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Date: November 29, 2005  
Refer To: ENV-WQH: 05-213

Mr. John Young  
Hazardous Waste Bureau  
New Mexico Environment Department  
2905 Rodeo Park Drive East, Building 1  
Santa Fe, New Mexico 87505-6303

**SUBJECT: ADDITIONAL CHARACTERIZATION AT TA-21-57 DIESEL RELEASE SITE**

Dear Mr. Young:

As a follow-up to our letter of August 19, 2005 regarding TA-21-57 diesel release, we have consulted with Mr. Terry Hazen, a remediation specialist contracted by DOE, and we have prepared a Sampling and Analysis Plan for additional characterization of the site to further evaluate subsurface diesel contamination. Additional characterization will provide information for determining current subsurface conditions. ~~Upon evaluation of the results, the Laboratory will develop a mitigation plan~~ for the site. Enclosed is a copy of the proposed Sampling and Analysis Plan for your review.

Please contact Mark Haagenstad at (505) 665-2014 or Mike Saladen (505) 665-6085 if additional information would be helpful.

Sincerely,

A handwritten signature in black ink, appearing to read 'Steven Rae'.

Steven Rae  
Group Leader  
Water Quality & Hydrology Group

SR:MH/tml



Enclosures: a/s

Cy: Waudelle Strickley, EPA Region 6, Dallas, TX, w/enc.  
Kathryn Chamberlain, NMED/HWB, Santa Fe, NM, w/o enc.  
Lorena Goerger, NMED/PSTB, Santa Fe, NM, w/enc.  
Brett Lucas, NMED/SWQB, Santa Fe, NM, w/enc.  
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Phil Wardwell, LC-ESH, w/o enc., MS A187  
James Stanton, SSS-AE-V02, w/enc., MS A199  
ENV-WQH File, w/enc., MS K497  
IM-5, w/enc., MS A150

LA-UR-05-8978

*Approved for public release;  
distribution is unlimited.*

*Title:* Sampling and Analysis Plan  
2005 Assessment of Fuel Oil Contamination  
TA-21-57 Fuel Storage Tank Release

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*Submitted to:* Jerome Gonzales  
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## Los Alamos

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**Sampling and Analysis Plan**  
**2005 Assessment of Fuel Oil Contamination**  
**TA-21-57 Fuel Storage Tank Release**  
**Revision 0**

**November 28, 2005**

**Prepared by:**  
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**Prepared for:**

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## List of Acronyms

IWD	Integrated Work Document
AST	Aboveground Storage Tank
DOE	Department of Energy
DRO	Diesel Range Organics
EPA	Environmental Protection Agency
FM-SWO	Facility Maintenance - Solid Waste Operations
FM-UI	Facility Maintenance – Utilities and Infrastructure
KSL	KBR-Shaw-LATA
KSL-CDDO	KSL-Construction Department Department Office
KSL-AENV	KSL Environmental Group (a.k.a. Eberline Services)
KSL-AAHS	KSL-Health, Safety, and Environment Office
KSL-UMDO	KSL Utilities Division Office
LANL	Los Alamos National Laboratory
NMED	New Mexico Environment Department
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Plan
ENV-SWRC	Environmental Stewardship-Solid Waste Regulatory Compliance
ENV-WQH	Environmental Stewardship-Water Quality and Hydrology
SAP	Sampling and Analysis Plan
TPH	Total Petroleum Hydrocarbons
VOA	Volatile Organic Analytes

## **1.0 INTRODUCTION**

Eberline Services/KSL-AENV has prepared this site sampling and analysis plan (SAP) to describe sampling and contaminated material handling activities associated with collecting data to assess current conditions at the site as a result of the diesel fuel release that occurred at TA-21-57. Results of the initial investigation are provided in LA-UR-02-4007, TA-21-57 Above Ground Storage Tank Diesel Fuel Oil Environmental Assessment and Characterization Report, Revision 1 (Characterization Report). This SAP will be implemented in conjunction with a detailed Integrated Work Document (IWD).

This SAP Addendum is organized into three main sections: project description, a work plan, and quality control procedures. The work activities for this SAP Addendum include:

- Mobilization
- Drilling
- Sample Collection and Analysis
- Project Report Preparation
- Material Management

### **1.1 Scope of Work**

The purpose of this project is to assess current conditions and extent of contamination at the site for comparison with conditions at the time of the initial investigation as a baseline. The scope of work for this project is to drill sampling boreholes adjacent to previously installed boreholes and collect samples for analysis to provide data to assess the current conditions at the site. Specific activities to accomplish the drilling and core sampling are provided in the Work Plan Section of this document. A schedule for the completion of the investigation is provided in Appendix A.

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 are in accordance with the objectives and procedures described in *Chapter 1.0 Soil and Groundwater, Sampling and Disposal*, from the *Guidelines For Corrective Action* (New Mexico Environment Department [NMED] Petroleum Storage Tank Bureau, March 13, 2003). This plan outlines the methods and procedures to collect samples and gather data of sufficient quality and quantity to adequately verify the extent of the contaminated soil identified during the initial investigation sampling activities and identify any potential changes in the subsurface conditions or movement of the contamination. The project will receive appropriate LANL reviews and will be performed in accordance with an approved IWD. The project will be performed in accordance with applicable DOE, LANL, and State of New Mexico requirements.

### **1.2 Project Organization and Responsibilities**

LANL Facility Management - Utilities and Infrastructure (FM-UI) Division has overall responsibility for the project. KSL Utilities is responsible for obtaining the required

excavation permits. Eberline Services/KSL-AENV is responsible for planning and directing of site sampling, conducting field screening, arranging for shipping of samples, laboratory analysis of samples, and reporting of results. KSL-AENV will also be responsible for waste characterization and waste management including temporary storage of waste materials. NWIS-SWO will be responsible for waste transportation and disposal. KSL construction is responsible for removal of the soil and any mobilization/site preparation tasks required for obtaining necessary clearances and site access. A contract laboratory, under subcontract to LANL, will provide analytical services. LANL's Water Quality & Hydrology Group (ENV-WQH) and Solid Waste Regulatory Compliance Group (ENV-SWRC) will provide institutional regulatory support for water quality issues and solid waste issues, respectively.

### **1.3 Key Individuals**

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

- Project Manager (FM-UI) - Responsible for overall management of the investigation.
- Facility Manager (KSL Utilities) -Responsible for operations and management of the Facility.
- Site Manager (Eberline Services/KSL-AENV)- 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. Coordinates sample analysis activities and is responsible for preparation of the final report
- Health and Safety Officer (KSL-AAHS) - Oversees and ensures proper implementation of the appropriate site health, safety and emergency response requirements and coordinates with the Site Manager to resolve site safety issues.
- Sampling Personnel (Eberline Services/KSL-AENV) - Responsible for collecting soil samples from drilling boreholes and core samples for field test screening and laboratory analysis.
- Sample Management Office – Provides sample collection paperwork, coordinates shipment of samples to laboratory, request for analysis, receipt of analytical results, and coordination of data validation.
- Construction Supervisor (KSL Construction)- Responsible for coordinating all construction activities pertaining to the investigation activities.
- Data validation personnel (ECR-SMO Sub.) – Responsible for ensuring the analytical data meets the data quality objectives.
- Driller (Enviro Drill) – Responsible for rig operation and safety pertaining to working at or near the rig.

### **1.4 Site Characteristics**

A map depicting the location of TA-21-57 is provided in Figure 1. A site diagram, depicting the previously installed boreholes at the TA-21-57 site, as well as proposed borehole locations, is provided in Figure 2. Characterization boreholes installed in 2002 have been abandoned and filled with grout consisting of a mixture of Portland cement

and bentonite. Four boreholes from the secondary characterization conducted in 2003 have not been grouted.

Additional site information is provided in "TA-21-57 Aboveground Storage Tank Diesel Fuel Oil Environmental Assessment and Characterization, Revision 1".

## **2.0 WORK PLAN**

The following sections describe the major activities necessary to complete the sampling and analysis to assess the current extent of soil contamination and to prepare a report to document project activities and results.

### **2.1 Field Mobilization**

Field mobilization involves the tasks required to prepare for and support fieldwork at the site. These activities include contract laboratory notification, coordination within KSL, 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), and developing an IWD. Field mobilization tasks must be complete prior to the initiation of any fieldwork or sampling activities. Tasks relative to the drilling, coring, and sampling activities are discussed within this plan.

### **2.2 Drilling**

An auger-drilling rig will be brought in to advance boreholes and collect samples in designated zones with split spoon sampling to evaluate current subsurface diesel contamination conditions. Proposed locations of the additional boreholes are shown on Figure 2. Boreholes V-1A and V-1B will be drilled and sampled as described. Boreholes V-1C and V-1D will be drilled and sampled only if contamination is found at such levels to warrant characterization.

A minimum depth profile for the proposed boreholes is provided in Figures 3 (West Elevation) and 4 (South Elevation). Each borehole will be advanced to the initial sampling point before a sample is collected. Borehole will be sampled to collect BTEX and PAH data at the point most likely to be contaminated based on the contamination zone profile from previous sampling. After collection of the initial sample, each borehole will be advanced to the total depth of the V-1 Borehole (175 feet) at a minimum. As each borehole is advanced, continuous core samples will be collected. If additional contamination is observed at or above the NMED TPH screening levels (880 mg/kg) to a depth of 175 feet, the borehole will be advanced until field screening indicates that TPH levels are at or below 880 mg/kg plus an additional 10 feet. Samples will be collected at 5-foot intervals from the initial sampling point to a depth of 45 feet and at 10-foot intervals thereafter in the continuously-cored zone of each borehole. Table 1 provides a summary of the samples to be collected for each borehole, assuming no contamination above 880 mg/kg TPH is observed to a depth of 175 feet.

**Table 1  
Proposed Borehole Sampling Locations**

<b>Proposed Borehole</b>	<b>Initial Sampling</b>	<b>Continuous Core Sampling</b>
V-1A	5'	5-foot intervals from 5'-45'; 10-foot intervals from 45' - 175'
V-1B	5'	5-foot intervals from 5'-45'; 10-foot intervals from 45' - 175'
V-1C, if necessary	5'	5-foot intervals from 5'-45'; 10-foot intervals from 45' - 175'
V-1D, if necessary	5'	5-foot intervals from 5'-45'; 10-foot intervals from 45' - 175'

### 2.3 Sample Collection and Analysis

Field analysis will be used in conjunction with visual and olfactory evidence to guide the drilling. No field analysis will be conducted until a depth of 155 feet has been reached, as this is near the depth where highest contamination was previously found. Field analysis will be conducted at 5-foot intervals from 155 feet to 175 feet in each borehole. Field analytical results greater than 880 mg/kg TPH will result in drilling to depths beyond 175 feet. Field analyses will be performed using a PetroFLAG field TPH analysis kit in accordance with the detailed instructions for the kit. In summary, the sample is mixed with reagents, filtered, allowed to develop, then read with a turbidimeter.

For each borehole, analytical samples will be collected from the initial sampling point and at 5-foot intervals from a depth of 5 feet until 45 feet. Beyond 45 feet, analytical samples will be collected 10-foot intervals. This approach corresponds with previous sampling activities.

Analytical samples will be placed in 8oz amber-glass jars with no headspace. Laboratory samples will be sent to a contract laboratory for analysis. Initial borehole samples will be analyzed for the target analyte list in Table 2 using Methods 8260/8270. Each analytical sample from the continuous-core zone of each borehole will be analyzed for diesel range total petroleum hydrocarbons (TPH-DRO) by method 8015M. Samples from the continuous-core zone of each borehole at depths of 145 feet and at total depth will also be analyzed for the target analyte list in Table 2 using Methods 8260/8270. Sample analysis will be performed to achieve the method detection limits specified in Table 1-1 of the NMED Corrective Action Guidelines (March 13, 2000) unless the detection limits are unobtainable for the sample. If the detection limit is unobtainable the analytical report will include a narrative discussion of why the limits are unobtainable. Samples will be identified, labeled, handled, and preserved as specified in section 3.3.

**Table 2  
Target Analyte List**

Benzene	Benzo(a)pyrene	Indeno(1,2,3-c,d) pyrene
Toluene	Benzo(b)fluoranthene	2-methyl Naphthalene
Ethyl benzene	Benzo(k)fluoranthene	Naphthalene
Xylene	Chrysene	Phenanthrene
Acenaphthalene	Dibenz(a,h)anthracene	Pyrene
Anthracene	Fluoranthene	
Benz(a)anthracene	Fluorene	

**2.5 Site Restoration**

As each borehole is completed it will be covered and barricaded to prevent personnel from accidentally stepping in the hole and to prevent soil and debris from falling in the hole. Once the determination that the boreholes are no longer needed they will be abandoned in accordance with the Chapter 3 of the NMED Guidelines For Corrective Action (March 13, 2000). Boreholes will remain open until a determination has been made by the NMED that the site has been sufficiently characterized or that the open boreholes pose a significant risk to health and safety or the environment. All sampling equipment and materials and drilling equipment will be removed from the site upon completion of the investigation. Drill cuttings and decontamination water will be handled in accordance with Section 2.7 of this document.

**2.6 Project Report Preparation**

Eberline Services/KSL-AENV will prepare a report summarizing the analytical results, compliance with QC requirements, and estimating the extent of soil contamination based on the analytical results. The report will contain sample collection and control documentation, analytical reports, and borehole logs. LANL ENV-WQH will provide this information to the regulators.

**2.7 Material Management**

Drill cuttings and spent field analytical samples are not anticipated to be regulated for these boreholes. If field analysis indicates the presence of unanticipated contamination, the waste will be placed in containers for management as New Mexico Special Waste and a storage area will be set up and registered on site until disposal can be arranged. Waste from the field analysis will be contained and disposed of as hazardous waste. A satellite accumulation area will be set up and registered on site until the material can be picked up for disposal. All decontamination solutions generated during this assessment will be properly characterized and disposed of through FM-SWO in accordance with LANL, NMED, and DOE requirements.

### **3.0 QUALITY CONTROL PROCEDURES**

The objective of the sampling is to obtain additional data of sufficient quantity and quality to confirm the extent of the contamination and to provide contaminant data for comparison with the NMED soil screening levels. The data must 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, the AHA will be amended as needed, and the deviation will be 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**

Whenever possible, disposable sampling equipment will be used to minimize the chance of cross-contamination of samples. Soil samples will be removed from the split spoon sampler and soil probe using disposable metal scoops. All non-disposable equipment will be decontaminated in accordance with Section 3.2 prior to use. Borehole samples will be collected in stainless steel split spoon samplers.

##### 3.1.1 PetroFLAG Analysis

Field TPH analysis will be conducted using PetroFLAG field analysis kit with a calibrated turbidimeter. The sensitivity and detection levels of the kit will be dependent upon the age of the material present and any interference present in the soils at the site. Test results will be used to semi-quantitatively identify any residual contamination. The analyst/technician performing soil analyses will be trained and familiar with use of the method and instrumentation 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 on the field activity log. 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 the stainless-steel split-spoon sampler. Samples will be placed into the sample containers and submitted to the contract analytical laboratory for analysis as soon as practicable after collection.

##### 3.1.3 QA/QC

In addition to field samples, field QC samples will be collected to assess the sample collection and handling techniques and the decontamination effectiveness. Field duplicate samples will be collected at a frequency of 10-percent and will be collected, handled and analyzed exactly as the original sample for which it is a duplicate. A trip blank will be included in any cooler containing samples to be analyzed for volatile organics to identify any contamination which may occur during handling or transportation of the samples.

Batch laboratory QC samples will be analyzed to assess the laboratory's performance during analysis of the samples. Any laboratory QC sample results falling outside of the acceptable limits will be explained on the analytical report and its effect on the validity of the sample results will be evaluated.

#### 3.1.4 Data Validation

Laboratory data will be checked for the following parameters to ensure validity of the data.

- Completeness – all samples and analysis have been processed.
- Detection and Quantitation Limits – Detection and quantitation limits are below the regulatory and/or action levels.
- Control Limits – Ensure that laboratory quality control sample analytical results are within acceptable control limits.
- Holding Times – Ensure that sample preparation and analysis were performed within the acceptable holding times.

A level 4 data validation will be performed on the data prior to reporting the results.

### **3.2 Decontamination**

The auger flights will be decontaminated between holes. The stainless-steel split-spoon sampler and soil probe will be decontaminated before the collection of each sample. Decontamination will consist of physically removing all gross contamination, followed by a wash with a laboratory detergent solution followed by two water rinses. Residues generated by decontamination procedures should be collected and disposed of in accordance with LANL and NMED requirements as specified in Section 2.7.

### **3.3 Sample Handling Protocol**

When a sample is collected for off-site analysis, it will be promptly placed into a labeled 8 oz. amber-glass jar and fitted with a Teflon lined lid. The sample will be labeled with a pre-prepared label, which includes the sample number and requested analysis. The sample will be sealed with custody tape, then placed in a reclosable poly bag and placed on ice to cool to 4°C for delivery to the analytical laboratory. Pertinent information will be recorded on the sample collection log and the chain-of-custody form.

#### 3.3.1 Custody and Shipping

Samples will be packed to prevent breakage, using additional, inert packing material as necessary. Samples will be delivered to the LANL Sample Management Office for delivery to the analytical laboratory. If overnight storage of the samples is required, the samples will be placed, under custody, in the KSL-AENV laboratory sample refrigerator. 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. Samples will be relinquished to the laboratory representative by one of the sample team members and the transaction will be recorded on the chain-of-custody form.

### 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.

## **4.0 References**

KSL-HENV/Eberline Services, 2002, "TA-21-57 AST Diesel Fuel Oil Environmental Assessment and Characterization Sampling and Analysis Plan", Los Alamos, New Mexico

KSL-HENV/Eberline Services, 2002, "TA-21-57 Above Ground Storage Tank Diesel Fuel Oil Environmental Assessment and Characterization Report, Los Alamos, New Mexico, LA-UR-02-4007.

New Mexico Environment Department, Petroleum Storage Tank Bureau, 2003, "Guidelines For Corrective Action", Santa Fe, New Mexico

New Mexico Environment Department, 2003, "New Mexico Environment Department TPH Screening Guidelines", Santa Fe, New Mexico

## Figures

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:  
 KSL

**UTILITY MAPPING**

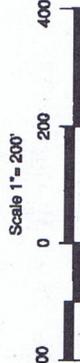
**LEGEND**

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



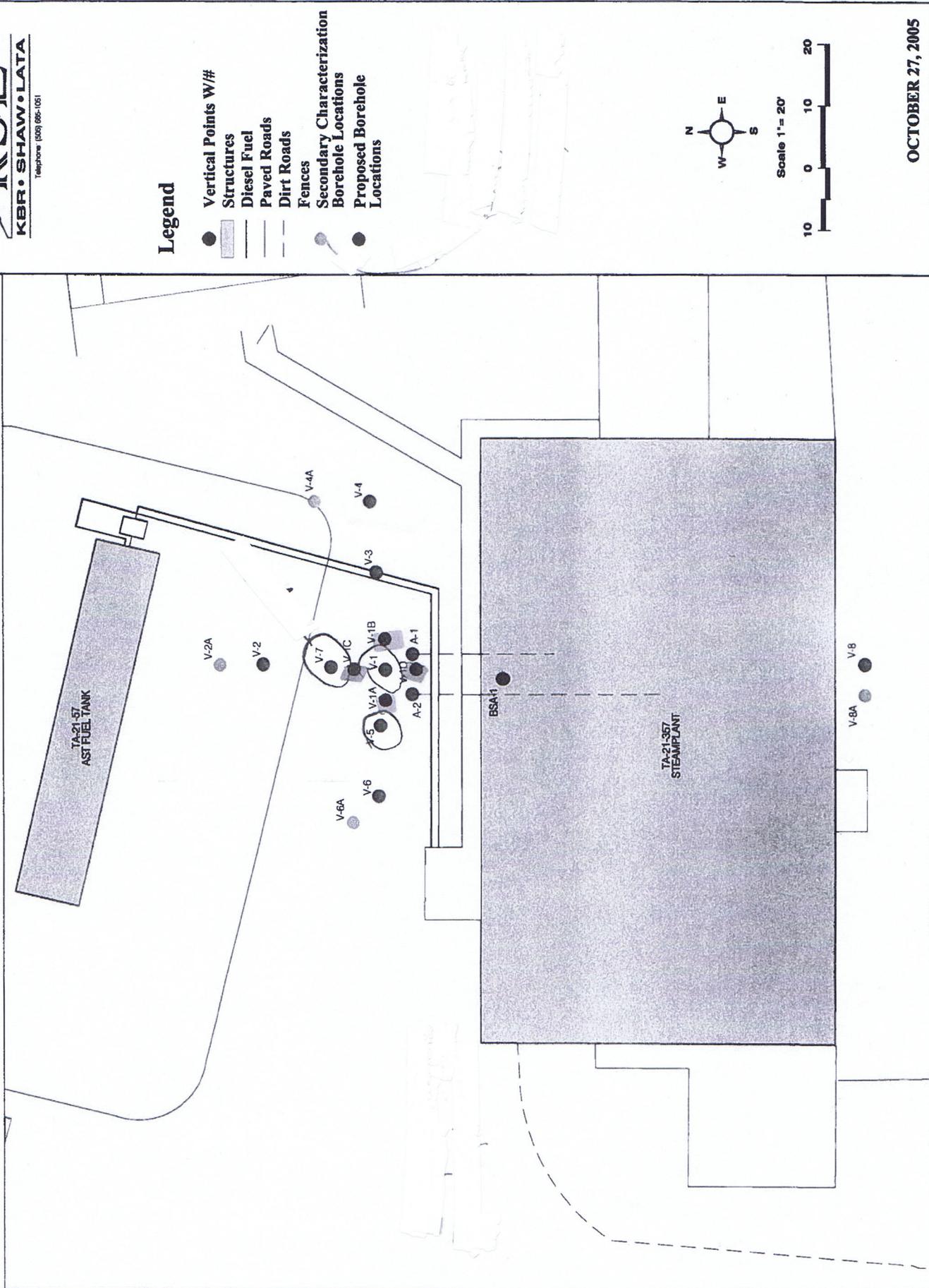
Data obtained from KSL Utility Mapping and Location Section. Data was collected using GPS units and located using conventional locating equipment. Data should be field verified prior to using the information for any design, planning, construction or otherwise.

Classification: \_\_\_\_\_ Reviewer: H. Salazar Date: \_\_\_\_\_

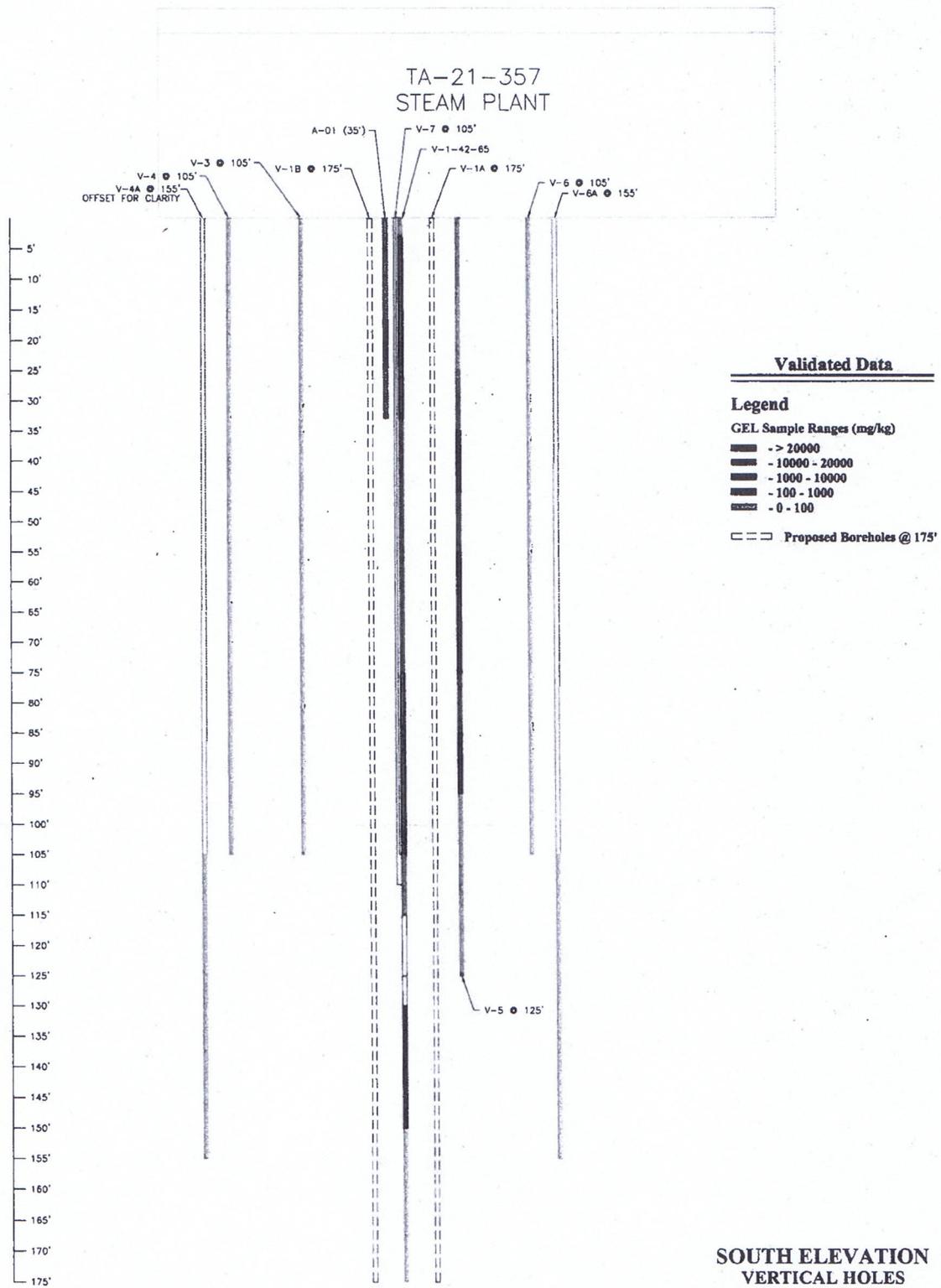


**KSL**  
 KBR • SHAW • LATA  
 Telephone: 505.886.1801  
 P.O. Box 166, Mail Stop 166  
 Los Alamos, NM 87545  
 Drawing Number: U-2002-002  
 Produced by: D. Nease

**Figure 2 - Vertical & Angle Core Sampling and Analyses Locations**

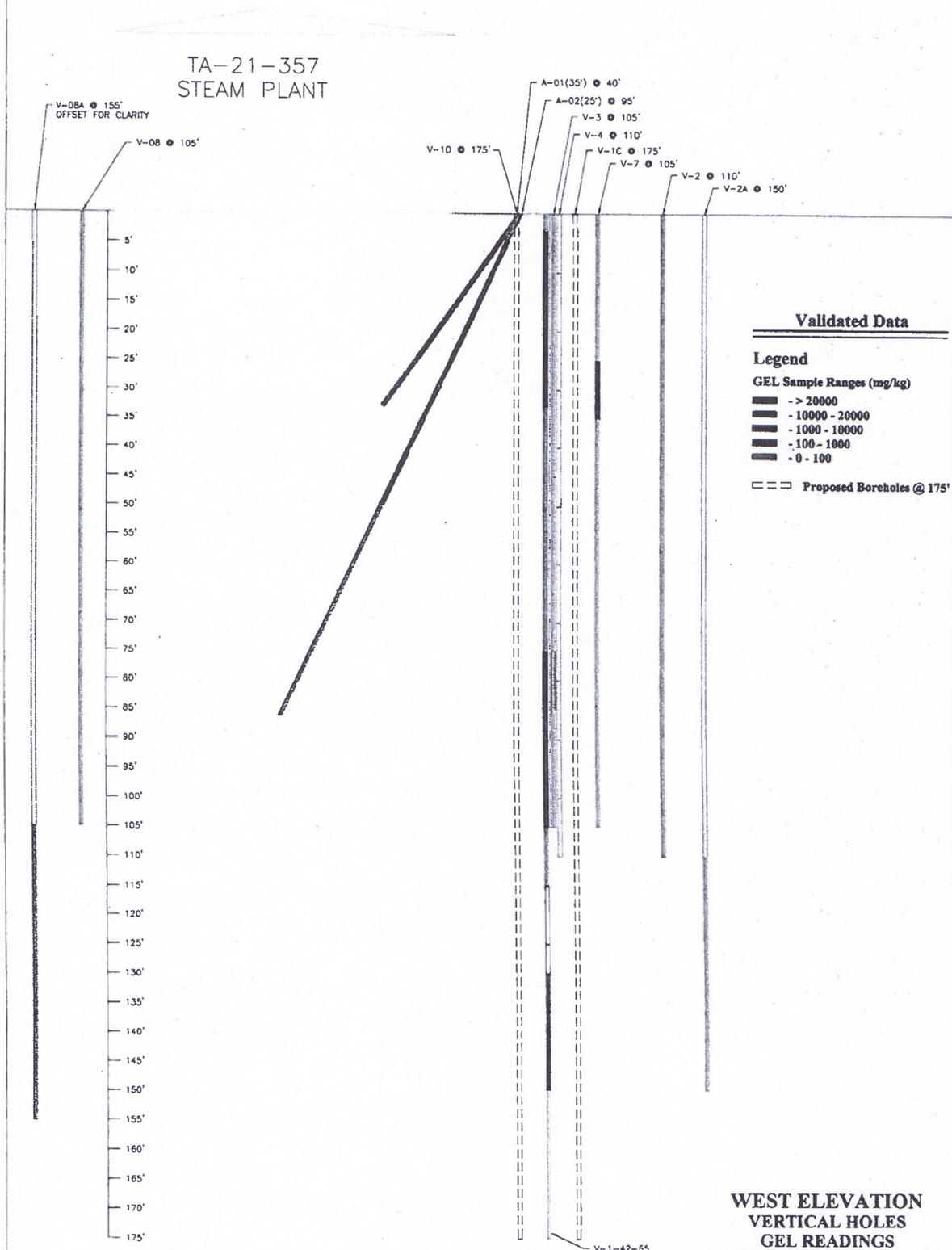


# Figure 3 (SE) DIESEL FUEL OIL #2 CONTAMINATION EXTENT



**SOUTH ELEVATION  
VERTICAL HOLES  
GEL READINGS**

# Figure 4 (WE) DIESEL FUEL OIL #2 CONTAMINATION EXTENT



**WEST ELEVATION  
VERTICAL HOLES  
GEL READINGS**

**APPENDIX A**  
**Project Schedule**

**2005 Assessment of Fuel Oil Contamination  
TA-21-57 Fuel Storage Tank Release  
Project Schedule**

<b>Task Name</b>	<b>Duration</b>
1. Prepare Addendum a. Prepare Draft b. KSL/LANL Review c. Incorporate comments d. Prepare Final Draft e. NMED Review f. Issue Final Addendum	Six weeks
2. Prepare Addendum Summary	One week
3. NMED Site Visit	One day
4. Prepare IWD and Excavation Permit	Three weeks
5. Prepare Subcontract for Driller	One week
6. Prepare Sample Labels/Paperwork (WQH)	One week
7. Drilling and Sampling a. Mobilize Driller b. Badging/Pre-job c. Drilling/Sample Collection d. Driller Demobilization	One week
8. Analysis	Four weeks
9. Prepare Report a. Prepare Draft b. KSL/LANL Review c. Incorporate comments d. Finalize Report e. Issue to NMED	Eight weeks