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SOILS INVESTIGATION FOR TA-41-76 UNDERGROUND DIESEL FUEL STORAGE TANK FINAL REPORT

August 24, 1998

Project No. 5077.98.0042

Prepared by:

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Prepared under Subcontract No. BI434 for:

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CONTENTS

FIGURES

LIST OF ACRONYMS

Benchmark	Benchmark Environmental Corporation
DOE	Department of Energy
JCNNM	Johnson Controls Northern New Mexico
JENV	Johnson North Environmental
LANL	Los Alamos National Laboratory
ND	non-detect
PCB	polychlorinated biphenyl
PPE	personal protective equipment
QA/QC	Quality Assurance/Quality Control
TA	Technical Area
TPH	total petroleum hydrocarbon
TRPH	total recoverable petroleum hydrocarbon
TSTA	tritium systems test assembly
UDFST	Underground Diesel Fuel Storage Tank
UDOST	Underground Dielectric Oil Storage Tank
UST	underground storage tank

1.0 INTRODUCTION

This report presents the results of the Site Characterization of the TA-41-76 Underground Diesel Fuel Storage Tank (UDFST). The services were authorized by Mr. Henry Nunes, D&D Group, Los Alamos National Laboratory (LANL), through Mr. Perry Trujillo, Johnson Controls Northern New Mexico (JCNNM).

1.1 Purpose and Scope

The purpose of the site characterization was to determine the existence of TPH and PCB contamination in the surrounding soil from the TA-41-76 UDSFT. Specifically, the project would look to differentiate possible contamination resulting from spillage or leakage as determined by the vertical extent of contamination. Project tasks included: developing a Site Characterization Plan; reviewing available documentation; conducting drilling operations to collect samples of soil borings from around the tank; performing laboratory analyses of soil samples; assessing the results; and formulating appropriate conclusions. A copy of the Site Characterization Plan for this project is included in Appendix A of this report.

The project went through appropriate LANL reviews and was performed in accordance with approved site health, safety, and emergency response plans. The project was performed in accordance with applicable Department of Energy (DOE), LANL, and State of New Mexico requirements.

2.0 PROJECT DESCRIPTION

The TA-41-76 UST is located on the south side of Building. 2 in Technical Area 41. The TA-41-76 UST is a 560 gal. tank used to store diesel fuel for a generator housed in Building. 2. The 560 gal. tank is a replacement tank and was installed in 1992. A small active surface stream is located approximately 100 feet south of the tank and 30 feet lower in elevation than the tank. An alluvial aquifer is associated with the stream but it is not believed to have been impacted by operations associated with the UST. The stream flows through a concrete channel the length of TA-41. There are no private water supply wells within a 1,000 ft radius, and no municipal water supply wells within a one mile radius. There is no record of any major reportable spills associated with the tank and no record of leaks from the existing tank or the previous tank.

3.0 PROCEDURES

This section provides an overview of the procedures used during the field investigation of the TA-41-76 UST. The field activities followed the procedures specified in the Site Characterization Plan For TA-41-76 UDFST prepared by Benchmark and approved by LANL.

3.1 Utilities Identification

Prior to drilling activities, JCNNM personnel identified utility locations and marked underground utilities throughout the area of investigation. The proposed drilling locations and a description of the size, depth, and method of boring were submitted for approval and an Excavation Permit was granted.

3.2 Drilling Procedures

3.2.1 Borehole Drilling

Four boreholes were drilled to collect soil samples for analysis. Drilling methods were consistent with those identified in the Site Characterization Plan.

Prior to drilling it was determined that the bottom of the UST was approximately 7 ft below the surface requiring the boreholes be drilled to at least 8 feet deep. Soil samples were collected at the surface-2.5 feet and at every 5 foot interval thereafter. Final borehole depths varied depending on location. Boreholes No. 1, 2, and 3 were drilled to sufficient depths; borehole No. 4 was finished at 2.5 feet. The drilling encountered hard resistance and small pieces of cement and it was decided that this location would be abandoned due to difficult access. Locations of the boreholes are shown in Figure 3-1.

Boreholes were drilled as close as possible to the tank without risk of hitting or drilling into the UST. Borings were advanced to a depth of at least 8 feet using continuous flight hollow-stem auger methods. The boreholes were advanced by drilling to 5 foot depth intervals, removing the auger center plug and driving a split spoon sampler 30 in. below the drilling face. Following removal of the split-spoon sampler, the center plug was reinstalled and the procedure was repeated at the next 5 ft interval. All downhole sampling equipment was decontaminated between sample intervals and locations. All hollow-stem augers and other drilling tools and equipment were decontaminated before use, between borings, and at the end of the boring work.

3.2.2 Borehole Abandonment

When borehole drilling and sampling was completed, all boring locations were plugged with bentonite at the surface. Upon determination to either remove the tank or remediate the surface contamination the boreholes will be abandoned by filling with cement, in accordance with the Site Characterization Plan.

3.3 Equipment Calibration

The Total Petroleum Hydrocarbon (TPH) Field Analytical Kit was calibrated daily using the calibration standard provided and in accordance with the manufacturers instructions.

3.4 Decontamination

Personal protective equipment (PPE), sampling equipment and heavy equipment was decontaminated on-site, in accordance with procedures specified in Section 3.4, Decontamination, of the Site Characterization Plan.

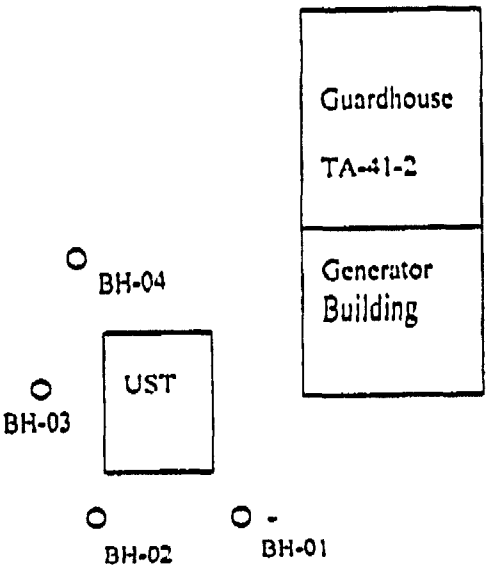


Figure 3-1. Initial Boring Locations

Nitrile gloves were washed with detergent (Alconox) and water, and then rinsed in deionized water before removal. All disposable PPE (outer gloves) were removed and disposed in plastic trash bags as solid waste.

All sampling equipment was decontaminated prior to sample collection, between sample collection, and between boreholes. Sampling equipment was scrubbed in a solution of detergent (Alconox), and rinsed with tap water and then deionized water and air dried. Sampling equipment washwater was characterized and sent to the TA-46 wastewater treatment plant.

The drill rig and all drilling equipment were cleaned and rinsed after the drilling activity at TA-50. Only clean augers, rods, samplers, and other downhole equipment were used during the drilling. Plastic sheeting was used at each borehole location and beneath the drill rig to contain accidental hydraulic leaks, cuttings, and any other materials that could potentially contaminate subsequent sampling sites.

3.5 Sample Collection

Soil samples were collected to determine levels of potential surface and subsurface contamination. All sampling conducted at TA-41-76 UST was in accordance with the Site Characterization Plan, Section 3.2 Sampling Procedures.

Soil samples collected from the split-spoon were inspected immediately upon retrieval. Initially the soil was classified using the Unified Soil Classification System (ASTM D2488-69 Visual Manual Procedure), and recorded on the boring log (Appendix B.). The contents of the split-spoon were transferred to a stainless steel mixing bowl for compositing. Duplicate samples were collected from the composited mixture for analysis using the TPH Field Test Kit with duplicates sent to a contract laboratory for analysis to confirm the field test kit results. Copies of the Field Borehole Logs for the investigation are contained in Appendix B.

3.5.1 Quality Assurance/Quality Control (QA/QC)

The data collected during the TA-41-76 Diesel Oil UST investigation are being used to determine the presence or absence of diesel contaminants in the soil around the UST, and to determine if any contaminants were from UST spillage or leakage, as evidenced by the vertical extent of contamination.

The QA/QC sampling was designed to provide an indication of the reliability of the field data collected. Reliability was ensured through the collection of a set of QA/QC samples concurrently with the field effort. The QA/QC samples were taken in accordance with U.S. Environmental Protection Agency, SW-846, requirements. QA/QC samples included one trip blank, one field blank, one field duplicate, and one equipment rinsate blank. The analytical laboratory included analytical QA/QC samples and checks including standards, blanks, and spikes, in the analytical program. Evaluation of field and laboratory QA/QC samples and checks facilitated data quality assessment.

3.5.2 Sample Chain-of-Custody and Shipment

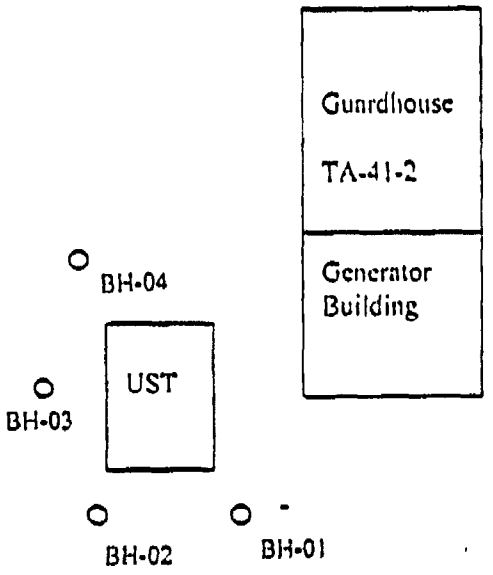
Prior to sample shipment JENV personnel completed the sample Chain-of-Custody and verified that samples were appropriately labeled. Samples were picked-up by the analytical laboratory for delivery to their laboratory in Albuquerque, New Mexico.

4.0 RESULTS OF SITE CHARACTERIZATION

The site characterization consisted of four soil borings: one angle drilled underneath the center of the UST; one near the southeast corner; one on the south side; and one on the west side. Figure 4.1 shows deep soil boring locations and the total concentration of TRPH found at each depth interval. Copies of analytical results are found in Appendix C.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the field investigations conducted to date, the tank does not appear to have leaked and what appears to be surface spillage was identified. The TPH contamination levels detected range between 100 ppm and 1000 ppm. LANL personnel believed that the surface contamination may be a result of residual asphalt when the tank was replaced in 1992. Asphalt was identified in the borehole logs for each of the four samples taken at the surface. It was decided by LANL personnel that additional samples should be analyzed to determine if the cause of the contamination was from spillage or asphalt. JENV personnel hand augered three additional samples from the surface to approximately 2.5 ft near each of the original boreholes. The hand augered samples were analyzed using U.S. EPA method 8015 TPH carbon chain identification to determine if the contamination was from asphalt residue or diesel spill. The sample results for the hand augered samples were non-detect (ND). Therefore, it appears that the surface contamination is residual asphalt from when the tank was replaced in 1992. JENV recommends that the tank be filled with inert material and that LANL proceed with finalizing closure of the tank with the New Mexico Environment Department.



BH-01

2.5' – 840 ppm (TRPH)
7.5' – 69 ppm (TRPH)
12.5' – 22 ppm (TRPH)

HA-01

2.5' – ND (TPH)

BH-02

2.5' – 47 ppm (TRPH)
8' – 43 ppm (TRPH)

HA-02

2.5' – ND (TPH)

BH-03

2.5' – 180 ppm (TRPH)
10' – 41 ppm (TRPH)

HA-03

2.5' – ND (TPH)

BH-04

2.5' – 770 ppm (TRPH)

Figure 4-1 Soil Boring Locations and TPH Concentration

APPENDIX A

SITE CHARACTERIZATION PLAN

SITE CHARACTERIZATION PLAN
FOR THE TA-41-76 UNDERGROUND DIESEL FUEL STORAGE TANK

June 15, 1998

Project No. 5077.98.0042

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TABLES

FIGURES

ACRONYMS AND ABBREVIATIONS

EPA	U.S. Environmental Protection Agency
JCNNM	Johnson Controls Northern New Mexico
JENV	Johnson Controls Environmental
I.D.	Inner Diameter
LANL	Los Alamos National Laboratory
O.D.	Outer Diameter
QC	Quality Control
QCSP	Quality Control and Sampling Plan
SCP	Site Characterization Plan
TRPH	Total Recoverable Petroleum Hydrocarbons
TPH	Total Petroleum Hydrocarbons

1.0 PROJECT DESCRIPTION

Benchmark Environmental/Johnson Controls Environmental (JENV) has prepared the site characterization plan (SCP) to direct the field investigation for the closure in place of a 560 gallon diesel fuel underground storage tank (UST), structure number 76, located at Technical Area (TA)-41 within the Los Alamos National Laboratory (LANL) boundary (Figure 1-1). The UST is scheduled for closure in 1998 and is being conducted pursuant to the New Mexico Underground Storage Tank Regulations, codified at 20 New Mexico Administrative Code 5.

The 560 gal. tank was a replacement tank and was installed in 1992, and has been used to store diesel fuel for the generator housed in building 41-W2. The depth to groundwater at this location is approximately 900 ft and the closest surface water, a small active stream, is approximately 100 ft south and 60 ft lower then the tank. An alluvial aquifer is associated with the stream in but it is not believed to have been impacted by operations associated with the UST. Note that the stream is channeled through a concrete channel the length of TA-41. There are no private water supply wells within a 1,000 ft radius, or municipal water wells within a one mile radius. A site characterization of the UST is necessary to measure for the presence of a release where contamination is most likely to be present. If contamination is found, the nature and extent will be determined. This SCP provides a detailed work plan, a quality control and sampling plan, and procedure references to obtain data sufficient to determine whether or not corrective actions are necessary at this site.

1.1 Scope of Work

The purpose of this project is to measure for the presence of contamination associated with the TA-41-76 diesel fuel UST. The SCP outlines the procedures to gather data of sufficient quality and quantity to adequately characterize the nature and extent of any release and to provide information necessary to identify remedial measures, if necessary. The project will have the 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.

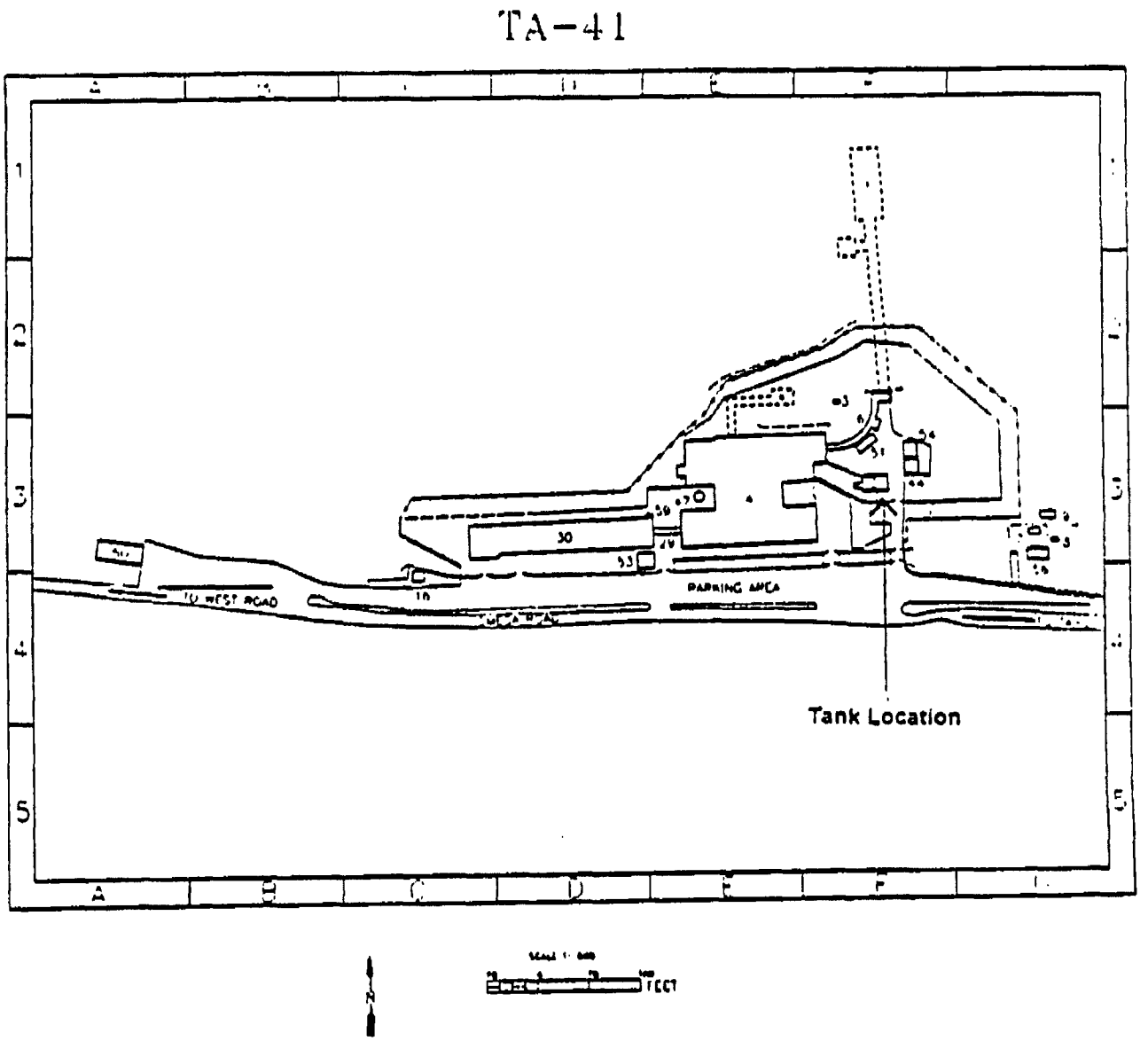

Figure 1-1. Site Location Map

1.2 Project Organization and Responsibilities

The SCP is organized into two main sections: a general work plan and a more specific quality control and sampling plan. Benchmark/JENV is responsible for planning and directing the site characterization, conducting field sampling, arranging for laboratory analysis of samples, and the reporting of results. Johnson Controls Northern New Mexico (JCNNM) is responsible for drilling, surveying, and any mobilization/site preparation tasks required to obtain necessary clearances and site access. Analytical services will be provided by the contract laboratory, Assaigai Analytical Laboratory, under subcontract to JCNNM.

1.3 Key Individuals

Key project participants for this effort include the Facility Manager, Project Manager, Site Manager, Health and Safety Officer, Driller, and Analyst. The following provides a description of the proposed project assignments and responsibilities.

- Facility Manager - Joe Trujillo, 667-6066 - Responsible for operations and management of the LANL Facility.
- Project Manager - Henry Nunes, 667-2970 - 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 - David Plante, 667-0104 - Supervises all field investigation activities and is responsible for implementation of appropriate site health, safety and emergency response plans and the quality control sampling plan (QCSP) during the fieldwork phase of this project.
- Health and Safety Officer - David Dixson, 667-3751 - 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.
- Driller - Joe Skalski, Stewart Bros., 667-2876 -Responsible for drilling soil borings, collecting sample soil borings and site restoration.
- Analyst - Lawrence Rodriguez, JENV, 667-0104 - Responsible for the analysis of samples using the field test kit.

1.4 Site Characteristics

The UST is located at the eastern end of TA-41 just south of the generator building 41-W2. The surface is partially covered with asphalt and the underlying soils have been reworked during grading and leveling activities at the site. Unit 3 of the Bandelier Tuff is approximately 2-4 ft below the surface. Surface drainage from this area is towards the south.

2.0 WORK PLAN

The following sections describe the major activities necessary to complete the site characterization. They are presented in the sequence in which they will be performed. For this project, field activities are focused on obtaining soil samples from borings on the north, south, and east sides of the UST (the west side is in-accessible due to a hillslope) to assess the degree, if any, of residual soil contamination. The sampling data will be used to determine whether a corrective action is necessary and what type of actions may be feasible. As indicated in the introduction, no information exists which indicates that the tank has leaked and it is expected that no contamination will be found.

2.1 Field Mobilization

Field mobilization involves all tasks required to prepare for and support fieldwork at the site. The activities include, but are not limited to; contract laboratory notification, drill scheduling, obtaining utility clearances and drilling permits, ordering and calibrating field equipment and instrumentation, procuring decontamination equipment, preparing the site for work (i.e., setting up decontamination station), etc. All field mobilization tasks must be complete prior to the initiation of any fieldwork or sampling activities.

2.2 Drilling

All boreholes will be drilled to a minimum of 1 ft beneath the bottom of the UST. Borings will be advanced using hollow-stem augers as described in Section 3. All drilling will be observed by an experienced geologist who will examine the cuttings and log the core. There are currently four boreholes

planned. The first borehole will be angle drilled from the southeast to the area below the center of the tank. The three remaining boreholes will be drilled as close as physically possible to the tank on the north and south ends and along the east side to determine the extent of any potential contamination. (Note: the west side of the tank is inaccessible due to a hillslope) Each of the boreholes will require coring or jackhammering through the asphalt prior to drilling. Additional boreholes and/or modification of the locations may be specified in the field by the Site and/or Project Manager, as conditions warrant. The estimated borehole depth is approximately 10-15 ft for the vertical holes.

2.3 Sampling

Soil/core samples will be collected as the borings are advanced using a 2-in. outer diameter (O.D.) by 24-in. split-spoon sampler. Samples will be collected at the surface, the soil/tuff interface, at each 5 ft interval, and at a depth 1 ft beneath the bottom of the tank. Samples will be obtained from the split-spoon sampler according to the procedures described in Section 3. If the Bandelier Tuff is too well-consolidated to allow for sampling, the depth to refusal will be recorded and another borehole will be advanced adjacent to the previous borehole. If the soil contamination conditions are >100 ppm Total Petroleum Hydrocarbons (TPH), ESH-19 will be consulted for additional guidance regarding site characterization. All sampling equipment will be thoroughly decontaminated after each use according to the procedures described in Section 3.

Based on the depth estimate (10-15 ft) and the number of boreholes expected (4), the number of samples requiring analysis is expected to be approximately twenty (20) field analyses and four (4) confirmatory lab analyses in addition to the required quality control (QC) samples.

2.4 Sample Analysis

This task includes all activities related to tracking samples, field analysis, sample analysis by the contract laboratory, and validation of analytical results. Sampling will proceed in two distinct phases: initial screening using a field test kit, and sampling for confirmation using laboratory analysis. The first phase of sample analysis will be conducted using the field screening test kits capable of measuring from 100 to 1000 ppm of TPH. Test results will be used to semi-quantitatively delineate the spatial distribution

(vertical and horizontal) of any residual contamination. Results from the first phase will be used to direct the second phase of sampling.

Phase two will begin immediately upon completion of phase one. The second phase of sampling will consist of obtaining samples from soil borings to determine quantitatively the nature and extent of soil contamination. Samples will be submitted to the contract analytical laboratory for analysis. Results from the second phase of sampling will be used in addition to the field screening results from phase one to establish a defensible basis for determining whether or not corrective action is necessary. The soil samples collected during phase two will be analyzed for Total Recoverable Petroleum Hydrocarbons (TRPH) , U.S. Environmental Protection Agency (EPA) Method 418.1. Analytical data will be subjected to an EPA Level 2 data validation to ensure that both project and analytical laboratory QC requirements have been satisfactorily fulfilled.

2.5 Survey

Prior to sampling, all borehole locations will be marked, labeled and recorded in the field logbook. At the completion of sampling, all borehole locations will be surveyed initially to permanent site features. These measurements will be shown on a site plan and recorded in the field logbook.

Coordinates and elevations will be established for each borehole and determined to the closest 1.0 ft and referenced to the State Plane Coordinate System or an existing local grid system. The ground elevation will be determined at each boring location to the nearest 0.1 ft. A tabulated list of the boreholes and monuments, copies of all field logbooks, and all computation sheets will be prepared and submitted for incorporation into the Site Characterization Report.

2.6 Site Restoration

The driller will restore the site to its original state within 10 working days of the completion of the field investigation. Restoration will include backfilling the borings with drill cuttings and/or cement grout, depending on boring depth and extent of contamination.

2.7 Report on Sample Results

Benchmark/JENV will prepare a brief report summarizing the analytical results, compliance with QC requirements, and estimating the nature and presence of soil contamination based on the analytical results.

3.0 QUALITY CONTROL AND SAMPLING PROCEDURES

The objective of this investigation is to obtain data of sufficient quantity and quality to determine the nature and extent of contamination from the TA-41-76 diesel fuel UST. All data will be obtained in a manner that is acceptable to the New Mexico Environment Department. The data will also be of sufficient quantity and spatially distributed such that conclusions may be drawn with respect to the nature and presence of contamination in the subsurface. The resulting data and analysis will be used to determine whether or not a corrective action is required. The following sections detail the equipment and procedures that will be used to conduct the field investigation for this project. Any deviations from this plan that are deemed necessary during conduct of fieldwork will be discussed with the Project Manager and clearly documented in the field logbook.

3.1 Borehole Soil Sampling Procedures

Initial borehole locations are shown on Figure 3-1. All locations will be staked and/or marked prior to mobilization in order to obtain a excavation permit and utility clearance from the proper officials. The borehole locations may be adjusted in the field based on utility clearances and existing site conditions. Alternate locations will be determined by the Site Manager and the reason for any changes shall be documented in the field logbook.

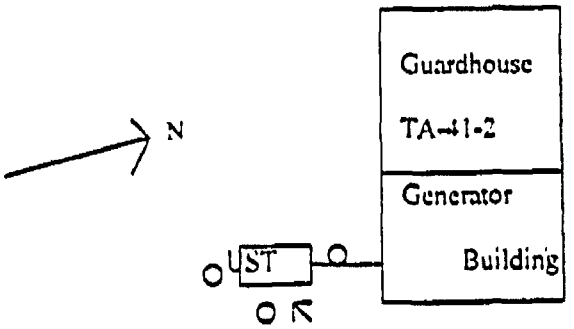

Figure 3-1. Borehole Location Map

3.1.1 Drill Rig and Sampler

The borings will be completed using a drill rig equipped with appropriately sized hollow-stem augers. The drill rig will have the capability to collect split-spoon samples according to American Society for Testing and Materials (ASTM) D1586-85 procedures. At a minimum, the rig will be equipped with a cathead operated, 140-pound hammer with a 30-in. draw. The drill rig will be free from oil and grease leaks, and a oil pan or polyethylene sheet will be placed underneath the rig during operations. A split-spoon sampler will be used to collect soil samples. The sampler will be a stainless steel 1.375-in. inner diameter (I.D.), 2.0-in. O.D. 24 in. split-spoon.

The auger flights, drill table, and back of the rig will be steam cleaned prior to moving the rig on site. Dirty augers will be stacked in a trailer and covered with plastic, at the completion of the job the augers will be delivered to TA-50 for steam cleaning and decontaining. Split-spoon sampler decontamination techniques are discussed in Section 3.3.

3.1.2 Drilling Procedures

3.1.2.1 Initial Activities

The Site Manager will verify that all utility locations/lines are clearly marked prior to drilling. If all utilities cannot be marked, then all boring locations must be cleared individually. If utility lines are present or metal has been detected, the drilling location will be offset. Distance to the alternate location will be as close as possible to the original location while still maintaining an adequate margin of safety. If it is not possible to relocate a boring to a location which will accomplish the intent of the original location, the Site Manager will obtain approval from the Project Manager for the new location prior to drilling. Both locations will be shown on the field logbook and/or site diagram. Alternate boring locations will require clearance prior to any drilling activities. Drilling will proceed only where no service lines are known to be near the boring location.

3.1.2.2 Drilling Protocol

After completion of initial activities, the drill rig will be set up on the selected location. Once the drill rig is in position, the following protocol will be followed for each borehole:

- The asphalt and the underlying road base will be removed,

- Immediately collect a sample from grade level,
- Begin augering and collect split-spoon samples at the required intervals,
- Composite the entire sampled interval in a stainless steel bowl prior to obtaining sample aliquots.

A soil Boring Log will be completed during drilling by a qualified geologist or field engineer. It will record the following data:

- Name of project, location, date, and borehole number,
- Name of driller and geologist,
- Type of drill rig, drilling method, diameter of boring, size and type of bit,
- Depth and thickness of stratum,
- Soil classification, consistency or density, plasticity, moisture contact, color, etc.,
- Depth of each sample and percentage recovered, and
- Total depth of the borehole.

3.1.3 Drill Cuttings and Backfilling

Drill cuttings will be drummed and stored on site until analytical results have been obtained. Upon receipt of analytical results identifying contamination below regulatory and LANL limits, borings will be backfilled by tamping the drill cuttings back into the borehole. If analytical results identify contamination above regulatory and LANL limits drill cuttings will be disposed of appropriately through TA-54. If a perched zone is encountered, the borehole will be backfilled with a cement grout. The grout will be a mixture of a maximum of 7 gal. of clean water to 1 cu ft of Portland cement. Three to five percent (by weight) powdered bentonite will be added in accordance with state regulations. The grout will be tremmied into place within 5 ft of the bottom of the boring.

3.1.4 Site Restoration

JCNNM will restore the site to its original state within ten working days after completion of the field investigation. A temporary plug will be placed in the borehole until all analytical results have been obtained. Boreholes will be backfilled in accordance with 3.1.3 Drill Cuttings and Backfilling. All restoration efforts will be subject to the approval of the Project Manager and the TA-41 Facility Manager.

3.1.5 Borehole Location Survey

Upon completion of sampling activities, each borehole location will be marked and surveyed. The location of each borehole will be measured from permanent site features to allow for relocation of sampling points. The survey will be tied into the State Plane Coordinate System with elevations referenced to mean sea level. A ground elevation to the closest 0.1 ft shall be obtained at each boring. A State of New Mexico-registered surveyor will be used to perform this survey.

3.2 Sampling Procedures

Immediately after removal from the boring, the split-spoon will be opened carefully and the contents examined. The contents will be transferred to a decontaminated stainless steel mixing bowl for compositing. Stainless steel tools will be used to transfer and mix the soil samples.

If split samples are being obtained for possible off-site laboratory analysis, these will be taken first and placed into appropriate sample containers, labeled, and immediately placed into the sample cooler. Any duplicate/split samples for off-site laboratory analysis should also be obtained at this time. Aliquots for analysis using the field test kit will then be obtained and analyzed immediately. After each sample has been collected, all of the sampling equipment, split-spoon, mixing bowl, sampling spoon, etc., will be decontaminated according to the procedure in Section 3.3.

Sampling and analysis of soil will be performed using two different techniques: initial screening using a field test kit, and sampling for laboratory analysis. Initial screening of all soil samples will be used to rapidly define the extent of residual contamination and estimate zones of highest concentration. Off-site laboratory analysis of samples will be performed to confirm the screening results.

This will involve collection of samples for both laboratory analysis and field screening from every split-spoon sample. The Site Manager will decide after all screening results are completed which corresponding soil samples to send to the contract laboratory for confirmation analysis. This will require that all duplicate samples be carefully logged and labeled, and that adequate sample containers are obtained prior to starting fieldwork.

3.2.1 Field Test Kit Screening

The first phase of sample analysis will be conducted using a field screening test kit capable of measuring TPH from 100 to 1,000 ppm. Test results will be used to semi-quantitatively delineate the spatial distribution of any residual contamination. Results from the first phase will be used to direct additional boreholes in the second phase of sampling, if required. The Analyst performing the soil analysis will be trained and familiar with use of the selected field test kit prior to the start of fieldwork.

Soil samples collected from the split-spoon will be inspected immediately upon retrieval and an aliquot obtained for the test kit analysis. As each soil sample is collected, a Sample Collection Log will be completed by the Analyst and an entry will be made in the field logbook. The Analyst will perform the sample analysis using the test kit as soon as is practicable. A sample will not be removed from the split spoon until the previous sample analysis is complete and the Analyst is ready to receive it. The soil will be classified using the Unified Soil Classification System (ASTM D2488-69 Visual-Manual Procedure), and recorded on the Boring Log. In addition, if duplicate samples are being collected for confirmatory analysis, they will be taken at this time and placed into appropriate sample containers. See Section 3.2.2 for procedure.

3.2.2 Confirmatory Analytical Samples

The second phase of sampling will consist of obtaining samples from soil borings to confirm the results obtained by the field test kit analysis, and to determine quantitatively the nature and extent of soil contamination. Samples will be submitted to the contract analytical laboratory to be analyzed for TRPH using EPA Method 8015 Modified and Non-Halogenated Semi-Volatile Organic Compounds (SVOCs) using EPA Method 8015.

In addition to field samples, QC samples will be taken in accordance with EPA SW-846 requirements. QC samples include duplicates/splits, field blanks, equipment rinsate blanks, and matrix spikes. Table 3-1 contains the QC sample requirements, their frequency of collection, and purpose of the sample. Results obtained will be subjected to a EPA Level 2 data validation to ensure that both project and analytical laboratory QC requirements have been satisfactorily fulfilled.

Table 3-1. Summary of Field Quality Control Samples

QC Sample Type	Sample Matrix	Applicable Analysis	Frequency	Purpose
Trip Blank	Water	Semivolatiles	One set per shipping cooler containing samples	Monitor sample contamination in field and lab
Field Blank	Water	Semivolatiles	One sample daily per analysis (can prepare and hold pending sample results)	Monitor field sample contamination/air contamination
Field Duplicate	Soil/ Water	Semivolatiles, TRPH	One for every 20 samples	Monitor sample variability
Equipment Rinsate Blank	Water	Semivolatiles, TRPH	One sample per day (can prepare and hold pending sample results)	Monitor decontamination effectiveness and sample cross contamination

3.3 Decontamination

All sampling equipment must be cleaned/decontaminated according to the following procedure prior to and after each sampling event:

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.

3.4 Sample Handling Protocol

When a sample is collected for off-site analysis, it will be promptly placed into an appropriate container. Table 3-2 lists the required sample containers, preservation method, and holding time for each analyte/ sample type.

Each sample container will be labeled with the following information:

- Sample identification number (borehole number – sample depth in ft – "D" for duplicate, "B" for blank, "ER" for equipment rinsate) (e.g., BH0105ER01)
- Project number, date, and time sampled
- Analysis requested and preservatives used
- Person sampling

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 chain-of-custody forms will be completed for all samples.

Table 3-2. Sample Containers, Preservatives, and Holding Times

Parameters	Sample Container[a]	Preservatives	Holding Time
TRPH/SVOCs	One 8 oz. wide-mouth jar; full	Ice to 4°C	Extract in 14 days; analyze in 40 days

[a]All containers to have Teflon-lined lids.

3.4.1 Custody and Shipping

The properly labeled and sealed containers will be placed in Ziplock™-type plastic 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 shipped to the contract laboratory on the day or following the day that they are obtained. 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 shipment.

3.4.2 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.

ER Individual Record Transmittal Form

(Use one form per individual record transmitted.)

Section I (to be completed by author/originator)

Author/originator's Information:

Name Mary Ebinger — Z number 117761

Organization ER D. — Phone 7-7954

Record transmittal date 7/20/00

Individual Record Information:

Author/originator (Print name[s] and title[s]):

Benchmark Environmental Corporation

ER doc catalog no. _____ ☑ n/a

Electronic file transmitted? ☐ Yes ☑ NA

Are all attachments are included? ☑ Yes

Does record carry proper authorization? ☑ Yes

Symbol number _____

Title of record (or describe topic record addresses [limited to 255 characters]):

Soil Investigation for TA-41-76 Underground Diesel Fuel Storage Tank Final Report

Document date 8/24/98

Page count 28

Privileged record? ☐ Yes ☑ No

Is record part of a reference set? ☐ Yes ☑ No

If yes, for which focus area?

☐ Canyons ☐ A^3 ☐ MDAs

☑ Reg Compliance ☐ Remedial Actions

ER ID # 66170

(For RPF use only.)

Section II (to be completed by RPF personnel only)

Name: Sandra Valdez — Print name

Signature — Date 7-25-00

This form is subject to change.

OP-4.4

Los Alamos
Environmental Restoration Project