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REPORTS

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SUBSURFACE ENVIRONMENTAL ASSESSMENT REPORT
G. L. ERWIN FEDERAL NCT-2 "A & B" TANK BATTERY
LEA COUNTY, NEW MEXICO

Prepared for:

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Subsurface Environmental Assessment Report

G. L. Erwin Federal NCT-2 "A & B" Tank Battery

Lea County, New Mexico

1.0 INTRODUCTION

Highlander Environmental Corp. (Highlander) has been requested by Texaco Exploration and Production, Inc. (Texaco) to perform a subsurface environmental assessment of the former G. L. Erwin Federal NCT-2 "A & B" Tank Battery (Site), located approximately three (3) miles northeast of Jal, New Mexico. The Site is situated in the southwest quarter (SW/4), SE/4, Section 35, Township 24 South, Range 37 East, Lea County, New Mexico. Figure 1 presents a Site location and topographic map. Figure 2 presents a Site map.

1.1 Background

The Site is an oil field tank battery and includes several aboveground storage tanks, associated piping and equipment. An unlined earthen emergency produced water overflow pit (Pit) was previously located adjacent to the west side of the tank battery, and was closed in July 1994. The Pit measured approximately 45' x 45' x 3.5'.

1.2 Previous Investigations

1.2.1 Environmental Spill Control, Inc. Investigations

Prior to closure of the Pit, Environmental Spill Control, Inc. (ESCI), Hobbs, New Mexico, was contracted by Texaco to conduct an initial subsurface investigation. The initial investigation consisted of drilling sixteen (16) rotary drilled boreholes for collection of soil samples for laboratory tests. The boreholes were drilled to depths from 30 to 100 feet below ground level (BGL), and soil samples were collected every ten (10) feet for total petroleum hydrocarbons (TPH) analysis. The highest TPH concentrations were reported in shallow soil samples from borehole # 2, located southeast of the Pit, which measured 111,700 parts per

million (ppm), and borehole # 4, located near the center of the Pit, which measured 149,600 ppm. A soil sample (10 feet BGL) from borehole # 16, located approximately 40 feet northwest of the Pit, reported TPH at 97 ppm.

Borehole # 1, located southeast of the Pit, was drilled to 100 feet BGL and completed as a temporary monitoring well. A groundwater sample from this well reported chloride at 6,100 ppm. This well was later removed due to interference with excavation of the Pit. A report summarizing the initial investigation results was prepared by Environmental Spill Control, Inc. and submitted to Texaco on October 1, 1993. Appendix A presents a copy of the report.

Following the initial subsurface investigation, Environmental Spill Control, Inc. was contracted to oversee closure of the Pit. Closure activities commenced on July 21, 1994. Initially, 492 cubic yards of hydrocarbon impacted soil was removed from the Pit and transferred to Controlled Recovery, Inc.(CRI), Hobbs, New Mexico for disposal. The Pit was excavated to a depth approximately 62.5 feet BGL, and composite soil samples were collected from the base of the excavation. These samples reported TPH below 50 ppm. The soil samples were also tested for benzene, toluene, ethylbenzene, and xylene (collectively referred to as BTEX), which were also below the test method detection limits.

Beginning September 15, 1994, the excavation was backfilled to a depth of approximately 55 feet BGL, with a mixture of clean sand and clay. The sand and clay mixture was placed in the excavation as a " buffer zone ". The soil removed from the excavation, approximately 40,000 cubic yards, was blended with clean soil and placed in five (5) foot lifts over the sand and clay mixed soils, and compacted. A composite soil sample was collected every five (5) feet and analyzed for TPH. At every ten (10) foot lift, the composite soil sample was also tested for BTEX , beginning at a depth of fifty (50) feet BGL. The highest TPH concentration measured in the composite soil samples was 890 ppm. The BTEX measurements were below the test method detection limits. On October 28, 1994, Environmental Spill Control, Inc. prepared a report titled, "Final Closure Report for the G. L. Erwin "B" NCT 2, Tank Battery Emergency Overflow Pit". Appendix A presents a copy of the report.

At the request of Texaco, Environmental Spill Control, Inc. prepared a work plan to address the elevated chloride reported in groundwater at the Site. The work plan (Plan) titled, " Hydrogeologic Investigation for the G. L. Erwin "B" NCT 2, Tank Battery ", was submitted to the OCD on February 14, 1995. The Plan was conditionally approved by the OCD on March 28, 1995, and a due date of June 30, 1995 was imposed by the OCD for submittal of a final report. On July 10, 1997, the OCD issued a letter to Texaco indicating that it had not received a final report, and required Texaco to submit a report by August 15, 1997. Appendix A presents a copy of the February 14, 1995 document.

Two (2) monitoring wells (West well and Southwest well) were installed by Environmental Spill Control, Inc., however, no records are available for these wells. Field measurements indicate that the wells are completed at depths of 67.99 feet BGL (West well) and 67.41 feet BGL (Southwest well).

1.2.2 Highlander Environmental Corp. Investigations

At the request of Texaco, Highlander personnel collected groundwater samples from the West and Southwest monitor wells on August 22, 1997. The groundwater samples were analyzed for chloride and reported concentrations of 250 mg/L (West Well) and 3,300 mg/L (Southwest Well). On September 8, 1997, an additional sample was collected from the West well, which reported a chloride concentration of 280 mg/L.

At Texaco's request, Highlander prepared a work plan titled, "Preliminary Investigation Findings and Addendum Work Plan for Emergency Produced Water Overflow Pit (Closed), Texaco Exploration and Production, Inc., G. L. Erwin A & B Federal NCT-2 Tank Battery, SW/4, SE/4, Section 35, Township 24 South, Range 37 East, Lea County, New Mexico", dated October 10, 1997. The Work Plan was prepared to characterize the extent of chloride impact to groundwater, and incorporated the February 14, 1995 work plan prepared by Environmental Spill Control, Inc., as well as conducting further investigations.

1.3 Regulatory Correspondence

On December 15, 1997, the OCD approved the Work Plan submitted on October 10, 1997, and imposed a due date of March 1, 1998 for submittal of report. An extension for submittal of the report was granted verbally by the OCD on March 10, 1998. The extension was necessary due to the drilling contractor's schedule and receiving sample data from the analytical laboratory. Appendix B presents copies of correspondence with the OCD.

2.0 SITE SETTING

2.1 Topography

Figure 3 presents a Site- specific topographic map. Referring to Figure 3, the topography of the Site slopes gently from northwest to southeast. Based on a topographic survey of the Site, the ground elevation ranges from 3,163.90 feet above mean sea level (AMSL) near the northwest corner of the Site to 3,156.80 feet AMSL near the southeast corner of the Site. Storm water runoff generally follows the topography and flows to the southeast. Storm water discharges to Monument Draw, located approximately 1.7 miles southeast of the Site.

2.2 Soils

The Site is underlain by soils of the Simona-Upton association (0 to 3 percent slopes). The Simona-Upton association consists of approximately 50 % Simona gravelly fine sandy loam, 25 % Upton gravely loam and small areas of Stegall, Slaughter and Kimbrough soils. Soils of the Simona-Upton association occur on ridges, slopes, fans, and are used for range, wildlife habitat and recreational areas.

The Simona gravely fine sandy loam (0 to 3 percent slopes) soil is comprised of a surface layer, approximately 0 to 8 inches thick, of grayish-brown fine sandy loam. The surface layer is soft and very friable when moist, and contains angular fragments of hard caliche. The surface layer is underlain by a subsoil, approximately 8 inches thick, consisting of pale-brown fine sandy

loam, which is underlain by white, platy and indurated caliche.

The Upton series soil consists of a surface layer and subsoil comprised of grayish-brown gravely loam, approximately 8 inches thick. The subsoil is underlain by white indurated caliche.

2.3 Geology

The Site is located within the Central Basin Platform of the Permian Basin. Sediments of the Pliocene-age Ogallala Formation underlie the Site. The Site is located near the southern limits of the Ogallala Formation outcrop area. The Ogallala Formation consists of semiconsolidated deposits of reddish-brown fine-grained calcareous sand and minor deposits of clay, silt and gravel (Nicholson and Clebsch, 1961). Locally, the Ogallala Formation also contains thin beds of red to dark red, very hard to crystalline sandstone. A dense layer of caliche, commonly referred to as "caprock" caps the Ogallala Formation. Based on Site-specific data, the Ogallala Formation ranges in thickness from about 65 to 84 feet.

The Ogallala Formation is underlain by the Triassic-age Chinle Formation. The Chinle Formation consists of red and green mudstone, minor fine-grained sandstone and siltstone. The Chinle Formation has a maximum thickness of about 1,270 feet. Figure 4 presents a northwest to southeast geological cross section (A – A'). Figure 5 presents a southwest to northeast geological cross section (B – B'). The lines of geological cross section are located on Figure 2.

2.4 Groundwater

Based on published data (Nicholson and Clebsch, 1961 and Nativ, 1988), the Site is situated near the southwest depositional limit of the Ogallala Formation. Groundwater occurs under unconfined conditions in sand and gravely sand of the Ogallala Formation (commonly referred to as the Ogallala aquifer). On February 17, 1998, the depth-to-groundwater at the Site ranged from 57.92 feet below ground level (BGL) to 61.22 feet BGL. Figure 6 presents a depth-to-groundwater map for the Site on February 17, 1998. On February 17, 1998, the elevation of the groundwater potentiometric surface ranged from 3,101.88 feet above mean sea level (AMSL)

to 3,098.50 feet AMSL. Groundwater flow was from northwest to southeast at a gradient of approximately 0.006 feet per foot. The groundwater flow direction at the Site corresponds to the regional groundwater flow direction reported in the published literature. Figure 7 presents a groundwater potentiometric surface map for February 17, 1998. The saturated thickness of the Ogallala Formation ranged from 4.67 feet at well MW-4 (west) to 25.15 feet at well MW-1 (east). The saturated thickness of the Ogallala Formation at the Site corresponds well to the published data and to records from wells drilled in the area. Figure 8 presents a saturated thickness map for the Ogallala aquifer on February 17, 1998.

Recharge to the Ogallala aquifer occurs through infiltration of precipitation. Discharge occurs principally through pumping from wells.

3.0 SUBSURFACE ASSESSMENT ACTIVITIES

3.1 Electromagnetic (EM-34) Terrain Conductivity Survey

An electromagnetic (EM-34) terrain conductivity survey was conducted at the Site to evaluate potential impacts to soil and groundwater from the former Pit. The EM technique measures terrain conductivity by imparting an alternating electrical current to the instrument transmitter coil, which is positioned near the earth's surface. A magnetic field, produced as the current passes through the transmitter coil, induces small electrical currents into the subsurface soil. The electrical currents produce a secondary magnetic field, which is sensed, with the primary magnetic field by a receiver coil. The terrain conductivity, which is linearly proportional to the ratio of the secondary magnetic field to the primary magnetic field, is displayed in analog form representing millimhos per meter (mmhos/m). The EM-34 instrument detects changes in ground conductivity, and was selected for use at the Site since produced (brine) water was discharged to the Pit and elevated chloride was present in groundwater at the Southwest monitoring well. The instrument's depth of exploration is dependent on the spacing between the transmitter coil and receiver coil (intercoil spacing), which is measured in meters, and the orientation of the transmitter and receiver coils (horizontal or vertical). The depth of exploration for the EM-34 ranges from 24.6 to 196.8 feet BGL.

The EM-34 survey was conducted at the Site using a 20-meter intercoil separation. The EM-34 instrument was operated in the horizontal and vertical mode, which yielded exploration depths from 0 to 49.2 feet (horizontal) and 0 to 98.4 feet (vertical). Prior to conducting the EM-34 survey a network of grids measuring approximately 50 x 50 feet was established at the Site to allow accurate collection and plotting data. The grid area measured approximately 400 feet (south to north) by 550 feet (west to east). A base (background) line consisting of five (5) measurement stations was established northwest of the Site for comparison of Site measurements. Numerous aboveground steel flow lines and overhead power lines were identified at the Site. Highlander personnel were able to conduct the EM-34 survey and limit interference associated with these utilities. Figure 2 presents a Site drawing showing the location of the EM-34 measurement stations, aboveground and overhead power lines.

At each station, EM-34 measurements were collected in the horizontal and vertical mode. The measurements were recorded on field forms and later transferred to drawings, which were contoured to show areas of elevated conductivity, with respect to background levels. Figure 9 presents an EM-34 conductivity map for the 20-meter horizontal dipole (HD) survey. Figure 10 presents an EM-34 conductivity map for the 20-meter vertical dipole (VD) survey.

Referring to Figure 9, the EM-34 20 meter HD survey recorded measurements at background stations A through E that ranged from 14 to 19 mmhos/m. The EM-34 measurements from the survey area detected a broad area of slightly elevated conductivity (i.e., greater than 20 mmhos/m). The area of slightly elevated readings trends from northwest to southeast and corresponds with the regional and local groundwater flow direction. The slightly elevated readings do not suggest that an environmental impact has occurred. However, the survey did record an area of elevated EM-34 readings within this area, which were greater than twice background. The area of elevated readings is situated in the vicinity of the Southwest monitoring well, and recorded a maximum EM-34 reading of 44 mmhos/m at station N250/E200. Two areas of slightly elevated EM-34 readings were also recorded at measurement stations N250/E350 (34 mmhos/m) and N50/E400 (32 mmhos/m). These anomalies suggest that an impact to unsaturated zone soils may have occurred. The remaining measurements were generally consistent with background.

Referring to Figure 10, the EM-34 20 meter VD survey recorded measurements at background stations A through C that ranged from 28 to 35 mmhos/m. At background stations D and E, the EM-34 instrument detected metallic interference, likely due to a subsurface flowline(s). The EM-34 measurements from the survey area also detected a broad area of elevated conductivity trending from northwest to southeast. Within this area, the survey recorded an area of EM-34 readings that were greater than eight (8) times background. The area of elevated readings is situated southeast (down gradient) of the Southwest monitoring well, and area of elevated conductivity recorded in the 20 meter HD mode. A maximum EM-34 measurement of 300 mmhos/m was recorded at station N100/E350. This anomaly trends to the south-southeast and corresponds with the direction of groundwater flow. This area is characterized by soils void of vegetation and stained from petroleum, indicating that a spill may have occurred. The area also appeared to be undergoing remediation, as suggested by recent tilling of the soil. The elevated readings EM-34 readings suggest that an impact to unsaturated zone soils and groundwater has occurred in this area. The remaining measurements were generally consistent with background. Appendix C presents the EM-34 field sheets.

3.2 Rotary Drilled Borings and Monitoring Well Installations

From February 2-3, 1998, Highlander personnel supervised installation of five (5) air rotary drilled borings (BH-1 through BH-5). Scarborough Drilling, Inc., Lamesa, Texas drilled the borings, using a truck-mounted drilling rig. The borings were situated based on the results of the EM-34 survey. Boring BH-1 was located southeast (down gradient) of the tank battery and northeast of the area of elevated EM-34 readings. Borings BH-2 through BH-3 were located down gradient (south and southwest) of the area of elevated conductivity. Boring BH-4 was located west of the Southwest monitoring well to define the extent of elevated chloride in groundwater, and boring BH-5 was placed in the vicinity of the highest EM-34 reading recorded at the Site. Figure 2 presents the locations of borings BH-1 through BH-5. The borings were drilled to depths ranging from 70.41 feet BGL (BH-5) to 87.05 feet BGL (BH-1). Table 1 presents a summary of soil boring drilling details.

During drilling, samples of cuttings were examined every five-(5) feet, and lithologic logs were prepared for each boring. Appendix D presents lithologic logs for borings BH-1 through BH-5. The drilling rig, rods and bit were thoroughly washed between borings using high-pressure hot water.

Following drilling at each location, the boring was completed as a groundwater monitoring well. The monitoring wells were completed using two (2) inch diameter schedule 40 PVC threaded casing and factory slotted screen. The well screen, approximately twenty (20) feet in length, was installed in the borings with approximately five (5) feet of screen above the water level observed during drilling. At location BH-1, the well screen was extended to thirty (30) feet, due to the thickness of the saturated portion of the Ogallala aquifer. A filter pack consisting of 8-16 graded silica sand was placed around the well screens to depths approximately 2 to 3 feet above the screen. A layer of bentonite pellets, approximately 3 to 4 feet thick, was placed over the sand and hydrated with water. The remainder of the annulus was filled with Portland cement and bentonite grout to a depth about 1-foot BGL. The wells were secured with locking steel protectors, which were anchored in a concrete pad measuring approximately 3 feet by 3 feet. Table 1 presents a summary of the monitoring well completion details. Appendix E presents construction drawings for the monitoring wells.

On February 4, 1998, Scarborough Drilling, Inc., using the drilling rig and a retrievable bailer, developed the monitoring wells. Water removed from the wells was containerized in 55-gallon drums, and later disposed by Chaparral Services, Inc., Eunice, New Mexico, at an OCD approved disposal well. The bailer and drilling rig were thoroughly decontaminated between wells using high-pressure hot water.

Piper Surveying, Inc., Gardendale, Texas, a New Mexico licensed professional land surveyor, surveyed the monitor wells for elevation on February 4, 1998.

3.3 Soil Samples

Per the Work Plan, two (2) soil samples were collected for geotechnical parameters (porosity, bulk density, hydraulic conductivity) and percent (%) organic carbon. The soil samples were selected from the upper ten (10) feet of the soil profile at boring BH-5, and were analyzed by Maxim Technologies, Inc., Dallas, Texas, using appropriate ASTM standards. Sample number 02-066-01A (0.0 to 2.0 feet BGL) was classified as silty sand clay. Sample number 02-066-02A (5.0 to 10.0 feet BGL) was classified as a silty sand, with some gravel and traces of clay. The samples were collected using a split-spoon sampler. Table 2 presents a summary of the laboratory results. Appendix F presents the laboratory report.

Referring to Table 2, the bulk density of the samples was consistent and ranged from 126.1 to 135.8 pounds per cubic foot (sample number 02-066-01A) and 125.4 to 134.5 pcf for sample number 02-066-02A. The porosity of the samples were 32.1 percent (%) for sample 02-066-01A, and 31.0 % for sample 02-066-02A. The hydraulic conductivity of the samples ranged from 1.63 x 10^{-5} centimeters per second (cm/sec) for sample number 02-066-02A to 6.74 x 10^{-7} cm/sec for sample number 02-066-01A. No data was available for organic carbon percentage at the time of report preparation.

3.4 Groundwater Samples

Groundwater samples were collected from monitoring wells MW-1 through MW-5 and the West and Southwest wells on February 17, 1998. The samples were submitted to ERMI Environmental Laboratories, Inc., Allen, Texas, and analyzed for BTEX, New Mexico Water Quality Control Commission (WQCC) metals and general chemistry parameters. The samples for metals analysis were filtered in the field at the time of sample collection and represent dissolved analysis. Prior to sample collection, the wells were purged of groundwater using dedicated disposable polyethylene bailers. Water purged from the wells was placed in 55-gallon drums and disposed by Chaparral Services, Inc., Eunice, New Mexico, at an OCD approved disposal well. The samples were placed in laboratory precleaned and preserved containers, and submitted under chain-of-custody

control to ERMI. Table 3 presents a summary of the BTEX analysis. Table 4 presents a summary of the dissolved metals analysis. Table 5 presents a summary of the general chemistry analysis. Appendix G presents the laboratory report.

Referring to Table 3, BTEX was not detected above the test method detection limit concentrations in the groundwater samples. Referring to Table 4, barium, calcium, copper, magnesium, manganese, potassium, sodium and zinc were the only dissolved metal reported in the groundwater samples. The WQCC has established standards for all of these parameters except, calcium, magnesium, potassium and sodium. Based on the laboratory results, the levels of barium, copper, manganese and zinc detected in the groundwater samples are well below the WQCC standards. Referring to Table 5, chloride, sulfate, bicarbonate, hardness and total dissolved solids (TDS) were the only general inorganic chemistry parameters detected in the groundwater samples. The WQCC has established standards for all parameters except, bicarbonate and hardness. The chloride levels reported in the groundwater samples ranged in concentration from 233 mg/L (MW-1) to 2,170 mg/L (MW-5). The WQCC standard for chloride, 250 mg/L, was exceeded in groundwater from all wells, except MW-1 and the West well. Figure 11 presents a drawing showing the distribution of chloride in groundwater. Referring to Figure 11, the highest chloride concentration was reported in groundwater from the Southwest well. The chloride levels decrease in concentration in the down gradient direction from this area to 423 mg/L and 983 mg/L, at wells MW-2 and MW-3, respectively. The distribution of chloride in groundwater at the Site appears to correspond with the results of the EM-34 survey. However, a comparison of the laboratory analysis for chloride in groundwater from well MW-5 (408 mg/L), and the conductivity levels observed with the EM-34 suggest that the impact in this area may be confined to the unsaturated zone. Interference from aboveground piping in the vicinity of the Southwest well does not allow for a comparison of the laboratory test results to the EM-34 results. The TDS analyses correlates well with the chloride results, and reported levels ranging from 812 mg/L (MW-1) to 4,719 mg/L (MW-5). The WQCC standard for TDS, 1,000 mg/L, was exceeded in groundwater samples from all wells, except MW-1 and the West well. Sulfate was reported in the groundwater samples from 92 mg/L (MW-1) to 255 mg/L (Southwest well), and were below the WQCC standard of 600 mg/L.

3.5 Water Well Survey

Highlander personnel conducted a survey of water wells within 1-mile of the Site. The survey was conducted through a review of records available from the New Mexico State Engineer's files. The records review did not identify any wells within 1-mile of the Site. Highlander personnel also conducted field reconnaissance and did not identify any wells within 1-mile of the Site.

4.0 CONCLUSIONS

1. The depth-to-groundwater at the Site on February 17, 1998, ranged from 57.92 feet BGL at well MW-1, to 61.22 feet BGL at well MW-4. The elevation of the groundwater potentiometric surface ranged from 3,101.88 feet AMSL at the West well (up gradient), to 3,098.50 feet AMSL at well MW-2 (down gradient). Groundwater flow was from northwest to southeast at a gradient of approximately 0.006 feet per foot. The groundwater flow direction at the Site corresponds to the regional groundwater flow direction reported in the published literature.
2. The saturated thickness of the Ogallala aquifer ranged from 4.67 feet at well MW-4 (west) to 25.15 feet at well MW-1 (east). The saturated thickness of the Ogallala aquifer at the Site corresponds well to the published data and to records from wells drilled in the area.
3. The EM-34 20 meter HD survey recorded measurements at background stations A through E that ranged from 14 to 19 mmhos/m. The EM-34 measurements from the survey area detected a broad area of slightly elevated conductivity (i.e., greater than 20 mmhos/m). The area of slightly elevated readings trends from northwest to southeast and corresponds with the regional and local groundwater flow direction. The slightly elevated readings do not suggest that an environmental impact has occurred. However, the survey did record an area of elevated EM-34 readings within this area, which were greater than twice background. The area of elevated readings is situated in the vicinity of the Southwest monitoring well, and recorded a maximum

EM-34 reading of 44 mmhos/m at station N250/E200. Two areas of slightly elevated EM-34 readings were also recorded at measurement stations N250/E350 (34 mmhos/m) and N50/E400 (32 mmhos/m). These anomalies suggest that an impact to unsaturated zone soils may have occurred. The remaining measurements were generally consistent with background.

4. The EM-34 20 meter VD survey recorded measurements at background stations A through C that ranged from 28 to 35 mmhos/m. At background stations D and E, the EM-34 instrument detected metallic interference, likely due to a subsurface pipeline(s). The EM-34 measurements from the survey area also detected a broad area of elevated conductivity trending from northwest to southeast. Within this area, the survey recorded an area of EM-34 readings that were greater than eight (8) times background. The area of elevated readings is situated southeast (down gradient) of the Southwest monitoring well, and area of elevated conductivity recorded in the 20 meter HD mode. A maximum EM-34 measurement of 300 mmhos/m was recorded at station N100/E350. This anomaly trends to the south-southeast and corresponds with the direction of groundwater flow. This area is characterized by soils void of vegetation and stained from petroleum, indicating that a spill may have occurred. The area also appeared to be undergoing remediation, as suggested by recent tilling of the soil. The elevated readings EM-34 readings suggest that an impact to unsaturated zone soils and groundwater has occurred in this area. The remaining measurements were generally consistent with background.

5. Soil samples collected from borehole BH-5 were analyzed by appropriate ASTM standards, and were classified as silty sand clay (sample number 02-066-01A) and silty sand, with some gravel and traces of clay (sample number 02-066-02A). The bulk density of the samples was consistent and ranged from 126.1 to 135.8 pcf (sample number 02-066-01A) and 125.4 to 134.5 pcf (sample number 02-066-02A). The porosity of the samples were 32.1 % (sample number 02-066-01A) and 31.0 % (sample number 02-066-02A). The hydraulic conductivity of the samples ranged

from 1.63 x 10^{-5} cm/sec (sample number 02-066-02A) to 6.74 x 10^{-7} cm/sec (sample number 02-066-01A). No data was available organic carbon percent at the time of report preparation.

6. Groundwater samples were tested for BTEX and were not detected above the test method detection limit concentrations in the groundwater samples.

7. Barium, calcium, copper, magnesium, manganese, potassium, sodium and zinc were the only dissolved metals reported in the groundwater samples. The WQCC has established standards all of these parameters except, calcium, magnesium, potassium and sodium. Based on the laboratory results, the levels of barium, copper, manganese and zinc detected in the groundwater samples are well below the WQCC standards.

8. Chloride, sulfate, bicarbonate, hardness and TDS were the only general inorganic chemistry parameters detected in the groundwater samples. The WQCC has established standards for all parameters except, bicarbonate and hardness. The chloride levels reported in the groundwater samples ranged in concentration from 233 mg/L (MW-1) to 2,170 mg/L (MW-5). The WQCC standard for chloride, 250 mg/L, was exceeded in groundwater from all wells, except MW-1 and the West well.

9. The TDS analyses correlates well with the chloride results, and reported levels ranging from 812 mg/L (MW-1) to 4,719 mg/L (MW-5). The WQCC standard for TDS, 1,000 mg/L, was exceeded in groundwater samples from all wells, except MW-1 and the West well.

10. Sulfate was reported in the groundwater samples from 92 mg/L (MW-1) to 255 mg/L (Southwest well), and were below the WQCC standard of 600 mg/L.

11. A review of water well records available from the New Mexico State Engineer's files

did not identify any wells within 1-mile of the Site. A field reconnaissance survey conducted by Highlander personnel also did not identify any wells within 1-mile of the Site.

5.0 PROPOSED REMEDIATION PLAN

Based on the investigation findings, concentrations of chloride in groundwater exceed the New Mexico WQCC standard of 250 mg/L. The chloride impact is greatest in the vicinity of the Southwest well. The chloride concentration in groundwater decreases in a south to southeast (down gradient) from the Southwest well. Based on records from the New Mexico State Engineer's files, there are no identifiable groundwater receptors within 1-mile of the Site. Based on the data obtained from the investigations, Texaco will implement a groundwater recovery program and proposes to install a groundwater recovery well in the area of highest chloride concentration. The location for the proposed recovery well is shown on Figure 11. The recovery well will be installed in a borehole drilled to the top of the Triassic-age Chinle Formation. The well will be screened from the bottom of the borehole to approximately five (5) feet above groundwater. The well will be constructed with PVC casing and screen of sufficient diameter for installation of a pitless adapter and electric submersible pump. The well will be constructed in accordance with State of New Mexico water well construction standards. The electric submersible pump will be equipped with an amperage (Coyote) controller, which has an adjustable timer for establishing pumping and resting cycles. The timer will be adjusted to allow sufficient recharge to occur in the aquifer between pumping cycles.

Recovered fluid will be conveyed from the well to the G. L. Erwin Federal NCT-2 "A & B" Tank Battery for disposal. The fluids will be transferred through suitable diameter HDPE piping, which will be buried from 1 to 2 feet BGL. The piping will be pressure tested to 3 pounds per square inch (psi) prior to system start-up. A total ionizing flow meter will be installed to record the volume of fluid recovered.

The recovery well will be monitored weekly during operation and the volume of recovered groundwater will be recorded at the flow meter. Groundwater samples will be collected every three

(3) months (quarterly) from all wells, and analyzed for chloride. During each semi-annual monitoring event, depth-to-groundwater measurements will be obtained from the recovery well and monitor wells. These measurements will be used to prepare a groundwater potentiometric map to evaluate the performance of the groundwater recovery system, and determine if pumping from the recovery well has decreased the concentration of chloride in groundwater. An annual report will be prepared and submitted to the OCD during April of each calendar year. The report will summarize the groundwater volumes recovered, laboratory analysis and potentiometric maps. Based on the recovery system performance evaluation, recommendations will be made to modify the recovery system (i.e., installation of additional recovery wells), continue or discontinue the current recovery program.

References

Alexander Nicholson, Jr., and Alfred Clebsch, Jr., 1961. Geology and Ground-water Conditions in Southern Lea County, New Mexico; New Mexico Institue of Mining and Technology, State Bureau of Mines and Resources, Ground-Water Report 6, 123 p.

Ronit Nativ, 1988, Hydrogeology and Hydrogeochemistry of the Ogallala Aquifer, Southern High Plains, Texas Panhandle and Eastern New Mexico; The University of Texas at Austin, Bureau of Economic Geology, Report of Investigation No. 177, 64 p.

Turner, M.T., et. al., 1974, Soil Survey of Lea County, New Mexico; U.S. Department of Agriculture, Soil Conservation Service, 89 p.

TABLES

Table 1: Summary of Soil Boring and Monitor Well Drilling and Completion Details, Texaco Exploration and Production, Inc., G.L. Erwin Federal "A & B" NCT-2 Tank Battery Lea County, New Mexico

Monitor Well	Date Drilled	Drilled Depth feet BGL	Ground Elevation feet AMSL	Top of Casing Elevation, feet AMSL	Well Depth, feet TOC	Screen Interval, feet BGL	Depth-to-Groundwater feet BGL, 2/4/98
MW-1	02/02/98	87.05	3159.40	3161.69	87.70	55.07-84.68	58.58
MW-2	02/02/98	70.50	3157.40	3159.89	72.94	50.30-69.90	58.76
MW-3	02/02/98	71.00	3161.30	3164.08	73.26	50.48-70.08	62.47
MW-4	02/03/98	70.70	3162.90	3165.65	73.31	50.63-70.23	61.33
MW-5	02/03/98	70.41	3158.30	3160.75	73.10	50.34-69.94	57.64
West	-	-	3162.00	3164.44	70.43	-	60.06
Southwest	-	-	3161.50	3164.54	70.45	-	60.17

Notes:

1. BGL: Denotes depth in feet below ground level
2. AMSL: Denotes elevation in feet above mean sea level
3. TOC: Top of casing
4. - No data available

Table 2: **Summary of Geotechnical Analysis of Soil Samples**
Texaco Exploration and Production, Inc., G.L. Erwin Federal "A & B" NCT-2 Tank Battery
Lea County, New Mexico

Borehole Number	Sample Depth feet BGL	Sample Number	Date Collected	Density pcf	Specific Gravity	Porosity %	Hydraulic Conductivity cm/sec	Organic Carbon %
BH-5	0.0 - 2.0	02-066-01A	2/3/98	126.1-	2.680	32.1	6.74×10^{-7}	-
				135.8				
BH-5	5.0 - 10.0	02-066-02A	2/3/98	125.4-	2.690	31.0	1.63×10^{-5}	-
				134.5				

Notes: Analysis performed by Maxim Technologies, Inc., Dallas, Texas

1. BGL: Below ground level
2. pcf: Pounds per cubic foot
3. %: Percent
4. cm/sec: Centimeters per second
5. No Data

Table 3: **Summary of BTEX Analysis of Groundwater Samples from Monitor Wells, Texaco Exploration and Production, Inc., G.L. Erwin Federal "A & B" NCT-2 Tank Battery Lea County, New Mexico**

Monitor Well	Sample Date	Benzene mg/L	Toluene mg/L	Ethylkenzene mg/L	Xylene mg/L
MW-1	02/17/98	<0.001	<0.001	<0.001	<0.003
MW-2	02/17/98	<0.001	<0.001	<0.001	<0.003
MW-3	02/17/98	<0.001	<0.001	<0.001	<0.003
MW-4	02/17/98	<0.001	<0.001	<0.001	<0.003
MW-5	02/17/98	<0.001	<0.001	<0.001	<0.003
West	02/17/98	<0.001	<0.001	<0.001	<0.003
Southwest	02/17/98	<0.001	<0.001	<0.001	<0.003

Notes:

1. mg/L: Denotes oncentration in milligrams per liter
2. <: Analyte concentration below test method detection limit

Table 4: **Summary of Dissolved Metals Analysis of Groundwater Samples from Monitor Wells, Texaco Exploration and Production, Inc., G.L. Erwin Federal "A & B" NCT-2 Tank Battery Lea County, New Mexico**

Monitor Well	Sample Date	Arsenic mg/L	Barium mg/L	Cadmium mg/L	Calcium mg/L	Chromium mg/L	Copper mg/L	Iron mg/L	Lead mg/L	Magnesium mg/L	Manganese mg/L	Mercury mg/L	Potassium mg/L	Selenium mg/L	Silver mg/L	Sodium mg/L	Zinc mg/L
MW-1	2/17/98	<0.020	0.059	<0.004	65	<0.005	<0.005	<0.005	<0.010	23	<0.002	<0.0002	3.6	<0.015	<0.007	135	0.045
MW-2	2/17/98	<0.020	0.048	<0.004	31	<0.005	<0.005	<0.005	<0.010	9.8	0.006	<0.0002	3.6	<0.015	<0.007	366	0.011
MW-3	2/17/98	<0.020	0.061	<0.004	58	<0.005	<0.005	<0.005	<0.010	19.0	0.014	<0.0002	13	<0.015	<0.007	743	<0.002
MW-4	2/17/98	0.050	0.042	<0.004	16	<0.005	<0.005	<0.005	<0.010	5.0	0.004	<0.0002	12	<0.015	<0.007	399	0.004
MW-5	2/17/98	0.040	0.051	<0.004	30	<0.005	0.031	18	<0.010	9.4	0.151	<0.0002	<0.015	<0.015	<0.007	385	0.078
West	2/17/98	<0.020	0.049	<0.004	23	<0.005	<0.005	<0.005	<0.010	7.0	0.006	<0.0002	21	<0.015	<0.007	285	0.005
SW	2/17/98	<0.020	0.049	<0.004	186	<0.005	<0.005	<0.005	<0.010	58	0.022	<0.0002	46	<0.015	<0.007	1480	0.006

Notes:

1. mg/L: Denotes oncentration in milligrams per liter
2. <: Analyte concentration below test method detection limit

Table 5: **Summary of General Chemistry Analysis of Groundwater Samples from Monitor Wells, Texaco Exploration and Production, Inc., G.L. Erwin Federal "A & B" NCT-2 Tank Battery Lea County, New Mexico**

Monitor Well	Sample Date	Chloride mg/L	Sulfate mg/L	Bicarbonate mg/L	Carbonate mg/L	Hardnes mg/L	TDS mg/L	PH S.U.
MW-1	08/22/97	-	-	-	-	-	-	-
	02/17/98	233	92	220	<2.0	276	812	7.5
MW-2	08/22/97	-	-	-	-	-	-	-
	02/17/98	423	141	360	<2.0	124	1257	7.6
MW-3	08/22/97	-	-	-	-	-	-	-
	02/17/98	983	173	410	<2.0	232	2261	7.6
MW-4	08/22/97	-	-	-	-	-	-	-
	02/17/98	372	136	510	<2.0	80	1268	7.9
MW-5	08/22/97	-	-	-	-	-	-	-
	02/17/98	408	151	360	<2.0	116	1219	7.8
West	08/22/97	250	-	-	-	-	-	-
	02/17/98	237	134	370	<2.0	96	975	7.7
Southwest	08/22/97	3300	-	-	-	-	-	-
	02/17/98	2170	255	420	<2.0	712	4719	7.1

Notes:

1. mg/L: Milligrams per liter
2. <: Below detection limit
3. --: No data available

FIGURES

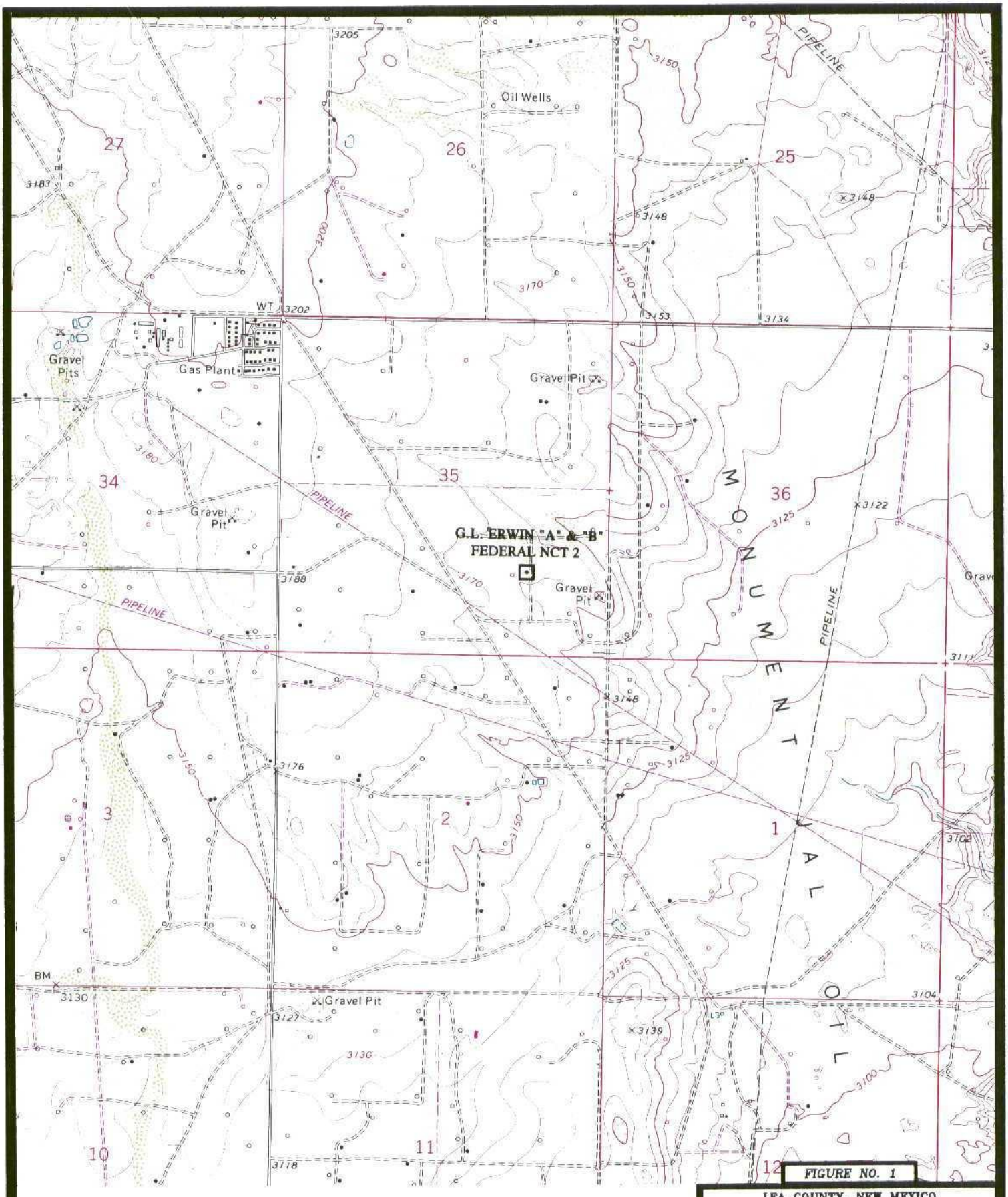


FIGURE NO. 1

LEA COUNTY, NEW MEXICO

TEXACO

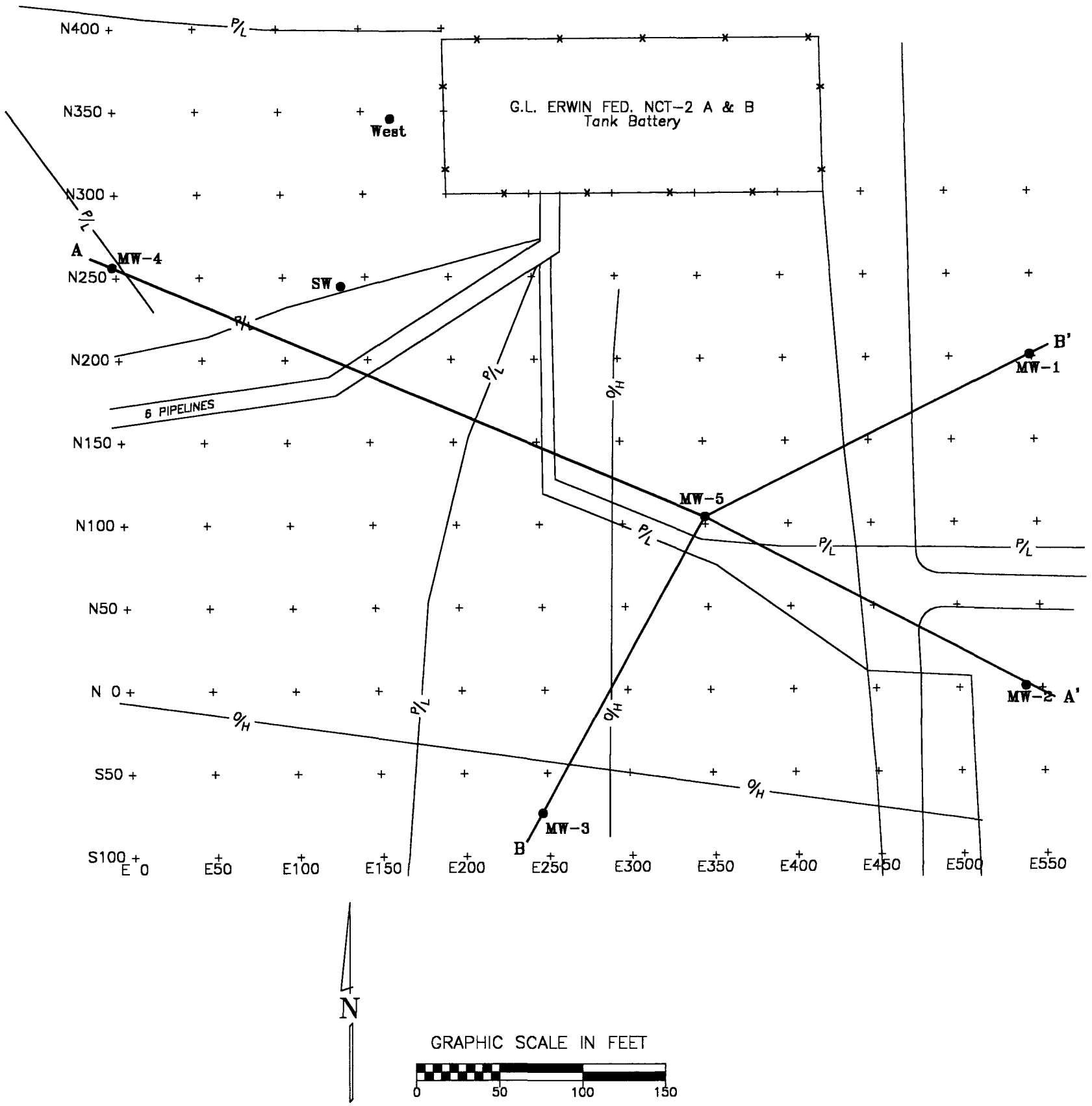
EXPLORATION & PRODUCTION INC.

TOPOGRAPHIC MAP

HIGHLANDER ENVIRONMENTAL
MIDLAND, TEXAS

TAKEN FROM U.S.G.S.
JAL NW AND JAL NE, NM
7.5' QUADRANGLES

SCALE: 1"=2000'



MONITOR WELL DATA		
MONITOR WELL NUMBER	GROUND ELEV., FEET AMSL	TOP OF CASING ELEV., FEET AMSL
WEST	3162.00	3164.44
SW	3161.50	3164.54
MW-1	3159.40	3161.69
MW-2	3157.40	3159.89
MW-3	3161.30	3164.08
MW-4	3162.90	3165.65
MW-5	3158.30	3160.75

LEGEND	
● MW - 1	MONITOR WELL LOCATION AND GROUNDWATER POTENTICMETRIC SURFACE ELEVATION, FEET AMSL, 2/17/98
+	ELECTROMAGNETIC (EM-34) TERRAIN CONDUCTIVITY MEASUREMENT STATION
—×—	FENCE LINE
—P/L—	PIPELINE
—O/H—	OVERHEAD POWERLINE
A—— A' B—— B'	LINE OF GEOLOGICAL CROSS-SECTION

FIGURE NO. 2

TEXACO EXPLORATION AND PRODUCTION, INC.

SITE PLAN
G.L. ERWIN FED. NCT-2 A & B TANK BATTERY
LEA COUNTY, NEW MEXICO

DATE: 03/29/98
DWN. BY: GLM
FILE: \997\997H

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS

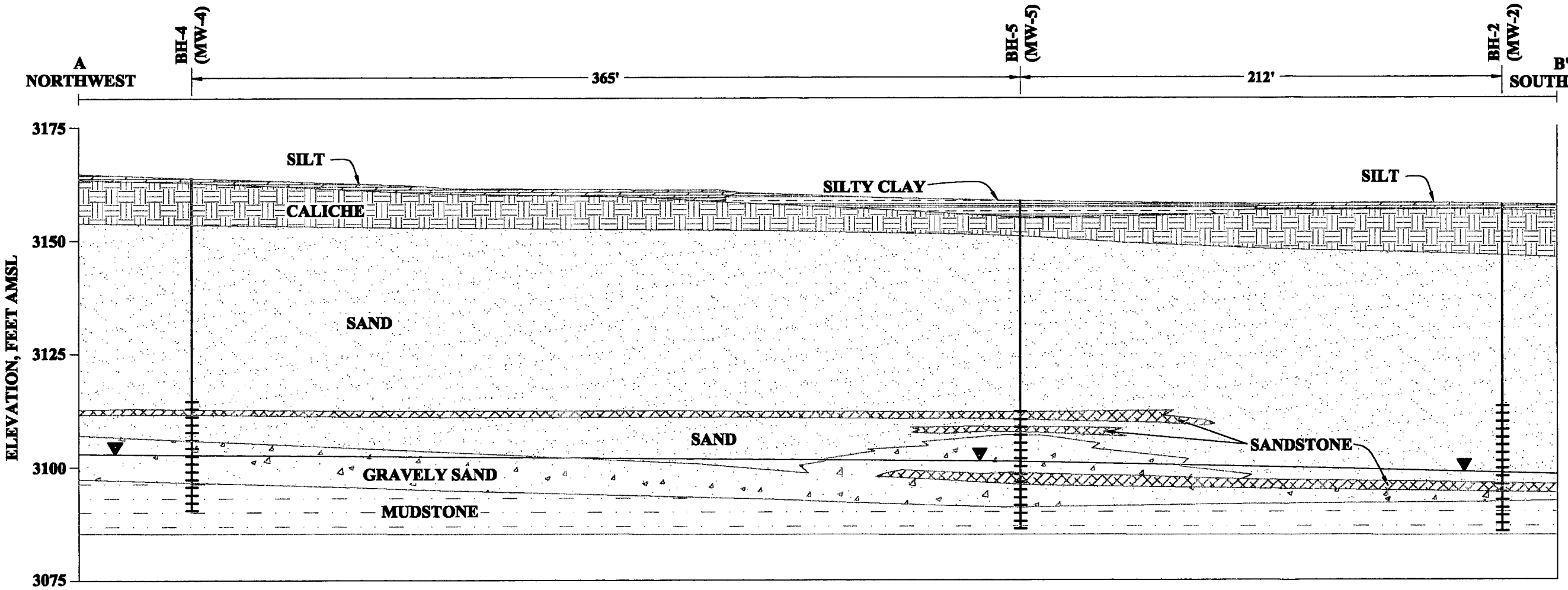


FIGURE NO. 4

LEGEND

MONITORING WELL SCREEN INTERVAL

GROUNDWATER POTENTIOMETRIC SURFACE, 02/04/98

NOTE:

VERTICAL EXAGERATION: X 2.4

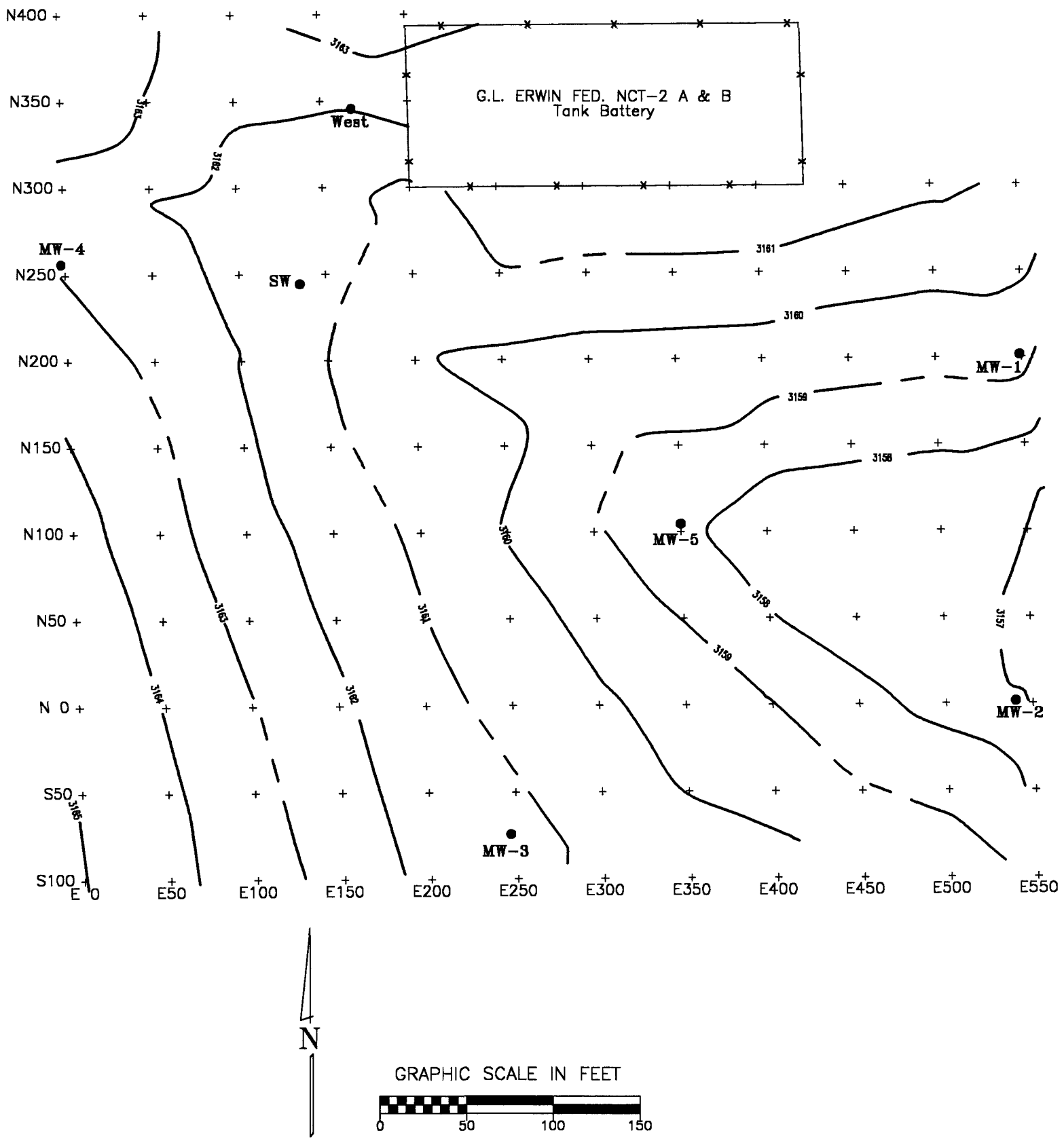
SCALE: VERTICAL - 1"=25'
HORIZONTAL - 1"=50'

DATE: 03/29/98
DWN. BY: GLM
FILE: \997\997K

TEXACO EXPLORATION AND PRODUCTION, INC.

GEOLOGICAL CROSS-SECTION
A - A'
G.L. ERWIN FED. "A & B" NCT-2
TANK BATTERY
LEA COUNTY, NEW MEXICO

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS



MONITOR WELL DATA		
MONITOR WELL NUMBER	GROUND ELEV., FEET AMSL	TOP OF CASING ELEV., FEET AMSL
WEST	3162.00	3164.44
SW	3161.50	3164.54
MW-1	3159.40	3161.69
MW-2	3157.40	3159.89
MW-3	3161.30	3164.08
MW-4	3162.90	3165.65
MW-5	3158.30	3160.75

LEGEND	
● MW - 1	MONITOR WELL LOCATION
+	ELECTROMAGNETIC (EM-34) TERRAIN CONDUCTIVITY MEASUREMENT STATION
—x—	FENCE LINE
3158	CONTOUR OF GROUND SURFACE ELEVATION, FEET AMSL

FIGURE NO. 3

TEXACO EXPLORATION AND PRODUCTION, INC.

SITE TOPOGRAPHIC MAP
G.L. ERWIN FED. NCT-2 A & B TANK BATTERY
LEA COUNTY, NEW MEXICO

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS

DATE: 03/10/98
DWN. BY: GLM
FILE: \997\9971

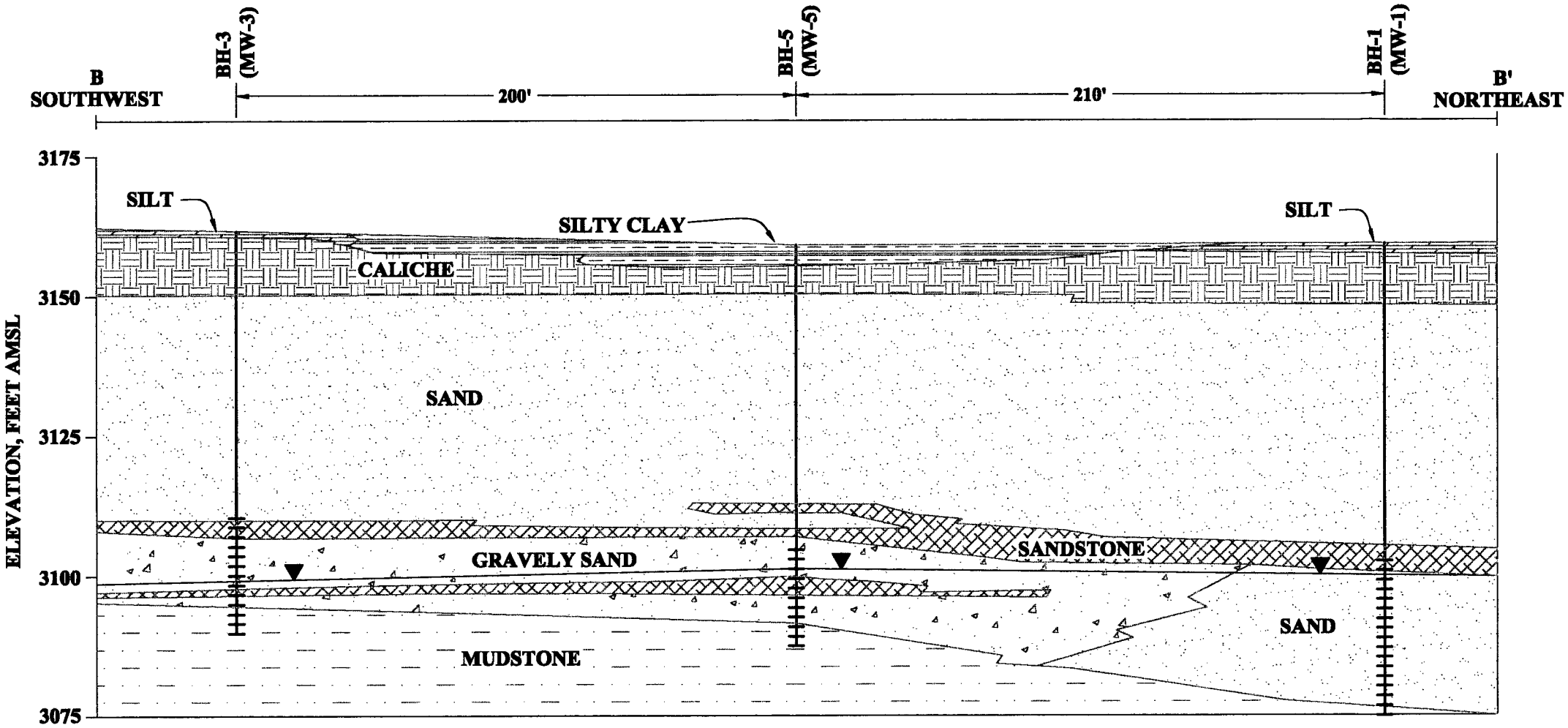


FIGURE NO. 5

LEGEND

MONITORING WELL SCREEN INTERVAL

GROUNDWATER POTENTIOMETRIC SURFACE, 02/04/98

NOTE:

VERTICAL EXAGERATION: X 2.4

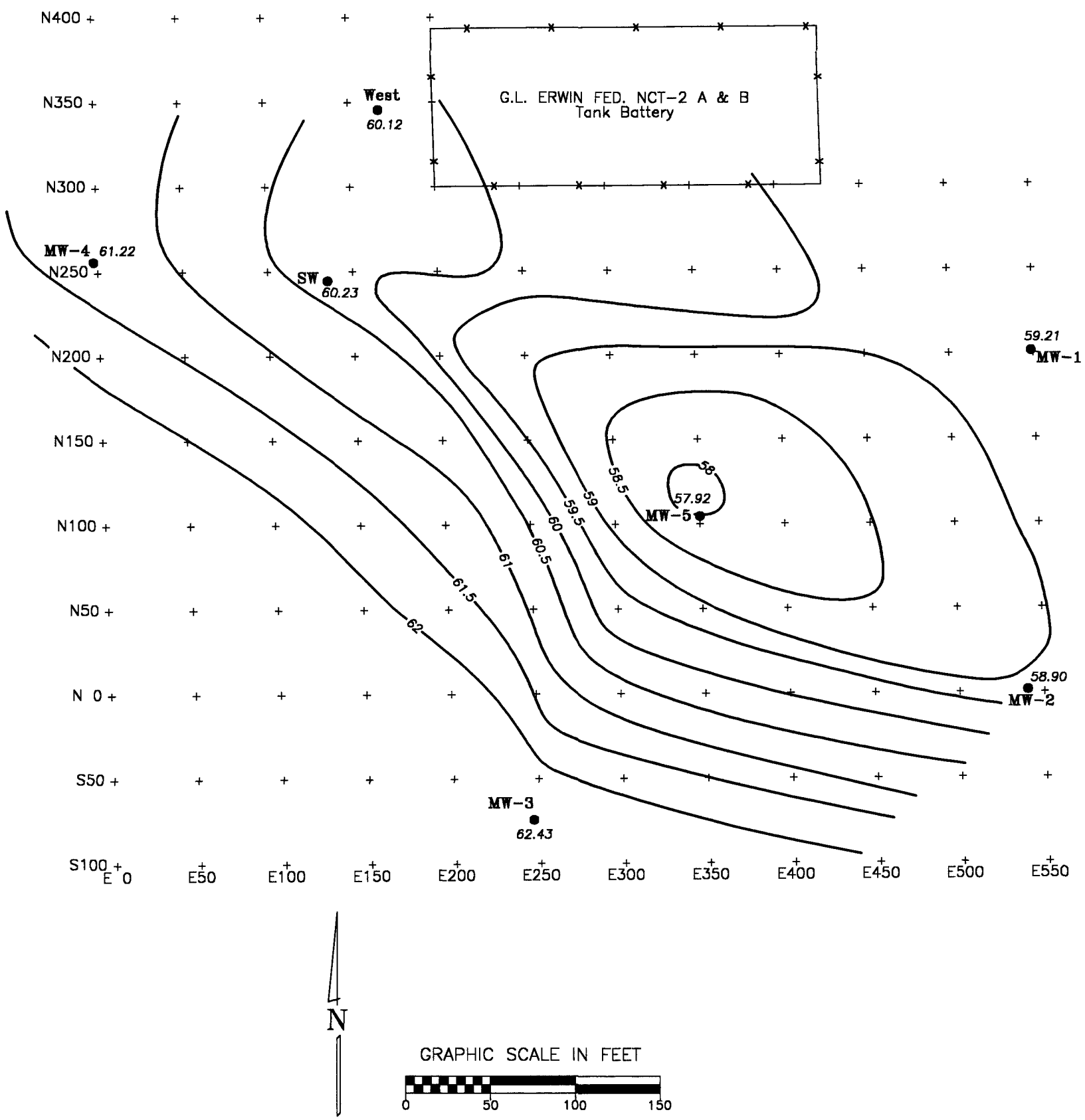
SCALE: VERTICAL - 1"=25'
HORIZONTAL - 1"=50'

DATE: 03/27/98
DWN. BY: GLM
FILE: \997\997J

TEXACO EXPLORATION AND PRODUCTION, INC.

GEOLOGICAL CROSS-SECTION
B - B'
G.L. ERWIN FED. "A & B" NCT-2
TANK BATTERY
LEA COUNTY, NEW MEXICO

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS



MONITOR WELL DATA		
MONITOR WELL NUMBER	GROUND ELEV., FEET AMSL	TOP OF CASING ELEV., FEET AMSL
WEST	3162.00	3164.44
SW	3161.50	3164.54
MW-1	3159.40	3161.69
MW-2	3157.40	3159.89
MW-3	3161.30	3164.08
MW-4	3162.90	3165.65
MW-5	3158.30	3160.75

LEGEND	
59.21 ● MW - 1	MONITOR WELL LOCATION AND DEPTH TO GROUNDWATER, FEET BGL 02/17/98
+	ELECTROMAGNETIC (EM-34) TERRAIN CONDUCTIVITY MEASUREMENT STATION
58.5	CONTOUR OF DEPTH TO GROUNDWATER, FEET BGL, 02/17/98

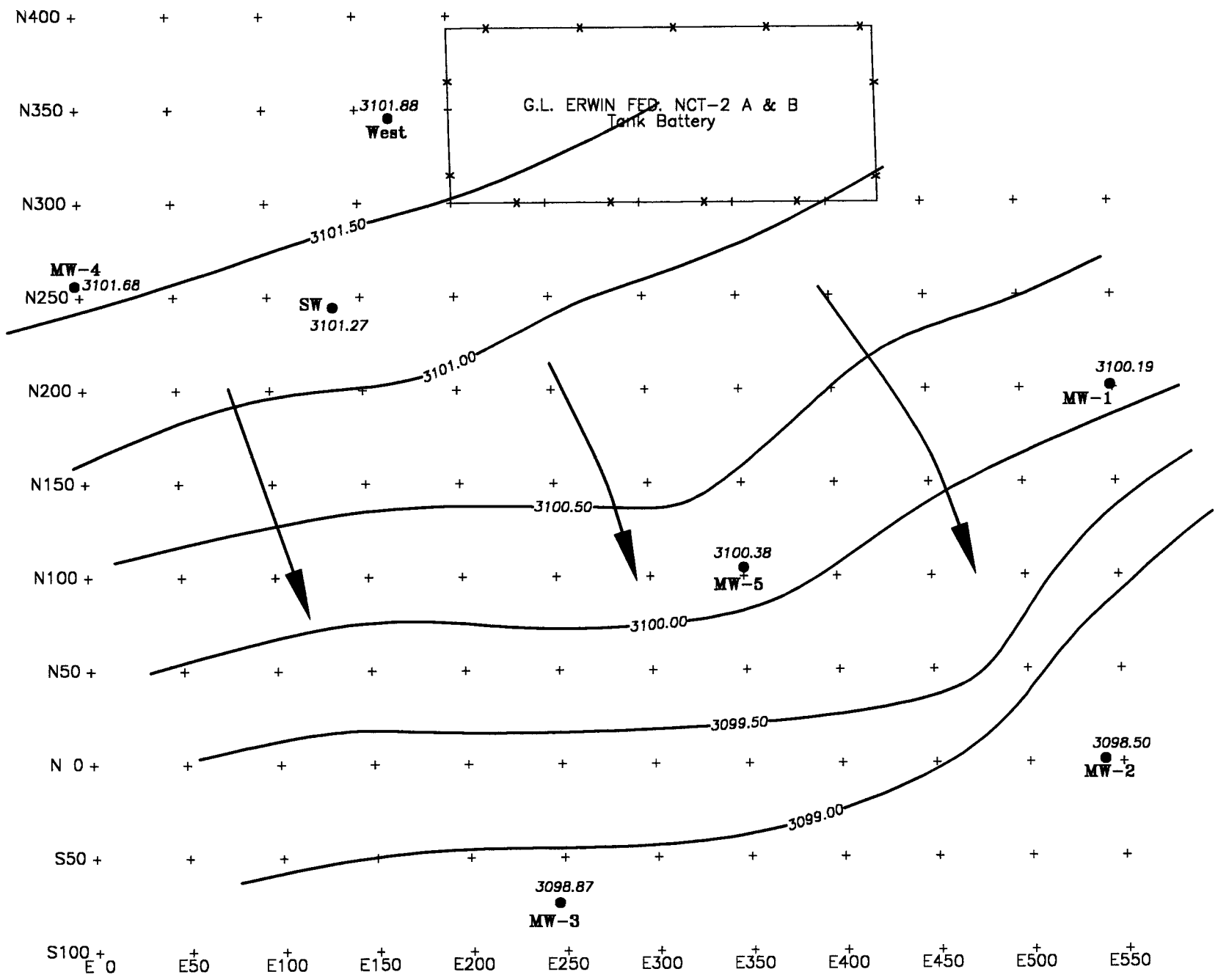
FIGURE NO. 6

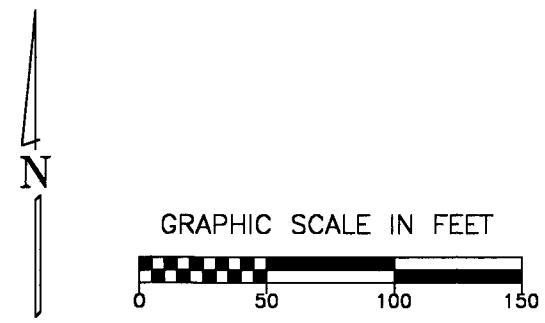
TEXACO EXPLORATION AND PRODUCTION, INC.

DEPTH-TO-GROUNDWATER MAP - 02/17/98
G.L. ERWIN FED. NCT-2 A & B TANK BATTERY
LEA COUNTY, NEW MEXICO

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS

DATE: 03/29/98
DWN. BY: GLM
FILE: \997\997F





MONITOR WELL DATA		
MONITOR WELL NUMBER	GROUND ELEV., FEET AMSL	TOP OF CASING ELEV., FEET AMSL
WEST	3162.00	3164.44
SW	3161.50	3164.54
MW-1	3159.40	3161.69
MW-2	3157.40	3159.89
MW-3	3161.30	3164.08
MW-4	3162.90	3165.65
MW-5	3158.30	3160.75

LEGEND	
3100.19 ● MW - 1	MONITOR WELL LOCATION AND GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION, FEET AMSL, 02/17/98
+	ELECTROMAGNETIC (EM-34) TERRAIN CONDUCTIVITY MEASUREMENT STATION
3100.00	CONTOUR OF GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION, FEET AMSL, 02/17/98
←	DIRECTION OF GROUNDWATER FLOW

FIGURE NO. 7

TEXACO EXPLORATION AND PRODUCTION, INC.

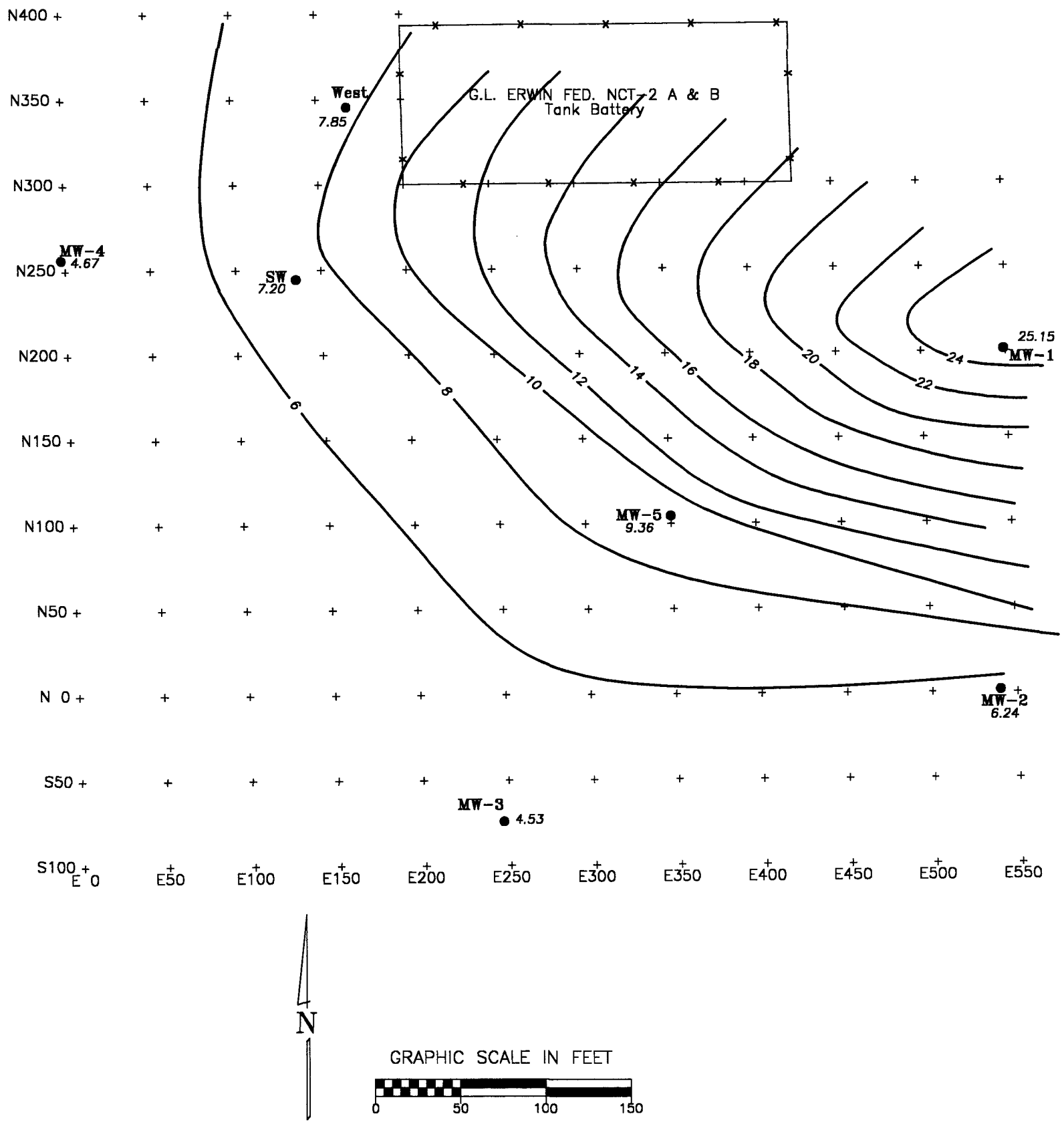
GROUNDWATER POTENTIOMETRIC SURFACE MAP, 02/17/98

G.L. ERWIN FED. NCT-2 A & B TANK BATTERY

LEA COUNTY, NEW MEXICO

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS

DATE: 03/29/98
DWN. BY: GLM
FILE: \997\997G



MONITOR WELL DATA		
MONITOR WELL NUMBER	GROUND ELEV., FEET AMSL	TOP OF CASING ELEV., FEET AMSL
WEST	3162.00	3164.44
SW	3161.50	3164.54
MW-1	3159.40	3161.69
MW-2	3157.40	3159.89
MW-3	3161.30	3164.08
MW-4	3162.90	3165.65
MW-5	3158.30	3160.75

LEGEND	
25.15 ● MW - 1	MONITOR WELL LOCATION AND OGALLALA FORMATION SATURATED THICKNESS, FEET 02/04/98
+	ELECTROMAGNETIC (EM-34) TERRAIN CONDUCTIVITY MEASUREMENT STATION
20	CONTOUR OF OGALLALA FORMATION SATURATED THICKNESS, FEET 02/04/98

FIGURE NO. 8

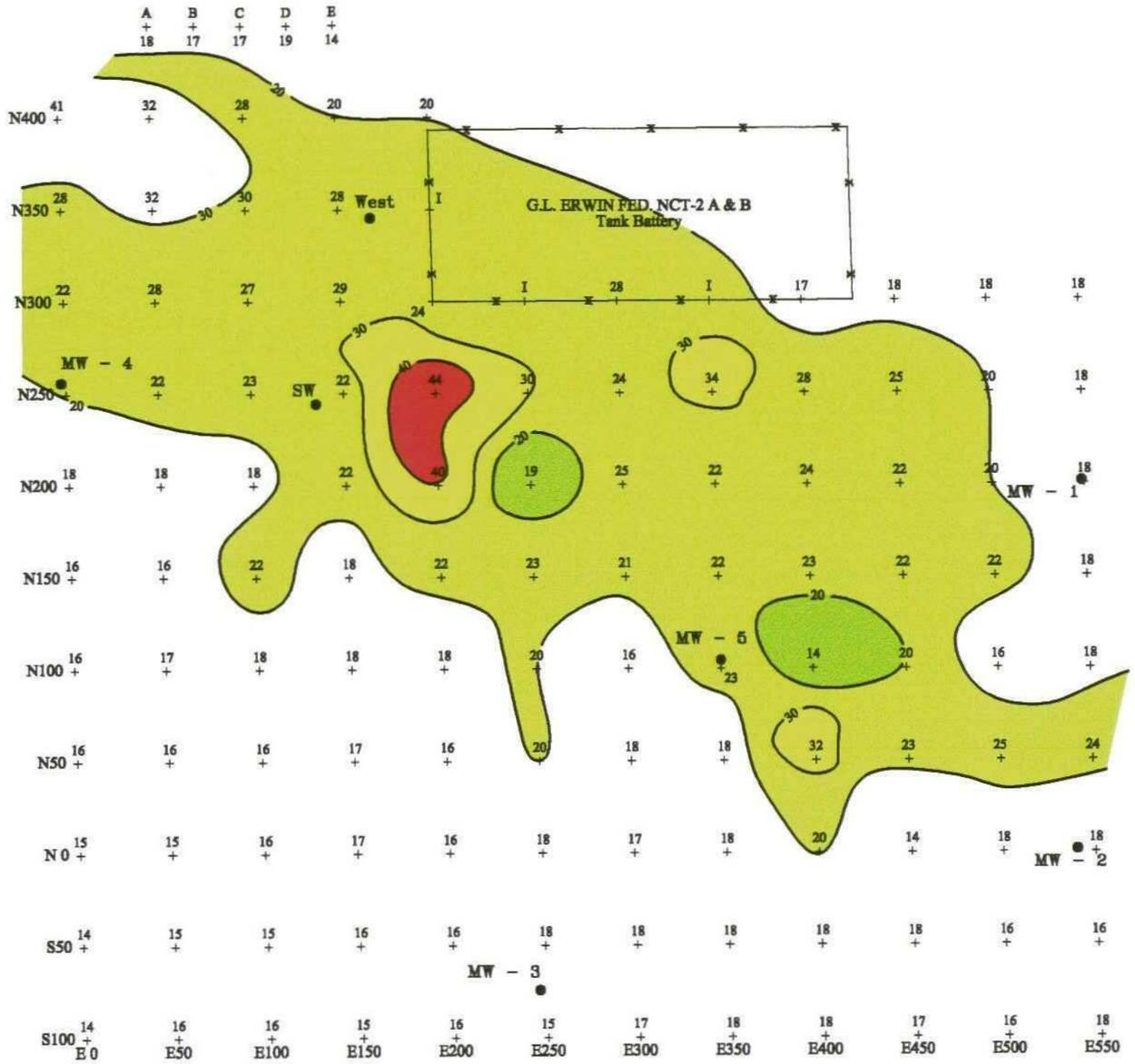
TEXACO EXPLORATION AND PRODUCTION, INC.

OGALLALA FORMATION SATURATED THICKNESS MAP, 02/04/98

G.L. ERWIN FED. NCT-2 A & B TANK BATTERY
LEA COUNTY, NEW MEXICO

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS

DATE: 03/29/98
DWN. BY: GLM
FILE: \997\997C



MONITOR WELL DATA		
MONITOR WELL NUMBER	GROUND ELEV., FEET AMSL	TOP OF CASING ELEV., FEET AMSL
WEST	3162.00	3164.44
SW	3161.50	3164.54
MW-1	3159.40	3161.69
MW-2	3157.40	3159.89
MW-3	3161.30	3164.08
MW-4	3162.90	3165.65
MW-5	3158.30	3160.75

LEGEND	
MW - 1	MONITOR WELL LOCATION
18	ELECTROMAGNETIC (EM-34) TERRAN CONDUCTIVITY MEASUREMENT STATION AND MEASURED VALUE, MMHOS/M, 1/12/98
20	CONTOUR OF EQUAL ELECTROMAGNETIC TERRAIN CONDUCTIVITY, MMHOS/M, 1/12/98
I	INTERFERENCE
	10 - 20 MMHOS/M
	20 - 30 MMHOS/M
	30 - 40 MMHOS/M
	40 - 50 MMHOS/M

N

GRAPHIC SCALE IN FEET

0 50 100 150

SCALE: 1"=75'

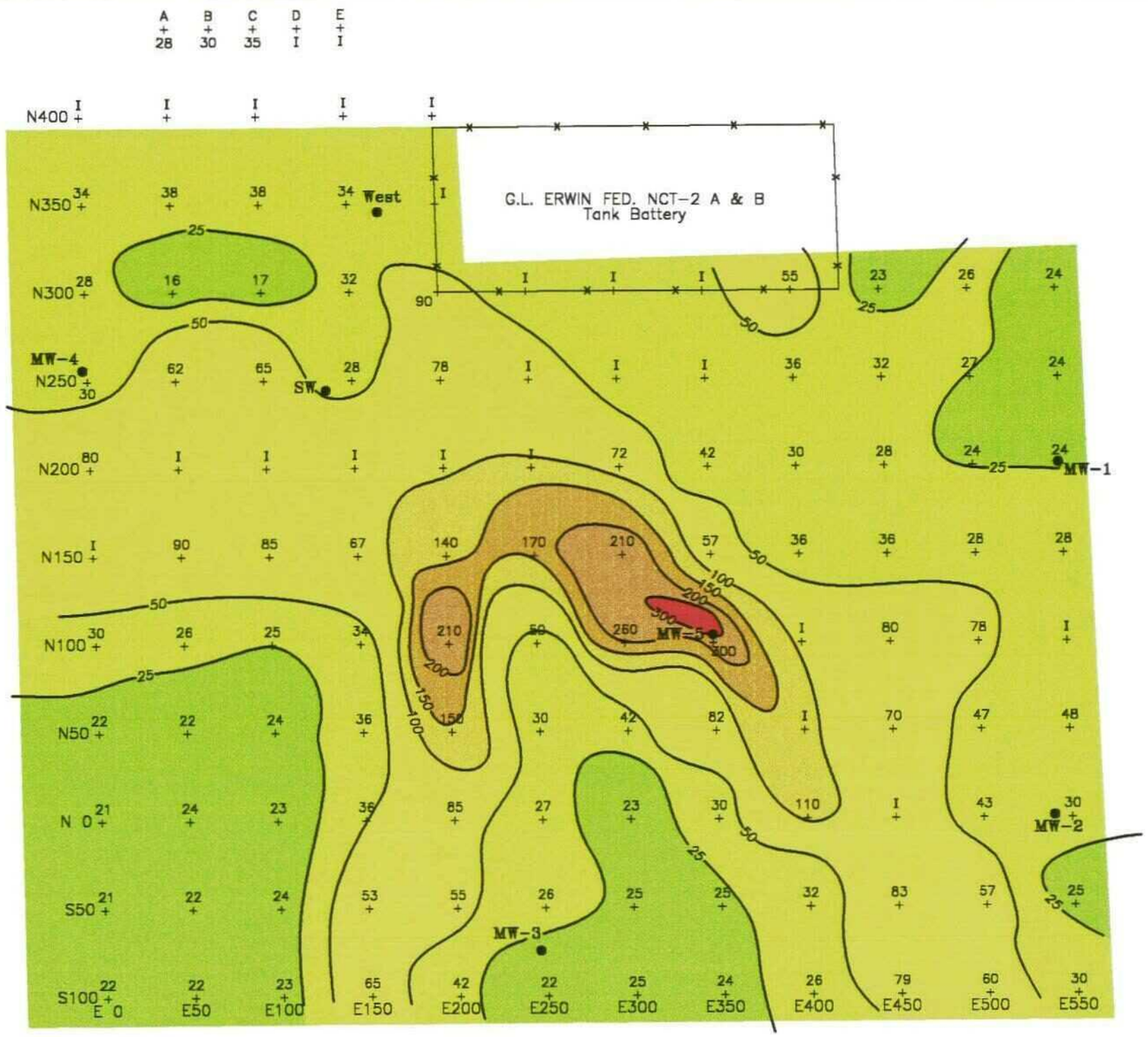
FIGURE NO. 9

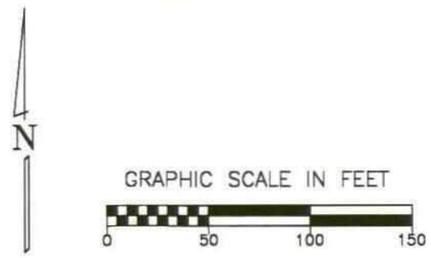
TEXACO EXPLORATION AND PRODUCTION, INC.

EM-34, 20 HD CONDUCTIVITY MAP
G.L. ERWIN FED. NCT-2 A & B TANK BATTERY
LEA COUNTY, NEW MEXICO

HIGHLANDER ENVIRONMENTAL
MIDLAND, TEXAS

DATE: 03/02/98
DWN. BY: GLM
FILE: \997\997A





MONITOR WELL DATA

MONITOR WELL NUMBER	GROUND ELEV., FEET AMSL	TOP OF CASING ELEV., FEET AMSL
WEST	3162.00	3164.44
SW	3161.50	3164.54
MW-1	3159.40	3161.69
MW-2	3157.40	3159.89
MW-3	3161.30	3164.08
MW-4	3162.90	3165.65
MW-5	3158.30	3160.75

LEGEND

MW - 1	MONITOR WELL LOCATION
24	ELECTROMAGNETIC (EM-34) TERRAIN CONDUCTIVITY MEASUREMENT STATION AND MEASURED VALUE, MMHOS/M 01/12/98
25	CONTOUR OF EQUAL ELECTROMAGNETIC TERRAIN CONDUCTIVITY, MMHOS/M, 01/12/98
I	INTERFERENCE

- 1 – 25 MMHOS/M
- 25 – 50 MMHOS/M
- 50 – 100 MMHOS/M
- 100 – 150 MMHOS/M
- 150 – 200 MMHOS/M
- 200 – 300 MMHOS/M
- 300 – 400 MMHOS/M

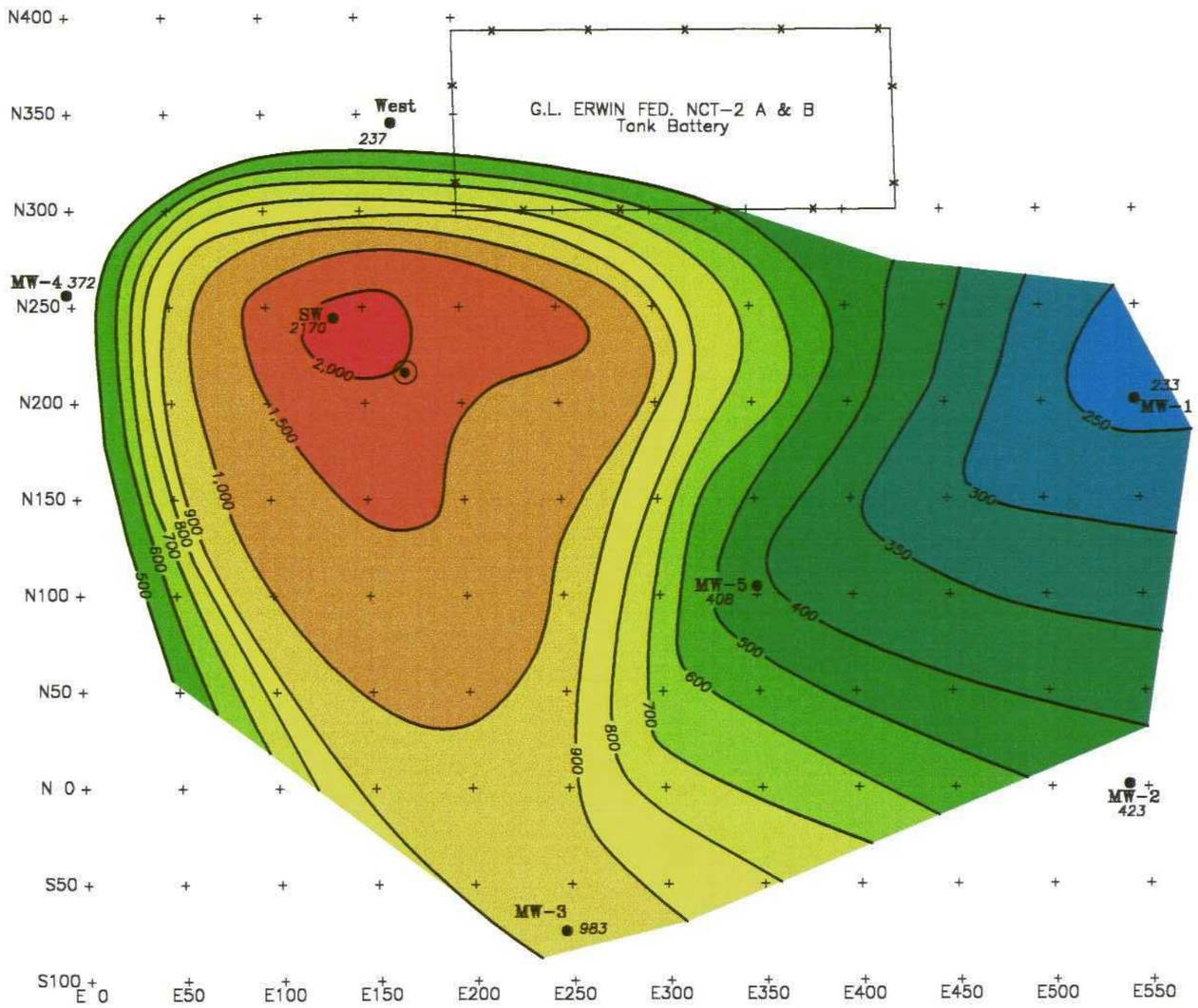
FIGURE NO. 10

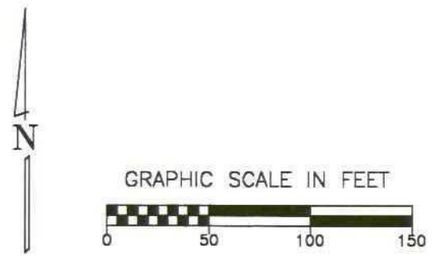
TEXACO EXPLORATION AND PRODUCTION, INC.

EM-34, 20 VD CONDUCTIVITY MAP
G.L. ERWIN FED. NCT-2 A & B TANK BATTERY
LEA COUNTY, NEW MEXICO

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS

DATE: 03/29/98
DWN. BY: GLM
FILE: \997\997E





GRAPHIC SCALE IN FEET

0 50 100 150

MONITOR WELL DATA		
MONITOR WELL NUMBER	GROUND ELEV., FEET AMSL	TOP OF CASING ELEV., FEET AMSL
WEST	3162.00	3164.44
SW	3161.50	3164.54
MW-1	3159.40	3161.69
MW-2	3157.40	3159.89
MW-3	3161.30	3164.08
MW-4	3162.90	3165.65
MW-5	3158.30	3160.75

LEGEND	
233 ● MW - 1	MONITOR WELL LOCATION AND CHLORIDE CONCENTRATION IN GROUNDWATER mg/L, 02/17/98
+	ELECTROMAGNETIC (EM-34) TERRAIN CONDUCTIVITY MEASUREMENT STATION
250	CONTOUR OF CHLORIDE CONCENTRATION IN GROUNDWATER mg/L, 02/17/98
⊙	PROPOSED RECOVERY WELL LOCATION

- 200 – 250 mg/L
- 250 – 300 mg/L
- 300 – 350 mg/L
- 350 – 400 mg/L
- 400 – 500 mg/L
- 500 – 600 mg/L
- 600 – 700 mg/L
- 700 – 800 mg/L
- 800 – 900 mg/L
- 900 – 1000 mg/L
- 1000 – 1500 mg/L
- 1500 – 2000 mg/L
- 2000 + mg/L

FIGURE NO. 11

TEXACO EXPLORATION AND PRODUCTION, INC.

ISOPLETH MAP OF CHLORIDE CONCENTRATION IN GROUNDWATER, 02/17/98

G.L. ERWIN FED. NCT-2 A & B TANK BATTERY
LEA COUNTY, NEW MEXICO

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS

DATE: 03/29/98
DWN. BY: GLM
FILE: \997\997D

APPENDIX A

Environmental Spill Control, Inc. Reports

December 1, 1993 Report

DATE: October 01, 1993

TO: Texaco, USA
P.O. Box 730
Hobbs, New Mexico 88241-0730

FROM: Eddie Slavens and Allen Hodge
ENVIRONMENTAL SPILL CONTROL, INC.

ATTN: Mr. Larry Lehman

RE: Site Assessment on G.L. Erwin B NCT-2

The pit is an inground, unlined earthen pit that has been in service for the past 20 to 30 years. There is free standing oil and water in the pit. The approximate dimensions of the pit are 45 feet by 45 feet, approximately 2,025 square feet of surface area.

The assessment of the pit was started on September 27, 1993, with the fence around the pit being removed and the free fluids pulled out of the pit for disposal. There is a small depression that runs from the northwest to the southeast; this would be the normal downhill flow for ground water. The ground water hole (number 1) was 30 parts per million (ppm) of Total Petroleum Hydrocarbons (TPH). At 50 feet to 53 feet a hard layer of sandstone was encountered. A sample was taken at 65 feet and a TPH reading of 21 ppm was observed. Ground water was encountered at 67 feet and the hole was drilled to 75 feet. The hole was cased as a 2" monitor well with 10 feet of screen in water and 5 feet above.

Pads for the core rig were constructed using a backhoe on the southeast corner, southwest corner, center of the pit and in the middle of the north end. The corner pads were constructed to drill at the fluid line of the pit. The second hole (number 2) was drilled in the southeast corner. 111,700 ppm of TPH was observed at surface, with 9,300 ppm of TPH observed at 10 feet.

At 20 feet the analyses indicated 142 ppm of TPH and 21 ppm of TPH at 30 feet. The third hole (number 3) was drilled in the southwest corner and 132,300 ppm of TPH was analyzed at surface. At 10 feet we analyzed 8,870 ppm of TPH with 176 ppm and 18 ppm at 20 feet and 30 feet respectively. The next hole (number 4) was drilled in the center of the pit. At surface we encountered 149,600 ppm of TPH and 7,980 ppm at 10 feet. We analyzed 139 ppm of TPH at 20 feet and had 27 pm of TPH at 30 feet.

The next hole (number 5) was drilled at the middle of the north end of the pit. This hole became of concern as we drilled the hole. At the surface we analyzed the soil and had a reading of 128, 200 ppm of TPH. At 10 feet we had a reading of 9,090 ppm of TPH and at 20 feet we had 8,630 ppm of TPH. We drilled deeper and at 30 feet we still had a high hydrocarbon content of 8,140 ppm of TPH. At 40 feet the reading dropped to 2,200 ppm of TPH and at 55 feet we had 22 ppm of TPH. It was apparent that the contamination drifted laterally to the north out of the pit proper area.

Hole (number 6) was drilled 5 feet north of the pit to confirm our suspicions. At 10 feet depth we analyzed the soil at 14,140 ppm of TPH and at 20 feet we has 12,710 ppm of TPH. At 30 feet we still had 9,210 ppm of TPH and 7,980 at 40 feet. We saw a drop at the 50 foot level down to 1,860 ppm and had 1,270 ppm at 60 feet. We did not drill any further to keep from contaminating the ground water zone. The readings above the sandstone layer at 50 feet are below the closure pit limits required by the Oil Conservation Division (OCD).

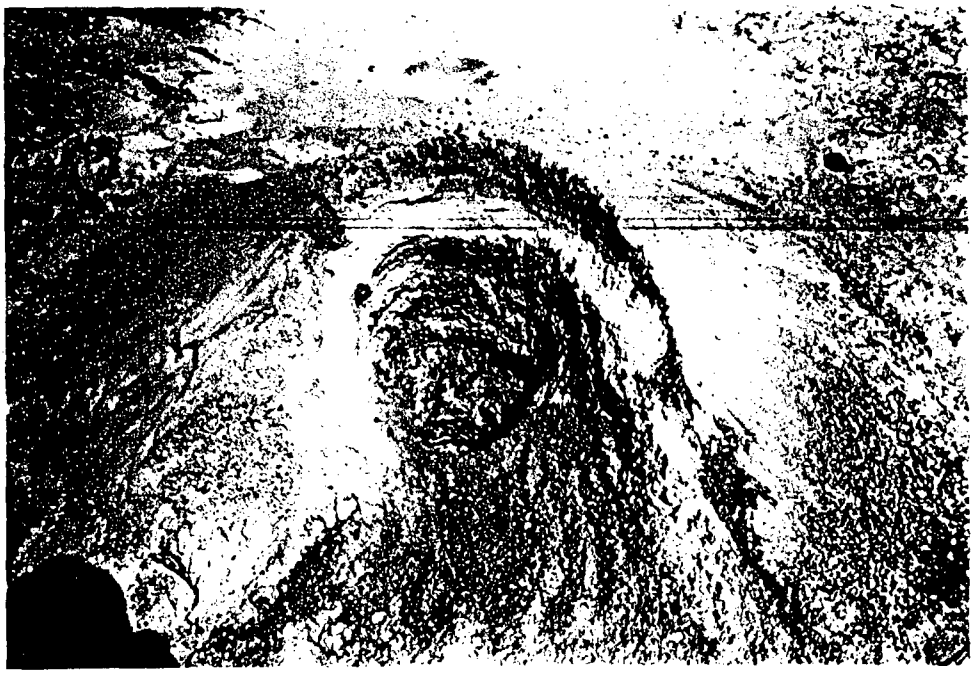
As indicated by the enclosed Soil Analysis Reports, we drilled on a northerly line out from the pit then

then laterally to determine the size of the plume of contamination emanating out of the pit (please refer to the drawing for the hole placement). The plume area is approximately 110 feet by 50 feet and reaches a depth of approximately 60 feet on top of the hard sandstone layer.

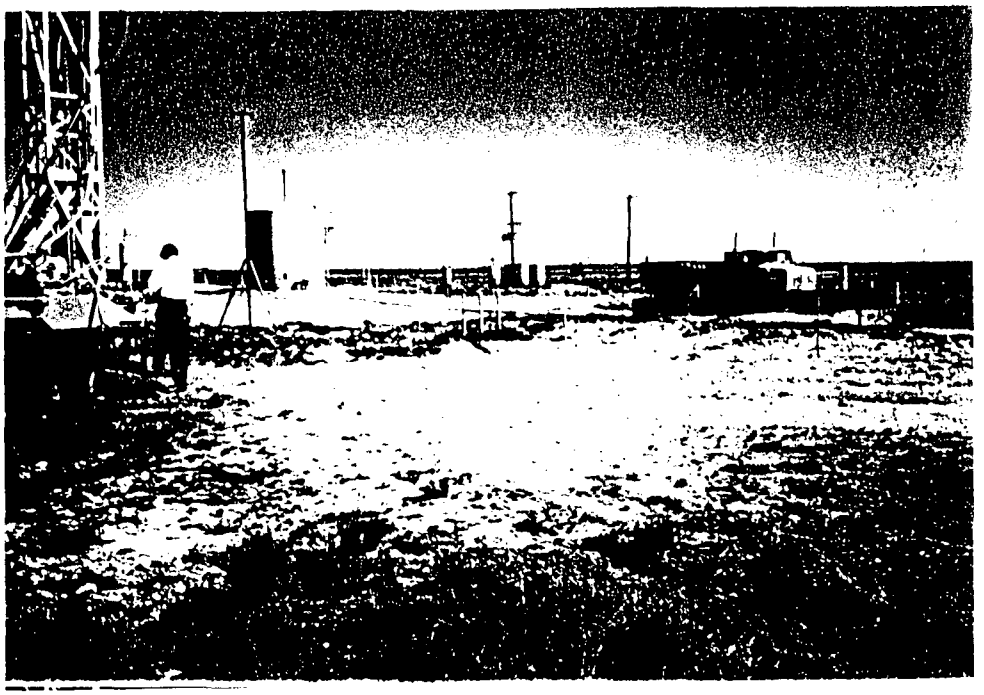
The contamination of the actual pit area would be 45 feet by 45 feet by approximately 15 feet deep. The overall contamination drops over into the natural depression to the north. There would be approximately 1,125 cubic yards of hydrocarbon contamination in the pit area. 2,250 total cubic yards would need to be excavated to remove the contamination due to the entry into the pit area. The contamination of the plume area is approximately 110 feet by 50 feet by 60 feet deep. This would account for approximately 12,222 cubic yards of contamination which would have to be excavated. The estimated total excavation including entry in the plume area and working area would be approximately 17,000 cubic yards.

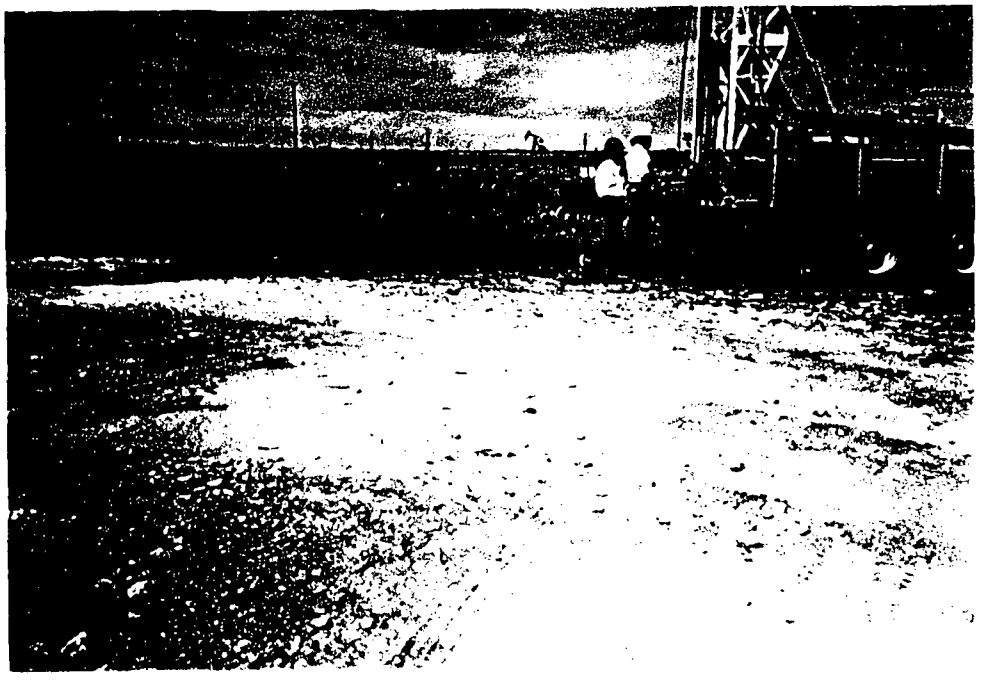
The cubic yards of contamination is approximately 13,347 cubic yards of hydrocarbon contaminated soil. The total cubic yards which would have to be removed due to entry and side wall excavation would be approximately 19,250 cubic yards to complete the excavation. It is an extremely rocky area and a tremendous amount of fresh fill would have to be brought into the site for dilution of the soil.

G. L. Erwin B NCT 2 Tank Battery
SW4 of SE4, Section 35, Township 24S, Range 38E
Lea County, New Mexico

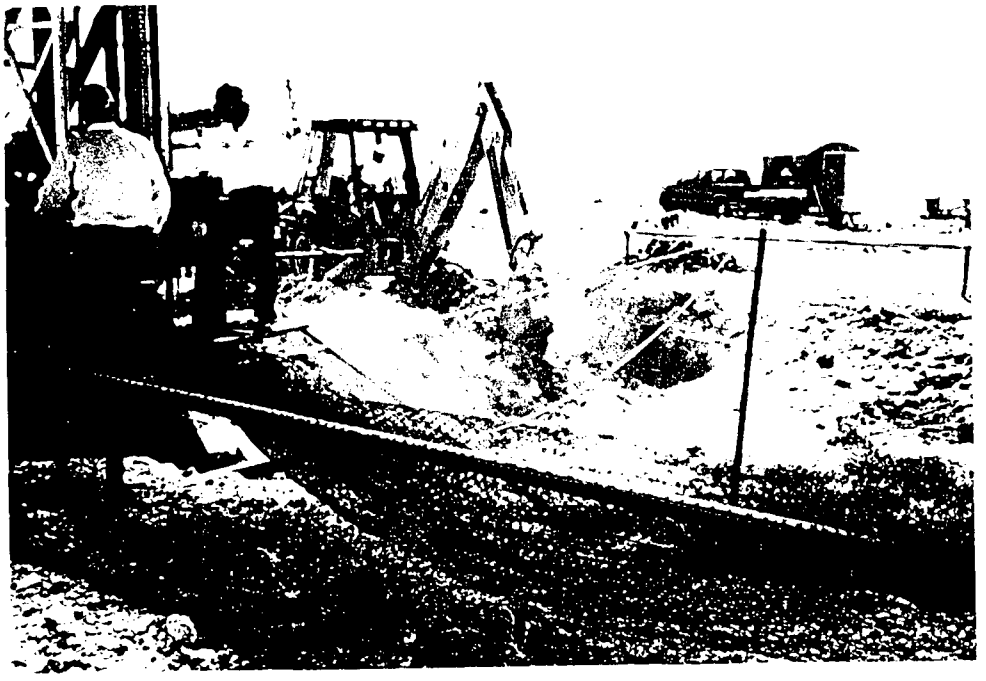


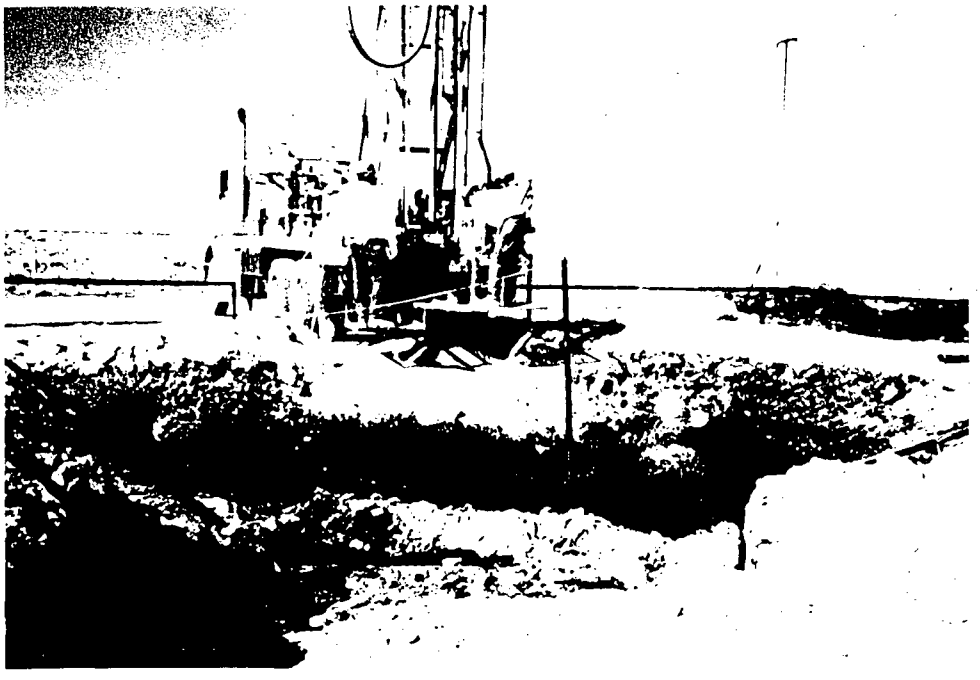
G. L. Erwin B NCT 2 Tank Battery
SW4 of SE4, Section 35, Township 24S, Range 38E
Lea County, New Mexico



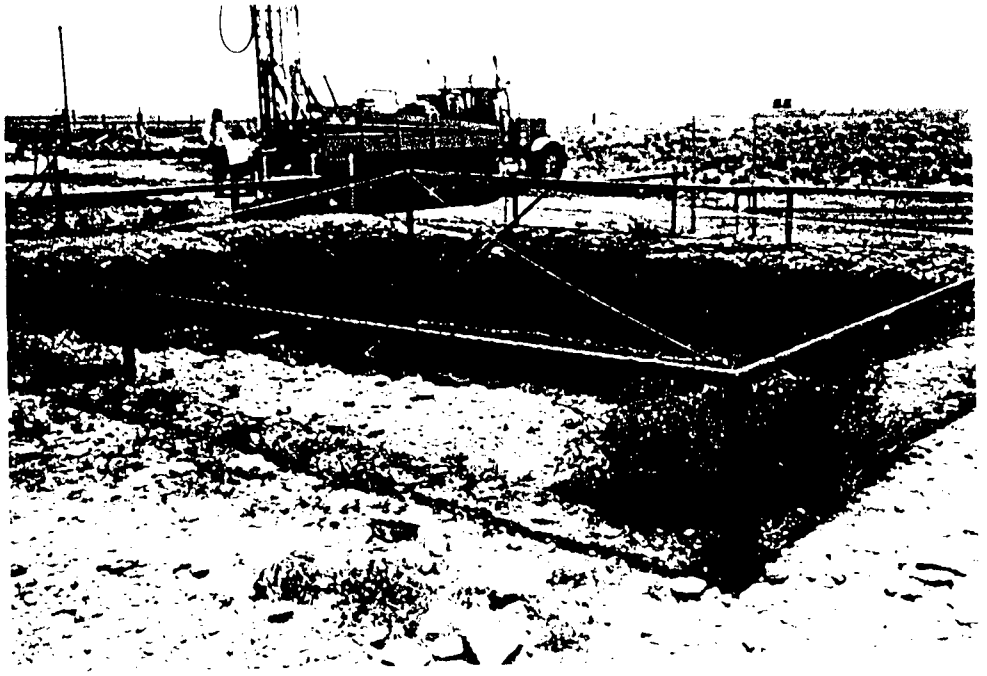


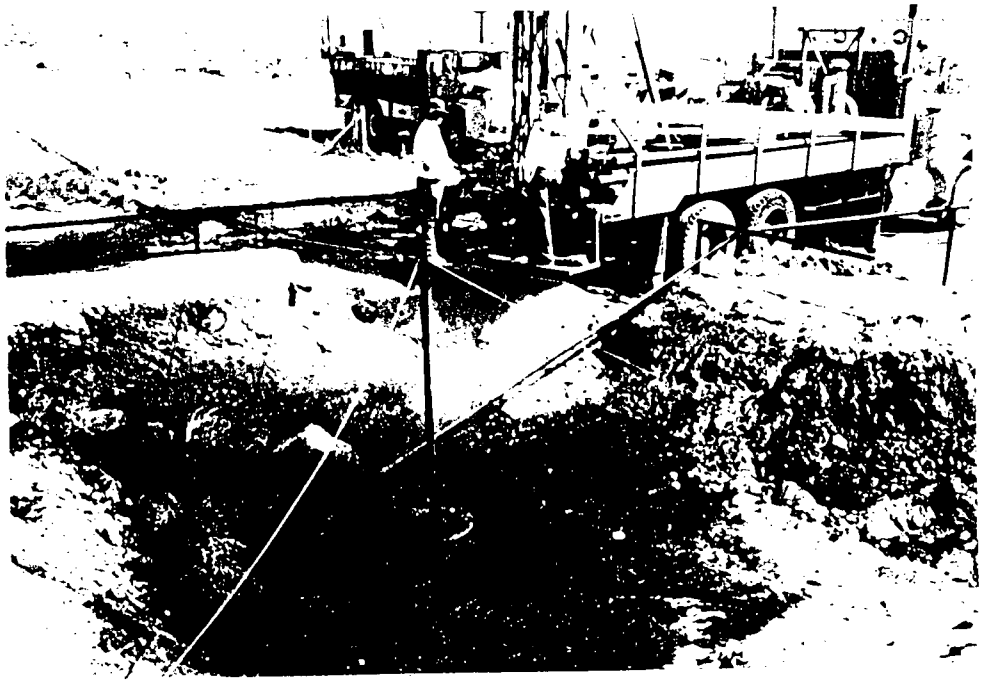
G. L. Erwin B NCT 2 Tank Battery
SW4 of SE4, Section 35, Township 24S, Range 38E
Lea County, New Mexico



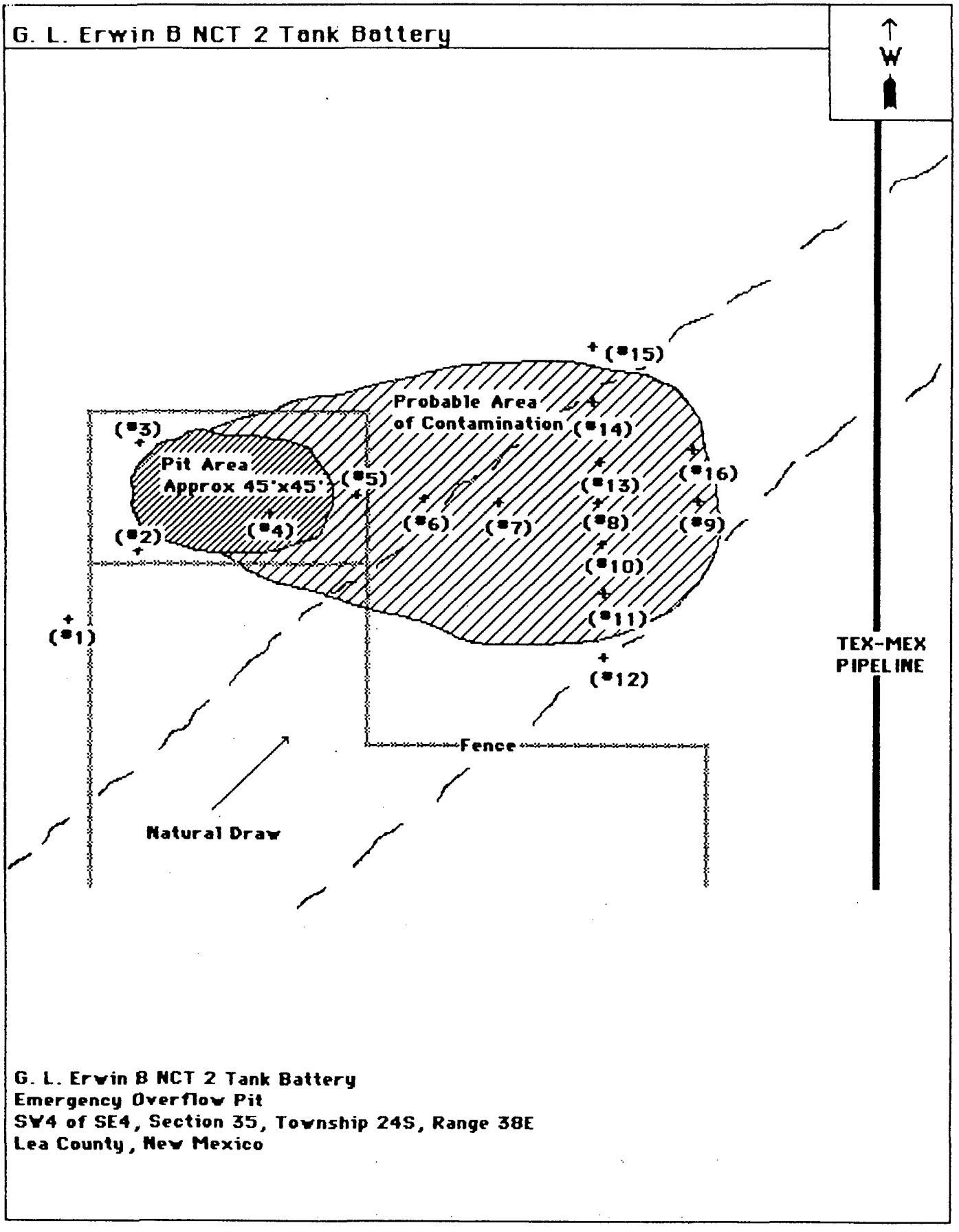


G. L. Erwin B NCT 2 Tank Battery
SW4 of SE4, Section 35, Township 24S, Range 38E
Lea County, New Mexico





G. L. Erwin B NCT 2 Tank Battery
SW4 of SE4, Section 35, Township 24S, Range 38E
Lea County, New Mexico



G. L. Erwin B NCT 2 Tank Battery
Emergency Overflow Pit
SW4 of SE4, Section 35, Township 24S, Range 38E
Lea County, New Mexico

ENVIRONMENTAL SPILL CONTROL, INC.
6210 Lovington Highway
P.O. Box 5890
Hobbs, NM 88240
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 09/27/93
CLIENT: TEXACO
SUPERVISOR: A. HODGE

FACILITY: G.L. ERWIN
B-NCT-2
HOLE # 1, #2, #3

	TPH	DEPTH	LOCATION
SAMPLE NO. 1:	30 PPM	Surface	SE Water well #1
SAMPLE NO. 2:	8 PPM	100'	SE Water well # 1
SAMPLE NO. 3:	111,700 PPM	Surface	SE # 2
SAMPLE NO. 4:	9,300 PPM	10'	SE # 2'
SAMPLE NO. 5:	142 PPM	20'	SE # 2
SAMPLE NO. 6:	21 PPM	30'	SE # 2
SAMPLE NO. 7:	132,300 PPM	Surface	SW # 3
SAMPLE NO. 8:	8,870 PPM	10'	SW # 3
SAMPLE NO. 9:	176 PPM	20'	SW # 3
SAMPLE NO. 10:	18 PPM	30'	SW # 3

COMMENTS: Drilled water well and hit water at about 67'. Southeast and southwest holes were clean at 30'. The north was clean at 55'. There is a plume that leads north of pit. There is a depression in the earth's surface that has allowed contamination to seep 40' north of pit, 50' west and 60' east. The depth of the contamination goes beyond 60' which is ground water level.

ENVIRONMENTAL SPILL CONTROL, INC.
6210 Lovington Highway
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Hobbs, NM 88240
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SOIL ANALYSIS REPORT

DATE: 09/27/93
CLIENT: TEXACO
SUPERVISOR: A. HODGE

FACILITY: G.L. ERWIN
B-NCT-2
HOLE # 4

	TPH	DEPTH	LOCATION
SAMPLE NO. 1:	149,600 PPM	Surface	Center
SAMPLE NO. 2:	7,980 PPM	10'	Center
SAMPLE NO. 3:	139 PPM	20'	Center
SAMPLE NO. 4:	27 PPM	30'	Center
SAMPLE NO. 5:	PPM		
SAMPLE NO. 6:	PPM		
SAMPLE NO. 7:	PPM		
SAMPLE NO. 8:	PPM		
SAMPLE NO. 9:	PPM		
SAMPLE NO. 10:	PPM		

COMMENTS:

ENVIRONMENTAL SPILL CONTROL, INC.
6210 Lovington Highway
P.O. Box 5890
Hobbs, NM 88240
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 09/27/93
CLIENT: TEXACO
SUPERVISOR: A. HODGE

FACILITY: G.L. ERWIN
B-NCT-2
HOLE # 5

	TPH	DEPTH	LOCATION
SAMPLE NO. 1:	128,200 PPM	Surface	North
SAMPLE NO. 2:	9,090 PPM	10'	North
SAMPLE NO. 3:	8,630 PPM	20'	North
SAMPLE NO. 4:	8,140 PPM	30'	North
SAMPLE NO. 5:	2,200 PPM	40'	North
SAMPLE NO. 6:	380 PPM	50'	North
SAMPLE NO. 7:	22 PPM	55'	North
SAMPLE NO. 8:	PPM		
SAMPLE NO. 9:	PPM		
SAMPLE NO. 10:	PPM		

COMMENTS:

ENVIRONMENTAL SPILL CONTROL, INC.
6210 Lovington Highway
P.O. Box 5890
Hobbs, NM 88240
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 09/28/93
CLIENT: TEXACO
SUPERVISOR: A. HODGE

FACILITY: G. L. ERWIN
B-NCT-2
HOLE #6

	TPH	DEPTH	LOCATION
SAMPLE NO. 1:	14,140 PPM	10'	5' North from pit
SAMPLE NO. 2:	12,710 PPM	20'	5' North from pit
SAMPLE NO. 3:	9,210 PPM	30'	5' North from pit
SAMPLE NO. 4:	7,980 PPM	40"	5' North from pit
SAMPLE NO. 5:	1,860 PPM	50'	5' North from pit
SAMPLE NO. 6:	1,270 PPM	60'	5' North from pit
SAMPLE NO. 7:	PPM		
SAMPLE NO. 8:	PPM		
SAMPLE NO. 9:	PPM		
SAMPLE NO. 10:	PPM		

COMMENTS: Drilling outside of pit walls to determine the size of the plume. Started 5' North of pit and went out to 40'. Then came back 20' and went 20' east. Drilled a hole and found contamination.

ENVIRONMENTAL SPILL CONTROL, INC.
6210 Lovington Highway
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Hobbs, NM 88240
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 09/27/93
CLIENT: TEXACO
SUPERVISOR: A. HODGE

FACILITY: G.L. ERWIN
B-NCT-2
HOLE # 7

	TPH	DEPTH	LOCATION
SAMPLE NO. 1:	16,110 PPM	10'	10' North from pit
SAMPLE NO. 2:	11,370 PPM	20'	10' North from pit
SAMPLE NO. 3:	9,860 PPM	30'	10' North from pit
SAMPLE NO. 4:	3,870 PPM	40'	10' North from pit
SAMPLE NO. 5:	1,540 PPM	50'	10' North from pit
SAMPLE NO. 6:	1,320 PPM	60'	10' North from pit
SAMPLE NO. 7:	PPM		
SAMPLE NO. 8:	PPM		
SAMPLE NO. 9:	PPM		
SAMPLE NO. 10:	PPM		

COMMENTS:

ENVIRONMENTAL SPILL CONTROL, INC.
6210 Lovington Highway
P.O. Box 5890
Hobbs, NM 88240
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 09/27/93
CLIENT: TEXACO
SUPERVISOR: A. HODGE

FACILITY: G.L. ERWIN
B-NCT-2
HOLE # 8

	TPH	DEPTH	LOCATION
SAMPLE NO. 1:	12,420 PPM	10'	20' North from pit
SAMPLE NO. 2:	11,040 PPM	20'	20' North from pit
SAMPLE NO. 3:	5.190 PPM	30'	20' North from pit
SAMPLE NO. 4:	332 PPM	40'	20' North from pit
SAMPLE NO. 5:	480 PPM	50'	20' North from pit
SAMPLE NO. 6:	1,310 PPM	60'	20' North from pit
SAMPLE NO. 7:	PPM		
SAMPLE NO. 8:	PPM		
SAMPLE NO. 9:	PPM		
SAMPLE NO. 10:	PPM		

COMMENTS:

ENVIRONMENTAL SPILL CONTROL, INC.
6210 Lovington Highway
P.O. Box 5890
Hobbs, NM 88240
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 09/27/93
CLIENT: TEXACO
SUPERVISOR: A. HODGE

FACILITY: G.L. ERWIN
B-NCT-2
HOLE # 9 and # 10

	TPH	DEPTH	LOCATION
SAMPLE NO. 1:	14,980 PPM	10'	40' North from pit
SAMPLE NO. 2:	286 PPM	20'	40' North from pit
SAMPLE NO. 3:	47 PPM	30'	40' North from pit
SAMPLE NO. 4:	12,150 PPM	10'	20' North / 20' East
SAMPLE NO. 5:	10,780 PPM	20'	20' North / 20' East
SAMPLE NO. 6:	5,860 PPM	30'	20' North / 20' East
SAMPLE NO. 7:	1,240 PPM	40'	20' North / 20' East
SAMPLE NO. 8:	PPM		
SAMPLE NO. 9:	PPM		
SAMPLE NO. 10:	PPM		

COMMENTS:

ENVIRONMENTAL SPILL CONTROL, INC.
6210 Lovington Highway
P.O. Box 5890
Hobbs, NM 88240
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 09/27/93
CLIENT: TEXACO
SUPERVISOR: A. HODGE

FACILITY: G.L. ERWIN
B-NCT-2
HOLE # 11, # 12 and # 13

	TPH	DEPTH	LOCATION
SAMPLE NO. 1:	7,820 PPM	10'	20' North / 40' East
SAMPLE NO. 2:	5,360 PPM	20'	20' North / 40' East
SAMPLE NO. 3:	4,750 PPM	30'	20' North / 40' East
SAMPLE NO. 4:	72 PPM	10'	20' North / 60' East
SAMPLE NO. 5:	59 PPM	20'	20' North / 60' East
SAMPLE NO. 6:	12 PPM	30'	20' North / 60' East
SAMPLE NO. 7:	11,570 PPM	10'	20' North / 20' West
SAMPLE NO. 8:	2,880 PPM	20'	20' North / 20' West
SAMPLE NO. 9:	470 PPM	30'	20' North / 20' West
SAMPLE NO. 10:	PPM		

COMMENTS:

ENVIRONMENTAL SPILL CONTROL, INC.
6210 Lovington Highway
P.O. Box 5890
Hobbs, NM 88240
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 09/27/93
CLIENT: TEXACO
SUPERVISOR: S. THOMAS

FACILITY: G.L. ERWIN
B-NCT-2
HOLE # 14, # 15 and # 16

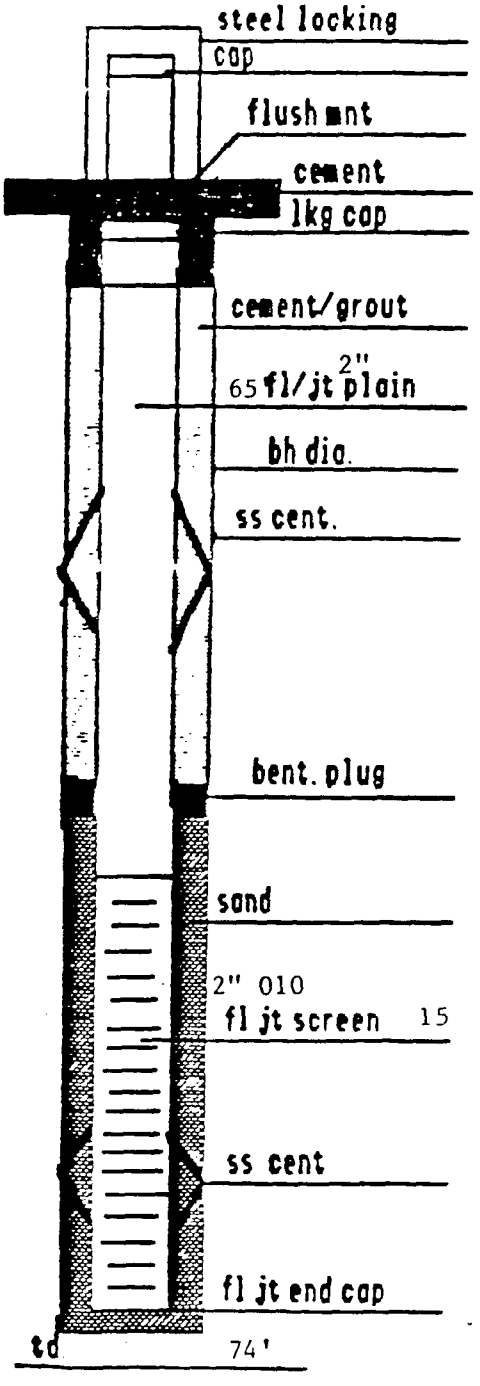
	TPH	DEPTH	LOCATION
SAMPLE NO. 1:	12,280 PPM	10'	20' North / 40' West
SAMPLE NO. 2:	478 PPM	20'	20' North / 40' West
SAMPLE NO. 3:	288 PPM	30'	20' North / 40' West
SAMPLE NO. 4:	9,970 PPM	10'	20' North / 60' West
SAMPLE NO. 5:	814 PPM	20'	20' North / 60' West
SAMPLE NO. 6:	130 PPM	30'	20' North / 60' West
SAMPLE NO. 7:	97 PPM	10'	40' North / 20' West
SAMPLE NO. 8:	18 PPM	20'	40' North / 20' West
SAMPLE NO. 9:	13 PPM	30'	40' North / 20' West
SAMPLE NO. 10:	PPM		

COMMENTS:

ENVIRONMENTAL
SPILL CONTROL, INC.

Customer G.L. Erwin — Date 9/27/93
Location BNCT-2TB — Well

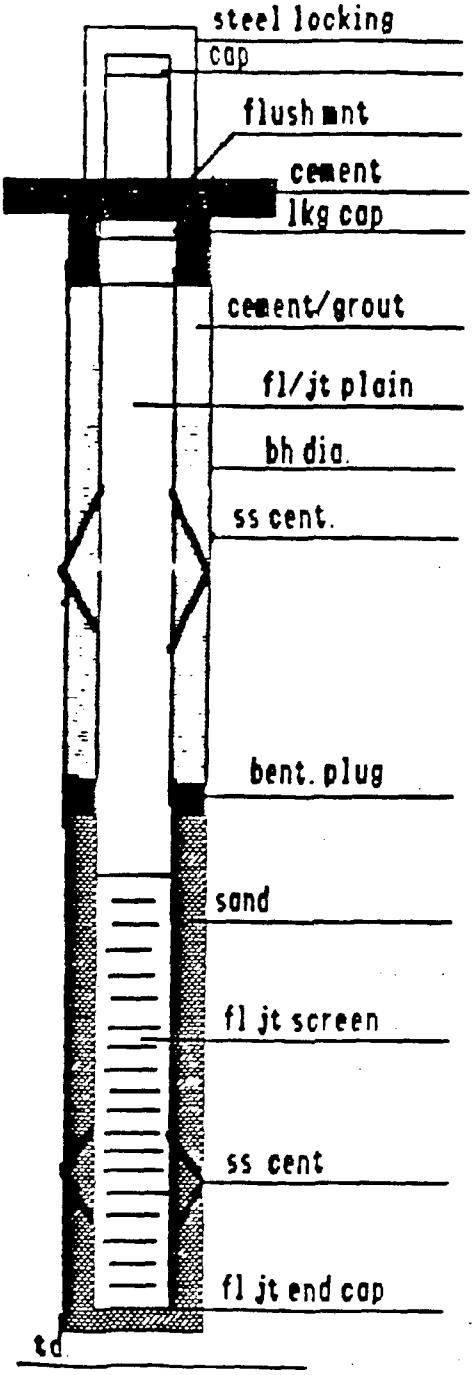
Description	Ft.	Ft.	Start	Stop	SB	SB	OVM Ft.	PPM
#1 100' hole			11:20		10:00	10:45		
TS	0	2						
CAL	2	13						
Sand	13	20						
SS	20	21						
Sand	21	50						
SS	50	52						
Sand	52	55						
S.R. Clay & Gray	~~55~~	~~74~~		~~1:40~~				
Wet @ 65'								
Set casing			1:40	2:00				
SB-2	30	TD	2:08	2:35				
SB-3	30	TD	2:40	3:05				
SB-4	55	TD	3:10	4:50	(Gray)			
SB-5	30	TD	5:30	6:05	4:50	5:30		



ENVIRONMENTAL
SPILL CONTROL, INC.

Customer G.L. Erwin Date 9/28/93
Location NCT-2TB Well

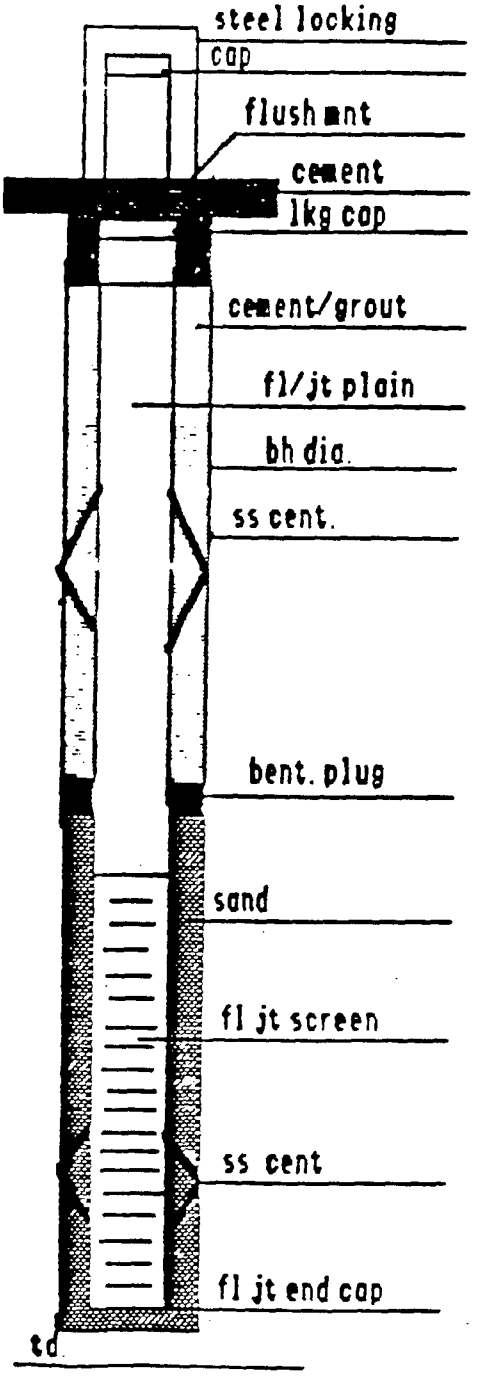
Description	Ft.	Ft.	Start	Stop	SB	SB	OVM Ft.	PPM
SB-6TS	0	3	9:30					
CAL	3	12						
Gray Sand	12	50						
SS	50	52						
Gray &Red Sand	52	60	TD	11:20				
SB-7	60	TD	11:20	12:33			(Gray)	
SB-8	60	TD	1:15	3:00			(Gray)	
SB-9	30	TD	3:00	3:40			(Gray)	
SB-10	40	TD	3:50	4:20			(Gray)	



ENVIRONMENTAL
SPILL CONTROL, INC.

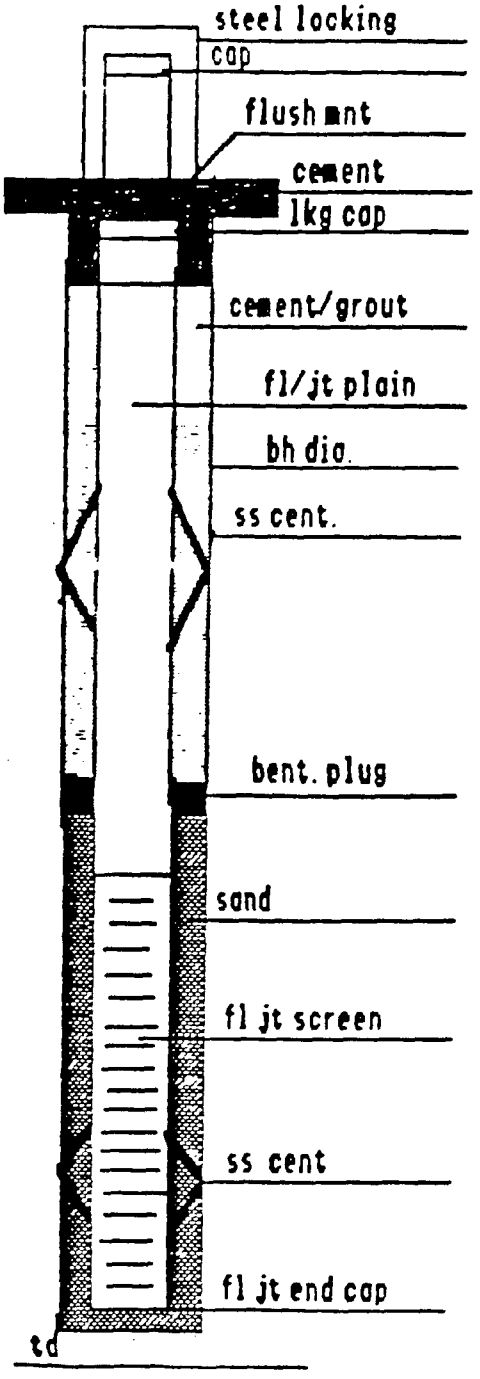
Customer G.L. Erwin Date 9/29/93
Location NCT-2TB Well

Description	Ft.	Ft.	Start	Stop	SB	SB	OVM	Ft.	PPM
SB- 11	30	TD	10:15	10:27	4:00	10:15	(Gray)		
SB- 12	30	TD	10:35	10:50			(Gray)		
SB- 13	30	TD	10:55	11:23			(Clean)	E	
SB- 14	30	TD	11:23	11:42			(Gray)		
SB- 15	30	TD	12:25	12:45			(Clean)	W	
Water Sample (100' hole)			4:15	5:00					
WL - 60'									
Bailed 6	gal								



ENVIRONMENTAL
SPILL CONTROL, INC.

Customer	G.L. Erwin						Date	9/30/93
Location	NCT-2TR						Well	
Description	Ft.	Ft.	Start	Stop	SB	SB	OVM	Ft. PPM
					10:00	11:15		
SB-16	30	TD	11:20	11:35				
(Clean)					11:35	11:50		
					left for Cooper Jal			
					to return around			12:00
					lunch			



ENVIRONMENTAL
LAB OF , INC.
"Don't Treat Your Soil Like Dirt!"

October 5, 1993

Environmental Spill Control
Mr. Allen Hodge
P.O. Box 5890
Hobbs, NM 88241

Sample Matrix: Soil

Project: Erwin
Submitted By: Allen Hodge

Date Received: 9/27/93
Date Reported: 10/5/93

CHEMICAL ANALYSIS REPORT

Parameter	Value	Units	Test Method
Sample ID: Southeast Corner Surface			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	<0.1	mg/kg	
Sample ID: Southeast Corner 30'			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	<0.1	mg/kg	

12600 West I-20 East • Odessa, Texas 79763 • (915) 563-1800 • Fax (915) 563-1713

Parameter	Value	Units	Test Method
Sample ID: Southwest Corner Surface			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	2.3	mg/kg	
Sample ID: Southwest Corner 30'			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	2.9	mg/kg	
Sample ID: North Surface			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	<0.1	mg/kg	
Sample ID: North 55'			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	<0.1	mg/kg	
Sample ID: Center Surface			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	<0.1	mg/kg	
Sample ID: Center 30'			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	<0.1	mg/kg	

Parameter	Value	Units	Test Method
Sample ID: Surface Water			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	<0.1	mg/kg	
Sample ID: Water Bottom 100'			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	<0.1	mg/kg	

Total QC (Quality Control)

Tot. BTEX QC:Blank spiked with 24 ug/l BTE and 48 ug/l (m,p)Xylene, 24 ug/l (o) Xylene
Detection Limits 0.1 mg/kg

	Result (ug/l)	% Accuracy
Benzene	26.3	109
Toluene	23.1	96
Ethylbenzene	22.4	93
Xylene (mp)	45.8	95
Xylene (o)	25.3	105

Parameter	Value (ppm)	EPA Limit (ppm)	QC	% Accuracy	Detection Limit
Sample ID: 1' TCLP					
Arsenic (As)	<0.1	5.0	5.1	102	0.1
Selenium (Se)	<0.2	1.0	1.0	100	0.2
Chromium (Cr)	<0.1	5.0	4.9	98	0.1
Cadmium (Cd)	<0.1	1.0	1.0	100	0.1
Lead (Pb)	<0.1	5.0	5.0	100	0.1
Barium (Ba)	<0.1	100	103	103	1.0
Mercury (Hg)	<0.001	0.20	0.020	100	0.001
Silver (Ag)	<0.01	5.0	5.4	108	0.01

Methods: EPA SW 846-1311, 6010, 7471
TCLP Metals QC: Blank spiked with 5.0 ppm As, Cr, Pb and Ag; 1.0 ppm Se and Cd; 100 ppm Ba; and 0.020 ppm Hg.

Kirk Robinson

ENVIRONMENTAL
LAB OF TEXAS, INC.
"Don't Treat Your Soil Like Dirt!"

October 11, 1993

Environmental Spill Control
Mr. Allen Hodge
P.O. Box 5890
Hobbs, NM 88241

Sample Matrix: Soil

Project: Erwin
Submitted By: Allen Hodge

Date Received: 9/30/93
Date Reported: 10/11/93

CHEMICAL ANALYSIS REPORT

Parameter	Value	Units	Test Method
Sample ID: Surface			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	1.8	mg/kg	
Sample ID: 5' Out Center			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	<0.1	mg/kg	

12600 West I-20 East • Odessa, Texas 79763 • (915) 563-1800 • Fax (915) 563-1713

Parameter	Value	Units	Test Method
Sample ID: 10' Out Center			
Benzene	<0.1	mg/kg	8020/5030
Toluene	<0.1	mg/kg	
Ethylbenzene	<0.1	mg/kg	
Xylene (omp)	<0.1	mg/kg	

Total QC (Quality Control)

Tot. BTEX QC:Blank spiked with 24 ug/l BTE and 48 ug/l (m,p)Xylene, 24 ug/l (o) Xylene
Detection Limits 0.1 mg/kg

	Result (ug/l)	% Accuracy
Benzene	25.7	107
Toluene	23.8	99
Ethylbenzene	23.5	98
Xylene (mp)	47.3	99
Xylene (o)	23.8	99

Kirk Robinson

October 28, 1994 Report

Presented to:

TEXACO

FINAL CLOSURE REPORT

for:

G. L. Erwin "B" NCT 2
Tank Battery
Emergency Overflow Pit
SW4/SE4
S35, T24S, R38E
Lea County

Prepared by:

Environmental Spill Control, Inc.
1203 W. Dunnam
P.O. Box 5890
Hobbs, New Mexico 88241
(505) 392-6167

PHONE (505) 392-6167
FAX (505) 392-8788

P.O. BOX 5890 ★ HOBBS, NM 88241

October 28, 1994

Texaco E & P
P.O. Box 730
Hobbs, New Mexico 88241-0730

Attn: Mr. Larry Lehman

Re: Final Closure Report for the G. L. Erwin "B" NCT 2, Tank Battery Emergency Overflow Pit

Dear Mr. Lehman:

Environmental Spill Control, Incorporated would like to take this opportunity to thank you and your organization for the ability to be of service. The following summarizes the G. L. Erwin pit closure, including soil reports and photo documentation.

An engineering study of the closure and Health and Safety Plan were begun on July 20, 1994. Approximately 400 feet by 500 feet, an estimated 200,000 square feet of working area was fenced off prior to mobilization of equipment. All the pipelines inside the work area were rerouted for excavation safety purposes.

The original pit size was approximately 45 feet by 45 feet, an estimated 2,025 square feet. The fence and netting around the pit were removed on July 21, 1994. There was 492 cubic yards of heavy hydrocarbon contaminated soil excavated in the first 6 feet of the pit that was stabilized and hauled to CRI for disposal. On August 1, 1994, heavy equipment being dozers, were moved onto the site to begin the excavation. The pit over the next several weeks was excavated to a depth of 62.5 feet. It should be mentioned that the closure guidelines recommended by the OCD in a ranking score for the pit was 1,000 ppm of Total Petroleum Hydrocarbon (TPH).

On September 14, 1994, excavation to the bottom of the pit was accomplished. Mr. Wayne Price, an engineer with the OCD, inspected the site to verify the clean-up criteria had been met on the pit. TPH tests were conducted on-site and witnessed by Mr. Price from soil samples taken at 62 feet in depth, with the highest TPH reading being 227 ppm. Approval from Mr. Price was given to begin backfilling the excavation. An additional 6 inches of soil was removed to clean out any residual contamination that had emanated from the equipment. TPH tests were again conducted on-site at 62.5 feet and all results were less than 50 ppm of TPH. A composite sample

was secured by random systematic sampling and sent to a third party lab, Environmental Labs of Texas, for TPH and BTEX analysis. The TPH test results were less than 10 ppm and the BTEX results were non detectable. We began backfilling the pit on September 15, 1994. It was estimated that there had been in excess of 40,000 cubic yards of soils and impacted soils excavated out of the excavation.

From 62.5 feet up to 55 feet, a mixture of clean sand and clay was placed in the bottom to act as a buffer zone. The buffer zone was layered in two foot lifts and compacted. Soil dilution of the excavated impacted material began and placement in the excavation began at 55 feet. The soils were mixed a number of times with final mixture with fresh soils to lower the overall TPH below closure limits and virtually eliminate any BTEX. Five foot lifts were employed and compaction of the lifts was accomplished at each five foot interval until the excavation was brought back to grade. Each five foot layer being compacted was analyzed for TPH to ensure that closure guidelines were maintained. BTEX was analyzed in 10 foot intervals beginning at 50 feet. All of the analyses for BTEX were non detectable to grade. Once the site was back to grade and dressed off, the site was planted in pasture mix. We choose to use pasture mix due to the season of the year; it was to late to use natural range grass. The site will remain fenced until the spring when natural range grass can be planted. Once a good stand of grass is up, the fencing will be taken down.

There was approximately 2,000 cubic yards of caliche left over from the excavation of the pit that was moved inside the battery fence to be used by Texaco for pad material when the battery is rebuilt.

If you have any questions or desire further information, please contact us.

Sincerely,
ENVIRONMENTAL SPILL CONTROL, INC.

Allen Hodge, REM
Field Superintendent

ENVIRONMENTAL SPILL CONTROL, INC.
1203 W. Dunnam
P.O. Box 5890
Hobbs, NM 88241
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 09/14/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	37	PPM	62.5'	Northwest Corner
SAMPLE NO. 2:	24	PPM	62.5'	Southwest Corner
SAMPLE NO. 3:	33	PPM	62.5'	Northeast Corner
SAMPLE NO. 4:	26	PPM	62.5'	Southeast Corner
SAMPLE NO. 5:	21	PPM	62.5'	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

for Grid - 4 or 5 GRAB SAMPLES

COMMENTS: These were composite samples taken at the bottom of the pit after an additional 6" was removed for a final cleaning to ensure all contamination was removed. A composite sample was also sent to an outside lab for TPH and BTEX.

ENVIRONMENTAL SPILL CONTROL, INC.
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SOIL ANALYSIS REPORT

DATE: 09/14/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	160	PPM	62'	Northwest Corner
SAMPLE NO. 2:	84	PPM	62'	Southwest Corner
SAMPLE NO. 3:	57	PPM	62'	Northeast Corner
SAMPLE NO. 4:	139	PPM	62'	Southeast Corner
SAMPLE NO. 5:	227	PPM	62'	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

COMMENTS: These samples were four point composite samples taken at the bottom of the pit at 62 feet. They were witnessed by Wayne Price with the OCD to ensure that all contamination had been removed.

ENVIRONMENTAL SPILL CONTROL, INC.
1203 W. Dunnam
P.O. Box 5890
Hobbs, NM 88241
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 09/16/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	420	PPM	55'-50'	Northwest Corner
SAMPLE NO. 2:	660	PPM	55'-50'	Southwest Corner
SAMPLE NO. 3:	548	PPM	55'-50'	Northeast Corner
SAMPLE NO. 4:	494	PPM	55'-50'	Southeast Corner
SAMPLE NO. 5:	580	PPM	55'-50'	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

COMMENTS: These were composite samples taken from the fill material from 55 feet back to 50 feet.

ENVIRONMENTAL SPILL CONTROL, INC.
1203 W. Dunnam
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Hobbs, NM 88241
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 09/19/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	510	PPM	50'-45'	Northwest Corner
SAMPLE NO. 2:	624	PPM	50'-45'	Southwest Corner
SAMPLE NO. 3:	545	PPM	50'-45'	Northeast Corner
SAMPLE NO. 4:	680	PPM	50'-45'	Southeast Corner
SAMPLE NO. 5:	490	PPM	50'-45'	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

COMMENTS: These were composite samples taken from the fill material from 50 feet back to 45 feet.

ENVIRONMENTAL SPILL CONTROL, INC.
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SOIL ANALYSIS REPORT

DATE: 09/22/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	720	PPM	45'-40'	Northwest Corner
SAMPLE NO. 2:	655	PPM	45'-40'	Southwest Corner
SAMPLE NO. 3:	480	PPM	45'-40'	Northeast Corner
SAMPLE NO. 4:	710	PPM	45'-40'	Southeast Corner
SAMPLE NO. 5:	588	PPM	45'-40'	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

COMMENTS: These were composite samples taken from the fill material from 45 feet back to 40 feet.

ENVIRONMENTAL SPILL CONTROL, INC.
1203 W. Dunnam
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SOIL ANALYSIS REPORT

DATE: 09/26/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	525	PPM	40'-35'	Northwest Corner
SAMPLE NO. 2:	467	PPM	40'-35'	Southwest Corner
SAMPLE NO. 3:	490	PPM	40'-35'	Northeast Corner
SAMPLE NO. 4:	610	PPM	40'-35'	Southeast Corner
SAMPLE NO. 5:	600	PPM	40'-35'	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

COMMENTS: These were composite samples taken from the fill material from 40 feet back to 35 feet.

ENVIRONMENTAL SPILL CONTROL, INC.
1203 W. Dunnam
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Hobbs, NM 88241
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 09/29/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	390	PPM	35'-30'	Northwest Corner
SAMPLE NO. 2:	812	PPM	35'-30'	Southwest Corner
SAMPLE NO. 3:	640	PPM	35'-30'	Northeast Corner
SAMPLE NO. 4:	765	PPM	35'-30'	Southeast Corner
SAMPLE NO. 5:	683	PPM	35'-30'	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

COMMENTS: These were composite samples taken from the fill material from 35 feet back to 30 feet.

ENVIRONMENTAL SPILL CONTROL, INC.
1203 W. Dunnam
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(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 10/01/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	388	PPM	30'-25'	Northwest Corner
SAMPLE NO. 2:	640	PPM	30'-25'	Southwest Corner
SAMPLE NO. 3:	420	PPM	30'-25'	Northeast Corner
SAMPLE NO. 4:	514	PPM	30'-25'	Southeast Corner
SAMPLE NO. 5:	477	PPM	30'-25'	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

COMMENTS: These were composite samples taken from the fill material from 30 feet back to 25 feet.

ENVIRONMENTAL SPILL CONTROL, INC.
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SOIL ANALYSIS REPORT

DATE: 10/03/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	560	PPM	25'-20'	Northwest Corner
SAMPLE NO. 2:	745	PPM	25'-20'	Southwest Corner
SAMPLE NO. 3:	620	PPM	25'-20'	Northeast Corner
SAMPLE NO. 4:	680	PPM	25'-20'	Southeast Corner
SAMPLE NO. 5:	664	PPM	25'-20'	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

COMMENTS: These were composite samples taken from the fill material from 25 feet back to 20 feet.

ENVIRONMENTAL SPILL CONTROL, INC.
1203 W. Dunnam
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SOIL ANALYSIS REPORT

DATE: 10/04/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	640	PPM	20'-15'	Northwest Corner
SAMPLE NO. 2:	744	PPM	20'-15'	Southwest Corner
SAMPLE NO. 3:	680	PPM	20'-15'	Northeast Corner
SAMPLE NO. 4:	696	PPM	20'-15'	Southeast Corner
SAMPLE NO. 5:	710	PPM	20'-15'	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

COMMENTS: These were composite samples taken from the fill material from 20 feet back to 15 feet.

ENVIRONMENTAL SPILL CONTROL, INC.
1203 W. Dunnam
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SOIL ANALYSIS REPORT

DATE: 10/05/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	760	PPM	15'-10'	Northwest Corner
SAMPLE NO. 2:	890	PPM	15'-10'	Southwest Corner
SAMPLE NO. 3:	770	PPM	15'-10'	Northeast Corner
SAMPLE NO. 4:	795	PPM	15'-10'	Southeast Corner
SAMPLE NO. 5:	864	PPM	15'-10'	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

COMMENTS: These were composite samples taken from the fill material from 15 feet back to 10 feet.

ENVIRONMENTAL SPILL CONTROL, INC.
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Hobbs, NM 88241
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 10/06/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	825	PPM	10'-5'	Northwest Corner
SAMPLE NO. 2:	780	PPM	10'-5'	Southwest Corner
SAMPLE NO. 3:	790	PPM	10'-5'	Northeast Corner
SAMPLE NO. 4:	845	PPM	10'-5'	Southeast Corner
SAMPLE NO. 5:	884	PPM	10'-5'	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

COMMENTS: These were composite samples taken from the fill material from 10 feet back to 5 feet.

ENVIRONMENTAL SPILL CONTROL, INC.
1203 W. Dunnam
P.O. Box 5890
Hobbs, NM 88241
(505) 392-6167 (800) 390-6167

SOIL ANALYSIS REPORT

DATE: 10/07/94
CLIENT: Texaco
SUPERVISOR: A. HODGE

FACILITY: G L Erwin
Test Method: EPA 418.1
Matrix: Soil

	TPH		DEPTH	LOCATION
SAMPLE NO. 1:	280	PPM	5'-Surface	Northwest Corner
SAMPLE NO. 2:	160	PPM	5'-Surface	Southwest Corner
SAMPLE NO. 3:	310	PPM	5'-Surface	Northeast Corner
SAMPLE NO. 4:	260	PPM	5'-Surface	Southeast Corner
SAMPLE NO. 5:	198	PPM	5'-Surface	Middle
SAMPLE NO. 6:		PPM		
SAMPLE NO. 7:		PPM		
SAMPLE NO. 8:		PPM		
SAMPLE NO. 9:		PPM		
SAMPLE NO. 10:		PPM		

COMMENTS: These were composite samples taken from the fill material from 5 feet back to the surface.

ENVIRONMENTAL SPILL CONTROL, INC.
1213 West County Road
P.O. Box 5890
Hobbs, New Mexico 88240
(505)392-6167

CHEMICAL ANALYSIS REPORT

CLIENT: Texaco
SUPERVISOR: Allen Hodge
SAMPLE MATRIX: Soil

SITE ID: G. L. Erwin "B" NCT 2
ORDERED BY: Mr. Larry Lehman
Tank Battery Emergency Overflow Pit

September 15, 1994

Parameter	Value	Units	Test Method
Sample #1 @ 50 feet			
Benzene	ND	Mg/L	Headspace GC
Toluene	ND	Mg/L	8020/EPA
Ethylbenzene	ND	Mg/L	
Xylene (OMP)	ND	Mg/L	

September 22, 1994

Parameter	Value	Units	Test Method
Sample #1 @ 40 feet			
Benzene	ND	Mg/L	Headspace GC
Toluene	ND	Mg/L	8020/EPA
Ethylbenzene	ND	Mg/L	
Xylene (OMP)	ND	Mg/L	

September 29, 1994

Parameter	Value	Units	Test Method
Sample #1 @ 30 feet			
Benzene	ND	Mg/L	Headspace GC
Toluene	ND	Mg/L	8020/EPA
Ethylbenzene	ND	Mg/L	
Xylene (OMP)	ND	Mg/L	

October 03, 1994

Parameter	Value	Units	Test Method
Sample #1 @ 20 feet			
Benzene	ND	Mg/L	Headspace GC
Toluene	ND	Mg/L	8020/EPA
Ethylbenzene	ND	Mg/L	
Xylene (OMP)	ND	Mg/L	

October 05, 1994

Parameter	Value	Units	Test Method
Sample #1 @ 10 feet			
Benzene	ND	Mg/L	Headspace GC
Toluene	ND	Mg/L	8020/EPA
Ethylbenzene	ND	Mg/L	
Xylene (OMP)	ND	Mg/L	

ENVIRONMENTAL SPILL CONTROL, INC.
1213 West County Road
P.O. Box 5890
Hobbs, New Mexico 88240
(505)392-6167

CHEMICAL ANALYSIS REPORT

CLIENT: Texaco
SUPERVISOR: Allen Hodge
SAMPLE MATRIX: Soil

SITE ID: G. L. Erwin "B" NCT 2
ORDERED BY: Mr. Larry Lehman
Tank Battery Emergency Overflow Pit

October 07, 1994

Parameter	Value	Units	Test Method
Sample #1 @ Surface			
Benzene	ND	Mg/L	Headspace GC
Toluene	ND	Mg/L	8020/EPA
Ethylbenzene	ND	Mg/L	
Xylene (OMP)	ND	Mg/L	

ENVIRONMENTAL
LAB OF , INC.
"Don't Treat Your Soil Like Dirt!"

September 23, 1994

Client: **Environmental Spill Control**
Mr. Allen Hodge
P.O. Box 5890
Hobbs, NM 88241

Sample Matrix: Soil

Job ID: G.L. Erwin, Jal NM
Date Received: 9/16/94
Analysis Date: 9/23/94

CHEMICAL ANALYSIS REPORT

Parameter	Value	Units	EPA SW-846 Test Method
Sample ID: G.L. Erwin bottom 62'			418.1/3550
Total Petroleum Hydrocarbons	<10.0	ppm	

QC (Quality Control)

Total Petroleum Hydrocarbons QC: 200 ppm
Detection Limit 10 ppm

	Result	% IA
TPH	224ppm	112

Kirk Robinson

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

September 23, 1994

Client: Environmental Spill Control
Mr. Allen Hodge
P.O. Box 5890
Hobbs, NM 88241

Sample Matrix: Soil

Job ID: G.L. Erwin, Jal NM
Date Received: 9/16/94
Analysis Date: 9/23/94

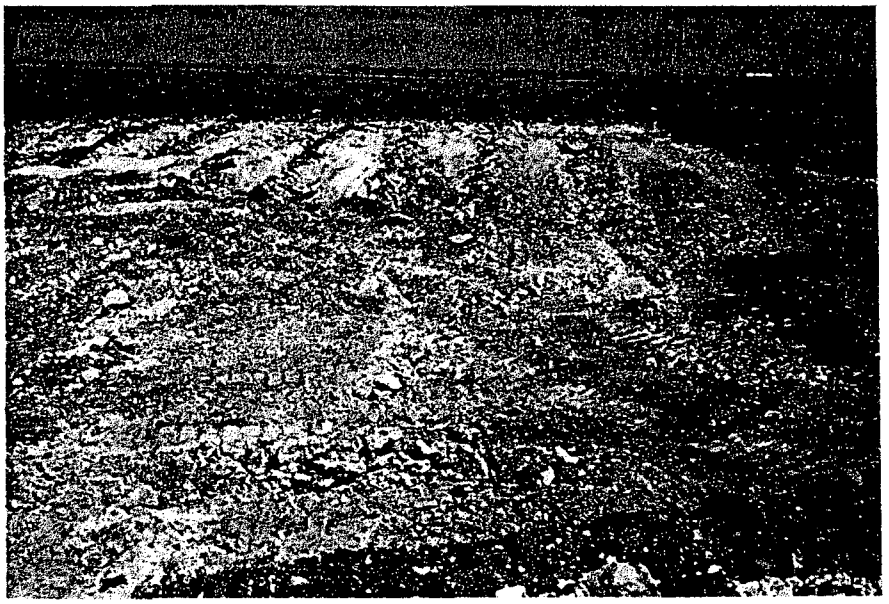
Compounds	Actual (ppm)	Detection Limit (ppm)	QC	%IA
Sample ID: G.L. Erwin bottom 62'				
Benzene	ND	0.1	0.094	94
Toluene	ND	0.1	0.095	95
Ethylbenzene	ND	0.1	0.097	97
Xylene (m,p)	ND	0.2	0.192	96
Xylene (o)	ND	0.1	0.096	96
Surrogate Spike	%Recovery			
a,a,a Trifluorotoluene	92			

QC= 100 ppb BTE (o)X & 200 ppb (m,p) X. Surrogate Spike=100 ppb a,a,a Trifluorotoluene
Methods: EPA SW 846-8020/5030

ND = Not Detected

Kirk Robinson

G. L. Erwin "B" NCT 2
Tank Battery
Emergency Overflow Pit
SW4/SE4, S35, T24S, R38E
Lea County



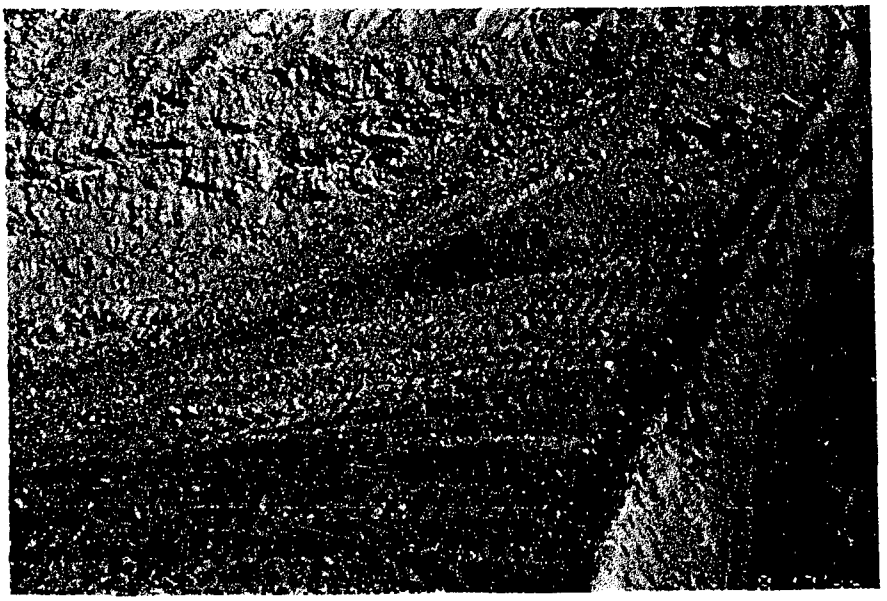
Start of Excavation

G. L. Erwin "B" NCT 2
Tank Battery
Emergency Overflow Pit
SW4/SE4, S35, T24S, R38E
Lea County

Second Week of Excavation

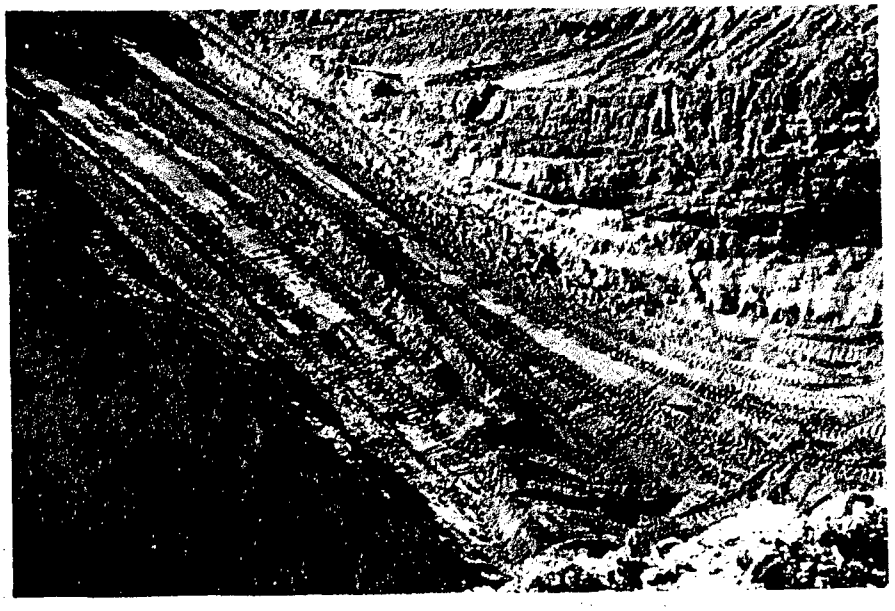
G. L. Erwin "B" NCT 2
Tank Battery
Emergency Overflow Pit
SW4/SE4, S35, T24S, R38E
Lea County

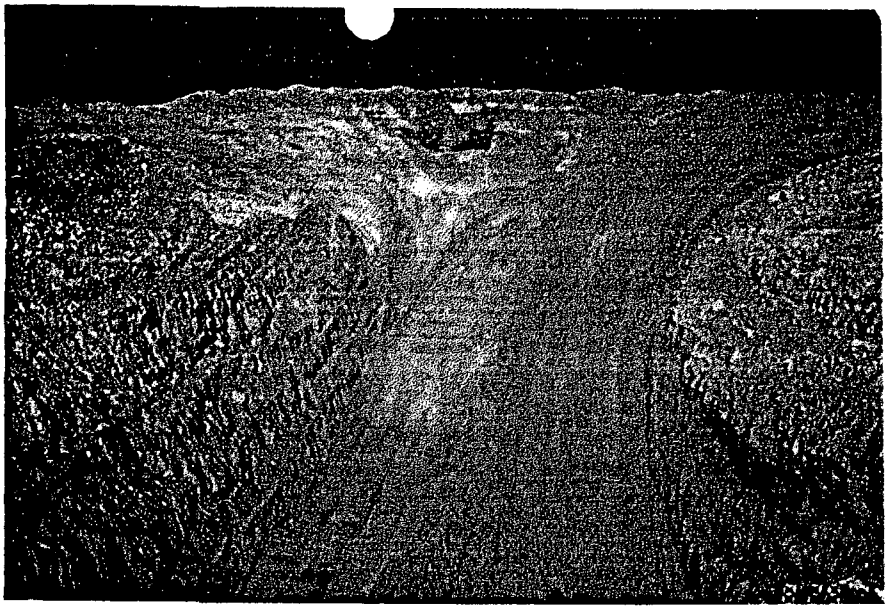
Third Week of Excavation



G. L. Erwin "B" NCT 2
Tank Battery
Emergency Overflow Pit
SW4/SE4, S35, T24S, R38E
Lea County

Fourth Week of Excavation



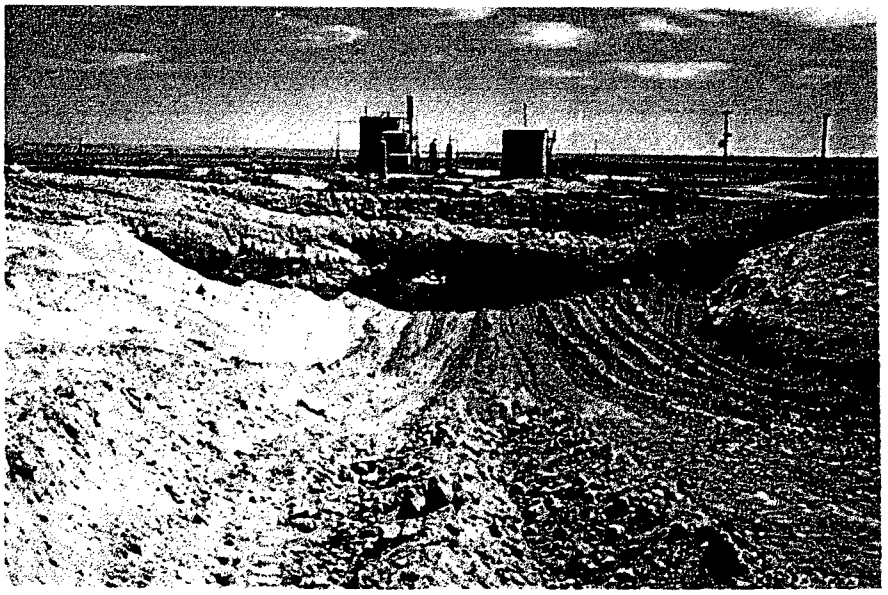


G. L. Erwin "B" NCT 2
Tank Battery
Emergency Overflow Pit
SW4/SE4, S35, T24S, R38E
Lea County

Fifth Week of Excavation

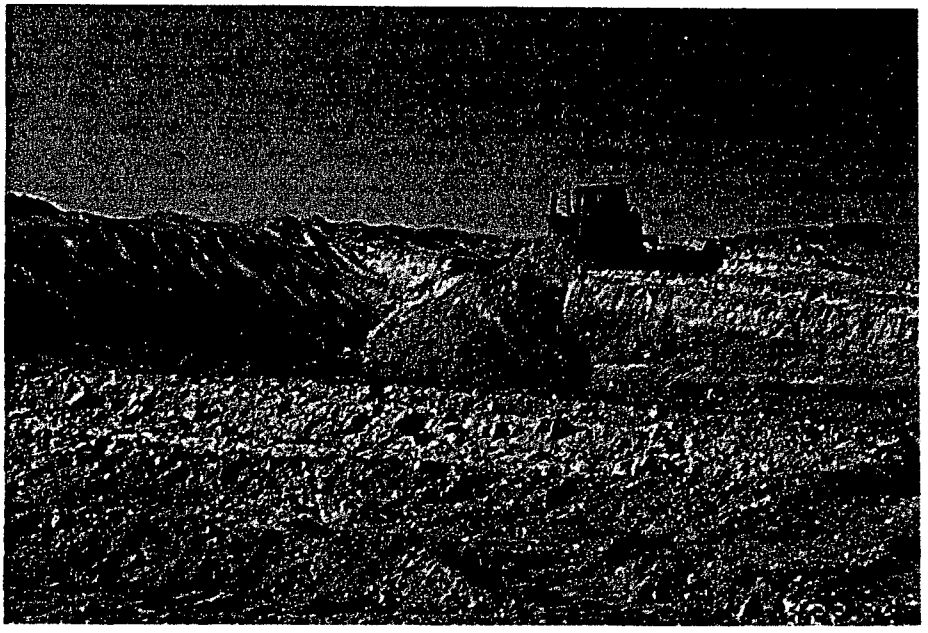
Sixth Week of Excavation
Pit Bottom

G. L. Erwin "B" NCT 2
Tank Battery
Emergency Overflow Pit
SW4/SE4, S35, T24S, R38E
Lea County

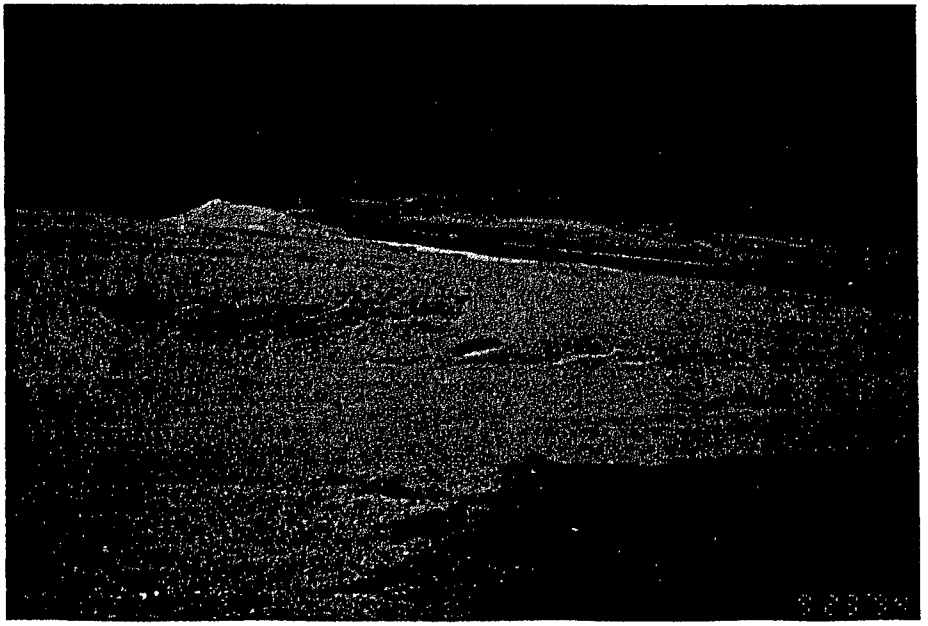


Seventh Week
Dilution & Stabilization

G. L. Erwin "B" NCT 2
Tank Battery
Emergency Overflow Pit
SW4/SE4, S35, T24S, R38E
Lea County

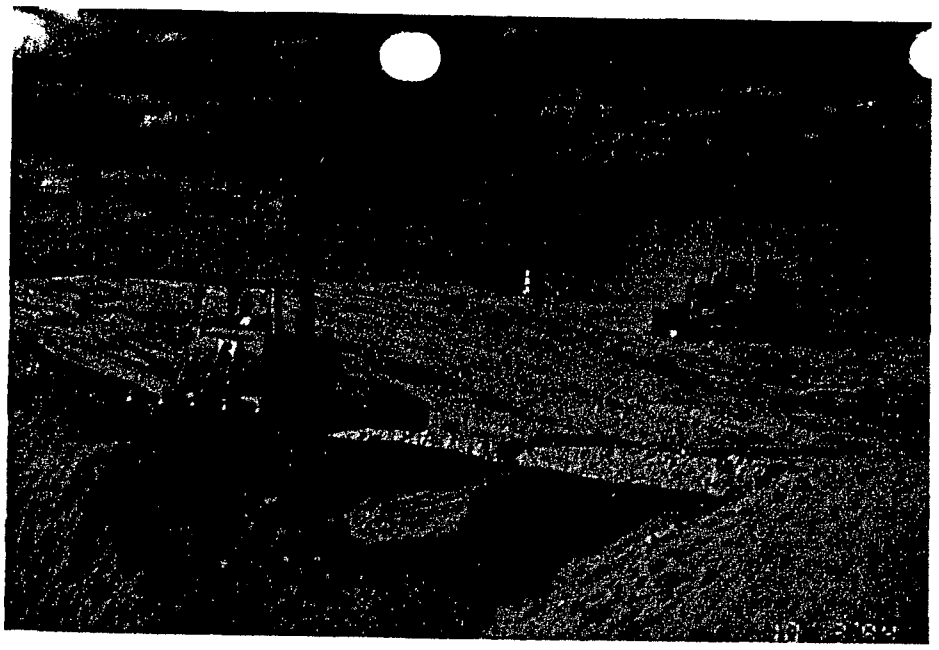


Eighth Week
Dilution & Stabilization



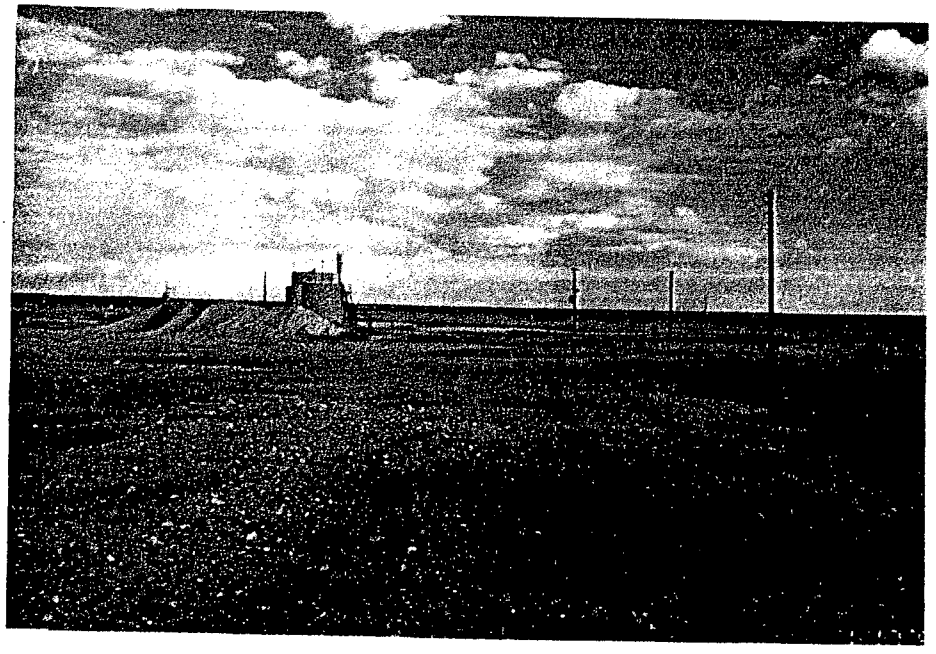
G. L. Erwin "B" NCT 2
Tank Battery
Emergency Overflow Pit
SW4/SE4, S35, T24S, R38E
Lea County

Ninth Week
Dilution & Stabilization

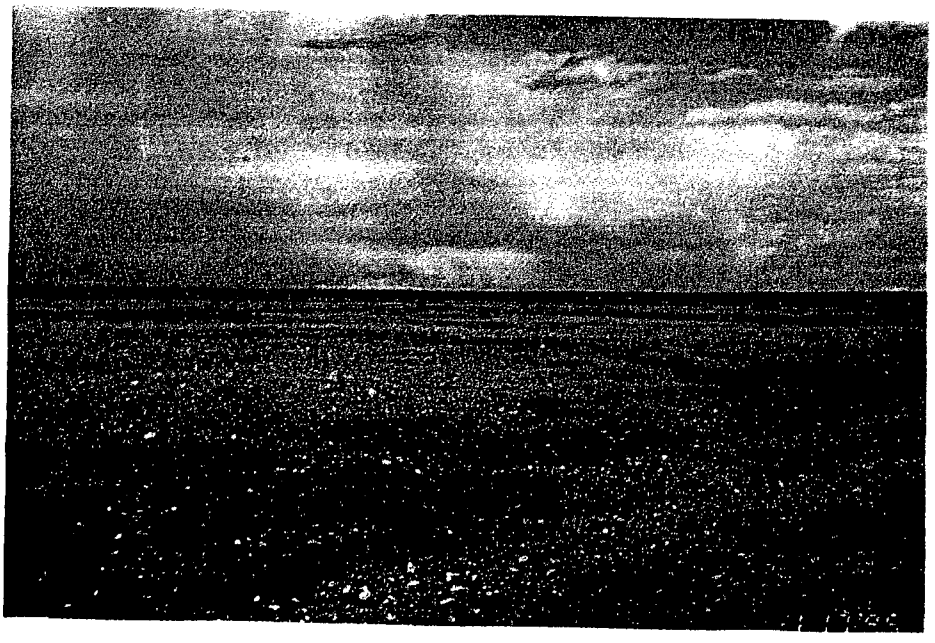


G. L. Erwin "B" NCT 2
Tank Battery
Emergency Overflow Pit
SW4/SE4, S35, T24S, R38E
Lea County

Dilution & Stabilization



Final Dress off & Completion



February 14, 1995 Report

Texaco E & P
P. O. Box 730
Hobbs, NM 88241-0730
505 393 7191

February 14, 1995

Mr. William C. Olsen
Environmental Bureau Chief
New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87504

RE: Hydrogelogical Investigation for the G.L. Erwin "B" NCT-2, Tank Battery

Dear Mr. Olsen:

Please find attached a work plan to conduct a Hydrogeologic Investigation at the above referenced site. Historical information is included with the attachment.

This work will be conducted in coordination with the Hobbs NMOCD Office for final C-103 filing. If additional information or questions need addressed, please contact, Larry Lehman at 505-397-0432.

Sincerely,

T. L. Frazier
Hobbs Area Manager

Attachment

cc: Mr. Jerry Sexton
Mr. Wayne Price

Bill Olsen 3/24/95
4:30 pm Calles Back:
To review + call back on Tuesday or Wednesday
3/25 or 26th

PHONE (505) 392-6167
FAX (505) 392-8788

ENVIRONMENTAL SPILL CONTROL, INC.
P.O. BOX 5890 ★ HOBBS, NM 88241

February 9, 1995

Texaco E & P
P.O. Box 730
Hobbs, New Mexico 88241-0730

Attn: Mr. Larry Lehman

Re: HYDROGEOLOGIC INVESTIGATION FOR THE G.L. ERWIN "B" NCT 2, TANK BATTERY

Dear Mr. Lehman:

Environmental Spill Control, Incorporated ("ESC") is pleased to present this work plan to conduct a Hydrogeologic Investigation at the above referenced site. The purpose of this investigation is to assess the perch zone characteristics and whether there was any vertical or horizontal contamination to the perch zone associated with the G.L. Erwin "B" NCT 2, Tank Battery Emergency Overflow Pit.

HISTORICAL INFORMATION

When we developed an initial Environmental Site Assessment ("ESA") on the above referenced emergency overflow pit in October 1993 ,it should be noted that during the ESA, we encountered groundwater that contained extremely high levels of TDS. We had several meetings with the local District Office of the Oil Conservation Division ("OCD") here in Hobbs, concerning the referenced emergency overflow pit and the groundwater perch zone.

One of the first items we determine on our ESA's is the depth to groundwater. We encountered groundwater at 67 feet and the hole was drilled to 74 feet. The hole was cased as a temporary two (2) inch monitor well with 10 feet of 0.020 screen in water and 5 feet above. It appeared to us that we had encountered an unprotectable small perch zone, due to the high TDS. Prior to performing the ESA, we were informed that there had been incidents of contamination to the groundwater in the area and that in fact, the ranch house to the west of the location was purchased by another oil company due to contamination of the groundwater. I might add that we have drilled a number of test holes in the area to 130 feet to 140 feet and had not encountered groundwater in the area.

We worked with Mr. Wayne Price out of the Hobbs OCD office on the project. In May 1994, we sampled the temporary monitor well for analyses, with Mr. Price as witness. The water in the well had over 10,000 mg/liter of TDS and in excess of 5,200 mg/liter of chlorides. The samples indicated 0.003 mg/liter of benzene and 0.4 mg/liter of total reportable hydrocarbons. Mr. Price suggested that we drill an additional monitor well to the northwest of the pit to determine if this was in fact an unprotectable water zone.

We drilled an additional hole approximately 250 feet northwest of the main pit location as referenced by the attached drawing. We drilled past 75 feet and had trouble with the bit and sub in the hole. Attempts to retrieve the bit and sub were futile at the time and we were stuck at 68 feet. This is the depth we considered as being the bottom of the hole. We again attempted to save the hole and were able to get the bit and sub up to 53 feet. The hole was caving in due to the soft sand and the next day we used a short catch overshot and retrieved the bit and sub.

At no time during the drilling of the well did we encounter any moisture or wet sands on the alternate hole drilled to the northwest. Rather than drill a new monitor well, we essentially dry holed the well. It appeared that we might have been on the side of a small fault. The first test hole we drilled to the southeast of the pit we encountered wet sand at 55 feet and water at 64 feet.

Please note by the attached drawing that we drilled a number of other test holes at the location to determine the extent of hydrocarbon contamination of the pit. The holes were drilled anywhere from 20 to 60 feet in determining the plume of contamination emanating out of the pit. The contamination out of the pit was to the north of the pit to a low natural draw, the same draw where the alternate monitor well was attempted. The contamination went down to 62.5 feet to a very hard sandstone layer, it was through this layer to the south that we encountered the water. To the northwest, we did not find water through the layer, and again, we appeared to have drilled into a fault.

The concern of Mr. Price was that we may have impacted the perch layer or actually caused the layer from the pit. This hydrogeologic investigation will determine any characteristics or impaction to the perch zone. It should also be noted that during the remedial cleanup of the emergency overflow pit, the original temporary monitor well was destroyed, due to the size of the excavation to remove the associated hydrocarbon contamination. Copies of the water analyses are enclosed.

WORK PLAN

1. Conduct a preliminary literature search to aid in classifying the geology, depth to water table, and apparent direction of groundwater flow.

2. Prepare a topographical drawing of the immediate area and surrounding terrain in a 1/8 mile radius from the original emergency overflow pit area to indicate elevations and surface water run-off flows after excavation of the emergency overflow pit. Use existing United States

Geological Survey (USGS) Maps for reference elevations and add excavation changes of the area.

3. Perform a record search and field inspection to identify any potential contamination sources within 1 mile of the site. This would include personnel interviews with anyone in the area having any knowledge of impaction of area waters which might influence the investigation.

4. Perform a field inspection to identify any potential sensitive receptors including water wells within 1 mile of the site.

5. Installation of monitor wells to delineate any possible impaction to the groundwater/perch zone. This would be a series of groundwater observation wells [2 inch (5 cm) diameter] would be established in a pattern, determined by a geologist, around the perimeter of the site. The wells will be set in porous soils and penetrate the groundwater if found, at least 10 feet (3 m). A survey crew will establish the top elevation of the well to the nearest 0.01 ft (0.5 cm). The caps of the wells will be vented and provided with a locking device to prevent tampering. A sufficient number of wells (three minimum) will be set to accurately determine the slope and direction of groundwater flow. The wells will be used as groundwater sampling points.

The following conditions are being met as per your instructions for the three (3) monitor well development package which are being drilled approximately 75 feet deep (a drawing is enclosed for the positioning of the borings/monitor wells):

1) Approximately 60' of SCH 40 PVC, flush thread, well casing;
2) Approximately 15' of SCH 40 PVC, flush thread, well screen (0.020" machine slot);
3) 20/40 or 8/16 Brady or equivalent sandpack 2 to 5 feet above top of screen;
4) 2 to 5 foot bentonite (pellets or chips) seal;
5) Grout to top of well using portland cement with 5% bentonite;
6) Above-grade completion using steel lockable well over set on a 4' X 4' concrete pad;
7) Lockable well seal cap with keyed-alike lock.

A steam sprayer will be used for decontamination of all sampling equipment (split-spoon; between each sample) and drilling equipment (drill pipe, bit, etc.; between each boring location). All decontamination/rinsate water will be contained at a central location and each site shall be set up for decontamination operations. We will temporarily construct a bermed rectangular area lined with 2 layers of 6 mil plastic or one layer of 10 mil plastic using cinder blocks and 2" X 4" lumber for the sides. Well development and decontamination/rinsate water shall be contained and placed in 55-gallon drums.

Level D personal protective equipment (PPE) will be used, which includes the following: hard hat, safety glasses, steel toed boots, ear plugs, nitrile gloves for handling sampling equipment. Being the drilling contractor, all of our employees meet the 40 hour HAZWOPER training required per 29 CFR 1910.120.

6. Obtain representative water samples from the monitor wells and field screen for volatile organic components ("VOCs"), total dissolved solids ("TDS") and chlorides (Cl).

7. Submit water samples to an approved laboratory for analysis of appropriate contaminants based on field screening results. The samples will be tested for BTEX and anion and cation content.

8. Prepare a Hydrogeological Report including technical information, maps, soil boring logs, monitor well construction, and laboratory reports.

SCOPE OF SERVICES

Task 1: Site Reconnaissance, Topographical Map Survey, File Review, and Receptor Survey

ESC personnel will inspect the site to observe physical features of the site and the surrounding area. During the site inspection, information relative to the identification of potential sensitive receptors or potential sources of possible contamination within the site vicinity and adjacent properties will be documented including the drawing of a topographical map of the area within a 1/8 radius of the excavated pit area.

Task 2: Soil Boring/Monitor Well Installation

ESC will drill three (3) soil borings and install 2 inch PVC monitor wells at the locations shown on the attached site map if water is encountered. Based on existing site information, groundwater perch zone is at a depth of approximately 67 feet below ground surface. The monitor wells will be screened with 0.020 inch slotted screen 60 and 75 feet below ground surface. Prior to beginning soil boring operations, all utilities at the site will be located. Well construction will be in accordance with New Mexico Environmental Improvement Division monitoring well construction and abandonment policy.

Task 3: Water/Soil Sample Collection and Analyses

After the monitor wells have been installed and allowed to reach static conditions, each well will be gauged to measure depth to groundwater and phase-separated hydrocarbon thickness if present. Prior to groundwater sampling a minimum of three well volumes will be bailed from each well to remove any fines introduced from installation activities and to ensure groundwater within the well bore represents aquifer/perch zone conditions.

Groundwater samples from each monitor well will be collected with a new disposable bailer and placed in glass containers, sealed with QA/QC seals, and transported on ice to the laboratory for analysis. The groundwater samples will be analyzed for BTEX using EPA method 8020; total dissolved solids (TDS); anion/cation content; and Chlorides (Cl).

One soil sample will be obtained from the upper five foot interval of the perch zone and analyzed for organic carbon fraction, porosity, bulk density, and hydraulic conductivity to aid in groundwater zone characterization using the appropriate ASTM methods. The sample will be placed in a glass jar with a teflon-lined lid, sealed with QA/QC seals, and preserved at 4 degrees centigrade in accordance with EPA requirements. A chain-of-custody which documents sample collection times and delivery to the laboratory will be completed for each set of samples.

Task 4: Disposal of Investigation Waters

The development water generated from the monitor well sampling operations will be stored on-site in labeled 55 gallon drums pending disposal.

Task 5: Health and Safety Plan

A Health and Safety Plan will be prepared in accordance to OSHA standards for use by all on-site personnel prior to beginning the investigation.

Task 6: Report Preparation

A Hydrogeologic Report will be prepared that will include the following sections: Report Summary, Site Characterization, Groundwater Assessment, Waste Management and Disposition, Conclusions, Recommendations, Photographic Documentation, and QA/QC Procedures.

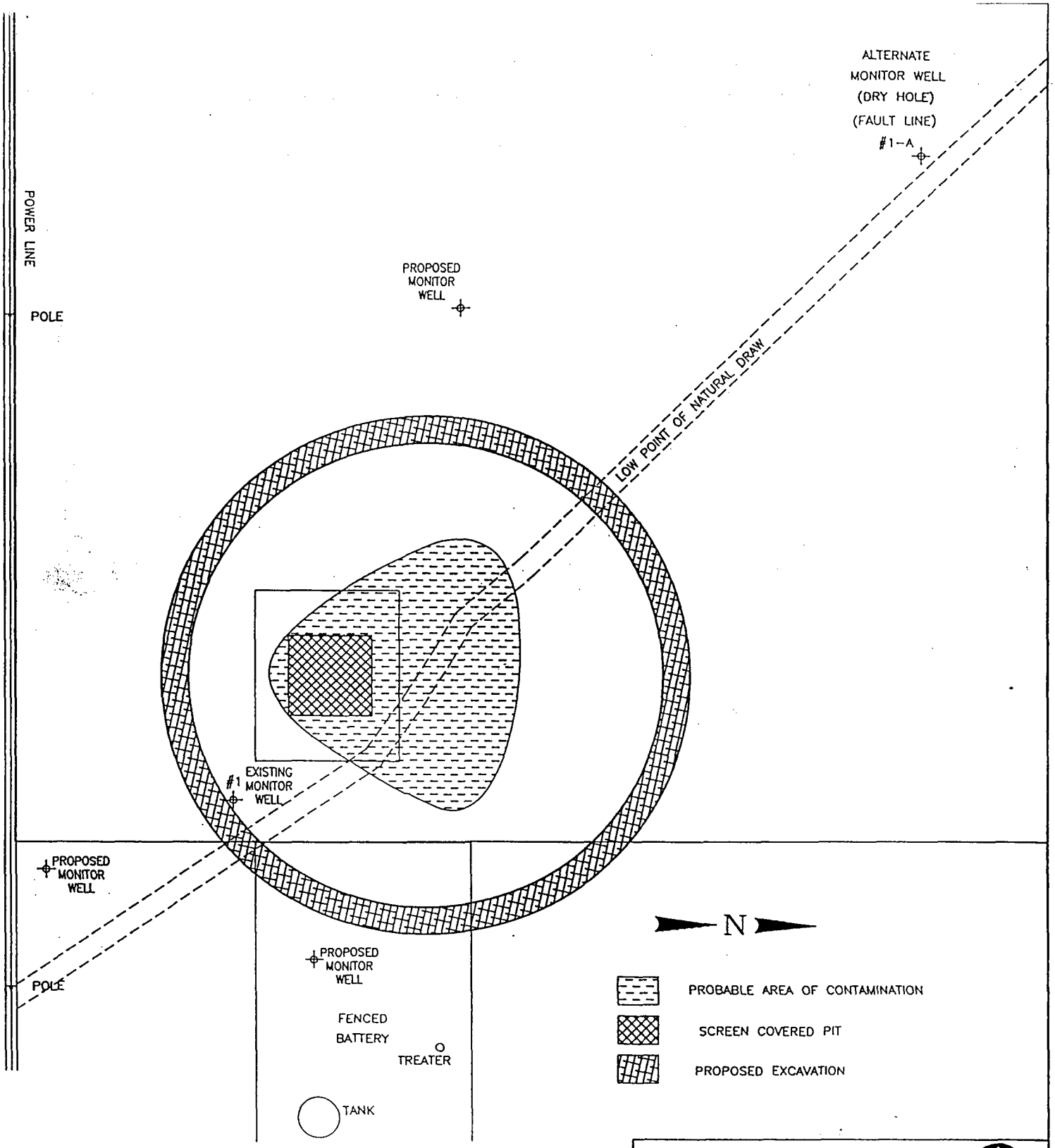
If you have any questions or desire further information, please contact us at any time.

Best regards,

ENVIRONMENTAL SPILL CONTROL, INC.

Eddie Slavens, REM
Vice President

cc: Mr. Allen Hodge
Mr. Jimmy Curtis



TEXACO Inc.

G.L. ERWIN NCT #2
TANK BATTERY
PROPOSED GROUND WATER MONITOR WELLS
SW4/SE4, SEC 35, T24S, R37E
LEA Co., NEW MEXICO

DATE: 2-9-95	DRAWN M.F.G.	REV. DATE	DIV
SCALE: 1" = 50'		JOB #	
SHEET 1 OF 1		DWG. #	

APPENDIX B

OCD Correspondence

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
2040 S. PACHECO
SANTA FE, NEW MEXICO 87505
(505) 827-7131

HOBBS AREA
TLF
RSP MCA DAB DJC DDD RBD MCD DAD KJH WTL RTM DLM LDR WAS SGW LML JAP
ALA JWB ADD MLG BCH PDH JDL SDU JY PLH CPM MKR PAS CRA HMC OLH PWM CDT
LEASE FILE
WELL FILE
CORP FILE
COPIES SENT

March 28, 1995

APR 1995 Received Texaco Hobbs Area

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-242-232

Mr. T.L. Frazier
Texaco E & P
P.O. Box 730
Hobbs, New Mexico 88241-0730

RE: GROUND WATER INVESTIGATION WORK PLAN
G.L. ERWIN "B" NCT-2 TANK BATTERY
LEA COUNTY, NEW MEXICO

Dear Mr. Frazier:

The New Mexico Oil Conservation Division (OCD) has completed a review of Texaco E & P's (TEP) February 14, 1995 "HYDROGEOLOGICAL INVESTIGATION FOR THE G.L. ERWIN "B" NCT-2, TANK BATTERY". This document contains TEP's work plan for investigating the extent of ground water contamination related to the use of an unlined emergency pit at the G.L. Erwin "B" NCT-2 tank battery in Section 35, T24S, R38E NMPM Lea County, New Mexico.

The above referenced work plan is approved with the following conditions:

1. All monitor wells will be constructed with at least 10 feet of well screen below the water table and 5 feet of well screen above the water table.

2. TEP will sample ground water from all monitor wells. Ground water from these monitor wells will be sampled and analyzed for concentrations of benzene, toluene, ethylbenzene, xylene (BTEX), major cations and anions, heavy metals and polynuclear aromatic hydrocarbons using EPA approved methods.

   NOTE: The OCD will not require TEP to analyze ground water samples for heavy metals and PAH's, if, TEP can provide the OCD with an analysis of the produced water from this line showing that these constituents do not exceed New Mexico Water Quality Control Commission ground water standards.

3. TEP will submit a report on the investigation to the OCD by June 30, 1995. The report will contain:

   a. A description of all activities which occurred during the investigation, conclusions and recommendations.

b. A summary of the laboratory analytic results of water quality sampling of the monitor wells.

c. A water table elevation map using the water table elevation of the ground water in all monitor wells.

d. A geologic log and as built well completion diagram for each well.

4. TEP will provide the OCD with the following information which was not included in the work plan:

a. The results of the "initial Environmental Site Assessment".

b. The locations and any other available information about the referenced "test holes at the location to determine the extent of hydrocarbon contamination of the pit".

c. The size of the excavated area, the final concentrations of contaminants in the bottom of the excavated area and the disposition or remediation method of the soils excavated.

d. Copies of the water analyses which are stated as being enclosed in the work plan.

5. TEP will notify the OCD at least one week in advance of all scheduled activities such that the OCD has the opportunity to witness the events and or split samples.

6. All original documents submitted for approval will be submitted to the OCD Santa Fe Office with copies provided to the OCD Hobbs District Office.

Please be advised that OCD approval does not relieve TEP of liability should the investigation activities determine that contamination exists which is beyond the scope of the work plan or if the activities fail to adequately determine the extent of contamination related to TEP's activities. In addition, OCD approval does not relieve TEP of responsibility for compliance with any other federal, state or local laws and/or regulations. If you have any questions, please call me at (505) 827-7154.

Sincerely,

William C. Olson
Hydrogeologist
Environmental Bureau

xc: Jerry Sexton, OCD Hobbs District Supervisor
Wayne Price , OCD Hobbs Office

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
2040 S. PACHECO
SANTA FE, NEW MEXICO 87505
(505) 827-7131

July 10, 1997

CERTIFIED MAIL
RETURN RECEIPT NO. P-410-431-191

Mr. Rodney Bailey
Texaco E&P Inc.
205 E. Bender
Hobbs, New Mexico 88240

RE: G. L. ERWIN "B" NCT-2 TANK BATTERY
LEA COUNTY, NEW MEXICO

Dear Mr. Bailey:

On March 28, 1995, the New Mexico Oil Conservation Division (OCD) conditionally approved Texaco Exploration & Development's (TEXACO) February 14, 1995 "HYDROGEOLOGICAL INVESTIGATION FOR THE G.L. ERWIN "B" NCT-2 TANK BATTERY". This document contained TEXACO's work plan for investigating the extent of ground water contamination related to an unlined emergency pit at the G.L. Erwin "B" NCT-2 tank battery located in Section 35, T24S, R38E NMPM, Lea County, New Mexico. This approval required that TEXACO provide the OCD with a report on the investigation by June 30, 1995. To date the OCD has no record of TEXACO either implementing the required work plan or submitting the required investigation report.

The OCD requires that by August 15, 1997 TEXACO will provide the OCD with the investigation report required in the OCD's March 28, 1995 work plan approval.

If you have any questions, please call me at (505) 827-7154.

Sincerely,

William C. Olson
Hydrogeologist
Environmental Bureau

xc: Chris Williams, OCD Hobbs District Supervisor
Wayne Price, OCD Hobbs Office

Texaco E & P
205 E. Bender Blvd.
Hobbs NM 88240
505 393 7191

Date: September 19, 1997

William C. Olson
Hydrogeologist
Environmental Bureau
Oil Conservation Division
Santa Fe, New Mexico 87505

RE: G.L. Erwin "B" NCT-2 Tank Battery
Lea County, New Mexico

Dear Mr. Olson

This letter is in response to our telephone conservation on September 19, 1997. The information requested by your July 10, 1997 letter has been difficult to obtain because the company that conducted the work back in 1995 is no longer in business. I have contacted them but they no longer have any records of this site.

At this time I have contacted Highlander Environmental and we are putting together the requested information. The required work plan for the extent of ground water contamination related to the emergency pit at the G.L. Erwin " B" NCT-2 will be provided no later than October 27, 1997.

If you have any questions or additional request please call me at 505-397-0422.

Sincerely,

Rodney G. Bailey
EHS Professional
Hobbs Operating Unit

Highlander Environmental Corp.

Midland, Texas

October 10, 1997

Mr. William C. Olson
Environmental Bureau
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
2040 S. Pacheco
Santa Fe, NM 87505

Re: Preliminary Investigation Findings and Addendum Work Plan for Emergency Produced Water Overflow Pit (Closed), Texaco Exploration and Production, Inc., G.L. Erwin A&B" Federal NCT-2 Tank Battery, SW/4, SE/4, Section 35, Township 24 South, Range 37 East, Lea County, New Mexico

Dear Mr. Olson:

Highlander Environmental Corp. (Highlander) has been retained by Texaco Exploration and Production, Inc. (Texaco) to conduct a subsurface investigation of a former emergency produced water overflow pit at the G.L. Erwin "A&B" Federal NCT-2 Tank Battery (Site), located approximately five (5) miles northeast of Jal, New Mexico. The Site is situated in the southwest quarter (SW/4) of the SE/4, Section 35, Township 24 South, Range 37 East, Lea County, New Mexico.

Background

The Site is currently the location of an oil and gas field tank battery. Previously, the Site included an unlined earthen emergency produced water overflow pit, which measured approximately 45' x 45' x 3.5'. The pit was operated until its closure in July 1994.

Prior to closure, an assessment was performed by Environmental Spill Control, Inc. (ESCI), Hobbs, New Mexico, consisting of drilling sixteen (16) rotary drilled boreholes and collection of soil samples for laboratory tests. The boreholes were drilled between 30 and 100 feet below ground level (BGL), and soil samples were collected every ten (10) feet and analyzed for total petroleum hydrocarbons (TPH). The highest TPH levels reported were in shallow samples borehole # 2, located southeast of the pit, which reported TPH at 111,700 parts per million (ppm), and borehole # 4, located near the center of the pit, which reported TPH at 149,600 ppm. A sample from borehole # 16, located approximately 40 feet northwest of the pit, reported TPH at 97 ppm (10 feet BGL).

Borehole # 1, located southeast of the pit was drilled to 100 feet BGL, and completed as a monitoring well. A groundwater sample reported chloride at 6,100 ppm. The results were reported to Texaco on October 1, 1993.

Closure of the pit began on July 21, 1994, and approximately 492 cubic yards of hydrocarbon impacted soil was removed from the pit and transferred to Controlled Recovery, Inc., Hobbs, New Mexico for disposal. The pit was excavated to approximately 62.5 feet BGL, and composite samples of soil from the base of the excavation reported TPH below 50 ppm. Benzene, toluene, ethylbenzene, and xylene (collectively referred to as BTEX) were also below the test method detection limits.

Beginning September 15, 1994, the excavation was backfilled with clean sand and clay to approximately 55 feet BGL, as a "buffer zone". The hydrocarbon affected and unaffected soils removed from the excavation, approximately 40,000 cubic yards, was blended with clean soil and placed over the "buffer zone" in five (5) foot lifts and compacted. A composite sample was collected every five (5) feet and analyzed for TPH. Every ten (10) feet a composite sample was collected and tested for BTEX , beginning at fifty (50) feet BGL. The highest TPH level reported in the composite samples was 890 ppm, and BTEX levels were below the test method detection limits.

On February 14, 1995, a work plan titled "Hydrogeologic Investigation for the G. L. Erwin "B" NCT 2, Tank Battery" (Plan) was submitted to the OCD to address delineation of the elevated chloride detected in groundwater at the Site. On March 28, 1995, the OCD conditionally approved the Plan, and imposed a due date of June 30, 1995 for submittal of the final report. On July 10, 1997, the OCD issued a letter to Texaco indicating that it had not received the report, originally scheduled for submittal on June 30, 1995, and required Texaco to submit the report by August 15, 1997. Appendix A presents the Plan. Appendix B presents OCD correspondence.

Preliminary Investigation Results

On August 22, 1997, Highlander personnel were directed to collect groundwater samples from the monitor wells (2). The groundwater samples were analyzed for chloride and reported levels of 250 mg/L (West Well) and 3,300 mg/L (Southwest Well). On September 8, 1997, a sample was collected from the West Well to confirm the previous results, and reported chloride at 280 mg/L.

Addendum Work Plan

Highlander will implement the Plan prepared by ESCI, as conditionally approved by the OCD. In addition, Highlander will conduct an electromagnetic (EM-34) survey to evaluate the area of elevated chloride in groundwater. The EM-34 measures the conductivity of oil and groundwater by imparting an alternating electrical current to a transmitter coil which is positioned near the earth's surface. The magnetic field produced as the current passes through the transmitter coil induces small electrical currents into the subsurface

soil. The electrical currents produce a secondary magnetic field which is sensed with the primary magnetic field by a receiver coil. The terrain conductivity which is linearly proportional to the ratio of the secondary magnetic field to the primary magnetic field is displayed on an analog scale in millimhos/meter (mmhos/m). The EM-34 has an effective depth of investigation of approximately 200 feet BGL. The EM-34 survey will be conducted using a grid station approach. A 50' x 50' grid network will be established across the Site and measurements will be collected at each grid intersection. A background station will also be established and compared to Site measurements.

Based on the EM-34 survey results, a minimum of three (3) additional monitor wells may be installed to evaluate the extent of the chloride impact.. The wells will be drilled using a truck-mounted rotary drill rig per OCD's conditions communicated to Texaco on March 28, 1995. The well will be surveyed by a New Mexico registered land surveyor to determine the approximate ground and top of casing elevations. The wells will be developed by hand bailing or pumping with an electric submersible pump. Water removed from the wells will be placed in an appropriate container (i.e., 55-gallon drums, portable tank, etc.) until disposed is arranged. Groundwater samples will be collected and analyzed for BTEX, anions, cations, and TDS. Groundwater samples will be delivered to the laboratory via overnight delivery and under chain of custody control. Soil samples may also be collected for chloride analysis.

Highlander will conduct an inventory of water wells within 1-mile radius of the Site for the purpose of identifying possible receptors. The water well search will include a review of records available from the New Mexico State Engineer's Office and visual survey.

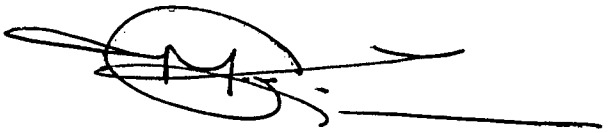
All down hole equipment used in connection with the investigation (i.e., drill rods, bit, water level indicator, submersible pump, etc.) will be thoroughly decontaminated between wells. Soil cuttings from drilling will be stockpiled next to the borehole until disposal is arranged.

Data Evaluation and Reporting

Upon receipt of analytical data from the laboratory, Highlander will assemble all data in tables for presentation in a report. The report will contain discussions of field sampling techniques and laboratory results. Highlander will compare the laboratory test results for soil and groundwater samples to applicable New Mexico OCD or WQCC action levels or cleanup standards. The report will also present a discussion of the EM-34 survey and findings. Detailed Site drawings will be presented in the report, and may include the EM-34 survey results, groundwater potentiometric surface contours, depth-to-groundwater and chloride concentrations.

Highlander will schedule the proposed field activities following your review and approval. Please call if you have questions.

Sincerely,
Highlander Environmental Corp.



Mark J. Larson
Senior Project Manager

Encl.
cc: Mr. Rodney Bailey, TEPI
Mr. Robert Browning, TEPI
Mr. Wayne Price, OCD-Hobbs District

PHONE (505) 392-6167
FAX (505) 392-8788

ENVIRONMENTAL SPILL CONTROL, INC.

P.O. BOX 5890 ★ HOBBS, NM 88241

February 9, 1995

Texaco E & P
P.O. Box 730
Hobbs, New Mexico 88241-0730

Attn: Mr. Larry Lehman

Re: HYDROGEOLOGIC INVESTIGATION FOR THE G.L. ERWIN "B" NCT 2, TANK BATTERY

Dear Mr. Lehman:

Environmental Spill Control, Incorporated ("ESC") is pleased to present this work plan to conduct a Hydrogeologic Investigation at the above referenced site. The purpose of this investigation is to assess the perch zone characteristics and whether there was any vertical or horizontal contamination to the perch zone associated with the G.L. Erwin "B" NCT 2, Tank Battery Emergency Overflow Pit.

HISTORICAL INFORMATION

When we developed an initial Environmental Site Assessment ("ESA") on the above referenced emergency overflow pit in October 1993 ,it should be noted that during the ESA, we encountered groundwater that contained extremely high levels of TDS. We had several meetings with the local District Office of the Oil Conservation Division ("OCD") here in Hobbs, concerning the referenced emergency overflow pit and the groundwater perch zone.

One of the first items we determine on our ESA's is the depth to groundwater. We encountered groundwater at 67 feet and the hole was drilled to 74 feet. The hole was cased as a temporary two (2) inch monitor well with 10 feet of 0.020 screen in water and 5 feet above. It appeared to us that we had encountered an unprotectable small perch zone, due to the high TDS. Prior to performing the ESA, we were informed that there had been incidents of contamination to the groundwater in the area and that in fact, the ranch house to the west of the location was purchased by another oil company due to contamination of the groundwater. I might add that we have drilled a number of test holes in the area to 130 feet to 140 feet and had not encountered groundwater in the area.

We worked with Mr. Wayne Price out of the Hobbs OCD office on the project. In May 1994, we sampled the temporary monitor well for analyses, with Mr. Price as witness. The water in the well had over 10,000 mg/liter of TDS and in excess of 5,200 mg/liter of chlorides. The samples indicated 0.003 mg/liter of benzene and 0.4 mg/liter of total reportable hydrocarbons. Mr. Price suggested that we drill an additional monitor well to the northwest of the pit to determine if this was in fact an unprotectable water zone.

We drilled an additional hole approximately 250 feet northwest of the main pit location as referenced by the attached drawing. We drilled past 75 feet and had trouble with the bit and sub in the hole. Attempts to retrieve the bit and sub were futile at the time and we were stuck at 68 feet. This is the depth we considered as being the bottom of the hole. We again attempted to save the hole and were able to get the bit and sub up to 53 feet. The hole was caving in due to the soft sand and the next day we used a short catch overshot and retrieved the bit and sub.

At no time during the drilling of the well did we encounter any moisture or wet sands on the alternate hole drilled to the northwest. Rather than drill a new monitor well, we essentially dry holed the well. It appeared that we might have been on the side of a small fault. The first test hole we drilled to the southeast of the pit we encountered wet sand at 55 feet and water at 64 feet.

Please note by the attached drawing that we drilled a number of other test holes at the location to determine the extent of hydrocarbon contamination of the pit. The holes were drilled anywhere from 20 to 60 feet in determining the plume of contamination emanating out of the pit. The contamination out of the pit was to the north of the pit to a low natural draw, the same draw where the alternate monitor well was attempted. The contamination went down to 62.5 feet to a very hard sandstone layer, it was through this layer to the south that we encountered the water. To the northwest, we did not find water through the layer, and again, we appeared to have drilled into a fault.

The concern of Mr. Price was that we may have impacted the perch layer or actually caused the layer from the pit. This hydrogeologic investigation will determine any characteristics or impaction to the perch zone. It should also be noted that during the remedial cleanup of the emergency overflow pit, the original temporary monitor well was destroyed, due to the size of the excavation to remove the associated hydrocarbon contamination. Copies of the water analyses are enclosed.

WORK PLAN

1. Conduct a preliminary literature search to aid in classifying the geology, depth to water table, and apparent direction of groundwater flow.

2. Prepare a topographical drawing of the immediate area and surrounding terrain in a 1/8 mile radius from the original emergency overflow pit area to indicate elevations and surface water run-off flows after excavation of the emergency overflow pit. Use existing United States

Geological Survey (USGS) Maps for reference elevations and add excavation changes of the area.

3. Perform a record search and field inspection to identify any potential contamination sources within 1 mile of the site. This would include personnel interviews with anyone in the area having any knowledge of impaction of area waters which might influence the investigation.

4. Perform a field inspection to identify any potential sensitive receptors including water wells within 1 mile of the site.

5. Installation of monitor wells to delineate any possible impaction to the groundwater/perch zone. This would be a series of groundwater observation wells [2 inch (5 cm) diameter] would be established in a pattern, determined by a geologist, around the perimeter of the site. The wells will be set in porous soils and penetrate the groundwater if found, at least 10 feet (3 m). A survey crew will establish the top elevation of the well to the nearest 0.01 ft (0.5 cm). The caps of the wells will be vented and provided with a locking device to prevent tampering. A sufficient number of wells (three minimum) will be set to accurately determine the slope and direction of groundwater flow. The wells will be used as groundwater sampling points.

The following conditions are being met as per your instructions for the three (3) monitor well development package which are being drilled approximately 75 feet deep (a drawing is enclosed for the positioning of the borings/monitor wells):

1) Approximately 60' of SCH 40 PVC, flush thread, well casing;
2) Approximately 15' of SCH 40 PVC, flush thread, well screen (0.020" machine slot);
3) 20/40 or 8/16 Brady or equivalent sandpack 2 to 5 feet above top of screen;
4) 2 to 5 foot bentonite (pellets or chips) seal;
5) Grout to top of well using portland cement with 5% bentonite;
6) Above-grade completion using steel lockable well over set on a 4' X 4' concrete pad;
7) Lockable well seal cap with keyed-alike lock.

A steam sprayer will be used for decontamination of all sampling equipment (split-spoon; between each sample) and drilling equipment (drill pipe, bit, etc.; between each boring location). All decontamination/rinsate water will be contained at a central location and each site shall be set up for decontamination operations. We will temporarily construct a bermed rectangular area lined with 2 layers of 6 mil plastic or one layer of 10 mil plastic using cinder blocks and 2" X 4" lumber for the sides. Well development and decontamination/rinsate water shall be contained and placed in 55-gallon drums.

Level D personal protective equipment (PPE) will be used, which includes the following: hard hat, safety glasses, steel toed boots, ear plugs, nitrile gloves for handling sampling equipment. Being the drilling contractor, all of our employees meet the 40 hour HAZWOPER training required per 29 CFR 1910.120.

6. Obtain representative water samples from the monitor wells and field screen for volatile organic components ("VOCs"), total dissolved solids ("TDS") and chlorides (Cl).

7. Submit water samples to an approved laboratory for analysis of appropriate contaminants based on field screening results. The samples will be tested for BTEX and anion and cation content.

8. Prepare a Hydrogeological Report including technical information, maps, soil boring logs, monitor well construction, and laboratory reports.

SCOPE OF SERVICES

Task 1: Site Reconnaissance, Topographical Map Survey, File Review, and Receptor Survey

ESC personnel will inspect the site to observe physical features of the site and the surrounding area. During the site inspection, information relative to the identification of potential sensitive receptors or potential sources of possible contamination within the site vicinity and adjacent properties will be documented including the drawing of a topographical map of the area within a 1/8 radius of the excavated pit area.

Task 2: Soil Boring/Monitor Well Installation

ESC will drill three (3) soil borings and install 2 inch PVC monitor wells at the locations shown on the attached site map if water is encountered. Based on existing site information, groundwater perch zone is at a depth of approximately 67 feet below ground surface. The monitor wells will be screened with 0.020 inch slotted screen 60 and 75 feet below ground surface. Prior to beginning soil boring operations, all utilities at the site will be located. Well construction will be in accordance with New Mexico Environmental Improvement Division monitoring well construction and abandonment policy.

Task 3: Water/Soil Sample Collection and Analyses

After the monitor wells have been installed and allowed to reach static conditions, each well will be gauged to measure depth to groundwater and phase-separated hydrocarbon thickness if present. Prior to groundwater sampling a minimum of three well volumes will be bailed from each well to remove any fines introduced from installation activities and to ensure groundwater within the well bore represents aquifer/perch zone conditions.

Groundwater samples from each monitor well will be collected with a new disposable bailer and placed in glass containers, sealed with QA/QC seals, and transported on ice to the laboratory for analysis. The groundwater samples will be analyzed for BTEX using EPA method 8020; total dissolved solids (TDS); anion/cation content; and Chlorides (Cl).

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
2040 S. PACHECO
SANTA FE, NEW MEXICO 87505
(505) 827-7131

December 15, 1997

CERTIFIED MAIL
RETURN RECEIPT NO. P-410-431-234

Mr. Rodney Bailey
Texaco E&P Inc.
205 E. Bender
Hobbs, New Mexico 88240

RE: G. L. ERWIN "A&B" FEDERAL NCT-2 TANK BATTERY
LEA COUNTY, NEW MEXICO

Dear Mr. Bailey:

The New Mexico Oil Conservation Division (OCD) has reviewed Texaco Exploration & Development's (TEXACO) October 10, 1997 "PRELIMINARY INVESTIGATION FINDINGS AND ADDENDUM WORK PLAN FOR EMERGENCY PRODUCED WATER OVERFLOW PIT(CLOSED), TEXACO EXPLORATION AND PRODUCTION, INC., G.L. ERWIN A&B FEDERAL NCT-2 TANK BATTERY, SW/4, SE/4, SECTION 35, TOWNSHIP 24 SOUTH, RANGE 37 EAST, LEA COUNTY, NEW MEXICO". This document which was submitted on behalf of TEXACO by their consultant Highlander Environmental Corp. contains TEXACO's work plan for investigating the extent of ground water contamination related to an unlined emergency pit at the G.L. Erwin "A&B" Federal NCT-2 tank battery located in Unit O, Section 35, T24S, R37E NMPM, Lea County, New Mexico.

The above referenced work plan is approved with the following conditions:

1. TEXACO will sample and analyze ground water from all monitor wells for benzene, toluene, ethylbenzene and xylene (BTEX), major cations and anions, total dissolved solids (TDS), WQCC metals and polynuclear aromatic hydrocarbons (PAH) using EPA approved methods and quality assurance/quality control (QA/QC).

2. All wastes generated will be disposed of at an OCD approved facility.

3. TEXACO will submit a report on the investigations to the OCD by March 1, 1998. The report will be submitted to the OCD Santa Fe Office with a copy provided to the OCD Hobbs District Office. The report will contain:

   a. A description of all past and present investigation activities including conclusions and recommendations.

   b. A summary of all past and present soil and water quality sampling results including copies of the laboratory analytical data sheets and associated QA/QC data.

   c. A geologic log and well completion diagram for all past and present monitor wells and boreholes.

   d. A site map showing the location of all monitor wells, boreholes and relevant site features.

   e. A water table elevation map constructed using the water table elevation of ground water in all site monitor wells.

4. TEXACO will notify the OCD at least 1 week in advance of all scheduled activities such that the OCD has the opportunity to witness the events and split samples.

Please be advised that OCD approval does not relieve TEXACO of liability should the investigation actions fail to adequately define the extent of contamination related to TEXACO's activities, or if contamination exists which is outside the scope of the work plan. In addition, OCD approval does not relieve TEXACO of responsibility for compliance with any other federal, state or local laws and regulations.

If you have any questions, please contact me at (505) 827-7154.

Sincerely,

William C. Olson
Hydrogeologist
Environmental Bureau

xc: Wayne Price, OCD Hobbs Office
Mark J. Larson, Highlander Environmental Corp.

Highlander Environmental Corp.

Midland, Texas

March 2, 1998

Mr. William C. Olson, Hydrogeologist
State of New Mexico
Oil Conservation Division
2040 South Pacheco
Santa Fe, New Mexico 87505

Re: Request for Extension for Report Submittal, Texaco Exploration and Production, Inc., G. L. Erwin "A&B" Federal NCT-2 Tank Battery and Cooper-Jal Unit South Injection Station, Lea County, New Mexico

Dear Mr. Olson:

Highlander Environmental Corp. (Highlander) has been retained by Texaco Exploration and Production, Inc. (Texaco) to conduct subsurface investigations at the above-referenced facilities (Sites). The investigations are being conducted in accordance with work plans approved by the New Mexico Oil Conservation Division (OCD), which requires submittal of a final report by March 1, 1998, for the G. L. Erwin Site and March 13, 1998, for the Cooper-Jal Unit.

As of February 28, 1998, Highlander has completed the fieldwork associated with the Sites. However, the laboratory analysis is not complete, therefore, it is necessary to request extensions for submittal of the final reports. Highlander requests an extension of 30 days from the deadline for each Site in order to receive and evaluate the laboratory data, and prepare the reports. The final report for the G. L. Erwin Site will be submitted by April 1, 1998 and by April 13, 1998 for the Cooper-Jal Site.

Highlander appreciates your consideration of this request. Please call if you have any questions.

Sincerely,
Highlander Environmental Corp.

Mark J. Larson
Senior Project Manager

cc: Rodney Bailey, Texaco Exploration and Production, Inc.

APPENDIX C

EM-34 Data Sheets

TEXACO E & P
G.L. ERWIN TANK BATTERY
LEA COUNTY, NEW MEXICO

PROFILE NO:	O E	**EM-34 TERRAIN**	**DATE:**	1/12/98
GRID SPACING:	50'	**CONDUCTIVITY SURVEY**	**START TIME:**	10:53 MST
NOTES:	N - S		**END TIME:**	11:10

STATION NO.	20 METER HD READING	SCALE	20 METER VD READING	SCALE	NOTES
N 0	15	100	21	100	OH powerline (E-W), 50' S
N 50	16	100	22	100	
N100	16	100	30	100	
N150	16	100	I	300	Powerline 10' N (6 lines)
N200	18	100	80	100	P/L (E-W) @ Sta. P/L NW/SE
N250	20	100	30	100	
N300	22	100	28	100	
N350	28	100	34	100	
N400	41	100	I	300	P/L (E-W) 10' N
S50	14	100	21	100	Powerline 10'N (E-W)
S100	14	100	22	100	
BASE LINE					
A	18	30	28	30	
B	17	30	30	100	
C	17	30	35	100	
D	19	30	I	100	
E	14	30	I	300	

Notes:
1. I: Denotes interference
2. P/L: Pipeline

TEXACO E & P
G.L. ERWIN TANK BATTERY
LEA COUNTY, NEW MEXICO

PROFILE NO:	50 E	**EM-34 TERRAIN**	**DATE:**	1/12/98
GRID SPACING:	50'	**CONDUCTIVITY SURVEY**	**START TIME:**	11:12
NOTES:	S - N		**END TIME:**	11:25

STATION NO.	20 METER HD READING	SCALE	20 METER VD READING	SCALE	NOTES
N 0	15	100	24	100	Powerline 50'S
N 50	16	100	22	100	
N 100	17	100	26	100	
N 150	16	100	90	300	Powerline (6) 25'N
N 200	18	100	I	I	P/L (6) 30'S & (1) 12'N
N 250	22	100	62	100	
N 300	28	100	16	100	
N 350	32	100	38	100	
N 400	32	100	I	300	P/L 10'N (E-W)
S 50	15	100	22	100	
S 100	16	100	22	100	

Notes:
1. I: Denotes interference
2. P/L: Pipeline

TEXACO E & P
G.L. ERWIN TANK BATTERY
LEA COUNTY, NEW MEXICO

PROFILE NO:	100 E	**EM-34 TERRAIN**	**DATE:**	1/12/98
GRID SPACING:	50'	**CONDUCTIVITY SURVEY**	**START TIME:**	11:27
NOTES:	N - S		**END TIME:**	11:37

STATION NO.	20 METER HD READING	SCALE	20 METER VD READING	SCALE	NOTES
N 0	16	100	23	100	
N 50	16	100	24	100	
N 100	18	100	25	100	
N 150	22	100	85	100	P/L (6) 20'N
N 200	18	100	I	I	P/L 10'S (6) and 30'N
N 250	23	100	65	100	
N 300	27	100	17	100	
N 350	30	100	38	100	
N 400	28	100	I	100	P/L (E-W) at Sta.
S 50	15	100	24	100	
S 100	16	100	23	100	

Notes:
1. I: Denotes interference
2. P/L: Pipeline

TEXACO E & P
G.L. ERWIN TANK BATTERY
LEA COUNTY, NEW MEXICO

PROFILE NO:	150 E	**EM-34 TERRAIN**	**DATE:**	1/12/98
GRID SPACING:	50'	**CONDUCTIVITY SURVEY**	**START TIME:**	11:40
NOTES:	S - N		**END TIME:**	11:50
	Flowline (N-S) 25' E			

STATION NO.	20 METER HD READING	SCALE	20 METER VD READING	SCALE	NOTES
N 0	17	100	36	100	
N 50	17	100	36	100	
N 100	18	100	34	100	
N 150	18	100	67	100	
N 200	22	100	I	I	Sta. on P/L (6) moved 10'S
N 250	22	100	28	100	P/L (1) 8' S (E-W) MW 15'W
N 300	29	100	32	100	
N 350	28	100	34	100	MW 22'E/5'S
N 400	20	100	I	300	P/L (gas) on Sta. moved 5'N
S 50	16	100	53	100	
S 100	15	100	65	100	

Notes:
1. I: Denotes interference
2. P/L: Pipeline

TEXACO E & P
G.L. ERWIN TANK BATTERY
LEA COUNTY, NEW MEXICO

PROFILE NO:	200 E	**EM-34 TERRAIN**	**DATE:**	1/12/98
GRID SPACING:	50'	**CONDUCTIVITY SURVEY**	**START TIME:**	12:03
NOTES:	N - S		**END TIME:**	12:20

STATION NO.	20 METER HD READING	SCALE	20 METER VD READING	SCALE	NOTES
N 0	16	100	85	300	
N 50	16	100	150	300	P/L (1) N-S 15'W
N 100	18	100	210	300	P/L (1) N-S 2'W
N 150	22	100	140	300	P/L (1) S-N 10'E
N200	40	100	I	I	P/L (6) 10'S
N 250	44	100	78	100	
N 300	24	100	90	300	
N 350	I	300	I	300	MW 25'W
N 400	20	100	I	300	P/L (gas) 1'S (moved 5'N)
S 50	16	100	55	100	
S 100	16	100	42	100	

Notes:
1. I: Denotes interference
2. P/L: Pipeline

TEXACO E & P
G.L. ERWIN TANK BATTERY
LEA COUNTY, NEW MEXICO

PROFILE NO:	250 E	**EM-34 TERRAIN**	**DATE:**	1/12/98
GRID SPACING:	50'	**CONDUCTIVITY SURVEY**	**START TIME:**	12:22
NOTES:	S - N		**END TIME:**	12:35

STATION NO.	20 METER HD READING	SCALE	20 METER VD READING	SCALE	NOTES
N 0	18	100	27	100	
N 50	20	100	30	100	
N150	20	100	50	100	
N 200	23	100	170	300	
N 250	19	100	I	I	P/L (N-S) 2'E; P/L E-W (6) 15'N
N 300	30	300	I	I	P/L N-S (12) 2'E
N 350	I	I	I	I	10' S OF S. fence (E-W)
S 50	18	100	26	100	
S 100	15	100	22	100	

Notes:
1. I: Denotes interference
2. P/L: Pipeline

TEXACO E & P
G.L. ERWIN TANK BATTERY
LEA COUNTY, NEW MEXICO

PROFILE NO:	300 E	**EM-34 TERRAIN**	**DATE:**	1/12/98
GRID SPACING:	50'	**CONDUCTIVITY SURVEY**	**START TIME:**	12:37
NOTES:	N - S		**END TIME:**	12:50

STATION NO.	20 METER HD READING	SCALE	20 METER VD READING	SCALE	NOTES
N 0	17	100	23	100	Powerline (N-S) 5'W
N 50	18	100	42	100	
N 100	16	100	260	300	P/L 10' N (E-W)
N 150	21	100	210	300	Sta. in low area
N 200	25	100	72	100	Powerline (N-S) 2'W of Sta.
N 250	24	100	I	I	Powerline 10' S of Sta. (N-S)
N 300	28	100	I	I	10' S of S fence (E-W)
S 50	18	100	25	100	Powerline(E-W) at Sta.(N-S)5'W
S 100	17	100	25	100	

Notes:
1. I: Denotes interference
2. P/L: Pipeline

TEXACO E & P
G.L. ERWIN TANK BATTERY
LEA COUNTY, NEW MEXICO

PROFILE NO:	350 E	**EM-34 TERRAIN**	**DATE:**	1/12/98
GRID SPACING:	50'	**CONDUCTIVITY SURVEY**	**START TIME:**	12:50
NOTES:	S - N		**END TIME:**	

STATION NO:	20 METER HD READING	SCALE	20 METER VD READING	SCALE	NOTES
N 0	18	100	30	100	
N 50	18	100	82	100	
N 100	23	100	300	300	P/L (E-W) 10'S
N 150	22	100	57	100	
N 200	22	100	42	100	
N 250	34	100	I	300	Interference in E-W profile
N 300	I	I	I	I	electric panel
S 50	18	100	25	100	
S 100	18	100	24	100	

Notes:
1. I: Denotes interference
2. P/L: Pipeline

TEXACO E & P
G.L. ERWIN TANK BATTERY
LEA COUNTY, NEW MEXICO

PROFILE NO:	400 E	**EM-34 TERRAIN**	**DATE:**	1/12/98
GRID SPACING:	50'	**CONDUCTIVITY SURVEY**	**START TIME:**	14:25
NOTES:	S - N		**END TIME:**	14:35

STATION NO.	20 METER HD READING	SCALE	20 METER VD READING	SCALE	NOTES
N 0	20	100	110	300	
N 50	32	100	I	I	P/L 5' S (E-W)
N 100	14	100	I	I	P/L 15' S (E-W)
N 150	23	100	36	100	
N 200	24	100	30	100	
N 250	28	100	36	100	
N 300	17	100	55	100	10' S of south fence
S 50	18	100	32	100	
S 100	18	100	26	100	

Notes:
1. I: Denotes interference
2. P/L: Pipeline

TEXACO E & P
G.L. ERWIN TANK BATTERY
LEA COUNTY, NEW MEXICO

PROFILE NO:	450 E	**EM-34 TERRAIN**	**DATE:**	1/12/98
GRID SPACING:	50'	**CONDUCTIVITY SURVEY**	**START TIME:**	14:37
NOTES:	N - S		**END TIME:**	14:50

STATION NO.	20 METER HD READING	SCALE	20 METER VD READING	SCALE	NOTES
N 0	14	100	I	I	P/L (E-W) 10' N
N 50	23	100	70	100	Inter. sec. of E-W / N-S lease rd.
N 100	20	100	80	100	P/L (1) 15' S (E-W)
N 150	22	100	36	100	
N 200	22	100	28	100	
N 250	25	100	32	100	
N 300	18	100	23	100	25' W of SE corner of TB
S 50	18	100	83	100	
S 100	17	100	79	100	

Notes:
1. I: Denotes interference
2. P/L: Pipeline

TEXACO E & P
G.L. ERWIN TANK BATTERY
LEA COUNTY, NEW MEXICO

PROFILE NO:	500 E	**EM-34 TERRAIN**	**DATE:**	1/12/98
GRID SPACING:	50'	**CONDUCTIVITY SURVEY**	**START TIME:**	14:50
NOTES:	S - N		**END TIME:**	15:00

STATION NO.	20 METER HD READING	SCALE	20 METER VD READING	SCALE	NOTES
N 0	18	100	43	100	
N 50	25	100	47	100	
N 100	16	100	78	100	
N 150	22	100	28	100	
N 200	20	100	24	100	
N 250	20	100	27	100	
N 300	18	100	26	100	
S 50	16	100	57	100	
S 100	16	100	60	100	

Notes:
1. I: Denotes interference
2. P/L: Pipeline

TEXACO E & P
G.L. ERWIN TANK BATTERY
LEA COUNTY, NEW MEXICO

PROFILE NO:	550 E	EM-34 TERRAIN	DATE:	1/12/98
GRID SPACING:	50'	CONDUCTIVITY SURVEY	START TIME:	15:00
NOTES:	N - S		END TIME:	15:10

STATION NO.	20 METER HD READING	SCALE	20 METER VD READING	SCALE	NOTES
N 0	18	100	30	100	
N 50	24	100	48	100	
N 100	18	100	I	100	P/L 5' S
N 150	18	100	28	100	
N 200	18	100	24	100	
N 250	18	100	24	100	
N 300	18	100	24	100	
S 50	16	100	25	100	
S 100	18	100	30	100	

Notes:
1. I: Denotes interference
2. P/L: Pipeline

APPENDIX D

Borehole Logs

SAMPLE LOG

Boring/Well: BH-1 (MW-1)
Project Number: 997
Client: Texaco Exploration & Production, Inc
Site Location: G. L. Erwin Federal NCT-2 "A & B " Tank Battery
Location: Lea County, New Mexico
Total Depth: 87.00 feet
Date Installed: 02/02/98

DEPTH (Ft)	TPH	OVM	SAMPLE DESCRIPTION
0-0.5	-	-	**Silt**, 10 YR 4/3 to 5/3, brown, v. fine grained quartz , dry
0.5-10	-	-	**Caliche**, 10 YR 6/3 to 7/3, light reddish brown to pink, indurated, massive, hard
10-54	-	-	**Sand**, 10 YR 7/6 to 7/4, reddish yellow to pink, v. fine grained quartz sand, mod. Well sorted, unconsolidated, dry
54-58	-	-	**Sandstone,** 2.5 YR 4/6 to 5/6, red to dark red, v. fine grain quartz sand, massive, hard
58-84	-	-	**Sand**, 10 YR 7/6 to 7/4, reddish yellow to pink, v. fine grained quartz sand, mod. Well sorted, unconsolidated, dry
84-87	-	-	**Mudstone,** 2.5 YR 4/6, red, moist, silty, v. fine grained quartz
TD: 87.00			

SAMPLE LOG

Boring/Well: BH-2 (MW-2)
Project Number:` 997
Client: Texaco Exploration & Production, Inc
Site Location: G. L. Erwin Federal NCT-2 "A & B " Tank Battery
Location: Lea County, New Mexico
Total Depth: 70.50 feet
Date Installed: 02/02/98

DEPTH (Ft)	TPH	OVM	SAMPLE DESCRIPTION
0-0.5	-	-	**Silt**, 10 YR 4/3 to 5/3, brown, v. fine grained quartz, dry
0.5-10	-	-	**Caliche**, 10 YR 6/3 to 7/3, light reddish brown to pink, indurated, massive, hard
10-61	-	-	**Sand**, 10 YR 7/6 to 7/4, reddish yellow to pink, v. fine grained quartz sand, mod. well sorted, unconsolidated, dry
61-62	-	-	**Sandstone,** 2.5 YR 4/6 to 5/6, red to dark red, v. fine grain quartz sand, massive, hard
62- 65	-	-	**Gravely sand**, 2.5 YR 4/6 to 5 YR 4/6, red to strong brown, v. coarse to med. Grained quartz sand, v. poorly sorted
65-70	-	-	**Mudstone,** 2.5 YR 4/6, red, moist, silty, v. fine grained quartz
TD: 70.50			

SAMPLE LOG

Boring/Well: BH-3 (MW-3)
Project Number: 997
Client: Texaco Exploration & Production, Inc
Site Location: G. L. Erwin Federal NCT-2 "A & B " Tank Battery
Location: Lea County, New Mexico
Total Depth: 71.00 feet
Date Installed: 02/03/98

DEPTH (Ft)	TPH	OVM	SAMPLE DESCRIPTION
0-0.5	-	-	**Silt**, 10 YR 4/3 to 5/3, brown, v. fine grained quartz, dry
0.5-11	-	-	**Caliche**, 10 YR 6/3 to 7/3, light reddish brown to pink, indurated, massive, hard
11-51.5	-	-	**Sand**, 10 YR 7/6 to 7/4, reddish yellow to pink, v. fine grained quartz sand, mod. Well sorted, unconsolidated, dry
51.5-54	-	-	**Sandstone,** 2.5 YR 4/6 to 5/6, red to dark red, v. fine grain quartz sand, massive, hard
54- 63	-	-	**Gravely sand**, 2.5 YR 4/6 to 5 YR 4/6, red to strong brown, v. coarse to med. Grained quartz sand, v. poorly sorted
63-64	-	-	**Sandstone,** 2.5 YR 4/6 to 5/6, red to dark red, v. fine grain quartz sand, massive, hard
64-67	-	-	**Gravely sand**, 2.5 YR 4/6 to 5 YR 4/6, red to strong brown, v. coarse to med. Grained quartz sand, v. poorly sorted
67-71	-	-	**Mudstone,** 2.5 YR 4/6, red, moist, v. fine grained quartz
TD: 71.00			

SAMPLE LOG

Boring/Well: BH-4 (MW-4)
Project Number:` 997
Client: Texaco Exploration & Production, Inc
Site Location: G. L. Erwin Federal NCT-2 "A & B " Tank Battery
Location: Lea County, New Mexico
Total Depth: 70.70 feet
Date Installed: 02/03/98

DEPTH (Ft)	TPH	OVM	SAMPLE DESCRIPTION
0-0.5	-	-	**Silt**, 10 YR 4/3 to 5/3, brown, v. fine grained quartz , dry
0.5-10	-	-	**Caliche**, 10 YR 6/3 to 7/3, light reddish brown to pink, indurated, massive, hard
10-51	-	-	**Sand**, 10 YR 7/6 to 7/4, reddish yellow to pink, v. fine grained quartz sand, mod well sorted, unconsolidated, dry
51.-52	-	-	**Sandstone,** 2.5 YR 4/6 to 5/6, red to dark red, v. fine grain quartz sand, massive, hard
52- 58	-	-	**Sand**, 10 YR 7/6 to 7/4, reddish yellow to pink, v. fine grained quartz sand, mod well sorted, unconsolidated, dry
58-66	-	-	**Gravely sand**, 2.5 YR 4/6 to 5 YR 4/6, red to strong brown, v. coarse to med grained quartz sand, v. poorly sorted
66-70	-	-	**Mudstone,** 2.5 YR 4/6, red, moist, v. fine grained quartz
TD: 70.70			

SAMPLE LOG

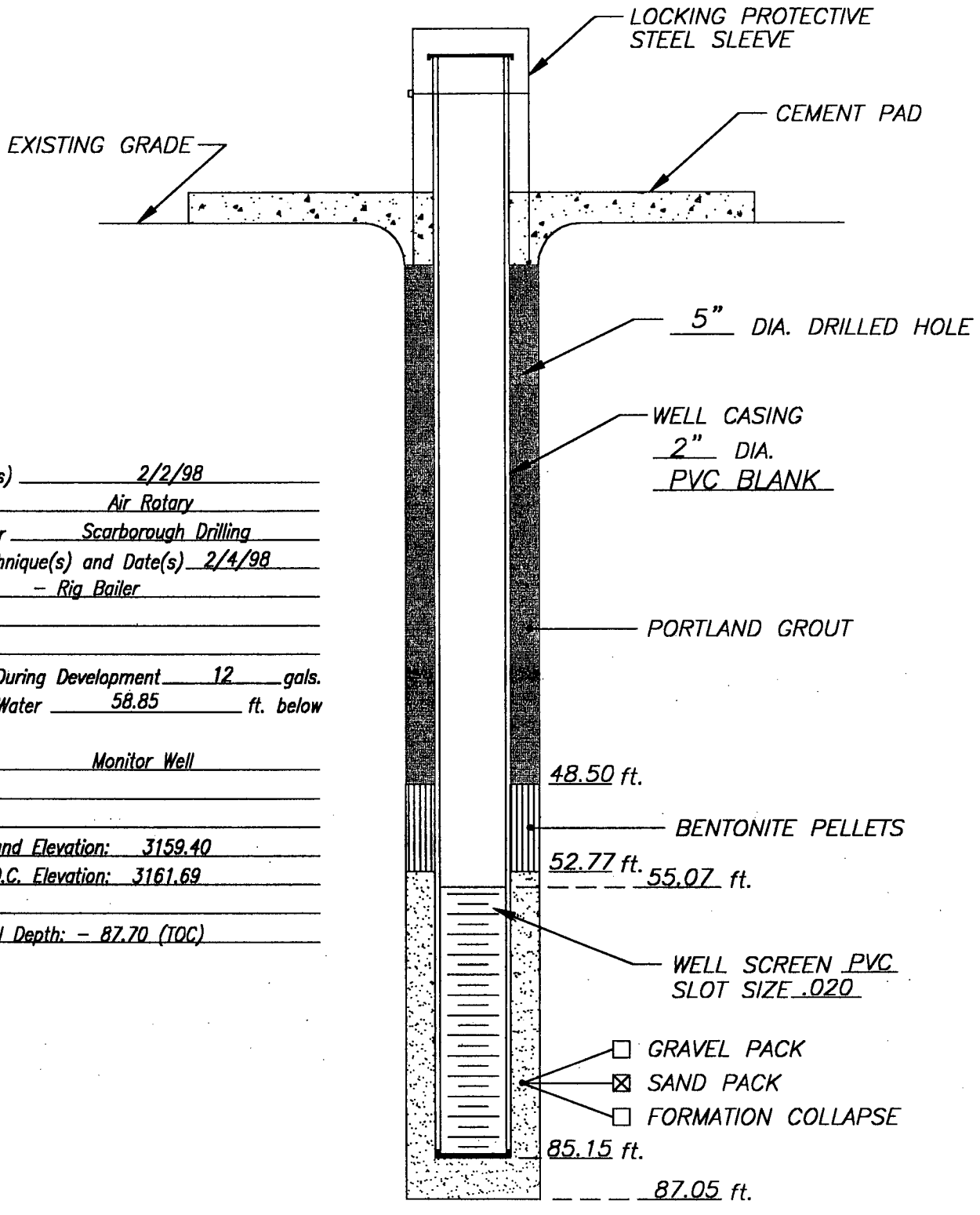
Boring/Well: BH-5 (MW-5)
Project Number: 997
Client: Texaco Exploration & Production, Inc
Site Location: G. L. Erwin Federal NCT-2 "A & B " Tank Battery
Location: Lea County, New Mexico
Total Depth: 70.41 feet
Date Installed: 02/03/98

DEPTH (Ft)	TPH	OVM	SAMPLE DESCRIPTION
0-3	-	-	**Silty clay**, 10 YR 4/3 to 4/6, brown to dark yellowish brown, v. fine grained quartz , dry
3-7	-	-	**Caliche**, 10 YR 6/3 to 7/3, light reddish brown to pink, indurated, massive, hard
7-47	-	-	**Sand**, 10 YR 7/6 to 7/4, reddish yellow to pink, v. fine grained quartz sand, mod well sorted, unconsolidated, dry
47.-47.5	-	-	**Sandstone,** 2.5 YR 4/6 to 5/6, red to dark red, v. fine grain quartz sand, massive, hard
47.5- 50	-	-	**Sand**, 10 YR 7/6 to 7/4, reddish yellow to pink, v. fine grained quartz sand, mod well sorted, unconsolidated, dry
50-50.5	-	-	**Sandstone,** 2.5 YR 4/6 to 5/6, red to dark red, v. fine grain quartz sand, massive, hard
50.5-59	-	-	**Gravely sand**, 2.5 YR 4/6 to 5 YR 4/6, red to strong brown, v. coarse to med grained quartz sand, v. poorly sorted
59-61	-	-	**Sandstone,** 2.5 YR 4/6 to 5/6, red to dark red, v. fine grain quartz sand, massive, hard
61-67	-	-	**Gravely sand**, 2.5 YR 4/6 to 5 YR 4/6, red to strong brown, v. coarse to med. Grained quartz sand, v. poorly sorted
67-70	-	-	**Mudstone,** 2.5 YR 4/6, red, moist, v. fine grained quartz
TD: 70.41			

APPENDIX E

Monitoring Well Construction Records

WELL CONSTRUCTION LOG



Installation Date(s) 2/2/98
Drilling Method Air Rotary
Drilling Contractor Scarborough Drilling
Development Technique(s) and Date(s) 2/4/98 – Rig Bailer

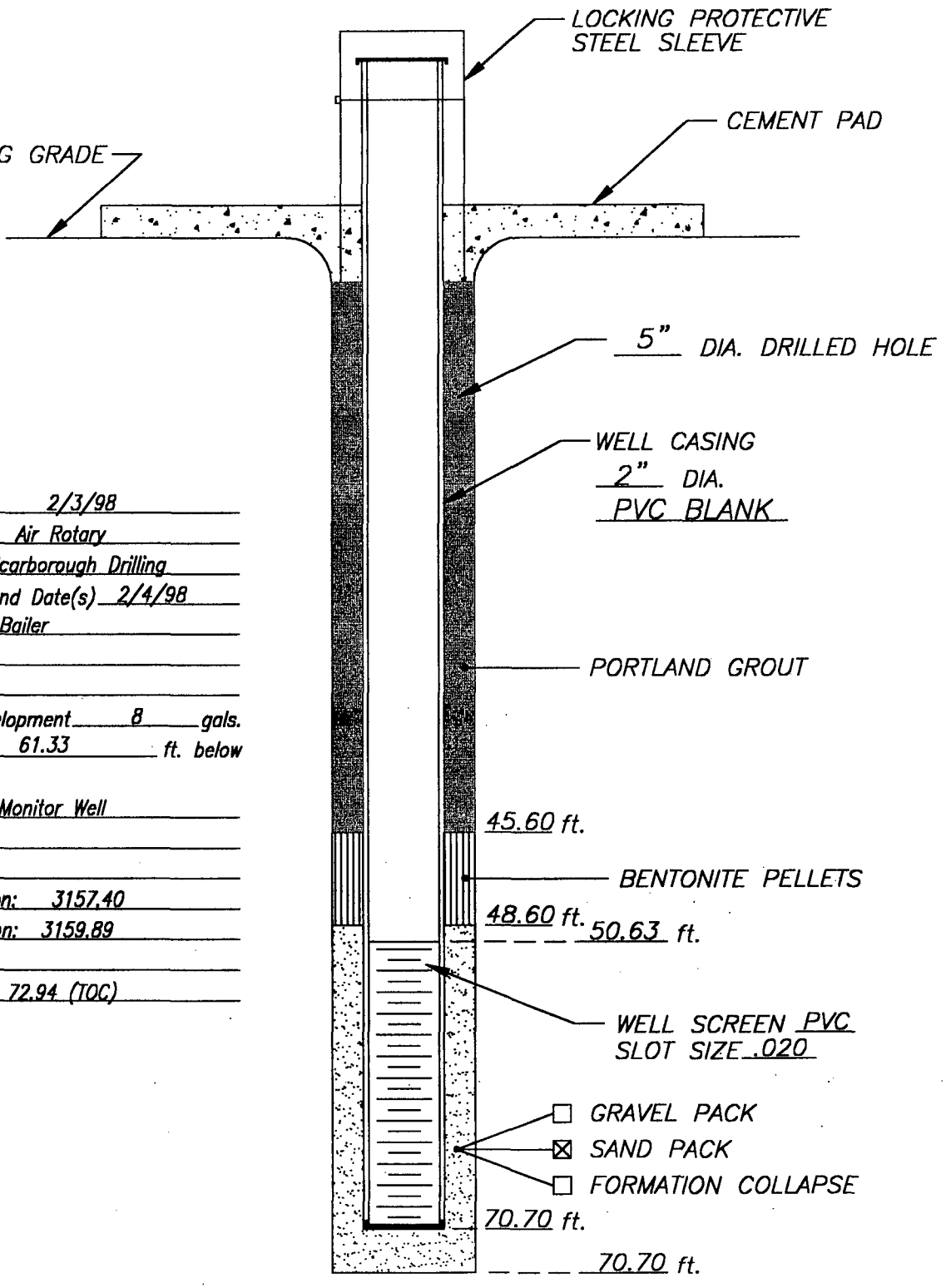
Water Removed During Development 12 gals.
Static Depth to Water 58.85 ft. below Ground Level
Well Purpose Monitor Well

Remarks
Ground Elevation: 3159.40
T.O.C. Elevation: 3161.69

Well Depth: – 87.70 (TOC)

DATE: 3/25/98	CLIENT: Texaco Exploration & Production, Inc.	WELL NO.
Highlander Environmental	PROJECT: G.L. ERWIN FED. NCT-2 A & B TANK BATTERY	MW-1
	LOCATION: Lea County, New Mexico	

WELL CONSTRUCTION LOG



Installation Date(s) 2/3/98
Drilling Method Air Rotary
Drilling Contractor Scarborough Drilling
Development Technique(s) and Date(s) 2/4/98 – Rig Bailer

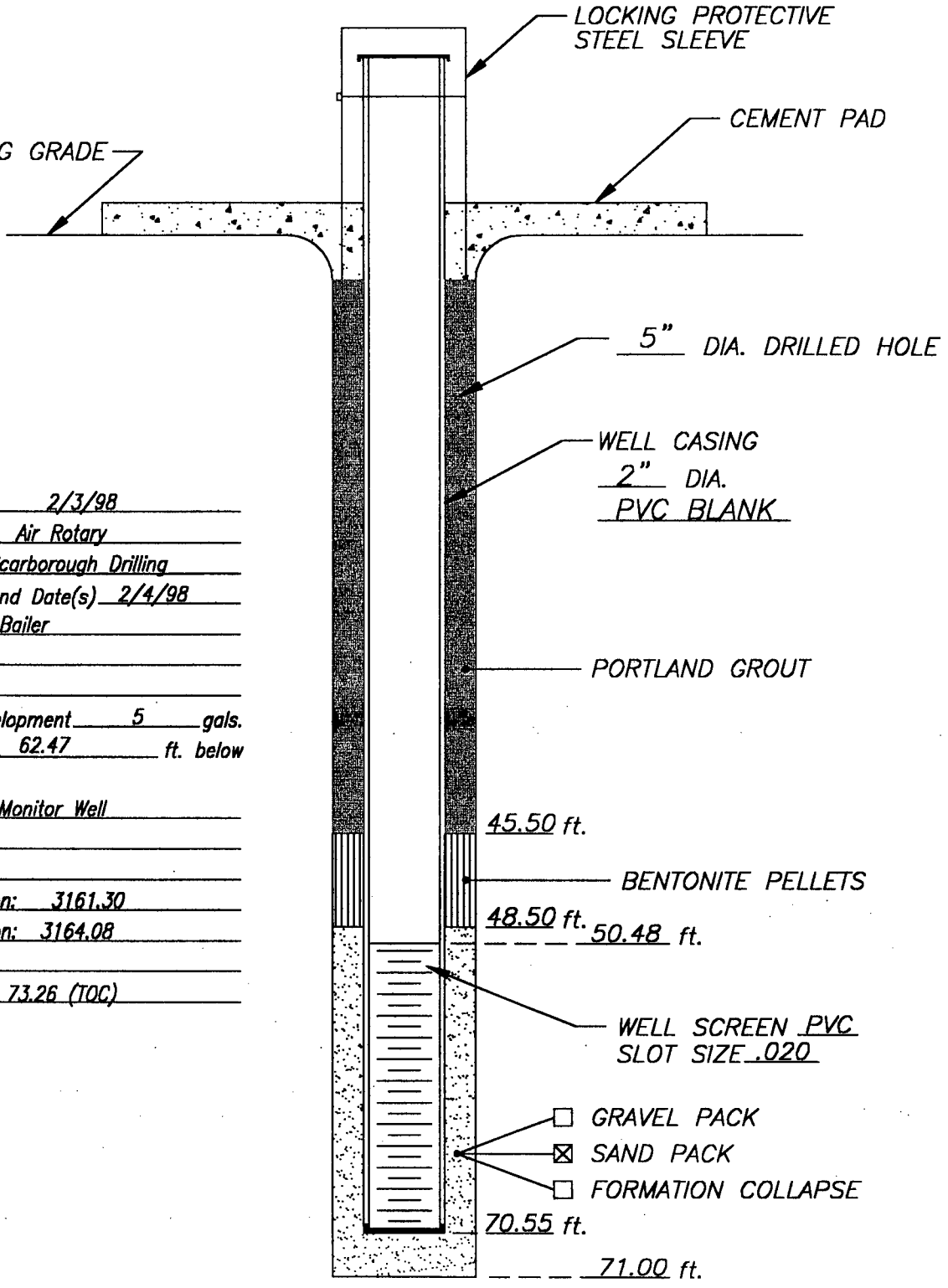
Water Removed During Development 8 gals.
Static Depth to Water 61.33 ft. below Ground Level
Well Purpose Monitor Well

Remarks
Ground Elevation: 3157.40
T.O.C. Elevation: 3159.89

Well Depth: – 72.94 (TOC)

DATE: 3/25/98	CLIENT: Texaco Exploration & Production, Inc.	WELL NO.
Highlander Environmental	PROJECT: G.L. ERWIN FED. NCT–2 A & B TANK BATTERY	MW–2
	LOCATION: Lea County, New Mexico	

WELL CONSTRUCTION LOG



Installation Date(s) 2/3/98
Drilling Method Air Rotary
Drilling Contractor Scarborough Drilling
Development Technique(s) and Date(s) 2/4/98
– Rig Bailer

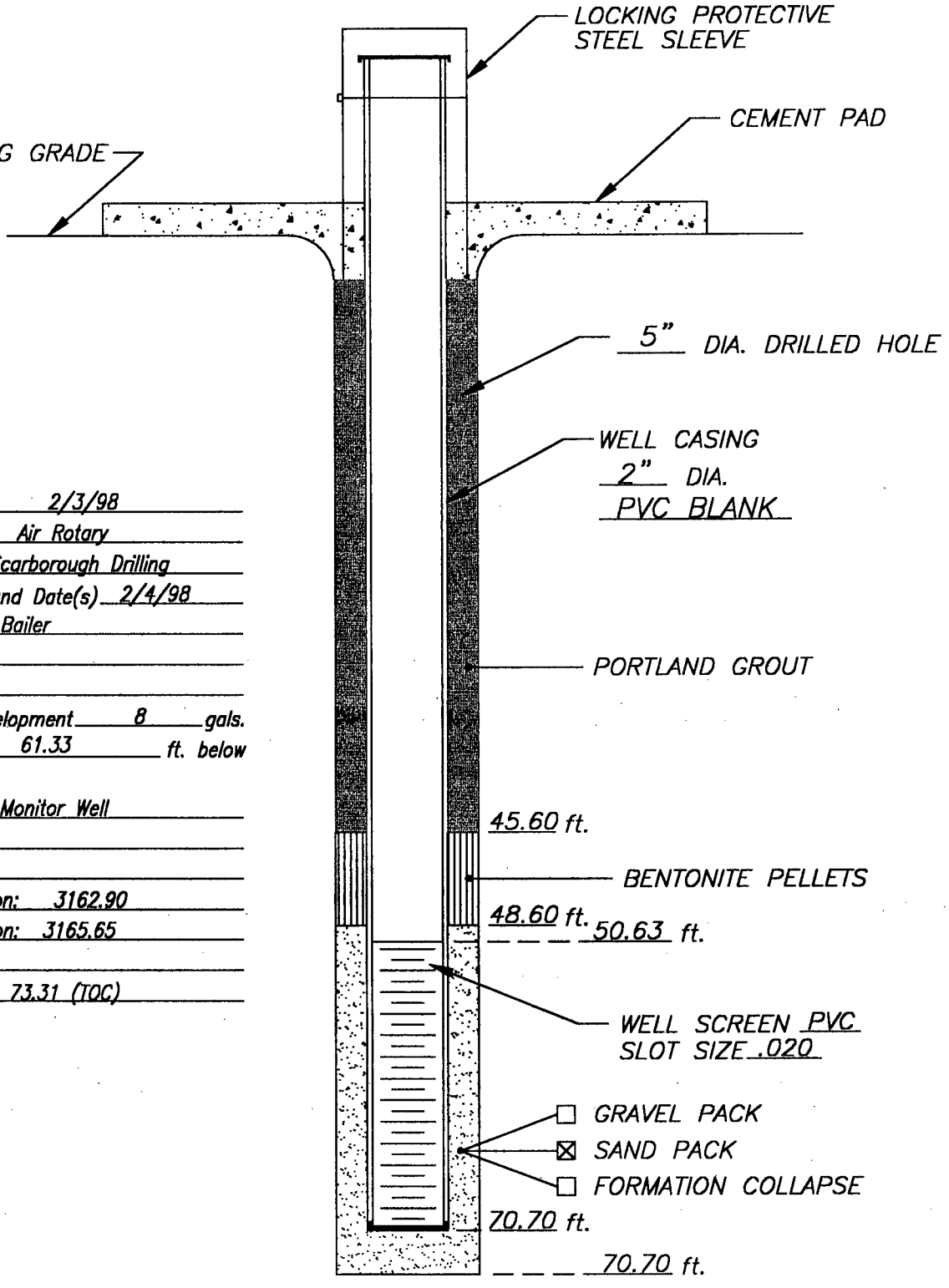
Water Removed During Development 5 gals.
Static Depth to Water 62.47 ft. below Ground Level
Well Purpose Monitor Well

Remarks
Ground Elevation: 3161.30
T.O.C. Elevation: 3164.08

Well Depth: – 73.26 (TOC)

DATE: 3/25/98 **Highlander Environmental**	CLIENT: Texaco Exploration & Production, Inc. PROJECT: G.L. ERWIN FED. NCT–2 A & B TANK BATTERY LOCATION: Lea County, New Mexico	WELL NO. MW–3

WELL CONSTRUCTION LOG



Installation Date(s) 2/3/98
Drilling Method Air Rotary
Drilling Contractor Scarborough Drilling
Development Technique(s) and Date(s) 2/4/98 – Rig Bailer

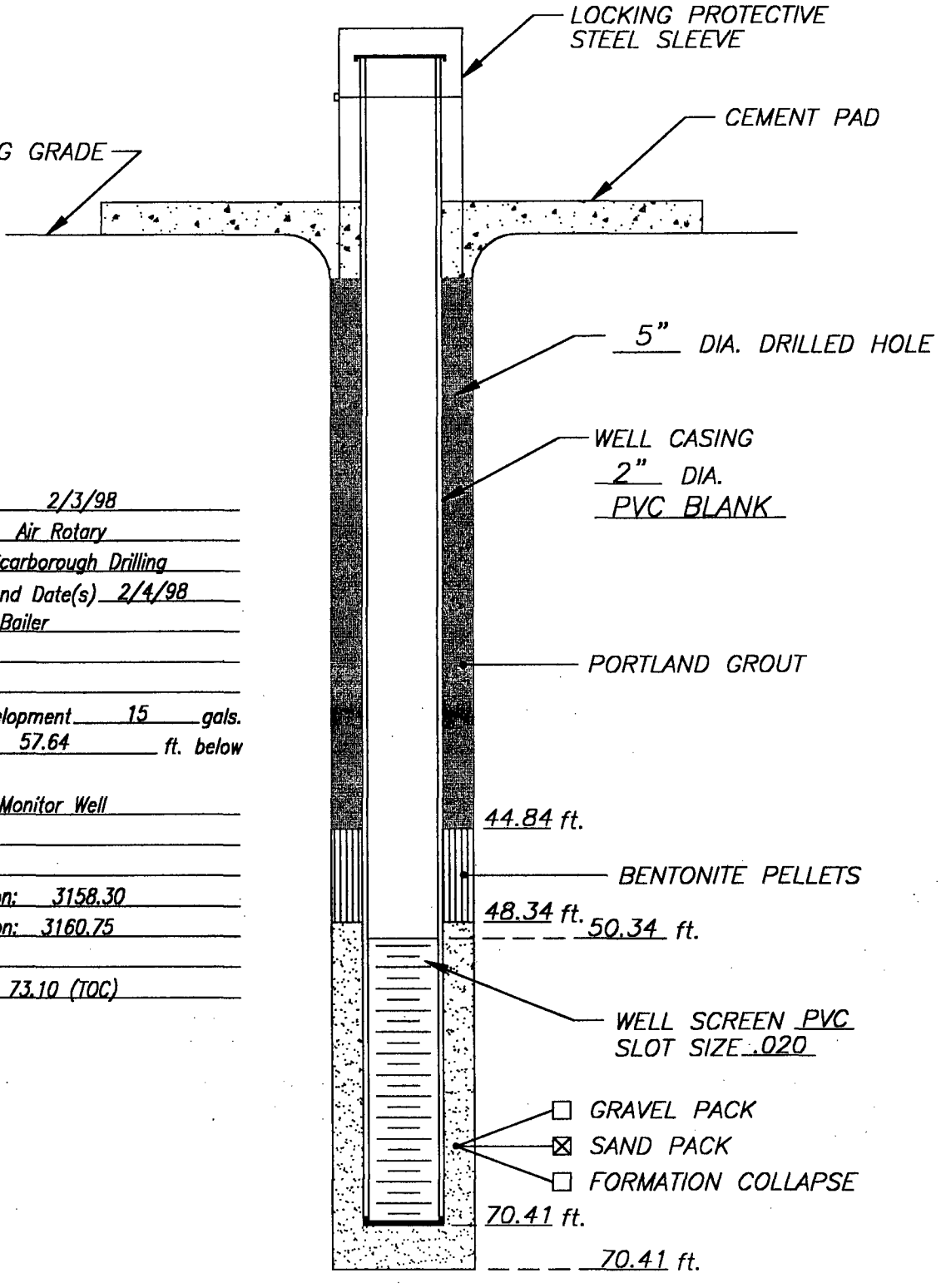
Water Removed During Development 8 gals.
Static Depth to Water 61.33 ft. below Ground Level
Well Purpose Monitor Well

Remarks
Ground Elevation: 3162.90
T.O.C. Elevation: 3165.65

Well Depth: – 73.31 (TOC)

DATE: 3/25/98	CLIENT: Texaco Exploration & Production, Inc.	WELL NO.
Highlander Environmental	PROJECT: G.L. ERWIN FED. NCT-2 A & B TANK BATTERY	MW-4
	LOCATION: Lea County, New Mexico	

WELL CONSTRUCTION LOG



Installation Date(s) 2/3/98
Drilling Method Air Rotary
Drilling Contractor Scarborough Drilling
Development Technique(s) and Date(s) 2/4/98 – Rig Bailer

Water Removed During Development 15 gals.
Static Depth to Water 57.64 ft. below Ground Level
Well Purpose Monitor Well

Remarks
Ground Elevation: 3158.30
T.O.C. Elevation: 3160.75

Well Depth: – 73.10 (TOC)

DATE: 3/25/98	CLIENT: Texaco Exploration & Production, Inc.	WELL NO.
Highlander Environmental	PROJECT: G.L. ERWIN FED. NCT-2 A & B TANK BATTERY	MW-5
	LOCATION: Lea County, New Mexico	

APPENDIX F

MAXIM Technologies, Inc. Report

MAXIM
TECHNOLOGIES INC

1703 West Industrial P.O. Box 2150 * Midland, Texas 79701 * 915/683-3349 FAX 915/686-0492

Client Mark Larson
Highlander Services Corp.
1910 N. Big Spring
Midland, TX 79705

Customer No. 107548
Report No. M8-02-066
Report Date 03/10/98 09:37

Project Project #997,Texaco,G.L.Erwin

Phone: 915-682-4559 Fax: 915-682-3946

Date Sampled 02/03/98

Sampled By Mark Larson

Sample Type Soil

Transported by Mark Larson

P.O. # _____

Date Received 02/13/98

Lab No.	Sample Identification
M8-02-066-01	BH-5, 0.0'- 2.0'
M8-02-066-02	BH-5, 5.0'- 10.0'

MAXIM

on

Reviewed By

ALLAN B. JOHNSTON

TEST RESULTS BY SAMPLE

03/10/98 09:37

Client: Highlander Services Corp.

Sample: 01A BH-5, 0.0'- 2.0' Collected: 02/03/98 13:00 Category: S

Test Name	Method	Result	Units	Detection Limit	Date Analyzed	Analyst
GEOTECHNICAL ANALYSIS	ASTM	Enclosure			02/25/98	DAL

Sample: 02A BH-5, 5.0'- 10.0' Collected: 02/03/98 13:05 Category: S

Test Name	Method	Result	Units	Detection Limit	Date Analyzed	Analyst
GEOTECHNICAL ANALYSIS	ASTM	Enclosure			02/25/98	DAL

FLEXIBLE WALL PERMEABILITY TEST - ASTM D 5084-90

Project	High Lander Environmental .		**Location**	02-066-01A	
Client	Maxim Technologies'Inc. / Midland.		**Client Job Number**	0630 - 4129	
Job Number	98107548	**Sample Number**	02 - 066 - 01A	**Depth**	N\A
Sample Description	Brown Silty Sand Clay..			**Board Station No.**	# 1

Sample Physical Data	Initial	Final
Diameter (in)	2.75	2.75
Height (in)	3.37	3.37
Porosity (%)	32.1	32.1
Bulk Density (pcf)**	126.1	135.8
Dry Density (pcf)**	114.0	114.0
Moisture Content (%)	10.6	19.2
Degree of Saturation (%)	58.0	99.0

** PCF = Pounds per cubic foot

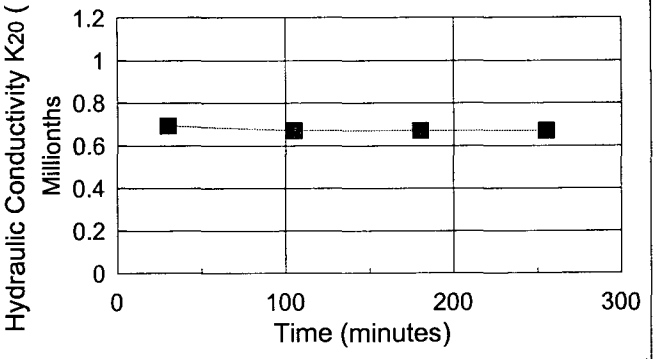
Cell Pressure (psi)	50.0
Back Pressure (psi)	47.0
Tail Water Pressure(psi)	44.0
Specific Gravity	2.680

Initial Differential Head Data	
Elevation of Tail Water Level (cm)	0.0
Elevation of Headwater Level (cm)	0.0
Differential Head (cm)	211.0
Hydraulic Gradient	24.7

Average Calculated Hydraulic Conductivity at 20 °C: k_{20}= 6.74E-07 cm/sec

Average Intrinsic Permeability: K = 6.88E-12 cm²

Interval Time (min)	Temp °C	Burette Reading (cc) Cell	Bottom	Top	Flow, Q (cc) In	Out	k_{20} (cm/sec)
0.00	21.0	2.50	8.30	17.90	0.00	0.00	N/A
30.00	21.0	2.50	9.50	16.70	1.20	1.20	6.92E-07
75.00	21.0	2.50	12.40	13.80	2.90	2.90	6.69E-07
75.00	21.0	2.50	11.20	15.00	2.90	2.90	6.69E-07
75.00	21.0	2.50	14.10	12.10	2.90	2.90	6.69E-07



Notes:

1) Test performed between 02/23/98 and 02/25/98.
2) Hydraulic Conductivity calculated by Constant Head Method.
3) Specific Gravity : Gs = 2.680

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FLEXIBLE WALL PERMEABILITY TEST - ASTM D 5084-90

Project	High Lander Environmental .		**Location**	02-066-02A	
Client	Maxim Technologies'Inc. / Midland.		**Client Job Number**	0630 - 4129	
Job Number	98107548	**Sample Number**	02 - 066 - 02A	**Depth**	N\A
Sample Description	Tan Silty Sand with some Gravel and Traces of Clay.			**Board Station No.**	#2

Sample Physical Data	Initial	Final
Diameter (in)	2.75	2.75
Height (in)	3.54	3.54
Porosity (%)	31.0	31.0
Bulk Density (pcf)**	125.4	134.5
Dry Density (pcf)**	115.9	115.9
Moisture Content (%)	8.2	16.1
Degree of Saturation (%)	49.0	100.0

** PCF = Pounds per cubic foot

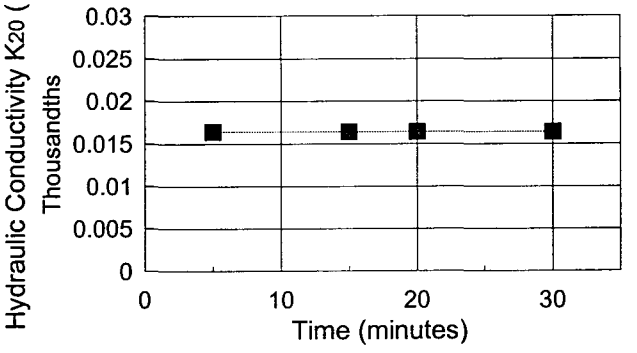
Cell Pressure (psi)	50.0
Back Pressure (psi)	47.0
Tail Water Pressure(psi)	44.0
Specific Gravity	2.690

Initial Differential Head Data	
Elevation of Tail Water Level (cm)	0.0
Elevation of Headwater Level (cm)	0.0
Differential Head (cm)	211.0
Hydraulic Gradient	23.5

Average Calculated Hydraulic Conductivity at 20 °C: k_{20}= 1.63E-05 cm/sec

Average Intrinsic Permeability: K = 1.67E-10 cm²

Interval Time (min)	Temp °C	Burette Reading (cc) Cell	Bottom	Top	Flow, Q (cc) In	Out	k_{20} (cm/sec)
0.00	21.0	12.80	2.70	16.80	0.00	0.00	N/A
5.00	21.0	12.80	7.20	12.30	4.50	4.50	1.63E-05
10.00	21.0	12.80	16.20	3.30	9.00	9.00	1.63E-05
5.00	21.0	12.80	7.20	12.30	4.50	4.50	1.63E-05
10.00	21.0	12.80	16.20	3.30	9.00	9.00	1.63E-05



Notes:

1) Test performed between 02/23/98 and 02/25/98.
2) Hydraulic Conductivity calculated by Constant Head Method.
3) Specific Gravity : G_s = 2.690

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Analysis Request and Chain of Custody Record

HIGHLANDER ENVIRONMENTAL CORP.

1910 N. Big Spring St.
Midland, Texas 79705

(915) 682-4559 Fax (915) 682-3946

PAGE: 1 OF: 1

CLIENT NAME: Texaco | SITE MANAGER: Mahlanen

PROJECT NO.: 9911 | PROJECT NAME: G. L. Erwin

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE
	2/3/98	13:00	✓			BH 5, 0.0-2.0'	1					
	2/3/98	13:05	✓			BH 5, 5.0-10.0'	1					

ANALYSIS REQUEST (Circle or Specify Method No.)

BTEX 8020/602	MTBE 8020/602	TPH	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Cr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	BOD, TSS, pH, TDS, Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	
																✓	c/o org. Carbon
																✓	density, Porosity
																✓	by gravimetric Correlation
																✓	

RELINQUISHED BY: (Signature) Mark Larson Date: 2/13/98 Time: 01:45

RECEIVED BY: (Signature) Date: Time:

SAMPLED BY: (Print & Sign) T. Larson Date: 2/13/98 Time: 13:00

RELINQUISHED BY: (Signature) Date: Time:

RECEIVED BY: (Signature) Date: Time:

SAMPLE SHIPPED BY: (Circle)
FEDEX BUS AIRBILL #
HAND DELIVERED UPS OTHER:

RELINQUISHED BY: (Signature) Date: Time:

RECEIVED BY: (Signature) Date: Time:

RECEIVING LABORATORY: Trace Anal. Tech., Inc.
ADDRESS:
CITY: STATE: ZIP:
CONTACT: PHONE:

RECEIVED BY: (Signature) Shelly Howell
DATE: 2-13-98 TIME: 10:07

HIGHLANDER CONTACT PERSON: Mark Larson

Results by: 2/25/98

RUSH Charges Authorized: Yes (No)

SAMPLE CONDITION WHEN RECEIVED:

MATRIX: W-Water A-Air SD-Solid S-Soil SL-Sludge O-Other

REMARKS: Need analysis by 2/25/98

APPENDIX G

ERMI Environmental Laboratories Report

Environmental Laboratories
Bethany Tech Center • Suite 190
400 W. Bethany Rd. • Allen, Texas 75013

February 24, 1998

REPORT OF: Water Analysis

REPORT TO: Mr. Ike Tavarez
Highlander Environmental Corp.
1910 N. Big Spring St.
Midland, Texas 79705

CLIENT NAME: Texaco
PROJECT NAME: G. L. Erwin
PROJECT NUMBER: 997

SAMPLE ID: See Below

SAMPLE DATE: February 17, 1998
SAMPLE RECEIVED February 20, 1998
TIME RECEIVED: 7:55AM
SAMPLE METHOD: Grab
SAMPLE COLLECTED BY: Tim Reed – Customer

SAMPLE NUMBER: See Below

RESULTS:

Sample Number	Sample ID	Benzene (mg/l)	Toluene (mg/l)	Ethyl Benzene (mg/l)	Xylene (mg/l)
92653	MW-1	<0.001	<0.001	<0.001	<0.003
92654	MW-2	<0.001	<0.001	<0.001	<0.003
92655	MW-3	<0.001	<0.001	<0.001	<0.003
92656	MW-4	<0.001	<0.001	<0.001	<0.003
92657	MW-5	<0.001	<0.001	<0.001	<0.003
92658	Southwest MW	<0.001	<0.001	<0.001	<0.003
92659	West MW	<0.001	<0.001	<0.001	<0.003
Detection Limits		**0.001**	**0.001**	**0.001**	**0.003**

Quality Control Information

Parameter	Sample Preservation	EPA Method	C.V.%		Standard Deviation	Spike Recovery %	Date of Analyses	Analyst
Benzene	HCl to pH <2/Cool to 4°C	8020	0.07	±	0.04	98	02/20/98	J. Wang
Toluene	HCl to pH <2/Cool to 4°C	8020	1.1	±	0.56	102	02/20/98	J. Wang
Ethyl Benzene	HCl to pH <2/Cool to 4°C	8020	1.4	±	0.70	102	02/20/98	J. Wang
Xylene	HCl to pH <2/Cool to 4°C	8020	0.01	±	0.01	102	02/20/98	J. Wang
Sample Number:	**92653**							
Surrogate: Bromofluorobenzene			N/A		N/A	101		

SAMPLE NUMBERS: 92653-92659

Quality Control Information (Continued)

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery %	Date of Analyses	Analyst
Sample Number:	**92654**						
Surrogate:							
Bromofluorobenzene			N/A	N/A	99		
Sample Number:	**92655**						
Surrogate:							
Bromofluorobenzene			N/A	N/A	97		
Sample Number:	**92656**						
Surrogate:							
Bromofluorobenzene			N/A	N/A	95		
Sample Number:	**92657**						
Surrogate:							
Bromofluorobenzene			N/A	N/A	99		
Sample Number:	**92658**						
Surrogate:							
Bromofluorobenzene			N/A	N/A	101		
Sample Number:	**92659**						
Surrogate:							
Bromofluorobenzene			N/A	N/A	99		

Respectfully submitted,

Kendall K. Brown
President

Prepared By S. Doster
Reviewed By Shelly Weems

Analysis Request and Chain of Custody Record

HIGHLANDER ENVIRONMENTAL CORP.

1910 N. Big Spring St.
Midland, Texas 79705

(915) 682-4559 Fax (915) 682-3946

PAGE: 1 OF: 1

CLIENT NAME: Texaco

SITE MANAGER: Tim Reed

PROJECT NO.: 997

PROJECT NAME: G.L. Erwin

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N) (Metals)	PRESERVATIVE METHOD: HCL	HNO3 or TMP	ICE	NONE	BTEX 8020/602	MTBE 8020/602	TPH	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Cr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	BOD, TSS, pH, TDS, Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Ions, Cations, TDS
	2/17/98				X	MW-1 92653	5	Y	X	X	X		X			X	X												X
	"					MW-2 92654	5	Y	X	X	X		X			X	X												X
	"					MW-3 92655	5	Y	X	X	X		X			X	X												X
	"					MW-4 92656	5	Y	X	X	X		X			X	X												X
	"					MW-5 92657	5	Y	X	X	X		X			X	X												X
	"					Southwest MW 92658	5	Y	X	X	X		X			X	X												X
	"					West MW 92659	5	Y	X	X	X		X			X	X												X

Bob Dutton

RELINQUISHED BY: (Signature) Date: Time:

RECEIVED BY: (Signature) Date: Time:

RELINQUISHED BY: (Signature) Date: Time:

RECEIVED BY: (Signature) Date: Time:

RELINQUISHED BY: (Signature) Date: Time:

RECEIVED BY: (Signature) Date: Time:

SAMPLED BY: (Print & Sign) Tim Reed Tim Reed Date: 2/17/98 Time: 1:40

SAMPLE SHIPPED BY: (Circle) FEDEX BUS UPS HAND DELIVERED AIRBILL #: OTHER:

RECEIVING LABORATORY: ERMI
ADDRESS: 400 W. Bethany Rd
CITY: Allen STATE: Tx ZIP: 75013
CONTACT: Misti PHONE:

RECEIVED BY: (Signature)
DATE: 2.20.98 TIME: 0755

HIGHLANDER CONTACT PERSON: Ike Tavarez

Results by:

RUSH Charges Authorized: Yes (No)

SAMPLE CONDITION WHEN RECEIVED:

MATRIX: W-Water A-Air SD-Solid S-Soil SL-Sludge O-Other

REMARKS:

Please Fill out all copies. Laboratory retains yellow copy - Return original copy to Highlander Environmental Corp. - Project Manager retains pink copy - Accounting receives Gold copy.

Sample I.D. Number: 926353-59

ERMI

Sample Preservation Documentation *

Subsample Parameters	Containers #	Size	Required Preservative	Sample Container	Check pH	Check Temp.
Metals + Hardness	1	1000 ml	1:1 HNO_3 to pH <2	Glass or Plastic	<2	
Dissolved Metals			Filter immediately(.45micron), then 1:1 HNO_3 to pH <2	Glass or Plastic		
Semivolatiles, Pesticides, PCBs, Herbicides	1	1 liter	Cool 4°C, 0.008% NaS_2O_3	Glass only with Teflon lid		on ice
VOA	1	40 ml	Cool 4°C, No Head Space	40 ml VOA vial		Do not open
Phos., NO_3/NO_2, NH_3N, COD, TKN			1:1 H_2SO_4 to pH <2; Cool 4°C	Glass or Plastic		
TDS, BOD, Cond, pH, TSS, F, SO_4, Cr^{6+}, DO, CBOD, Cl, Alk	1	1000 ml	Cool 4°C	Glass or Plastic Plastic only if F		on ice
TOC			1:1 H_2SO_4 to pH <2; Cool 4°C	Glass or Plastic		
Oil & Grease, TPH, Phenols			1:1 H_2SO_4 to pH <2; Cool 4°C	Glass only with Teflon lid		
Cyanide			5N NaOH to pH>12,Cool 4°C, 0.6 gms ascorbic acid	Glass or Plastic		
Sulfite			Cool 4°C	Glass or Plastic		
Sulfide			Add zinc acetate, then 10N NaOH to pH >9; Cool 4°C	Glass or Plastic		
Bacteria			Bag contains Sodium Thiosulfite	Thio bag or Plastic		
Soil, Sludge, Solid, Oil, liquid, Semisolid			Cool 4°C			
Comments:						

* This form is used to document sample preservation. Circle parameter requested. Fill in number and size of containers received. Check and record pH and temperature. Adjust pH if needed. Note any incorrect sample containers or preservation on chain-of-custody.

Preservation Checked By: [signature] 2-20-98 0755

Date Time

Environmental Laboratories
Bethany Tech Center • Suite 190
400 W. Bethany Rd. • Allen, Texas 75013

March 06, 1998

REVISED

REPORT OF: Water Analysis

REPORT TO: Mr. Ike Tavarez
Highlander Environmental Corp.
1910 N. Big Spring St.
Midland, Texas 79705

CLIENT NAME: Texaco
PROJECT NAME: G. L. Erwin
PROJECT NUMBER: 997

SAMPLE ID: MW-1

SAMPLE DATE: February 17, 1998
SAMPLE RECEIVED: February 20, 1998
TIME RECEIVED: 7:55AM
SAMPLE METHOD: Grab
SAMPLE COLLECTED BY: Tim Reed – Customer

SAMPLE NUMBER: 92653

RESULTS:

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
METALS		
Arsenic, Dissolved	0.020	<0.020
Barium, Dissolved	0.005	0.059
Cadmium, Dissolved	0.004	<0.004
Calcium, Dissolved	0.25	65
Chromium, Dissolved	0.005	<0.005
Copper, Dissolved	0.005	<0.005
Iron, Dissolved	0.005	<0.005
Lead, Dissolved	0.010	<0.010
Magnesium, Dissolved	0.15	23
Manganese, Dissolved	0.002	<0.002
Mercury, Dissolved	0.0002	<0.0002
Potassium, Dissolved	2.0	3.6
Selenium, Dissolved	0.015	<0.015
Silver, Dissolved	0.007	<0.007
Sodium, Dissolved	0.80	135
Zinc, Dissolved	0.002	0.045
CONVENTIONAL POLLUTANTS		
Chloride	1.0	233
Sulfate	1.0	92
Bicarbonate Alkalinity (as $CaCO_3$)	2.0	220
Carbonate Alkalinity (as $CaCO_3$)	2.0	<2.0

SAMPLE NUMBER: 92653

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
CONVENTIONAL POLLUTANTS (Continued)		
Hardness, Total (as $CaCO_3$)	2.0	276
Total Dissolved Solids	5.0	812
pH	0.1 units	7.5 units
POLYNUCLEAR AROMATIC HYDROCARBONS		
Acenaphthene	0.006	<0.006
Acenaphthylene	0.006	<0.006
Anthracene	0.006	<0.006
Benzo(a)anthracene (1,2-Benzanthracene)	0.006	<0.006
Benzo(a)pyrene (3,4-Benzopyrene)	0.006	<0.006
Benzo(b)fluoranthene (3,4-Benzofluoranthene)	0.006	<0.006
Benzo(j)fluoranthene	0.006	<0.006
Benzo(k)fluoranthene (11,12-Benzofluoranthene)	0.006	<0.006
Benzo(ghi)perylene (1,12-Benzoperylene)	0.006	<0.006
Chrysene	0.006	<0.006
Dibenz(a,h)acridine	0.006	<0.006
Dibenz(a,j)acridine	0.006	<0.006
Dibenzo(a,h)anthracene (1,2,5,6-Dibenzathracene)	0.006	<0.006
Dibenzo(c,g)carbazole	0.006	<0.006
Dibenzo(a,e)pyrene	0.006	<0.006
Dibenzo(a,h)pyrene	0.006	<0.006
Dibenzo(a,i)pyrene	0.006	<0.006
Fluoranthene	0.006	<0.006
Fluorene	0.006	<0.006
Indeno(1,2,3-c,d)Pyrene (2,3-0-Phenlene Pyrene)	0.006	<0.006
3-Methylcholanthrene	0.006	<0.006
Naphthalene	0.006	<0.006
Phenanthrene	0.006	<0.006
Pyrene	0.006	<0.006

Quality Control Information

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Metals Digestion – ICP		3010				02/21/98	4:00PM	D. Schwartz
Metals Digestion – ICP		3010				03/02/98	5:45PM	D. Schwartz
Metals Digestion – Mercury		7470				02/23/98	10:30AM	M. M°Gaugh

SAMPLE NUMBER: 92653

Quality Control Information (Continued)

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Arsenic, D	HNO_3 to pH <2	6010	1.6	± 0.02	99	02/24/98	10:53PM	D. Schwartz
Barium, D	HNO_3 to pH <2	6010	9.2	± 0.09	92	02/25/98	1:33PM	D. Schwartz
Cadmium, D	HNO_3 to pH <2	6010	4.1	± 0.04	94	02/24/98	10:53PM	D. Schwartz
Calcium, D	HNO_3 to pH <2	6010	1.4	± 0.26	97	02/26/98	9:34PM	D. Schwartz
Chromium, D	HNO_3 to pH <2	6010	5.0	± 0.04	91	02/24/98	10:53PM	D. Schwartz
Copper, D	HNO_3 to pH <2	6010	0.4	± 0.004	98	03/02/98	8:13PM	D. Schwartz
Iron, D	HNO_3 to pH <2	6010	1.4	± 0.02	101	03/02/98	8:13PM	D. Schwartz
Lead, D	HNO_3 to pH <2	6010	3.8	± 0.04	94	02/24/98	10:53PM	D. Schwartz
Magnesium, D	HNO_3 to pH <2	6010	2.2	± 0.44	102	02/27/98	9:49AM	D. Schwartz
Manganese, D	HNO_3 to pH <2	6010	0.6	± 0.006	102	03/02/98	8:13PM	D. Schwartz
Mercury, D	HNO_3 to pH <2	7470	4.1	± 0.0002	101	02/24/98	2:09PM	M. McGaugh
Potassium, D	HNO_3 to pH <2	6010	0.07	± 0.01	95	02/26/98	9:34PM	D. Schwartz
Selenium, D	HNO_3 to pH <2	6010	0.6	± 0.006	101	02/25/98	3:17PM	D. Schwartz
Silver, D	HNO_3 to pH <2	6010	1.3	± 0.006	107	02/25/98	5:08PM	D. Schwartz
Sodium, D	HNO_3 to pH <2	6010	0.3	± 0.06	93	02/26/98	9:34PM	D. Schwartz
Zinc, D	HNO_3 to pH <2	6010	0.4	± 0.004	102	03/02/98	8:13PM	D. Schwartz
Chloride	None Required	9056	0.0	± 0.00	104	02/24/98	11:26AM	M. Coker
Sulfate	Cool to 4°C	9056	0.3	± 0.70	95	02/24/98	11:26AM	M. Coker
Bicarbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Carbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Hardness	HNO_3 to pH <2	130.2	0.0	± 0.00	98	02/25/98	10:15AM	K. Hartzell
TDS	Cool to 4°C	160.1	0.1	± 1.41	100	02/20/98	3:25PM	J. Duncan
pH	None Required	150.1	0.0	± 0.00	N/A	02/20/98	1:10PM	M. Coker
PAHs	Cool to 4°C	8270				02/24/98	7:54PM	K. Richmond
Liquid-Liquid Extraction		3510				02/23/98	11:30AM	E. Boateng
Gel Permeation Cleanup		3640				02/23/98	3:45PM	E. Boateng
Matrix Spikes:								
1,4-Dichlorobenzene			20.187	± 12.424	62			
N-Nitroso-di-n-propylamine			15.479	± 11.915	77			
1,2,4-Trichlorobenzene			22.207	± 18.986	85			
Acenaphthene			20.921	± 16.546	79			
2,4-Dinitrotoluene			16.074	± 12.827	80			
Pyrene			2.248	± 2.397	107			
Surrogates:								
Nitrobenzene-d_5			N/A	N/A	111			
2-Fluorobiphenyl			N/A	N/A	115			
Terphenyl-d_{14}			N/A	N/A	131			

SAMPLE NUMBER: 92653

- Standard Methods, 18th Edition.

Respectfully submitted,

Kendall K. Brown
President

Prepared By S. Doster
Reviewed By Shelly Weems

Environmental Laboratories
Bethany Tech Center • Suite 190
400 W. Bethany Rd. • Allen, Texas 75013

REVISED

March 06, 1998

REPORT OF: Water Analysis

REPORT TO: Mr. Ike Tavarez
Highlander Environmental Corp.
1910 N. Big Spring St.
Midland, Texas 79705

CLIENT NAME: Texaco
PROJECT NAME: G. L. Erwin
PROJECT NUMBER: 997

SAMPLE ID: MW-2

SAMPLE DATE: February 17, 1998
SAMPLE RECEIVED: February 20, 1998
TIME RECEIVED: 7:55AM
SAMPLE COLLECTED BY: Tim Reed – Customer

SAMPLE NUMBER: 92654

RESULTS:

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
METALS		
Arsenic, Dissolved	0.020	<0.020
Barium, Dissolved	0.005	0.048
Cadmium, Dissolved	0.004	<0.004
Calcium, Dissolved	0.25	31
Chromium, Dissolved	0.005	<0.005
Copper, Dissolved	0.005	<0.005
Iron, Dissolved	0.005	<0.005
Lead, Dissolved	0.010	<0.010
Magnesium, Dissolved	0.15	9.8
Manganese, Dissolved	0.002	0.006
Mercury, Dissolved	0.0002	<0.0002
Potassium, Dissolved	2.0	3.6
Selenium, Dissolved	0.015	<0.015
Silver, Dissolved	0.007	<0.007
Sodium, Dissolved	0.80	366
Zinc, Dissolved	0.002	0.011
CONVENTIONAL POLLUTANTS		
Chloride	1.0	423
Sulfate	1.0	141
Bicarbonate Alkalinity (as $CaCO_3$)	2.0	360
Carbonate Alkalinity (as $CaCO_3$)	2.0	<2.0

SAMPLE NUMBER: 92654

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
CONVENTIONAL POLLUTANTS (Continued)		
Hardness, Total (as $CaCO_3$)	2.0	124
Total Dissolved Solids	5.0	1257
pH	0.1 units	7.6 units
POLYNUCLEAR AROMATIC HYDROCARBONS		
Acenaphthene	0.006	<0.006
Acenaphthylene	0.006	<0.006
Anthracene	0.006	<0.006
Benzo(a)anthracene (1,2-Benzanthracene)	0.006	<0.006
Benzo(a)pyrene (3,4-Benzopyrene)	0.006	<0.006
Benzo(b)fluoranthene (3,4-Benzofluoranthene)	0.006	<0.006
Benzo(j)fluoranthene	0.006	<0.006
Benzo(k)fluoranthene (11,12-Benzofluoranthene)	0.006	<0.006
Benzo(ghi)perylene (1,12-Benzoperylene)	0.006	<0.006
Chrysene	0.006	<0.006
Dibenz(a,h)acridine	0.006	<0.006
Dibenz(a,j)acridine	0.006	<0.006
Dibenzo(a,h)anthracene (1,2,5,6-Dibenzathracene)	0.006	<0.006
Dibenzo(c,g)carbazole	0.006	<0.006
Dibenzo(a,e)pyrene	0.006	<0.006
Dibenzo(a,h)pyrene	0.006	<0.006
Dibenzo(a,i)pyrene	0.006	<0.006
Fluoranthene	0.006	<0.006
Fluorene	0.006	<0.006
Indeno(1,2,3-c,d)Pyrene (2,3-0-Phenlene Pyrene)	0.006	<0.006
3-Methylcholanthrene	0.006	<0.006
Naphthalene	0.006	<0.006
Phenanthrene	0.006	<0.006
Pyrene	0.006	<0.006

Quality Control Information

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Metals Digestion – ICP		3010				02/21/98	4:00PM	D. Schwartz
Metals Digestion – ICP		3010				03/03/98	11:30AM	D. Schwartz
Metals Digestion – Mercury		7470				02/23/98	10:30AM	M. M°Gaugh

SAMPLE NUMBER: 92654

Quality Control Information (Continued)

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Arsenic, D	HNO_3 to pH <2	6010	1.6	± 0.02	99	02/24/98	11:39PM	D. Schwartz
Barium, D	HNO_3 to pH <2	6010	9.2	± 0.09	92	02/25/98	1:49PM	D. Schwartz
Cadmium, D	HNO_3 to pH <2	6010	4.1	± 0.04	94	02/24/98	11:39PM	D. Schwartz
Calcium, D	HNO_3 to pH <2	6010	1.4	± 0.26	97	02/26/98	9:39PM	D. Schwartz
Chromium, D	HNO_3 to pH <2	6010	5.0	± 0.04	91	02/24/98	11:39PM	D. Schwartz
Copper, D	HNO_3 to pH <2	6010	2.6	± 0.02	96	03/03/98	6:25PM	D. Schwartz
Iron, D	HNO_3 to pH <2	6010	1.2	± 0.01	97	03/03/98	6:25PM	D. Schwartz
Lead, D	HNO_3 to pH <2	6010	3.8	± 0.04	94	02/24/98	11:39PM	D. Schwartz
Magnesium, D	HNO_3 to pH <2	6010	2.2	± 0.44	102	02/27/98	9:52AM	D. Schwartz
Manganese, D	HNO_3 to pH <2	6010	0.6	± 0.005	93	03/04/98	11:09AM	D. Schwartz
Mercury, D	HNO_3 to pH <2	7470	4.1	± 0.0002	101	02/24/98	2:11PM	M. McGaugh
Potassium, D	HNO_3 to pH <2	6010	0.07	± 0.01	95	02/26/98	9:39PM	D. Schwartz
Selenium, D	HNO_3 to pH <2	6010	0.6	± 0.006	101	02/25/98	3:46PM	D. Schwartz
Silver, D	HNO_3 to pH <2	6010	1.3	± 0.006	107	02/25/98	5:20PM	D. Schwartz
Sodium, D	HNO_3 to pH <2	6010	0.3	± 0.06	93	02/26/98	9:39PM	D. Schwartz
Zinc, D	HNO_3 to pH <2	6010	1.8	± 0.02	101	03/03/98	6:25PM	D. Schwartz
Chloride	None Required	9056	0.0	± 0.00	104	02/24/98	11:34AM	M. Coker
Sulfate	Cool to 4°C	9056	0.3	± 0.70	95	02/24/98	11:34AM	M. Coker
Bicarbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Carbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Hardness	HNO_3 to pH <2	130.2	0.0	± 0.00	98	02/25/98	10:15AM	K. Hartzell
TDS	Cool to 4°C	160.1	0.1	± 1.41	100	02/20/98	3:25PM	J. Duncan
pH	None Required	150.1	0.0	± 0.00	N/A	02/20/98	1:10PM	M. Coker
PAHs	Cool to 4°C	8270				02/24/98	8:32PM	K. Richmond
Liquid-Liquid Extraction		3510				02/23/98	11:30AM	E. Boateng
Gel Permeation Cleanup		3640				02/23/98	5:45PM	E. Boateng
Matrix Spikes:								
1,4-Dichlorobenzene			15.839	± 14.029	89			
N-Nitroso-di-n-propylamine			4.810	± 5.105	106			
1,2,4-Trichlorobenzene			7.282	± 7.552	104			
Acenaphthene			7.725	± 6.350	82			
2,4-Dinitrotoluene			6.943	± 6.583	95			
Pyrene			2.008	± 2.044	102			
Surrogates:								
Nitrobenzene-d_5			N/A	N/A	102			
2-Fluorobiphenyl			N/A	N/A	114			
Terphenyl-d_{14}			N/A	N/A	138			

SAMPLE NUMBER: 92654

- Standard Methods, 18th Edition.

Respectfully submitted,

Kendall K. Brown
President

Prepared By S. Doster
Reviewed By Shelly Weems

Environmental Laboratories
Bethany Tech Center • Suite 190
400 W. Bethany Rd. • Allen, Texas 75013

REVISED

March 06, 1998

REPORT OF: Water Analysis

REPORT TO: Mr. Ike Tavarez
Highlander Environmental Corp.
1910 N. Big Spring St.
Midland, Texas 79705

CLIENT NAME: Texaco
PROJECT NAME: G. L. Erwin
PROJECT NUMBER: 997

SAMPLE ID: MW-3

SAMPLE DATE: February 17, 1998
SAMPLE RECEIVED: February 20, 1998
TIME RECEIVED: 7:55AM
SAMPLE COLLECTED BY: Tim Reed – Customer

SAMPLE NUMBER: 92655

RESULTS:

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
METALS		
Arsenic, Dissolved	0.020	<0.020
Barium, Dissolved	0.005	0.061
Cadmium, Dissolved	0.004	<0.004
Calcium, Dissolved	0.25	58
Chromium, Dissolved	0.005	<0.005
Copper, Dissolved	0.005	<0.005
Iron, Dissolved	0.005	<0.005
Lead, Dissolved	0.010	<0.010
Magnesium, Dissolved	0.15	19
Manganese, Dissolved	0.002	0.014
Mercury, Dissolved	0.0002	<0.0002
Potassium, Dissolved	2.0	13
Selenium, Dissolved	0.015	<0.015
Silver, Dissolved	0.007	<0.007
Sodium, Dissolved	0.80	743
Zinc, Dissolved	0.002	<0.002
CONVENTIONAL POLLUTANTS		
Chloride	5.0	983
Sulfate	1.0	173
Bicarbonate Alkalinity (as $CaCO_3$)	2.0	410
Carbonate Alkalinity (as $CaCO_3$)	2.0	<2.0

SAMPLE NUMBER: 92655

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
CONVENTIONAL POLLUTANTS (Continued)		
Hardness, Total (as $CaCO_3$)	2.0	232
Total Dissolved Solids	5.0	2261
pH	0.1 units	7.6 units
POLYNUCLEAR AROMATIC HYDROCARBONS		
Acenaphthene	0.006	<0.006
Acenaphthylene	0.006	<0.006
Anthracene	0.006	<0.006
Benzo(a)anthracene (1,2-Benzanthracene)	0.006	<0.006
Benzo(a)pyrene (3,4-Benzopyrene)	0.006	<0.006
Benzo(b)fluoranthene (3,4-Benzofluoranthene)	0.006	<0.006
Benzo(j)fluoranthene	0.006	<0.006
Benzo(k)fluoranthene (11,12-Benzofluoranthene)	0.006	<0.006
Benzo(ghi)perylene (1,12-Benzoperylene)	0.006	<0.006
Chrysene	0.006	<0.006
Dibenz(a,h)acridine	0.006	<0.006
Dibenz(a,j)acridine	0.006	<0.006
Dibenzo(a,h)anthracene (1,2,5,6-Dibenzathracene)	0.006	<0.006
Dibenzo(c,g)carbazole	0.006	<0.006
Dibenzo(a,e)pyrene	0.006	<0.006
Dibenzo(a,h)pyrene	0.006	<0.006
Dibenzo(a,i)pyrene	0.006	<0.006
Fluoranthene	0.006	<0.006
Fluorene	0.006	<0.006
Indeno(1,2,3-c,d)Pyrene (2,3-0-Phenlene Pyrene)	0.006	<0.006
3-Methylcholanthrene	0.006	<0.006
Naphthalene	0.006	<0.006
Phenanthrene	0.006	<0.006
Pyrene	0.006	<0.006

Quality Control Information

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Metals Digestion – ICP		3010				02/21/98	4:00PM	D. Schwartz
Metals Digestion – ICP		3010				03/03/98	11:30AM	D. Schwartz
Metals Digestion – Mercury		7470				02/23/98	10:30AM	M. McGaugh

SAMPLE NUMBER: 92655

Quality Control Information (Continued)

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Arsenic, D	HNO_3 to pH <2	6010	1.6	± 0.02	99	02/24/98	11:48PM	D. Schwartz
Barium, D	HNO_3 to pH <2	6010	9.2	± 0.09	92	02/25/98	1:54PM	D. Schwartz
Cadmium, D	HNO_3 to pH <2	6010	4.1	± 0.04	94	02/24/98	11:48PM	D. Schwartz
Calcium, D	HNO_3 to pH <2	6010	1.4	± 0.26	97	02/26/98	9:44PM	D. Schwartz
Chromium, D	HNO_3 to pH <2	6010	5.0	± 0.04	91	02/24/98	11:48PM	D. Schwartz
Copper, D	HNO_3 to pH <2	6010	2.6	± 0.02	96	03/03/98	6:30PM	D. Schwartz
Iron, D	HNO_3 to pH <2	6010	1.2	± 0.01	97	03/03/98	6:30PM	D. Schwartz
Lead, D	HNO_3 to pH <2	6010	3.8	± 0.04	94	02/24/98	11:48PM	D. Schwartz
Magnesium, D	HNO_3 to pH <2	6010	2.2	± 0.44	102	02/27/98	9:56AM	D. Schwartz
Manganese, D	HNO_3 to pH <2	6010	0.6	± 0.005	93	03/04/98	11:12AM	D. Schwartz
Mercury, D	HNO_3 to pH <2	7470	4.1	± 0.0002	101	02/24/98	2:13PM	M. McGaugh
Potassium, D	HNO_3 to pH <2	6010	0.07	± 0.01	95	02/26/98	9:44PM	D. Schwartz
Selenium, D	HNO_3 to pH <2	6010	0.6	± 0.006	101	02/25/98	3:50PM	D. Schwartz
Silver, D	HNO_3 to pH <2	6010	1.3	± 0.006	107	02/25/98	5:23PM	D. Schwartz
Sodium, D	HNO_3 to pH <2	6010	0.3	± 0.06	93	02/26/98	9:44PM	D. Schwartz
Zinc, D	HNO_3 to pH <2	6010	1.8	± 0.02	101	03/03/98	6:30PM	D. Schwartz
Chloride	None Required	9056	0.0	± 0.00	104	02/24/98	1:37PM	M. Coker
Sulfate	Cool to 4°C	9056	0.3	± 0.70	95	02/24/98	11:42AM	M. Coker
Bicarbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Carbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Hardness	HNO_3 to pH <2	130.2	0.0	± 0.00	98	02/25/98	10:15AM	K. Hartzell
TDS	Cool to 4°C	160.1	0.1	± 1.41	100	02/20/98	3:25PM	J. Duncan
pH	None Required	150.1	0.0	± 0.00	N/A	02/20/98	1:10PM	M. Coker
PAHs	Cool to 4°C	8270				02/24/98	9:10PM	K. Richmond
Liquid-Liquid Extraction		3510				02/23/98	11:30AM	E. Boateng
Gel Permeation Cleanup		3640				02/23/98	6:45PM	E. Boateng
Matrix Spikes:								
1,4-Dichlorobenzene			15.839	± 14.029	89			
N-Nitroso-di-n-propylamine			4.810	± 5.105	106			
1,2,4-Trichlorobenzene			7.282	± 7.552	104			
Acenaphthene			7.725	± 6.350	82			
2,4-Dinitrotoluene			6.943	± 6.583	95			
Pyrene			2.008	± 2.044	102			
Surrogates:								
Nitrobenzene-d_5			N/A	N/A	95			
2-Fluorobiphenyl			N/A	N/A	115			
Terphenyl-d_{14}			N/A	N/A	137			

SAMPLE NUMBER: 92655

- Standard Methods, 18th Edition.

Respectfully submitted,

Kendall K. Brown
President

Prepared By S. Doster
Reviewed By Shelly Weems

Environmental Laboratories
Bethany Tech Center • Suite 190
400 W. Bethany Rd. • Allen, Texas 75013

March 06, 1998

REVISED

REPORT OF: Water Analysis

REPORT TO: Mr. Ike Tavarez
Highlander Environmental Corp.
1910 N. Big Spring St.
Midland, Texas 79705

CLIENT NAME: Texaco
PROJECT NAME: G. L. Erwin
PROJECT NUMBER: 997

SAMPLE ID: MW-4

SAMPLE DATE: February 17, 1998
SAMPLE RECEIVED: February 20, 1998
TIME RECEIVED: 7:55AM
SAMPLE COLLECTED BY: Tim Reed – Customer

SAMPLE NUMBER: 92656

RESULTS:

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
METALS		
Arsenic, Dissolved	0.020	0.050
Barium, Dissolved	0.005	0.042
Cadmium, Dissolved	0.004	<0.004
Calcium, Dissolved	0.25	16
Chromium, Dissolved	0.005	<0.005
Copper, Dissolved	0.005	<0.005
Iron, Dissolved	0.005	<0.005
Lead, Dissolved	0.010	<0.010
Magnesium, Dissolved	0.15	5.0
Manganese, Dissolved	0.002	0.004
Mercury, Dissolved	0.0002	<0.0002
Potassium, Dissolved	2.0	12
Selenium, Dissolved	0.015	<0.015
Silver, Dissolved	0.007	<0.007
Sodium, Dissolved	0.80	399
Zinc, Dissolved	0.002	0.004
CONVENTIONAL POLLUTANTS		
Chloride	1.0	372
Sulfate	1.0	136
Bicarbonate Alkalinity (as $CaCO_3$)	2.0	510
Carbonate Alkalinity (as $CaCO_3$)	2.0	<2.0

SAMPLE NUMBER: 92656

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
CONVENTIONAL POLLUTANTS (Continued)		
Hardness, Total (as $CaCO_3$)	2.0	80
Total Dissolved Solids	5.0	1268
pH	0.1 units	7.9 units
POLYNUCLEAR AROMATIC HYDROCARBONS		
Acenaphthene	0.006	<0.006
Acenaphthylene	0.006	<0.006
Anthracene	0.006	<0.006
Benzo(a)anthracene (1,2-Benzanthracene)	0.006	<0.006
Benzo(a)pyrene (3,4-Benzopyrene)	0.006	<0.006
Benzo(b)fluoranthene (3,4-Benzofluoranthene)	0.006	<0.006
Benzo(j)fluoranthene	0.006	<0.006
Benzo(k)fluoranthene (11,12-Benzofluoranthene)	0.006	<0.006
Benzo(ghi)perylene (1,12-Benzoperylene)	0.006	<0.006
Chrysene	0.006	<0.006
Dibenz(a,h)acridine	0.006	<0.006
Dibenz(a,j)acridine	0.006	<0.006
Dibenzo(a,h)anthracene (1,2,5,6-Dibenzathracene)	0.006	<0.006
Dibenzo(c,g)carbazole	0.006	<0.006
Dibenzo(a,e)pyrene	0.006	<0.006
Dibenzo(a,h)pyrene	0.006	<0.006
Dibenzo(a,i)pyrene	0.006	<0.006
Fluoranthene	0.006	<0.006
Fluorene	0.006	<0.006
Indeno(1,2,3-c,d)Pyrene (2,3-0-Phenlene Pyrene)	0.006	<0.006
3-Methylcholanthrene	0.006	<0.006
Naphthalene	0.006	<0.006
Phenanthrene	0.006	<0.006
Pyrene	0.006	<0.006

Quality Control Information

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Metals Digestion – ICP		3010				02/21/98	4:00PM	D. Schwartz
Metals Digestion – ICP		3010				03/02/98	5:45PM	D. Schwartz
Metals Digestion – Mercury		7470				02/23/98	10:30AM	M. McGaugh

SAMPLE NUMBER: 92656

Quality Control Information (Continued)

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Arsenic, D	HNO_3 to pH <2	6010	1.6	± 0.02	99	02/24/98	11:58PM	D. Schwartz
Barium, D	HNO_3 to pH <2	6010	9.2	± 0.09	92	02/25/98	1:58PM	D. Schwartz
Cadmium, D	HNO_3 to pH <2	6010	4.1	± 0.04	94	02/24/98	11:58PM	D. Schwartz
Calcium, D	HNO_3 to pH <2	6010	1.4	± 0.26	97	02/26/98	9:50PM	D. Schwartz
Chromium, D	HNO_3 to pH <2	6010	5.0	± 0.04	91	02/24/98	11:58PM	D. Schwartz
Copper, D	HNO_3 to pH <2	6010	0.4	± 0.004	98	03/02/98	8:18PM	D. Schwartz
Iron, D	HNO_3 to pH <2	6010	1.4	± 0.02	101	03/02/98	8:18PM	D. Schwartz
Lead, D	HNO_3 to pH <2	6010	3.8	± 0.04	94	02/24/98	11:58PM	D. Schwartz
Magnesium, D	HNO_3 to pH <2	6010	2.2	± 0.44	102	02/27/98	9:59AM	D. Schwartz
Manganese, D	HNO_3 to pH <2	6010	0.6	± 0.006	102	03/02/98	8:18PM	D. Schwartz
Mercury, D	HNO_3 to pH <2	7470	4.1	± 0.0002	101	02/24/98	2:14PM	M. McGaugh
Potassium, D	HNO_3 to pH <2	6010	0.07	± 0.01	95	02/26/98	9:50PM	D. Schwartz
Selenium, D	HNO_3 to pH <2	6010	0.6	± 0.006	101	02/25/98	3:54PM	D. Schwartz
Silver, D	HNO_3 to pH <2	6010	1.3	± 0.006	107	02/25/98	5:27PM	D. Schwartz
Sodium, D	HNO_3 to pH <2	6010	0.3	± 0.06	93	02/26/98	9:50PM	D. Schwartz
Zinc, D	HNO_3 to pH <2	6010	0.4	± 0.004	102	03/02/98	8:18PM	D. Schwartz
Chloride	None Required	9056	0.0	± 0.00	104	02/24/98	11:51AM	M. Coker
Sulfate	Cool to 4°C	9056	0.3	± 0.70	95	02/24/98	11:51AM	M. Coker
Bicarbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Carbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Hardness	HNO_3 to pH <2	130.2	0.0	± 0.00	98	02/25/98	10:15AM	K. Hartzell
TDS	Cool to 4°C	160.1	0.1	± 1.41	100	02/20/98	3:25PM	J. Duncan
pH	None Required	150.1	0.0	± 0.00	N/A	02/20/98	1:10PM	M. Coker
PAHs	Cool to 4°C	8270				02/25/98	12:27AM	K. Richmond
Liquid-Liquid Extraction		3510				02/23/98	11:30AM	E. Boateng
Gel Permeation Cleanup		3640				02/23/98	7:45PM	E. Boateng
Matrix Spikes:								
1,4-Dichlorobenzene			15.839	± 14.029	89			
N-Nitroso-di-n-propylamine			4.810	± 5.105	106			
1,2,4-Trichlorobenzene			7.282	± 7.552	104			
Acenaphthene			7.725	± 6.350	82			
2,4-Dinitrotoluene			6.943	± 6.583	95			
Pyrene			2.008	± 2.044	102			
Surrogates:								
Nitrobenzene-d_5			N/A	N/A	112			
2-Fluorobiphenyl			N/A	N/A	114			
Terphenyl-d_{14}			N/A	N/A	139			

SAMPLE NUMBER: 92656

- Standard Methods, 18th Edition.

Respectfully submitted,

Kendall K. Brown
President

Prepared By S. Doster
Reviewed By Shelly Weems

Environmental Laboratories
Bethany Tech Center • Suite 190
400 W. Bethany Rd. • Allen, Texas 75013

March 06, 1998

REVISED

REPORT OF: Water Analysis

REPORT TO: Mr. Ike Tavarez
Highlander Environmental Corp.
1910 N. Big Spring St.
Midland, Texas 79705

CLIENT NAME: Texaco
PROJECT NAME: G. L. Erwin
PROJECT NUMBER: 997

SAMPLE ID: MW-5

SAMPLE DATE: February 17, 1998
SAMPLE RECEIVED: February 20, 1998
TIME RECEIVED: 7:55AM
SAMPLE COLLECTED BY: Tim Reed – Customer

SAMPLE NUMBER: 92657

RESULTS:

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
METALS		
Arsenic, Dissolved	0.020	0.040
Barium, Dissolved	0.005	0.051
Cadmium, Dissolved	0.004	<0.004
Calcium, Dissolved	0.25	30
Chromium, Dissolved	0.005	<0.005
Copper, Dissolved	0.005	0.031
Iron, Dissolved	0.05	18
Lead, Dissolved	0.010	<0.010
Magnesium, Dissolved	0.15	9.4
Manganese, Dissolved	0.002	0.151
Mercury, Dissolved	0.0002	<0.0002
Potassium, Dissolved	2.0	10
Selenium, Dissolved	0.015	<0.015
Silver, Dissolved	0.007	<0.007
Sodium, Dissolved	0.80	385
Zinc, Dissolved	0.002	0.078
CONVENTIONAL POLLUTANTS		
Chloride	1.0	408
Sulfate	1.0	151
Bicarbonate Alkalinity (as $CaCO_3$)	2.0	360
Carbonate Alkalinity (as $CaCO_3$)	2.0	<2.0

SAMPLE NUMBER: 92657

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
CONVENTIONAL POLLUTANTS (Continued)		
Hardness, Total (as $CaCO_3$)	2.0	116
Total Dissolved Solids	5.0	1219
pH	0.1 units	7.8 units
POLYNUCLEAR AROMATIC HYDROCARBONS*		
Acenaphthene	0.006	<0.006
Acenaphthylene	0.006	<0.006
Anthracene	0.006	<0.006
Benzo(a)anthracene (1,2-Benzanthracene)	0.006	<0.006
Benzo(a)pyrene (3,4-Benzopyrene)	0.006	<0.006
Benzo(b)fluoranthene (3,4-Benzofluoranthene)	0.006	<0.006
Benzo(j)fluoranthene	0.006	<0.006
Benzo(k)fluoranthene (11,12-Benzofluoranthene)	0.006	<0.006
Benzo(ghi)perylene (1,12-Benzoperylene)	0.006	<0.006
Chrysene	0.006	<0.006
Dibenz(a,h)acridine	0.006	<0.006
Dibenz(a,j)acridine	0.006	<0.006
Dibenzo(a,h)anthracene (1,2,5,6-Dibenzathracene)	0.006	<0.006
Dibenzo(c,g)carbazole	0.006	<0.006
Dibenzo(a,e)pyrene	0.006	<0.006
Dibenzo(a,h)pyrene	0.006	<0.006
Dibenzo(a,i)pyrene	0.006	<0.006
Fluoranthene	0.006	<0.006
Fluorene	0.006	<0.006
Indeno(1,2,3-c,d)Pyrene (2,3-0-Phenlene Pyrene)	0.006	<0.006
3-Methylcholanthrene	0.006	<0.006
Naphthalene	0.006	<0.006
Phenanthrene	0.006	<0.006
Pyrene	0.006	<0.006

Quality Control Information

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Metals Digestion – ICP		3010				02/21/98	4:00PM	D. Schwartz
Metals Digestion – ICP		3010				03/02/98	5:45PM	D. Schwartz
Metals Digestion – Mercury		7470				02/23/98	10:30AM	M. M°Gaugh

SAMPLE NUMBER: 92657

Quality Control Information (Continued)

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Arsenic, D	HNO_3 to pH <2	6010	1.6	± 0.02	99	02/25/98	12:08AM	D. Schwartz
Barium, D	HNO_3 to pH <2	6010	9.2	± 0.09	92	02/25/98	2:03PM	D. Schwartz
Cadmium, D	HNO_3 to pH <2	6010	4.1	± 0.04	94	02/25/98	12:08AM	D. Schwartz
Calcium, D	HNO_3 to pH <2	6010	1.4	± 0.26	97	02/26/98	9:55PM	D. Schwartz
Chromium, D	HNO_3 to pH <2	6010	5.0	± 0.04	91	02/25/98	12:08AM	D. Schwartz
Copper, D	HNO_3 to pH <2	6010	0.4	± 0.004	98	03/02/98	8:25PM	D. Schwartz
Iron, D	HNO_3 to pH <2	6010	1.2	± 0.01	101	03/03/98	12:53PM	D. Schwartz
Lead, D	HNO_3 to pH <2	6010	3.8	± 0.04	94	02/25/98	12:08AM	D. Schwartz
Magnesium, D	HNO_3 to pH <2	6010	2.2	± 0.44	102	02/27/98	10:03AM	D. Schwartz
Manganese, D	HNO_3 to pH <2	6010	0.6	± 0.006	102	03/02/98	8:25PM	D. Schwartz
Mercury, D	HNO_3 to pH <2	7470	4.1	± 0.0002	101	02/24/98	2:16PM	M. M°Gaugh
Potassium, D	HNO_3 to pH <2	6010	0.07	± 0.01	95	02/26/98	9:55PM	D. Schwartz
Selenium, D	HNO_3 to pH <2	6010	0.6	± 0.006	101	02/25/98	3:58PM	D. Schwartz
Silver, D	HNO_3 to pH <2	6010	1.3	± 0.006	107	02/25/98	5:30PM	D. Schwartz
Sodium, D	HNO_3 to pH <2	6010	0.3	± 0.06	93	02/26/98	9:55PM	D. Schwartz
Zinc, D	HNO_3 to pH <2	6010	0.4	± 0.004	102	03/02/98	8:25PM	D. Schwartz
Chloride	None Required	9056	0.0	± 0.00	104	02/24/98	12:00PM	M. Coker
Sulfate	Cool to 4°C	9056	0.3	± 0.70	95	02/24/98	12:00PM	M. Coker
Bicarbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Carbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Hardness	HNO_3 to pH <2	130.2	0.0	± 0.00	98	02/25/98	10:15AM	K. Hartzell
TDS	Cool to 4°C	160.1	0.1	± 1.41	97	02/23/98	4:30PM	J. Duncan
pH	None Required	150.1	0.0	± 0.00	N/A	02/20/98	1:10PM	M. Coker
PAHs	Cool to 4°C	8270				02/25/98	3:43PM	K. Richmond
Liquid-Liquid Extraction		3510				02/24/98	11:30AM	E. Boateng
Gel Permeation Cleanup		3640				02/24/98	8:00PM	E. Boateng
Matrix Spikes:								
1,4-Dichlorobenzene			15.839	± 14.029	89			
N-Nitroso-di-n-propylamine			4.810	± 5.105	106			
1,2,4-Trichlorobenzene			7.282	± 7.552	104			
Acenaphthene			7.725	± 6.350	82			
2,4-Dinitrotoluene			6.943	± 6.583	95			
Pyrene			2.008	± 2.044	102			
Surrogates:								
Nitrobenzene-d_5			N/A	N/A	102			
2-Fluorobiphenyl			N/A	N/A	115			
Terphenyl-d_{14}			N/A	N/A	132			

SAMPLE NUMBER: 92657

* PAH subsampled from plastic container due to breakage of original glass container.

♦ Standard Methods, 18th Edition.

Respectfully submitted,

Kendall K. Brown
President

Prepared By S. Doster
Reviewed By Shelly Weems

Environmental Laboratories
Bethany Tech Center • Suite 190
400 W. Bethany Rd. • Allen, Texas 75013

REVISED

March 06, 1998

REPORT OF: Water Analysis

REPORT TO: Mr. Ike Tavarez
Highlander Environmental Corp.
1910 N. Big Spring St.
Midland, Texas 79705

CLIENT NAME: Texaco
PROJECT NAME: G. L. Erwin
PROJECT NUMBER: 997

SAMPLE ID: West MW

SAMPLE DATE: February 17, 1998
SAMPLE RECEIVED: February 20, 1998
TIME RECEIVED: 7:55AM
SAMPLE COLLECTED BY: Tim Reed – Customer

SAMPLE NUMBER: 92659

RESULTS:

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
METALS		
Arsenic, Dissolved	0.020	<0.020
Barium, Dissolved	0.005	0.049
Cadmium, Dissolved	0.004	<0.004
Calcium, Dissolved	0.25	23
Chromium, Dissolved	0.005	<0.005
Copper, Dissolved	0.005	<0.005
Iron, Dissolved	0.005	<0.005
Lead, Dissolved	0.010	<0.010
Magnesium, Dissolved	0.15	7.0
Manganese, Dissolved	0.002	0.006
Mercury, Dissolved	0.0002	<0.0002
Potassium, Dissolved	2.0	21
Selenium, Dissolved	0.015	<0.015
Silver, Dissolved	0.007	<0.007
Sodium, Dissolved	0.80	285
Zinc, Dissolved	0.002	0.005
CONVENTIONAL POLLUTANTS		
Chloride	1.0	237
Sulfate	1.0	134
Bicarbonate Alkalinity (as $CaCO_3$)	2.0	370
Carbonate Alkalinity (as $CaCO_3$)	2.0	<2.0

SAMPLE NUMBER: 92659

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
CONVENTIONAL POLLUTANTS (Continued)		
Hardness, Total (as $CaCO_3$)	2.0	96
Total Dissolved Solids	5.0	975
pH	0.1 units	7.7 units
POLYNUCLEAR AROMATIC HYDROCARBONS		
Acenaphthene	0.006	<0.006
Acenaphthylene	0.006	<0.006
Anthracene	0.006	<0.006
Benzo(a)anthracene (1,2-Benzanthracene)	0.006	<0.006
Benzo(a)pyrene (3,4-Benzopyrene)	0.006	<0.006
Benzo(b)fluoranthene (3,4-Benzofluoranthene)	0.006	<0.006
Benzo(j)fluoranthene	0.006	<0.006
Benzo(k)fluoranthene (11,12-Benzofluoranthene)	0.006	<0.006
Benzo(ghi)perylene (1,12-Benzoperylene)	0.006	<0.006
Chrysene	0.006	<0.006
Dibenz(a,h)acridine	0.006	<0.006
Dibenz(a,j)acridine	0.006	<0.006
Dibenzo(a,h)anthracene (1,2,5,6-Dibenzathracene)	0.006	<0.006
Dibenzo(c,g)carbazole	0.006	<0.006
Dibenzo(a,e)pyrene	0.006	<0.006
Dibenzo(a,h)pyrene	0.006	<0.006
Dibenzo(a,i)pyrene	0.006	<0.006
Fluoranthene	0.006	<0.006
Fluorene	0.006	<0.006
Indeno(1,2,3-c,d)Pyrene (2,3-0-Phenlene Pyrene)	0.006	<0.006
3-Methylcholanthrene	0.006	<0.006
Naphthalene	0.006	<0.006
Phenanthrene	0.006	<0.006
Pyrene	0.006	<0.006

Quality Control Information

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Metals Digestion – ICP		3010				02/21/98	4:00PM	D. Schwartz
Metals Digestion – ICP		3010				03/03/98	11:30AM	D. Schwartz
Metals Digestion – Mercury		7470				02/20/98	5:00PM	M. M°Gaugh

SAMPLE NUMBER: 92659

Quality Control Information (Continued)

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Arsenic, D	HNO_3 to pH <2	6010	1.6	± 0.02	99	02/25/98	12:27AM	D. Schwartz
Barium, D	HNO_3 to pH <2	6010	9.2	± 0.09	92	02/25/98	2:12PM	D. Schwartz
Cadmium, D	HNO_3 to pH <2	6010	4.1	± 0.04	94	02/25/98	12:27AM	D. Schwartz
Calcium, D	HNO_3 to pH <2	6010	1.4	± 0.26	97	02/26/98	10:12PM	D. Schwartz
Chromium, D	HNO_3 to pH <2	6010	5.0	± 0.04	91	02/25/98	12:27AM	D. Schwartz
Copper, D	HNO_3 to pH <2	6010	2.6	± 0.02	96	03/03/98	6:35PM	D. Schwartz
Iron, D	HNO_3 to pH <2	6010	1.2	± 0.01	97	03/03/98	6:35PM	D. Schwartz
Lead, D	HNO_3 to pH <2	6010	3.8	± 0.04	94	02/25/98	12:27AM	D. Schwartz
Magnesium, D	HNO_3 to pH <2	6010	2.2	± 0.44	102	02/27/98	10:10AM	D. Schwartz
Manganese, D	HNO_3 to pH <2	6010	0.6	± 0.005	93	03/04/98	11:15AM	D. Schwartz
Mercury, D	HNO_3 to pH <2	7470	5.9	± 0.0003	109	02/21/98	3:38PM	M. M°Gaugh
Potassium, D	HNO_3 to pH <2	6010	0.07	± 0.01	95	02/26/98	10:12PM	D. Schwartz
Selenium, D	HNO_3 to pH <2	6010	0.6	± 0.006	101	02/25/98	4:06PM	D. Schwartz
Silver, D	HNO_3 to pH <2	6010	1.3	± 0.006	107	02/25/98	5:51PM	D. Schwartz
Sodium, D	HNO_3 to pH <2	6010	0.3	± 0.06	93	02/26/98	10:12PM	D. Schwartz
Zinc, D	HNO_3 to pH <2	6010	1.8	± 0.02	101	03/03/98	6:35PM	D. Schwartz
Chloride	None Required	9056	0.0	± 0.00	104	02/24/98	12:20PM	M. Coker
Sulfate	Cool to 4°C	9056	0.3	± 0.70	95	02/24/98	12:20PM	M. Coker
Bicarbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Carbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Hardness	HNO_3 to pH <2	130.2	0.0	± 0.00	98	02/25/98	10:15AM	K. Hartzell
TDS	Cool to 4°C	160.1	0.1	± 1.41	97	02/23/98	4:30PM	J. Duncan
pH	None Required	150.1	0.0	± 0.00	N/A	02/20/98	1:10PM	M. Coker
PAHs	Cool to 4°C	8270				02/25/98	1:42AM	K. Richmond
Liquid-Liquid Extraction		3510				02/23/98	11:30AM	E. Boateng
Gel Permeation Cleanup		3640				02/23/98	11:45PM	E. Boateng
Matrix Spikes:								
1,4-Dichlorobenzene			15.839	± 14.029	89			
N-Nitroso-di-n-propylamine			4.810	± 5.105	106			
1,2,4-Trichlorobenzene			7.282	± 7.552	104			
Acenaphthene			7.725	± 6.350	82			
2,4-Dinitrotoluene			6.943	± 6.583	95			
Pyrene			2.008	± 2.044	102			
Surrogates:								
Nitrobenzene-d_5			N/A	N/A	105			
2-Fluorobiphenyl			N/A	N/A	116			
Terphenyl-d_{14}			N/A	N/A	132			

SAMPLE NUMBER: 92659

- Standard Methods, 18th Edition.

Respectfully submitted,

Kendall K. Brown
President

Prepared By S. Doster
Reviewed By Shelly Weems

Environmental Laboratories
Bethany Tech Center • Suite 190
400 W. Bethany Rd. • Allen, Texas 75013

March 06, 1998

REVISED

REPORT OF: Water Analysis

REPORT TO: Mr. Ike Tavarez
Highlander Environmental Corp.
1910 N. Big Spring St.
Midland, Texas 79705

CLIENT NAME: Texaco
PROJECT NAME: G. L. Erwin
PROJECT NUMBER: 997

SAMPLE ID: Southwest MW

SAMPLE DATE: February 17, 1998
SAMPLE RECEIVED: February 20, 1998
TIME RECEIVED: 7:55AM
SAMPLE COLLECTED BY: Tim Reed – Customer

SAMPLE NUMBER: 92658

RESULTS:

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
METALS		
Arsenic, Dissolved	0.020	<0.020
Barium, Dissolved	0.005	0.049
Cadmium, Dissolved	0.004	<0.004
Calcium, Dissolved	0.25	186
Chromium, Dissolved	0.005	<0.005
Copper, Dissolved	0.005	<0.005
Iron, Dissolved	0.005	<0.005
Lead, Dissolved	0.010	<0.010
Magnesium, Dissolved	0.15	58
Manganese, Dissolved	0.002	0.022
Mercury, Dissolved	0.0002	<0.0002
Potassium, Dissolved	2.0	46
Selenium, Dissolved	0.015	<0.015
Silver, Dissolved	0.007	<0.007
Sodium, Dissolved	8.0	1480
Zinc, Dissolved	0.002	0.006
CONVENTIONAL POLLUTANTS		
Chloride	10	2170
Sulfate	1.0	255
Bicarbonate Alkalinity (as $CaCO_3$)	2.0	420
Carbonate Alkalinity (as $CaCO_3$)	2.0	<2.0

SAMPLE NUMBER: 92658

Parameter	Detection Limits (mg/l)	Observed Concentration (mg/l)
CONVENTIONAL POLLUTANTS (Continued)		
Hardness, Total (as $CaCO_3$)	2.0	712
Total Dissolved Solids	5.0	4719
pH	0.1 units	7.1 units
POLYNUCLEAR AROMATIC HYDROCARBONS		
Acenaphthene	0.006	<0.006
Acenaphthylene	0.006	<0.006
Anthracene	0.006	<0.006
Benzo(a)anthracene (1,2-Benzanthracene)	0.006	<0.006
Benzo(a)pyrene (3,4-Benzopyrene)	0.006	<0.006
Benzo(b)fluoranthene (3,4-Benzofluoranthene)	0.006	<0.006
Benzo(j)fluoranthene	0.006	<0.006
Benzo(k)fluoranthene (11,12-Benzofluoranthene)	0.006	<0.006
Benzo(ghi)perylene (1,12-Benzoperylene)	0.006	<0.006
Chrysene	0.006	<0.006
Dibenz(a,h)acridine	0.006	<0.006
Dibenz(a,j)acridine	0.006	<0.006
Dibenzo(a,h)anthracene (1,2,5,6-Dibenzathracene)	0.006	<0.006
Dibenzo(c,g)carbazole	0.006	<0.006
Dibenzo(a,e)pyrene	0.006	<0.006
Dibenzo(a,h)pyrene	0.006	<0.006
Dibenzo(a,i)pyrene	0.006	<0.006
Fluoranthene	0.006	<0.006
Fluorene	0.006	<0.006
Indeno(1,2,3-c,d)Pyrene (2,3-0-Phenlene Pyrene)	0.006	<0.006
3-Methylcholanthrene	0.006	<0.006
Naphthalene	0.006	<0.006
Phenanthrene	0.006	<0.006
Pyrene	0.006	<0.006

Quality Control Information

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Metals Digestion – ICP		3010				02/21/98	4:00PM	D. Schwartz
Metals Digestion – ICP		3010				03/02/98	5:45PM	D. Schwartz
Metals Digestion – Mercury		7470				02/23/98	10:30AM	M. M°Gaugh

SAMPLE NUMBER: 92658

Quality Control Information (Continued)

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Arsenic, D	HNO_3 to pH <2	6010	1.6	± 0.02	99	02/25/98	12:17AM	D. Schwartz
Barium, D	HNO_3 to pH <2	6010	9.2	± 0.09	92	02/25/98	2:07PM	D. Schwartz
Cadmium, D	HNO_3 to pH <2	6010	4.1	± 0.04	94	02/25/98	12:17AM	D. Schwartz
Calcium, D	HNO_3 to pH <2	6010	1.4	± 0.26	97	02/26/98	10:06PM	D. Schwartz
Chromium, D	HNO_3 to pH <2	6010	5.0	± 0.04	91	02/25/98	12:17AM	D. Schwartz
Copper, D	HNO_3 to pH <2	6010	0.4	± 0.004	98	03/02/98	8:35PM	D. Schwartz
Iron, D	HNO_3 to pH <2	6010	1.4	± 0.02	101	03/02/98	8:35PM	D. Schwartz
Lead, D	HNO_3 to pH <2	6010	3.8	± 0.04	94	02/25/98	12:17AM	D. Schwartz
Magnesium, D	HNO_3 to pH <2	6010	2.2	± 0.44	102	02/27/98	10:06AM	D. Schwartz
Manganese, D	HNO_3 to pH <2	6010	0.6	± 0.006	102	03/02/98	8:35PM	D. Schwartz
Mercury, D	HNO_3 to pH <2	7470	4.1	± 0.0002	101	02/24/98	2:17PM	M. McGaugh
Potassium, D	HNO_3 to pH <2	6010	0.07	± 0.01	95	02/26/98	10:06PM	D. Schwartz
Selenium, D	HNO_3 to pH <2	6010	0.6	± 0.006	101	02/25/98	4:02PM	D. Schwartz
Silver, D	HNO_3 to pH <2	6010	1.3	± 0.006	107	02/25/98	5:47PM	D. Schwartz
Sodium, D	HNO_3 to pH <2	6010	0.3	± 0.06	93	02/26/98	10:01PM	D. Schwartz
Zinc, D	HNO_3 to pH <2	6010	0.4	± 0.004	102	03/02/98	8:35PM	D. Schwartz
Chloride	None Required	9056	0.0	± 0.00	104	02/24/98	2:01PM	M. Coker
Sulfate	Cool to 4°C	9056	0.3	± 0.70	95	02/24/98	12:09PM	M. Coker
Bicarbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Carbonate	Cool to 4°C	2320B♦	2.4	± 14.10	96	02/24/98	3:30PM	J. Duncan
Hardness	HNO_3 to pH <2	130.2	0.0	± 0.00	98	02/25/98	10:15AM	K. Hartzell
TDS	Cool to 4°C	160.1	0.1	± 1.41	97	02/23/98	4:30PM	J. Duncan
pH	None Required	150.1	0.0	± 0.00	N/A	02/20/98	1:10PM	M. Coker
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2,4-Dinitrotoluene			6.943	± 6.583	95			
Pyrene			2.008	± 2.044	102			
Surrogates:								
Nitrobenzene-d_5			N/A	N/A	95			
2-Fluorobiphenyl			N/A	N/A	111			
Terphenyl-d_{14}			N/A	N/A	133			

SAMPLE NUMBER: 92658

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Respectfully submitted,

Kendall K. Brown
President

Prepared By S. Doster
Reviewed By Shelly Weems