TA-21

Los Alamos
NATIONAL LABORATORY

*Risk Reduction & Environmental Stewardship Division*
*Water Quality & Hydrology Group (RRES-WQH)*
PO Box 1663, MS K497
Los Alamos, New Mexico 87545
(505) 665-1859/Fax: (505) 665-9344



Date: August 28, 2003
Refer to: RRES-WQH: 03-208

Ms. Carolyn Cooper
Hazardous Waste Bureau
New Mexico Environment Department (NMED)
P.O. Box 26110
Santa Fe, New Mexico 87502

**SUBJECT: CHARACTERIZATION SAMPLING AND ANALYSIS PLAN (SAP) FOR THE TA-21-57 ABOVEGROUND STORAGE TANK DIESEL FUEL OIL RELEASE ADDENDUM**

Dear Ms. Cooper:

On May 28, 2003, the Laboratory received the New Mexico Environment Department's (NMED) "*RESPONSE AND COMMENTS FOR DIESEL SPILL LOCATED AT TA-21-57. LOS ALAMOS NATIONAL LABOREATORY EPA ID# NM0890010515"* regarding the "TA-21-57 AST Diesel Fuel Oil Environmental Assessment and Characterization Report" and the "TA-21-57 Aboveground Storage Tank Diesel Release, Tier 1 Evaluation" provided by the Laboratory. NMED advised that additional subsurface characterization would be required for the diesel fuel oil release from the TA-21-57 aboveground storage tank (AST) and associated underground piping. Enclosed for your review is Addendum 1, "Additional Sampling and Analysis Plan, Assessment of Fuel Oil Contamination TA-21-57 Fuel Storage Tank Release Investigation" which addresses the comments in your letter and comments from the site visit with Ms. Vickie Maranville (NMED-HWB) on August 5, 2003. The Laboratory plans to begin additional characterization drilling/sampling activities on September 22, 2003.

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

Sincerely,

Steven Rae
Group Leader
Water Quality & Hydrology Group

SR:MH/jr



10704

Enclosures: a/s

Cy: John Young, NMED-HWB, Santa Fe, NM, w/enc.
Lorena Goerger, NMED-PSTB, Santa Fe, NM, w/enc.
Steve Yanicak, NMED-OB, w/enc., MS J993
Joseph Vozella, DOE-OLASO, w/enc., MS A316
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David Padilla, FWO-UI, w/o enc., MS K718
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Mike Saladen, RRES-WQH, w/o enc., MS K497
Mark Haagenstad, RRES-WQH, w/enc., MS K497
Suzanne Moore, KSL-HENV, w/o enc., MS A199
Bruce Baumgartner, KSL-HENV, w/o enc., MS A199
Deborah Woitte, LC-ESH, w/enc., MS A187
Phil Wardwell, LC-ESH, w/enc., MS A187
RRES-WQH File, w/enc., MS K497
IM-5, w/enc., MS A150

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# Addendum 1
# Additional Sampling and Analysis Plan
## Assessment of Fuel Oil Contamination
## TA-21-57 Fuel Storage Tank Release Investigation

**Revision 0**

**August 25, 2003**

**Project Number: 9901-315**


**Prepared by:**
**Eberline Services/KSL-HENV**
**1900 Diamond Drive, Room 208**
**Los Alamos, New Mexico 87544**

**Author:**


Prepared under Work Order No. 00098680.12 for:

FWO-UI
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

*Reviewed by:*

LANL Representatives:

RRES-WQH

RRES-SWRC

FWO-UI

# Table of Contents



# List of Figures

## List of Acronyms

| | |
|---|---|
| AHA | Activity Hazard Analysis |
| AST | Aboveground Storage Tank |
| DOE | Department of Energy |
| DRO | Diesel Range Organics |
| EPA | Environmental Protection Agency |
| FWO-SWO | Facility Waste Operations-Solid Waste Operations |
| FWO-UI | Facility Waste Operations – Utilities and Infrastructure |
| KSL | KBR-Shaw-LATA |
| KSL-CDDO | KSL-Construction Department Department Office |
| KSL-HENV | KSL Environmental Group (a.k.a. Eberline Services) |
| KSL-HSEO | 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 |
| RRES-SWRC | Risk Reduction Environmental Stewardship-Solid Waste Regulatory Compliance |
| RRES-WQH | Risk Reduction 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-HENV has prepared this site sampling and analysis plan as an addendum to the TA-21-57 AST Diesel Fuel Oil Environmental Assessment and Characterization Sampling and Analysis Plan (SAP) to describe sampling and contaminated material handling activities associated with collecting data to respond to New Mexico Environment Department comments on the TA-21-57 Above Ground Storage Tank Diesel Fuel Oil Environmental Assessment and Characterization report (Characterization Report). A copy of the comments is provided as Appendix A. This addendum addresses the last two bullets listed in NMED's comments pertaining to providing additional extent characterization and the use of a field screening test kit to guide the investigation. This SAP Addendum will be implemented in conjunction with a detailed Activity Hazard Analysis (AHA).

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 further define the vertical extent of contamination and confirm the horizontal limits of contamination defined during the initial sampling and analysis activities. The scope of work for this project is to drill investigative boreholes adjacent to previously installed boreholes and extend the new boreholes to depths below the contamination zone identified during the initial sampling and analysis. 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 B.

The purpose of this SAP Addendum 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) with the following exception; the "New Mexico Environment Department TPH Screening Guidelines" (February 28, 2003) levels for TPH will be used to determine the contamination boundaries. 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 sampling activities. The project will receive appropriate LANL reviews and will be performed in accordance with an approved Activity Hazards Analysis and

Hazard Analysis and Control for Facility Work. 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 Waste Operations (FWO) - Utilities and Infrastructure (UI) Division has overall responsibility for the project. KSL Utilities is responsible for obtaining the required excavation permits. Eberline Services/KSL-HENV 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-HENV will also be responsible for waste characterization and waste management including temporary storage of waste materials. FWO-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 (RRES-WQH) and Solid Waste Regulatory Compliance Group (RRES-SWRC) will provide institutional regulatory support for water quality issues and solid waste issues, respectively.

### 1.3 Key Individuals

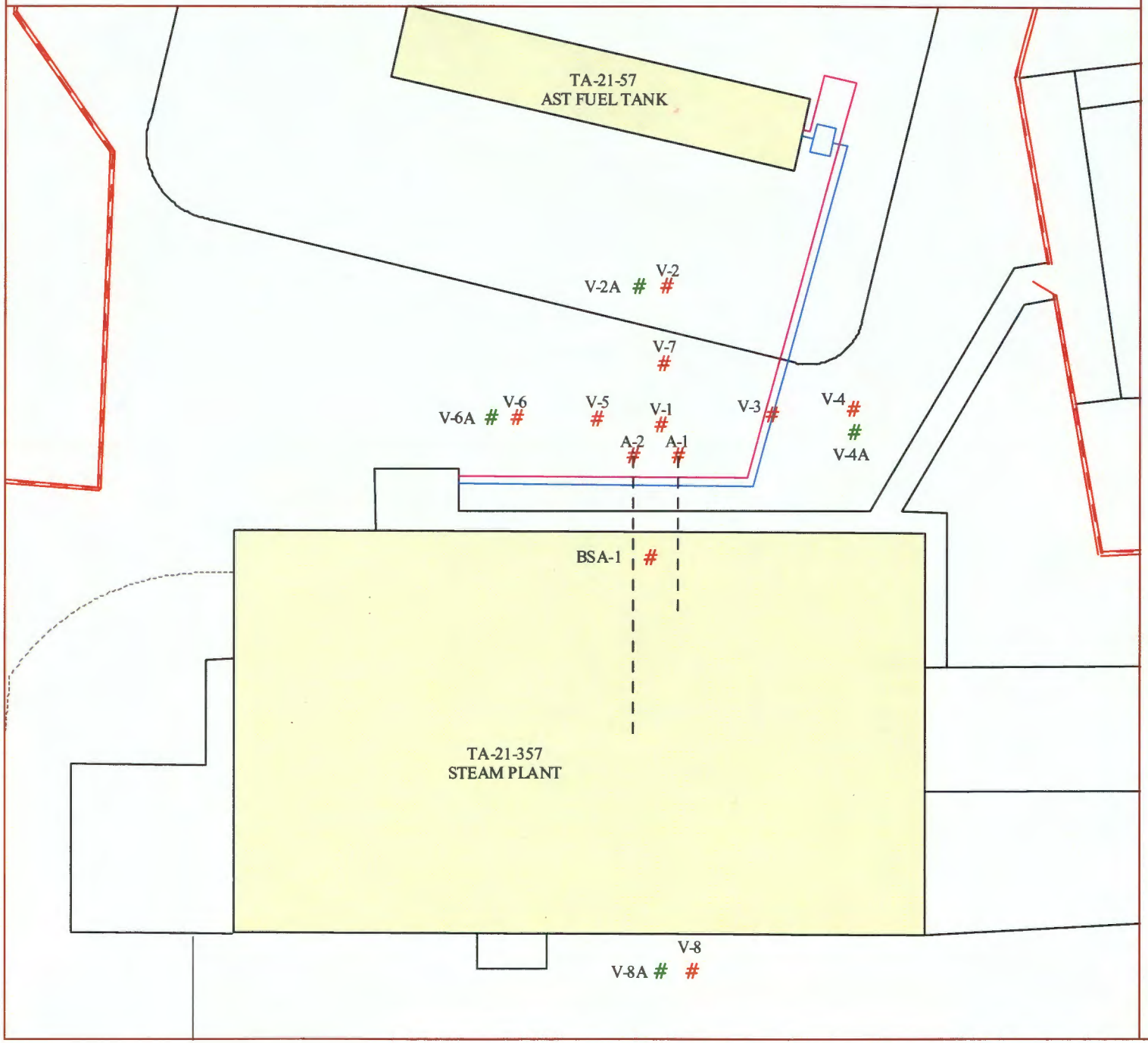
Key project participants for this effort include the Project Manager, Site Manager, Health and Safety Officer, Sampling Personnel, Construction Supervisor, and the Driller. The proposed project assignments and responsibilities are provided as follows:

- Project Manager (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.
- Facility Manager (KSL-UMDO) -Responsible for operations and management of the Facility.
- Site Manager (Eberline Services/KSL-HENV)- 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 (KSL-HSEO) - 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-HENV) - Responsible for collecting soil samples from drilling boreholes and core samples for field test screening and laboratory analysis.
- Construction Supervisor (KSL-CDDO)- Responsible for coordinating all construction activities pertaining to the investigation activities.
- Geologist (Eberline Services/KSL-HENV) - Responsible for logging boreholes.
- Data validation personnel (Eberline Services/KSL-HENV) – 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 site diagram, depicting the previously installed boreholes at the TA-21-57 site, is provided in Figure 1. Vertical profiles of the previously installed boreholes are provided in Figure 2 (NS) and Figure 2 (EW). All previously installed boreholes have been abandoned and filled with grout consisting of a mixture of Portland cement and bentonite. Additional site information is provided in the SAP and the "TA-21-57 Aboveground Storage Tank Diesel Fuel Oil Environmental Assessment and Characterization" report.

# Figure 1 - Vertical & Angle Core Sampling and Analyses Locations

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**Legend**

- # Vertical Points W/#
- Structures
- Diesel Fuel Supply
- Diesel Fuel Return
- Paved Roads
- Dirt Roads
- Fences
- # Proposed Additonal Borehole Locations

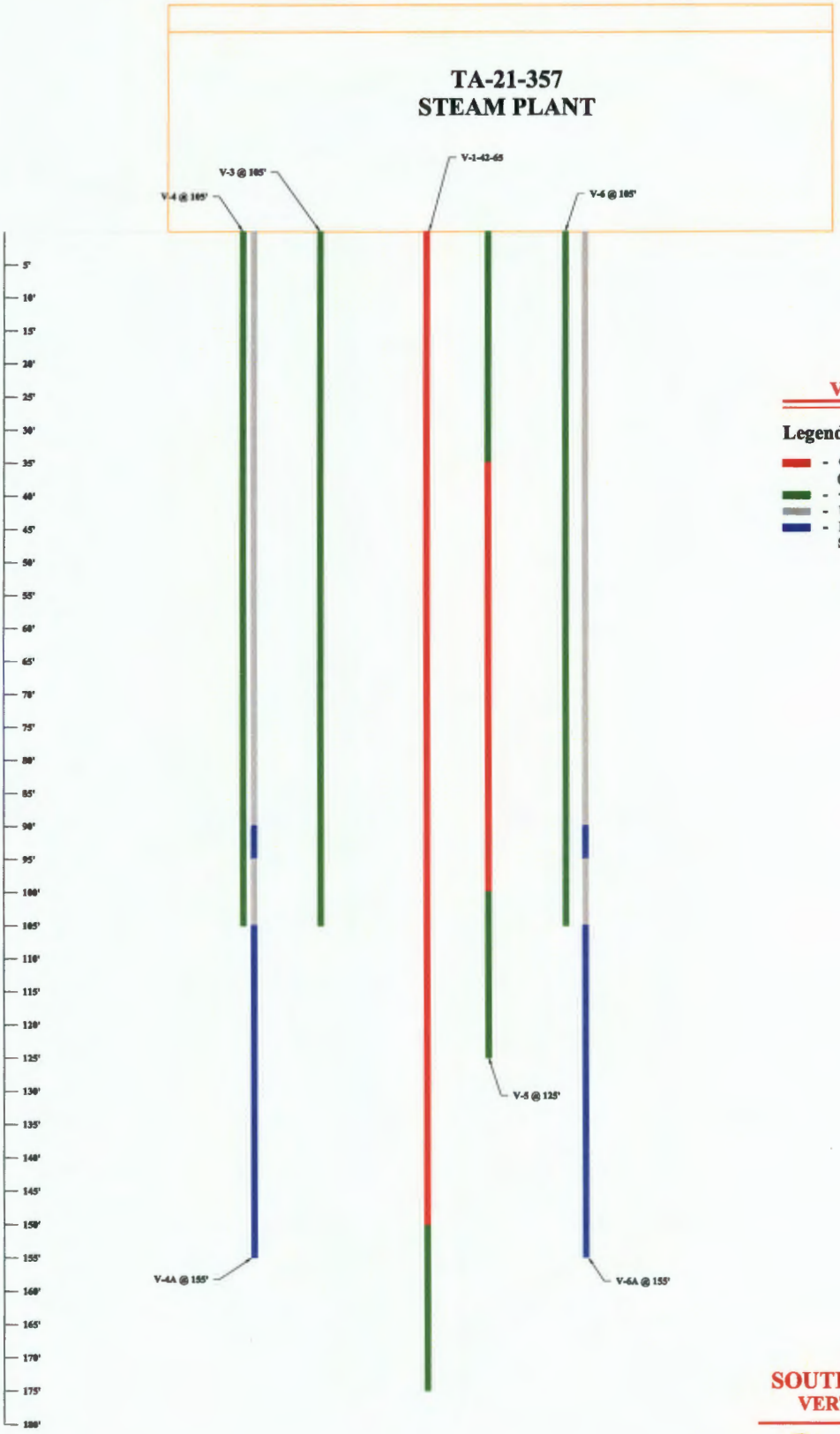
N
W E
S

Scale: 1" = 20' ft

10 0 10 20 Feet

July 30, 2003

# Figure 2 (EW)
# PROPOSED BOREHOLE SAMPLE LOCATIONS ALONG THE EAST-WEST AXIS




**SOUTH ELEVATION**
**VERTICAL HOLES**

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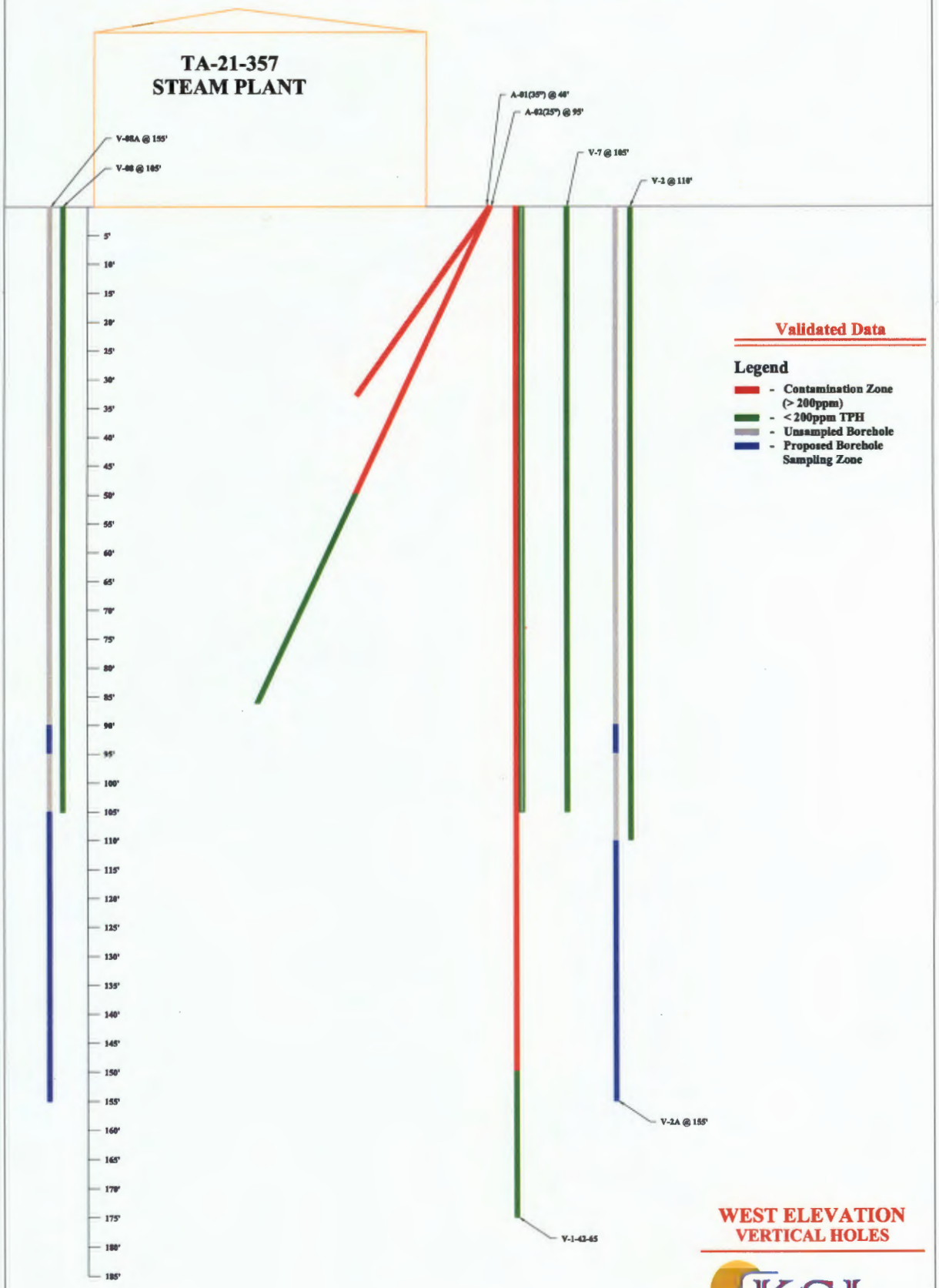
JULY 31, 2003

# Figure 2 (NS)
# PROPOSED BOREHOLE SAMPLING LOCATIONS ALONG THE NORTH-SOUTH AXIS




**WEST ELEVATION**
**VERTICAL HOLES**

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JULY 31, 2003

## 2.0 WORK PLAN

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

### 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 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), developing an activity hazard analysis, and preparing this SAP Addendum. All 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 further define the vertical and confirm the horizontal extent of contamination. Proposed locations of the additional boreholes are shown on Figure 1. A minimum depth profile for the proposed boreholes is provided in Figures 2 (NS) and 2 (EW). Each borehole will be advanced to the initial sampling point before a sample is collected. The initial sampling point at each borehole will be sampled to collect BTEX and PAH data at the point most likely to be contaminated based on the contamination zone profile. After collection of the initial sample, each borehole will be advanced to the total depth of the adjacent previously installed borehole. Each borehole will then be advanced, collecting continuous core samples, to a depth of 155 feet assuming no contamination above 880 mg/kg TPH is observed to a depth of 155 feet. If additional contamination is observed above 880 mg/kg TPH, the borehole will be advanced until field screening indicates that TPH levels are at or below NMED TPH screening levels (880 mg/kg) plus an additional 10 feet. Samples will be collected at 5-foot intervals from 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 155 feet.

**Table 1**
**Proposed Borehole Sampling Locations**

| Proposed Borehole | Initial Sampling | Continuous Core Sampling |
|---|---|---|
| V-2A | 90'-95' | 5-foot intervals from 110'-155' |
| V-4A | 90'-95' | 5-foot intervals from 105'-155' |
| V-6A | 90'-95' | 5-foot intervals from 105'-155' |
| V-8A | 90'-95' | 5-foot intervals from 105'-155' |

## 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 on the initial sample. Field analysis will be conducted at 5-foot intervals in the continuous core-sampling zone of each borehole. 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.

Analytical samples will be collected from the initial sampling point and at 10-foot intervals within the continuous-core zone of each borehole. 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-HENV 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 RRES-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 FWO-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 interferences 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-HENV 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

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

# APPENDIX A
# NMED Response and Comments for Diesel Spill Located at Technical Area 21-57

*State of New Mexico*
***ENVIRONMENT DEPARTMENT***
*Hazardous Waste Bureau*
*2905 Rodeo Park Drive East, Building 1*
*Santa Fe, New Mexico 87505-6303*
*Telephone (505) 428-2500*
*Fax (505) 428-2567*
*www.nmenv.state.nm.us*

BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

DERRITH WATCHMAN-MOORE
DEPUTY SECRETARY

**CERTIFIED MAIL**
**RETURN RECEIPT REQUESTED**

May 28, 2003

Mr. G. Pete Nanos, Interim Director
Los Alamos National Laboratory
P.O. Box 1663, Mail Stop A100
Los Alamos, New Mexico 87545

Mr. David Gregory, Project Manager
Office of Los Alamos Site Operations
Department of Energy
528 35th Street, Mail Stop A316
Los Alamos, New Mexico 87544

**SUBJECT: RESPONSE AND COMMENTS FOR DIESEL SPILL LOCATED AT TECHNICAL AREA 21-57.**
**LOS ALAMOS NATIONAL LABORATORY EPA ID# NM0890010515**

Dear Messrs. Nanos and Gregory:

The New Mexico Environment Department (NMED) is in receipt of Los Alamos National Laboratory and U.S Department of Energy's (Permittees') report dated September 19, 2002 and, titled "TA-21-57 AST Diesel Fuel Oil Environmental Assessment and Characterization Report" referenced by LA-UR-02-4007 (RRES-WQH: 02-356) and "TA-21-57 Aboveground Storage Tank Diesel Release, Tier 1 Evaluation," dated March 26, 2003 and referenced by RRES-WQH: 03-068. NMED has conducted a review of the aforementioned documents and has determined that additional characterization to define the nature and extent of diesel contamination at the site is required. NMED is providing the following rational for its determination that additional characterization is required:

- Fractures were observed in boreholes installed during assessment activities conducted at the site. Although fracture flow is identified as a potential contaminant migration pathway, fracture flow at the site is not fully evaluated. The September 2002

Characterization Report contains assumptions regarding fracture flow at the site but does not provide data to support the fracture flow assumptions. NMED does not believe diesel migration by fracture flow has been thoroughly evaluated. Every attempt should be made to characterize the nature and extent of subsurface contamination related to fractures.

- Vertical and horizontal extent of diesel contamination at the site has not been defined. Vertical borehole designated V1 was drilled to a total depth (TD) of approximately 175 feet below ground surface (bgs). At the TD of this borehole analytical data indicated a total petroleum hydrocarbon (TPH) diesel range organic concentration of 1,700 milligrams per kilogram (mg/kg). Data collected from borehole V1 indicates a TPH as diesel concentration of 22,300.00 mg/kg at a depth of 145 feet bgs. Although data collected from borehole V1 indicates a decreasing vertical concentration trend for TPH as diesel, no other borehole installed at the site during investigation activities was completed to depths greater than 125 feet bgs. Based on the borehole data collected during investigation activities conducted at the site, NMED has determined that additional boreholes are required to determine the nature and extent of diesel contamination at the site. Additional boreholes must be installed to a minimum depth of 145 feet bgs. If TPH as diesel is detected at or above 880 mg/kg at or below 145 feet bgs, the borehole must be installed until concentrations of TPH as diesel are less than the NMED soil screening guidelines for TPH. Soil screening for TPH must be conducted in accordance with "New Mexico Environment Department TPH Screening Guidelines, February 28, 2003 Draft TPH Guidelines). A copy of the guidance is attached and can be accessed on the NMED website (http://www.nmenv.state.nm.us/HWB/guidance.html).

- A photo-ionization detector (PID) was used to guide drilling activities. The use of a PID to guide sample collection for laboratory analysis or to determine when to discontinue drilling activities is not appropriate for investigation of diesel or heavier range petroleum-related contamination. Diesel is not as volatile as gasoline-range organics and, therefore, will not be accurately detected using a PID.

All future activities performed at the site should be conducted in accordance with the current Petroleum Storage Tank Bureau (PSTB) Regulations (20.5 NMAC), and guidelines put forth by the PSTB for a diesel release or spill where applicable. Since the Facility is a Resource Conservation and Recovery Act (RCRA) permitted Facility, reporting should also be consistent with RCRA corrective action requirements as applicable. The PSTB and the Hazardous Waste Bureau (HWB) will work jointly with LANL to ensure compliance with all applicable PSTB and RCRA Regulations.

NMED requires the Permittees to submit a sampling and analysis plan (SAP) for additional characterization activities to NMED HWB for review and approval on or before August 29,

2003. Please provide in the SAP a plan to define nature and extent of subsurface contamination and investigate subsurface contamination related to fractures, the role in the transport of contaminants along fractures, and the impact of fracture flow on contaminant transport at this site. An alternate method for field screening should also be proposed. Visual, olfactory and use of immunoassay or other TPH field detection kit are appropriate mechanisms for field screening of diesel.

As discussed during a meeting between NMED and LANL staff on May 5, 2003, NMED is willing to discuss details of the SAP prior to submittal. Should you have any questions regarding this letter or the deadline outlined above, please feel free to contact either me at (505) 428-2546, or Lorena Goerger of the NMED PSTB at (505) 984-1941.

Sincerely,

Vickie Maranville
Project Manager
Permits Management Program

Attachment: New Mexico Environment Department TPH Screening Guidelines, TPH Guidelines, February 28, 2003.

cc: D. Cobrain, NMED HWB
J. Young, NMED HWB
L. Goerger, NMED PSTB
J. Davis, NMED SWQB
J. Parker, NMED DOE OB
S. Yanicak, NMED DOE-OB, MS J993
L. King, EPA Region 6 (6PD-N)
M. Saladen, RRES/WQH, MS K497
J. Hopkins, RRESR, MS M992
B. Ramsey, LANL RRES/ER, MS M992
N. Quintana, LANL RRES/ER, MS M992
G. Turner, DOE OLASO, MS A316
File: Reading and LANL TA-21 (TA-21-57 AST Diesel Release)

## NEW MEXICO ENVIRONMENT DEPARTMENT TPH SCREENING GUIDELINES

Some sites with areas of soil contamination resulting from releases of petroleum products such as jet fuel and diesel wish to use total petroleum hydrocarbon (TPH) sampling results to delineate the extent of petroleum-related contamination at these sites and ascertain if the residual level of petroleum products does not represent an unacceptable risk to future users of the site. TPH results represent a complex mixture of compounds, some of which are regulated constituents and some compounds that are not regulated. In addition, the amount and types of the constituent compounds in TPH differ widely depending on which petroleum product was spilled and how the spill has weathered. This variability makes it difficult to determine the toxicity of weathered petroleum products in soil solely from TPH results. **Therefore, remediation of spills and corrective action sites cannot be based solely on results of TPH sampling; these TPH guidelines must be used in conjunction with the screening guidelines for individual petroleum-related contaminants in Table 3 and other contaminants as applicable.**

The screening levels for each petroleum carbon range from the Massachusetts Department of Environmental Protection (MADEP) Volatile Petroleum Hydrocarbons/Extractable Petroleum Hydrocarbons (VPH/EPH) approach and the percent composition table below were used to generate screening levels corresponding to total TPH. Except for waste oil, the information in the compositional assumptions table was obtained from Table 5-1 of the Massachusetts Department of Environmental Protection guidance document *Implementation of the MADEP VPH/EPH Approach Final Draft June 2001*. TPH toxicity was based only on the weighted sum of the toxicity of the hydrocarbon fractions listed in Table 1.

**Table 1: TPH Compositional Assumptions in Soil**

| Petroleum Product | C11-C22 Aromatics | C9-C18 Aliphatics | C19-C36 Aliphatics |
|---|---|---|---|
| Diesel #2/ new crankcase oil | 60% | 40% | 0% |
| #3 and #6 Fuel Oil | 70% | 30% | 0% |
| Kerosene and jet fuel | 30% | 70% | 0% |
| Mineral oil dielectric fluid | 20% | 40% | 40% |
| Unknown oil [a] | 100% | 0% | 0% |
| Waste Oil[b] | 0% | 0% | 100% |

[a] Sites with oil from unknown sources must be tested for VOCs, SVOCs, metals, and PCBs to determine if other potentially toxic constituents are present. The TPH guidelines in Table 2 are not designed to be protective of exposure to these constituents therefore they must be tested for, and compared to, their individual NMED soil screening guidelines.

[b] Compositional assumption for waste oil developed by NMED is based on review of chromatographs of several types of waste oil. Sites with waste oil must be tested for VOCs, SVOCs, metals, and PCBs to determine if other potentially toxic constituents are present. The TPH guidelines in Table 2 are not designed to be protective of exposure to these constituents therefore they must be tested for, and compared to, their individual NMED soil screening guidelines.

A TPH screening guideline was calculated for each of the types of petroleum product based on the assumed composition from the above table for petroleum products and the direct soil standards incorporating ceiling concentrations given in the MADEP VPH/EPH Excel spreadsheet for each of the carbon fractions. Ground water concentrations are based on the weighted sum of the noncarcinogenic toxicity of the petroleum fractions assuming the water is drinking water.

**Table 2: TPH Screening Guidelines**

| Petroleum Product | TPH | | Concentration in Ground Water (mg/L) |
|---|---|---|---|
| | Residential Direct Exposure (mg/kg) | Industrial Direct Exposure (mg/kg) | |
| Diesel #2/crankcase oil | 880 | 2200 | 1.8 |
| #3 and #6 Fuel Oil | 860 | 2150 | 1.4 |
| Kerosene and jet fuel | 940 | 2350 | 3.0 |
| Mineral oil dielectric fluid | 1560 | 3400 | 3.7 |
| Unknown oil [a] | 800 | 2000 | 2.3 |
| Waste Oil [b] | 2500 | 5000 | Petroleum-Related Contaminants |
| Gasoline | Not applicable | Not applicable | Petroleum-Related Contaminants |

Mineral oil based hydraulic fluids can be evaluated for petroleum fraction toxicity using the screening guidelines from Table 2 specified for waste oil, because this type of hydraulic fluid is composed of approximately the same range of carbon fractions as waste oil. However, these hydraulic fluids often contain proprietary additives that may be significantly more toxic than the oil itself; these additives must be considered on a site- and product-specific basis (see ATSDR hydraulic fluids profile reference). **Use of alternate screening guideline values requires prior written approval from the New Mexico Environment Department.** TPH screening guidelines in Table 2 must be used in conjunction with the screening levels for petroleum-related contaminants given in Table 3 because the TPH screening levels are NOT designed to be protective of exposure to these individual petroleum-related contaminants. Table 3 petroleum-related contaminants screening levels are based on the New Mexico Environment Department soil screening levels (NMED SSLs) released in December of 2000.

The list of petroleum-related contaminants does not include PAHs with individual screening levels that would exceed the total TPH screening levels (acenaphthene, anthracene, flouranthene, flourene, and pyrene). In addition, these TPH screening guidelines are based solely on human health, not ecological risk considerations, protection of surface water, or potential indoor air impacts from soil vapors. Potential soil vapor impacts to structures or utilities are not addressed by these guidelines. Site-specific investigations for potential soil vapor impacts to structures or utilities must be done to assure that screenings are consistently protective of human health, welfare or use of the property. NMED believes that use of these screening guidelines will allow more efficient screenings of petroleum release sites at sites while protecting human health and

the environment. Copies of the references cited below are available on the MADEP website at http://www.state.ma.us/dep/bwsc/vph_eph.htm and the NMED website at http://www.nmenv.state.nm.us/HWB/guidance.html.

**Table 3. Petroleum-Related Contaminants Screening Guidelines**

| Petroleum-Related Contaminants | Values for Direct[a] Exposure to Soil | | NMED DAF 20 GW protection (mg/kg in soil) | NMED DAF 1[f] GW protection (mg/kg in soil) |
|---|---|---|---|---|
| | NMED residential SSL (mg/kg) | NMED Indus. SSL (mg/kg) | | |
| Benzene | 6 | 14 | 0.06 | 0.003 |
| Toluene | 180 | 180 | 5 | 0.2 |
| Ethyl benzene | 68 | 68 | 8 | 0.4 |
| Xylene | 63 | 63 | 100 | 5 |
| Naphthalene | 53 | 180 | 0.2 | 0.01 |
| 2-methyl naphthalene | 1000[c] | 2500[c] | —[e] | —[e] |
| Benzo(a)anthracene | 6.2 | 26 | 40 | 2 |
| Benzo(b)fluoranthene | 6.2 | 26 | 20 | 0.8 |
| Benzo(k)fluoranthene | 62 | 260 | 200 | 8 |
| Benzo(a)pyrene | 0.62 | 2.6 | 100 | 6 |
| Chrysene | 610 | 2500 | 1000 | 50 |
| Dibenz(a,h) anthracene | 0.62 | 2.6 | 9 | 0.5 |
| Indeno(1,2,3-c,d) pyrene | 6.2 | 26 | 40 | 2 |

[c] no NMED value available, value taken from MADEP paper
[f] for contaminated soil in contact with ground water

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1997. Toxicological Profile for Hydraulic fluids.

Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup and Office of Research and Standards. 1994. "Background Documentation for the Development of the MCP Numerical Standards."

Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup and Office of Research and Standards. 2001. "Characterizing Risks Posed by Petroleum

Contaminated Sites: Implementation of the MADEP VPH/EPH Approach Final Draft June 2001."

New Mexico Environment Department, Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program. 2000. "Technical Background Document for Development of Soil Screening Levels." Document # NMED-00-008.

# APPENDIX B
# Project Schedule

# TA-21-57 Additional Sampling Schedule

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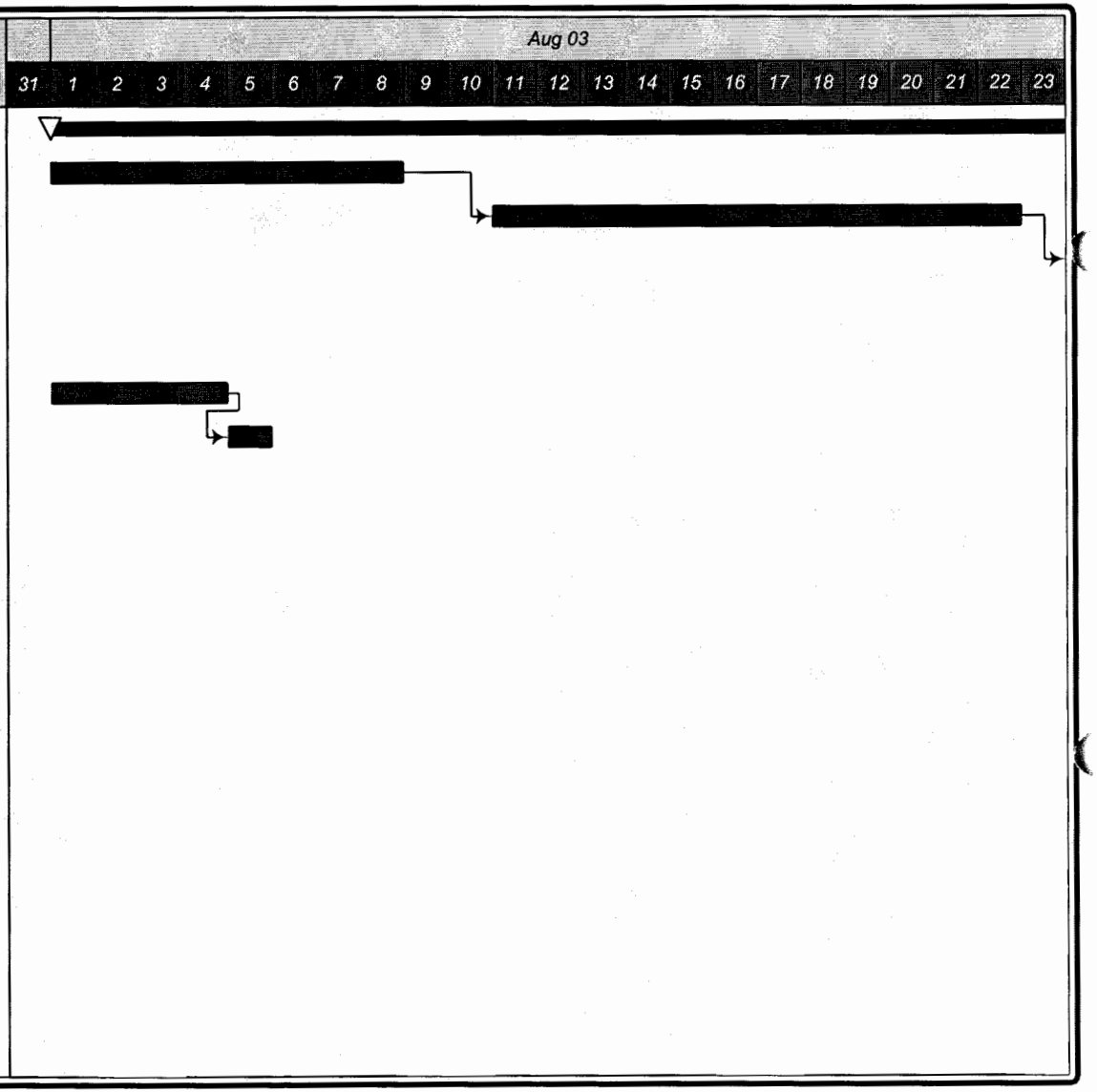

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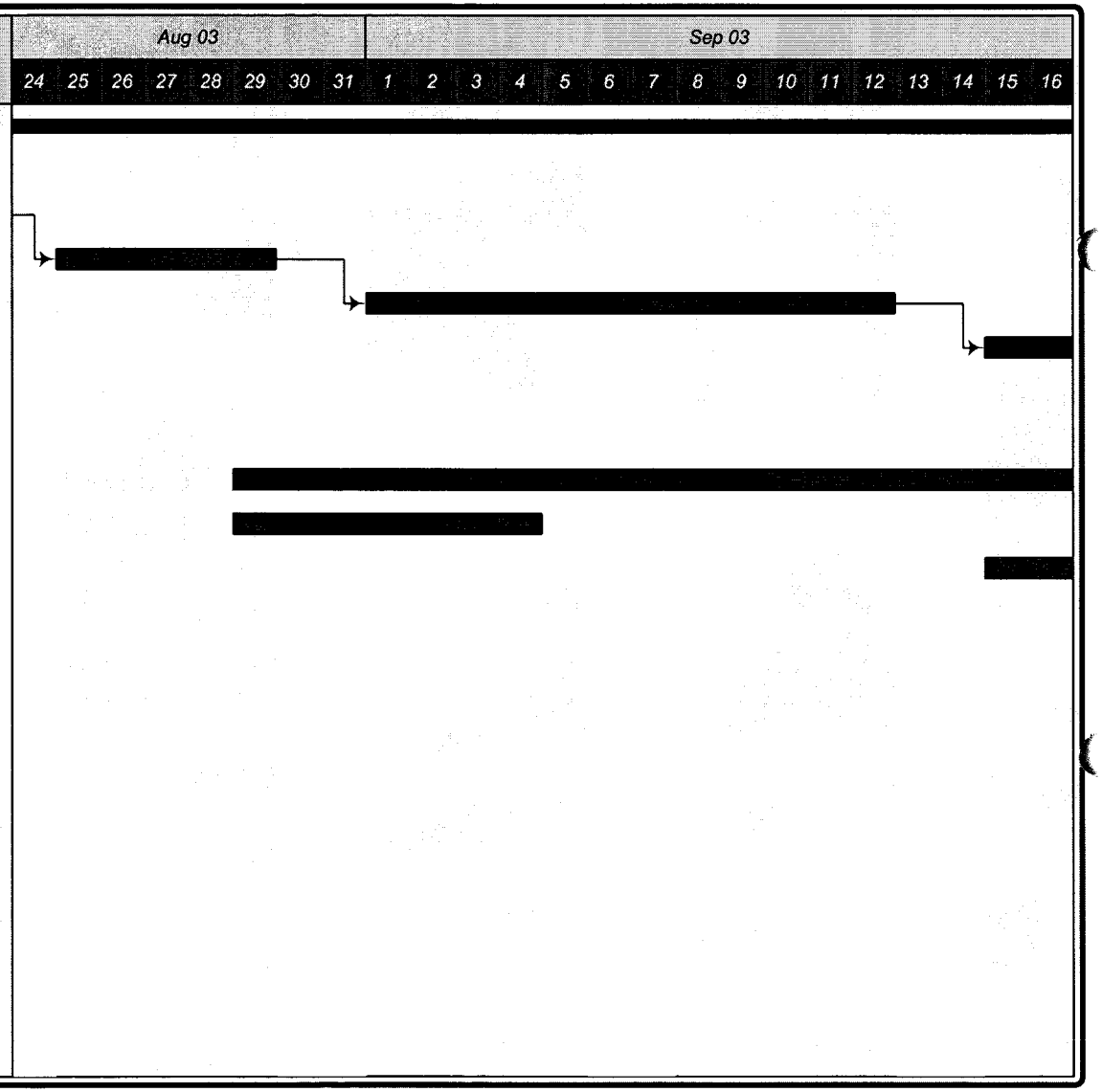

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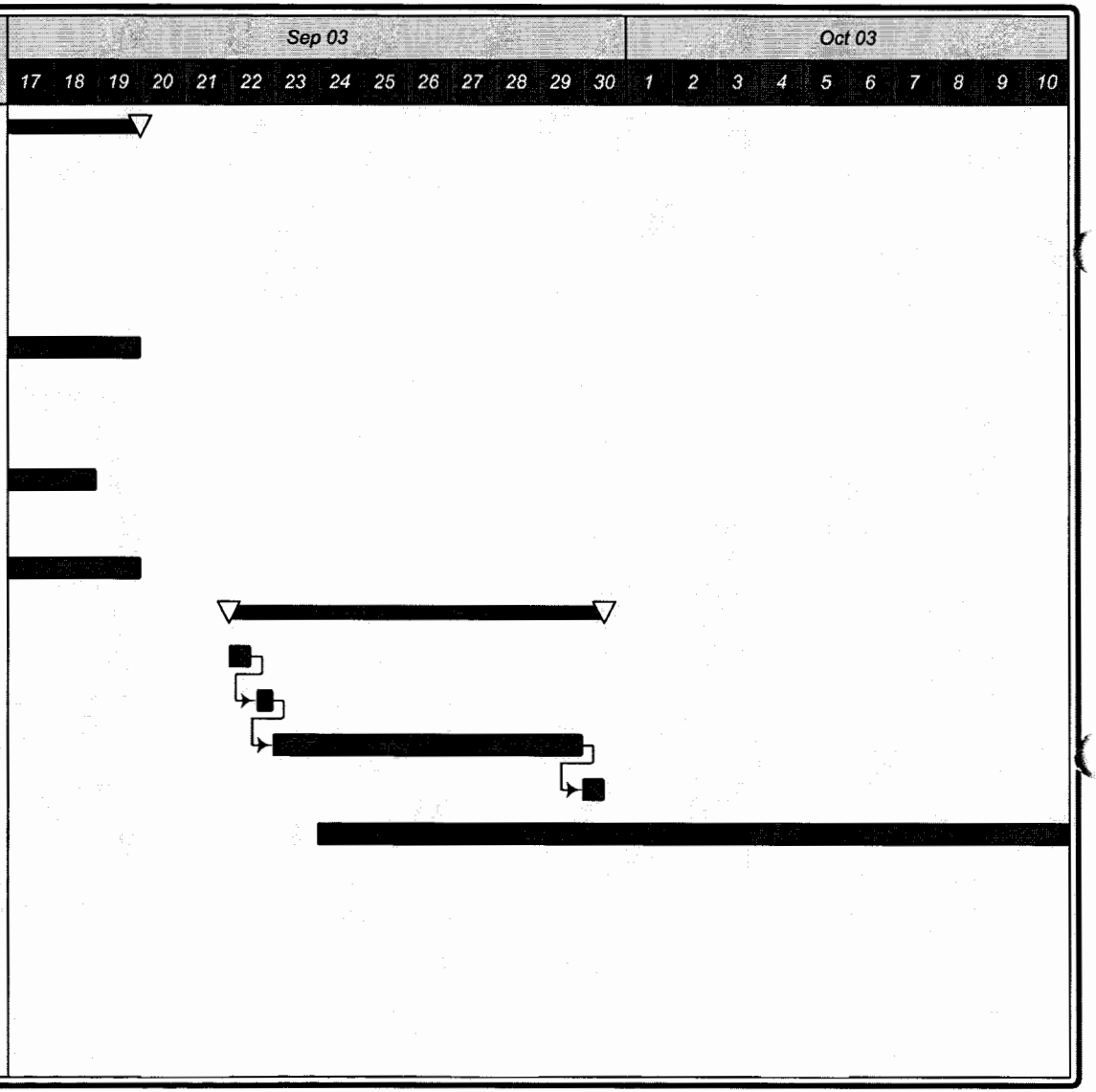

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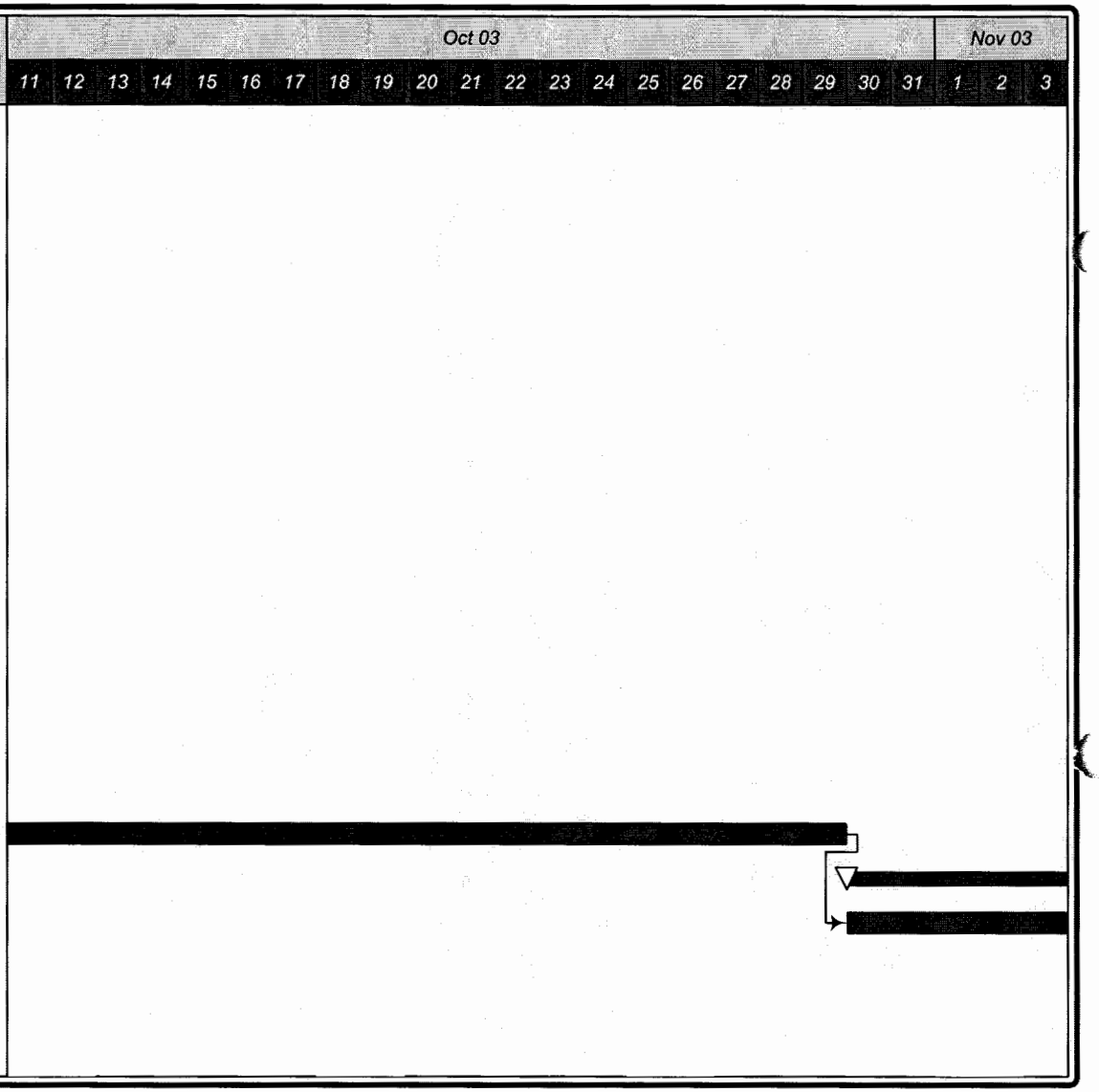

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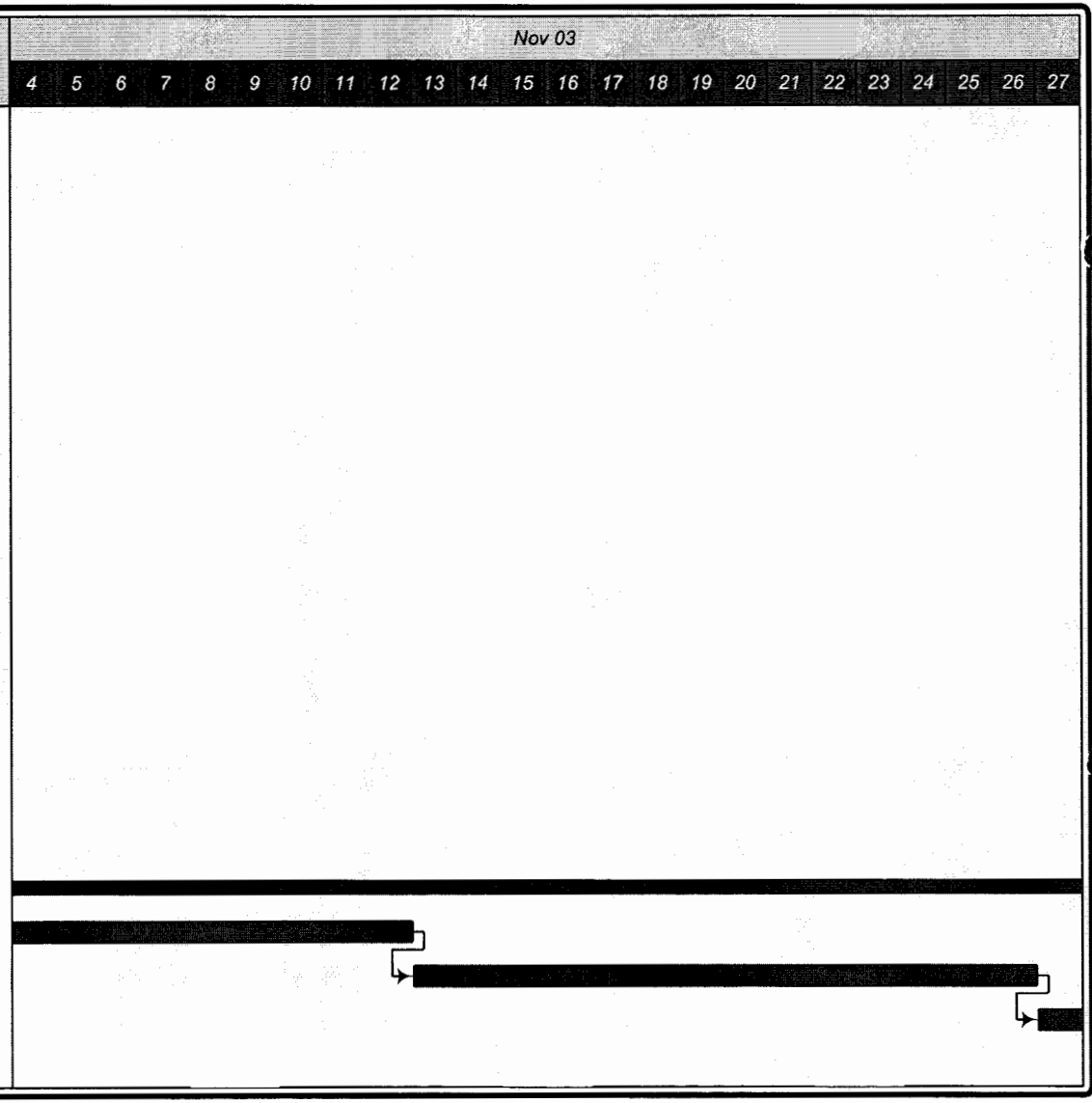

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