1R - 421

REPORTS

DATE:

2005

KANE
ENVIRONMENTAL ENGINEERING, INC.

January 31, 2005

Roger Anderson
Oil Conservation Division
1220 South St. Francis Drive
Sante Fe, NM 87505

RE: Mattie Price Site Investigation Report and Corrective Action Plan

Enclosed please find the Site Investigation Report and Corrective Action Plan for the Mattie Price Tank Battery. This facility is located in Lea County, New Mexico.

Please review and provide comments or concurrence for the remedial actions described therein.

If you have any questions, please don't hesitate to give me a call at (432) 689-8675 or send me an e-mail at dlambertson@earthlink.net. Please forward all written correspondence for this site investigation plan to me at the following address:

Deb Pennington
Kane Environmental Engineering, Inc.
4713 Rosewood Dr.
Midland, TX 79707

Sincerely,

D. Pennington

Deb Pennington

Enclosure

CC: With Enclosure:

Paul Sheeley
Oil Conservation Division
1625 N. French Dr
Hobbs, NM 88240

Joyce Swayze, Osborne Heirs Company

Phase II ESA

Site Investigation Report and Corrective Action Plan

Mattie Price Tank Battery

Lea County, New Mexico

Prepared for:

Osborn Heirs Company
1250 NE Loop 410 Suite 1100
San Antonio, TX 78209

January 2005

Prepared by:

KANE

Kane Environmental Engineering, Inc.
5307 Oakdale Creek Court
Spring, Texas 77379
Project No. 04-631

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1.0 SITE HISTORY

At the request of Osborn Heirs Company, Kane Environmental Engineering, Inc. (Kane Environmental) conducted a Phase I environmental site assessment (ESA) of the Mattie Price Tank Battery on August 26, 2004. This property is identified as being located in Section 6, T17S R38E, Lea County, New Mexico, at a global position of North 32° 52' 3.4'', West 103° 10' 45.8''. A topographic map of the location is shown as **Figure 1**.

Previous Phase I and Phase II Environmental Site Assessments, performed by Larson & Associates, Inc., identified visual and olfactory evidence of hydrocarbon impacted soils, with this impact identified from the surface to depths of up to three feet (the point of auger refusal). Impacts were reported in these assessments at the following locations:

- near the free water knockout
- at an area reported as a pit
- near the west end of the tank battery
- near the flare
- around the produced water injection points

No soil samples were submitted for laboratory analyses during the aforementioned Phase II ESA. The depth to groundwater in the vicinity of the tank battery was reported to range between 80 and 100 feet below ground surface.

A second investigation was conducted by R.E. Environmental Services, Inc. This investigation consisted of four soil borings placed around the tank battery. Hydrocarbon impacted soils were reported at depths up to 14 feet, with a maximum reported concentration of 25,900 ppm TPH at a depth of 7.5' at Test Point A. All chloride concentrations from the four borings were reported below 250 ppm. See **Figure 2** for a depiction of these soil boring placements and sampling results.

Five surface soil samples were also collected during this ESA in the vicinity of the tank battery and associated well locations. Chloride concentrations were generally reported at a concentration of 100 ppm, with a maximum of 300 ppm measured at Test Point D. This Test Point is located adjacent to the onsite injection well.

During the Kane Environmental ESA a windmill was identified approximately 954 ft. south-southeast from the tank battery. This windmill is reported in the R.E. Environmental Services, Inc. ESA to have a total well depth of 80 feet. The R.E. Environmental Services, Inc. ESA also reports that groundwater is found at a depth of 62 feet.

The windmill supplies water for a steel cattle watering stock tank. Overflow from the stock tank collects in an earthen overflow pond, located immediately to the south. This overflow pond is located 1,030 feet south-southwest of the tank battery.

General drainage in this area is to the south-southeast. A ridge, or increase in elevation, occurs between the tank battery and the windmill/stock tank/overflow pond area, isolating the battery from these surface water impoundments along their northern exposure. The elevated county road completes the isolation of the surface water along the east side. See **Figure 1** for a depiction of the topographic features in this area.

The New Mexico Oil Conservation Guidelines for Remediation of Leaks, Spills and Releases utilize a site ranking protocol for determining the remediation requirements for hydrocarbon-impacted soil. Based on this guidance and available hydrogeologic information, this site is ranked as follows:

Criterion	Measured Value	Ranking Score
Depth to groundwater	50-99 ft	10
Distance to surface water	See Note 1	0
Distance to wellhead protection area	See Note 2	0
	Total Ranking Score	10

Note 1: The overflow pond is located 1,030' from the tank battery. In addition, a ridge provides a natural barrier between the tank battery and the overflow pond, precluding surface drainage from migrating from the tank battery area to the pond.

Note 2: The windmill is not located in a wellhead protection area.

The site sensitivity ranking for Mattie Price Tank Battery is rated at 10. This ranking score yields the following remediation thresholds:

Constituent	Remediation Threshold
Total Petroleum Hydrocarbons	1,000 ppm
Benzene	10 ppm
BTEX	50 ppm

Based on the findings of the Phase I site assessment, a Phase II Site Investigation was conducted; this Phase II Site Investigation Report has been prepared as documentation of site investigation activities at the Mattie Price tank battery.

2.0 FIELD INVESTIGATION AND LABORATORY ANALYSES

Site investigation activities were conducted on December 14 and 15, 2004. Investigation activities were conducted using a mobile rotary drilling rig equipped with hollow-core augers and continuous coring equipment. Under Kane Environmental supervision, Groundwater Monitoring, Inc. of Grand Prairie, Texas performed 16 borings designed to horizontally and vertically delineate potential impact around the tanks and equipment at the Mattie Price tank battery.

Field Investigation Protocols

Initial boring locations were placed to confirm or refute hydrocarbon impact reported around Test Points A (MPB-1) & B (MPB-2) during previous site investigations. Additional borings were performed northwest of AST #1 (MPB-3) and south of AST #2 (MPB-4) to provide delineation of potential hydrocarbon impact. Additional borings, labeled MPB-5 through MPB-16 were performed to provide full additional delineation of hydrocarbon impacted areas as well as delineation around potential hydrocarbon source equipment. Boring locations are depicted in **Figure 3**.

Soil logs were prepared during boring (**Appendix A**) and field headspace readings were collected on each 2.5-foot sample interval using a photo-ionization detector (PID). Sample collection and headspace readings were conducted according to the procedures outlined in NMOCD's Guidelines for Remediation of Leaks, Spills and Releases. A threshold value of 100 ppm was used to estimate compliance with these BTEX standards and to guide placement of additional borings.

For boring samples with field headspace readings in excess of 100 ppm (MPB-1, MPB-5, MPB-7, MPB-10 and MPB-12), additional borings were placed outward from the initial location in the four cardinal directions wherever possible, based on access limitations caused by surface equipment, piping, electrical lines and lease boundaries. Additional borings to the west and the south of boring MPB-12 were not performed due to physical access constrains, surface and underground piping, and the presence of electrical lines and equipment. For boring MPB-5, additional borings to the east and south were not performed due to the proximity to the east lease boundary and similar access constrains to the south.

The sample interval for each boring demonstrating a maximum field headspace reading and the terminal depth sample interval were submitted to OilLab, Inc. in Midland Texas under a Chain of Custody transport for the analysis of the following constituents:

- TPH-GRO
- TPH-DRO
- BTEX

Significant differences in hydrocarbon impact character (light end vs. heavy end) were encountered at some locations. Subjective cues (color, odor and apparent degree of hydrocarbon saturation) as well as field headspace readings were used to select the sample interval with the expected maximum heavy end impact levels for laboratory analyses from these soil samples.

Soils encountered during boring ranged from sandy loam surface soils (0-2.5',) to silty clay subsurface (2.5-5.0+' generally), overlying hard to very hard but friable caliche to depths of up to 20 feet. In most locations, boring speed (an indicator of material hardness) was slowest in the 10-15' depth range. Materials encountered were generally moist to wet, (but not saturated) in the 12.5-20.0 foot depth range.

Laboratory Analysis

The site maximum benzene and total BTEX concentrations measured in sample borings was encountered in MPB-1 5.0-7.5' (0.175 mg/kg benzene) and MPB-9 7.5-10.0' (15.0106 mg/kg BTEX) are below the OCD regulatory thresholds of 10 mg/kg for benzene and 50 mg/kg for BTEX.

Soil borings from the areas of AST #3 and #4 have measured TPH concentrations in excess of the 1,000 mg/kg OCD threshold. These soil borings are identified as:

MPB-1	MPB-9
MPB-5	MPB-10
MPB-7	MPB-12

A site maximum concentration of 2,740 mg/kg TPH was identified in boring MPB-5 7.5-10.0'.

Soils sample analysis demonstrated that the following borings measured TPH concentrations below the 1,000 mg/kg OCD TPH threshold:

MPB-2	MPB-13
MPB-4	MPB-15
MPB-8	MPB-16
MPB-11	

These borings demonstrate and serve to delineate the boundary of the area of hydrocarbon impact to the north, south and the east. Complete horizontal delineation of the hydrocarbon contaminated area was not achievable to the West due physical access constraints and safety restrictions on working the drilling rig in the area of electrical and process equipment.

In locations where total hydrocarbon levels measured by laboratory analysis exceeded the OCD regulatory threshold, field headspace readings in the surface and near surface materials were much lower than the maximum levels for each boring, indicating surface leaks were not the source for these elevated hydrocarbons. Field personnel reported that a former pit may have been located in the vicinity of the borings showing elevated hydrocarbons. This pit was reportedly used by a previous operator for disposal of tank bottoms generated during the removal and replacement of ASTs that were located where ASTs #3 and #4 are currently located. The pattern of hydrocarbon distribution with depth supports this report.

Laboratory analyses are summarized in Table 3, with complete analytical reports including Chain of Custody documentation found in the Appendices.

3.0 QUALITY CONTROL

All sample collection equipment was decontaminated between intervals by washing with soap and water followed by a clean-water rinse.

All soil samples to be submitted for laboratory analysis were immediately packed on ice for shipment to the laboratory under a Chain of Custody transport. EPA approved pre-cleaned and certified containers were used for sample collection.

The PID used for headspace an analysis was calibrated to assume a benzene response factor prior to arrival on location.

Laboratory quality control measures used to insure the precision and accuracy of the data included:

- matrix spike analyses to demonstrate the effectiveness of the extraction procedures.
- known standard sample analyses and quality control spike analyses to demonstrate the accuracy of the equipment used for laboratory analyses.
- method blank analyses to demonstrate the purity of reagents used.

All analytical quality control measures were measured within acceptable limits.

All laboratory analyses were completed within required sample holding times, using EPA or OCD approved analytical methods.

4.0 SUMMARY AND RECOMMENDATIONS

Based on analyses performed to-date, total hydrocarbon impact in excess of established OCD thresholds is present in certain subsurface soils at the Mattie Price Tank Battery. The most significant impact is found to be focused around and to the west of ASTs #3 and #4.

Complete excavation to remove all subsurface materials with hydrocarbon levels in excess of OCD regulatory thresholds is impractical, as this action will require relocation and/or structural support of surface equipment, including ASTs #3 and #4, the doghouse, separator and electrical panel west of ASTs #3 and #4, as well as the relocation of underground utilities in this area.

The extent of excavation depth will be determined by the need to preserve the integrity of the supporting foundations of the surface equipment and underground utilities. These determinations will largely be made in-field during the time of excavation, as underground utilities may be encountered that are not currently known. As such, it is recommended that the impacted soils be remediated as follows:

- excavation of shallow soils ($\leq$ 5') for landspreading, and
- in situ remediation of the soils that are impractical to excavate, and
- in situ remediation of the deep ($\geq$ 5') impacted soils.

Excavation and Bioremediation through Landspreading

Following the completion of excavating the selected soils to a depth of 5', the excavation floor should be divided into 625 square foot sections (25' x 25'), and each excavation sidewall divided into the same size sections. Soil samples will be extracted and collected from each section for laboratory analysis, as discussed below.

Note: No personnel should enter the excavation area unless confined space entry and OSHA slope/shoring procedures are followed.

Samples collected will be analyzed for total hydrocarbons to demonstrate that all residual hydrocarbon concentrations in soils that remain in place are below the OCD total petroleum thresholds. BTEX concentrations do not require further evaluation, as concentrations encountered during this investigation are reported below the OCD thresholds for this constituent.

Bioremediation will be achieved by constructing a landfarm cell adjacent to the location, and spreading the excavated soils in the landfarm area at depth of no greater than 6 inches. The landfarm cells will be equipped with 18" berm to prevent the migration of contaminants, with the berms constructed from native soil. The bioremediation cell will be sized appropriately to accommodate all excavated soils. After spreading is completed

the cell will be fertilized with 300 lb. actual nitrogen per acre, and disked to distribute the fertilizer and aerate the soils.

The landfarm cell will be disked twice monthly, with approximately 2 inches of water applied to the cell after each disking for a minimum of two warm-season months (average daily temperatures of >65 °F).

The bioremediation cell will be divided into quadrants, with 4 soil samples collected from each quadrant and composited for analysis to determine the effectiveness of these remedial activities. If sample analysis is measured above the OCD total hydrocarbon threshold, an additional 300 lb. of actual nitrogen per acre fertilizer application will be applied, followed by an additional two months of disking and water applications to complete bioremediation. Additional composite samples will be collected and analyzed as described above. This procedure will be repeated until all soil in the bioremediation cell has achieved the OCD threshold for total hydrocarbons.

Once remediation is complete, the remediated soils will be released for unrestricted use. These remediated soils will be used for backfilling the excavated area and surface grading.

Excavation and In Situ Remediation - Fertilizer

Excavation of the area to the west of ASTs #3 and #4 will be performed unless constrained by surface or subsurface equipment. In areas where hydrocarbon impact is >5' and <10', with unrestricted access, 1,000 lbs of nitrogen will be applied on a per acre basis and tilled into the soil with the aid of a backhoe, to the depth of measured contamination. Soil samples will be collected within six months, with samples extracted from each 4' interval to the maximum depth of impact for each area where this remedial method is employed. Upon achieving the OCD thresholds for total hydrocarbons in these areas, remediation will be considered complete.

Excavation and In Situ Remediation – Fertilizer & Air Sparging

Following excavation and insitu remediation of all accessible areas, remediation of the inaccessible areas will be conducted in situ using the application of subsurface amendments and air sparging. Soil borings will be placed using a drilling rig to a minimum depth of 15 feet or as indicated by field PID headspace readings (using a reading of 50 ppm as the cut-off depth) on a 15-foot grid pattern, as follows:

- Slotted 4" PVC pipe will be installed from 5 feet below ground (bgs) surface to the total boring depth.
- Solid 4" PVC pipe will be used from the < 5' bgs to 1-ft above the surface.

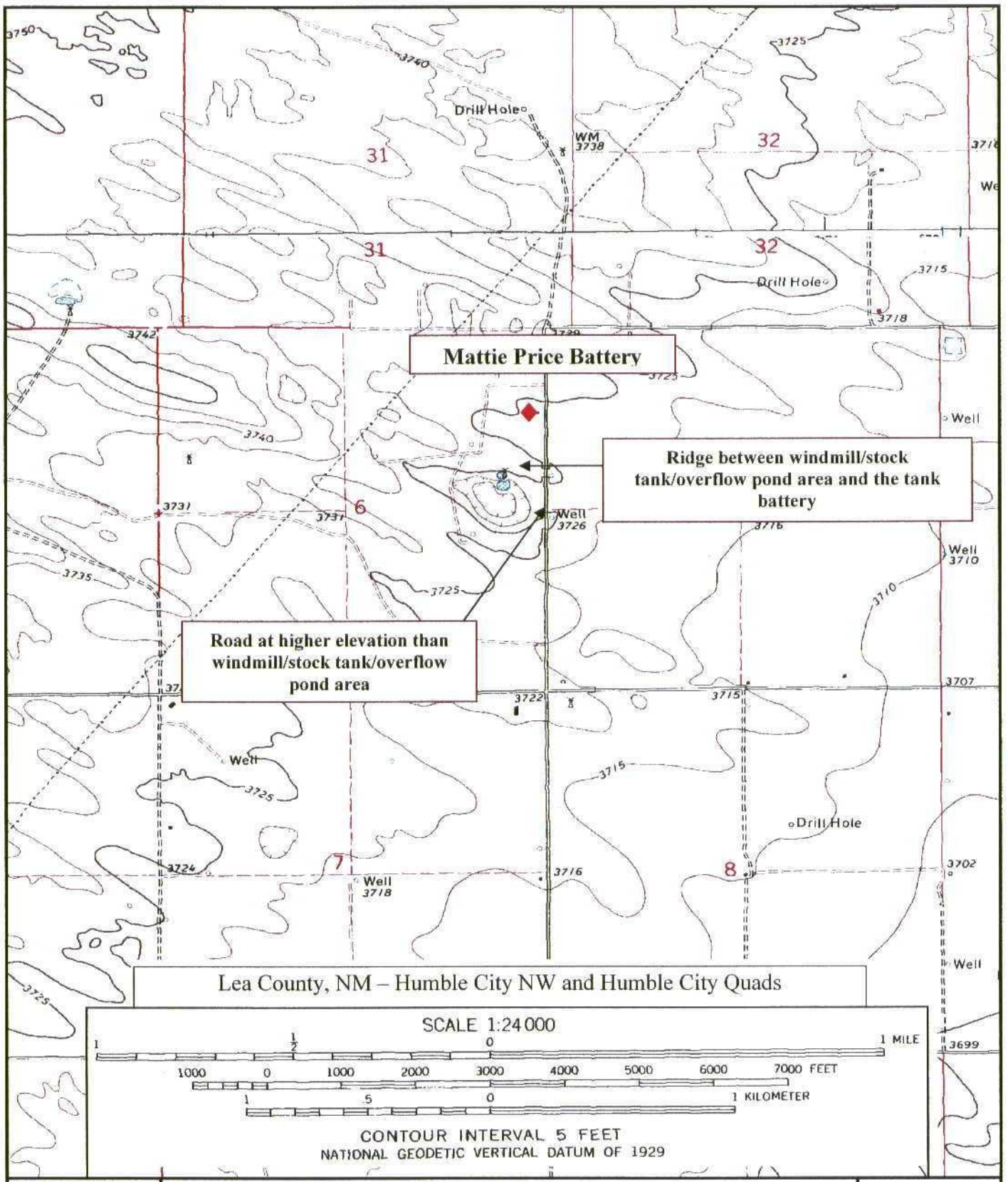
Pea gravel or coarse well sand mixed with 40 lb. of ammonium sulfate fertilizer will be used as backfill to set the pipe, up to a depth of five feet bgs. The remaining backfill will

be accomplished with bentonite, bringing this backfill material to, and sealing, the surface.

A surface manifold system will be constructed to connect the air sparging well piping, using 2" PVC pipe. Low pressure (5 - 10 PSI) compressed air will be applied to the manifold system by use of a portable air compressor to aerate the subsurface soils, allowing for bioremediation of subsurface hydrocarbons to occur. The ammonium sulfate will encourage permeability of the soil, enabling the acceptance of the injected oxygen into the impacted area.

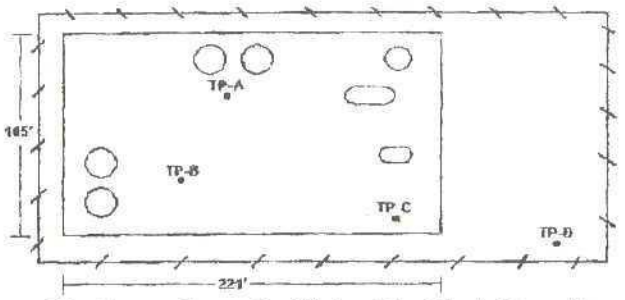
The air compressor will be run daily for approximately 1 hour per day. Progress sampling will be conducted within 6 months of the onset of the remediation project, analyzing for total hydrocarbons, and approximately every 6 months thereafter until the OCD total hydrocarbon thresholds are met. Sample depth will follow the original depth of hydrocarbon impact, with sample cores collected on 4' intervals.

Upon completion of remediation at this site, the landfarm area will be graded to its original contour. Air sparging wells will be removed and the wellbores filled with native soil.



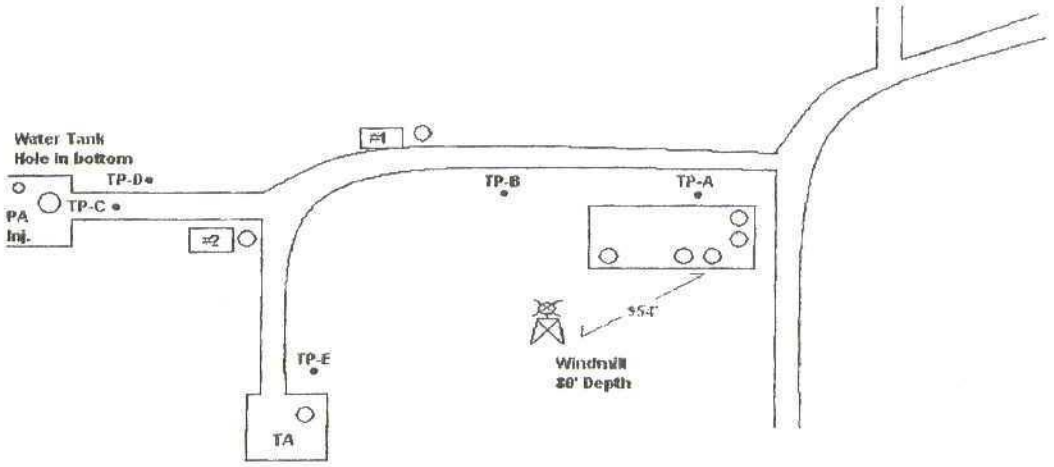
Area Location Map	Osborn Heirs **MATTIE PRICE TANK BATTERY** Lea County, New Mexico	Figure 1 USGS Topographic Map

Mattie Price Tank Battery
West Garrett Devonian Pool
NE ¼ NE ¼
Sec-6 TS-17-S R-38E
Lea Co. New Mexico



Hydrocarbon & Chloride Test Results

Test Point	Results			
A	16,860ppm @ 6'	25,900ppm @ 7 ½'	2,160ppm @ 10'	516ppm @ 14'
B	3,130ppm @ 6'			
C	460ppm @ 6'			
D	18ppm @ 4'			
Chlorides	<250ppm			



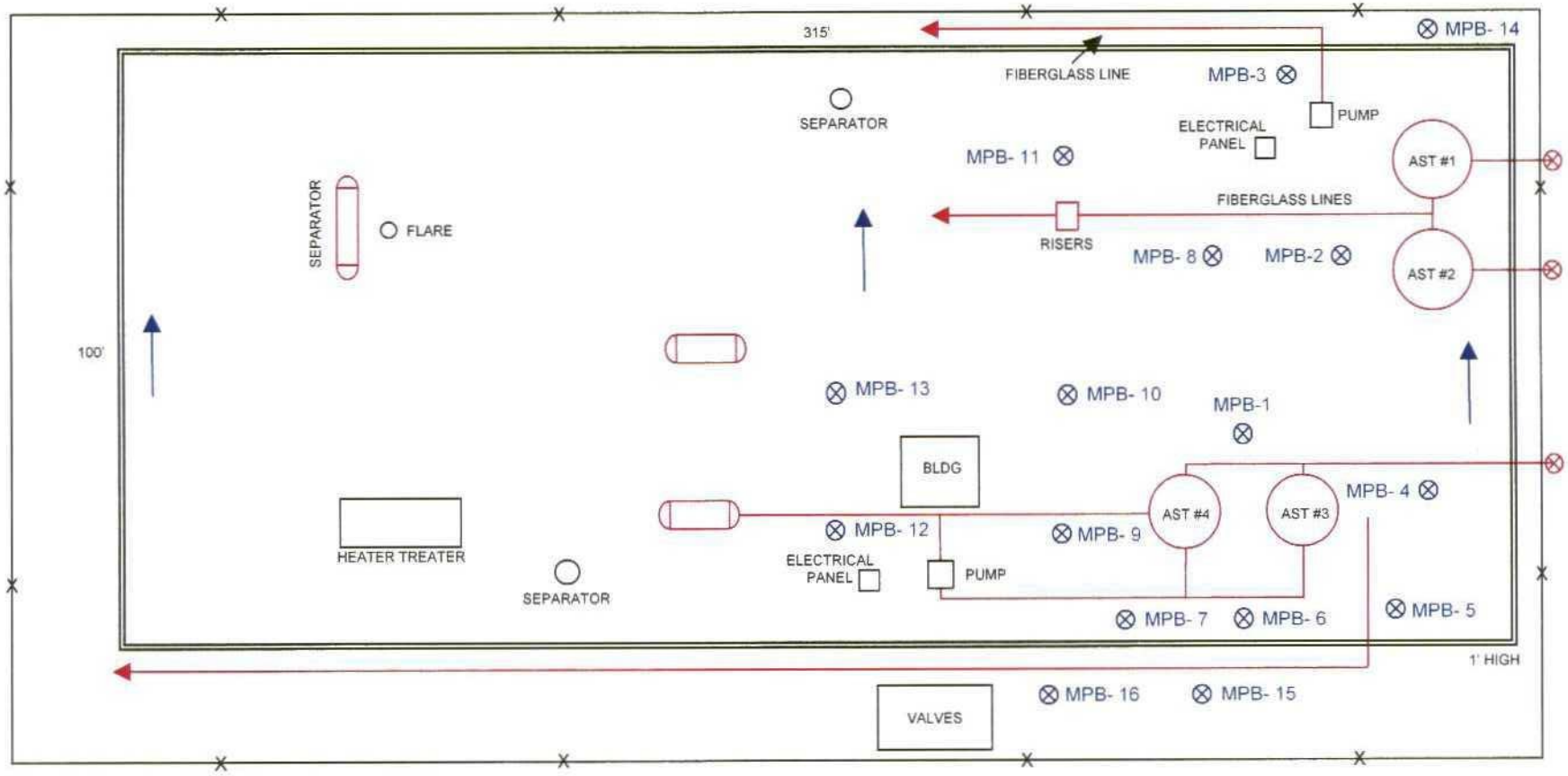
Chloride Test Results

Test Point	Results
A.	100ppm @ Surface
B.	100ppm @ Surface
C.	100ppm @ Surface
D.	300ppm @ Surface
E.	150ppm @ Surface

KANE

Environmental Engineering Inc.
Spring Texas

Figure 2
R.E. Environmental Services, Inc.
Sample Locations and Analyses Results



BERM DIMENSIONS REFLECT TOP OF BERM

TANK LEGEND	
SURFACE DRAINAGE	
FENCE	
SPCC-REGULATED STORAGE TANKS OR OIL CONTAINING EQUIPMENT	
EARTHEN BERM	
SOIL BORING	

TANK LEGEND	
AST #1 PRODUCED WATER TANK	504 BBL
AST #2 PRODUCED WATER TANK	504 BBL
AST #3 PRODUCED OIL TANK	500 BBL
AST #4 PRODUCED OIL TANK	500 BBL

N, NW, NE, W, KANE, E, SW, SE, S

KANE

Environmental Engineering Inc.
Spring, Texas

Figure 3

Mattie Price Battery Soil Boring Plot

Lea County, New Mexico

N 32° 52' 33" W 103° 10' 46.86"

DRAWN BY: TYH	PROJECT: 04-631
DATE: 8/29/2004	APPROVED BY: DCL
REVISED:12/30/2004	NOT TO SCALE

Table 1 Site Investigation Soil Boring Logs – December 2004

Boring Location	Depth Interval, ft	Soil Description
MPB-1	0-2.5'	Brown sandy loam with caliche, hydrocarbon odor
	2.5-7.5'	Grayish brown stiff, sticky silty clay with caliche, hydrocarbon odor
	7.5-15.0'	Tan hard to very hard friable caliche with decreasing hydrocarbon odor
MPB-2	0-2.5'	Brown sandy loam with caliche, hydrocarbon odor
	2.5-7.5'	Grayish brown stiff, sticky silty clay with caliche, hydrocarbon odor
	7.5-10.0'	Tan soft friable caliche, hydrocarbon odor, moist
	10.0-12.5'	Tan soft friable caliche, hydrocarbon odor, wet at 12.0'
	12.5-15.0'	Tan hard to very hard friable caliche, dry, decreasing hydrocarbon odor
MPB-3	0-2.5'	Black sandy loam with caliche, hydrocarbon odor
	2.5-5.0'	Black stiff, sticky silty clay with caliche, hydrocarbon odor
	5.0-10.0'	Gray to light gray hard to very hard friable caliche with decreasing hydrocarbon odor
	10.0-15.0'	Tan hard to very hard friable caliche
MPB-4	0-2.5'	Tan sandy loam with caliche, gray hydrocarbon staining 1.5-2.5'
	2.5-10.0'	Dark brown stiff, sticky silty clay with caliche, hydrocarbon staining 2.5-2.75', faint hydrocarbon odor
	10.0-15.0'	Tan hard to very hard friable caliche with white crystals
MPB-5	0-2.5'	Tan sandy loam with caliche, gray hydrocarbon staining 1.5-2.5'
	2.5-10.0'	Dark brown stiff, sticky silty clay with caliche, hydrocarbon staining 2.5-2.75', faint hydrocarbon odor
	10.0-15.0'	Tan hard to very hard friable caliche with white crystals
MPB-6	0-2.5'	Tan sandy loam with caliche, gray hydrocarbon staining 1.5-2.5'
	2.5-10.0'	Dark brown stiff, sticky silty clay with caliche, hydrocarbon staining 2.5-2.75', faint hydrocarbon odor
	10.0-15.0'	Tan hard to very hard friable caliche with white crystals
MPB-7	0-2.5'	Tan sandy loam with caliche, hydrocarbon odor
	2.5-5.0'	Black to dark gray stiff, sticky silty clay with caliche, hydrocarbon odor
	5.0-10.0'	Dark brown hard to very hard friable caliche, hydrocarbon odor
	10.0-15.0'	Tan hard to very hard friable caliche, decreasing hydrocarbon odor
	15.0-20.0'	Tan sandy loam with caliche, faint light end hydrocarbon odor

Table 1 Site Investigation Soil Boring Logs – December 2004, continued

Boring Location	Depth Interval, ft	Soil Description
MPB-8	0-2.5'	Tan sandy loam with caliche
	2.5-5.0'	Brown stiff silty clay with caliche
	5.0-10.0'	Tan hard to very hard friable caliche with decreasing hydrocarbon odor
	10.0-15.0'	Reddish tan hard to very hard friable caliche, saturated at 11', dry at 12.5'
MPB-9	0-2.5'	Black sandy loam with caliche, hydrocarbon staining 2.0-2.5'
	2.5-5.0'	Black stiff, sticky silty clay with caliche, hydrocarbon staining 2.5-3.5'
	5.0-15.0'	Tan hard to very hard friable caliche, hydrocarbon odor
	15.0-20.0'	Tan hard to very hard friable caliche with decreasing hydrocarbon odor
MPB-10	0-2.5'	Black sandy loam with caliche, hydrocarbon staining 2.0-2.5'
	2.5-5.0'	Black stiff, sticky silty clay with caliche, hydrocarbon saturated 3.0-4.0'
	5.0-10.0'	Tan hard to very hard friable caliche, hydrocarbon odor
	10.0-20.0'	Tan hard to very hard friable caliche with decreasing hydrocarbon odor
MPB-11	0-2.5'	Tan sandy loam with caliche, hydrocarbon odor
	2.5-5.0'	Brown stiff silty clay with caliche, faint hydrocarbon odor
	5.0-12.5'	Tan hard to very hard friable caliche
MPB-12	0-2.5'	Tan sandy loam with caliche, dark brown hydrocarbon staining from 1.5-2.5'
	2.5-5.0'	Brown stiff, stick silty clay with caliche, hydrocarbon odor
	5.0-10.0'	Tan hard to very hard friable caliche with light end hydrocarbon odor
	10.0-15.0'	Tan hard to very hard friable caliche with light end hydrocarbon odor
MPB-13	0-2.5'	Reddish brown sandy loam with caliche, dark gray hydrocarbon staining from 1.5-2.5'
	2.5-5.0'	Gray stiff, stick silty clay with caliche, hydrocarbon odor
	5.0-15.0'	Tan hard to very hard friable caliche with faint, decreasing light end hydrocarbon odor
MPB-14	0-2.5'	Tan sandy loam with caliche
	2.5-5.0'	Brown stiff silty clay with caliche
	5.0-12.5'	Light gray hard to very hard friable caliche

Table 1 Site Investigation Soil Boring Logs – December 2004, continued

Boring Location	Depth Interval, ft	Soil Description
MPB-15	0-2.5'	Dark brown sandy loam with caliche
	2.5-10.0'	Brown stiff silty clay with caliche
	10.0-15.0'	Tan to reddish brown hard to very hard friable caliche
MPB-16	0-2.5'	Dark brown sandy loam with caliche
	2.5-5.0'	Brown stiff silty clay with caliche
	5.0-15.0'	Tan to reddish brown hard to very hard friable caliche

Table 5 Field Headspace Analysis by PID.

Boring Location	Sample Depth Interval, ft	Field Headspace Reading, ppm	Boring Location	Sample Depth Interval, ft	Field Headspace Reading, ppm
MPB-1	0-2.5'	60	MPB-8	0-2.5'	0.0
MPB-1	2.5-5.0'	160	MPB-8	2.5-5.0'	1.0
MPB-1	5.0-7.5'	172	MPB-8	5.0-7.5'	1.1
MPB-1	7.5-10.0'	142	MPB-8	7.5-10.0'	37.5
MPB-1	10.0-12.5'	88	MPB-8	10.0-12.5'	2.3
MPB-1	12.5-15.0'	28	MPB-8	12.5-15.0'	1.0
MPB-2	0-2.5'	2.1	MPB-9	0-2.5'	98
MPB-2	2.5-5.0'	1.1	MPB-9	2.5-5.0'	102
MPB-2	5.0-7.5'	0.0	MPB-9	5.0-7.5'	179
MPB-2	7.5-10.0'	0.0	MPB-9	7.5-10.0'	289
MPB-2	10.0-12.5'	0.0	MPB-9	10.0-12.5'	255
MPB-2	12.5-15.0'	0.0	MPB-9	12.5-15.0'	232
MPB-3	0-2.5'	57	MPB-9	15.0-17.5'	1.8
MPB-3	2.5-5.0'	38	MPB-9	17.5-20.0'	1.1
MPB-3	5.0-7.5'	8.0	MPB-10	0-2.5'	289
MPB-3	7.5-10.0'	2.2	MPB-10	2.5-5.0'	435
MPB-3	10.0-12.5'	4.5	MPB-10	5.0-7.5'	547
MPB-3	12.5-15.0'	1.1	MPB-10	7.5-10.0'	408
MPB-4	0-2.5'	1.8	MPB-10	10.0-12.5'	400
MPB-4	2.5-5.0'	1.1	MPB-10	12.5-15.0'	289
MPB-4	5.0-7.5'	0.0	MPB-10	15.0-17.5'	214
MPB-4	7.5-10.0'	1.1	MPB-10	17.5-20.0'	87.0
MPB-4	10.0-12.5'	1.3	MPB-11	0-2.5'	8.0
MPB-4	12.5-15.0'	2.0	MPB-11	2.5-5.0'	3.4
MPB-5	0-2.5'	55.2	MPB-11	5.0-7.5'	12.4
MPB-5	2.5-5.0'	92.5	MPB-11	7.5-10.0'	2.2
MPB-5	5.0-7.5'	96.7	MPB-11	10.0-12.5'	1.0
MPB-5	7.5-10.0'	227	MPB-12	0-2.5'	22
MPB-5	10.0-12.5'	23.0	MPB-12	2.5-5.0'	35
MPB-5	12.5-15.0'	15.2	MPB-12	5.0-7.5'	85
MPB-6	0-2.5'	1.1	MPB-12	7.5-10.0'	78
MPB-6	2.5-5.0'	1.0	MPB-12	10.0-12.5'	81
MPB-6	5.0-7.5'	28.6	MPB-12	12.5-15.0'	76
MPB-6	7.5-10.0'	2.4	MPB-13	0-2.5'	50

Table 5 Field Headspace Analysis by PID.

Boring Location	Sample Depth Interval, ft	Field Headspace Reading, ppm	Boring Location	Sample Depth Interval, ft	Field Headspace Reading, ppm
MPB-6	10.0-12.5'	1.0	MPB-13	2.5-5.0'	5.7
MPB-6	12.5-15.0'	0.0	MPB-13	5.0-7.5'	2.5
MPB-7	0-2.5'	89	MPB-13	7.5-10.0'	1.5
MPB-7	2.5-5.0'	70	MPB-13	10.0-12.5'	0.0
MPB-7	5.0-7.5'	225	MPB-13	12.5-15.0'	0.0
MPB-7	7.5-10.0'	327	MPB-14	0-2.5'	1.2
MPB-7	10.0-12.5'	105	MPB-14	2.5-5.0'	0.0
MPB-7	12.5-15.0'	57	MPB-14	5.0-7.5'	0.0
MPB-7	15.0-17.5'	1.1	MPB-14	7.5-10.0'	0.0
MPB-7	17.5-20.0'	1.1	MPB-14	10.0-12.5'	0.0
MPB-15	0-2.5'	0.0	MPB-16	0-2.5'	0.0
MPB-15	2.5-5.0'	0.0	MPB-16	2.5-5.0'	0.0
MPB-15	5.0-7.5'	0.0	MPB-16	5.0-7.5'	0.0
MPB-15	7.5-10.0'	0.0	MPB-16	7.5-10.0'	0.0
MPB-15	10.0-12.5'	0.0	MPB-16	10.0-12.5'	0.0
MPB-15	12.5-15.0'	0.0	MPB-16	12.5-15.0'	0.0

Table 6 Total Petroleum Hydrocarbon and Benzene, Toluene, Ethylbenzene, and Xylenes Analyses for Soil Samples.

Sample ID	Benzene	Toluene	Ethylbenzene	Xylenes	Total BTEX	TPH GRO	TPH-DRO	Total Hydrocarbon
				Mg/kg				
MPB-1 5.0-7.5'	0.1750	1.4200	0.4570	2.1510	4.2030	527	828	1360
MPB-1 12.5-15.0'	<0.025	0.1060	0.1540	1.1770	1.4370	311	812	1120
MPB-2 0.0-2.5'	<0.025	0.0248	0.0169	0.0661	0.1078	13.6	26.5	40.1
MPB-2 12.5-15.0'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
MPB-3 0.0-2.5'	<0.025	0.0111	0.0268	0.1214	0.1593	260	4360	4620
MPB-3 12.5-15.0'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	12.5	12.5
MPB-4 0.0-2.5'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
MPB-4 12.5-15.0'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
MPB-5 7.5-10.0'	0.1540	1.4100	0.3880	2.2850	4.2370	1090	1650	2740
MPB-5 12.5-15.0'	<0.025	0.0160	0.0203	0.0325	0.0688	15.5	22	37.5
MPB-6 5.0-7.5'	<0.025	0.0287	0.0542	0.3487	0.4316	29.4	65.6	95
MPB-6 12.5-15.0'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
MPB-7 7.5-10.0	0.0169	0.9660	0.3750	2.7280	4.0859	863	1530	2390
MPB-7 17.5-20.0'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
MPB-8 7.5-10.0'	<0.025	<0.025	0.0455	0.4280	0.4735	52.7	218	271
MPB-8 12.5-15.0'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
OCD Regulatory Thresholds	**10**	**--**	**--**	**--**	**50**	**1,000**	**1,000**	**1,000**

Table 6 Total Petroleum Hydrocarbon and Benzene, Toluene, Ethylbenzene, and Xylenes Analyses for Soil Samples.

Sample ID	Benzene	Toluene	Ethylbenzene	Xylenes	Total BTEX	TPH GRO	TPH-DRO	Total Hydrocarbon
				Mg/kg				
MPB-9 2.5-5.0'	0.0215	0.2160	0.2460	2.0920	2.5755	114	293	407
MPB-9 7.5-10.0'	0.0946	1.2200	0.9360	12.7600	15.0106	701	1180	1880
MPB-9 17.5-20.0	0.0361	0.5520	0.2210	1.6180	2.4271	727	1700	2430
MPB-10 2.5-5.0	0.2500	1.0300	0.6640	6.7590	8.7030	211	448	659
MPB-10 17.5-20.0	0.1320	1.0800	0.4270	2.5540	4.1930	771	1480	2250
MPB-11 0.0-2.5	<0.025	0.0386	0.0581	0.3838	0.4805	<10	<10	<10
MPB-11 10.0-12.5	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
MPB-12 0.0-2.5	<0.025	0.0247	0.0429	0.0929	0.1605	14.9	<10	14.9
MPB-12 5.0-7.5'	0.0201	0.5460	0.2300	2.2060	3.0021	711	1430	2140
MPB-12 12.5-15.0'	<0.025	0.0973	0.0626	1.0270	1.1869	141	408	549
MPB-13 0.0-2.5	<0.025	0.0615	0.1000	0.5690	0.7305	34	347	381
MPB-13 12.5-15.0'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	30	30
MPB-14 0.0-2.5'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
MPB-14 10.0-12.5'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
MPB-15 0.0-2.5'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
MPB-15 12.5-15.0'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
MPB-16 0.0-2.5'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
MPB-16 12.5-15.0'	<0.025	<0.025	<0.025	<0.025	<0.025	<10	<10	<10
OCD Regulatory Thresholds	**10**	--	--	--	**50**	**1,000**	**1,000**	**1,000**