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# REPORTS

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2/93 - REMOVAL ACTION

**Brown McCarroll & Oaks Hartline**

Austin, Texas

ENSR

# Removal Action Workplan for Facility Formerly Leased by Exxon Chemical Company in Hobbs, New Mexico (2607/2609 West Marland Boulevard)

**ENSR Consulting and Engineering**

**February 1993**

**Document Number 1009-006-120**

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# 1.0 INTRODUCTION

## 1.1 Purpose

This workplan has been prepared to describe the soil removal planned for a facility formerly leased by Exxon Chemical Company (Exxon) located at 2607/2609 West Marland Boulevard in Hobbs, New Mexico (Site, Property or Facility).

## 1.2 Site Investigation History

A Phase I Preliminary Assessment (PA) was conducted by ENSR Consulting and Engineering (ENSR) during August and September 1991 at the West Marland Boulevard chemical distribution facility which is located in Hobbs, New Mexico. The PA included site visits, interviews with personnel who worked at the facility, facility records review and review of state agency and EPA files. Because the PA identified areas which appeared to require additional investigation, a Phase II Site Inspection (SI) was conducted in January 1992 by ENSR. The SI identified the following three areas of hydrocarbon soil contamination with TPH concentrations above the state action level:

- former location of above-ground diesel tank,
- area of exploration trench (excavated in search of septic tank), and
- area of yard grid sample YS-4A (in vicinity of former location of above-ground product storage tanks).

The three areas were later sampled in-situ for waste characterization. Sample analysis for RCRA hazardous waste characteristics show the soils to be nonhazardous for waste disposal purposes. All three areas are limited in size. The amount of contaminated soil to be excavated from the three areas has been estimated to be approximately 50 to 100 cubic yards.

The State of New Mexico Oil Conservation Division's (OCD) cleanup levels for hydrocarbon-contaminated soils are as follows:

TPH - 100 ppm (EPA 8015(m), EPA 418.1)

BETX (Total) - 100 ppm (TCLP, 8020)

## 1.3 Background Facility Information

The Facility, which is located at 2607/2609 West Marland Street in Hobbs, New Mexico, is currently owned and operated by Electro-Support Systems, Inc. (ESS). ESS purchased the Facility in January or February 1991 from Sweatt Construction (Sweatt). Sweatt had used the Facility for office space, truck maintenance, and construction equipment storage.

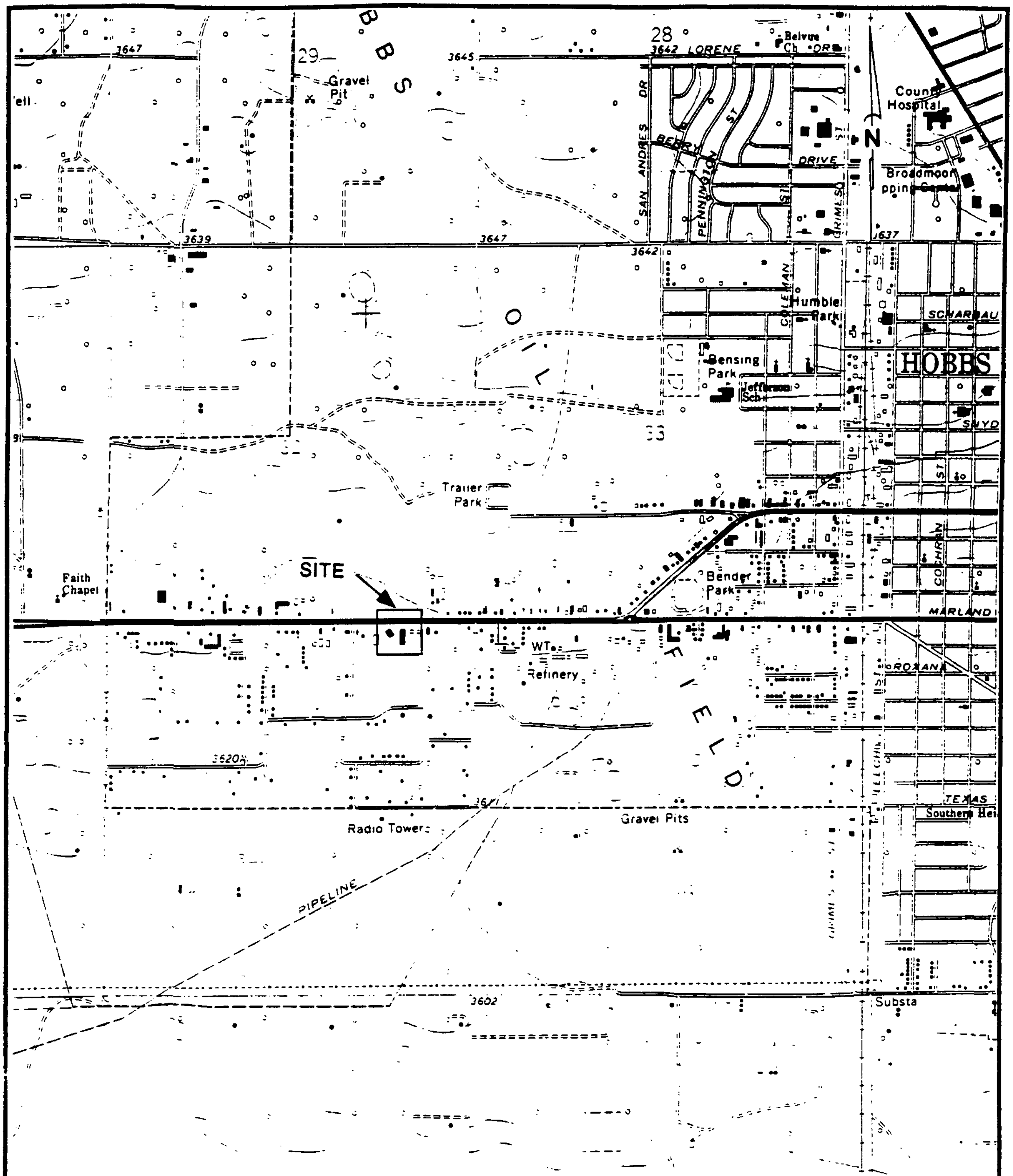
NL Treating Chemicals Co. (NL Treating) leased the office suite at 2606 West Marland intermittently, from approximately 1980 until 1988. Exxon assumed this lease when it acquired NL Treating in 1987.

During this time, (1980-1988), Sweatt used a majority of the Property for its activities. NL Treating used a small room as a laboratory to conduct emulsion tests from 1980 to 1988. Exxon leased the entire Property (buildings and yard) from March 1988 to August 1989.

The Site is approximately 2.15 acres and consists of two buildings and a caliche covered yard. The Site location is shown on Figure 1-1. The Site Plot Plan is shown on Figure 1-2. Two buildings are on the Site: an office building and a warehouse assembly building. The main building consists of two office suites, 2607 West Marland and 2609 West Marland, and is located in the northern portion of the Property. The main building is surrounded on the north and east by an asphalt parking area.

The warehouse assembly building (Bldg. No. 1 on Site Plot Plan - Figure 1-2) is located along the west side of the property. This building is currently in use by the present owner, ESS.

During the period that Exxon leased the entire Property (March 1988 to August 1989) the Facility was used for the storage and distribution of oilfield treating chemicals. Exxon maintained seven 750-gallon above-ground storage tanks on the property for the storage of oilfield chemicals. These tanks were installed with secondary containment. Chemical product was also stored in drums. Typically, at any one time, 250 drums of product were stored on pallets in the yard. No blending or processing for these chemicals occurred at the Site.




0 2000 4000

SCALE IN FEET

REFERENCE: U.S.G.S. Quadrangle Map for Hobbs West, New Mexico 1979

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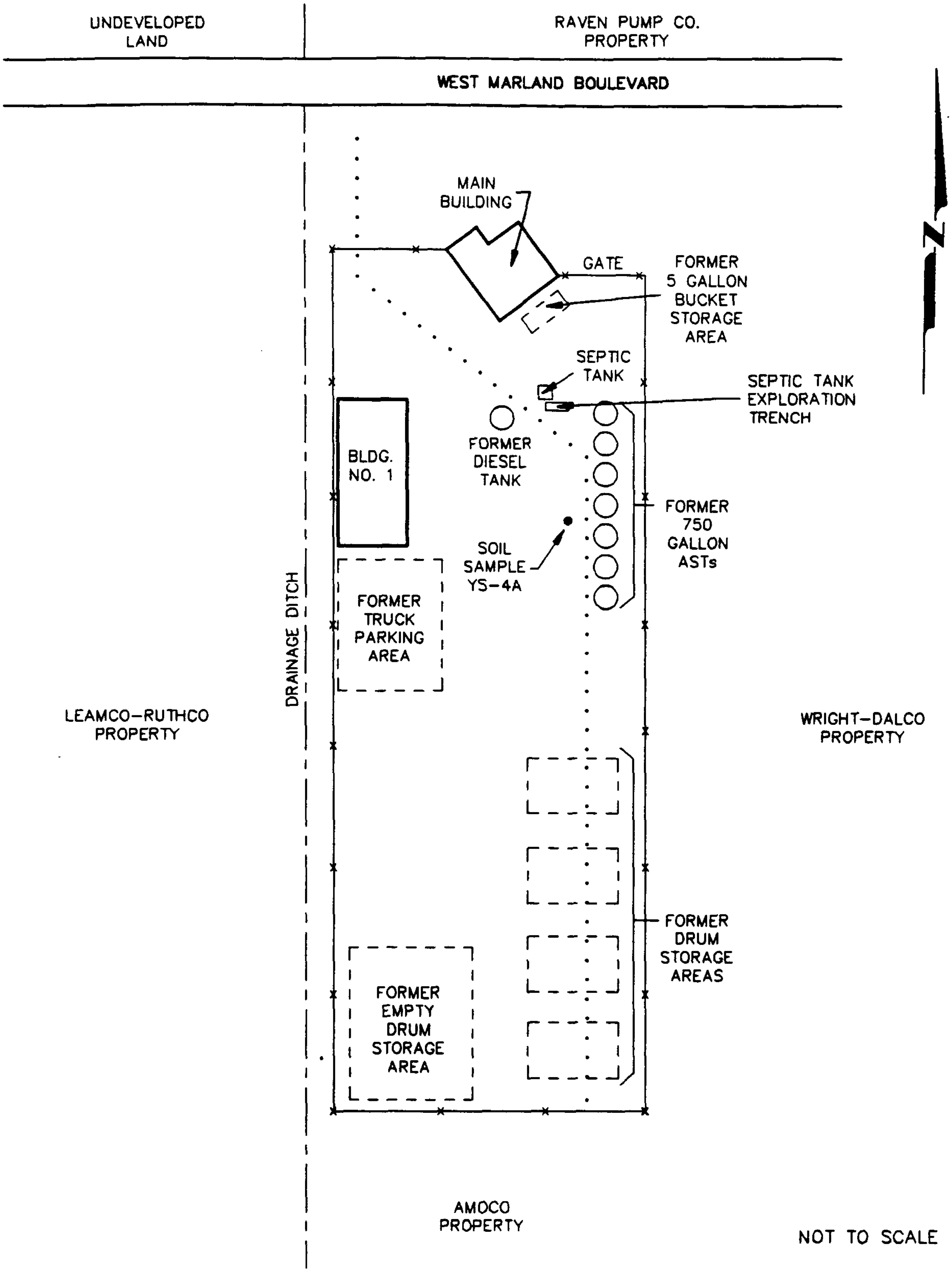
## FIGURE 1-1
## SITE LOCATION MAP
## FORMER CHEMICAL DISTRIBUTION COMPANY
## HOBBS, NEW MEXICO

| DRAWN BY: S. GHANI | DATE: 10-16-92 | PROJECT NUMBER: 1009-001-150 |
| --- | --- | --- |
| CHK'D.BY: | REVISED: | |

TOPO




LEGEND

EXISTING STRUCTURE

FENCE

GAS PIPELINE

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FIGURE 1-2
SITE PLOT PLAN
CHEMICAL DISTRIBUTION COMPANY
HOBBS, NEW MEXICO

| | | |
|---|---|---|
| DRAWN: LG/SF/SH | DATE: 11-12-92 | PROJECT NUMBER: |
| APPV'D: | REVISED 01-25-93 | 1009-001-150 |

CE100954

# 2.0 REMOVAL ACTION

## 2.1 Mobilization

Prior to the start of earthwork activities, a pre-construction meeting will be conducted at the Site and will include the following:

- ESS Facility Manager (Milton Mosher),
- Consultant (ENSR Consulting and Engineering) representatives, and
- Contractor (To be selected) representatives.

ENSR's representative will discuss details of this workplan and the accompanying health and safety plan during the pre-construction meeting to ensure that the other representatives understand the project scope and health and safety issues. Mobilization of equipment and personnel onto the Site will be authorized only after completion of the pre-construction meeting.

## 2.2 Site Drainage Control

Site drainage control is not expected to be a problem because of the area's sparse rainfall. In the event of rain, however, diversion berms will be constructed around each excavation. These berms will divert stormwater runoff away from the excavations. The berms will be approximately 6-inches above grade and will be constructed of clean backfill soil.

## 2.3 Removal of Contaminated Soils

As shown in Figure 1-2, contaminated soils will be excavated from the following three separate areas:

- former location of above-ground diesel tank (Samples DT-1A, DT-2A, DT-2B),
- septic tank exploration trench area, (Sample TR-1A), and
- location of yard grid Sample YS-4A.

Excavated soils will be temporarily stockpiled, as necessary, on plastic sheeting adjacent to the excavated areas. All stockpiled soils will be covered with plastic sheeting and secured with sand bags or their equivalent at the end of each day.

The depth of each excavation will be dependent upon the depth of contamination as indicated by previous soil sample analysis, as well as the depth of physical evidence of contamination. Confirmation samples will be collected from each excavation to confirm the successful cleanup of all contaminated soils with contamination above cleanup levels. Sampling procedures are described in Section 3.0 of this report.

An Organic Vapor Meter (OVM) or equivalent photoionization detector (PID) will be used to screen soils as excavation progresses. The screening will involve a random check of soils to be accomplished by holding the PID probe near (i.e. 1/2 inch from) the ground surface. Confirmation samples will be taken when both visual examination and PID readings demonstrate conditions comparable to those known for uncontaminated soils. Confirmation samples will be taken according to the sampling procedures described in Section 3.0.

A daily log book, describing all activities of the day, will be kept.

No visitors will be permitted on Site at any time during remediation activities, except for representatives of the OCD conducting official business.

### 2.4 Field Screening, Head Space

When visual, olfactory and PID readings (as described above) indicate that the contaminated soil has been removed, samples will be taken for field screening by head space analysis.

Head space analysis will be performed on the soil by taking approximately 5-6 ounces of soil and placing it in an 8 ounces straight-side, glass container. The container will be covered with aluminum foil and allowed to sit until a constant temperature is achieved (1 to 2 hours), after which time the head space in the sample container will be analyzed with a PID. PID readings and other observations such as color, debris, or other significant factors will be recorded.

### 2.5 Disposal of Contaminated Soils

Previous in-situ sampling of the soils to be excavated determined that these soils are nonhazardous. Details of the in-situ waste characterization sampling are discussed in Section

3.1 of this report. If necessary, excavated soils will be stored on Site prior to manifesting and shipment to an authorized landfill for proper disposal.

## 2.6 Backfilling the Excavation

Clean off-site fill material will be brought to the Site and will be stockpiled in the general area indicated on Figure 2-1. After confirmation sampling in each excavation area has indicated successful cleanup of that area, the stockpiled backfill material will be placed in the excavation and will be uniformly compacted. Backfilled areas will be brought up to approximately 3 inches above original grade to allow for short-term consolidation effects.

A sample of the backfill will be taken at the rate of one sample per 50 per cubic yards and tested for TPH and BETX to insure the use of clean backfill material.

## 2.7 Air Monitoring

Air Monitoring will not be conducted during removal actions because volatile emissions are anticipated to be minimal.

## 2.8 Confirmation Sampling

Confirmation sampling is discussed in detail in Section 3.0 - Soil Sampling Program. Confirmation sampling will be performed to verify that all contaminants above the OCD cleanup criteria have been removed.

## 2.9 Monitoring Wells

Results of the PA and SI indicate that groundwater monitoring wells is not necessary at this Site. The depth of the groundwater table is estimated to be approximately 40 to 60 below grade should not, therefore, have been impacted by contaminants from the Site.

## 2.10 Demobilization

Following final backfilling and compaction of the excavation, the undercarriage, drive train, and bucket of the excavation equipment will be scraped clean of any remaining soils. These soils will be disposed with the excavated soils. Before allowing any equipment to leave the Site, all equipment will be examined for soils adhering to the undercarriage, and if found, will be properly disposed of.

# 3.0 SOIL SAMPLING PROGRAM

## 3.1 Confirmation Sample Collection

The purpose of the confirmation sampling program is to ensure that the goals of the removal action have been met. The Site will be cleaned up until the sampling program indicates, with reasonable confidence, that the concentrations of the contaminants across the Site are below the cleanup standard.

The cleanup standards for this Site (set up by the State of New Mexico OCD) are as follows:

- TPH - 100 ppm (using EPA methods 8015(m), EPA 418.1)
- BETX (total) - 100 ppm (TCLP, EPA 8020)

Following the completion of each excavation, confirmation soil samples will be analyzed for TPH, BETX (benzene, ethylbenzene, toluene, and xylene) . For each newly exposed depth, the base and sidewalls will be field screened using PID methods (previously described in Section 2.4) to determine whether target levels of cleanup have been achieved. If PID analyses indicate probable attainment of target levels at the newly exposed depth, confirmation soil sampling will be conducted for the area.

The confirmation samples will be collected from the excavation walls and floor. A minimum of five samples will be collected from each excavation, one from each sidewall and one from the floor. The actual number of samples may be greater, depending upon the size of the excavation. A single sidewall sample will be collected for no more than 20 feet of sidewall length. If the sidewall is longer than 20 feet, but less than 40 feet, the length of the sidewall will be divided in half and one sample will be collected from each half of the sidewall. The longest sidewall is not anticipated to be longer than twenty feet for any of the three excavations. Each floor sample will be collected for an area no more than 100 square feet.

Each confirmation sample will be composited in a stainless steel mixing bowl, and will consist of at least five grab samples collected from the wall or floor area being sampled. After field screening and sample analysis confirm that constituents of concern in the soil are below the OCD cleanup standards, soil removal will be halted and backfilling of the excavation will commence.

Table 3-1 summarizes the details of the confirmation soil sampling and associated Quality Assurance. Section 6.0 provides details of the Quality Assurance Project Plan for this removal action.

## 3.2 In-Situ Waste Disposal Sample Collection

A representative, in-situ composite sample of the waste soils requiring disposal was collected and analyzed for toxicity characteristics as described in 40 CFR Part 261 (TCLP metals, TCLP volatiles, TCLP semivolatiles, corrosivity, and reactivity). One waste disposal sample was collected as a 5-point composite for the estimated 100 cubic-yards of waste soil.

## 3.3 Soil Sampling Equipment

The following sampling equipment will be used for collecting soil samples during the removal activities:

- health and safety equipment as specified by health and safety plan;
- PID instrument;
- sample bottles;
- ice chests for sample storage and transport;
- field log book;
- plot plan;
- supply of plastic trash bags;
- supply of heavy duty plastic sheeting;
- stainless steel mixing bowls;
- stainless steel hand trowels and spatulas;
- 100-foot tape measure;
- potable water supply;
- supply of deionized water with plastic squeeze bottle;
- powdered non-phosphate detergent;
- supply of paper towels;
- scrub brushes;
- sample labels;
- chain-of-custody forms; and
- hammer.

## TABLE 3-1

## Estimated Number of Confirmation Soil and Quality Assurance Samples

| Confirmation Soil Sampling | |
|---|---|
| Scope: 3 excavations x 5 samples for each excavation plus backfilling Sampling | |
| Analysis | Number of Samples |
| TPH<br>Method: 8015(m) Gasoline Diesel and Naptha Ranges | 16 samples<br>(includes one sample of backfill soil) |
| BETX<br>Method: TCLP or 8020 | 16 samples<br>(includes one sample of backfill soil) |

| QA/QC Samples | |
|---|---|
| Analysis | Number of Samples |
| TPH (Soil)<br>Method: 8015(m) | 1 Duplicate Sample |
| BETX (Soil)<br>Method: TCLP, 8020 | 1 Duplicate Sample |
| TPH (Liquid)<br>Method: 8015(m) | 1 Equipment Blank |
| BETX (Liquid)<br>Method: TCLP, 8020 | 1 Trip Blank<br>1 Equipment Blank |

## 3.4 Sample Collection Procedures

Soil samples will be collected according to the following procedures:

1. Itemize and assemble sampling equipment.

2. Using stainless steel hand trowel or spatula, collect soil sample.

3. Place sample in stainless steel mixing bowl and quickly homogenize the sample and distribute to sample bottles.

4. Decontaminate all sample equipment.

5. Place all trash (i.e., spent gloves, paper towels, plastic sheeting, etc.) in plastic trash bags.

6. Note location in field book by measuring distance from property boundaries.

7. Move to next location.

## 3.5 Sample Preservation and Shipment

Table 3-2 identifies the types of sampling containers and preservatives that will be used for the collection and transportation of soil samples. Sample bottles, shipping containers, chain-of-custody forms, labels, and preservatives will be provided by the laboratory. Soil samples will be preserved and shipped according to the following procedures:

1. After each sample has been collected and placed in an appropriate bottle, and after any appropriate preservative has been added, the sample bottle will be labeled, wrapped with plastic, bubble-packing material and placed in an ice chest for transport to an authorized laboratory. Each ice chest will contain either ice, blue ice, or similar coolant.

2. All samples will be transported to the laboratory at the end of the sampling day during which they were collected.

3. A chain-of-custody form will accompany the samples at all times after the sample has been collected and until it reaches the laboratory.

## TABLE 3-2

## Sample Containers and Preservatives
## Removal Work Plan
## Exxon Chemical Facility
## Hobbs, New Mexico

| Parameter | Sample Matrix | Sample Containers | Preservative | Holding Time |
|---|---|---|---|---|
| TPH | Soil | 8 oz. glass | 4°C | Indefinite |
| BETX | Soil | 4 oz. glass | 4°C | 14 days |
| TCLP Lead | Soil | 16 oz SSWM | 4°C | Indefinite |
| TPH | Liquid | 16 oz. glass | 4°C | Indefinite |
| BETX | Liquid | 40 ml VOA x 3 | 4°C | 14 days |

## 3.6 Decontamination Procedures

Sample collection equipment (i.e., stainless steel trowel, stainless steel mixing bowl, etc.) will be decontaminated as follows:

1. In a 5-gallon plastic bucket, prepare a mixture of potable water and powdered non-phosphate detergent.
2. Fill another 5-gallon plastic bucket with deionized water.
3. Place the equipment to be cleaned in the potable water/non-phosphate detergent mixture, and using a scrub brush, thoroughly clean the equipment.
4. Then, thoroughly rinse the equipment in the 5-gallon bucket containing the deionized water.
5. Dry equipment with paper towel.
6. Wrap equipment in plastic or aluminum foil until ready to use again.
7. Place all trash (i.e., paper towels, plastic sheeting, aluminum foil, etc.) in plastic trash bags.

# 4.0 FIELD RECORDS AND DOCUMENTATION

## 4.1 Field Log Book

A daily log will be maintained. Each day, all activities of the day (including sampling notes) will be recorded in a hard cover, bound, field log book with numbered pages. Each page will be signed and dated by the sampler(s).

The log book will contain the following information on each soil sample location:

- a sketch of the area under investigation
- soil sample location, including sample number and measured distances from southern and eastern property line to soil sample location
- date, time of day, weather conditions, and sampler(s) name(s);
- procedures and equipment used in collecting soil samples;
- descriptions of soil type and field screening observations;
- types of sample containers and sample identification;
- parameters requested for analysis; and
- decontamination procedure.

## 4.2 Sample Labels

All sample bottles will be identified with labels containing the following information:

- Site location,
- sample location (soil sample number),
- sample number,
- date and time of sample collection,
- sample method (grab or composite),
- parameters for analysis,

# 5.0 REPORT ON REMOVAL ACTIVITIES

After laboratory analytical reports have been received and reviewed by ENSR, a Phase III report will be prepared detailing the removal action. The report will provide the following information:

- facility history and description;
- previous investigations;
- objectives and scope of work;
- description of removal activities completed;
- amount of soils excavated and disposed of off site;
- results of laboratory analysis of excavated soils; and
- conclusions.

All laboratory analytical packages related to removal action sampling will be provided as an appendix to the Phase III report.

# 6.0 QUALITY ASSURANCE PROJECT PLAN

## 6.1 Quality Assurance Goals

The purpose of this Quality Assurance Project Plan (QAPP) is to ensure that all data generated during the soil removal activities at the former Exxon Hobbs, New Mexico Site will be of sufficient quality to ensure that project objective have been accomplished. The quality of the data can be defined in terms of completeness, accuracy and precision, comparability, representativeness, and traceability. These terms are defined below and the manner by which each will be achieved is described.

**Completeness** is the adequacy in quantity of valid measurements to prevent misinterpretation and to meet the needs of the sampling an analysis program. Completeness will be addressed in two ways:

- In the design of the confirmation sampling program, by selection of sufficient sampling sites and measurement parameters; and
- In the implementation of the confirmation sampling program, by maximizing successful sample collection and analysis and completion of corresponding field and laboratory documentation.

**Accuracy** is the agreement between a measurement and the true value. Precision is the degree of variability among individual measurements of the same property under similar conditions.

**Comparability** represents the extent to which comparisons among different measurements of the same quantity or quality will yield valid conclusions. Comparability will be achieved through the use of standard techniques to collect and analyze the samples and by reporting analytical results in appropriate units.

**Representativeness** is the extent to which discrete measurements accurately describe a characteristic of population, parameter variations at a sampling point, or an environmental condition. Representativeness will be optimized through the informed selection of sampling sites, the proper collection and handling of samples, and the extraction an analysis of samples within the required holding times.

**Traceability** is the extent to which data can be substantiated by hard-copy documentation. Documentation will exist in two forms; 1) that which links quantitation to authoritative standards and, 2) that which explicitly describes the history of each sample from collection to analysis.

This QAPP describes the sampling and analytical procedures, documentation, quality control requirements, audits, and quality assurance responses that will be employed during the soil removal activities at the former Exxon Site to ensure quality, as defined above.

## 6.2 Project Organization and Responsibilities

Responsibilities of key personnel in the project organization are described below:

- Project Manager: The Project Manager will have overall responsibility for technical, financial, and scheduling matters. Additional responsibilities will include communication with the Site owner, authorization of revisions to the project plans, and review and approval of project deliverables.

- Project Geologist: The Project Geologist will be primarily responsible for the coordination and implementation of the field program. Additional responsibilities will include procuring and monitoring subcontractors; communicating field activity information to the Project Manager; maintaining field records; issuing and tracking field equipment, and ensuring the proper sample collection, handling, and chain-of-custody procedures are used.

- Laboratory Manager: The Laboratory Manager will be responsible for overall management of laboratory operations to meet project commitments, including scheduling personnel and physical resources.

- Laboratory Quality Control (QC) Officer: The primary responsibility of the Laboratory QC Officer will be to maintain the laboratory QC program. The Laboratory QC Officer will be responsible for maintaining standards and traceability documentation and will perform analytical data validation.

- Field Supervisor: The primary responsibility of the Field Supervisor will be the coordination and effective use of all subcontractor personnel and equipment to meet the needs of the project. The Field Supervisor will also be responsible for ensuring that all drilling, well construction, and equipment decontamination procedures are performed in accordance with the project work plan and this QAPP.

- Project QA Officer: The Project QA Officer will be responsible for the review and approval of the QAPP and any necessary revisions to the plan. The QA Officer will also be responsible for conducting any audits mandated by this QAPP or warranted in his/her judgement, and for reporting any conditions adverse to quality to the Project Manager.

- Project Health and Safety (H&S) Manager: The Project H&S Manager will be responsible for reviewing and approving the project-specific H&S plan, monitoring H&S activities to ensure compliance with the H&S plan, and notifying personnel of any changes in procedures.

## 6.3 Subcontractors

Subcontractor quality control is that system of activities which ensures that products or services obtained from subcontractors fulfill the needs of the project. AnalytiKEM Laboratories, Inc. of Houston, Texas and Environ Express of La Porte, Texas, will provide analytical services.

A written agreement will be established with each subcontractor. The agreement will identify the scope, technical specifications, and the schedule of the work to be performed.

All subcontractors will be required to follow the procedures of this QAPP. The Project Geologist will monitor subcontractors to evaluate their adherence to the project plans. Inspections may include, as appropriate:

- procedures,
- type and condition of equipment,
- calibration procedures,
- personnel qualifications, and
- documentation.

The results of these inspections will be documented and included in the project files.

## 6.4 Project Communications and Records

The Project Manager will be responsible for ensuring that project records are complete, traceable, and secure. Original incoming materials will be placed in the project central file upon receipt. All outgoing materials must be reviewed and approved by the Project Manager prior to release. Copies of outgoing documents will be maintained in the project file.

The project file will include the following materials, as appropriate:

- project proposal;
- work, QA, and H&S Plans, including revisions;
- contracts, including subcontract agreements;
- field records;
- sample chain-of-custody forms;
- analytical data;
- correspondence;
- memos;
- telephone logs;
- maps, drawings, and photographs;
- numerical analyses;
- audits and corrective action requests;
- technical and peer reviews; and
- reports.

Upon project completion, records will be maintained in a secure location for a period of at least five years.

## 6.5 Field Sampling Activities

This section describes specific activities aimed at the prevention and early detection of circumstances that could adversely affect the quality of each field program task.

### 6.5.1 Training

Prior to the commencement of field work, all field personnel, including subcontractors, will be given instructions specific to the soil removal activities at the Site. The instructions will cover the following areas:

- project organization and lines of communication and authority,
- description of the Site,
- overview of the project,
- documentation requirements,
- personal protection,
- decontamination procedures, and
- emergency procedures.

Training of field personnel will be provided by the Project Geologist or a qualified designee.

## 6.6 Quality Control

Quality control samples, equipment and trip blanks, and field duplicates/replicates will be collected in the field to assess sample contamination, precision, and accuracy.

### 6.6.1 Equipment Blanks

Equipment blanks will be collected to measure the amount of contamination due to field practices and the combination of site, sampling, and transporting characteristics. Equipment blanks will be prepared prior to sampling by pouring deionized water over the freshly decontaminated sampling equipment (i.e., hand trowel) and transferring it into sample containers. The deionized water used for the blanks will be provided by the laboratory. Equipment blanks will be prepared at a rate of one per day. Equipment blanks will be returned to the laboratory with their associated samples and analyzed for the same parameters.

### 6.6.2 Trip Blanks

Trip blanks will be analyzed to discriminate between contamination due to field practices and that due to sample proximity during transport. One trip blank will be prepared for each shipping container and will consist of three 40-ml VOA vials of deionized water. The trip blank will be prepared in the laboratory and will accompany the sample containers from their original source to the field and throughout their transport, storage, and analysis. Trip blanks will be analyzed for the same parameters as their associated samples.

### 6.6.3 Field Duplicates/Replicates

Field duplicate/replicate samples will be collected and analyzed to assess project data precision. Duplicates/replicates taken in the field account for both the sample matrix and variabilities in sampling and analytical procedures. Duplicate or replicate samples will be collected at a frequency of one per 20 samples. Duplicate soil samples will be obtained by transferring two aliquots of sample material from the same auger sample into identical containers. To minimize the loss of volatile components, sample material will not be composited prior to placement in jars. If possible, duplicates/replicates will be taken from locations where significant contamination is expected.

To reduce bias in the laboratory, field blanks and duplicates/replicates will not be identified as such on sample labels or chain-of-custody forms. The field notebook will, however, identify all quality control samples.

## 6.7 Documentation of Removal Action Field Activities

The Project Geologist will document all field activities occurring during the removal action in a field log book. The log book will be kept in the ENSR project files after completion of the removal action.

## 6.8 Maintenance and Calibration of Equipment

All field measurement equipment will be calibrated, operated, and maintained in accordance with the manufacturers' instructions.

The Project Geologist will be responsible for the issuance and control of field measurement equipment. All field calibrations will be documented in the field notebook. Equipment problems, including the corrective action taken, will also be noted in the field records.

## 6.9 Sample Control and Chain of Custody

Successful analysis depends on the capability to produce valid data and to demonstrate such validity. In addition to proper sample collection and handling, appropriate sample identification and chain-of-custody procedures are necessary to help support the validity of the data.

Sampling kits will be prepared by the Environ Express or AnalytiKEM Laboratories Sample Custodian. The sampling kits will be packaged in coolers and will include the chain-of-custody forms, appropriate sample containers, preservatives, and trip blanks.

## 6.10 Laboratory Analysis

Sample analysis will be performed by AnalytiKEM Laboratories, Inc. of Houston, Texas and Environ Express of La Porte, Texas. The following is a description of the overall quality control procedures which will be incorporated into the analyses of samples associated with this project.

### 6.10.1 Sample Receipt and Storage

All samples submitted to the laboratory for analysis will be accompanied by chain-of-custody documentation. The Laboratory Sample Custodian will complete each chain-of-custody record by signing and dating it. All samples will be inspected for:

- intact air-tight seal,
- evidence of breakage or damage,
- intact chain-of-custody seal,
- completeness of accompanying records, and
- adequateness of preservation.

Any discrepancies or problems should be communicated immediately to the Project Geologist.

After inspection, each sample will be logged in and assigned a unique laboratory sample identification number. Information entered into the logging system for each sample will include:

- field sample identification number,
- laboratory sample identification number,
- date received,
- project identification,
- date and time of collection,
- sample type,
- condition of sample (from inspection),
- analyses sought, and
- assigned storage area.

All samples will be stored at 4°C in a secure location until analysis.

## 6.11 Documentation

All analytical results will be thoroughly documented in ink and in reproduction quality. Duplicate records will be kept whenever practical. Project records will be maintained in a secure area.

For each analytical result, including all blanks, spikes, calibration standards, and samples, supporting documentation will be maintained that includes at least the following:

- complete chain-of-custody records for the sample;

- records of traceability to Certified Reference Materials for all analytical standards, spikes, and balance calibration weights;

- records of all sample preparation and analysis, including weights and volumes of samples, solvents, reagents, dilution ratios, standards, etc. Maintained in laboratory notebooks and/or on formalized data sheets, and reviewed by a supervisor or quality control officer; and

- documentation of all manual calculations in reproduction quality.

## 6.12 Data Validation

Data validation is a process of review of the analytical results and documentation against established criteria. The Laboratory Quality Control Officer will be responsible for performing the validation.

### 6.12.1 Statistical Evaluation

The precision and accuracy of all data will be computed and compared to the laboratory control limits as part of the data validation process. Precision will be determined from the analytical results of duplicate samples; accuracy will be computed from spike recoveries.

The results of all other quality control checks will be reviewed in terms of the following criteria:

- Method blank values should contain less than five times the detection limit concentration of common laboratory contaminants and no detectable levels of other target analytes.

- The daily calibration curves should be linear over their entire range, and all samples analyzed should be within that range.

- Instrument performance checks, including check standards, should meet method criteria.

If any of the above criteria are not met, the appropriate corrective action will be taken.

### 6.12.2 Documentation Review

Each batch of analyses supporting documentation will be reviewed for completeness, traceability, correctness, and legibility by the Laboratory Quality Control Officer.

## 6.13 Quality Assurance Response

A Quality assurance response will be required whenever an out-of-control or potential out-of-control event is noted. Control limits and the appropriate responses are defined in the analytical method. Complete documentation of responses will be included in the laboratory project files.

## 6.14 Reporting Requirements

A summary of the analytical results will be submitted to the Project Manager. The report will include the following:

- letter of transmittal, indicating the laboratory management's approval of the data as presented;
- sample chain-of-custody records;
- sample receipt checklist, indicating the condition of each sample upon receipt in the laboratory;
- summary of methodologies;
- analytical results for each sample;
- results of all quality control analyses; and
- discussion of any incidents of nonconformance or out-of-control events.

## 6.15 Numerical Analysis and Peer Review

### 6.15.1 Numerical Analysis

All numerical analyses and records of calculations will be legible, reproduction-quality, and complete enough to permit logical reconstruction by a qualified individual other than the originator. Each record will include the project name, signature of the originator, and date of origin. Records of all final calculations will be maintained in the project files.

All calculations will be verified by a qualified person other than the originator. Verification will consist of a thorough check of the calculations for the following:

- appropriateness of method,
- appropriateness of assumptions,
- correctness of calculations,
- completeness of references, and
- completeness of records.

### 6.15.2 Peer Review

All reports will be reviewed prior to transmittal to ensure consistency with the project objectives and appropriateness of interpretations, conclusions, and recommendations. The review will be conducted by an ENSR staff member whose professional qualifications are at least equivalent to those of the originator.

## 6.16 Quality Assurance Audits and Responses

An audit of this project for conformance with this QAPP will be conducted at the request of the Project Manager or at the discretion of the Project QA Officer. The audit may include observations of procedures, discussions with project personnel, and review of field documentation.

If quality deficiencies are observed that warrant immediate attention, quality assurance response requests will be issued to the Project Manager. The Response Form is a multicopy form used for recording responses to quality assurance deficiency notifications. The QA Officer will retain one copy of the form when it is issued. The Project Manager will complete and sign the form when a quality assurance response has been implemented, and will return the original to the QA Officer to close the loop.