-80) has over all responsibility for the project. Benchmark Environmental/JCNNM-HENV is responsible for planning and directing of site sampling, conducting field screening, arranging for shipping of samples and laboratory analysis of samples, and reporting on results. JCNNM construction is responsible for removal of the soil and any mobilization/site preparation tasks required for obtaining necessary clearances and site access. The contract laboratory, Assaigai Analytical Laboratory, under subcontract to JCNNM, will provide analytical services.

1.3 Key Individuals

Key project participants for this effort include the Project Manager, Site Manager, Health and Safety Officer, Sampling Personnel, Construction Supervisor. The proposed project assignments and responsibilities are provided as follows:

- Facility Manager (FWO-UI) – Responsible for operations and management of the Facility.

- LANL Water Quality & Hydrology Personnel (ESH-18) – Responsibility for institutional interface with external regulatory agencies, report notification and project recommendation support

- Project Manager (FWO-UI) – Responsible for overall management of the investigation. Coordinates between internal and client organizations, manages administrative requirements, schedules, technical approach, implementation, and report preparation.

- Site Manager (JCNNM-UESB) – Supervises all field investigation activities and is responsible for implementation of appropriate site health, safety and emergency response plans and quality control and sampling plans during the fieldwork phase of this project.

- Health and Safety Officer (JCNNM-HSEO) – Oversees and ensures proper implementation of the appropriate site health, safety and emergency response requirements and coordinates with the Site Manager to enforce site safety.

- Sampling Personnel (JCNNM-HENV) – Responsible for collecting soil samples from excavated areas and the track hoe bucket for field test screening and laboratory analysis.

- Construction Supervisor (JCNNM-CDDO) – Responsible for coordinating all construction activities pertaining to the investigation activities.
- Soils Engineer (JCNNM-HENV) – Responsible for monitoring excavation activities with regard to maintaining the integrity of the footing of the adjacent building.
- Data validation personnel.
- Analyst (JCNNM-HENV) – Responsible for the analysis of samples using the field test kit.

1.4 Site Characteristics

The TA-21-57 Steam Plant AST is located at TA-21 on the north side of building 357 near the south edge of the site, which is located between Los Alamos Canyon and DP Canyon. TA-21 is sited on the relatively narrow DP Mesa, and is underlain by approximately 800 ft of volcanic ash deposits, the Bandelier Tuff, which is the bedrock throughout the region. The groundwater lies at a depth of approximately 1150 ft. Knowledge of the geology beneath TA-21 is very important because it is believed that this geologic setting provides substantial impedance to contaminant migration (TA-21 Operable Unit RFI Work Plan for Environmental Restoration, May 1991). There is approximately 1150 feet of volcanic and sedimentary material between the bearing units and the groundwater. Environmental Restoration designated Solid Waste Management Units and Potential Release Site that are reviewed and identified in any of the required Excavation Permits will be dealt with in accordance with LANL, DOE and NMED requirements.

1.4.1 Initial Site Analysis and Investigation

Ten areas were potholed to expose the diesel fuel lines for observation (Figure 2). Potholes were distributed along the line in varying intervals for initial assessment of the extent of contamination. Composite samples were taken at a depth of six inches below and between the oil fuel supply and return lines to determine the extent of contamination near and under the fuel lines in each pothole. Soil samples were analyzed using Petroflag to measure TPH (Diesel Range Organics) levels and verification samples were sent to a state certified laboratory (Assaigai Analytical Laboratory) for analysis. To date, this data has not been validated, but will be used internally to mitigate a path forward for further assessment. The results from this initial site analysis and assessment will also be used to help develop characterization for soil handling and storage.

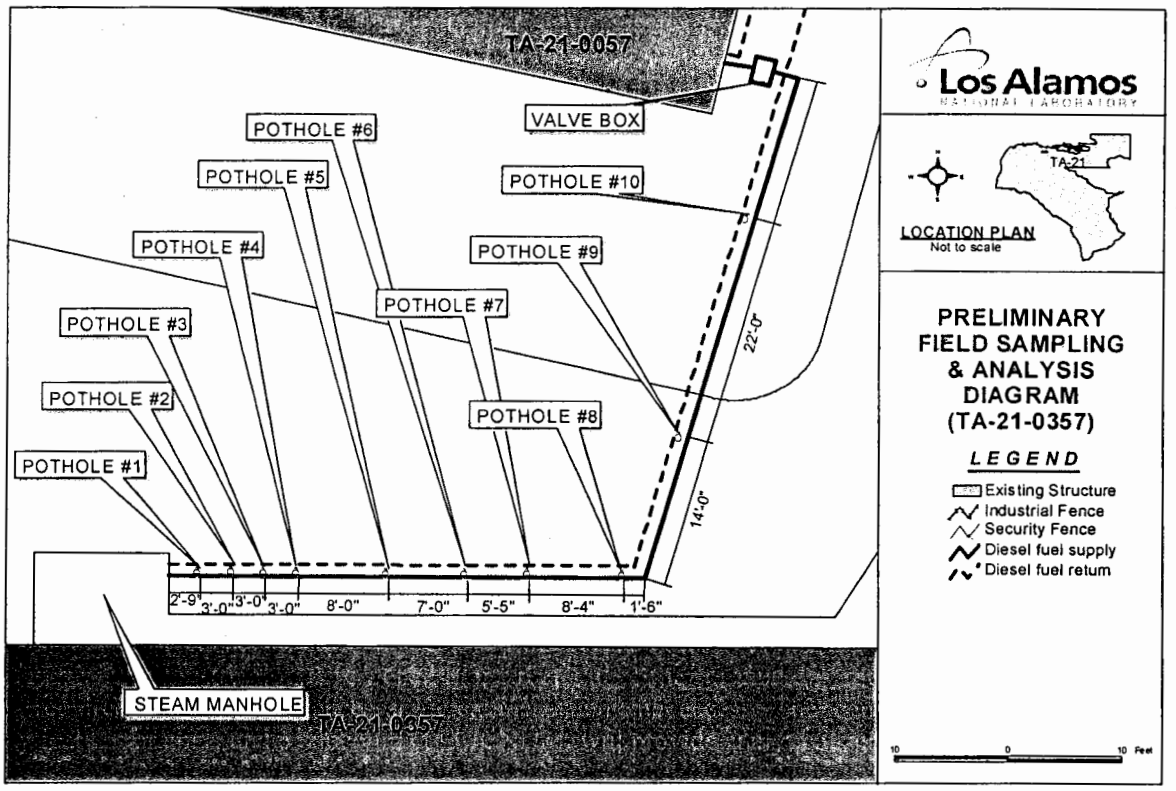

Figure 2. Sample Locations Taken from Potholes During Preliminary Sampling and Analysis

2.0 WORK PLAN

The following sections describe all major activities necessary to complete the sampling and analysis assessment of the fuel oil lines from the AST (TA-21-57) at TA-21-357. They are presented in the sequence in which they will be performed. For this project, field and laboratory activities are focused on determining if a release of fuel oil has occurred from the underground piping associated with the tank and to determine if remediation of any contaminated soil is needed. As indicated in the introduction there is a significant amount of fuel oil unaccounted for. The objective of this work plan is to determine to what extent, if any, the fuel oil has leaked into the ground and environment.

2.1 Field Mobilization

Field mobilization involves all tasks required to prepare for and support fieldwork at the site. These activities include contract laboratory notification, coordination within JCNNM, obtaining utility clearances and excavation permits, ordering and calibrating field equipment and instrumentation, procuring decontamination equipment, preparing the site for work (i.e., setting up decontamination station), development of a health and safety plan, and preparing this SAP. All field mobilization tasks must be complete prior to the initiation of any fieldwork or sampling activities. Tasks relative to the excavation and sampling activities are discussed within this plan. Tasks such as the removal of the canopy and above ground piping network for the tank are not discussed in this plan.

2.2 Excavation and Visual Inspection

A trench will be excavated to expose the pipes from the concrete pit where the pipes enter Building TA-21-357 to the sump at the east end of the tank. At the east end of the tank the old piping to the Old Steam Plant will be exposed to verify they were disconnected and capped when they were decommissioned. If the old lines to the steam plant were not disconnected and capped, the old lines will also be excavated to expose the piping to the steam plant. Soil from the excavation will be stockpiled in a lined containment area east of Building TA-21-357 or placed in covered roll-off bins. During the excavation a visual inspection of the excavated soil and soil around the pipes will be performed to identify any areas of visible contamination including color variations in the soil or heavy hydrocarbon odors. PetroFLAG will be used to measure TPH to verify visual inspections. Confirmation sampling will be conducted in areas where there is no visible contamination with PetroFLAG and state certified laboratory analyses (Assaigai Analytical Laboratories).

2.3 Confirmation Sampling

Two samples will be collected to determine if contamination exists in the sump just outside of Building TA-21-357 and in soil between the sump at the west end of the tank and the tank itself. The samples will be collected at a depth of two feet using a hand auger.

If no visible contamination is found along the pipe runs, confirmation sampling will be performed in the trench. Samples will be collected below all joints in each pipe. Additional samples will be collected along the pipe to ensure that a sample is collected at least every ten feet along the pipes. The samples will be collected between the supply and the return line pipes from just below the pipe to a depth of six inches. The samples will be collected using a hand auger or metal/poly scoop depending on the depth of the trench.

2.4 Sample Analysis

Field analyses will be performed using a PetroFLAG hydrocarbon test kit. Results greater than 100 ppm indicate contaminated soil. Laboratory samples will be sent to Assaigai Analytical Laboratory for analysis of TPH, Target Analytes and TCLP Metals. All analyses data will be validated in accordance with DOE, LANL and NMED requirements.

2.5 Site Restoration

During the assessment, any soil removed that is determined contaminated will be profiled and removed from the site for disposal at a properly permitted and licensed facility. Uncontaminated soils will be left stockpiled at the site until the trenches are ready to be backfilled. The trenches will be left open to facilitate anticipated renovation of the piping. Best Management Practices will be installed as necessary.

2.6 Report on Sample Results

Benchmark Environmental/JCNNM-HENV will prepare a brief report summarizing the analytical results, compliance with quality control (QC) requirements (data validation), and estimating the nature and extent of soil contamination based on the analytical results. LANL's ESH-18 will provide this information to the regulators.

2.7 Material Management

During the assessment process, all soil will be segregated (contaminated versus non-contaminated) during soil removal and placed in covered roll-off bins. Non-contaminated soil will be managed as reusable fill material. All excavated soil will be sampled and analyzed for TPH, Target Analytes and TCLP Metals for characterization. Contaminated soil with TPH levels higher than 1000 mg/kg will me managed as New Mexico Special Waste. Contaminated soil with TCLP Metals levels greater than regulatory limits will be managed and disposed of as Hazardous Waste. All soil removed during this assessment will be properly characterized (waste profiles) and disposed of in accordance to LANL, NMED, and DOE requirements through FWO-SWO.

3.0 QUALITY CONTROL AND SAMPLING PROCEDURES

The objective of the sampling is to obtain data of sufficient quantity and quality to determine the extent of the leak that may have occurred from the tank piping and the severity of the leak. These data must be obtained in a manner that is acceptable to the New Mexico Environment Department and DOE order requirements for assessment of off-normal occurrences. The data must also be of sufficient quantity and spatially distributed such that conclusions may be drawn with respect to the extent and quantity of contamination in the subsurface. The following sections detail the equipment, personnel, and procedures that will be used to conduct the field sampling and analysis for this project. Any deviations from this plan that are deemed necessary during conduct of fieldwork will be discussed with the Project Manager (Health and Safety Plan will be amended as needed) and clearly documented in the field logbook. All sampling and analyses will be verified in accordance to DOE, EPA and NMED requirements.

3.1 Soil Sampling Procedures

Soil samples will be collected using a stainless steel hand auger or with stainless steel or disposable poly scoops. Samples from trenches or excavations less than 3 feet in depth will be collected using scoops. Samplers will not enter an excavation or trench that is more than 4 feet in depth to collect a sample. Samples from trenches deeper than 4 feet will be collected using the auger. Samples from an excavation deeper then 4 feet will be collected from soil collected by the excavator using scoops to collect the sample from the bucket. The samples will be placed in a labeled 4 oz. or 8 oz. glass jar. If a stainless steel spoon or auger is used it will be decontaminated prior to collecting another sample. Decontamination techniques are discussed in Section 3.4.

Sampling and analysis of soil will be performed using two different techniques: initial screening using a field test kit, and sampling for laboratory analysis. Screening of soil samples will be used to rapidly define the presence or absence of residual contamination and estimate contamination boundaries. Off-site laboratory analysis of samples by a NMED and DOE qualified laboratory will be performed in order to confirm hydrocarbon levels are below regulatory concern.

3.1.1 Field Test Kit Screening

Soil screening analyses will be conducted using a field calibrated screening test kit capable of measuring TPH from 100 to 10,000 ppm. Test results will be used to semi-quantitatively identify any residual contamination. Results will be used to determine the boundaries of any contamination excavated. The Analyst/technician performing soil analyses will be trained and familiar with use of the selected field test kit prior to the start of fieldwork. As each soil sample is collected, the Analyst will complete a Sample Collection Log and an entry will be made in the field logbook. The Analyst will perform sample analyses

using the test kit as soon as is practicable after sample collection. All results will be recorded on the Sample Collection Log as they are obtained.

3.1.2 Confirmatory Analytical Samples

The sampling will consist of obtaining samples from soil beneath the pipes and from excavation floors if necessary to confirm the presence/absence of contamination from a leak or to determine that the excavation is sufficient to remove contaminants below levels of regulatory concern. Samples will be submitted to the contract analytical laboratory for analysis. The soil samples collected during this phase will be analyzed for diesel range organics using method 8015A TPH, TCLP Metals, and Target Analytes

3.1.3 Quality Assurance/Quality Control

In addition to field samples, QC samples will be taken in accordance with EPA SW-846 requirements. QC samples include duplicates, and equipment rinsate blanks (if necessary). A field duplicate sample will be collected for every 10 samples collected. If stainless steel augers or scoops are used, an equipment rinsate sample will be collected each day to assess the effectiveness of the decontamination procedure. The rinsate sample will be collected and placed in two 40 ml vials for analysis. Results obtained will be subjected to a data validation to ensure that both the project and analytical laboratory QC requirements have been satisfactorily fulfilled.

After each sample has been collected, all of the sampling equipment, mixing bowl, sampling spoon, etc., will be decontaminated according to the procedure in Section 3.4.

3.2 Decontamination

All sampling equipment, if not disposable, must be cleaned/decontaminated before being reused according to the following procedure:

1. Brush or scrape off any large particles of soil.
2. Wash with a brush in a solution of Alconox, or equivalent.
3. Rinse in a second bucket filled with of tap water.
4. Rinse with deionized water.
5. Air dry.

Residues generated by decontamination procedures should be collected and disposed of in accordance with LANL and NMED requirements.

3.3 Sample Handling Protocol

When a sample is collected for off-site analysis, it will be promptly placed into a labeled 4 oz. or 8 oz. glass jar and fitted with a Teflon lined lid. The sample will be placed in a reclosable poly bag then placed on ice to cool to 4°C until delivery to the lab. The sample must be extracted by the laboratory within 14 days of collection and analyzed within 40 days of collection

Each sample container will be labeled with the following information:

- Unique sample identification number (including locations)
- Project number
- Date

- Time sampled
- Name of Sampler
- Requested analysis
- Preservation method

The labels will be covered with transparent plastic tape and the sample containers will be sealed with custody tape. Pertinent information will be recorded in the field logbook and all chain-of-custody forms will be fully completed for all samples.

3.3.1 Custody and Shipping

The properly labeled and sealed containers will be placed in reclosable poly bags and sealed. These will be placed into the sample cooler, which will have sufficient ice or blue ice to maintain a temperature of approximately 4°C. Samples will be packed to prevent breakage, using additional, inert packing material as necessary. Samples will be picked up by a representative from the contract laboratory for delivery to the laboratory. All chain-of-custody forms will be placed into a plastic bag and attached to the cooler lid, or otherwise included with the samples, prior to pickup.

3.3.2 Sample Preservation

All samples will be preserved by cooling on ice to approximately 4°C. Samples will be maintained on-site in a cooler filled with ice or blue ice. No samples will be held for more than 24 hours on site.

3.3.3 Custody Seals

Custody seals are preprinted adhesive-backed seals with security slots designed to break if disturbed or tampered with. Except for VOA vials, individual sample bottles are to be sealed over the cap by the person obtaining samples. Sample shipping containers (coolers, shipping boxes, etc.) are to be sealed in as many places as necessary to ensure that tampering will be obvious. Seals are signed and dated before application. On receipt at the contract laboratory, the receiving individual will check and certify that the seals on shipping containers and sample bottles are intact. Discrepancies shall be noted and communicated immediately to the Project Manager.

3.4 Field Logbook

The field logbook will be permanently bound with pre-numbered pages and all entries will be made in indelible ink. The field logbook will be kept and maintained at TA-21-357. Corrections will be made by drawing a single line through any errors, and the person correcting the entry will initial the change. The person recording in the field logbook will sign and date their entries at the end of the day at the bottom of the last page on which entries are made. Any blank pages or blank space left at the end of a page will be crossed out and "BLANK" will be written across the blank space and initialed.

Sampling and Analysis Plan For Assessment Activities of Fuel Oil Leak In Underground Transfer Lines From AST At TA-21-357 Steam Plant

Amendment 1

February 26, 2002

Project Numbers: 5399.12 and 5383.06

Prepared by:
Benchmark Environmental Corporation
1900 Diamond Drive, Room 203
Los Alamos, New Mexico 87544

Authors:

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_____

Prepared under Subcontract No. BI434 for:
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Reviewed by:

LANL Representatives:

ESH-18 _____

ESH-19 _____

FWO-UI _____

Other _____

1.0 Purpose

The purpose of this amendment is to provide guidance in conducting additional subsurface investigation in support of the TA-21-57 fuel oil leak.

2.0 Objective

The objective of the Geo Probe investigation at TA-21-357 is to determine if any No. 2 Fuel Oil is present at the interface between the Bandelier Tuff and the topsoil beneath the site.

3.0 Sample Collection

A Geo Probe unit will be used to collect subsurface samples at the tuff/top soil interface. The Geo Probe will be advanced until rejection is reached at which point a sample will be collected. The sample will then be retrieved, packaged and shipped to an independent laboratory for analysis.

Proposed sampling locations are provided on the attached site diagram (Figure 1). This sampling scheme provides for data that would encircle the tank and all associated piping, containing the fuel oil leak concern. Alternative sampling points have also been shown on the site diagram because of access concerns. Sampling points within the fenced area to the north and west of the tank are located to the north of the tank. Access to these sampling points would have to be granted by removing a portion of the fence or removing the delivery line only. Alternatively the samples could be taken outside of the fence line through the asphalt. An alternative sampling point to the west of the fence would be difficult due to the presence of the water tower and multiple high-voltage electrical panels and associated underground cable to the west of the TA-21-357 fence line.

4.0 Analysis and Quality Control

Sampling collected using the Geo Probe and Geo Test will be labeled, handled, and analyzed in accordance with the procedures outlined in the Sampling and Analysis. The chain of custody, decontamination, and collection of duplicate samples required in the Sampling and Analysis Plan will also apply to the Geo Probe and Geo Test sampling activities.

MORE DETAIL TO BE PROVIDED BY CONTRACTOR UPON SELECTION OF GEO PROBE AND GEO TEST.

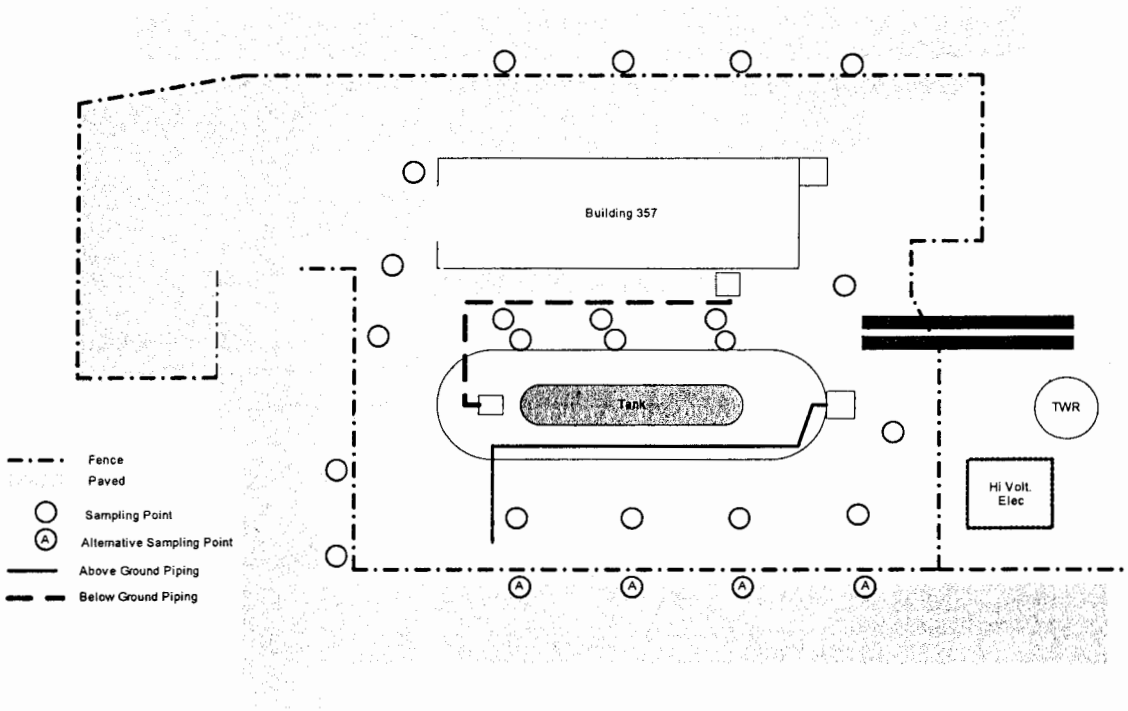

Figure 1. Locations for Investigation of Contaminated Region Using GeoProbe And GeoTest

Sampling and Analysis Plan

Amendment 2

TA-21-357 Continuous Coring For Fuel Oil Assessment

March 18, 2002

Project Numbers: 5399.12 and 5383.06

Prepared by:
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_____

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Reviewed by:

LANL Representatives:

ESH-18 _____

ESH-19 _____

FWO-UI _____

Other _____

1.0 Purpose

The purpose of this amendment is to provide guidance in conducting additional subsurface assessment in support of the TA-21-357 Fuel Oil Assessment using a drill rig to collect core samples in areas determined to be contaminated during previous assessment activities.

2.0 Objective

The first objective of the drilling is to better define the vertical extent of contamination in the area determined to be most heavily contaminated based on visual observations, soil analyses and GeoProbe sampling efforts during the pipe exposure sampling and Geo Probe sampling tasks. The second objective of the drilling is to determine a contaminant profile along fractures identified in the area of contamination.

3.0 Sample Collection

A central mine equipment-75 drill rig will be used to collect minimum 2" diameter core samples. One vertical boring (see Figure 1) will be advanced through the area identified with the highest level of contamination. Two additional angle borings (#2 and #3) will be advanced through the contaminated area, the first near the trench and the second stepped out towards the tank. Proposed sampling locations are provided on the attached site diagram. The vertical hole (#1) will provide data on the depth of contamination in the most contaminated area. The angle sample will provide data on the concentration profile in fractures moving away from the suspected source of the contamination.

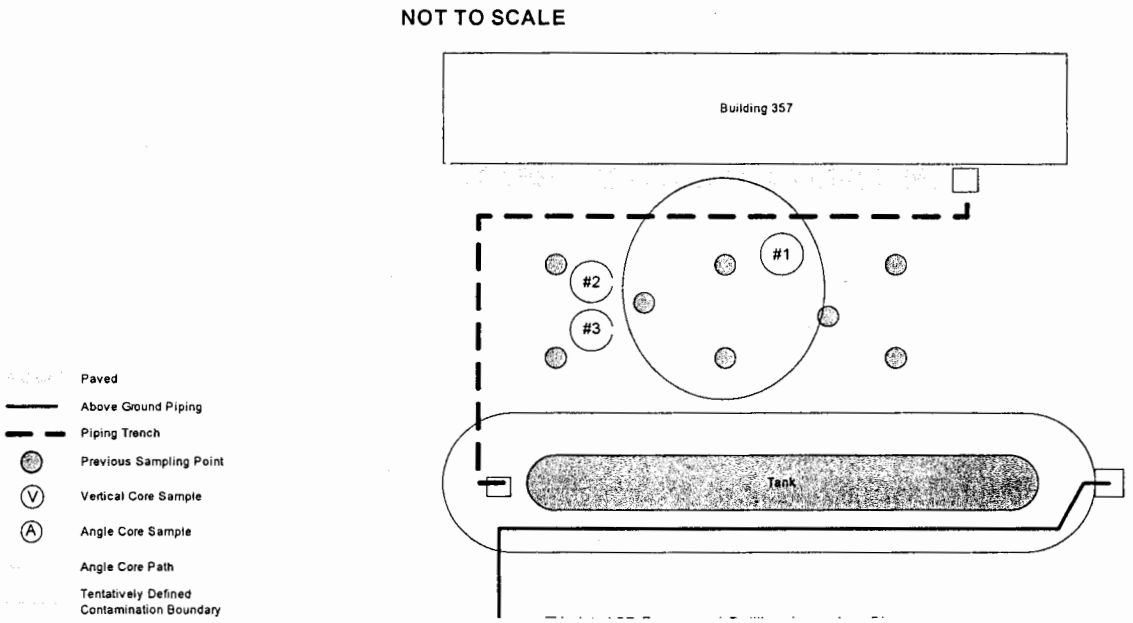

Figure 1. Locations for Vertical and Angled Coring and Sampling for Contamination Assessment at TA-21-357 and TA-21-57

After collection, each coring will be logged by a geologist to document depths at which soil types change and identify any fractures that may be encountered. The core samples will then be divided into samples for laboratory analysis with an emphasis on segregating samples from the various soil types encountered. It is anticipated that the first sample will be collected from the fill soil just above the fill/tuft interface, the

second sample from the tuft, and subsequent samples from any differing soil type layers encountered below the tuft. Because the number of samples will be dependant upon the soil/tuff profile encountered, the exact number of samples is unknown.

Parameter	Sample Container	Preservative
TPH-DRO	8 oz glass wide mouth	Cool to 4° C and 14 day holding time.
PAH's	8 oz Amber glass wide mouth	Cool to 4° C, no head-space in jar and a 14 day holding time.
BTEX	4 oz Amber glass wide mouth	Cool to 4° C, no head-space in jar and a 14 day holding time.

4.0 Analysis and Quality Control

Samples collected will be labeled and handled in accordance with the procedures outlined in the Sampling and Analysis Plan. The chain of custody, and decontamination requirements in the Sampling and Analysis Plan will also apply to the drilling activities. The sampling team will attempt to collect one field duplicate sample from the contaminated zone of the fill material and the tuft. Collection of the duplicates will be dependent upon the amount of soil present in the core sample to represent these zones.

Each sample collected will be analyzed for diesel range organics (TPH-DRO) using method SW846 8015B. Two samples from soil or tuff zones with indications of contamination will be analyzed for polynuclear aromatic hydrocarbons (PAH) using method SW846 8310 (HPLC) or SW846 8270C and benzene, toluene, ethylbenzene, and xylenes (BTEX, Nathalene and MTBE) using method SW846 8021 or SW846 8260B.

5.0 Data Analysis

Drilling locations will be surveyed using GPS for inclusion on the project maps being developed by (JCNNM-UMAP). The concentration profile will be diagramed to determine the probable depth of contamination. The horizontal contamination profile along any identified fissures will be diagrammed to determine the likelihood of contaminant travel within the fissures.

Sampling and Analysis Plan

Amendment 3

TA-21-357 Continuous Coring For Fuel Oil Assessment

March 29, 2002

Project Numbers: 5393.06 and 5383.06

Prepared by:
Benchmark Environmental Corporation
1900 Diamond Drive, Room 203
Los Alamos, New Mexico 87544

Authors:

_____

_____

Prepared under Subcontract No. BI434 for:
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Reviewed by:

LANL Representatives:

ESH-18 _____

ESH-19 _____

FWO-UI _____

Other _____

1.0 Purpose

The purpose of this amendment is to provide guidance in conducting additional subsurface assessment in support of the TA-21-357 Fuel Oil Assessment using a drill rig to collect core samples in areas determined to be contaminated during previous assessment activities.

2.0 Objective

The first objective of the drilling is to better define the vertical and horizontal extent of contamination in the area determined to be most heavily contaminated based on visual observations, soil analyses and GeoProbe sampling efforts during the pipe exposure sampling and Geo Probe sampling tasks.

3.0 Sample Collection

A Central Mine Equipment-75 drill rig will be used to collect minimum 2" diameter core samples. Approximately ten vertical borings (see Figure 1) will be advanced through the area identified with the highest level of contamination. Borings will be advanced through the contaminated area, the first near the trench and additional coring will be stepped out towards the tank and parallel to the Steam Plant building (TA-3-21) in intervals that are based on previous boreholes. Coring will commence in a sequence (#1 through #8 see Figure 1) to assess the horizontal and vertical extent of the contamination. Coring will continue in the same fashion if the extent of the contamination goes outward beyond coring locations #1 through #8. Proposed sampling locations are provided on the attached site diagram (Figure 1). The vertical holes will provide data on the depth and horizontal extent of contamination in the most contaminated area between the AST (TA-21-357) and the Steam Plant.

If necessary, an additional angled boring will be designated for under the building (see Figure 1 #9). This bore hole will be used to assess the extent of contamination under the Steam Plant building.

After collection, each coring will be logged by a geologist to document depths at which soil types change and identify any fractures that may be encountered. The core samples will then be divided into samples for laboratory analysis with an emphasis on segregating samples from the various soil types encountered. Samples will be taken in intervals of 5 to 12 feet depending on the contamination encountered. Because the number of samples will be dependant upon the soil/tuff profile encountered, the exact number of samples is unknown.

Parameter	Sample Container	Preservative
TPH-DRO	8 oz glass wide mouth	Cool to 4° C and 14 day holding time.
PAH's	8 oz Amber glass wide mouth	Cool to 4° C, no head-space in jar and a 14 day holding time.
BTEX	4 oz Amber glass wide mouth	Cool to 4° C, no head-space in jar and a 14 day holding time.

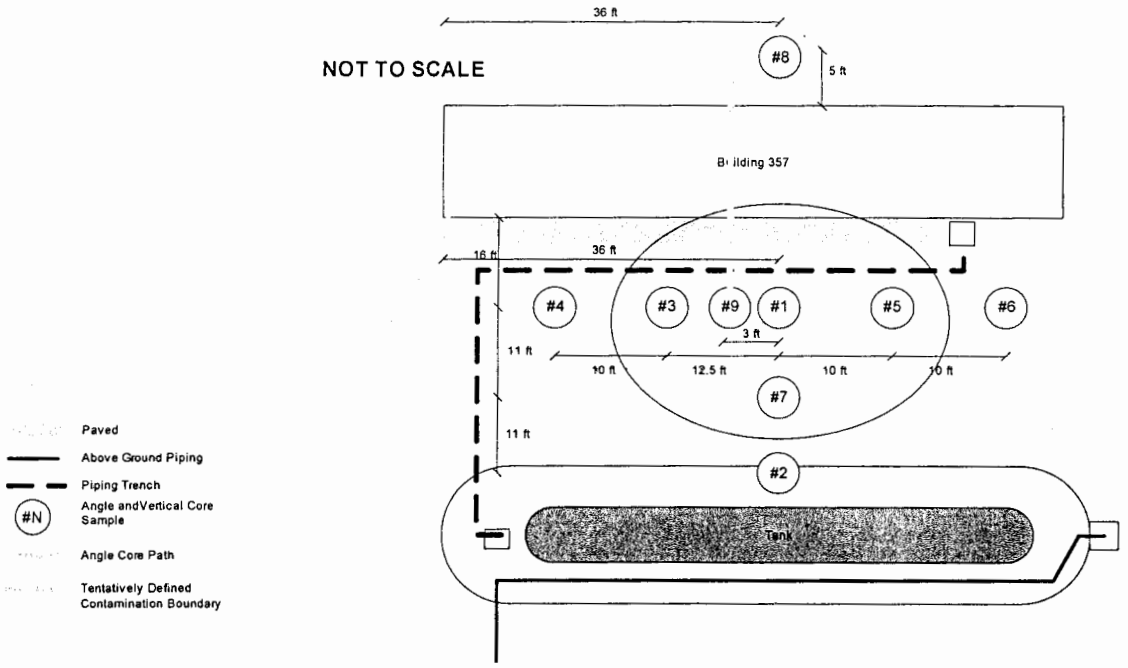

Figure 1. Locations for Vertical and Angled Coring and Sampling for Contamination Assessment at TA-21-357 and TA-21-57

4.0 Analysis and Quality Control.

Samples collected will be labeled and handled in accordance with the procedures outlined in the Sampling and Analysis Plan. The chain of custody, and decontamination requirements in the Sampling and Analysis Plan will also apply to the drilling activities. The sampling team will attempt to collect one field duplicate sample from the contaminated zone of the fill material and the tuft. Collection of the duplicates will be dependent upon the amount of soil present in the core sample to represent these zones.

Each sample collected will be analyzed for diesel range organics (TPH-DRO) using method SW846 8015B. Two samples from soil or tuff zones with indications of contamination will be analyzed for PAH using method SW846 8310(HPLC) or SW846 8270C and benzene, toluene, ethylbenzene, and xylenes (BTEX, Nathalene and MTBE) using method SW846 8021 or SW846 8260B.

5.0 Data Analysis

Drilling locations will be surveyed using GPS for inclusion on the project maps being developed by (JCNNM-UMAP). The concentration profile will be diagramed to determine the probable depth of contamination. The horizontal contamination profile along any identified fissures will be diagrammed to determine the likelihood of contaminant travel within the fissures.

Sampling and Analysis Plan

Amendment 4

TA-21-357 Continuous Coring For Fuel Oil Assessment

April 3, 2002

Project Numbers: 5393.06 and 5383.06

Prepared by:
Benchmark Environmental Corporation
1900 Diamond Drive, Room 203
Los Alamos, New Mexico 87544

Authors:

_____

_____

Prepared under Subcontract No. BI434 for:
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Reviewed by:

LANL Representatives:

ESH-18 _____

ESH-19 _____

FWO-UI _____

Other _____

1.0 Purpose

The purpose of this amendment is to provide guidance in conducting additional subsurface assessment in support of the TA-21-357 Fuel Oil Assessment using a drill rig to collect core samples in areas determined to be contaminated during previous assessment activities.

2.0 Objective

The first objective of the drilling is to better define the vertical and horizontal extent of contamination in the area determined to be most heavily contaminated based on visual observations, soil analyses and GeoProbe sampling efforts during the pipe exposure sampling and Geo Probe sampling tasks.

3.0 Sample Collection

A central mine equipment-75 drill rig will be used to collect minimum 2" diameter core samples. Approximately ten vertical borings (see Figure 1) will be advanced through the area identified with the highest level of contamination. Borings will be advanced through the contaminated area, the first near the trench and additional coring will be stepped out towards the tank and parallel to the Steam Plant building (TA-3-21) in intervals that are based on previous boreholes. Coring will commence in a sequence (#1 through #8 see Figure 1) to assess the horizontal and vertical extent of the contamination. Coring will continue in the same fashion if the extent of the contamination goes outward beyond coring locations #1 through #8. Proposed sampling locations are provided on the attached site diagram (Figure 1). The vertical holes will provide data on the depth and horizontal extent of contamination in the most contaminated area between the aboveground storage tank (TA-21-357) and the Steam Plant.

If necessary, an additional angled boring will be designated for under the building (see Figure 1 #9). This bore hole will be used to assess the extent of contamination under the Steam Plant building.

After collection, each coring will be logged by a geologist to document depths at which soil types change and identify any fractures that may be encountered. The core samples will then be divided into samples for laboratory analysis with an emphasis on segregating samples from the various soil types encountered. Samples will be taken in intervals of 5 to 12 feet depending on the contamination encountered. Because the number of samples will be dependant upon the soil/tuff profile encountered, the exact number of samples is unknown.

Parameter	Sample Container	Preservative
TPH-DRO	8 oz glass wide mouth	Cool to 4° C and 14 day holding time.
PAH's	8 oz Amber glass wide mouth	Cool to 4° C, no head-space in jar and a 14 day holding time.
BTEX	4 oz Amber glass wide mouth	Cool to 4° C, no head-space in jar and a 14 day holding time.

TA-21-57 Location Map for Coring and Sampling Activities

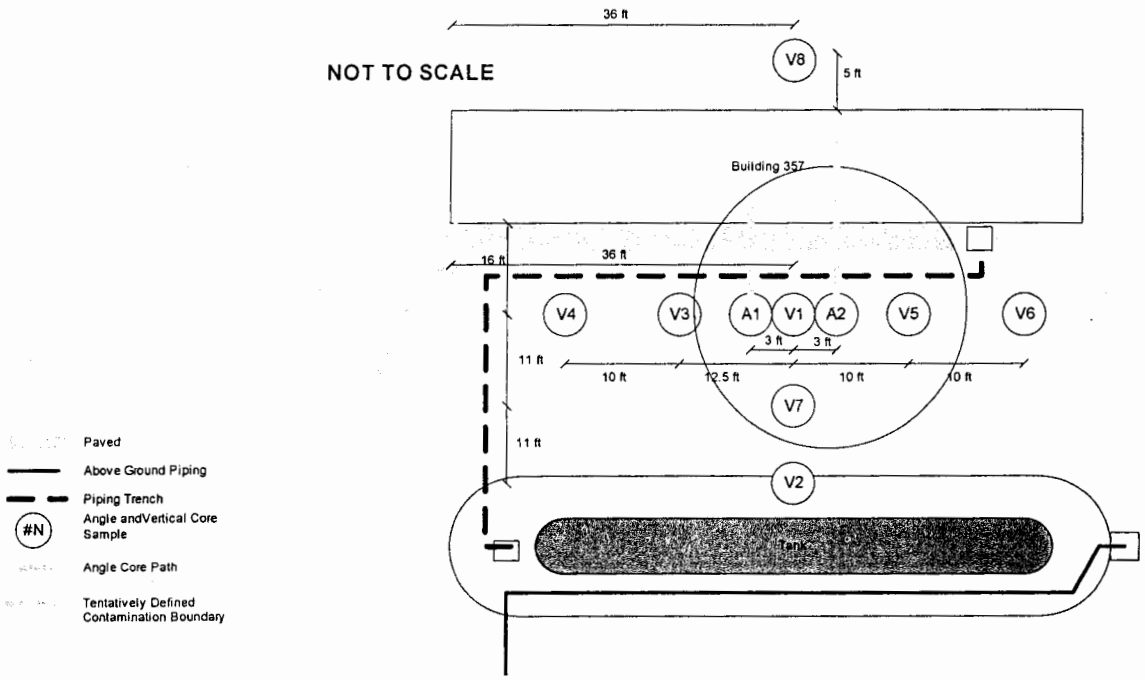

Figure 1. Location for Vertical and Angled Coring and Sampling aor Contamination Assessment at TA-21-357 and TA-21-57

4.0 Analysis and Quality Control

Samples collected will be labeled and handled in accordance with the procedures outlined in the Sampling and Analysis Plan. The chain of custody, and decontamination requirements in the Sampling and Analysis Plan will also apply to the drilling activities. The sampling team will attempt to collect one field duplicate sample from the contaminated zone of the fill material and the tuft. Collection of the duplicates will be dependent upon the amount of soil present in the core sample to represent these zones.

Each sample collected will be analyzed for diesel range organics (TPH-DRO) using method SW846 8015B. Two samples from soil or tuff zones with indications of contamination will be analyzed for PAH using method SW846 8310(HPLC) or SW846 8270C and benzene, toluene, ethylbenzene, and xylenes (BTEX, Nathalene and MTBE) using method SW846 8021 or SW846 8260B.

5.0 Data Analysis

Drilling locations will be surveyed using GPS for inclusion on the project maps being developed by (JCNNM-UMAP). The concentration profile will be diagramed to determine the probable depth of contamination. The horizontal contamination profile along any identified fissures will be diagrammed to determine the likelihood of contaminant travel within the fissures.

APPENDIX 3

Radiation, Water Quality, and Air Quality Survey Documentation

HPAL SUBMITTAL FORM

SAMPLE DESCRIPTION

Sample Date/Time: 4-3-02 No. Of Samples: 1
TA: 21 Bldg: 357
RCT: Don Gibbons Z Number: 071631
RCT Signature: Don Gibbon MS: K-988
Phone/Fax: 5-4926

SAMPLE TRACKING NUMBER

ESH-1 SAMPLE TRACKING

22001713

TYPE OF SAMPLE

☐ Smear ☐ Tritium Smears ☐ Oils ☐ Liquid ☒ Soil
☐ CAM ☐ Air Sampler ☐ Nasal Swipe ☐ Solid
☐ Special / Type:

ANALYSIS REQUESTED

Gross: ☐ Alpha ☐ Beta ☒ Gamma
☐ Alpha Spec ☐ Beta Analysis ☒ Gamma Spec. ☐ Liquid Scintillation Counting
☐ Nuclide:

COMMENTS

SOIL FROM
TA-21 357
DRILL HOLE

Occurrence No.:
Incident No.:
RWP No.:

NASAL SWIPES

	Name	Z Number	Group	Respirator Yes/No	Date	Time
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

LIQUID / WOUND / OTHER SAMPLES

	Description	Sample ID No.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

CAM FILTERS / AIR SAMPLES

	Location	Sample On		Sample Off	
		Date	Time	Date	Time
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

HPAL Submittal Form 4/22/99

ESH-1 SMEAR SURVEY FORM

SAMPLE DESCRIPTION

Sample Date/Time: 4-3 No. Of Samples: 1
TA: 21 Bldg: 357
RCT: Don Gibbons Z Number: 071631
Phone/Fax: 5-4926

SAMPLE TRACKING NUMBER

ESH-1 SAMPLE TRACKING

22001713

PURPOSE OF SURVEY

☐ ROUTINE ☐ PRE-JOB ☐ POST-JOB ☐ HOT-JOB
☐ ITEM RELEASE ☐ OFFSITE SHIPMENT ☐ ONSITE SHIPMENT
☒ NON-ROUTINE/OTHER: Soil FROM DRILL SITE

INSTRUMENTATION

TYPE	HSE No.	CAL DUE	% EFF	BKG
LUDLUM 139	3794	1-23-03	50	NDA
ESP-1	0199	7-16-02	50	200

ADDITIONAL INFORMATION

☐ Occurrence No.:
☐ Incident No.:
☐ RWP No.:

Smear No.	Location	Alpha*	Beta*	Gamma*
1	BOTTLE	NDA	NDA	NDA

Smear No.	Location	Alpha*	Beta*	Gamma*

* dpm/100 cm2

E:\ODREL\DRW\HPALMST.DOR

PAGE 1 OF _____

Rev. 10/3

ESH-1 DIRECT SURVEY FORM

SAMPLE DESCRIPTION

Sample Date/Time: 4-3-02 No. Of Samples: 1
TA: 21 Bldg: 357
RCT: DON GIBBONS Z Number: 071631
RCT Signature: Don Gibbons MS: K-988
Phone/Fax: 5-4926

PURPOSE OF SURVEY

☐ Routine ☐ Pre-Job ☐ Post-Job ☐ Hot-Job
☐ Item Release ☐ Offsite Shipment ☐ Onsite Shipment
☒ Non-Routine / Other: SOIL FROM DRILL HOLE

ADDITIONAL INFORMATION

Occurrence No.:
Incident No.:
RWP No.:

INSTRUMENTATION

TYPE	HSE No.	CAL Due	% EFF	BKG
LUP 139	3794	6-23-3	50	NDA
ESP-1	6197	7-26-3	50	200

REMARKS

ESH-1 REVIEW BY

Item/Area	Alpha cpm	Alpha dpm*	Beta/Gamma cpm	Beta/Gamma dpm*	Remarks
SAMPLE BOTTLE	NDA	NDA	NDA	NDA	

*dpm/100 cm²

DIRECT SURVEY FORM 1 of ... 3/11/99

Los Alamos
NATIONAL LABORATORY
memorandum

Health & Safety Division
ESH-4 Health Physics Measurements
Analytical Laboratories Section

To/MS: Don Gibbons, ESH-1, MS G749
Analyst: Michael Martinez, ESH-4, MS G757
Reviewer: Bob Martin, ESH-4, MS G757
Phone/FAX: 5-8888/7-7246
Symbol: ESH-4-HPAL-REP-797
Date: April 9, 2002

ANALYSIS REPORTS FOR SAMPLES SUBMITTED TO THE HEALTH PHYSICS ANALYTICAL LABORATORY FROM TA-21 (BC22001713)

The following samples were submitted to ESH-4's HPAL from TA-21, for analysis. The reported activities, in µCi, are the total activities on the samples and are decay corrected to the stop date and time indicated. The samples were analyzed utilizing a HpGe detector and ADCAM Multi-Channel Analyzer.

The analysis results are shown in the table below:

Sample Id	Reference #	Collected Date	Collected Time	Analyzed Date	Analyzed Time	Nuclide(s)	Activity (µCi)	2s (%)
Soil	22001713	04/03/02	1200	04/08/02	1429	-------	<MDA	---

MV:sm

Cy: File

Stewart, Patricia, NMENV

From: Baldwin, Stephanie [sbaldwin@hgl.com]
Sent: Wednesday, May 16, 2007 4:05 PM
To: Stewart, Patricia, NMENV; Lara.E.Beasley@spa02.usace.army.mil
Cc: Jacobs, Julie, NMENV; Limoges, Clark
Subject: RE: West Mesa AFS PA

Hi Pat,

We also could not locate T-18 and T-19, even though the buildings are included in the index on the site layout. There is also no information in the site documents that describes where the buildings were located or their purpose. We'll review the site layout tomorrow under magnification and see if we can locate them. I'll let you know what we find.

Thanks,

Stephanie

From: Stewart, Patricia, NMENV [mailto:patricia.stewart@state.nm.us]
Sent: Wednesday, May 16, 2007 3:06 PM
To: Lara.E.Beasley@spa02.usace.army.mil; Baldwin, Stephanie
Cc: Jacobs, Julie, NMENV
Subject: West Mesa AFS PA

Hi Lara:

Could you or Stephanie tell me where to find the Pump Stations, buildings T-18 and T-19, on the West Mesa AFS building layout? What did they pump? Thanks.

Regards,
Pat Stewart
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Bldg. 1
Santa Fe, NM 87505-6303
(505) 476-6059

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This inbound email has been scanned by the MessageLabs Email Security System.

ESH-1 DIRECT SURVEY FORM

SAMPLE DESCRIPTION

Sample Date/Time: 4-2-02 No. Of Samples: 1
TA: 21 Bldg:
RCT: DON GIBBONS Z Number: 071631
RCT Signature: [illegible] MS: M-988
Phone/Fax: 5-4926

PURPOSE OF SURVEY

☐ Routine ☐ Pre-Job ☐ Post-Job ☐ Hot-Job
☐ Item Release ☐ Offsite Shipment ☐ Onsite Shipment
☒ Non-Routine / Other: SOIL FROM 55' DRILL HOLE BY DIESEL TANK

ADDITIONAL INFORMATION

Occurrence No.:
Incident No.:
RWP No.:

INSTRUMENTATION

TYPE	HSE No.	CAL Due	% EFF	BKG
LUD 139			50	NDA
ESP-1	6313	12-17-02	50	200

REMARKS

ESH-1 REVIEW BY

Item/Area	Alpha		Beta/Gamma		Remarks
	cpm	dpm*	cpm	dpm*	

*dpm/100 cm²

DIRECT SURVEY FORM 1 of ____ 3/11/99

HPAL SUBMITTAL FORM

SAMPLE DESCRIPTION

Sample Date/Time: 4-2-02 No. Of Samples: 1
TA: 21 Bldg: STEAM PLANT
RCT: Don Gibbon Z Number: 071631
RCT Signature: Don Gibbon MS: K-888
Phone/Fax: 5-4926

SAMPLE TRACKING NUMBER

ESH-1 SAMPLE TRACKING

'22001650'

TYPE OF SAMPLE

☐ Smear ☐ Tritium Smears ☐ Oils ☐ Liquid ☒ Soil
☐ CAM ☐ Air Sampler ☐ Nasal Swipe ☐ Solid
☐ Special / Type:

COMMENTS

SOIL FROM DRILL HOLE NEAR DIESEL TANK

ANALYSIS REQUESTED

Gross: ☒ Alpha ☒ Beta ☐ Gamma
☐ Alpha Spec ☐ Beta Analysis ☐ Gamma Spec. ☐ Liquid Scintillation Counting
☐ Nuclide:

Occurrence No.:
Incident No.:
RWP No.:

NASAL SWIPES

	Name	Z Number	Group	Respirator Yes/No	Date	Time
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

LIQUID / WOUND / OTHER SAMPLES

	Description	Sample ID No.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

CAM FILTERS / AIR SAMPLES

	Location	Sample On Date	Sample On Time	Sample Off Date	Sample Off Time
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

HPAL Submittal Form 4/22/99

ESH-1 SMEAR SURVEY FORM

SAMPLE DESCRIPTION

Sample Date/Time: _____ No. Of Samples: _____
TA: _____ Bldg: _____
RCT: _____ Z Number: _____
Phone/Fax: _____

SAMPLE TRACKING NUMBER

ESH-1 SAMPLE TRACKING

22001650

PURPOSE OF SURVEY

☐ ROUTINE ☐ PRE-JOB ☐ POST-JOB ☐ HOT-JOB
☐ ITEM RELEASE ☐ OFFSITE SHIPMENT ☐ ONSITE SHIPMENT
☐ NON-ROUTINE/OTHER: _____

INSTRUMENTATION

TYPE	HSE No.	CAL DUE	% EFF	BKG

ADDITIONAL INFORMATION

☐ Occurrence No.: _____
☐ Incident No.: _____
☐ RWP No.: _____

Smear No.	Location	Alpha*	Beta*	Gamma*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
14				
15				

Smear No.	Location	Alpha*	Beta*	Gamma*
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

* dpm/100 cm2

PAGE 1 OF 2

Los Alamos
NATIONAL LABORATORY
memorandum

Health & Safety Division
ESH-4 Health Physics Measurements
Analytical Laboratories Section

To/MS: Don Gibbons, ESH-1, MS G749
Analyst: Mike Jensen, ESH-4, MS G757
Reviewer: Bob Martin, ESH-4, MS G757
Phone/FAX: 5-8888/7-7246
Symbol: ESH-4-HPAL-REP-788
Date: April 3, 2002

ANALYSIS REPORTS FOR SAMPLES SUBMITTED TO THE HEALTH PHYSICS ANALYTICAL LABORATORY FROM TA-21 (BC22001650)

The following samples were submitted to ESH-4's HPAL from TA-21, for analysis. The reported activities, in μCi, are the total activities on the samples and are decay corrected to the stop date and time indicated. The samples were analyzed utilizing a HpGe detector and ADCAM Multi-Channel Analyzer.

The analysis results are shown in the table below:

Sample Id	Reference #	Collected Date	Collected Time	Analyzed Date	Analyzed Time	Nuclide(s)	Activity (μCi)	2s (%)
Soil	22001650	04/02/02	1200	04/03/02	1017	-------	<MDA	---

BM:sm

Cy: File

"Jerome F. Gonzales" <jerome@lanl.gov>
04/15/2002 10:59 AM

To: fcaporuscio@eberlineservices.com
cc:
Subject: Fwd: TA-21 Rad Survey

```
>X-Sender: u108821@esh-mail.lanl.gov
>X-Mailer: QUALCOMM Windows Eudora Version 5.1
>Date: Mon, 25 Mar 2002 08:09:40 -0700
>To: jerome@lanl.gov
>From: "Martin J. Peifer" <peiferm@lanl.gov>
>Subject: Fwd: TA-21 EAST BOREHOLE
>
>Jerome,
>
>As you have requested, here is a brief report from Darril Stafford (ESH-1
>RCT) regarding radiation monitoring activities he performed at the drill
>site near TA-21-57.  Please let me or Darril know if you need any further
>information for your records.  Marty.
>
>
>
>
>
>Marty Peifer, Team Leader
>ESH-1, Health Physics Operations
>Los Alamos National Laboratory
>Los Alamos, New Mexico 87545  MS. M-769
>Phone:  (505) 665-4342
>Pager:            (505) 664-6649
>Cellular phone:   (505) 699-1063
>Fax:              (505) 667-0189
>E-mail: peiferm@lanl.gov
>
>
>
>
>>X-Sender: u113569@esh-mail.lanl.gov
>>X-Mailer: QUALCOMM Windows Eudora Version 5.0
>>Date: Mon, 25 Mar 2002 08:20:49 -0700
>>To: peiferm@lanl.gov
>>From: Darril Stafford <darril@lanl.gov>
>>Subject: TA-21 EAST BOREHOLE
>>
>>Marty, on March 11 through March 20, ESH-1 provided RCT support for the
>>boreholes that were drilled around the diesel tank at DP EAST.  All
>>direct surveys were at background levels for Beta/Gamma and Alpha and
>>require no further action.  If you have any further questions in this
>>matter please feel free to contact me at 104-8421 or 699-1005.
>>
>>INSTRUMENTS USED:
>>

>>Eberline ESP-1/HP-260, HSE #5934, Cal Due,4/10/02
>>Ludlum 139, HSE # 7617, Cal Due, 8/14/02
>>
>>Thanks, Darril Stafford, ESH-1 RCT
```

"Jerome F. Gonzales" <jerome@lanl.gov>
04/15/2002 02:11 PM

To: fcaporuscio@eberlineservices.com
cc:
Subject: Fwd: Rad Survey Results

X-Sender: 182557@chaco.jci.lanl.gov
X-Mailer: QUALCOMM Windows Eudora Version 5.1
Date: Mon, 15 Apr 2002 14:08:42 -0600
To: "Jerome F. Gonzales" <jerome@lanl.gov>,
"Mell A. Smithour" <smithour_mell_a@lanl.gov>
From: "David L. Madrid" <dlmadrid@lanl.gov>
Subject: Fwd: Soil Sample Results

X-Sender: jami@esh-mail.lanl.gov
X-Mailer: QUALCOMM Windows Eudora Version 5.1
Date: Mon, 15 Apr 2002 13:27:08 -0600
To: dlmadrid@lanl.gov
From: Jami Morgan <jami@lanl.gov>
Subject: Soil Sample Results
Cc: lwpacheco@lanl.gov, jgeorge@lanl.gov

David, A per your request, I am e-mailing you with the results of soil samples taken at TA-21 diesel tank leak on 04/02/02, and 04/03/02. Direct Surveys taken with a Ludlum 139 #3794, and an ESP-1 #6199 revealed no Alpha, Beta, or Gamma contamination. Soil samples submitted to our analysis Laboratory also revealed the same results.
I will forward copies to you through inner-office mail.
If you have any more questions, please feel free to call us.
Don Gibbons, ESH-1 RCT 5-4926
Jami Morgan, ESH-1 RCT 5-4926

David L. Madrid
Project Manager

Johnson Controls Northern New Mexico
TA3-38 Room 108
P.O. Box 50
Los Alamos, New Mexico 87544

Tel: (505) 677-3751
Cell: (505) 699-1778
Pager: 104-3867
Fax: (505) 667-8151

WATER QUALITY SURVEY

Table 2. Special Drinking Water Monitoring Results for Diesel Range Organics (DRO) in 2002

Sample Date	Analytical Lab	PM-1 (mg/L)	PM-3 (mg/L)	O-1 (mg/L)	O-4 (mg/L)
2/23/2002	GEL	0.2	<0.05	<0.05	<0.05
2/23/2002	GEL-duplicate sample				<0.05
3/14/2002	GEL	<0.05	<0.05	<0.05	<0.05
3/14/2002	GEL-duplicate sample				<0.05
4/18/2002	GEL	<0.048	<0.048	<0.048	<0.048
4/18/2002	GEL-duplicate sample				<0.048
5/18/2002	GEL	<0.05	<0.05	0.076	<0.048
6/26/2002	GEL	<0.05	<0.05	<0.05	<0.05

GEL = General Engineering Laboratories

Notes:

AIR QUALITY SAMPLING AND ANALYSES

Date	Location	Time On	Time Off	Sample Type	Monitor #	Empl. ID	Sample ID	Total Hydrocarbons		Total Time (min)	Detection Limit (ppm)
5/21/2002	TA-21	7:58	3:19	Personal	RC4695		02052101TM	<0.099		433	0.0820734
5/21/2002	TA-21	8:19	3:22	Area	RC4694		02052102TM	<0.1		423	0.0840137
5/21/2002	TA-21			Blank	RC4690		02052103TM	ND			
5/22/2002	TA-21	8:02	3:00	Personal	RC4607		02052201TM	<0.1		418	0.0850186
5/22/2001	TA-21	8:07	3:00	Personal	RC4544		02052202TM	<0.11		413	0.0860479
5/22/2002	TA-21	8:03	3:00	Personal	RC4655		02052203TM	<0.1		417	0.0852225
5/22/2002	TA-21			Blank	RC4527		02052204TM	ND			
5/30/2002	TA-21	7:38	3:40	Personal	QB3304		02053001TM	<0.089		478	0.0743468
5/30/2002	TA-21	7:39	3:40	Personal	QB3268		02053002TM	<0.089		479	0.0741916
5/30/2002	TA-21	7:40	3:40	Personal	QB3293		02053003TM	<0.089		480	0.0740371
5/30/2002	TA-21	8:00	7:00	Area	QB3395		02053004TM	<.06		660	0.0538451
5/30/2002	TA-21			Blank	QB3362		02053005TM	ND			
6/5/2002	TA-21	8:10	3:30	Area	QB3321		02060501TM	0.099		440	0.0807677
6/5/2002	TA-21	7:54	3:30	Personal	QB3234		02060502TM	0.27		456	0.0779338
6/5/2002	TA-21	8:00	3:00	Personal	QB3375		02060503TM	0.096		420	0.0846138
6/5/2002	TA-21			Blank	QB3358		02060504TM	ND			
6/11/2002	TA-21	9:00	3:40	Personal	QB3361		02061101TM	0.12		400	0.0888445
6/11/2002	TA-21	9:03	10:40	Personal	QB3395		02061102TM	0.11		97	0.366369
6/11/2002	TA-21	9:49	3:50	Area	QB3280		02061103TM	0.12		359	0.0989911
6/20/2002	TA-21	7:18	4:00	Personal	QB3283		02062001TM	< 0.087		522	0.0680801
6/20/2002	TA-21	7:19	4:00	Personal	QB3410		02062002TM	< 0.087		521	0.0682107
6/20/2002	TA-21	7:20	4:00	Personal	QB3263		02062003TM	0.57		520	0.0683419
6/20/2002	TA-21	7:27	4:30	Area	QB3339		02062004TM	< 0.085		537	0.0661784
6/20/2002	TA-21			Blank			02062005TM	ND			
6/25/2002	TA-21	8:00	3:40	Personal	QB3394		02062501TM	1.6		460	0.0772561
6/25/2002	TA-21	8:00	3:30	Personal	QB3727		02062502TM	0.17		450	0.0789729
6/25/2002	TA-21	8:08	3:45	Area	QB3231		02062503TM	0.95		457	0.0777632
7/2/2002	TA-21	8:28	3:36	Personal	QB3713		02070208TM	< 0.11		424	0.0838155
7/2/2002	TA-21	8:25	3:36	Personal	QB3596		0207029TM	0.13		421	0.0844128
7/2/2002	TA-21	8:30	3:38	Area	QB3800		02070210TM	< 0.11		428	0.0830322
7/10/2002	TA-21	9:08	3:36	Area	QB3981		02071001TM	0.26		388	0.0915922
7/10/2002	TA-21	9:00	3:30	Personal	QB3434		02071002TM	0.14		390	0.0911225
7/10/2002	TA-21	9:04	3:30	Personal	QB3739		02071003TM	< 0.11		386	0.0920668
7/10/2002	TA-21	9:01	3:30	Personal	QB4886		02071004TM	0.21		389	0.0913568
7/16/2002	TA-21	7:55	4:25	Personal	QB3525		02071601TM	0.16		510	0.0696819
7/16/2002	TA-21	8:00	4:28	Area	QB3679		02071602TM	< 0.087		508	0.0699563
7/23/2002	TA-21	7:55	3:45	Personal	QB3555		02072305TM	< 0.094		460	0.0772561
7/23/2002	TA-21	7:59	3:40	Personal	QB3570		02072306TM	< 0.1		451	0.0787978
7/23/2002	TA-21	8:04	3:39	Area	QB3841		02072307TM	< 0.097		457	0.0777632
7/23/2002	TA-21			Blank	QB4691		02072308TM	ND			
7/30/2002	TA-21	8:51	3:31	Personal	QB3701		02073004TM				
7/30/2002	TA-21	8:55	3:31	Personal	QB3677		02073005TM				
7/30/2002	TA-21	9:00	3:33	Area	QB3808		02073006TM				
8/6/2002	TA-21	8:04	3:22	Personal	QB3844		02080601TM				

Date	Location	Time On	Time Off	Sample Type	Monitor #	Empl. ID	Sample ID	Total Hydrocarbons		Total Time (min)	Detection Limit (ppm)
8/6/2002	TA-21	8:06	3:22	Personal	QB3748		02080602TM				
8/6/2002	TA-21	8:12	3:22	Personal	QB3591		02080603TM				
8/6/2002	TA-21	8:17	3:36	Area	QB3782		02080604TM				
8/13/2002	TA-21	7:55	3:44	Personal	QB3736		02081301TM				
8/13/2002	TA-21	7:57	3:44	Personal	QB3755		02081302TM				
8/13/2002	TA-21	7:59	3:44	Personal	QB3572		02081303TM				
8/13/2002	TA-21	8:04	3:47	Area	QB3600		02081304TM				
8/13/2002	TA-21			Blank	QB3710		02081305TM				
8/13/2002	TA-21			Blank	QB3571		02081306TM				
8/20/2002	TA-21	8:12	5:00	Personal	QB3541		02082001TM				
8/20/2002	TA-21	8:15	4:26	Personal	QB4896		02082002TM				
8/20/2002	TA-21	8:20	4:26	Personal	QB3852		02082003TM				
8/20/2002	TA-21	8:34	4:30	Area	QB3634		02082004TM				

APPENDIX 4

Analytical Results

Results from Vertical Coring Holes at TA-21-357 Fuel Oil Assessment
Provisional Analytical Data from General Engineering Laboratories

Sample Name	Depth (ft)	General Engineering Laboratories Analytical Data (TPH-Diesel Range Organics [mg/kg])
Vertical Hole #1	3	4.100
	8	31900.000
	15	26800.000
	20	36200.000
	25	30800.000
	30	22500.000
	33	24800.000
	39	18800.000
	45	14600.000
	55	13600.000
	65	12600.000
	75	13400.000
	85	141000.000
	95	88000.000
	105	44500.000
	115	18100.000
	125	170.000
	135	29800.000
	145	22300.000
	155	48.700
	165	7.540
	175	1.700
Vertical Hole #2	7.5	1.620
	20	2.600
	30	0.844
	40	1.190
	50	1.520
	60	1.330
	70	2.620
	80	3.100
	90	1.330
	100	1.090
	110	ND
Vertical Hole #3	15	67.300
	25	1.840
	35	50.200
	45	77.800
	55	2.720

Sample Name	Depth (ft)	General Engineering Laboratories Analytical Data (TPH-Diesel Range Organics [mg/kg])
	65	3.740
	75	55.400
	85	13.300
	95	0.932
	105	2.340
Vertical Hole #4	15	2.320
	25	2.320
	35	1.280
	45	1.470
	55	1.990
	65	1.590
	75	2.340
	85	2.290
	95	1.580
	105	0.718
	105 (duplicate)	ND
Vertical Hole #5	15	6.720
	25	20.500
	35	12900.000
	45	25200.000
	55	13300.000
	65	21800.000
	75	22100.000
	85	18700.000
	95	27600.000
	105	4.000
	105 (duplicate)	22.900
	115	4.440
	125	1.340
Vertical Hole #6	15	3.72
	25	1.58
	35	3.69
	45	6.72
	55	1.34
	65	1.77
	75	1.03
	85	1.17
	95	0.928
	105	1.93

Sample Name	Depth (ft)	General Engineering Laboratories Analytical Data (TPH-Diesel Range Organics [mg/kg])
Vertical Hole #7	15	0.955
	25	37.4
	35	209
	45	2.74
	55	56.3
	65	59.7
	75	47.4
	85	12.2
	95	2.17
	105	1.19
Vertical Hole #8	15	1.650
	25	2.890
	35	2.230
	45	0.000
	55	1.630
	65	0.000
	75	1.190
	85	0.000
	95	0.844
	105	0.726
Angle Hole #1at 35 degrees	20	14700.000
	30	25000.000
	40	12500.000
Horizontal Extent	11.47	2.230
	17.21	0.000
	22.94	1.630
Vertical Extent	16.38	0.000
	24.57	1.650
	32.77	2.890
Angle Hole #2 at 25 degrees	15	13600.000
	25	27300.000
	35	13600.000
	45	16700.000
	55	204.000
	65	2.800
	75	3.580
	85	4.340
	95	1.650

Sample Name	Depth (ft)	General Engineering Laboratories Analytical Data (TPH-Diesel Range Organics [mg/kg])
Horizontal Extent	6.33	1.190
	10.57	0.000
	14.79	0.844
	19.02	0.726
	23.24	0.000
	27.47	14700.000
	31.70	25000.000
	35.92	12500.000
	40.15	2.230
Vertical Extent	13.59	3.580
	22.66	4.340
	31.72	1.650
	40.78	1.190
	49.85	0.000
	58.91	0.844
	67.97	0.726
	77.04	0.000
	86.10	14700.000
Point J Re-Characterization		
JPA-1	4.5 to 5	119
JPA-2	4.5 to 5	287
JPA-3	4.5 to 5	79
JPA-4	4.5 to 5	103

APPENDIX 5

Point J Characterization

POINT J CHARACTERIZATION

Overview

During the Geoprobe characterization activities of the TA-21-57 Above Ground Storage Tank Diesel Fuel Oil Environmental Assessment and Characterization sampling and analyses of Point J resulted in Total Petroleum Hydrocarbons (TPH)-Diesel Range Organics (DRO) contamination levels of 1,080 mg/kg. The composite sample was taken near the tuff/topsoil interface between 2-ft. and 5-ft. depths. Although only slightly higher than New Mexico Special Waste Limits (1,000 mg/kg TPH), further characterization of the area was conducted.

Excavation and Sampling and Analyses Characterization

To further characterize the extent of contamination near Point J, a 5 ft. x 5 ft. x 5 ft. section of soil was removed directly over the original Geoprobe point. Four composite samples were taken (JPA-1 through JPA-4) in a 2 ft. radius on four sides of the excavated region at depths of 4.5 ft. to 5 ft. (see Figure 1). Field sampling using PetroFlag was used to determine the extent of contamination in all four of the sampling locations. Immediate field sampling provided only one indication of contamination at point JPA-2 (5 ppm TPH-DRO). The samples were sent to General Engineering Laboratory to be analyzed for TPH Diesel Range Organics.

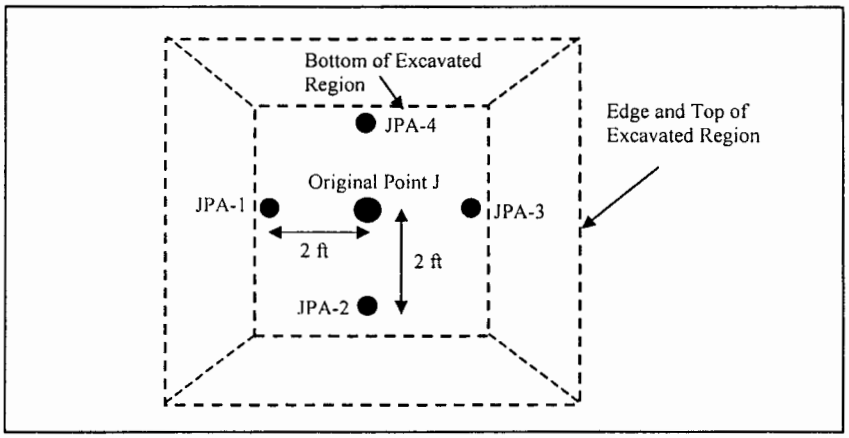


Figure 1. Sampling Layout of Point J

Analytical Result and Conclusions

Analytical results from GEL reflected low levels of TPH-DRO ranging from 79 mg/kg to 287 mg/kg (see Table 1). These levels are considerably lower than the original reading at point J of 1,080 mg/kg TPH-DRO. The TPH-DRO levels suggest that the contamination is bound within the area that was excavated. These TPH-DRO levels also indicate that the contamination of the area is very minor and well below New Mexico Special Waste levels of concern.

There are several utility lines (water and gas) within 18 inches of Point J. It is possible that the contamination may have been an artifact of a small historical spill that occurred during the placement of these utility lines. At this point, this cannot be confirmed.

All soil excavated from the area was placed back into the ground until remediation activities have been established.

Table 1. General Engineering Laboratories Analytical Results (TPH-DRO) of Point J Characterization

Sample ID	TPH-DRO (mg/kg)
JPA-1	119
JPA-2	287
JPA-3	79
JPA-4	103

APPENDIX 6

Figures

List of Figures

1 TA-21 DP Site – Overview of the TA-21 Building 357 and 57 Site

2 Vertical & Angle Core Sampling and Analyses Locations

3 TA-21 Stratigraphic Correlations (North Elevation)

4 TA-21 Stratigraphic Correlations (West Elevation)

5a Sample Locations Taken from Potholes During Preliminary Sampling and Analyses

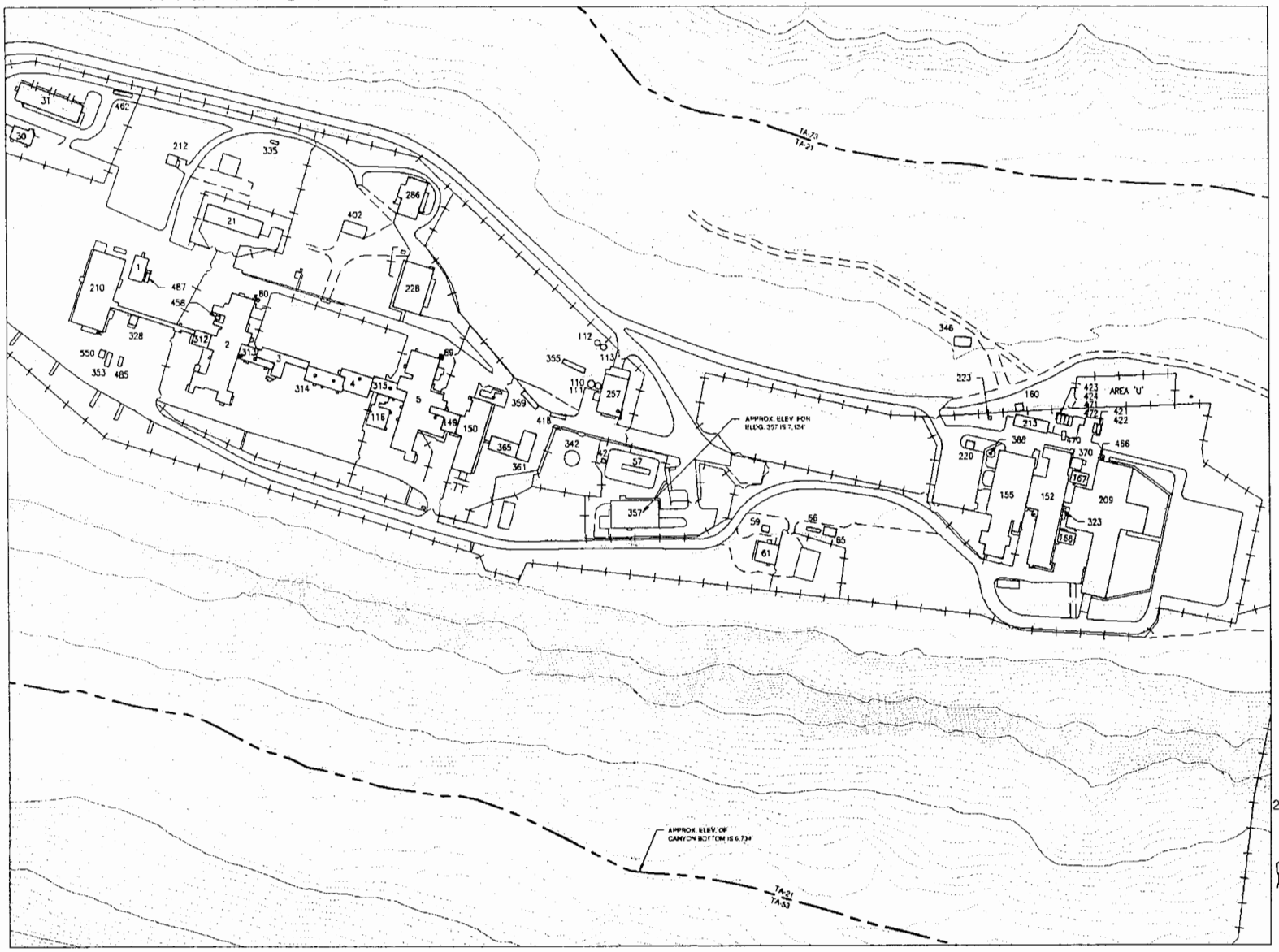
5b Trench Assessment Sampling and Analyses Locations

6 Geoprobe Sample and Analyses Locations and Layouts

7 (SE) Diesel Fuel Oil #2 Contamination Extent

7 (WE) Diesel Fuel Oil #2 Contamination Extent

Figure 1 - BASE MAP W/CONTOURS
TA-21 DP SITE - OVERVIEW OF THE TA-21 BUILDING 357 AND 57 SITE



Prepared For:
Los Alamos National Lab

Prepared by:
Johnson Controls Northern New Mexico

UTILITY MAPPING

LEGEND

- XXX Featured Building
- XXX Building With Number
- Paved Road
- Dirt/Gravel Road
- Security Fence
- Industrial Fence
- TA Boundary Line
- 100 Contours

Data obtained from JCNNM Utility Mapping and Location Section. Data was collected using GPS units and located using conventional locating equipment. Data should be field verified prior to using the information for any design, planning, construction or otherwise.

N
W E
S

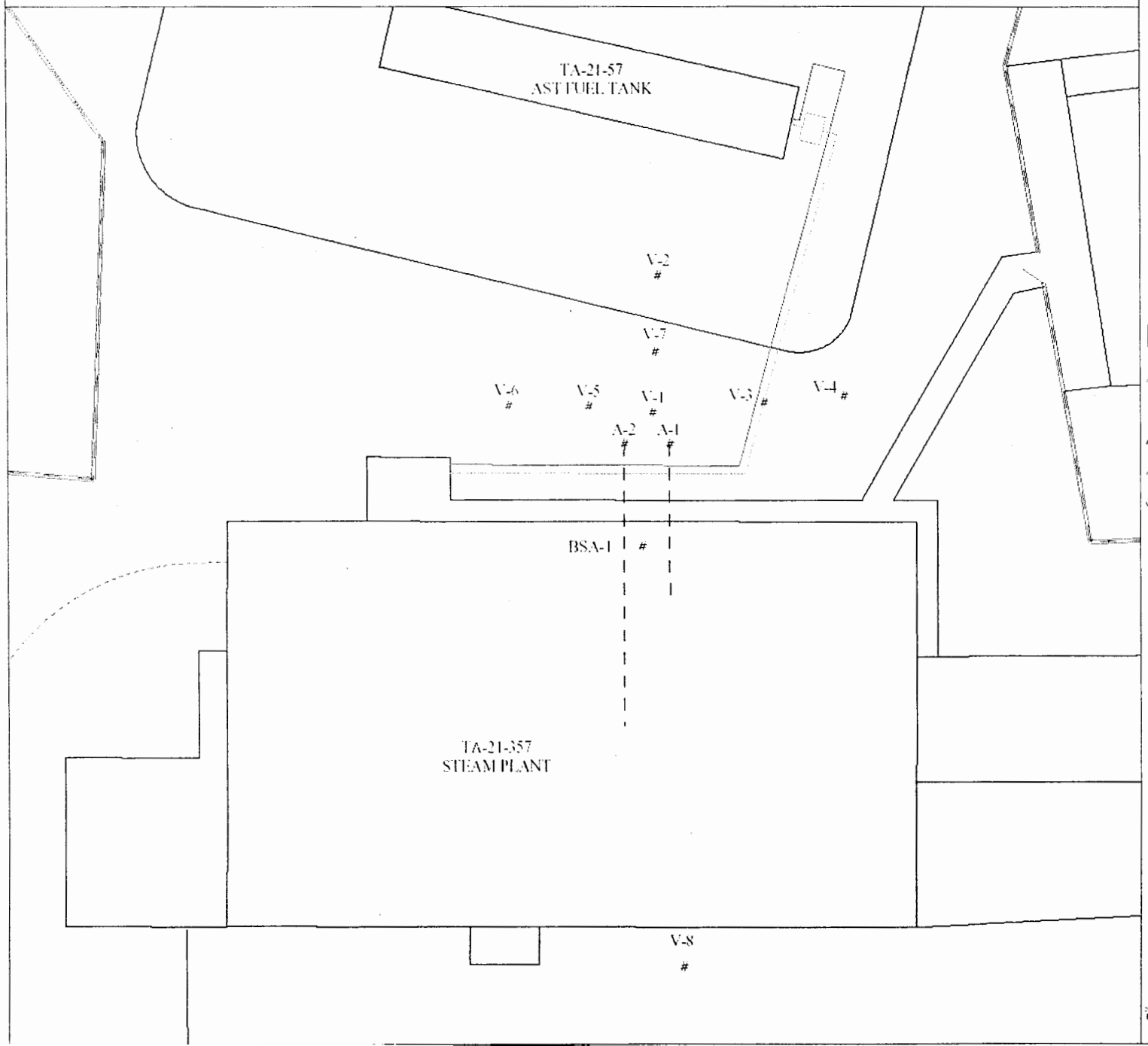
Scale 1"= 200'

200 0 400 600

Johnson Controls
Northern New Mexico
Telephone: (505) 665-1951

P. O. Box 30, MS A199
Los Alamos, NM 87544
Drawing Number: 100209; A.dwg
Date: August 23, 2002
Produced by: D. Sauer

Figure 2 - Vertical & Angle Core Sampling and Analyses Locations



Johnson Controls
Northern New Mexico
UTILITIES GIS AND DATA MANAGEMENT

Legend

- # Vertical Points W/#
- Structures
- Diesel Fuel Supply
- Diesel Fuel Return
- Paved Roads
- Dirt Roads
- Fences

Provisional Data

- DR - Detected Reading
- ND - Not Detected
- QA/QC In Progress
- Assaigai Analytical LABS Data
- Date Measures Diesel Range Organics

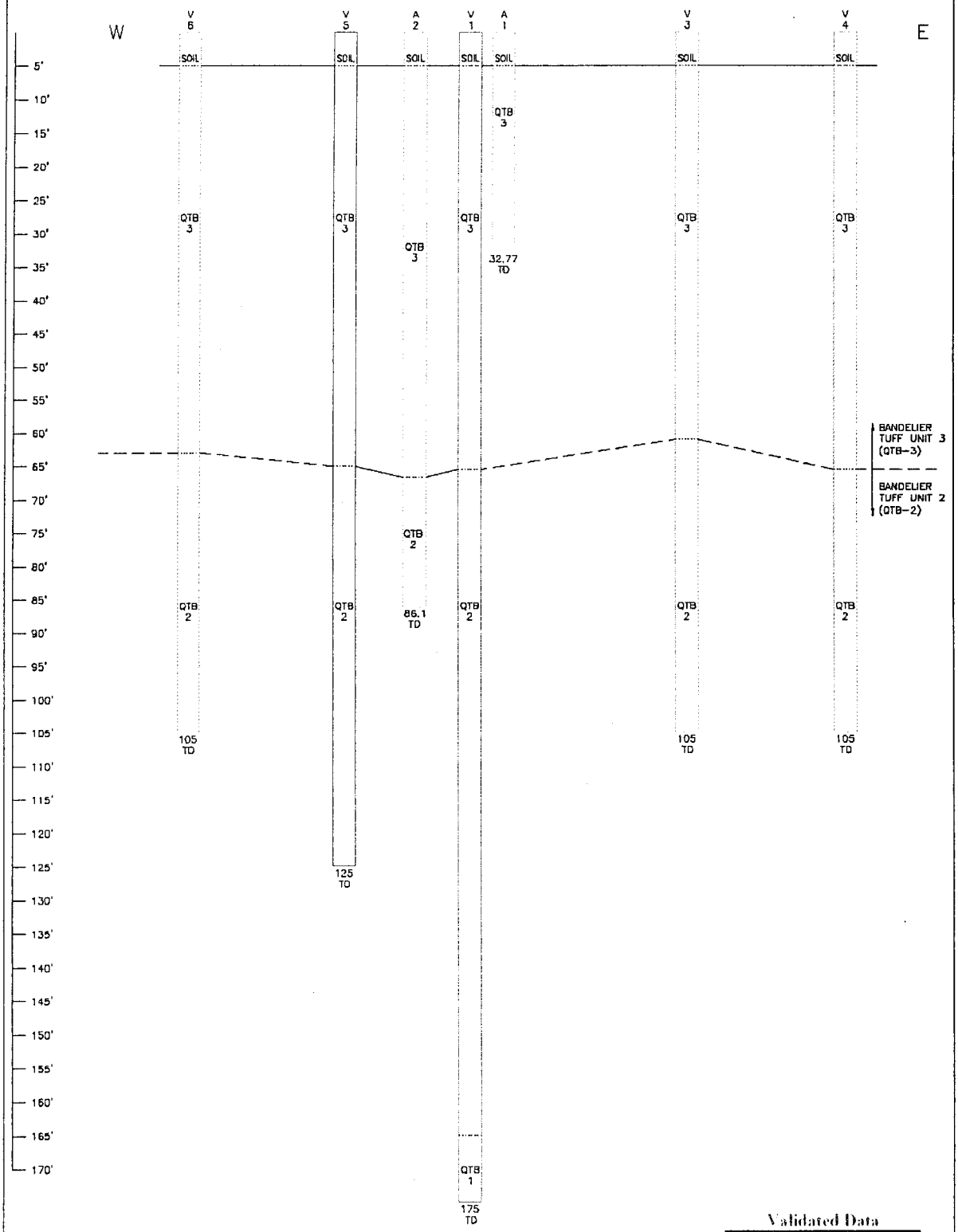
N
W E
S

Scale: 1" = 20' ft

August 23, 2002

Figure 3

TA-21 STRATIGRAPHIC CORRELATIONS (NORTH ELEVATION)

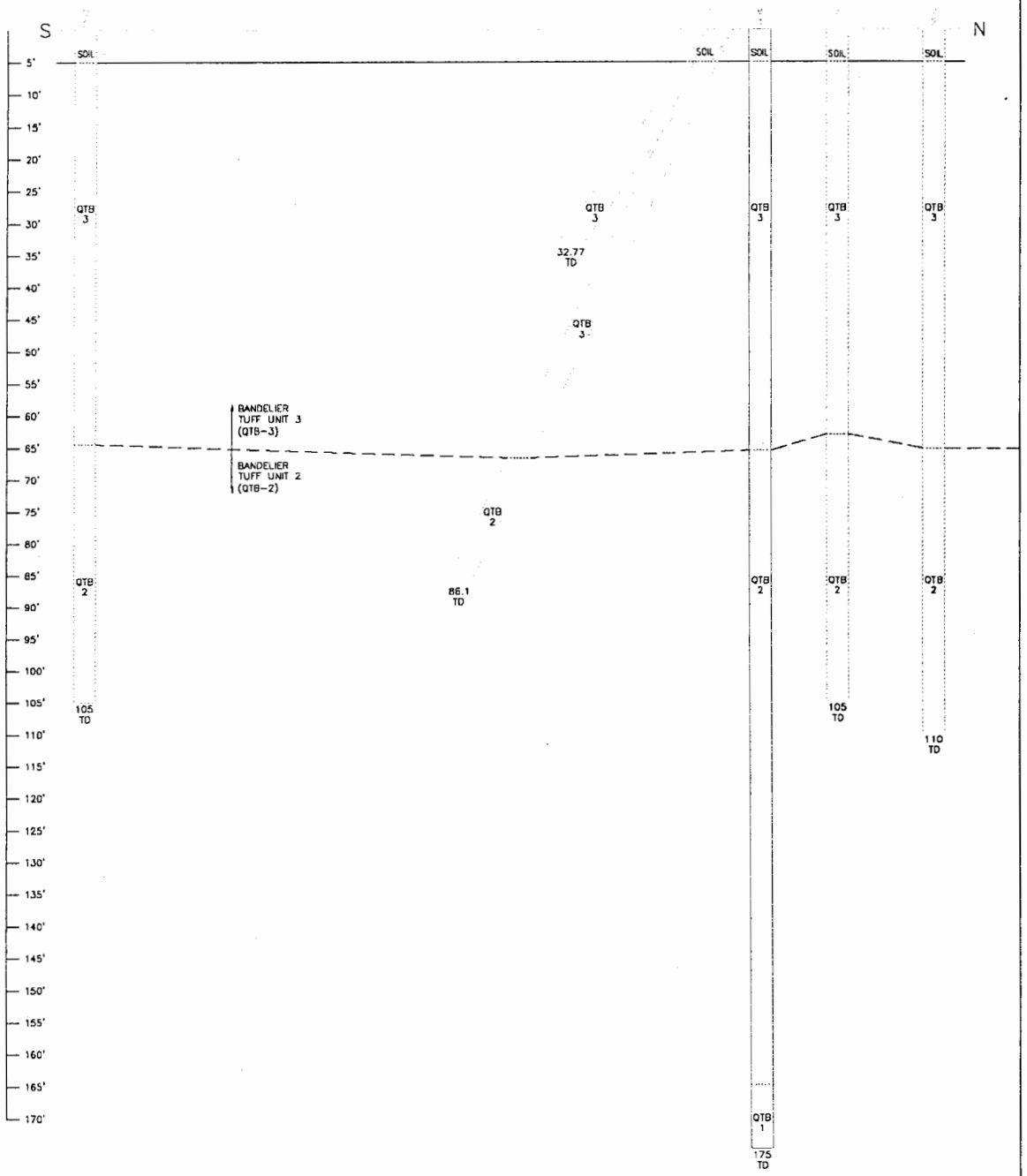


Validated Data

NORTH ELEVATION
VERTICAL HOLES

Johnson Controls
UTILITIES GIS AND DATA MANAGEMENT
AUGUST 23, 2002

Figure 4
TA-21 STRATIGRAPHIC CORRELATIONS (WEST ELEVATION)

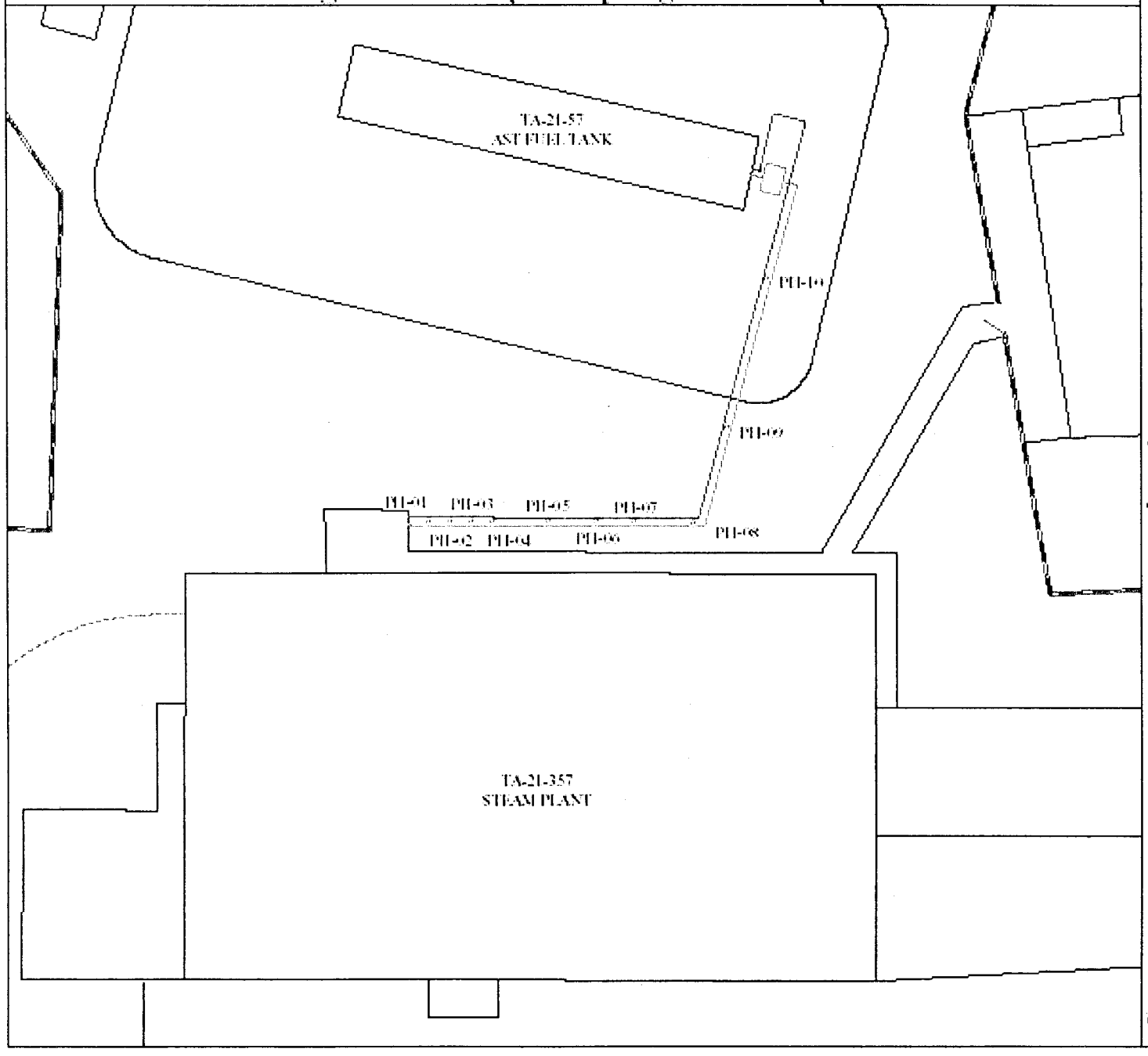


Validated Data

WEST ELEVATION
VERTICAL HOLES

Johnson Controls
UTILITIES GIS AND DATA MANAGEMENT
AUGUST 23, 2002

Figure 5a Sample Locations Taken from Potholes During Preliminary Sampling and Analyses



Johnson Controls
Utilities GIS and Data Management

Legend

- PH Points W/#
- Structures
- Diesel Fuel Supply
- Diesel Fuel Return
- Paved Roads
- Dirt Roads
- Fences

Provisional Data

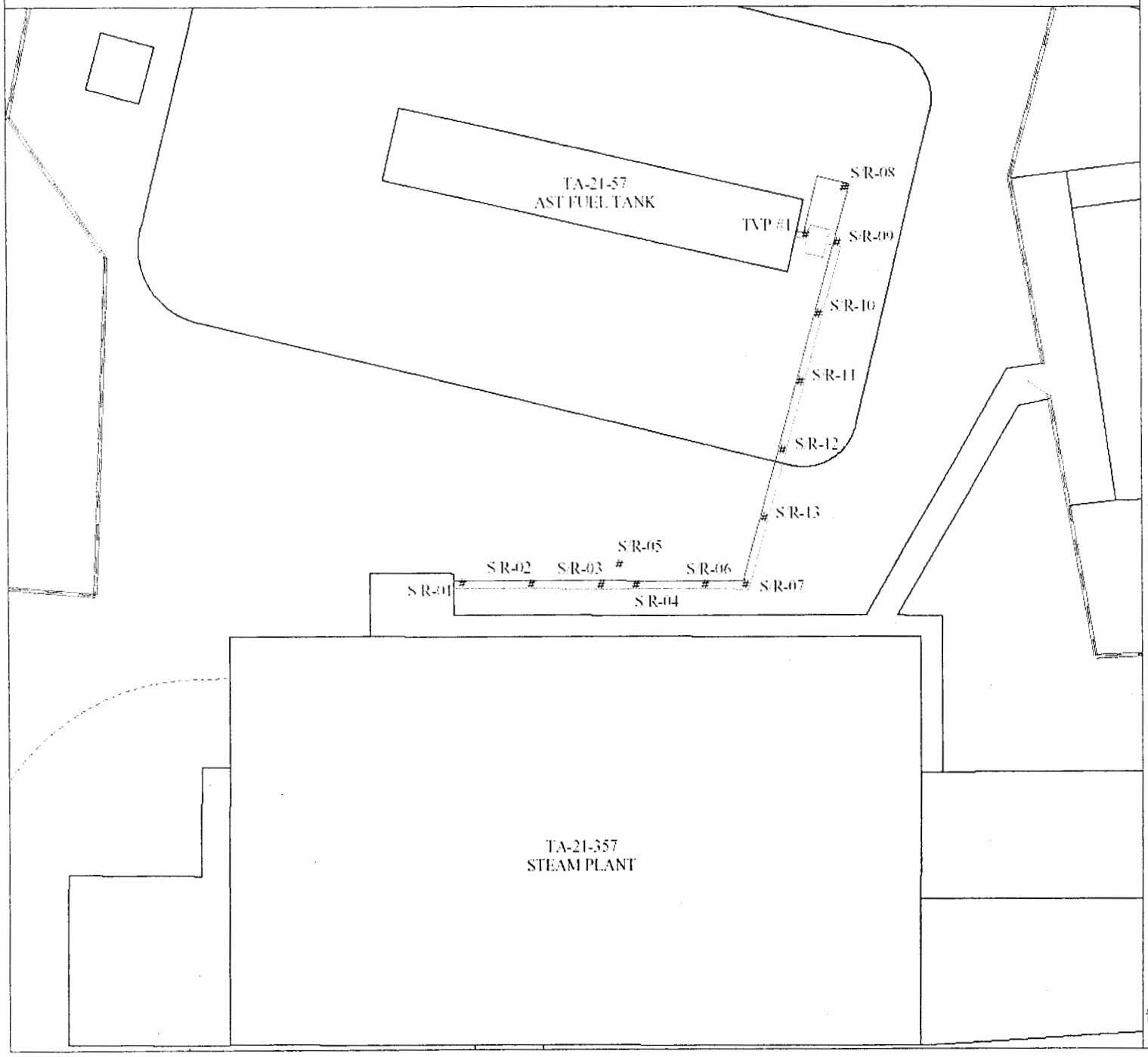
- DR - Detected Reading
- ND - Not Detected
- QA/QC In Progress
- Assaigai Analytical LABS Data
- Date Measures Diesel Range Organics

N
W
E
S

Scale 1" = 20 ft

August 23, 2002

Figure 5b - Trench Assessment Sampling and Analyses Locations



Johnson Controls
Northern New Mexico
UTILITIES GIS AND DATA MANAGEMENT

Legend

- # SR Points W/#
- Structures
- Diesel Fuel Supply
- Diesel Fuel Return
- Paved Roads
- Dirt Roads
- Fences

Provisional Data

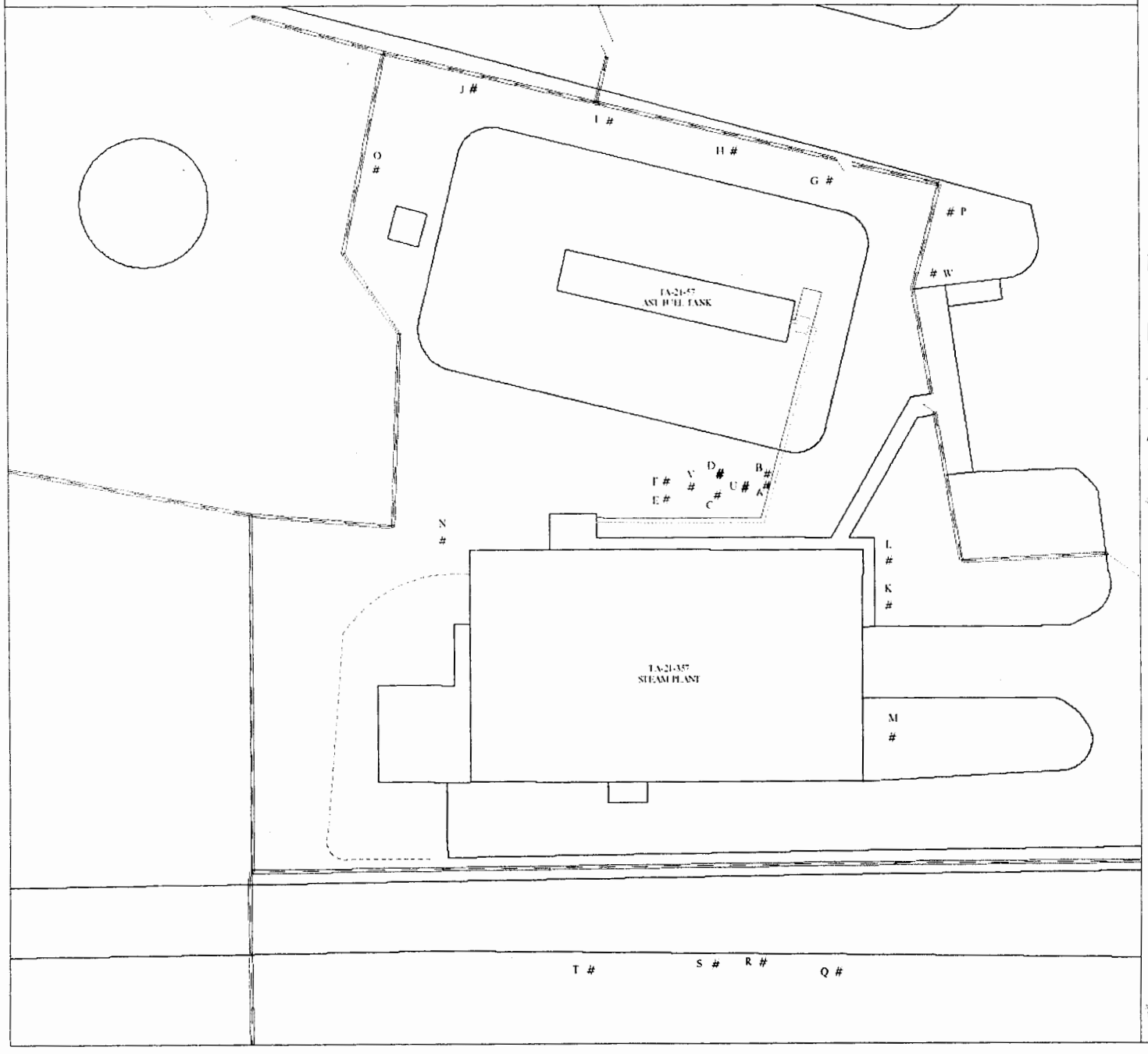
- DR - Detected Reading
- ND - Not Detected
- QA/QC In Progress
- Assaigai Analytical LABS Data
- Date Measures Diesel Range Organics

N
W E
S

Scale: 1" = 20' ft

August 23, 2002

Figure 6 - Geoprobe Sample and Analyses Locations and Layouts



Johnson Controls
Northern New Mexico
UTILITIES GIS AND DATA MANAGEMENT

Legend

- # Geoprobe Points W/#
- Structures
- Diesel Fuel Supply
- Diesel Fuel Return
- Paved Roads
- Dirt Roads
- Fences

Provisional Data

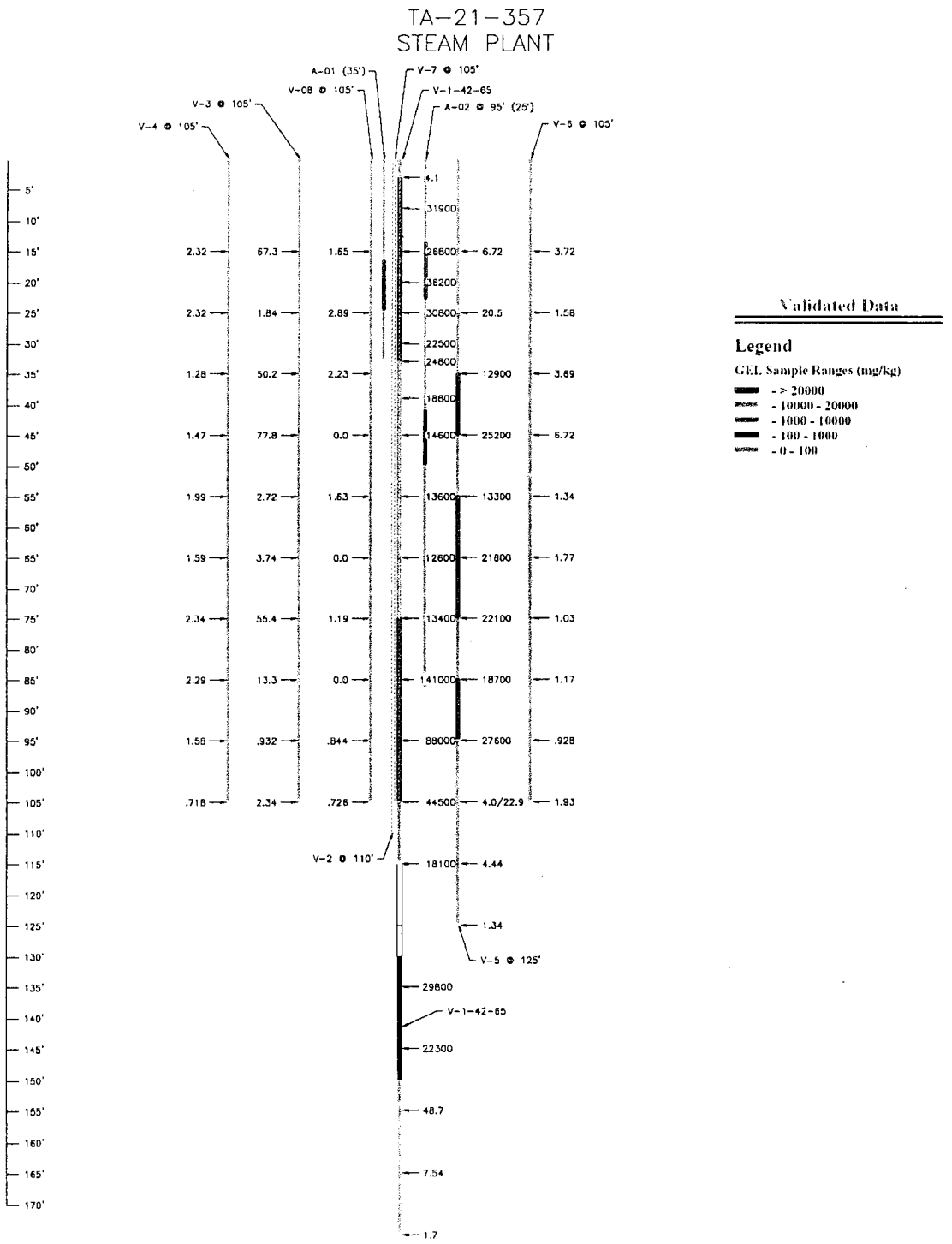
- DR - Detected Reading
- ND - Not Detected
- QA/QC In Progress
- Assaigai Analytical LABS Data
- Date Measures Diesel Range Organics

N
W E
S

Scale: 1" = 35' ft

August 23, 2002

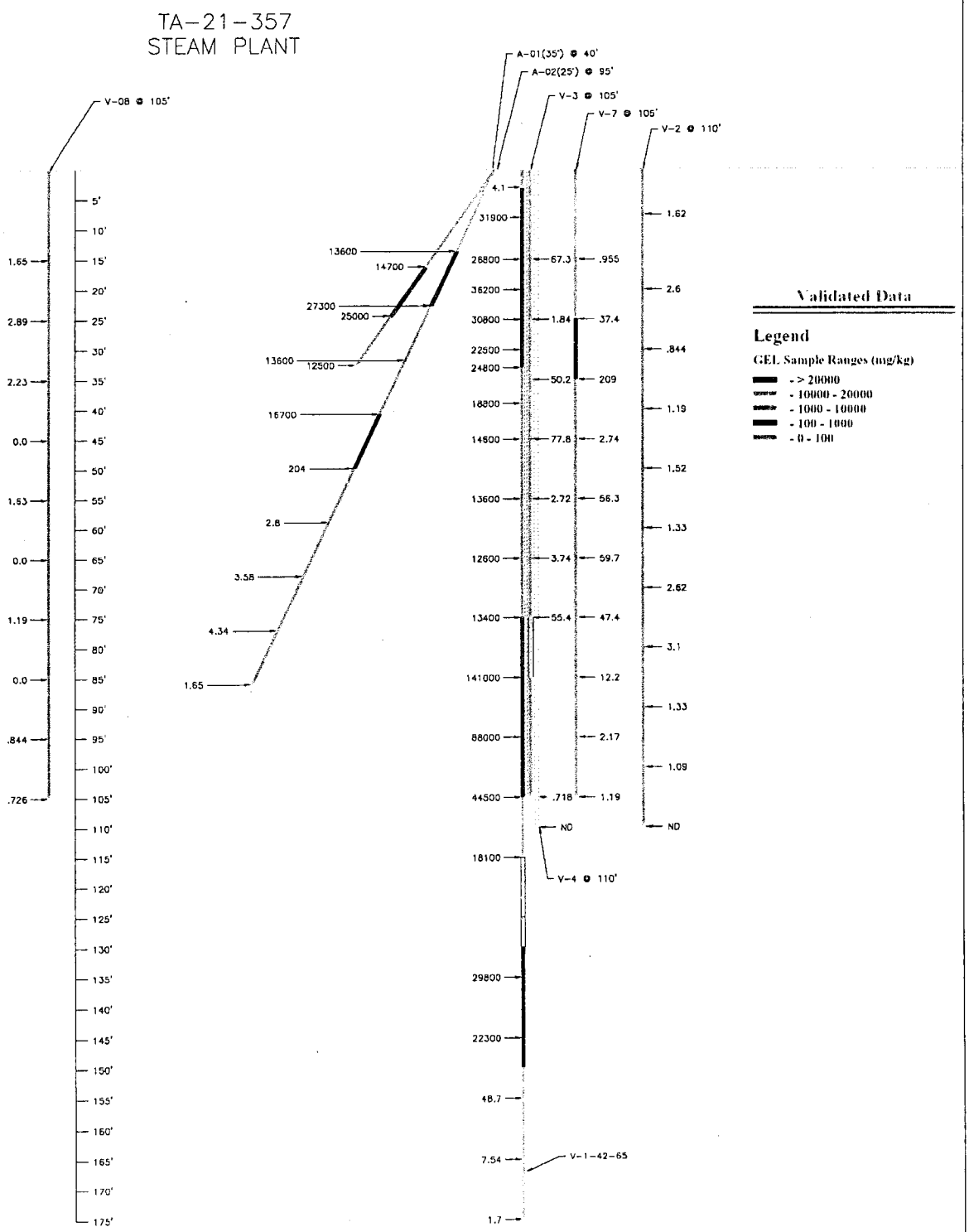
Figure 7 (SE)
DIESEL FUEL OIL #2 CONTAMINATION EXTENT



SOUTH ELEVATION
VERTICAL HOLES
GEL READINGS

Johnson Controls
UTILITIES GIS AND DATA MANAGEMENT
AUGUST 23, 2002

Figure 7 (WE)
DIESEL FUEL OIL #2 CONTAMINATION EXTENT



WEST ELEVATION
VERTICAL HOLES
GEL READINGS

Johnson Controls
Battelle Res. Labs
UTILITIES GIS AND DATA MANAGEMENT
AUGUST 23, 2002

ENCLOSURE 3

LOS ALAMOS NATIONAL LABORATORY
WASTE PROFILE SYSTEM
WPF #: 34731

Generator :	HOTH, EDWARD JAMES	MS :	K718	PH :	56002	Z#:	095092
WMC :	HAAGENSTAD, MARK	MS :	C306	PH :	70104	Z#:	116327
Contact :	Jim Stanton 7-0104						
RCRA Rev :	CORIZ, MICHELLE	MS :	J595	PH :	54000	Z#:	120950
Status :	ACTIVE	Activation Date :	07-Mar-2002		Expiration Date:		07-Mar-2003
Group :	FWO	TA :	21	Bldg :	000357	Room:	OUTSIDE

You are required to keep a copy of the WPF(s) in your files for at least three years. This WPF(s) is valid for one year or as long as the composition of the waste you have characterized remains the same and the generator remains the same. Should your waste or generator change, please submit a new WPF to FWO-SWO Customer Service, and attach a copy of the WPF which is being replaced.

Waste Accumu : **None of the Above Site ID#**

Method of Char : **Analysis/Documents Attached**
Chemical/Physical Analysis — **Number: See Below**
Acceptable Knowledge Documentation — **Number: HENV-2112**
MSDS

Waste Type : **Process Waste/Spent Chemical/Other**

Waste Classes: RCA Waste - **Not RCA Waste**
RAD Waste - **Non-rad**
Classif/Sensi - **N**

Waste Category: **Other**

Waste Sources : **Remediation/Restoration**

Waste Matrix : **Absorbed Liquid**

Matrix Type : **Heterogeneous**

Waste/Proc Desc : SOIL CONTAMINATED BY DIESEL FUEL BY AN HISTORICAL LEAK FROM THE UNDERGROUND PIPING OF AN ABOVE GROUND STORAGE TANK (AST). SAMPLE NUMBERS S/R-1 TO S/R-13, S/R-15, S/R-16, AND TVP-1. ADDITIONAL SAMPLES ARE BEING PROCESSED AND WILL BE INCLUDED IN THE AK DOCUMENTATION.

Ignitability : **Not ignitable**

Corrosivity : **Non-aqueous**

Reactivity : **Non-reactive**

Boiling Point : **Not applicable**

Toxicity Characteristic Metals : N/A

Toxicity Characteristic Organic Compounds: N/A

Additional Chemical Constituents and Contaminants :

CAS NO	Constituent	MIN	MAX	UOM
	SOIL	**90**	**95**	**%**
100-41-4	**ETHYLBENZENE**	**0**	**.01**	**%**
95-47-6	**O-XYLENES**	**0**	**.01**	**%**
108-38/31	**P/M-XYLENES**	**0**	**.01**	**%**
108-88-3	**TOLUENE**	**0**	**.01**	**%**
	DIESEL RANGE ORGANICS	**.1**	**5**	**%**

Additional Information: ALL CONTAMINANTS ARE ADSORBED TO SOIL PARTICLES.

LDR and Underlying Hazardous Constituents Information

Non-Wastewater/Wastewater Category: **Non Wastewater**

Notification of California List Applicability: N/A

Notification Of Underlying Hazardous Constituents:

Constituents

Ethyl benzene
Toluene
Xylenes (total)

WASTE CHARACTERIZATION INFORMATION

Radioactivity Category : **NON-RAD**

RCRA Category : **NON HAZARDOUS**

Secondary Info : N/A

Waste Classification : **NEW MEXICO SPECIAL WASTE**

Waste Acceptances :

EPA Hazardous Waste Code : N/A

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WASTE PROFILE FORM

Contact (if other than given below)	For rapid processing, complete all sections in black or blue ink and mail to: EM-SWO at **MS J595.** For assistance with completing this form, call EM-SWO at **5-4000**.	Reference Number (For EM-SWO use only.)

Generator's Z Number	Waste Generator's Name (print)	WMC's Z Number	WMC's Name (print)
095092	Ed Hoth	116327	Mark Haagenstad

~~Generator's Telephone~~	~~Generator's Mail Stop~~	~~Waste Generating Group~~	~~Waste Stream Technical Area~~	~~Building~~	~~Room~~
~~665-6002~~	~~K718~~	~~FWO-UI~~	~~21~~	~~357~~	~~Outside~~

Waste Accumulation (Check only one.)
- ☐ Satellite Accumulation Area — Site no: _____
- ☐ Less-than-90-days Storage Area — Site no: _____
- ☐ TSDF — Site no: _____
- ☐ ~~Universal Waste Storage Area~~ — Site no: _____
- ☒ None of the Above

ER Use Only ☐ ER Site — PRS #: _____

Method of Characterization (Check as many as apply.)
- ☒ Analysis/Documents Attached
- ☒ Chemical/Physical Analysis — Sample #: See Below
- ☐ Radiological Analysis — Sample #: _____
- ☐ PCB Analysis — Sample #: _____
- ☒ Acceptable Knowledge Documentation — Documentation #: HENV-2112
- ☒ MSDS

Section 1 - Chemical and Physical Information

Waste Type (Check only one.)
- ☐ Unused/Unspent Chemical (Complete all sections as appropriate.)
- ☒ Process Waste/Spent Chemical/ other (Complete all sections.)
- ☐ Green is Clean Waste (Complete all sections as appropriate.)

Waste Classes

Radiological Information
Was Waste Generated in a RCA? ☐ Yes ☒ No
- ☒ Non-radioactive
- ☐ Radioactive
  - ☐ Low-Level
  - ☐ Transuranic

Wastewater Information
- ☐ Wastewater for SWSC (TA-46) (Complete Attachment 1)
- ☐ Wastewater for RLWTF (TA-50/TA-21) (Complete Attachment 2)
- ☐ Wastewater for TA-16 (HE)

Classification Information
- ☒ Unclassified
- ☐ Classified/Sensitive

Waste Category (Check as many as apply.)
- ☐ Inorganic
- ☐ Organic
- Volatile Organics ☐ < 500 ppm ☐ ≥ 500 ppm
- ☐ Solvent *
- ☐ Degreaser *
- ☐ Dioxin
- ☐ Electroplating
- ☐ Treated Hazardous waste residue
- ☐ Explosive process
- ☐ Infectious/Medical
- ☐ Biological
- ☐ Beryllium
- ☐ Empty Container (See instructions)
- ☐ Battery (See instructions)
- Asbestos ☐ friable ☐ non-friable
- PCB Source Concentration
  - ☐ PCB < 50 ppm
  - ☐ PCB ≥ 50 - < 500 ppm
  - ☐ PCB ≥ 500 ppm
- ☒ Other (Describe below)

* Concentrations 10% or greater before use.

Waste Source (Check only one.)

Routine Waste
- ☐ Decon
- ☐ Materials Processing/Production
- ☐ Research/Development/Testing
- ☐ Scheduled Maintenance
- ☐ Housekeeping - Routine
- ☐ Spill Cleanup - Routine
- ☐ Sampling - Routine Monitoring
- ☐ Other (Describe below)

Non-routine Waste
- ☐ Abatement
- ☐ Construction/Upgrades
- ☐ Demolition
- ☐ Decon/Decom
- ☐ Investigative Derived
- ☐ Orphan/Legacy
- ☒ Remediation/Restoration
- ☐ Repacking (Secondary)
- ☐ Unscheduled Maintenance
- ☐ Housekeeping - Non-routine
- ☐ Spill Cleanup - Non-routine
- ☐ UST - Non-petroleum
- ☐ UST - Petroleum
- ☐ Other (Describe below)

Waste Matrix (Check only one.)

Gas
- ☐ ≤ 1.5 Atmospheres pressure
- ☐ > 1.5 Atmospheres pressure
- ☐ Liquefied compressed gas

Liquid
- ☐ Aqueous
- ☐ Non-aqueous
- ☐ Suspended Solids/ Aqueous
- ☐ Suspended Solids/ Non-aqueous

Solid
- ☐ Powder/Ash
- ☐ Solid
- ☐ Sludge
- ☒ Absorbed liquid

Matrix Type (Check only one.)
- ☐ Homogeneous
- ☒ Heterogeneous (Describe below)

Waste/Process Description (Chemical formulas may be used in this field.)

Soil contaminated by diesel fuel by an historical leak from the underground piping of an above ground storage tank (AST). Sample numbers S/R-1 to S/R-13, S/R-15, S/R-16, and TVP-1. Additional samples are being processed and will be included in the AK documentation file.

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WASTE PROFILE FORM

Section 3 - Additional Constituents

di tional Constituents and Contaminants. Please account for 100% of waste. Ranges should be given within guidelines of LIG 404-00-03 of individual constituents. List all other .onstituents (including inerts) not identified above and attach any applicable analysis. No chemical formulas allowed in this field. Continue in Section 3 Additional Information as necessary. CAS Numbers are needed for all chemical constituents, for material without a CAS Number enter "No CAS Number." Contact Waste Services at 5-4000 for assistance.

CAS No.	Name of constituent	Minimum	Maximum
No CAS Number	Soil	90	95 %
100-41-4	Ethylbenzene	0	.01 %
95-47-6	o-Xylene	0	.01 %
108-38/31/106-4	p/m-Xylenes	0	.01 %
108-88-3	Toluene	0	.01 %
No CAS Number	Diesel Range Organics	0.1	5 %
			%
			%
			%
			%
			%
			%
	Total of max. ranges of this section	100	**in %**
	Total of max. ranges from page 2.	0	**in ppm**

Additional Information (Use additional sheet if necessary.)

If additional information is available on the chemical, physical, or radiological character of the waste not covered on this form, provide it below:

All contaminants are adsorbed to soil particles.

WASTE GENERATOR CERTIFICATION: Based on my knowledge of the waste and/or chemical/physical analysis, I certify that the information on this form is correct. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature	Date
	2/28/02

WASTE MANAGEMENT COORDINATOR: I have reviewed this form and to the best of my knowledge, the information is complete and accurate.

Signature	Date
	02/27/02

Notification Of Underlying Hazardous Constituents

(Check the applicable underlying constituents above the concentration levels for D001 - D043 characteristic wastes only)

ganic Constituents - continued

- ☐ Di-n-propylnitrosamine
- ☐ 1,4-Dioxane
- ☐ Diphenylamine
- ☐ Diphenylnitrosamine
- ☐ 1,2-Diphenylhydrazine
- ☐ Disulfoton
- ☐ Dithiocarbamates (total)
- ☐ Endosulfan I
- ☐ Endosulfan II
- ☐ Endosulfan sulfate
- ☐ Endrin
- ☐ Endrin aldehyde
- ☐ EPTC
- ☐ Ethyl acetate
- ☒ Ethyl benzene
- ☐ Ethyl cyanide (Propanenitrile)
- ☐ Ethyl ether
- ☐ bis(2-Ethylhexyl) phthalate
- ☐ Ethyl methacrylate
- ☐ Ethylene oxide
- ☐ Famphur
- luoranthene
- ☐ Fluorene
- ☐ Formetanate hydrochloride
- ☐ Formparanate
- ☐ Heptachlor
- ☐ Heptachlor epoxide
- ☐ Hexachlorobenzene
- ☐ Hexachlorobutadiene
- ☐ Hexachlorocyclopentadiene
- ☐ Hexachlorodibenzo-p-dioxins (HxCDDs)
- ☐ Hexachlorodibenzo-furans (HxCDFs)
- ☐ Hexachloroethane
- ☐ Hexachloropropylene
- ☐ Indeno (1,2,3-c,d) pyrene
- ☐ Iodomethane
- ☐ 3-Iodo-2-propynyl n-butylcarbamate
- ☐ Isobutyl alcohol
- ☐ Isodrin
- ☐ Isolan
- ☐ Isosafrole
- ☐ Kepone
- ☐ Methacrylonitrile
- iethanol
- ☐ Methapyrilene
- ☐ Methiocarb
- ☐ Methomyl
- ☐ Methoxychlor
- ☐ 3-Methylcholanthrene
- ☐ 4,4-Methylene bis(2-chloroaniline)
- ☐ Methylene chloride
- ☐ Methyl ethyl ketone
- ☐ Methyl isobutyl ketone
- ☐ Methyl methacrylate
- ☐ Methyl methansulfonate
- ☐ Methyl parathion
- ☐ Metolcarb
- ☐ Mexacarbate
- ☐ Molinate
- ☐ Naphthalene
- ☐ 2-Naphthylamine
- ☐ o-Nitroaniline
- ☐ p-Nitroaniline
- ☐ Nitrobenzene
- ☐ 5-Nitro-o-toluidine
- ☐ o-Nitrophenol
- ☐ p-Nitrophenol
- ☐ N-Nitrosodiethylamine
- ☐ N-Nitrosodimethylamine
- ☐ N-Nitroso-di-n-butylamine
- ☐ N-Nitrosomethylethylamine
- ☐ N-Nitrosomorpholine
- ☐ N- Nitrosopiperidine
- ☐ N-Nitrosopyrrolidine
- ☐ Oxamyl
- ☐ Parathion
- ☐ PCBs (total)
- ☐ Pebulate
- ☐ Pentachlorobenzene
- ☐ Pentachlorodibenzo-p-dioxins (PeCDDs)
- ☐ Pentachlorodibenzo-furans (PeCDFs)
- ☐ Pentachloroethane
- ☐ Pentachloronitrobenzene
- ☐ Pentachlorophenol
- ☐ Phenacetin
- ☐ Phenanthrene
- ☐ Phenol
- ☐ o-Phenylenediamine
- ☐ Phorate
- ☐ Phthalic acid
- ☐ Phthalic anhydride
- ☐ Physostigmine
- ☐ Physostigmine salicylate
- ☐ Promecarb
- ☐ Pronamide
- ☐ Propham
- ☐ Propoxur
- ☐ Prosulfocarb
- ☐ Pyrene
- ☐ Pyridine
- ☐ Safrole
- ☐ Silvex (2,4,5-TP)
- ☐ 1,2,4,5-Tetrachlorobenzene
- ☐ Tetrachlorodibenzo-p-dioxins (TCDDs)
- ☐ Tetrachlorodibenzofurans (TCDFs)
- ☐ 1,1,1,2-Tetrachloroethane
- ☐ 1,1,2,2-Tetrachloroethane
- ☐ Tetrachloroethylene
- ☐ 2,3,4,6-Tertachlorophenol
- ☐ Thiodicarb
- ☐ Thiophanate-methyl
- ☐ Tirpate
- ☒ Toluene
- ☐ Toxaphene
- ☐ Triallate
- ☐ Tribromomethane (Bromoform)
- ☐ 1,2,4-Trichlorobenzene
- ☐ 1,1,1-Trichloroethane
- ☐ 1,1,2-Trichloroethane
- ☐ Trichloroethylene
- ☐ Trichloromonofluoromethane
- ☐ 2,4,5-Trichlorophenol
- ☐ 2,4,6-Trichlorophenol
- ☐ 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)
- ☐ 1,2,3-Trichloropropane
- ☐ 1,1,2-Trichloro-1,2,2-trifluoroethane
- ☐ Triethylamine
- ☐ tris-(2,3-Dibromopropyl) phosphate
- ☐ Vernolate
- ☐ Vinyl chloride
- ☒ Xylenes (total)

MSDS#24B

SECTION 1 - MANUFACTURER INFORMATION

MANUF/DIST : BLOOMFIELD REFINING CO.
EMERGENCY PHONE.....: 800-434-9300
P.O. BOX 159 PREPARATION/REVISION DATE: 3/26/90
BLOOMFIELD NM 87413
PREPARER/CONTACT: JIM STIFFLER

LOCATION : UNITS

TRADE NAME/SYNONYMS...: DIESEL
CHEMICAL NAME/SYNONYMS: FUEL OIL #2
CHEMICAL FAMILY.....: HYDROCARBON
FORMULA.....: NO INFORMATION
PRODUCT CODE.....:

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM (HMIS)

```
**************************
*                        *
*   HEALTH........ 0     *
*   FLAMMABILITY.. 2     *
*   REACTIVITY.... 0     *
*   PROTECTION.... Y     *
*                        *
**************************
```

SECTION 2 - HAZARDOUS INGREDIENTS

THIS PRODUCT CONTAINS HAZARDOUS INGREDIENTS : YES

CHEMICAL/COMMON NAME	CAS-NUMBER	%	PEL-OSHA	TLV-ACGIH
COMPLEX COMBINATION OF STRAIGHT CHAIN AND CRACKED HYDROCARBONS. CONTAINS ADDITIVES WHICH ARE NOT CONSIDERED HAZARDOUS IN CONCENTRATIONS PRESENT.	MIXTURE	100	N/I	N/I

THIS PRODUCT CONTAINS CARCINOGENS (NTP, IARC, or OSHA):NO

CHEMICAL/COMMON NAME	CAS-NUMBER	%	NTP	IARC	OSHA

SEE SECTION 3 "HEALTH HAZARD DATA"

SECTION 3 - HEALTH HAZARD DATA

HEALTH EFFECTS (Acute And Chronic)-
WARNING, MINIMIZE BREATHING VAPORS. REPEATED OR PROLONGED EXPOSURE TO HIGH CONCENTRATION OF VAPOR MAY CAUSE HEADACHE, DIZZINESS, NAUSEA, INCOORDINATION LOSS OF CONSCIOUSNESS OR EVEN DEATH.
HARMFUL IS SWALLOWED RESULTING IN NAUSEA, VOMITING, DIARRHEA AND RESTLESSNESS.
ATION OF VOMITUS MAY LEAD TO SEVERE LUNG DAMAGE AND EVEN DEATH.
NGED AND REPEATED LIQUID CONTACT CAN CAUSE DEFATTING AND DRYING OF THE SKIN RESULTING IN SKIN IRRITATION AND DERMATITIS.

INCOMPATIBILITY (Materials To Avoid)-
AVOID HEAT, SPARKS, OPEN FLAME, AND STRONG OXIDIZING AGENTS, PREVENT VAPOR ACCUMULATION.

HAZARDOUS DECOMPOSITION PRODUCTS-
CARBON MONOXIDE AND OTHER ORGANIC COMPOUNDS CAN BE FORMED UPON COMBUSTION. (SEE SECTION 3 "HEALTH HAZARD DATA"

WILL HAZARDOUS POLYMERIZATION OCCUR-
WILL NOT OCCUR

CONDITIONS TO AVOID FOR POLYMERIZATION-
N/I

IS THE PRODUCT STABLE-
YES

CONDITIONS TO AVOID FOR STABILITY-
N/I

SECTION 6 - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED-
ISOLATE HAZARD AREA. WEAR APPROPRIATE RESPIRATOR AND CLOTHING. SHUT OFF SOURCE OF LEAK IF SAFE TO DO SO. DIKE AND CONTAIN. REMOVE WITH VACUUM TRUCKS OR PUMP T[illegible]AGE SALVAGE VESSELS.SOAK UP RESIDUE WITH AN ABSORBANT SUCH AS CLAY,SAND OR [illegible]ER SUITABLE MATERIAL, PLACE IN D.O.T. AUTHORIZED NON-LEAKING CONTAINERS FOR PROPER DISPOSAL. SMALL SPILLS, TAKE UP WITH AN ABSORBANT MATERIAL AND DISPOSE AS ABOVE.

WASTE DISPOSAL METHODS-
RECOVERED PRODUCT SHOULD BE RECYCLED. WASTE GENERATED DURING CLEANUP WHICH IS DISCARDED AS A SOLID WASTE SHOULD BE DISPOSED OF AT A FACILITY APPROVED UNDER RCRA REGULATIONS FOR HAZARDOUS WASTE.

SECTION 7 - EXPOSURE CONTROL INFORMATION

VENTILATION-
LOCAL EXHAUST: TO CAPTURE VAPORS MECHANICAL (General): EXPLOSION PROOF
SPECIAL.....: 60 fpm VELOCITY OTHER.....: N/A

RESPIRATORY PROTECTION-
UNDER CONDITONS OF POTENTIAL HIGH EXPOSURE, THE USE OF A NIOSH APPROVED RESPIRATOR IS RECOMMENDED. PER 29 CFR 1910.134 USE EITHER AN ATMOSPHERE SUPPLYING RESPIRATOR OR AN AIR PURIFYING RESPIRATOR FOR ORGANIC VAPORS.

PROTECTIVE GLOVES-
IMPERVIOUS

ASSAIGAI
ANALYTICAL
LABORATORIES, INC.
7300 Jefferson, NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259
3332 Wedgewood Dr., Suite N • El Paso, Texas 79925 • (915) 593-6000 • FAX (915) 593-7820
127 Eastgate Drive, 212-C • Los Alamos, New Mexico 87544 • (505) 662-255

Explanation of codes

B	analyte detected in Method Blank
E	result is estimated
H	analyzed out of hold time
N	tentatively identified compound
S	subcontracted
1-9	see footnote

JOHNSON CONTROLS NNM
attn: MARK HAAGENSTAD
PO BOX 50
LOS ALAMOS NM 87544

STANDAR

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

William P. Biava: President of Assaigai Analytical Laboratories, Inc.

Client: JOHNSON CONTROLS NNM
Project: TA-21-357/5383.06.0000
Order: 0202315 JOH23 Receipt: 02-25-02

Sample: *S/R-1 /PIPE TRENCH* Collected: *02-23-02 10:15:00* By: *BB*
Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202315-01A		SW846 5030A/8021B Purgeable VOCs by GC/PID					By: JAA			
X0277	XG.2002.249.4	71-43-2	Benzene	ND	mg / Kg	1	0.005		02-25-02	02-25-
X0277	XG.2002.249.4	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		02-25-02	02-25-
X0277	XG.2002.249.4	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		02-25-02	02-25-
X0277	XG.2002.249.4	108-38-3/106-42	p/m-Xylenes	ND	mg / Kg	1	0.01		02-25-02	02-25-
X0277	XG.2002.249.4	108-88-3	Toluene	ND	mg / Kg	1	0.005		02-25-02	02-25-
0202315-01A		SW846 ME/8015A Diesel Range Organics by GC/FID					By: JWB			
X0276	XG.2002.251.4		Diesel Range Organics	ND	mg / Kg	1	25		02-25-02	02-25-

Sample: *S/R-2 /PIPE TRENCH* Collected: *02-23-02 10:17:00* By: *BB*
Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202315-02A		SW846 5030A/8021B Purgeable VOCs by GC/PID					By: JAA			
X0277	XG.2002.249.7	71-43-2	Benzene	ND	mg / Kg	1	0.005		02-25-02	02-25
X0277	XG.2002.249.7	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		02-25-02	02-25
X0277	XG.2002.249.7	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		02-25-02	02-25
X0277	XG.2002.249.7	108-38-3/106-42	p/m-Xylenes	ND	mg / Kg	1	0.01		02-25-02	02-25
X0277	XG.2002.249.7	108-88-3	Toluene	ND	mg / Kg	1	0.005		02-25-02	02-25
0202315-02A		SW846 ME/8015A Diesel Range Organics by GC/FID					By: JWB			
	XG.2002.251.7		Diesel Range Organics	ND	mg / Kg	1	25		02-25-02	02-25

Member: American Council of

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THIS REPORT MAY NOT BE USED IN ANY MANNER BY THE CLIENT OR ANY OTHER THIRD PARTY TO CLAIM

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

: **JOHNSON CONTROLS NNM**

Project: **TA-21-357/5383.06.0000**

Order: **0202315 JOH23** Receipt: **02-25-02**

Sample: *S/R-6 /PIPE TRENCH* Collected: *02-23-02 12:31:00* By: *BB*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202315-06A		SW846 5030A/8021B Purgeable VOCs by GC/PID					By: JAA			
X0277	XG.2002.250.2	71-43-2	Benzene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.2	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.2	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.2	108-38-3/106-42	p/m-Xylenes	ND	mg / Kg	1	0.01		02-25-02	02-25-02
X0277	XG.2002.250.2	108-88-3	Toluene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
0202315-06A		SW846 ME/8015A Diesel Range Organics by GC/FID					By: JWB			
X0276	XG.2002.261.0		Diesel Range Organics	78	mg / Kg	1	25		02-25-02	02-25-02

Sample: *S/R-7 /PIPE TRENCH* Collected: *02-23-02 12:43:00* By: *BB*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
15-07A		SW846 5030A/8021B Purgeable VOCs by GC/PID					By: JAA			
[illegible]	XG.2002.250.3	71-43-2	Benzene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.3	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.3	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.3	108-38-3/106-42	p/m-Xylenes	ND	mg / Kg	1	0.01		02-25-02	02-25-02
X0277	XG.2002.250.3	108-88-3	Toluene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
0202315-07A		SW846 ME/8015A Diesel Range Organics by GC/FID					By: JWB			
X0276	XG.2002.251.10		Diesel Range Organics	210	mg / Kg	1	25		02-25-02	02-25-02

Sample: *TVP-1 /VALVE PIT* Collected: *02-23-02 12:46:00* By: *BB*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202315-08A		SW846 5030A/8021B Purgeable VOCs by GC/PID					By: JAA			
X0277	XG.2002.250.4	71-43-2	Benzene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.4	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.4	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.4	108-38-3/106-42	p/m-Xylenes	ND	mg / Kg	1	0.01		02-25-02	02-25-02
X0277	XG.2002.250.4	108-88-3	Toluene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
0202315-08A		SW846 ME/8015A Diesel Range Organics by GC/FID					By: JWB			
X0276	XG.2002.251.11		Diesel Range Organics	ND	mg / Kg	1	25		02-25-02	02-25-02

STANDARD

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

JOHNSON CONTROLS NNM

Project: **TA-21-357/5383.06.0000**

Order: **0202315** **JOH23** Receipt: **02-25-02**

Sample: ***S/R-11 /PIPE TRENCH*** Collected: *02-23-02 15:26:00* By: *BB*

Matrix: ***SOIL***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202315-12A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**						By: JAA		
X0277	XG.2002.250.8	71-43-2	Benzene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.8	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.8	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.8	108-38-3/106-42	p/m-Xylenes	ND	mg / Kg	1	0.01		02-25-02	02-25-02
X0277	XG.2002.250.8	108-88-3	Toluene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
0202315-12A		**SW846 ME/8015A Diesel Range Organics by GC/FID**						By: JWB		
X0276	XG.2002.251.13		Diesel Range Organics	ND	mg / Kg	1	25		02-25-02	02-25-02

Sample: ***S/R-12 /PIPE TRENCH*** Collected: *02-23-02 15:29:00* By: *BB*

Matrix: ***SOIL***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
15-13A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**						By: JAA		
X0277	XG.2002.250.9	71-43-2	Benzene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.9	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.9	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.250.9	108-38-3/106-42	p/m-Xylenes	ND	mg / Kg	1	0.01		02-25-02	02-25-02
X0277	XG.2002.250.9	108-88-3	Toluene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
0202315-13A		**SW846 ME/8015A Diesel Range Organics by GC/FID**						By: JWB		
X0276	XG.2002.251.14		Diesel Range Organics	ND	mg / Kg	1	25		02-25-02	02-25-02

Sample: ***S/R-13 /PIPE TRENCH*** Collected: *02-23-02 15:32:00* By: *BB*

Matrix: ***SOIL***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202315-14A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**						By: JAA		
X0277	XG.2002.249.8	71-43-2	Benzene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.249.8	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.249.8	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		02-25-02	02-25-02
X0277	XG.2002.249.8	108-38-3/106-42	p/m-Xylenes	ND	mg / Kg	1	0.01		02-25-02	02-25-02
X0277	XG.2002.249.8	108-88-3	Toluene	ND	mg / Kg	1	0.005		02-25-02	02-25-0
0202315-14A		**SW846 ME/8015A Diesel Range Organics by GC/FID**						By: JWB		
X0276	XG.2002.251.15		Diesel Range Organics	ND	mg / Kg	1	25		02-25-02	02-25-0

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Explanation of codes

B	analyte detected in Method Blank
E	result is estimated
H	analyzed out of hold time
N	tentatively identified compound
S	subcontracted
1-9	see footnote

JOHNSON CONTROLS NNM
attn: MARK HAAGENSTAD
PO BOX 50
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Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: JOHNSON CONTROLS NNM
Project: TA-21 SAMPLING
Order: 0202276 JOH23 Receipt: 02-21-02

William P. Biava: President of Assaigai Analytical Laboratories, Inc.

Sample: *02.0005/ TA-21* Collected: *02-21-02 10:30:00* By: *MH*
Matrix: *S*

Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202276-01A		SW846 ME/8015A Diesel Range Organics by GC/FID						By: ALG		
X0274	XG.2002.242.1		Diesel Range Organics	ND	mg / Kg	1	25		02-21-02	02-21-0

Sample: *02.0006/ TA-21* Collected: *02-21-02 10:33:00* By: *MH*
Matrix: *S*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202276-02A		SW846 ME/8015A Diesel Range Organics by GC/FID						By: ALG		
X0274	XG.2002.241.7		Diesel Range Organics	ND	mg / Kg	1	25		02-21-02	02-21-0

Sample: *02.0007/ TA-21* Collected: *02-21-02 10:35:00* By: *MH*
Matrix: *S*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202276-03A		SW846 ME/8015A Diesel Range Organics by GC/FID						By: ALG		
X0274	XG.2002.241.8		Diesel Range Organics	ND	mg / Kg	1	25		02-21-02	02-21-0

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Certificate of Analysis

t: JOHNSON CONTROLS NNM

t: TA-21 SAMPLING

Order: 0202276 JOH23 Receipt: 02-21-02

Sample: 02.0008/ TA-21 Collected: 02-21-02 10:40:00 By: MH

Matrix: S

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202276-04A		SW846 ME/8015A Diesel Range Organics by GC/FID						By: ALG		
X0274	XG.2002.241.9		Diesel Range Organics	ND	mg / Kg	1	25		02-21-02	02-21-0

Sample: 02.0009/ TA-21 Collected: 02-21-02 10:45:00 By: MH

Matrix: S

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202276-05A		SW846 ME/8015A Diesel Range Organics by GC/FID						By: ALG		
X0274	XG.2002.241.14		Diesel Range Organics	120	mg / Kg	1	25		02-21-02	02-22-0

Sample: 02.0010/ TA-21 Collected: 02-21-02 10:50:00 By: MH

Matrix: S

Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
76-06A		SW846 ME/8015A Diesel Range Organics by GC/FID						By: ALG		
	XG.2002.241.10		Diesel Range Organics	ND	mg / Kg	1	25		02-21-02	02-21-0

Sample: 02.0011/ TA-21 Collected: 02-21-02 10:58:00 By: MH

Matrix: S

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202276-07A		SW846 ME/8015A Diesel Range Organics by GC/FID						By: ALG		
X0274	XG.2002.241.11		Diesel Range Organics	ND	mg / Kg	1	25		02-21-02	02-21-0

Sample: 02.0012/ TA-21 Collected: 02-21-02 11:00:00 By: MH

Matrix: S

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202276-08A		SW846 ME/8015A Diesel Range Organics by GC/FID						By: ALG		
X0274	XG.2002.241.15		Diesel Range Organics	280	mg / Kg	1	25		02-21-02	02-22-0

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ɔt: TA-21 SAMPLING

Order: 0202276 JOH23 Receipt: 02-21-02

Sample: *02.0013/ TA-21* Collected: *02-21-02 11:05:00* By: *MH*

Matrix: *S*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202276-09A		SW846 ME/8015A Diesel Range Organics by GC/FID						By: ALG		
X0274	XG.2002.241.12		Diesel Range Organics	ND	mg / Kg	1	25		02-21-02	02-22-

Sample: *02.0014/ TA-21* Collected: *02-21-02 11:10:00* By: *MH*

Matrix: *S*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0202276-10A		SW846 ME/8015A Diesel Range Organics by GC/FID						By: ALG		
X0274	XG.2002.241.13		Diesel Range Organics	ND	mg / Kg	1	25		02-21-02	02-22-

Unless otherwise noted, all samples were received in acceptable condition and all sampling was performed by client or client representative. Sample result of ND indicates Not Detected, le result is less than the sample specific Detection Limit. Sample specific Detection Limit is determined by multiplying the sample Dilution Factor by the listed Reporting Detection Limit. All results relate only to the items tested. Any miscellaneous workorder information or foonotes will appear below.

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Explanation of codes

B	*analyte detected in Method Blank*
E	*result is estimated*
H	*analyzed out of hold time*
N	*tentatively identified compound*
S	*subcontracted*
1-9	*see footnote*

JOHNSON CONTROLS NNM
attn: **MARK HAAGENSTAD**
PO BOX 50
LOS ALAMOS NM 87544

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Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: JOHNSON CONTROLS NNM
Project:
Order: 0203002 JOH23 Receipt: 03-01-02

William P. Biava: President of Assaigai Analytical Laboratories, Inc.

Sample: *02.0016/TA-21-357* Collected: *02-28-02 11:41:00* By: *MH*
Matrix: *SOIL*

Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-01A		SW846 3550A/8270B SVOCs by GC/MS					By:	DS		
X0267	XG.2002.288.2	90-12-0	1-Methylnaphthalene	0.64	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.2	91-57-6	2-Methylnaphthalene	0.28	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.8	83-32-9	Acenaphthene	0.31	mg / Kg	5	0.03		03-01-02	03-01-
X0267	XG.2002.288.2	208-96-8	Acenaphthylene	ND	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.2	120-12-7	Anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.2	56-55-3	Benzo (a) anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.8	50-32-8	Benzo(a)pyrene	ND	mg / Kg	5	0.03		03-01-02	03-01-
X0267	XG.2002.288.8		Benzo(b & k)fluoranthene	ND	mg / Kg	5	0.03		03-01-02	03-01-
X0267	XG.2002.288.8	191-24-2	Benzo(g,h,i)perylene	ND	mg / Kg	5	0.03		03-01-02	03-01-
X0267	XG.2002.288.2	218-01-9	Chrysene	ND	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.8	53-70-3	Dibenz(a,h)anthracene	ND	mg / Kg	5	0.03		03-01-02	03-01-
X0267	XG.2002.288.8	206-44-0	Fluoranthene	ND	mg / Kg	5	0.03		03-01-02	03-01-
X0267	XG.2002.288.2	86737	Fluorene	ND	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.8	193-39-5	Indeno(1,2,3-cd)pyrene	ND	mg / Kg	5	0.03		03-01-02	03-01-
X0267	XG.2002.288.8	91-20-3	Naphthalene	ND	mg / Kg	5	0.03		03-01-02	03-01-
X0267	XG.2002.288.2	85-01-8	Phenanthrene	0.47	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.2	129-00-0	Pyrene	0.13	mg / Kg	1	0.03		03-01-02	03-01-
0203002-01A		SW846 5030A/8021B Purgeable VOCs by GC/PID					By:	JDR		
X0244	XG.2002.280.2	71-43-2	Benzene	ND	mg / Kg	20	0.005		03-01-02	03-01-
X0244	XG.2002.280.2	100-41-4	Ethylbenzene	0.31	mg / Kg	20	0.006		03-01-02	03-01-
X0244	XG.2002.280.2	95-47-6	o-Xylene	0.24	mg / Kg	20	0.005		03-01-02	03-01-
X0244	XG.2002.280.2	108-38-3/106-42	p/m-Xylenes	0.61	mg / Kg	20	0.01		03-01-02	03-01-
X0244	XG.2002.280.2	108-88-3	Toluene	ND	mg / Kg	20	0.005		03-01-02	03-01-

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Certificate of Analysis

JOHNSON CONTROLS NNM

Order: 0203002 JOH23 Receipt: 03-01-02

Sample: *02.0016/TA-21-357* Collected: *02-28-02 11:41:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-01A		SW846 ME/8015A Diesel Range Organics by GC/FID					By:	JDR		
X0246	XG.2002.262.2		Diesel Range Organics	2400	mg / Kg	10	25		03-01-02	03-01-02
0203002-01B		SW846 1311/3010A/6010A ICP TCLP					By:	SKD		
M02269	MW.2002.281.13	7440-38-2	Arsenic	ND	mg / L	1	0.1		03-04-02	03-04-02
M02269	MW.2002.281.13	7440-39-3	Barium	0.5	mg / L	1	0.1		03-04-02	03-04-02
M02269	MW.2002.281.13	7440-43-9	Cadmium	ND	mg / L	1	0.02		03-04-02	03-04-02
M02269	MW.2002.281.13	7440-47-3	Chromium	ND	mg / L	1	0.02		03-04-02	03-04-02
M02269	MW.2002.281.13	7439-92-1	Lead	ND	mg / L	1	0.05		03-04-02	03-04-02
M02269	MW.2002.281.13	7782-49-2	Selenium	0.10	mg / L	1	0.05	B	03-04-02	03-04-02
M02269	MW.2002.281.13	7440-22-4	Silver	ND	mg / L	1	0.04		03-04-02	03-04-02
0203002-01B		SW846 1311/7470 CVAA TCLP					By:	JE		
M02275	MW.2002.284.12	7439-97-6	Mercury	ND	mg / L	1	0.0002		03-05-02	03-06-02

Sample: *02.0017/TA-21-357* Collected: *02-28-02 13:44:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-02A		SW846 3550A/8270B SVOCs by GC/MS					By:	DS		
X0267	XG.2002.288.3	90-12-0	1-Methylnaphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	91-57-6	2-Methylnaphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	83-32-9	Acenaphthene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	208-96-8	Acenaphthylene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	120-12-7	Anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	56-55-3	Benzo (a) anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	50-32-8	Benzo(a)pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3		Benzo(b & k)fluoranthene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	191-24-2	Benzo(g,h,i)perylene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	218-01-9	Chrysene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	53-70-3	Dibenz(a,h)anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	206-44-0	Fluoranthene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	86737	Fluorene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	193-39-5	Indeno(1,2,3-cd)pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	91-20-3	Naphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	85-01-8	Phenanthrene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.3	129-00-0	Pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
0203002-02A		SW846 5030A/8021B Purgeable VOCs by GC/PID					By:	JDR		
X0244	XG.2002.280.3	71-43-2	Benzene	ND	mg / Kg	1	0.005		03-01-02	03-01-02
X0244	XG.2002.280.3	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		03-01-02	03-01-02
X0244	XG.2002.280.3	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		03-01-02	03-01-02
Y	XG.2002.280.3	108-38-3/106-42	p/m-Xylenes	ND	mg / Kg	1	0.01		03-01-02	03-01-02

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Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

nt: **JOHNSON CONTROLS NNM**

t:

Order: **0203002** **JOH23** Receipt: **03-01-02**

Sample: ***02.0017/TA-21-357*** Collected: *02-28-02 13:44:00* By: *MH*

Matrix: ***SOIL***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-02A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**						By: JDR		
X0244	XG.2002.280.3	108-88-3	Toluene	ND	mg / Kg	1	0.005		03-01-02	03-01-0
0203002-02A		**SW846 ME/8015A Diesel Range Organics by GC/FID**						By: JDR		
X0245	XG.2002.282.3		Diesel Range Organics	ND	mg / Kg	1	25		03-01-02	03-01-0
0203002-02B		**SW846 1311/3010A/6010A ICP TCLP**						By: SKD		
M02269	MW.2002.291.16	7440-38-2	Arsenic	ND	mg / L	1	0.1		03-04-02	03-04-0
M02269	MW.2002.291.16	7440-39-3	Barium	0.7	mg / L	1	0.1		03-04-02	03-04-0
M02269	MW.2002.291.16	7440-43-9	Cadmium	ND	mg / L	1	0.02		03-04-02	03-04-0
M02269	MW.2002.291.16	7440-47-3	Chromium	ND	mg / L	1	0.02		03-04-02	03-04-0
M02269	MW.2002.291.16	7439-92-1	Lead	ND	mg / L	1	0.05		03-04-02	03-04-0
M02269	MW.2002.291.16	7782-49-2	Selenium	0.12	mg / L	1	0.05	B	03-04-02	03-04-0
M02269	MW.2002.291.16	7440-22-4	Silver	ND	mg / L	1	0.04		03-04-02	03-04-0
0203002-02B		**SW846 1311/7470 CVAA TCLP**						By: JE		
M02275	MW.2002.294.16	7439-97-6	Mercury	ND	mg / L	1	0.0002		03-05-02	03-05-0

e: ***02.0018/TA-21-357*** Collected: *02-28-02 13:47:00* By: *MH*

N ***SOIL***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-03A		**SW846 3550A/8270B SVOCs by GC/MS**						By: DS		
X0267	XG.2002.288.4	90-12-0	1-Methylnaphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.4	91-57-6	2-Methylnaphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.4	83-32-9	Acenaphthene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.4	208-96-8	Acenaphthylene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.4	120-12-7	Anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.4	56-55-3	Benzo (a) anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.4	50-32-8	Benzo(a)pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.4		Benzo(b & k)fluoranthene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.4	191-24-2	Benzo(g,h,i)perylene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.4	218-01-9	Chrysene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.4	53-70-3	Dibenz(a,h)anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.4	206-44-0	Fluoranthene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.4	86737	Fluorene	ND	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.4	193-39-5	Indeno(1,2,3-cd)pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.4	91-20-3	Naphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.4	85-01-8	Phenanthrene	ND	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.4	129-00-0	Pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-
0203002-03A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**						By: JDR		
X0	XG.2002.280.4	71-43-2	Benzene	ND	mg / Kg	1	0.005		03-01-02	03-01-
X.	XG.2002.280.4	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		03-01-02	03-01-

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Certificate of Analysis

nt: **JOHNSON CONTROLS NNM**

Order: **0203002** **JOH23** Receipt: **03-01-02**

Sample: *02.0018/TA-21-357* Collected: *02-28-02 13:47:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-03A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**					By:	JDR		
X0244	XG.2002.280.4	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		03-01-02	03-01-0
X0244	XG.2002.280.4	108-38-3/106-42	p/m-Xylenes	ND	mg / Kg	1	0.01		03-01-02	03-01-0
X0244	XG.2002.280.4	108-88-3	Toluene	ND	mg / Kg	1	0.005		03-01-02	03-01-0
0203002-03A		**SW846 ME/8015A Diesel Range Organics by GC/FID**					By:	JDR		
X0245	XG.2002.282.4		Diesel Range Organics	ND	mg / Kg	1	25		03-01-02	03-01-0
0203002-03B		**SW846 1311/3010A/6010A ICP TCLP**					By:	SKD		
M02269	MW.2002.291.17	7440-38-2	Arsenic	ND	mg / L	1	0.1		03-04-02	03-04-0
M02269	MW.2002.291.17	7440-39-3	Barium	0.5	mg / L	1	0.1		03-04-02	03-04-0
M02269	MW.2002.291.17	7440-43-9	Cadmium	ND	mg / L	1	0.02		03-04-02	03-04-0
M02269	MW.2002.291.17	7440-47-3	Chromium	ND	mg / L	1	0.02		03-04-02	03-04-0
M02269	MW.2002.291.17	7439-92-1	Lead	ND	mg / L	1	0.05		03-04-02	03-04-0
M02269	MW.2002.291.17	7782-49-2	Selenium	0.11	mg / L	1	0.05	B	03-04-02	03-04-0
M02269	MW.2002.291.17	7440-22-4	Silver	ND	mg / L	1	0.04		03-04-02	03-04-0
02-03B		**SW846 1311/7470 CVAA TCLP**					By:	JE		
	MW.2002.294.16	7439-97-6	Mercury	ND	mg / L	1	0.0002		03-05-02	03-05-0

Sample: *02.0019/TA-21-357* Collected: *02-28-02 13:55:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-04A		**SW846 3550A/8270B SVOCs by GC/MS**					By:	DS		
X0267	XG.2002.288.9	90-12-0	1-Methylnaphthalene	ND	mg / Kg	9	0.03		03-01-02	03-01-0
X0267	XG.2002.288.9	91-57-6	2-Methylnaphthalene	ND	mg / Kg	9	0.03		03-01-02	03-01-0
X0267	XG.2002.288.9	83-32-9	Acenaphthene	ND	mg / Kg	9	0.03		03-01-02	03-01-0
X0267	XG.2002.288.9	208-96-8	Acenaphthylene	ND	mg / Kg	9	0.03		03-01-02	03-01-0
X0267	XG.2002.288.9	120-12-7	Anthracene	ND	mg / Kg	9	0.03		03-01-02	03-01-0
X0267	XG.2002.288.9	56-55-3	Benzo (a) anthracene	ND	mg / Kg	9	0.03		03-01-02	03-01-0
X0267	XG.2002.288.9	50-32-8	Benzo(a)pyrene	ND	mg / Kg	9	0.03		03-01-02	03-01-0
X0267	XG.2002.288.9		Benzo(b & k)fluoranthene	ND	mg / Kg	9	0.03		03-01-02	03-01-
X0267	XG.2002.288.9	191-24-2	Benzo(g,h,i)perylene	ND	mg / Kg	9	0.03		03-01-02	03-01-
X0267	XG.2002.288.9	218-01-9	Chrysene	ND	mg / Kg	9	0.03		03-01-02	03-01-
X0267	XG.2002.288.9	53-70-3	Dibenz(a,h)anthracene	ND	mg / Kg	9	0.03		03-01-02	03-01-
X0267	XG.2002.288.9	206-44-0	Fluoranthene	ND	mg / Kg	9	0.03		03-01-02	03-01-
X0267	XG.2002.288.9	86737	Fluorene	ND	mg / Kg	9	0.03		03-01-02	03-01-
X0267	XG.2002.288.9	193-39-5	Indeno(1,2,3-cd)pyrene	ND	mg / Kg	9	0.03		03-01-02	03-01-
X0267	XG.2002.288.9	91-20-3	Naphthalene	ND	mg / Kg	9	0.03		03-01-02	03-01-
X0267	XG.2002.288.9	85-01-8	Phenanthrene	ND	mg / Kg	9	0.03		03-01-02	03-01-
X0	XG.2002.288.9	129-00-0	Pyrene	ND	mg / Kg	9	0.03		03-01-02	03-01-

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Certificate of Analysis

Client: JOHNSON CONTROLS NNM

Order: 0203002 JOH23 Receipt: 03-01-02

Sample: *02.0019/TA-21-357* Collected: *02-28-02 13:55:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-04A		SW846 5030A/8021B Purgeable VOCs by GC/PID						By: JDR		
X0244	XG.2002.285.2	71-43-2	Benzene	ND	mg / Kg	1	0.005		03-02-02	03-02-0
X0244	XG.2002.285.2	100-41-4	Ethylbenzene	0.012	mg / Kg	1	0.005		03-02-02	03-02-0
X0244	XG.2002.285.2	95-47-6	o-Xylene	0.012	mg / Kg	1	0.005		03-02-02	03-02-0
X0244	XG.2002.285.2	108-38-3/106-42	p/m-Xylenes	0.018	mg / Kg	1	0.01		03-02-02	03-02-0
X0244	XG.2002.285.2	108-88-3	Toluene	ND	mg / Kg	1	0.005		03-02-02	03-02-0
0203002-04A		SW846 ME/8015A Diesel Range Organics by GC/FID						By: JDR		
X0245	XG.2002.282.5		Diesel Range Organics	2300	mg / Kg	10	25		03-01-02	03-01-0
0203002-04B		SW846 1311/3010A/6010A ICP TCLP						By: SKD		
M02268	MW.2002.291.18	7440-38-2	Arsenic	ND	mg / L	1	0.1		03-04-02	03-04-0
M02269	MW.2002.291.18	7440-39-3	Barium	0.6	mg / L	1	0.1		03-04-02	03-04-0
M02269	MW.2002.291.18	7440-43-9	Cadmium	ND	mg / L	1	0.02		03-04-02	03-04-0
M02269	MW.2002.291.18	7440-47-3	Chromium	ND	mg / L	1	0.02		03-04-02	03-04-0
M02269	MW.2002.291.18	7439-92-1	Lead	ND	mg / L	1	0.05		03-04-02	03-04-0
M[illegible]69	MW.2002.291.18	7782-49-2	Selenium	0.19	mg / L	1	0.05	B	03-04-02	03-04-0
[illegible]	MW.2002.291.18	7440-22-4	Silver	ND	mg / L	1	0.04		03-04-02	03-04-0
0[illegible]02-04B		SW846 1311/7470 CVAA TCLP						By: JE		
M02276	MW.2002.284.17	7439-97-6	Mercury	ND	mg / L	1	0.0002		03-05-02	03-05-0

Sample: *02.0020/TA-21-357* Collected: *02-28-02 14:10:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-05A		SW846 3550A/8270B SVOCs by GC/MS						By: DS		
X0267	XG.2002.288.11	90-12-0	1-Methylnaphthalene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11	91-57-6	2-Methylnaphthalene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11	83-32-9	Acenaphthene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11	208-96-8	Acenaphthylene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11	120-12-7	Anthracene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11	56-55-3	Benzo (a) anthracene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11	50-32-8	Benzo(a)pyrene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11		Benzo(b & k)fluoranthene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11	191-24-2	Benzo(g,h,i)perylene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11	218-01-9	Chrysene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11	53-70-3	Dibenz(a,h)anthracene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11	206-44-0	Fluoranthene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11	86737	Fluorene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X0267	XG.2002.288.11	193-39-5	Indeno(1,2,3-cd)pyrene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
X[illegible]	XG.2002.288.11	91-20-3	Naphthalene	ND	mg / Kg	5	0.03		03-01-02	03-02-0
[illegible]	XG.2002.288.11	85-01-8	Phenanthrene	ND	mg / Kg	5	0.03		03-01-02	03-02-0

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Certificate of Analysis

t: JOHNSON CONTROLS NNM

Order: 0203002 JOH23 Receipt: 03-01-02

Sample: *02.0020/TA-21-357* Collected: *02-28-02 14:10:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-06A		SW846 3550A/8270B SVOCs by GC/MS						By: DS		
X0267	XG.2002.288.11	129-00-0	Pyrene	ND	mg / Kg	5	0.03		03-01-02	03-02-02
0203002-06A		SW846 5030A/8021B Purgeable VOCs by GC/PID						By: JDR		
X0244	XG.2002.280.6	71-43-2	Benzene	ND	mg / Kg	1	0.005		03-01-02	03-01-02
X0244	XG.2002.280.6	100-41-4	Ethylbenzene	0.012	mg / Kg	1	0.005		03-01-02	03-01-02
X0244	XG.2002.280.6	95-47-6	o-Xylene	0.013	mg / Kg	1	0.005		03-01-02	03-01-02
X0244	XG.2002.280.6	108-38-3/106-42	p/m-Xylenes	0.017	mg / Kg	1	0.01		03-01-02	03-01-02
X0244	XG.2002.280.6	108-88-3	Toluene	ND	mg / Kg	1	0.005		03-01-02	03-01-02
0203002-06A		SW846 ME/8015A Diesel Range Organics by GC/FID						By: JDR		
X0245	XG.2002.282.10		Diesel Range Organics	2200	mg / Kg	10	25		03-01-02	03-01-02
0203002-06B		SW846 1311/3010A/6010A ICP TCLP						By: SKD		
M02269	MW.2002.291.19	7440-38-2	Arsenic	ND	mg / L	1	0.1		03-04-02	03-04-02
M02269	MW.2002.291.19	7440-39-3	Barium	0.4	mg / L	1	0.1		03-04-02	03-04-02
M02269	MW.2002.291.19	7440-43-9	Cadmium	ND	mg / L	1	0.02		03-04-02	03-04-02
	MW.2002.291.19	7440-47-3	Chromium	ND	mg / L	1	0.02		03-04-02	03-04-02
[illegible]	MW.2002.291.19	7439-92-1	Lead	ND	mg / L	1	0.05		03-04-02	03-04-02
M[illegible]	MW.2002.291.19	7782-49-2	Selenium	0.13	mg / L	1	0.05	B	03-04-02	03-04-02
M02269	MW.2002.291.19	7440-22-4	Silver	ND	mg / L	1	0.04		03-04-02	03-04-02
0203002-06B		SW846 1311/7470 CVAA TCLP						By: JE		
M02275	MW.2002.294.18	7439-97-6	Mercury	ND	mg / L	1	0.0002		03-05-02	03-05-02

Sample: *02.0021/TA-21-357* Collected: *02-28-02 14:19:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-06A		SW846 3550A/8270B SVOCs by GC/MS						By: DS		
X0267	XG.2002.288.5	90-12-0	1-Methylnaphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.5	91-57-6	2-Methylnaphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.5	83-32-9	Acenaphthene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.5	208-96-8	Acenaphthylene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.5	120-12-7	Anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.5	56-55-3	Benzo (a) anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.5	50-32-8	Benzo(a)pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.5		Benzo(b & k)fluoranthene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.5	191-24-2	Benzo(g,h,i)perylene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.5	218-01-9	Chrysene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.5	53-70-3	Dibenz(a,h)anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.5	206-44-0	Fluoranthene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X	XG.2002.288.5	86737	Fluorene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0	XG.2002.288.5	193-39-5	Indeno(1,2,3-cd)pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-0

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Certificate of Analysis

JOHNSON CONTROLS NNM

Order: 0203002 JOH23 Receipt: 03-01-02

Sample: *02.0021/TA-21-357* Collected: *02-28-02 14:19:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-06A		SW846 3550A/8270B SVOCs by GC/MS					By:	DS		
X0267	XG.2002.288.5	91-20-3	Naphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.5	85-01-8	Phenanthrene	ND	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.5	129-00-0	Pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-
0203002-06A		SW846 5030A/8021B Purgeable VOCs by GC/PID					By:	JDR		
X0277	XG.2002.280.7	71-43-2	Benzene	ND	mg / Kg	1	0.005		03-01-02	03-01-
X0277	XG.2002.280.7	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		03-01-02	03-01-
X0277	XG.2002.280.7	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		03-01-02	03-01-
X0277	XG.2002.280.7	108-38-3/106-42	p/m-Xylenes	ND	mg / Kg	1	0.01		03-01-02	03-01-
X0277	XG.2002.280.7	108-88-3	Toluene	ND	mg / Kg	1	0.005		03-01-02	03-01-
0203002-06A		SW846 ME/8015A Diesel Range Organics by GC/FID					By:	JDR		
X0245	XG.2002.282.6		Diesel Range Organics	ND	mg / Kg	1	25		03-01-02	03-01-
0203002-06B		SW846 1311/3010A/6010A ICP TCLP					By:	SKD		
M02269	MW.2002.291.20	7440-38-2	Arsenic	ND	mg / L	1	0.1		03-04-02	03-04-
9	MW.2002.291.20	7440-39-3	Barium	0.4	mg / L	1	0.1		03-04-02	03-04-
1	MW.2002.291.20	7440-43-9	Cadmium	ND	mg / L	1	0.02		03-04-02	03-04-
M[illegible]9	MW.2002.291.20	7440-47-3	Chromium	ND	mg / L	1	0.02		03-04-02	03-04-
M02289	MW.2002.291.20	7439-92-1	Lead	ND	mg / L	1	0.05		03-04-02	03-04-
M02269	MW.2002.291.20	7782-49-2	Selenium	0.15	mg / L	1	0.05	B	03-04-02	03-04-
M02289	MW.2002.291.20	7440-22-4	Silver	ND	mg / L	1	0.04		03-04-02	03-04-
0203002-06B		SW846 1311/7470 CVAA TCLP					By:	JE		
M02275	MW.2002.294.21	7439-97-6	Mercury	ND	mg / L	1	0.0002		03-06-02	03-06-

Sample: *02.0022/TA-21-357* Collected: *02-28-02 14:31:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-07A		SW846 3550A/8270B SVOCs by GC/MS					By:	DS		
X0267	XG.2002.296.1	90-12-0	1-Methylnaphthalene	0.99	mg / Kg	3	0.03		03-01-02	03-02-
X0267	XG.2002.296.1	91-57-6	2-Methylnaphthalene	0.41	mg / Kg	3	0.03		03-01-02	03-02-
X0267	XG.2002.296.1	83-32-9	Acenaphthene	0.70	mg / Kg	3	0.03		03-01-02	03-02-
X0267	XG.2002.296.1	208-96-8	Acenaphthylene	ND	mg / Kg	3	0.03		03-01-02	03-02-
X0267	XG.2002.296.1	120-12-7	Anthracene	ND	mg / Kg	3	0.03		03-01-02	03-02-
X0267	XG.2002.296.1	56-55-3	Benzo (a) anthracene	ND	mg / Kg	3	0.03		03-01-02	03-02-
X0267	XG.2002.296.1	50-32-8	Benzo(a)pyrene	ND	mg / Kg	3	0.03		03-01-02	03-02-
X0267	XG.2002.296.1		Benzo(b & k)fluoranthene	ND	mg / Kg	3	0.03		03-01-02	03-02-
X0267	XG.2002.296.1	191-24-2	Benzo(g,h,i)perylene	ND	mg / Kg	3	0.03		03-01-02	03-02-
X0267	XG.2002.296.1	218-01-9	Chrysene	ND	mg / Kg	3	0.03		03-01-02	03-02-
Y	XG.2002.296.1	53-70-3	Dibenz(a,h)anthracene	ND	mg / Kg	3	0.03		03-01-02	03-02-
1	XG.2002.296.1	206-44-0	Fluoranthene	ND	mg / Kg	3	0.03		03-01-02	03-02-

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Certificate of Analysis

JOHNSON CONTROLS NNM

Order: 0203002 JOH23 Receipt: 03-01-02

Sample: *02.0022/TA-21-357* Collected: *02-28-02 14:31:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-07A		**SW846 3550A/8270B SVOCs by GC/MS**					By:	DS		
X0267	XG.2002.298.1	86737	Fluorene	ND	mg / Kg	3	0.03		03-01-02	03-02-0
X0267	XG.2002.298.1	193-39-5	Indeno(1,2,3-cd)pyrene	ND	mg / Kg	3	0.03		03-01-02	03-02-0
X0267	XG.2002.298.1	91-20-3	Naphthalene	0.20	mg / Kg	3	0.03		03-01-02	03-02-0
X0267	XG.2002.298.1	85-01-8	Phenanthrene	ND	mg / Kg	3	0.03		03-01-02	03-02-0
X0267	XG.2002.298.1	129-00-0	Pyrene	0.21	mg / Kg	3	0.03		03-01-02	03-02-0
0203002-07A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**					By:	JDR		
X0277	XG.2002.280.8	71-43-2	Benzene	ND	mg / Kg	1	0.005		03-01-02	03-01-0
X0277	XG.2002.280.8	100-41-4	Ethylbenzene	0.085	mg / Kg	1	0.005		03-01-02	03-01-0
X0277	XG.2002.280.8	95-47-6	o-Xylene	0.16	mg / Kg	1	0.005		03-01-02	03-01-0
X0277	XG.2002.280.8	108-38-3/106-42	p/m-Xylenes	0.25	mg / Kg	1	0.01		03-01-02	03-01-0
X0277	XG.2002.280.8	108-88-3	Toluene	0.025	mg / Kg	1	0.005		03-01-02	03-01-0
0203002-07A		**SW846 ME/8015A Diesel Range Organics by GC/FID**					By:	JDR		
X0245	XG.2002.282.11		Diesel Range Organics	10000	mg / Kg	20	25		03-01-02	03-01-0
02-07B		**SW846 1311/3010A/6010A ICP TCLP**					By:	SKD		
	MW.2002.291.21	7440-38-2	Arsenic	ND	mg / L	1	0.1		03-04-02	03-04-0
M[illegible]9	MW.2002.291.21	7440-39-3	Barium	0.4	mg / L	1	0.1		03-04-02	03-04-0
M02269	MW.2002.291.21	7440-43-9	Cadmium	ND	mg / L	1	0.02		03-04-02	03-04-0
M02269	MW.2002.291.21	7440-47-3	Chromium	ND	mg / L	1	0.02		03-04-02	03-04-0
M02269	MW.2002.291.21	7439-92-1	Lead	ND	mg / L	1	0.05		03-04-02	03-04-0
M02269	MW.2002.291.21	7782-49-2	Selenium	0.16	mg / L	1	0.05	B	03-04-02	03-04-0
M02269	MW.2002.291.21	7440-22-4	Silver	ND	mg / L	1	0.04		03-04-02	03-04-0
0203002-07B		**SW846 1311/7470 CVAA TCLP**					By:	JE		
M02275	MW.2002.294.22	7439-97-6	Mercury	ND	mg / L	1	0.0002		03-05-02	03-05-0

Sample: *02.0023/TA-21-357* Collected: *02-28-02 14:36:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-08A		**SW846 3550A/8270B SVOCs by GC/MS**					By:	DS		
X0267	XG.2002.288.6	90-12-0	1-Methylnaphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.6	91-57-6	2-Methylnaphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.6	83-32-9	Acenaphthene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.6	208-96-8	Acenaphthylene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.6	120-12-7	Anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.6	56-55-3	Benzo (a) anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-
X0267	XG.2002.288.10	50-32-8	Benzo(a)pyrene	ND	mg / Kg	8	0.03		03-01-02	03-01-
X0267	XG.2002.288.10		Benzo(b & k)fluoranthene	ND	mg / Kg	8	0.03		03-01-02	03-01-
X	XG.2002.288.10	191-24-2	Benzo(g,h,i)perylene	ND	mg / Kg	8	0.03		03-01-02	03-01-
X	XG.2002.288.6	218-01-9	Chrysene	ND	mg / Kg	1	0.03		03-01-02	03-01-

STANDARD

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

[illegible]: **JOHNSON CONTROLS NNM**

[illegible]:

Order: **0203002** **JOH23** Receipt: **03-01-02**

Sample: ***02.0023/TA-21-357*** Collected: *02-28-02 14:36:00* By: *MH*

Matrix: ***SOIL***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-08A		**SW846 3550A/8270B SVOCs by GC/MS**					By:	DS		
X0267	XG.2002.288.10	53-70-3	Dibenz(a,h)anthracene	ND	mg / Kg	8	0.03		03-01-02	03-01-02
X0267	XG.2002.288.6	206-44-0	Fluoranthene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.6	86737	Fluorene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.10	193-39-5	Indeno(1,2,3-cd)pyrene	ND	mg / Kg	8	0.03		03-01-02	03-01-02
X0267	XG.2002.288.6	91-20-3	Naphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.6	85-01-8	Phenanthrene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
X0267	XG.2002.288.6	129-00-0	Pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-02
0203002-08A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**					By:	JDR		
X0277	XG.2002.280.9	71-43-2	Benzene	ND	mg / Kg	1	0.005		03-01-02	03-01-02
X0277	XG.2002.280.9	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		03-01-02	03-01-02
X0277	XG.2002.280.9	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		03-01-02	03-01-02
X0277	XG.2002.280.9	108-38-3/108-42	p/m-Xylenes	ND	mg / Kg	1	0.01		03-01-02	03-01-02
X0277	XG.2002.280.9	108-88-3	Toluene	ND	mg / Kg	1	0.005		03-01-02	03-01-02
0203002-08A		**SW846 ME/8015A Diesel Range Organics by GC/FID**					By:	JDR		
	XG.2002.282.7		Diesel Range Organics	ND	mg / Kg	1	25		03-01-02	03-01-02
0203002-08B		**SW846 1311/3010A/6010A ICP TCLP**					By:	SKD		
M02269	MW.2002.291.22	7440-38-2	Arsenic	ND	mg / L	1	0.1		03-04-02	03-04-02
M02269	MW.2002.291.22	7440-39-3	Barium	0.4	mg / L	1	0.1		03-04-02	03-04-02
M02269	MW.2002.291.22	7440-43-9	Cadmium	ND	mg / L	1	0.02		03-04-02	03-04-02
M02269	MW.2002.291.22	7440-47-3	Chromium	ND	mg / L	1	0.02		03-04-02	03-04-02
M02269	MW.2002.291.22	7439-92-1	Lead	ND	mg / L	1	0.05		03-04-02	03-04-02
M02269	MW.2002.291.22	7782-49-2	Selenium	0.09	mg / L	1	0.05	B	03-04-02	03-04-02
M02269	MW.2002.291.22	7440-22-4	Silver	ND	mg / L	1	0.04		03-04-02	03-04-02
0203002-08B		**SW846 1311/7470 CVAA TCLP**					By:	JE		
M02276	MW.2002.294.23	7439-97-6	Mercury	ND	mg / L	1	0.0002		03-05-02	03-06-02

Sample: ***02.0024/TA-21-357*** Collected: *02-28-02 14:55:00* By: *MH*

Matrix: ***SOIL***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-08A		**SW846 3550A/8270B SVOCs by GC/MS**					By:	DS		
X0267	XG.2002.288.7	90-12-0	1-Methylnaphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	91-57-6	2-Methylnaphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	83-32-9	Acenaphthene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	208-96-8	Acenaphthylene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	120-12-7	Anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	56-55-3	Benzo (a) anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0	XG.2002.288.7	50-32-8	Benzo(a)pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X	XG.2002.288.7		Benzo(b & k)fluoranthene	ND	mg / Kg	1	0.03		03-01-02	03-01-0

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

JOHNSON CONTROLS NNM

Order: **0203002** **JOH23** Receipt: **03-01-02**

Sample: *02.0024/TA-21-357* Collected: *02-28-02 14:55:00* By: *MH*

Matrix: *SOIL*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0203002-09A		**SW846 3550A/8270B SVOCs by GC/MS**					By:	DS		
X0267	XG.2002.288.7	191-24-2	Benzo(g,h,i)perylene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	218-01-9	Chrysene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	53-70-3	Dibenz(a,h)anthracene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	206-44-0	Fluoranthene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	86737	Fluorene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	193-39-5	Indeno(1,2,3-cd)pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	91-20-3	Naphthalene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	85-01-8	Phenanthrene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
X0267	XG.2002.288.7	129-00-0	Pyrene	ND	mg / Kg	1	0.03		03-01-02	03-01-0
0203002-09A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**					By:	JDR		
X0277	XG.2002.280.10	71-43-2	Benzene	ND	mg / Kg	1	0.005		03-01-02	03-01-0
X0277	XG.2002.280.10	100-41-4	Ethylbenzene	ND	mg / Kg	1	0.005		03-01-02	03-01-0
X0277	XG.2002.280.10	95-47-6	o-Xylene	ND	mg / Kg	1	0.005		03-01-02	03-01-0
X0277	XG.2002.280.10	108-38-3/106-42	p/m-Xylenes	ND	mg / Kg	1	0.01		03-01-02	03-01-0
	XG.2002.280.10	108-88-3	Toluene	ND	mg / Kg	1	0.005		03-01-02	03-01-0
J2-09A		**SW846 ME/8015A Diesel Range Organics by GC/FID**					By:	JDR		
X0274	XG.2002.282.8		Diesel Range Organics	ND	mg / Kg	1	25		03-01-02	03-01-0
0203002-09B		**SW846 1311/3010A/6010A ICP TCLP**					By:	SKD		
M02269	MW.2002.291.23	7440-38-2	Arsenic	ND	mg / L	1	0.1		03-04-02	03-04-0
M02269	MW.2002.291.23	7440-39-3	Barium	0.6	mg / L	1	0.1		03-04-02	03-04-0
M02269	MW.2002.291.23	7440-43-9	Cadmium	ND	mg / L	1	0.02		03-04-02	03-04-0
M02269	MW.2002.291.23	7440-47-3	Chromium	ND	mg / L	1	0.02		03-04-02	03-04-0
M02269	MW.2002.291.23	7439-92-1	Lead	ND	mg / L	1	0.05		03-04-02	03-04-0
M02269	MW.2002.291.23	7782-49-2	Selenium	0.22	mg / L	1	0.05	B	03-04-02	03-04-0
M02269	MW.2002.291.23	7440-22-4	Silver	ND	mg / L	1	0.04		03-04-02	03-04-0
0203002-09B		**SW846 1311/7470 CVAA TCLP**					By:	JE		
M02275	MW.2002.294.24	7439-97-6	Mercury	ND	mg / L	1	0.0002		03-05-02	03-05-

Unless otherwise noted, all samples were received in acceptable condition and all sampling was performed by client or client representative. Sample result of ND indicates Not Detected, ie result is less than the sample specific Detection Limit. Sample specific Detection Limit is determined by multiplying the sample Dilution Factor by the listed Reporting Detection Limit. All results relate only to the items tested. Any miscellaneous workorder information or foonotes will appear below.

Los Alar
National Lat ıtory

Chemical Waste Dis sal Request

Waste Services Use Only

This form is used to request disposal of chemical and low-level radioactive wastes. Mail completed form to Waste Services at **MS J595.**

Account Information	Z Number	Name (Print)	Telephone	Date
7D3400/XURP/04505203	095092	Edward Hoth	5-6002	05/08/02

Waste Pick-up Location and Storage Type:	TA	Building	Room	☐ Security Area	☐ Direct Off-Site Shipment
	21	357	Outside		

☐ < 90 Day Accumulation Area
☐ Universal Waste Area
(Start Date _____)

☐ Satellite Accumulation Area (Approx. vol. _____)
☐ PCB Waste (Start Date: _____)
☒ NM Special Waste (<90 days) (Start Date:02/25/02 _____)

☐ Rad Staging Area (<90 days)
☐ Rad Storage Area (<1 year)
(Start Date: _____)

☐ Rad Dumpster
(No:__ _____)

☐ Other (describe in description)

Item Id	Waste Profile Number	Shipping Container Information					Waste Information				*S=Solid L=Liquid G=Gas P=Powder	Description
		Type	Volume	Unit	Tare Weight	Unit	Volume	Unit	Weight	Unit		
2220178	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220179	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220180	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220181	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220182	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220183	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220184	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220185	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220186	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220187	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220188	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220189	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220190	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)

												Steam Plant AST (TA-21-57)
2220192	54731	02	55	G	30	P	45	G	000	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)

Container Types

01-Bulk (Unpackaged)	**04**-Plastic Bottle or Container	**07**-Fiber or Plastic Box	**10**-Portable Tank	**13**-Other **(specify in description)**
02-Metal Drum	**05**-Glass Bottle or Container	**08**-Wooden Box	**11**-Cylinder	**14**-Compactor Box
03-Fiber or Plastic Drum	**06**-Plastic Bag	**09**-Metal Box	**12**-Shield Cask	**15**-Aerosol Can

Units for Volume

G-Gallon	**M**-Cubic Meters
L-Liters	**O**-Fluid Ounce
F-Cubic Feet	**P**-Pint
Q-Quart	

Units for Weight

P-Pound	**O**-Ounce
K-Kilograms	**T**-Tons
G-Grams	

CERTIFICATION STATEMENT: To the best of my knowledge, I certify that the information on this form is correct. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Printed Name	Signature	Z Number	Date
Mark Haagenstad		116327	05/08/02

*For new and unused chemicals

FMU64-F286, R.0 (5/01)

Los Alamos National Laboratory

Chemical Waste Disposal Request

Waste Services Use Only

This form is used to request disposal of chemical and low-level radioactive wastes. Mail completed form to Waste Services at MS J595.

Account Information	Z Number	Name (Print)	Telephone	Date
7D3400/XURP/04505203	095092	Edward Hoth	5-6002	05/08/02

Waste Pick-up Location and Storage Type:	TA	Building	Room	☐ Security Area	☐ Direct Off-Site Shipment
	21	357	Outside		

☐ < 90 Day Accumulation Area
☐ Universal Waste Area
(Start Date _____)

☐ Satellite Accumulation Area (Approx. vol. _____)
☐ PCB Waste (Start Date: _____)
☒ NM Special Waste (<90 days) (Start Date:02/25/02_____)

☐ Rad Staging Area (<90 days)
☐ Rad Storage Area (<1 year)
(Start Date: _____)

☐ Rad Dumpster
(No:__ _____)
☐ Other (describe in description)

Item Id	Waste Profile Number	Shipping Container Information					Waste Information				*S=Solid L=Liquid G=Gas P=Powder	Description
		Type	Volume	Unit	Tare Weight	Unit	Volume	Unit	Weight	Unit		
2220193	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220194	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220195	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220196	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220197	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220198	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220199	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220200	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220201	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220202	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220203	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220204	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220205	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)

												Steam Plant AST (TA-21-57)
2220207	4731	02	55	G	30	P	45	G		P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)

Container Types

01-Bulk (Unpackaged)	**04**-Plastic Bottle or Container	**07**-Fiber or Plastic Box	**10**-Portable Tank	**13**-Other **(specify in description)**
02-Metal Drum	**05**-Glass Bottle or Container	**08**-Wooden Box	**11**-Cylinder	**14**-Compactor Box
03-Fiber or Plastic Drum	**06**-Plastic Bag	**09**-Metal Box	**12**-Shield Cask	**15**-Aerosol Can

Units for Volume

G-Gallon	**M**-Cubic Meters
L-Liters	**O**-Fluid Ounce
F-Cubic Feet	**P**-Pint
Q-Quart	

Units for Weight

P-Pound	**O**-Ounce
K-Kilograms	**T**-Tons
G-Grams	

CERTIFICATION STATEMENT: To the best of my knowledge, I certify that the information on this form is correct. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Printed Name	Signature	Z Number	Date
Mark Haagenstad		116327	05/08/02

*For new and unused chemicals

FMU64-F286, R.0 (5/01)

Los Alamos National Laboratory

Chemical Waste Disposal Request

Waste Services Use Only

This form is used to request disposal of chemical and low-level radioactive wastes. Mail completed form to Waste Services at **MS J595.**

Account Information	Z Number	Name (Print)	Telephone	Date
7D3400/XURP/04505203	095092	Edward Hoth	5-6002	05/08/02

Waste Pick-up Location and Storage Type:	TA	Building	Room	☐ Security Area	☐ Direct Off-Site Shipment
	21	357	Outside		

☐ < 90 Day Accumulation Area ☐ Universal Waste Area (Start Date _____)	☐ Satellite Accumulation Area (Approx. vol. _____) ☐ PCB Waste (Start Date: _____) ☒ NM Special Waste (<90 days) (Start Date:02/25/02_____)	☐ Rad Staging Area (<90 days) ☐ Rad Storage Area (<1 year) (Start Date: _____)	☐ Rad Dumpster (No:__ _____) ☐ Other (describe in description)

Item Id	Waste Profile Number	Shipping Container Information					Waste Information				*S=Solid L=Liquid G=Gas P=Powder	Description
		Type	Volume	Unit	Tare Weight	Unit	Volume	Unit	Weight	Unit		
2220208	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220209	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220210	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220211	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220212	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220213	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220214	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220215	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220216	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220217	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220218	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220219	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220220	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)

2220221	[illegible]4731	02	55	G	30	P	45	G	[illegible]	P	S	[illegible] Steam Plant AST (TA-21-57)
2220222	[illegible]4731	02	55	G	30	P	45	G	[illegible]	P	S	Diesel contaminated soil from fuel line leak [illegible] Steam Plant AST (TA-21-57)

Container Types

01-Bulk (Unpackaged)	**04**-Plastic Bottle or Container	**07**-Fiber or Plastic Box	**10**-Portable Tank	**13**-Other **(specify in description)**
02-Metal Drum	**05**-Glass Bottle or Container	**08**-Wooden Box	**11**-Cylinder	**14**-Compactor Box
03-Fiber or Plastic Drum	**06**-Plastic Bag	**09**-Metal Box	**12**-Shield Cask	**15**-Aerosol Can

Units for Volume

G-Gallon	**M**-Cubic Meters
L-Liters	**O**-Fluid Ounce
F-Cubic Feet	**P**-Pint
Q-Quart	

Units for Weight

P-Pound	**O**-Ounce
K-Kilograms	**T**-Tons
G-Grams	

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Printed Name	Signature	Z Number	Date
Mark Haagenstad		116327	05/08/02

*For new and unused chemicals
FMU64-F286, R.0 (5/01)

Los Alamos National Laboratory

Chemical Waste Disposal Request

Waste Services Use Only

This form is used to request disposal of chemical and low-level radioactive wastes. Mail completed form to Waste Services at **MS J595.**

Account Information	Z Number	Name (Print)	Telephone	Date
7D3400/XURP/04505203	095092	Edward Hoth	5-6002	05/08/02

Waste Pick-up Location and Storage Type:	TA	Building	Room	☐ Security Area	☐ Direct Off-Site Shipment
	21	357	Outside		

☐ < 90 Day Accumulation Area
☐ Universal Waste Area
(Start Date _____)

☐ Satellite Accumulation Area (Approx. vol. _____)
☐ PCB Waste (Start Date: _____)
☒ NM Special Waste (<90 days) (Start Date:02/25/02_____)

☐ Rad Staging Area (<90 days)
☐ Rad Storage Area (<1 year)
(Start Date: _____)

☐ Rad Dumpster (No:__ _____)
☐ Other (describe in description)

Item Id	Waste Profile Number	Shipping Container Information					Waste Information				*S=Solid L=Liquid G=Gas P=Powder	Description
		Type	Volume	Unit	Tare Weight	Unit	Volume	Unit	Weight	Unit		
2220223	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2220224	34731	02	55	G	30	P	45	G	600	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)

Container Types
01-Bulk (Unpackaged) 04-Plastic Bottle or Container 07-Fiber or Plastic Box 10-Portable Tank 13-Other (specify in description)
02-Metal Drum 05-Glass Bottle or Container 08-Wooden Box 11-Cylinder 14-Compactor Box
03-Fiber or Plastic Drum 06-Plastic Bag 09-Metal Box 12-Shield Cask 15-Aerosol Can

Units for Volume
G-Gallon M-Cubic Meters
L-Liters O-Fluid Ounce
F-Cubic Feet P-Pint
Q-Quart

Units for Weight
P-Pound O-Ounce
K-Kilograms T-Tons
G-Grams

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Printed Name	Signature	Z Number	Date
Mark Haagenstad		116327	05/08/02

*For new and unused chemicals

FMU64-F286, R.0 (5/01)

Los Al[illegible]s National L[illegible]oratory

Chemical Waste D[illegible]osal Request

This form is used to request disposal of chemical and low-level radioactive wastes. Mail completed form to Waste Services at **MS J595.**

Account Information	Z Number	Name (Print)	Telephone	Date
7D3400/XURP/04505203	095092	Edward Hoth	5-6002	04/26/02

Waste Pick-up Location and Storage Type:	TA	Building	Room	☐ Security Area	☐ Direct Off-Site Shipment
	21	357	Outside		

☐ < 90 Day Accumulation Area
☐ Universal Waste Area
(Start Date _____)

☐ Satellite Accumulation Area (Approx. vol. _____)
☐ PCB Waste (Start Date: _____)
☒ NM Special Waste (<90 days) (Start Date:02/25/02_____)

☐ Rad Staging Area (<90 days)
☐ Rad Storage Area (<1 year)
(Start Date: _____)

☐ Rad Dumpster
(No:__ _____)

☐ Other (describe in description)

Item Id	Waste Profile Number	Shipping Container Information					Waste Information				*S=Solid L=Liquid G=Gas P=Powder	Description
		Type	Volume	Unit	Tare Weight	Unit	Volume	Unit	Weight	Unit		
2207987	34731	13	15	M	4500	P	12	M	30,000	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2207988	34731	13	15	M	4500	P	12	M	30,000	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)
2207989	34731	13	15	M	4500	P	12	M	30,000	P	S	Diesel contaminated soil from fuel line leak at the Steam Plant AST (TA-21-57)

Container Types
01-Bulk (Unpackaged) 02-Metal Drum 03-Fiber or Plastic Drum 04-Plastic Bottle or Container 05-Glass Bottle or Container 06-Plastic Bag 07-Fiber or Plastic Box 08-Wooden Box 09-Metal Box 10-Portable Tank 11-Cylinder 12-Shield Cask 13-Other (specify in description) 14-Compactor Box 15-Aerosol Can

Units for Volume
G-Gallon M-Cubic Meters L-Liters O-Fluid Ounce F-Cubic Feet P-Pint Q-Quart

Units for Weight
P-Pound O-Ounce K-Kilograms T-Tons G-Grams

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Printed Name	Signature	Z Number	Date
Mark Haagenstad		116327	04/26/02

*For new and unused chemicals

Los Al: ıs
National L. ɔratory

Chemical Waste D: ıosal Request

Waste Services Use Only

This form is used to request disposal of chemical and low-level radioactive wastes. Mail completed form to Waste Services at **MS J595.**

Account Information	Z Number	Name (Print)	Telephone	Date
7D3400/XURP/04505203	116327	Mark Haagenstad	5-0104	05/13/02

Waste Pick-up Location and Storage Type:	TA	Building	Room	☐ Security Area	☐ Direct Off-Site Shipment
	21	357	Outside		

☐ < 90 Day Accumulation Area
☐ Universal Waste Area
(Start Date _____)

☐ Satellite Accumulation Area (Approx. vol. _____)
☐ PCB Waste (Start Date: _____)
☒ NM Special Waste (<90 days) (Start Date:02/25/02_____)

☐ Rad Staging Area (<90 days)
☐ Rad Storage Area (<1 year)
(Start Date: _____)

☐ Rad Dumpster
(No:__ _____)
☐ Other (describe in description)

Item Id	Waste Profile Number	Shipping Container Information					Waste Information				*S=Solid L=Liquid G=Gas P=Powder	Description
		Type	Volume	Unit	Tare Weight	Unit	Volume	Unit	Weight	Unit		
2220225	34731	13	15	M	4500	P	12	M	4000	P	S	Diesel contaminated brick concrete and metal from fuel line leak at the Steam Plant AST (TA-21-57)

Container Types
01-Bulk (Unpackaged) 04-Plastic Bottle or Container 07-Fiber or Plastic Box 10-Portable Tank 13-Other **(specify in description)**
02-Metal Drum 05-Glass Bottle or Container 08-Wooden Box 11-Cylinder 14-Compactor Box
03-Fiber or Plastic Drum 06-Plastic Bag 09-Metal Box 12-Shield Cask 15-Aerosol Can

Units for Volume
G-Gallon M-Cubic Meters
L-Liters O-Fluid Ounce
F-Cubic Feet P-Pint
Q-Quart

Units for Weight
P-Pound O-Ounce
K-Kilograms T-Tons
G-Grams

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Mark Haagenstad		116327	05/13/02

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