1R - 396

REPORTS

DATE:

1/27/2003

Larson & Associates, Inc.
Environmental Consultants

1R-396

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ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

January 27, 2003

Mr. William C. Olson
Environmental Bureau
Oil Conservation Division
New Mexico Energy, Minerals and Natural Resources Department
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Re: Emergency Pit Excavation and Closure Report, Texaco Exploration and Production Inc., V.M. Henderson Tank Battery, Unit Letter H, (SE/4, NE/4), Section 30, Township 21 South, Range 37 East, Lea County, New Mexico

Dear Mr. Olson:

Texaco Exploration and Production Inc. (Texaco) has retained Larson and Associates, Inc. (LA) to prepare a closure report for an emergency pit that was previously associated with the V.M. Henderson tank battery (Site) located in unit letter H (SE/4, NE/4) of Section 30, Township 21 South, Range 37 East, Lea County, New Mexico. Figure 1 presents a location and topographic map. Figure 2 presents a Site drawing.

Background

In December 2000, Texaco retained Environmental Plus, Inc. (EPI) to conduct a preliminary investigation to determine the vertical and horizontal extent of hydrocarbon impact to soil from the emergency pit. EPI drilled nineteen borings (BH1 through BH19) using a trailer-mounted auger rig, and collected soil samples for field and laboratory analysis. Most of the borings were advanced to approximately 15 feet below ground surface (bgs). However, borings BH2, BH3, BH14 and BH17 were advanced to approximately 20, 25, 55 and 35 feet bgs, respectively. Soil samples were collected every 5 feet, and submitted to Cardinal laboratories, Inc., located in Hobbs, New Mexico. Certain samples were analyzed for benzene, toluene, ethylbenzene, xylene (collectively referred to as BTEX) using method SW-846-8260, total petroleum hydrocarbons (TPH) using method SW-846-8015 modified for gasoline range organics (GRO) and diesel range organics (DRO) and chloride using standard method 4500. Soil samples were also analyzed in the field for headspace vapors and chloride.

EPI calculated remediation action levels (RRALs) for benzene, total BTEX and TPH using New Mexico Oil Conservation Division (NMOCD) guidelines, including: *"Unlined Surface Impoundment Closure Guidelines, February 1993"* and *"Guidelines for Remediation of Leaks, Spills and Releases, August 13, 1993"*. The RRALs calculated for benzene, total BTEX and TPH were 10 milligrams per kilogram (mg/kg), 50 mg/kg and 1000 mg/kg, respectively. The calculation assumed depth-to-groundwater to be 99-83 feet bgs, and the deepest contamination at approximately 35 feet bgs, The RRAL

for TPH was exceeded in the deepest samples from borings BH3 (25 feet) and BH17 (35 feet). EPI determined that an impermeable barrier (i.e., compacted clay) installed over the Site following removal of impacted soil would provide an adequate barrier to prevent leaching and vertical migration of residual chloride to groundwater. EPI concluded that additional investigation was needed to assess the vertical extent of the chloride in soil. Two areas were also investigated southeast and east of the tank battery where hydrocarbons exceeded the RRAL, and were also remediated. The areas were identified as the "southeast area" and "east area", and are shown on Figure 2. EPI presented the findings of its findings in a report titled, "*Site Investigation, Remediation Status, & Closure Proposal, June 17, 2001*", a copy of which is presented in Appendix A.

Setting

The Site is located about 2 miles west of Eunice, New Mexico, at an elevation approximately 3490 feet above mean sea level (AMSL). A thin veneer of wind deposited sand covers the area, and overlies the Tertiary-age Ogallala formation. The Ogallala formation is comprised of poorly to well-cemented sand and sandstone, interbedded with caliche, clay, silt and gravel. The Triassic-age Chinle formation (commonly referred to as "red bed") is present beneath the Ogallala formation, and consists of interbedded units of mudstone, shale, siltstone and sandstone.

Files of the New Mexico State Engineer were reviewed on-line to determine locations and depths of water wells within one mile of the Site. No well records were found, but a windmill was noted on the U.S.G.S. topographic map (Eunice Quadrangle) about one-half mile west of the Site. Depth-to-groundwater was reported at approximately 102 feet bgs. Groundwater was observed in boring BH-8 near the center of the former emergency pit at approximately 103 feet bgs.

Emergency Pit Remediation

Between January and June 2001, EPI excavated approximately 41,572 cubic yards of soil from the Site. The soil was transported to the Texaco-owned centralized landfarm located northwest of Jal, New Mexico. EPI periodically collected soil samples from the excavations, and Cardinal Laboratories, Inc. analyzed the samples for TPH and chloride. A survey was also performed for naturally occurring radioactive materials (NORM), and an area exhibiting NORM readings greater than twice background was identified at the emergency pit excavation. The soil was excavated, piled adjacent to the location, and covered with plastic until laboratory analysis confirmed the presence of NORM. On March 26, 2001, LA measured the background radiation between 6 to 8 microroentgens per hour (μR/hr). LA collected a composite sample from the pile at four (4) locations. Each location was checked for radioactivity using a Ludlum Model 3 survey meter, and measurements ranged from 25 to 60 μR/hr. The sample was analyzed by American Radiation Services, Inc. (ARS), located in Baton Rouge, Louisiana, using gamma spectroscopy for radium 226 and radium 228. The radium 226 and radium 228 levels were reported at 15.09 picocuries per gram (pCi/gm) and 0.33 pCi/gm, respectively. The

sample results were below the regulatory threshold of 30 pCi/gm. Appendix B presents the ARS report.

EPI excavated the emergency pit to approximately 36 feet bgs, and periodically collected soil samples from the excavation. The BTEX compounds were below the RRAL, and TPH in the bottom sample was 119, mg/kg. Chloride was 482 mg/kg in the bottom sample. Appendix C presents the laboratory analysis.

The excavation was filled with clean soil to approximately five (5) feet BGS. A layer of compacted clay, approximately 2 feet thick, was placed over the fill in two (2) lifts. The clay was compacted to achieve 95% proctor density, and field tests were performed following compaction of each lift. Density was measured at nine (9) locations at the emergency pit, and at one location at each of the southeast and east areas. The testing was performed by Peddigrew and Associates, Inc., located in Hobbs, New Mexico. A sample of the clay was analyzed at Pettigrew's laboratory on December 22, 2001, for proctor density using ASTM method D-698. The field density tests recorded compaction between 96.5% and 105% standard proctor density. Figure 3 presents a drawing showing the density test locations. Test numbers 1 through 11 indicate measurements collected following placement and compaction of the first clay lift. Test numbers 12 through 22 indicate measurements collected following placement and compaction of the second clay lift. Appendix D presents the density test reports. Appendix E presents photographs

Chloride Investigation

Between September 6 and December 4, 2001, LA supervised drilling of eight (8) borings (BH-1 through BH-8), and collected soil samples for chloride analysis. Scarborough Drilling, Inc. drilled borings BH-1 through BH-7 between September 6 and 10, 2001, using a truck-mounted air-rotary drilling rig. The borings were drilled between 50 feet bgs (BH-6 and BH-7) and 90 feet bgs (BH-1). Soil samples were collected using split-spoon and jam tube core samplers approximately every 10 feet (i.e., 0', 10', 20', 30', etc.). Environmental Technology Group, Inc. (ETGI) drilled boring BH-8 on December 3 and 4, 2001, using hollow stem augers and air rotary drilling techniques. The boring was drilled near the center of the former emergency pit, and hollow stem augers were advanced to competent rock at about 42 feet bgs. A rotary bit was used to advance the boring from inside the augers to groundwater using air rotary drilling. Groundwater was observed at approximately 103 feet bgs. The augers prevented the fill material from caving during air rotary drilling. Grab samples of drill cuttings were collected approximately every ten (10) feet for headspace vapor and laboratory analysis. The laboratory samples were placed in glass sample jars, labeled, chilled in an ice chest, and hand delivered under chain-of-custody control to Environmental Lab of Texas, Inc. (ELT), located in Odessa, Texas. The samples were analyzed for chloride using EPA method SW-846-9253. Table 1 presents a summary of the chloride analysis. Appendix F presents the ELT reports.

A portion of each sample was also analyzed for headspace gas using the ambient temperature headspace method. The ATH method involves filling an 8-ounce sample jar approximately ¾ full, and covering the opening with a layer of aluminum foil before replacing the cap. The headspace samples were set aside and allowed to warm up to ambient temperature before a RAE Instruments, Model 2000 photoionization detector (PID) was used to measure the concentration of organic vapors in the sample headspace. The PID probe was inserted into the headspace of the sample jars (through the aluminum foil), and the concentration of organic vapors was measured in parts per million (ppm). The headspace measurements are summarized on Table 1, and graphically displayed on boring logs in Appendix G.

All down-hole equipment (i.e., drill bits, rods, etc.) was thoroughly washed between locations using high-pressure hot water. All sampling equipment (i.e., core sampler, hand auger, hand trowels etc.) was thoroughly washed between sample events using laboratory-grade detergent, and rinsed with distilled water. The borings were plugged with bentonite chips and hydrated.

Referring to Table 1, PID readings ranged from 1.4 ppm (BH-3, 20 feet) to 46.3 ppm (BH-8, 82 feet). The deepest samples collected from the borings, except BH-3 and BH-7, reported chloride levels below 250 milligrams per kilogram (mg/kg). Samples from borings BH-3 (60 feet) and BH-7 (40 feet) reported chloride levels of 346 mg/kg and 993 mg/kg, respectively. The residual chloride levels should be protective of groundwater since two (2) feet of compacted clay was placed over the areas. Texaco requests that the NMOCD grant final closure for the Site. Please call Mr. Rodney Bailey at (915) 687-7251 or myself at (915) 687-0901 if you have questions.

Sincerely,
Larson and Associates, Inc.

Mark J. Larson, CPG, CGWP
President

Encl.

cc: Rodney Bailey - ChevronTexaco
Chris Williams – NMOCD District I

Tables

Table 1
Texaco Exploration and Production Inc.
V.M. Henderson Tank Battery
Unit Letter H, Section 30, Township 21 South, Range 37 East
Lea County, New Mexico

Boring Number	Date	Depth (Feet)	PID (ppm)	Chloride (mg/kg)
BH-1	06-Sept-01	0-2	8.7	18
		10	--	--
		20	8	35
		30	--	--
		40	8.1	71
		50	--	--
		60	N/R	N/R
		70	--	35
		80	--	--
BH-2	06-Sept-01	0-1	15.2	329
		10	--	--
		20	13.8	39
		30	--	--
		40	10.1	51
		50	--	--
		60	N/R	N/R
		70	--	18
		8-	--	--
BH-3	07-Sept-01	0-1	5.4	1290
		10	--	--
		20	1.4	748
		30	--	--
		40	4.9	257
		50	--	--
		60	5.1	346
BH-4	07-Sept-01	0-1	20	89
		10	--	--
		20	16.6	71
		30	--	--
		40	8.1	354

Notes: Analysis performed by Environmental Lab of Texas I, Inc., Odessa, Texas

1. Feet: Sample depth in feet below ground surface
2. PID: Photoionization detector
3. ppm: Parts per million
4. mg/kg: Milligrams per kilogram
5. --: No data available
6. <: Below method detection limit
7. N/R: No sample recovery

Table 1
Texaco Exploration and Production Inc.
V.M. Henderson Tank Battery
Unit Letter H, Section 30, Township 21 South, Range 37 East
Lea County, New Mexico

Boring Number	Date	Depth (Feet)	PID (ppm)	Chloride (mg/kg)
BH-4 (Cont.)		40	8.1	354
		50	--	--
		60	8	160
BH-5	10-Sept-01	0-1	6.8	514
		10	--	--
		20	8.1	81
		30	--	--
		40	8.4	116
		50	N/R	N/R
		60	--	--
		70	7.8	67
		80	--	--
BH-6	10-Sept-01	0-1	8.5	26
		10	--	--
		20	8.3	14
		30	--	--
		40	8.8	16
		50	8.8	14
BH-7	10-Sept-01	0-1	9.8	30
		10	--	--
		20	8.1	768
		30	--	--
		40	8.1	993
		50	--	35
BH-8	03-Dec-01	40	26.4	19
		50	--	44
		60	13.6	18
	04-Dec-01	70	14.7	18
		80-82	46.3	18
		90-92	14.5	18

Notes: Analysis performed by Environmental Lab of Texas I, Inc., Odessa, Texas

1. Feet: Sample depth in feet below ground surface
2. PID: Photoionization detector
3. ppm: Parts per million
4. mg/kg: Milligrams per kilogram
5. --: No data available
6. <: Below method detection limit
7. N/R: No sample recovery

Table 1
Texaco Exploration and Production Inc.
V.M. Henderson Tank Battery
Unit Letter H, Section 30, Township 21 South, Range 37 East
Lea County, New Mexico

Boring Number	Date	Depth (Feet)	PID (ppm)	Chloride (mg/kg)
BH-8 (Cont.)	04-Dec-01	100-102	18.1	18

Notes: Analysis performed by Environmental Lab of Texas I, Inc., Odessa, Texas

1. Feet: Sample depth in feet below ground surface
2. PID: Photoionization detector
3. ppm: Parts per million
4. mg/kg: Milligrams per kilogram
5. --: No data available
6. <: Below method detection limit
7. N/R: No sample recovery

Figures

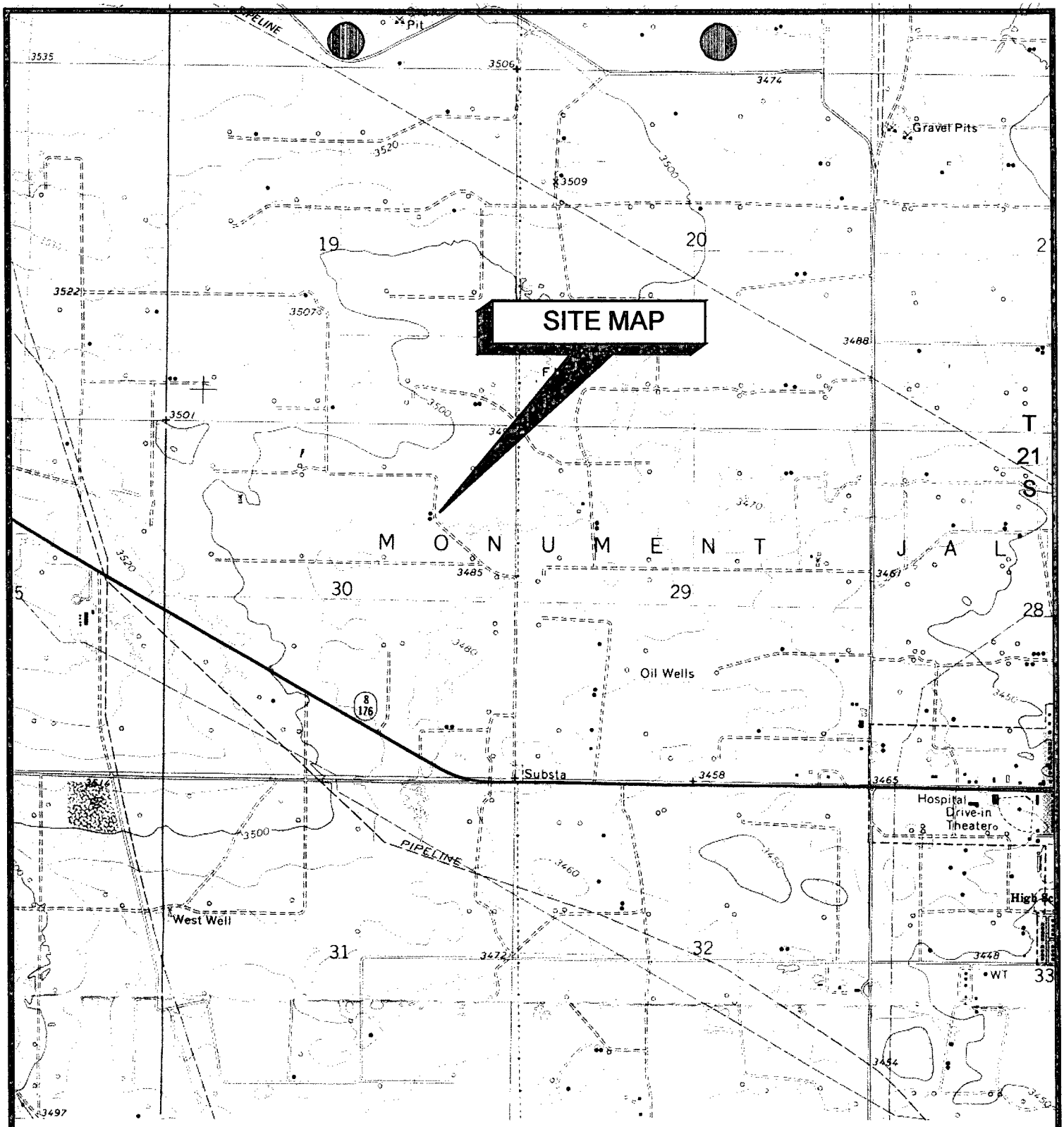

FIGURE #1

LEA COUNTY, NEW MEXICO

TEXACO EXPLORATION and PRODUCTION INC.

V.M. HENDERSON TANK BATTERY

SW/4, SE/4, SEC. 30, T21S, R37E

TOPOGRAPHIC MAP

TAKEN FROM U.S.G.S.
EUNICE, N. MEX. 1969
7.5' QUADRANGLES

SCALE: 1"=2000'

DATE: 4/11/01
NAME:
FILE 1-01109

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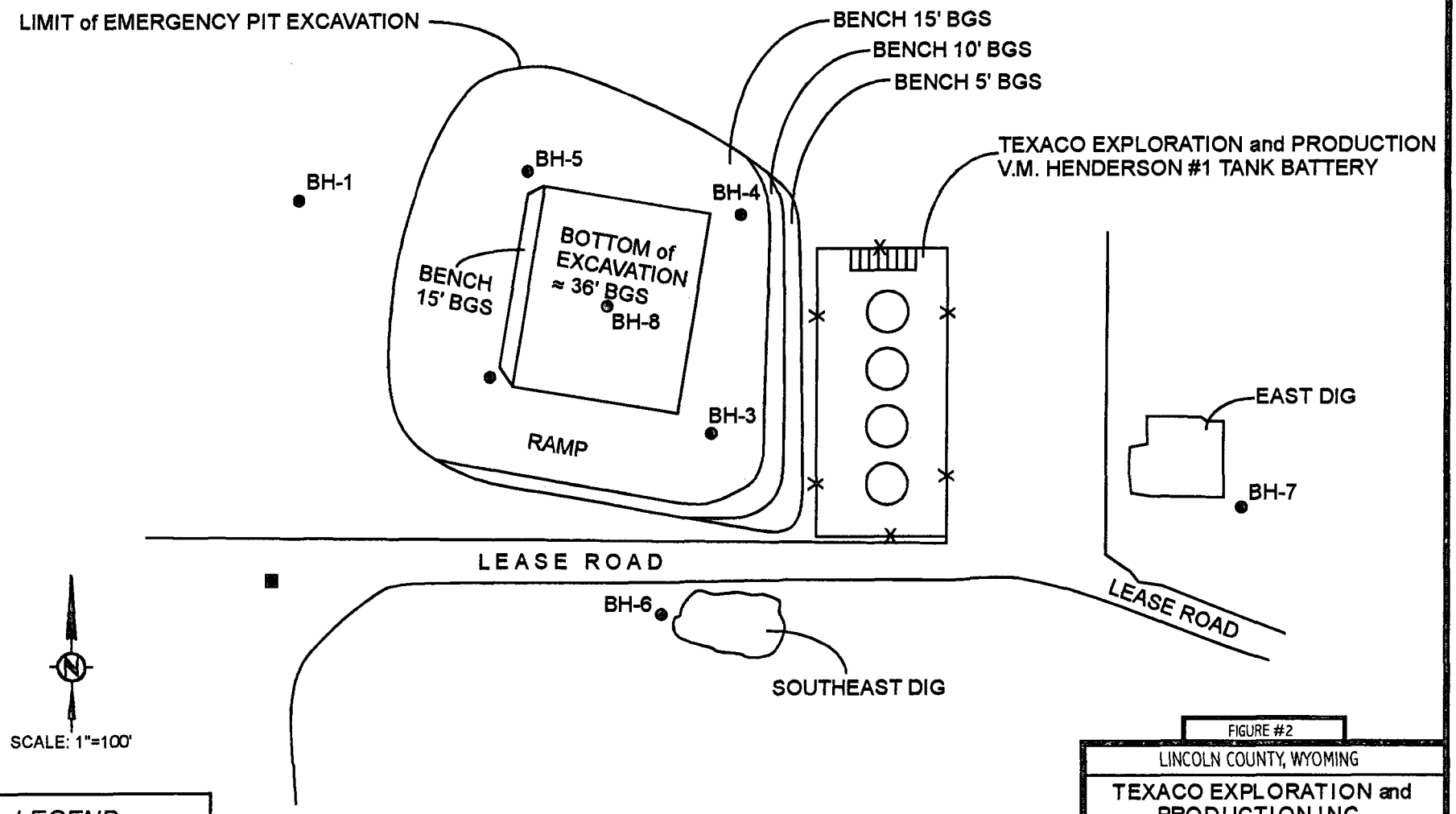

LEGEND

- ROTARY DRILLED BORING LOCATION
- OIL WELL LOCATION

FIGURE #2

LINCOLN COUNTY, WYOMING

TEXACO EXPLORATION and PRODUCTION INC.

V.M. HENDERSON TANK BATTERY

SITE DRAWING

DATE: 01/29/03

NAME:

FILE: 1-0109

LAarson & Associates, Inc.
Environmental Consultants

APPENDIX A

EPI Report

TEXACO E & P, INC.

SITE INVESTIGATION, REMEDIATION STATUS, & CLOSURE PROPOSAL

FOR THE
HISTORICAL PRODUCTION FLUID RELEASE
ASSOCIATED WITH THE

V.M. Henderson Battery

Unit H Sec 30, T21S, R37E
~1.5 miles west of Eunice
Lea County, New Mexico

June17, 2001

Prepared by

Environmental Plus, Inc.
1524 North Main Street
P.O. Box 1558
Eunice, New Mexico 88231
Tele 505•394•3481 FAX 505•394•2601

TEXACO E & P, INC.

SITE INVESTIGATION, REMEDIATION STATUS, & CLOSURE PROPOSAL

FOR THE
HISTORICAL PRODUCTION FLUID RELEASE
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Unit H Sec 30, T21S, R37E
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Table of Contents

1 V.M. HENDERSON BATTERY PROJECT PLAN

This plan determined the vertical and horizontal extent of production fluid contamination at V.M. Henderson Battery historical spill site. This determination is based on remedial action goals/thresholds and protocols provided by the New Mexico Oil Conservation Division (NMOCD) guidelines. Of main concern will be the concentration of Chloride in soil at different subsurface intervals. Total Petroleum Hydrocarbon (TPH-EPA method 8015M), BTEX (Benzene, Toluene, Ethyl Benzene, and total Xylene), and Benzene will be analyzed in the laboratory if the Volatile Organic Constituents (VOC) headspace gas concentration of a sample is >100 parts per million (ppm). This Site Specific Project Plan (PjP) provides information and identifies activities necessary to;

1. Determine vertical and horizontal extent of contamination
2. Document final achievement of acceptable environmental thresholds established by the NMOCD

1.1 Site Description

This site is located ~1.5 miles west of Eunice, New Mexico and is associated with the Texaco V.M. Henderson tank battery. The site has in the past received unknown volumes of production fluid consisting of crude oil and saline produced water resulting from tank overflows, pump failures, and leaks. The surface area affected is approximately 84, 690 ft^2. A site map is included as Attachment I.

1.1.1 Historical Use

This land surface is used for livestock grazing and oil and gas production facilities access roads.

1.1.2 Legal Description

The site is on "deeded (private) land," located approximately 1.5 miles west of Eunice, Lea County, New Mexico. The legal description is Unit Letter H, Sec 30, T21S, R37E.

1.1.3 Photographic documentation

A photograph of the site is included as Attachment II.

1.1.4 Ecological Description

The area is typical of the northern most extent of the Upper Chihuahuan Desert Biome consisting primarily of Honey Mesquite (Prosopis glandulosa), Harvard Shinoak (Querques harvardi), and typical desert grasses and weeds. Mammals present, include Orrd's and Merriam's Kangaroo Rat, Deer Mouse, White Throated Wood Rat, Cottontail Rabbit, Black Tailed Jackrabbit, and the Desert Mule Deer (Odocoileus hemionus). Reptiles, Amphibians, and Birds are numerous and typical of area. While a biotic survey was not conducted, Listed, Threatened, or Endangered species are not known to exist in this area.

1.1.5 Environmental Media Characterization

Chemical parameters of the soil were characterized consistent with the New Mexico Oil Conservation Division (NMOCD) guidelines published in the following documents;

- Guidelines for Remediation of Leaks, Spills and Releases (August 13, 1993)
- Unlined Surface Impoundment Closure Guidelines (February 1993)

Acceptable "Site Specific" thresholds for contaminants of concern, i.e., soil TPH and soil Chloride, were determined based on the following;

- Depth to Ground water, i.e., distance from the lower most acceptable concentration to the ground water.
- Wellhead Protection Area, i.e., distance from fresh water supply wells.
- Distance to Surface Water Body, i.e., horizontal distance to all down gradient surface water bodies.

1.1.5.1 Ground Water Level

The site is located in the NE¼ of Section 30. The New Mexico State Engineer's Office provides ground water level data for sections 28 and 27 at 71' and 76' feet below the ground surface (bgs), respectively, but nothing recorded in Section 30. Based on this information ground water would be estimated to occur at or below 73.5' bgs. However, field measurements

of a monitor well located 5,860 feet east and a windmill 2550 feet west indicate a calculated water level of 99.83'bgs. The monitor well is owned by Chevron USA at the CDU Tract 19 Battery and measured 93.7'bgs (April 01) and the windmill is owned by Sims/Kennann and measured 102.6'bgs (May 01).

1.1.5.2 Ground Water Gradient

According to the USGS (Nicholson & Clbesch), the gradient is to the southeast.

1.1.5.3 Wellhead Protection Area

There are no public water supply, domestic or agricultural use wells located within 1000 feet of the site.

1.1.5.4 Distance to Nearest Surface Water Body

There are no naturally occurring surface water bodies located within a 1 mile radius of the site.

1.1.5.5 Soil Assessment

Soil borings were obtained at 19 locations within the spill area. These points were chosen based on areas of "asphaltinic surface" that can indicate maximum contamination. Refer to Attachment I, Site Map.

1.1.5.6 Ground Water Assessment

The ground water level is conservatively estimated to occur at ~99.83 feet below ground surface (bgs).

1.2 Data Quality

To ensure quality and credibility of laboratory data used to support successful site remediation the following quality controls were documented.

- Laboratory data must have > 85% recovery for TPH and BTEX and >75% recovery for general chemistry parameters.
- Laboratory data must have <15% Relative Percent Difference
- Field headspace analyses must be supported with instrument calibration data and calibration gas certification.

Duplicates or blanks were not submitted to the laboratory to establish reproducibility and possible laboratory contamination, respectively.

1.3 Project Safety

Hazards encountered at this site included the following;

- Moving equipment
- Buried pipelines
- Highway ingress/egress
- Excavation
- Potential Hydrogen Sulfide Gas

Employees and subcontractors were required to confirm current training in these hazards.

Standard personal protective equipment includee;

- Personal H_2S Monitor
- Hard-hat
- Safety Glasses
- Excavation Safety
- Steel Toed Boots/Shoes

1.4 PjP Process/Procedure

The following sequence was used to guide safe project implementation.

1. Site visit: Photograph and map and develop PjP elements
2. Issue "One Call" and notifying utilities
3. Locate, hand spot, and mark buried lines or other structures
4. Overhead powerlines are present just beyond the south perimeter and will not be a hazard.
5. Lockout/Tagout: Pipeline companies notified of activity but LO/TO unnecessary
6. Procedure: Equipment required will be: Drilling Unit and support equipment
    - Tail gate safety Briefing and PPE check
    - Rigup
    - Sample Borehole probe samples at 2' intervals

2.3.9 BH9

TPH at 15' bgs is 102.6 mg/Kg and Chloride is 845 mg/Kg.

2.3.10 BH10

TPH at 15'bgs is 100 mg/Kg and Chloride is 1140 mg/Kg.

2.3.11 BH11

TPH at 15'bgs is 369 mg/Kg and Chloride is 33 mg/Kg.

2.3.12 BH12

TPH and chloride are nominal to 15'bgs.

2.3.13 BH13

TPH and Chloride are nominal to 15'bgs.

2.3.14 BH14

TPH is >1000 mg/Kg to 10'bgs and <1000 mg/Kg from 10'bgs to 55'bgs. Chloride concentrations range from 2270 mg/Kg at 10'bgs, to 7870 mg/Kg at 20'bgs, and 3710 mg/Kg at 55'bgs.

2.3.15 BH15

TPH is nominal at all intervals with Chloride at 248 mg/Kg at 15'bgs.

2.3.16 BH16

TPH ranges from 646 mg/Kg at the surface to 100 mg/Kg at 15'bgs. Chloride is nominal, i.e., 50 mg/Kg.

2.3.17 BH17

TPH ranges from 114 mg/Kg at the surface to 10,612 mg/Kg at 10'bgs and 3563.8 mg/Kg at 35'bgs. Chloride ranges from 248 mg/Kg at the surface to 1110 mg/Kg at 35'bgs.

2.3.18 BH18

TPH ranges from 750 mg/Kg at the surface to 4160 mg/Kg at 5'bgs and 628 mg/Kg at 15'bgs. Chloride is 1822 mg/Kg at 15'bgs.

2.3.19 BH19

TPH ranges from 9583 mg/Kg at the surface to 15050 at 5'bgs and decreasing to 1200 mg/Kg at 15'bgs.

2.4 Compliance Objectives

Achievement of the NMOCD remedial action goals are relative to depth to ground water for TPH and the BTEX compounds. In situ chloride concentrations must be protective of the ground water.

2.4.1 Depth to Ground Water Calculation

Depth to ground water, i.e., "the vertical distance from the lowermost contaminants to the seasonal high water elevation of the ground water." For Total Petroleum Hydrocarbon (TPH-EPA method 8015M), BTEX (Benzene, Toluene, Ethyl Benzene, and total Xylene), and Benzene, the interval from ground surface to 49.83' bgs must achieve 1000 mg/Kg, 50 mg/Kg, and 10 mg/Kg, respectively. A calibrated Volatile Organic Contaminate/Constituent (VOC) Headspace reading of 100 ppm is acceptable for BTEX and Benzene and may be submitted in lieu of laboratory analyses. TPH, BTEX, and Benzene data collected during the investigation support a NMOCD Depth to Ground Water Calculation of 68.5 feet.

99.83 feet – 35 feet (minus lowermost TPH contaminate) = Depth to Ground Water= **64.83 feet**

- Analyze samples for chloride
- Prepare confirmatory samples for BTEX, TPH 8015M and Chloride analyses
- Plug boreholes with Sodium Bentonite clay
- Prepare report

2 V.M. HENDERSON BATTERY ASSESSMENT

Drilling and sampling occurred in December 2000 with excavation and disposal beginning in January 2001.

2.1 Drilling and Sampling

Environmental Plus, Inc. personnel advanced boreholes BH1 through BH19, successfully sampling at 5' vertical intervals, analyzing for chloride and VOC headspace, and preparing confirmatory laboratory samples for ascension under chain-of-custody protocols.

2.2 Background Sampling

A background sample was obtained from an unimpacted surface location 100' north of the battery site.

2.3 Site Analytical

Selected samples were submitted to Cardinal Laboratories of Hobbs, New Mexico for soil TPH (8015M and 418.1) and soil Chloride analyses. VOC headspace and Field Chloride analyses are also provided. The original data reports and summary are provided in Attachment III. The background concentration for Soil TPH and Chloride were determined to be 81.6 and 61 mg/Kg, respectively. To minimize analytical expense some intermediate interval data points are interpolated from the relationship between the field data and laboratory results. Benzene and BTEX were detected but none above the respective thresholds of 10 mg/Kg and 50 mg/Kg. Only laboratory generated information will be used for compliance determination comments.

2.3.1 BH1

TPH contamination <1000 mg/Kg occurs at 15'bgs. Chloride value at 15'bgs is 282 mg/Kg

2.3.2 BH2

TPH contamination <1000 mg/Kg occurs at 20'bgs. Chloride at 20'bgs is 375 mg/Kg.

2.3.3 BH3

TPH at 25'bgs is 4321 mg/Kg. Chloride is 346 mg/Kg at 25'bgs.

2.3.4 BH4

TPH is 122.1 mg/Kg and Chloride is 50 mg/Kg at 10'bgs.

2.3.5 BH5

Interpolated values to 15'bgs range from 372 to 221 mg/Kg and should be considered nominal. Laboratory Chloride is <50 mg/Kg.

2.3.6 BH6

TPH is 102 and Chloride 50 mg/Kg at 15'bgs.

2.3.7 BH7

Interpolated values to 15'bgs range from 154 to 67 mg/Kg and should be considered nominal. Laboratory Chloride is <50 mg/Kg.

2.3.8 BH8

TPH is 116 mg/Kg at 15 'bgs with Chloride at 679 mg/Kg.

2.4.2 TPH and BTEX Ranking

Site has a ranking of "10" and is summarized below.

Criteria	Ranking
Depth to Ground Water	10
Wellhead Protection Area	0
Distance to Surface Water Body	0
Total Ranking	**10**

Acceptable NMOCD Remediation Levels

TPH- 1,000 mg/Kg Benzene-10 mg/Kg BTEX- 50 mg/Kg

2.4.3 Soil Chloride Criteria

Acceptable residual in situ soil Chloride contamination is relative to the source term transport mechanism that considers nearness to ground water, geology, and annual rainfall and the likelihood of the contamination impacting ground water above the 250 mg/Kg above background Drinking Water Standard.

2.5 Discussion of Data

Subsurface interval data from the sampling event indicate that Benzene and BTEX are residual and do not occur above the regulatory thresholds of 10 and 50 mg/Kg, respectively. The Background chloride for the area is 61 mg/Kg. The matrix below summarizes the vertical extents of TPH and Chloride contamination associated with each borehole.

Borehole #	TPH Compliance Interval	Chloride Compliance Interval
	Feet below ground surface	Feet below ground surface
BH1	15	Surface
BH2	20	>20
BH3	>25	25
BH4	Surface	Surface
BH5	Surface	Surface
BH6	Surface	Surface
BH7	Surface	Surface
BH8	Surface	>15
BH9	10	>15
BH10	5	>15
BH11	15	Surface
BH12	Surface	Surface
BH13	Surface	Surface
BH14	15	>55
BH15	Surface	Surface
BH16	Surface	Surface
BH17	>35	>35
BH18	10	>15
BH19	15	>15

2.6 Conclusion

The vertical extent of TPH contamination above 1000 mg/Kg is >25 'bgs at BH3 and >35'bgs at BH17. The horizontal distribution of TPH and Chloride impact is limited to the visibly impacted surface area. Residual chloride contamination above 500 mg/Kg is distributed vertically near the site center >35'bgs and >55'bgs at BH17 and BH14, respectively. Further subsurface investigation is needed to bound the vertical extent of TPH and Chloride contamination. This can be achieved with deeper borings or during the remediation excavation disposal phase of the project.

3 REMEDIATION

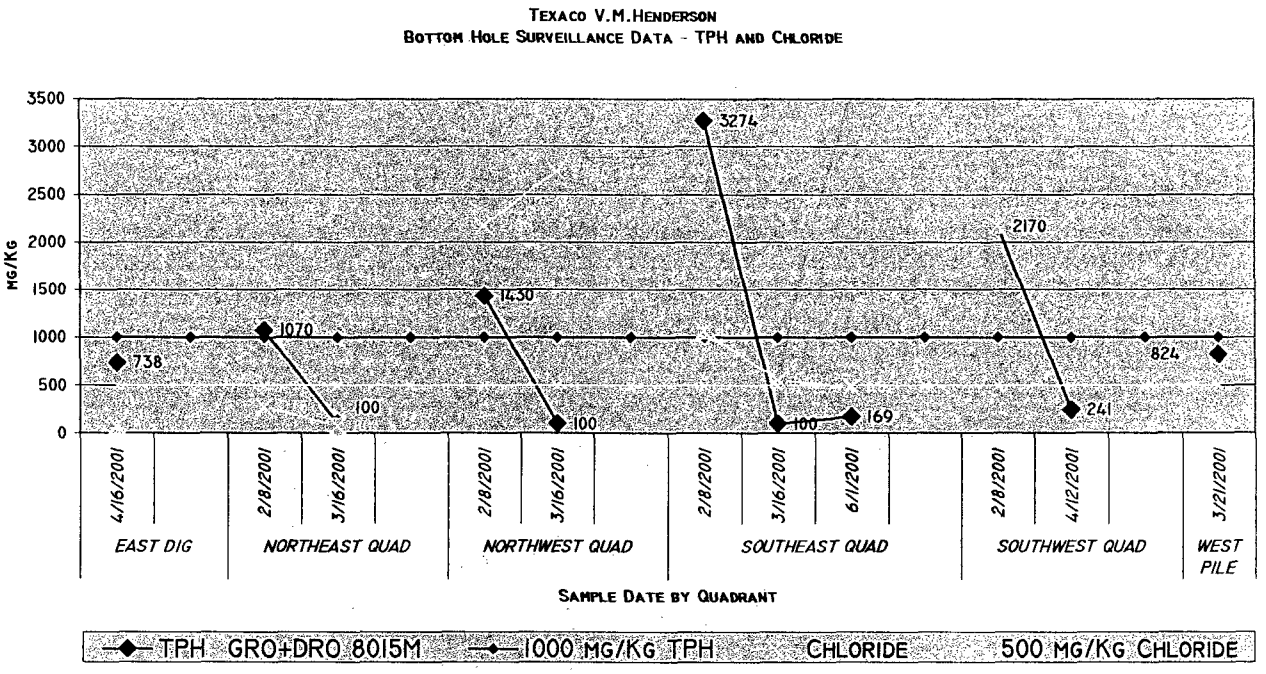
The remediation strategy ,i.e., excavate and dispose, was selected for the site and implemented in January 2001. The excavation will be center around BH14 and BH17 and advanced to compliant delineation levels for TPH.

3.1 Disposal Volume as of June18, 2001

41,572 cubic yards of contaminated soil was disposed of in the Texaco Landfarm.

3.2 Compliance Sampling

The site was divided into the NE, NW, SE, and SW quadrants to ensure that the composite bottom hole samples were representative and collected within reasonably sized and definable boundaries. During the course of the remediation, composite samples were collected at successive excavation depths to determine achievement of the remedial goals. These data are summarized on the chart below.



Note that for each quadrant, the most recent bottom hole TPH sample results are <1000 mg/Kg and are thus within acceptable limits. The Chloride values obtained at the current excavation bottom hole interval in the Northwest and Southwest quadrants indicate elevated levels.

3.3 East Dig

This location was discovered to the east of the tank battery during remediation activities and was excavated and delineated to acceptable TPH and Chloride levels as indicated by the above chart.

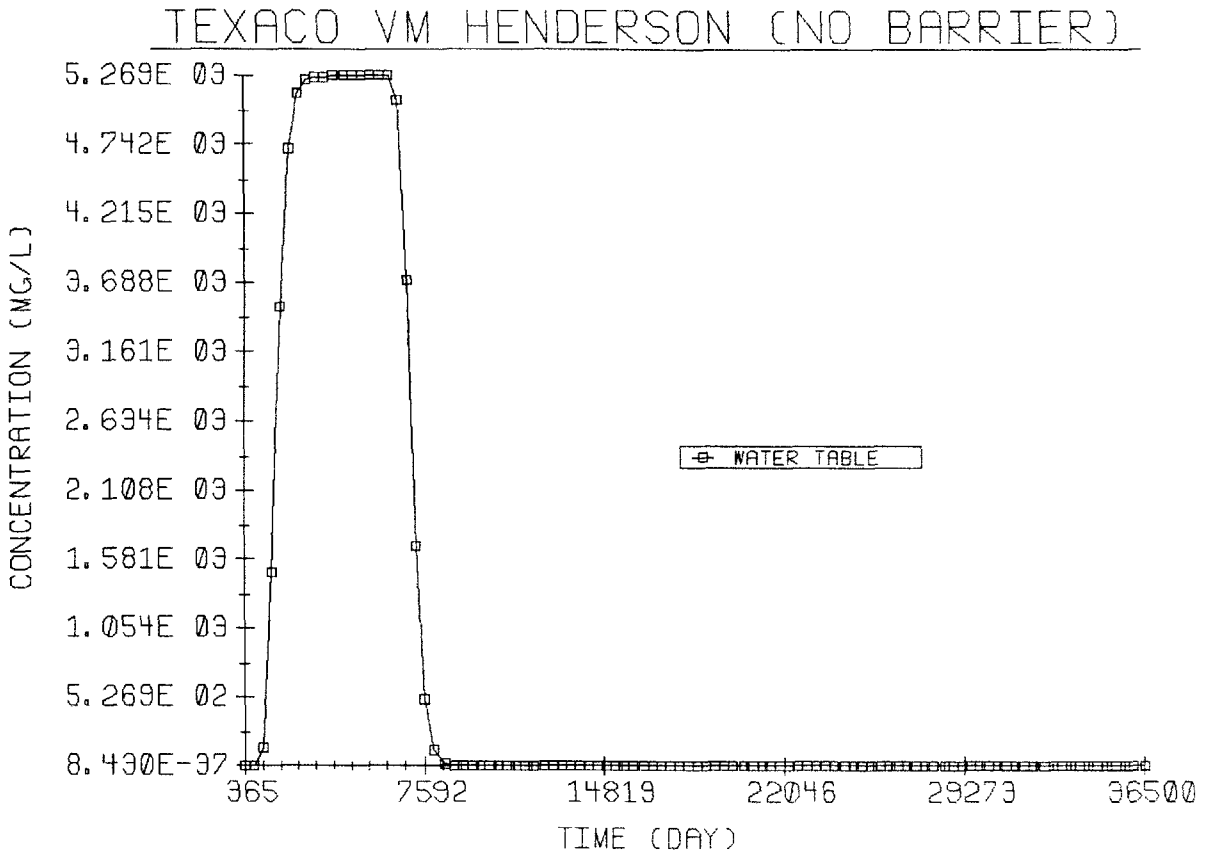
3.4 Preliminary Exposure Risk Assessment

To determine whether or not the residual chloride will impact ground water above the 250 mg/L WQCC standard the known variables for the site were inputted into the "VADSAT" computer code to simulate transport. "VADSAT" is a vadose and saturated zone transport model for assessing the effects on ground water quality from subsurface petroleum hydrocarbon releases and petroleum production waste management practices and was developed by the American Petroleum Institute. To add confidence and ensure the conservative nature of the simulation, the following geohydrologic parameters were chosen.

Parameter	Description or Value
Unsaturated ZoneWaste zone thickness	25'
Chloride Concentration	3710 mg/L
Depth to Ground water	99.83' bgs
Infiltration Rate	10^{-4}
Lithology	Sand (conservative)
Hydrogeology	Sand and Gravel (conservative)
Bgs=below ground surface	

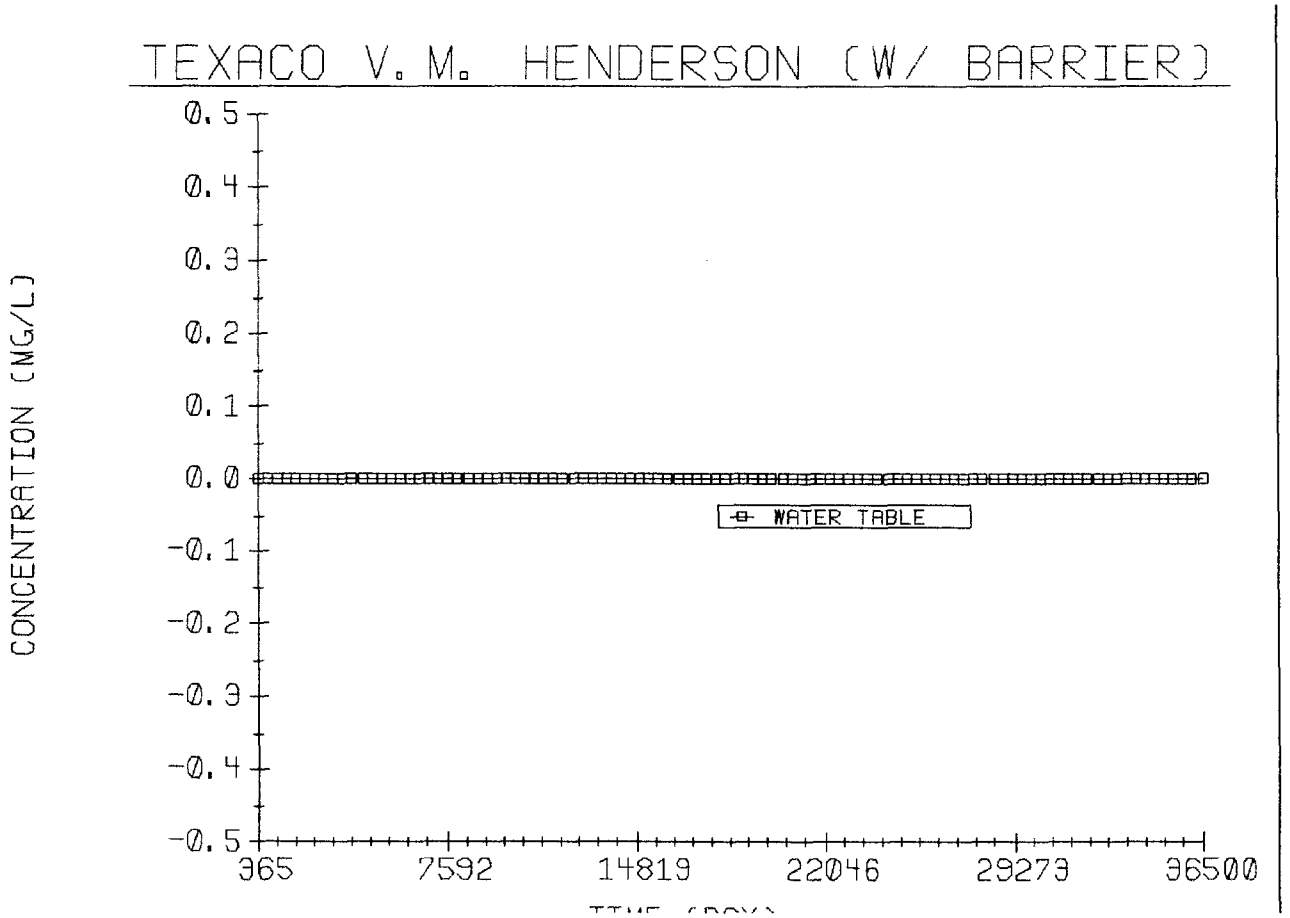
3.4.1 Simulation w/o impermeable barrier

This simulation indicates that the residual chloride will impact ground water in approximately 7 years at an unacceptable level of 5,269 mg/L Chloride.



3.4.2 Simulation with impermeable barrier

The installation of an impermeable barrier will interrupt the chloride transport sufficiently enough to eliminate future ground water impact.



3.4.3 Discussion

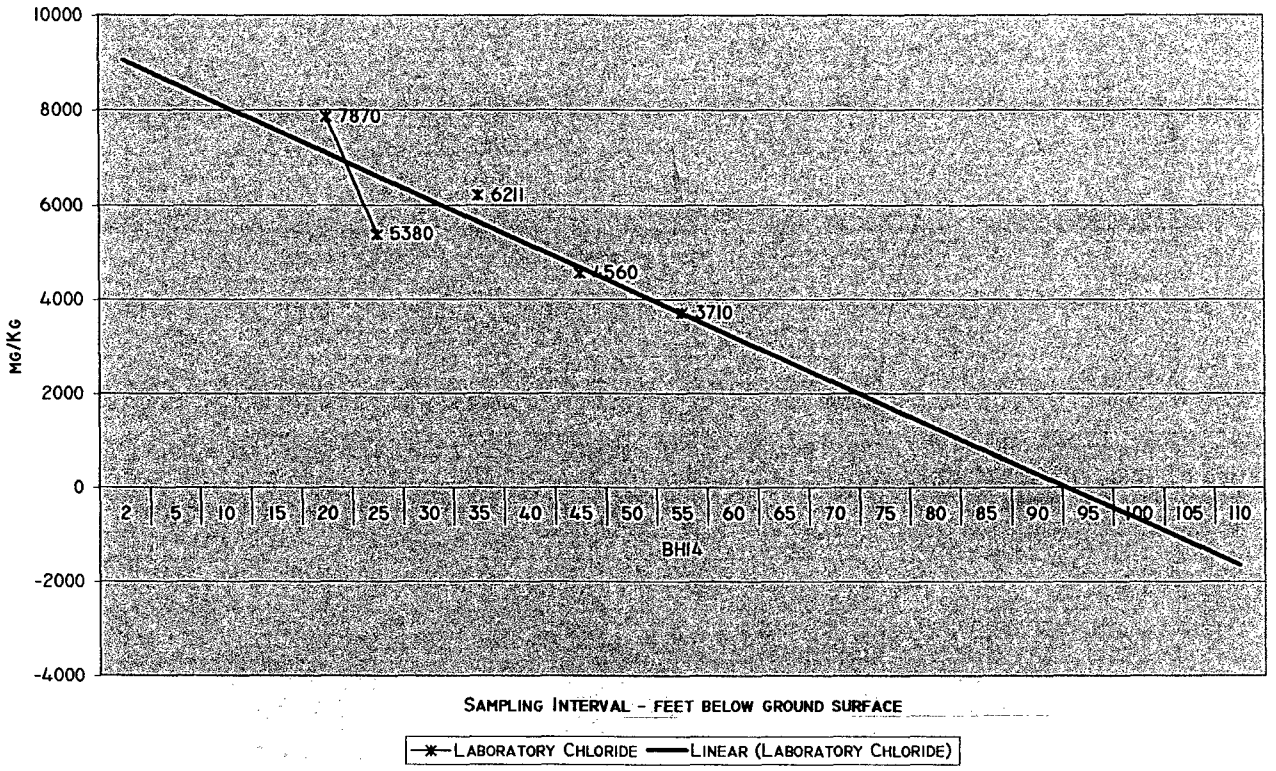
Clearly, installation of an impermeable barrier will prevent future contamination of the ground water resource at the site. Also, the natural topography of the site dips to the south and will not allow retention of sufficient quantities of water to promote infiltration and may be reason to reduce the inputted infiltration rate.

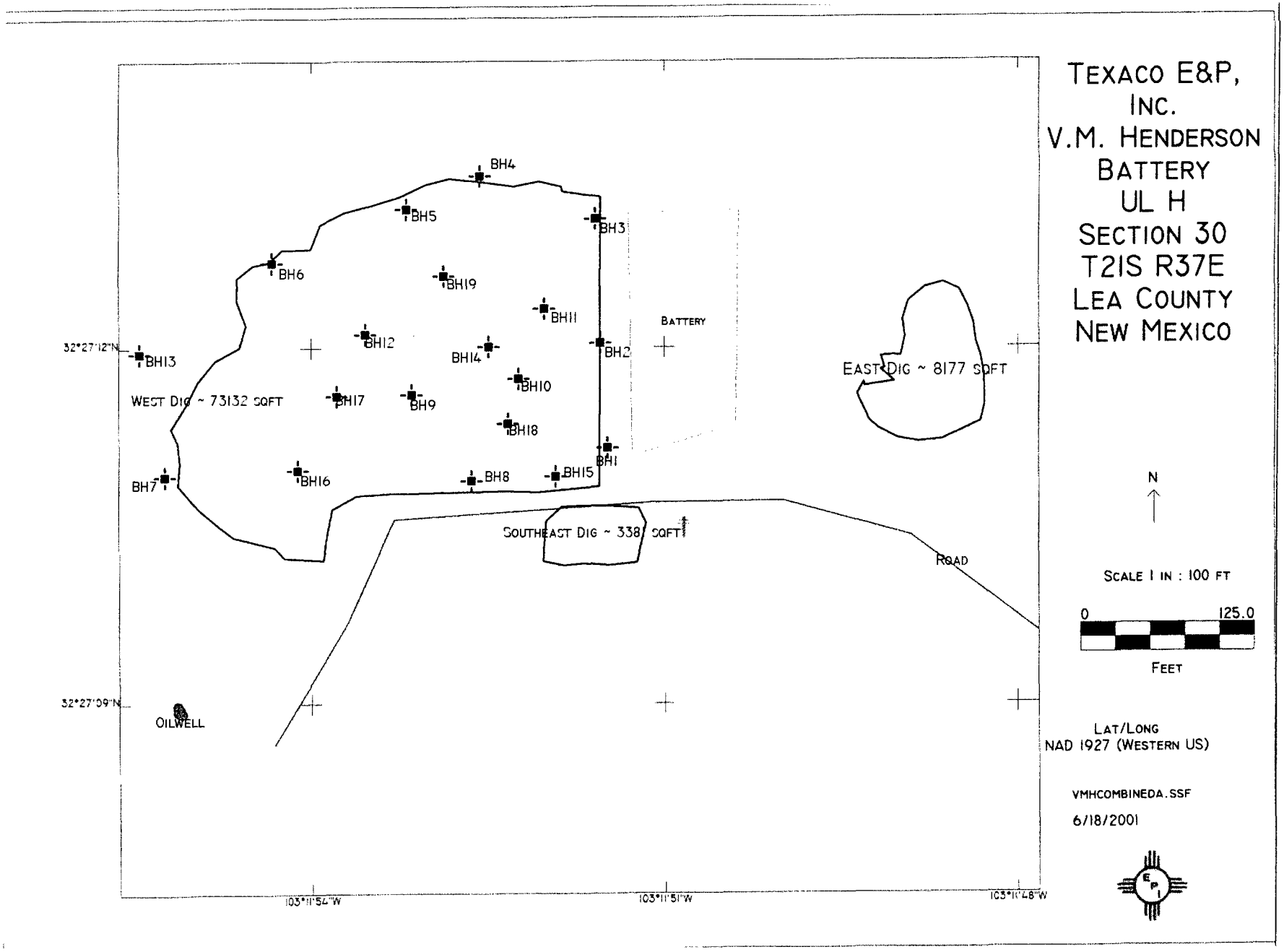
4 PROPOSAL

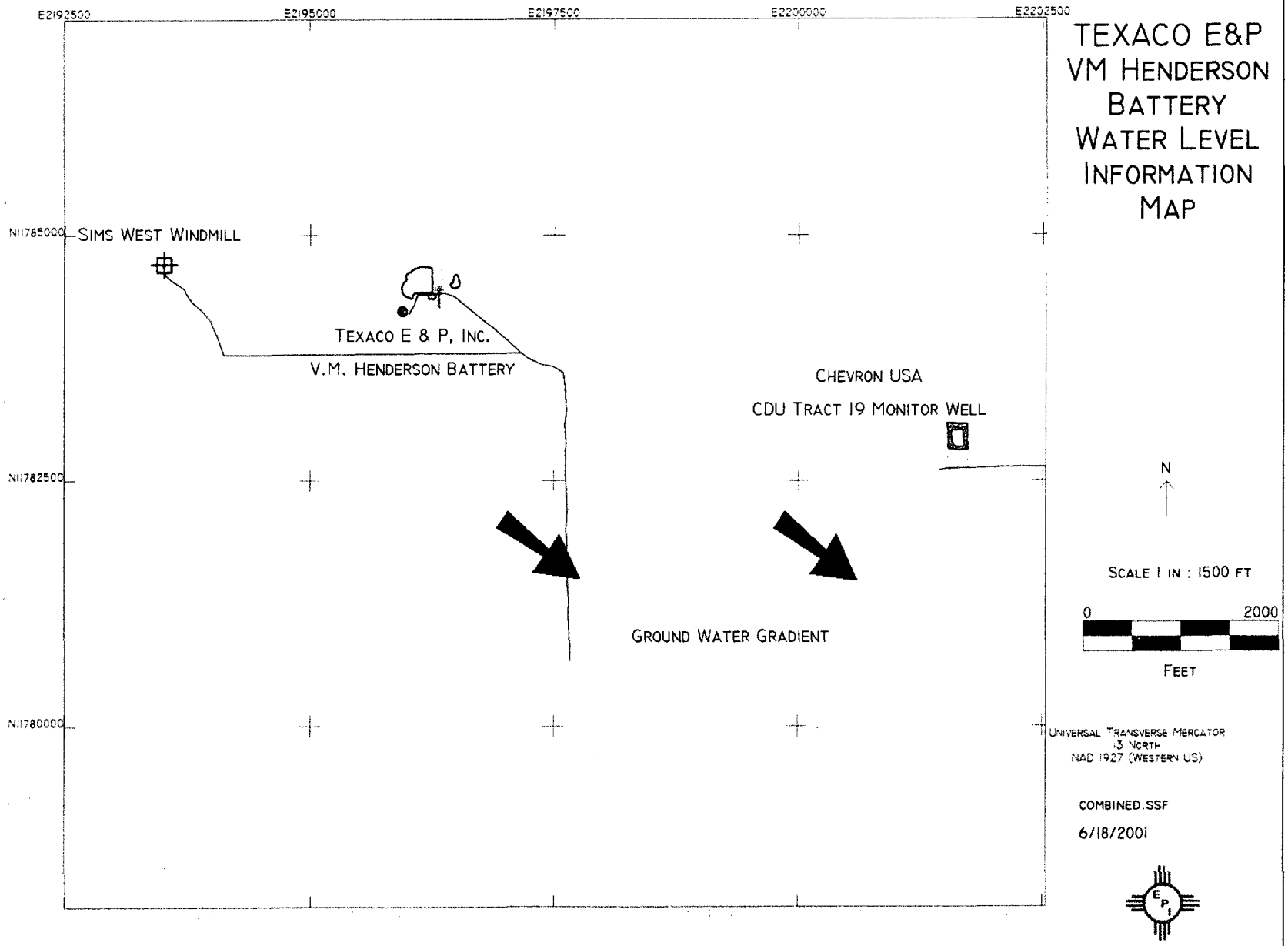
Clearly, the TPH bottom hole data supports closure of the site and regarding Chloride, the installation of an impermeable barrier will isolate the source term and ensure protection of the ground water resource. The impermeable barrier will be constructed of a relatively pure red clay and compacted to 95% Proctor. To achieve impermeability and durability the barrier is to be at least 24" thick and installed at 8-10' below ground surface for protection against intrusion and erosion. The barrier will also have a similarly thick skirt extending 5-7' beyond the current excavation into the areas of the lateral boreholes that were not impacted. Laboratory data from the borehole and the bottom hole samples do not adequately bound the vertical extent of Chloride contamination sufficient to conclude that the ground water has not already been impacted. The data does however establish a decreasing gradient to the 55'bgs interval. The chart below indicates that, with a straight-line trend projection, the vertical extent of the chloride should be at the 92'bgs interval and will not have impacted ground water. Nevertheless, it is proposed to advance a single borehole, central to the site near Borehole #14, sampling at 5' intervals until chloride levels are delineated to less than 250 mg/Kg or ground water is encountered. If ground water is

encountered a monitor well will be installed and sampled to determine impact. A background sample will be collected from the Sims West Windmill (2550' west) for comparison purposes. If impacted above the 250 mg/L above background Chloride WQCC standard, the NMOCD will be notified and a ground water remediation plan developed and submitted.

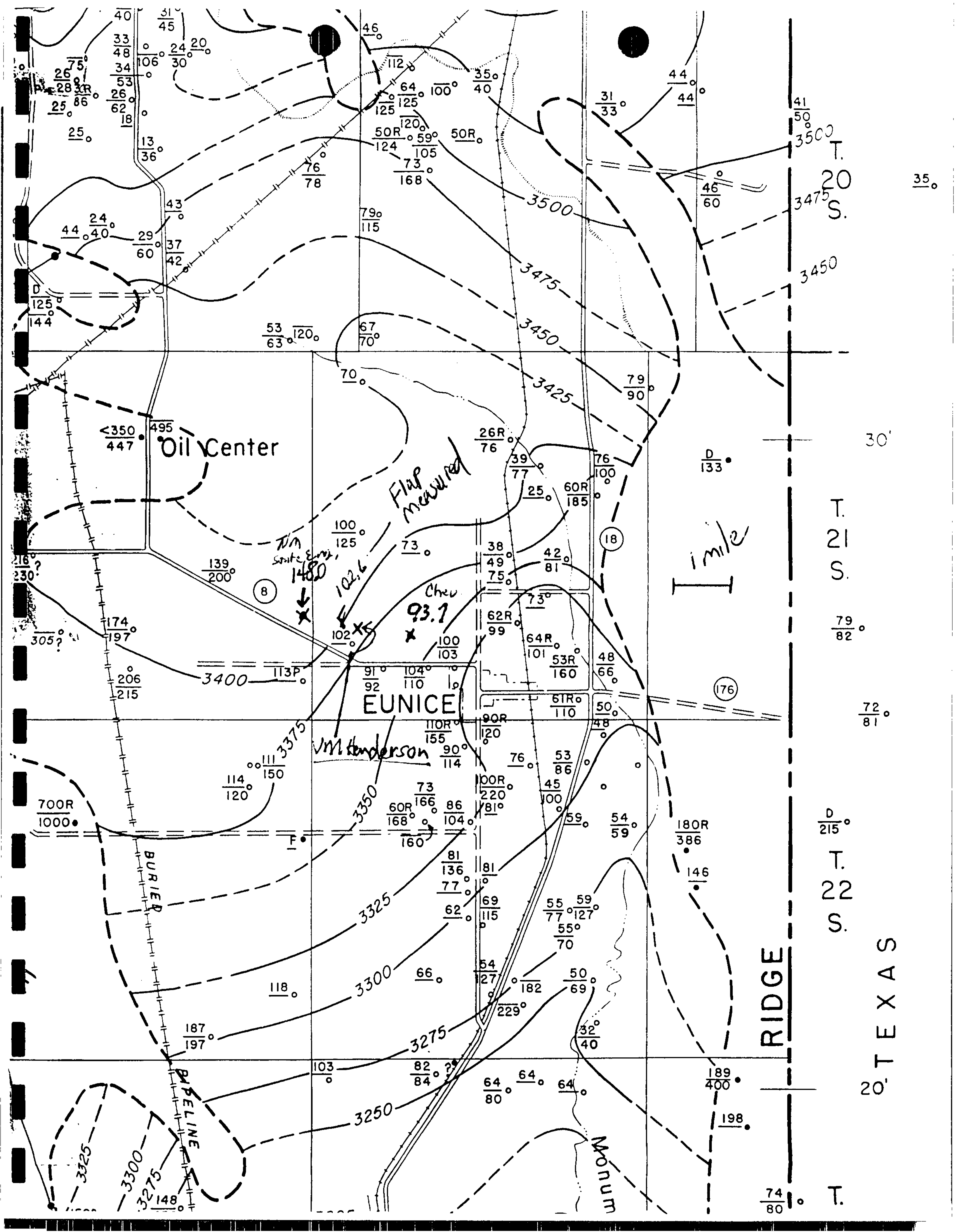
TEXACO E & P, INC.
V.M. HENDERSON BOERHOLE #14 SOIL CHLORIDE DATA AND TREND



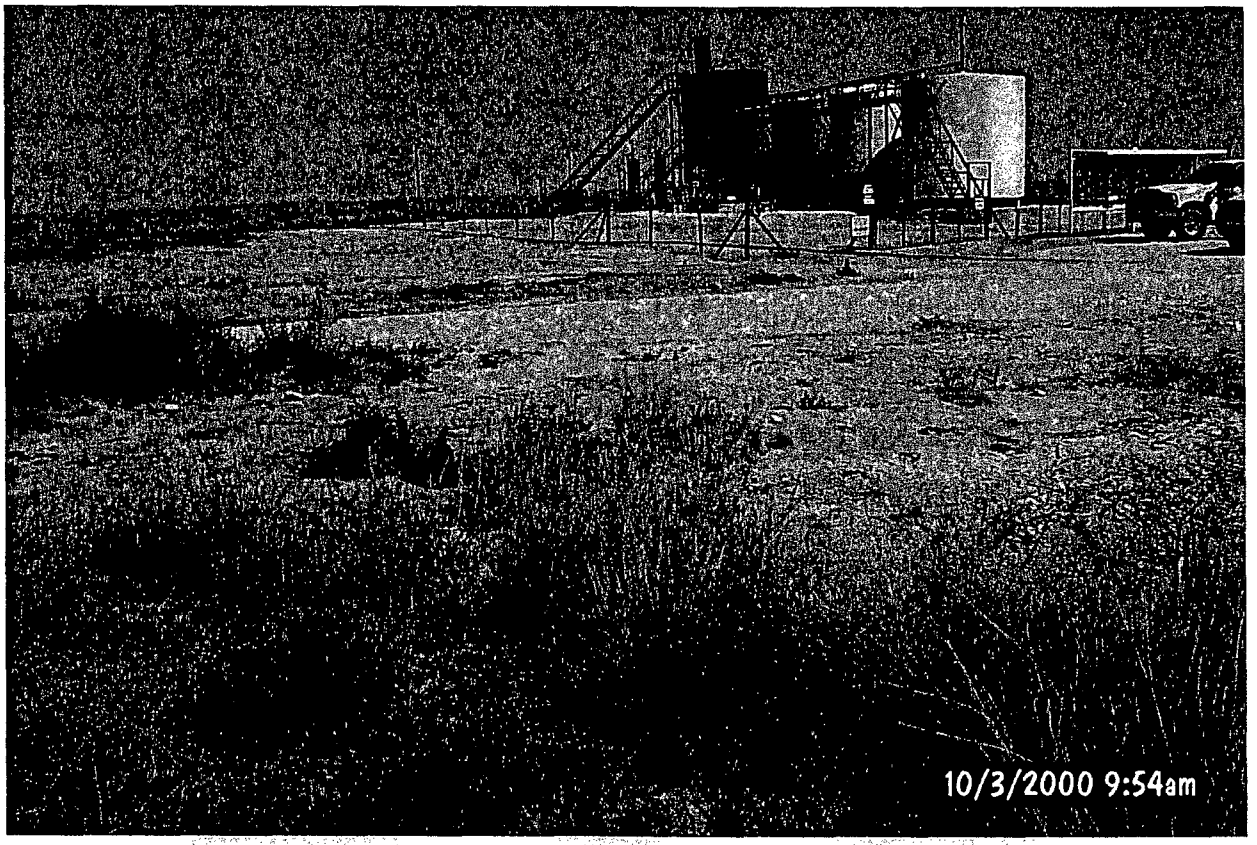

TEXACO E&P, INC.
V.M. HENDERSON BATTERY
UL H
SECTION 30
T21S R37E
LEA COUNTY
NEW MEXICO
BH4
BH5
BH3
BH6
BH19
BH11
BATTERY
BH12
BH2
32°27'12"N
BH13
BH14
BH10
EAST DIG ~ 8177 SQFT
WEST DIG ~ 73132 SQFT
BH17
BH9
BH18
BH1
BH7
BH16
BH8
BH15
SOUTHEAST DIG ~ 338 SQFT
ROAD
N
SCALE 1 IN : 100 FT
0
125.0
FEET
32°27'09"N
OILWELL
LAT/LONG
NAD 1927 (WESTERN US)
VMHCOMBINEDA.SSF
6/18/2001
103°11'54"W
103°11'51"W
103°11'48"W



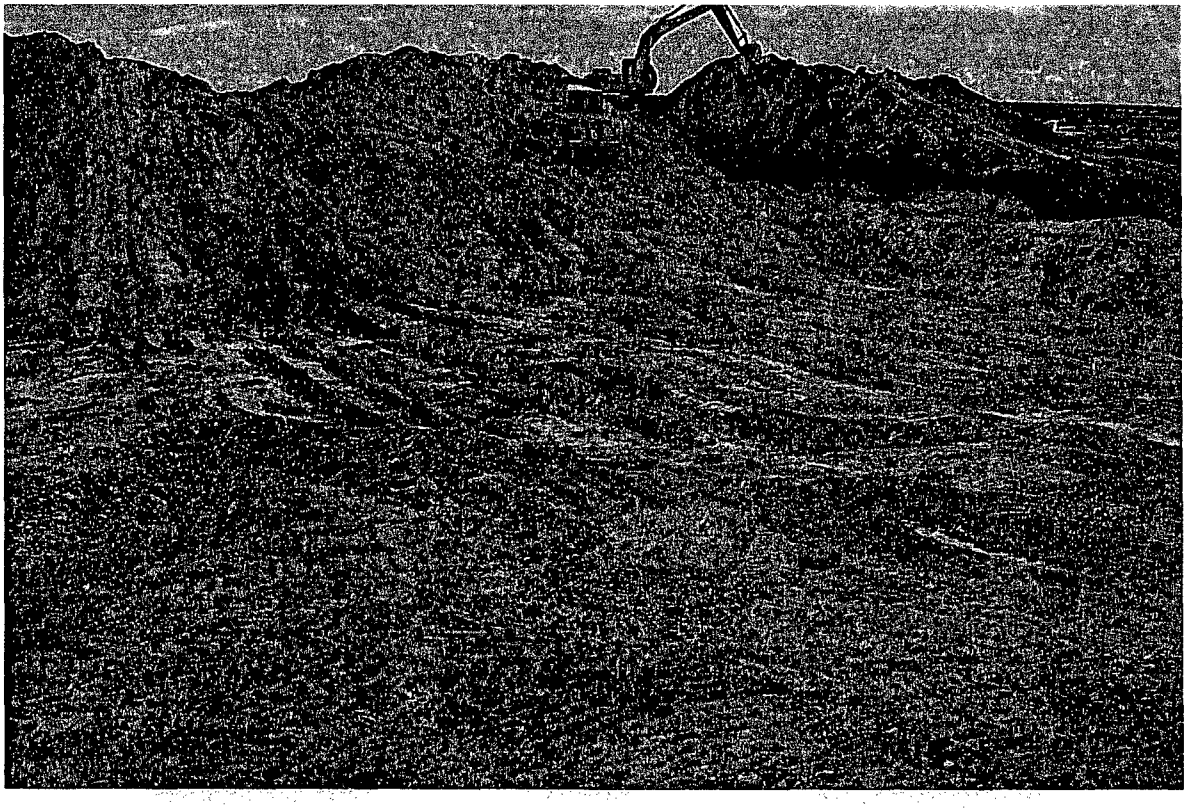
TEXACO E&P VM HENDERSON BATTERY WATER LEVEL INFORMATION MAP

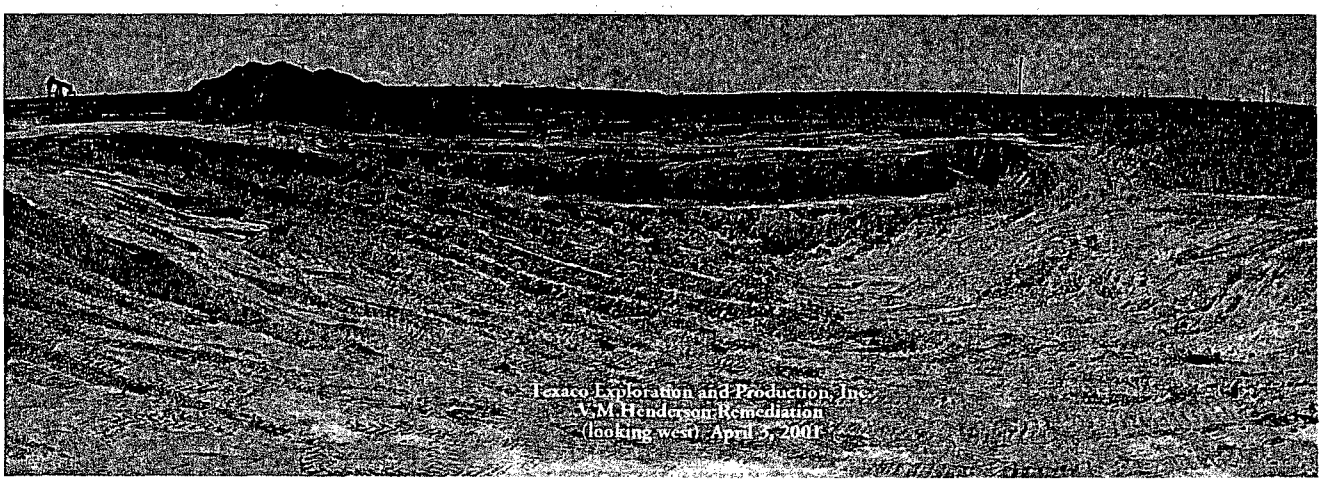

Oil Center
EUNICE
Flap measured
NM State Eng.
1480
102.6
Chev
93.7
VM Henderson
1 mile
T. 20 S.
T. 21 S.
T. 22 S.
T.
30'
20'
RIDGE
TEXAS
BURIED PIPELINE
Monum
3500
3475
3450
3425
3400
3375
3350
3325
3300
3275
3250
(8)
(18)
(176)
700R
1000
<350
447
495

Attachment II: Photographs

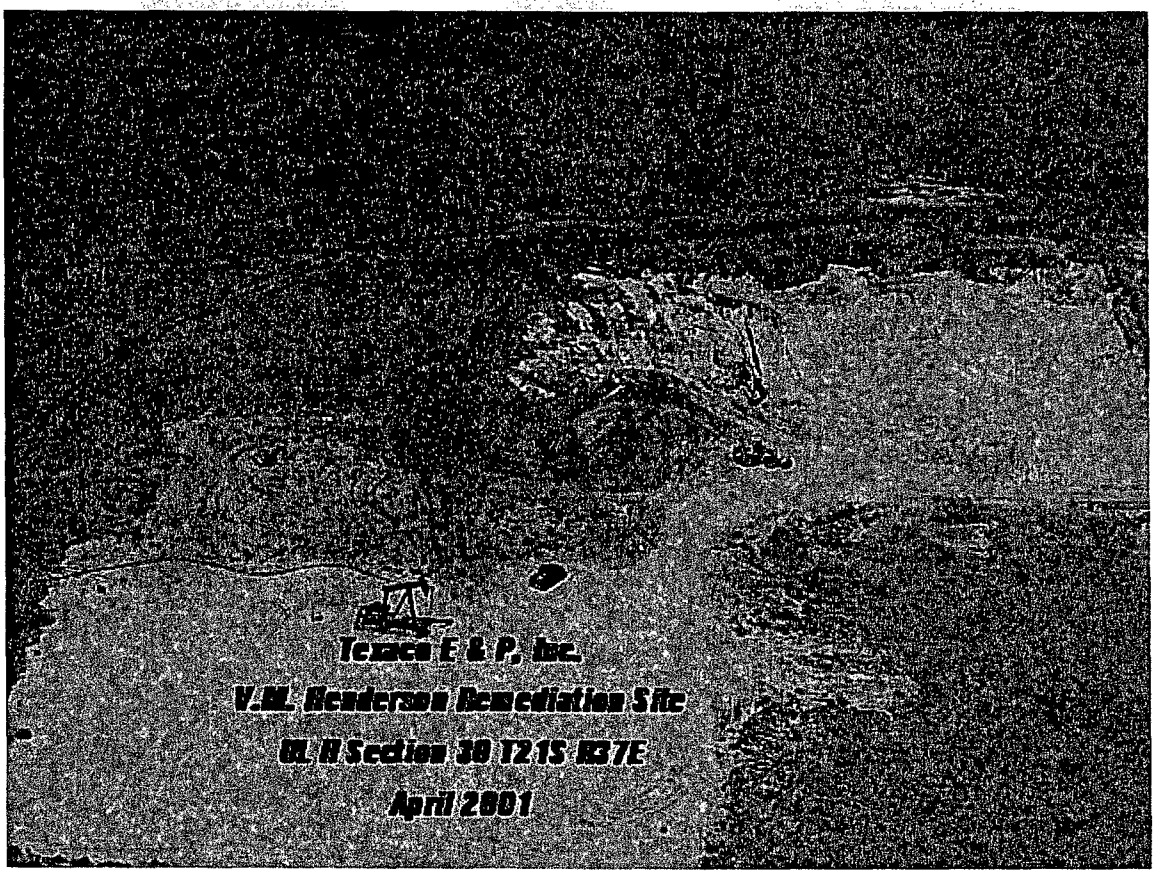


V.M. Henderson Battery




Texaco Exploration and Production, Inc.
V.M. Henderson Remediation
(looking west) April 5, 2001


5/16/2001


Texaco E & P, Inc.
V.M. Henderson Remediation Site
OL H Section 30 T21S R37E
April 2001

TEXACO E & P, INC.
V.M. HENDERSON BATTERY DATA SUMMARY

DATE	SAMPLE LOCATION BOREHOLE	SAMPLE ID#	SAMPLING INTERVAL	HEADSPACE VOC[2]	CHLORIDE	GRO[4]	DRO[5]	TPH GRO+DRO 8015M	INTERPOLATED TPH	BTEX[6]	BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENE
			'BGS'	PPM	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG
12/18/2000	1	VMH1-2	2	171.0					6772					
12/18/2000	1	VMH1-5	5	71.5					2831					
12/18/2000	1	VMH1-10	10	25.0	182				990					
12/18/2000	1	VMH1-15	15	32.8	282	50.0	192.0	242.0	1299	0.021	*0.003*	*0.006*	*0.006*	0.006
12/18/2000	2	VMH2-2	2	170.0	484				6732					
12/18/2000	2	VMH2-5	5	120.0					4752					
12/18/2000	2	VMH2-10	10	50.1	861				1984					
12/18/2000	2	VMH2-15	15	49.3					1952					
12/18/2000	2	VMH2-20	20	18.9	1280	50.0	325.0	375.0	748	0.015	*0.004*	0.003	*0.004*	*0.004*
12/18/2000	3	VMH3-2	2	207.0					8197					
12/18/2000	3	VMH3-5	5	427.0					16909					
12/18/2000	3	VMH3-10	10	610.0	182				24156					
12/18/2000	3	VMH3-15	15	592.0					23443					
12/18/2000	3	VMH3-20	20	300.0	298				11880					
12/18/2000	3	VMH3-25	25	98.7	346	561.0	3760.0	4321.0	3909	19.527	*0.729*	*0.408*	*7.190*	*11.200*
12/20/2000	4	VMH4-2	2	8.7	66				345					
12/20/2000	4	VMH4-5	5	7.1					281					
12/20/2000	4	VMH4-10	10	5.7	50	50.0	72.1	122.1	226	0.012	*0.002*	*0.002*	*0.002*	*0.006*
12/20/2000	4	VMH4-15	15	5.0					198					
12/20/2000	5	VMH5-2	2	9.4	50									
12/20/2000	5	VMH5-5	5	8.6					372					
12/20/2000	5	VMH5-10	10	8.8					341					
12/20/2000	5	VMH5-15	15	5.6					348					
12/20/2000	6	VMH6-2	2	3.5					222					
12/20/2000	6	VMH6-5	5	3.5										
12/20/2000	6	VMH6-10	10	2.7					139					
12/20/2000	6	VMH6-15	15	2.5	50	50.0	52.3	102.3	139	0.012	*0.002*	*0.002*	*0.002*	*0.006*
12/20/2000	7	VMH7-2	2	3.9	50				107					
12/20/2000	7	VMH7-5	5	4.1					99					
12/20/2000	7	VMH7-10	10	4.6										
12/20/2000	7	VMH7-15	15	1.7					154					
12/21/2000	8	VMH8-2	2	13.8					162					
12/21/2000	8	VMH8-5	5	27.8	282				182					
12/21/2000	8	VMH8-10	10	8.7					67					
12/21/2000	8	VMH8-15	15	5.1	679	50.0	66.7	116.7		0.012	*0.002*	*0.002*	*0.002*	*0.006*
12/21/2000	9	VMH9-2	2	4.9					546					
12/21/2000	9	VMH9-5	5	97.5	431				1101					
12/21/2000	9	VMH9-10	10	23.8					345					
12/21/2000	9	VMH9-15	15	6.7	845	50.0	52.6	102.6	202	0.012	*0.002*	*0.002*	*0.002*	*0.006*

TEXACO E & P, INC.
V.M. HENDERSON BATTERY DATA SUMMARY

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			'BGS'	PPM	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG
12/21/2000	10	VMH10-2	2	34.3										
12/21/2000	10	VMH10-5	5	12.9	1460				194					
12/21/2000	10	VMH10-10	10	3.1					3861					
12/21/2000	10	VMH10-15	15	3.2	1140	50.0	50.0	100.0	942	0.012	*0.002*	*0.002*	*0.002*	*0.006*
12/21/2000	11	VMH11-2	2	6.200	66				265					
12/21/2000	11	VMH11-5	5	38.9										
12/21/2000	11	VMH11-10	10	39.4	83				1358					
12/21/2000	11	VMH11-15	15	17.2	33	50.0	319.0	369.0	511	0.012	*0.002*	*0.002*	*0.002*	*0.006*
12/21/2000	12	VMH12-2	2	9	83				123					
12/21/2000	12	VMH12-5	5	4.7					127					
12/21/2000	12	VMH12-10	10	4.6										
12/21/2000	12	VMH12-15	15	9.4	83	50.0	50.0	100.0	246	0.012	*0.002*	*0.002*	*0.002*	*0.006*
12/22/2000	13	VMH13-2	2	9.5	83				1540					
12/22/2000	13	VMH13-5	5	7.4					1560					
12/22/2000	13	VMH13-10	10	5					681					
12/22/2000	13	VMH13-15	15	6.9	50	50.0	50.0	100.0		0.058	*0.048*	*0.002*	*0.002*	*0.006*
12/22/2000	14	VMH14-2	2	198					356					
12/22/2000	14	VMH14-55	5	552					186					
12/22/2000	14	VMH14-10	10	421.0	2220	50.0	220.0	270.0	182	0.750	*0.002*	*0.027*	*0.191*	*0.530*
12/22/2000	14	VMH14-15	15	16.9	3430	50.0	213.0	263.0	372	0.012	*0.002*	*0.002*	*0.002*	*0.006*
12/22/2000	14	VMH14-20	20	17.4	7870	50.0	227.0	277.0		0.012	*0.002*	*0.002*	*0.002*	*0.006*
12/22/2000	14	VMH14-25	25	3.6	5380	50.0	50.0	100.0	376	0.012	*0.002*	*0.002*	*0.002*	*0.006*
12/22/2000	14	VMH14-30	30	2.5					293					
12/22/2000	14	VMH14-35	35	5.6	6211				198					
12/22/2000	14	VMH14-40	40	32.1					273					
12/22/2000	14	VMH14-45	45	1.0	4560	50.0	50.0	100.0		0.012	*0.002*	*0.002*	*0.002*	*0.006*
12/29/2000	14	VMH14-50	50	NA					7841					
12/29/2000	14	VMH14-55	55	3.4	3710	50.0	50.0	100.0	21859	0.000	*	*	*	*
12/29/2000	15	VMHGP15-2	2	1.7	66	50.0	50.0	100.0	16672	0.000	*	*	*	*
12/29/2000	15	VMHGP15-5	5	2.1					669					
12/29/2000	15	VMHGP15-10	10	2.1					689					
12/29/2000	15	VMHGP15-15	15	3.2	248	50.0	50.0	100.0	143	0.000	*	*	*	*
12/29/2000	16	VMHGP16-2	2	0.7	50	50.0	596.0	646.0	99	0.000	*	*	*	*
12/29/2000	16	VMHGP16-5	5	2.1					222					
12/29/2000	16	VMHGP16-10	10	3.6					1271					
12/29/2000	16	VMHGP16-15	15	2.1	50	50.0	50.0	100.0	40	0.000	*	*	*	*
1/3/2001	17	VMHGP17-2	2	2.7	248	50.0	64.0	114.0		0.000	*	*	*	*
1/3/2001	17	VMHGP17-5	5	96.7					135					
1/3/2001	17	VMHGP17-10	10	268.0	1160	124.0	4940.0	5064.0		0.000	*	*	*	*

TEXACO E & P, INC.
V.M. HENDERSON BATTERY DATA SUMMARY

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			'BGS[1]	PPM	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG
1/3/2001	17	VMHGPI7-15	15	165					67					
1/3/2001	17	VMHGPI7-20	20	145					83					
1/3/2001	17	VMHGPI7-25	25	143.2	1410	210.0	4440.0	4650.0	83	0.000	*	*	*	*
1/3/2001	17	VMHGPI7-30	30	101.0	845	59.9	3080.0	3139.9	127	0.000	*	*	*	*
1/3/2001	17	VMHGPI7-35	35	35.9	1110	93.8	3470.0	3563.8		0.000	*	*	*	*
1/3/2001	18	VMHGPI8-2	2	4.7	282	50.0	700.0	750.0	28	0.000	*	*	*	*
1/3/2001	18	VMHGPI8-5	5	110.0	845	50.0	4110.0	4160.0	83	0.000	*	*	*	*
1/3/2001	18	VMHGPI8-10	10	166.0	480	50.0	682.0	732.0	143	0.000	*	*	*	*
1/3/2001	18	VMHGPI8-15	15	63.9	1822	50.0	578.0	628.0	83	0.000	*	*	*	*
1/3/2001	19	VMHGPI9-2	2	35.3	265	53.0	9530.0	9583.0		0.000	*	*	*	*
1/3/2001	19	VMHGPI9-5	5	60.4	812	50.0	15000.0	15050.0	107	0.000	*	*	*	*
1/3/2001	19	VMHGPI9-10	10	228.0	911	144.0	12600.0	12744.0	3829	0.000	*	*	*	*
1/3/2001	19	VMHGPI9-15	15	68.9	795	50.0	1150.0	1200.0	10613	0.000	*	*	*	*
6/1/2001	BOTTOM HOLE	S6101VMHSBH		*	482	50	119	169		0.030	0.005	0.005	0.005	0.015
4/16/2001	EAST QUAD	S4301VMECI		*	80	50	688	738		0.037	0.005	0.005	0.005	0.022
2/8/2001	NORTH EAST QUAD	S2801THNECI		*	275	50	1020	1070		0.132	0.01	0.025	0.025	0.072
3/16/2001	NORTH EAST QUAD	TVM3160INEQ		*	80	50	50	100		0.035	0.005	0.005	0.005	0.02
2/8/2001	NORTH WEST QUAD	S2801THNWCI		*	2180	50	1380	1430		0.890	0.01	0.247	0.247	0.386
3/16/2001	NORTH WEST QUAD	TVM3160INWQ		*	2750	50	50	100		0.030	0.005	0.005	0.005	0.015
2/8/2001	SOUT EAST QUAD	S2801THSECI		*	1070	144	3130	3274		9.849	0.649	2.94	2.94	3.32
3/16/2001	SOUT EAST QUAD	TVM3160ISEQ		*	560	50	50	100		0.034	0.005	0.005	0.005	0.019
2/8/2001	SOUTH WEST QUAD	S2801THSWCI		*	2180	50	2120	2170		3.549	0.077	0.726	0.726	2.02
4/12/2001	SOUTH WEST QUAD	VMHS4120ISWQI		*	2270	50	191	241		0.112	0.005	0.007	0.023	0.077
3/21/2001	WEST PILE	TVM3210IWP		*	112	50	774	824		0.033	0.005	0.005	0.005	0.018

[1]'BGS - FEET BELOW GROUND SURFACE

[2]VOC - VOLATILE ORGANIC CONSTITUENTS

[3]TPH - TOTAL PETROLEUM HYDROCARBON

[4]GRO - GASOLINE RANGE ORGANICS (C_6 - C_{10})

[5]DRO - DIESEL RANGE ORGANICS (C_{10}-C_{28})

[6]BTEX - THE SUM OF BENZENE, TOLUENE, ETHYL BENZENE, AND XYLENES

CARDINAL LABORATORIES

PHONE (915) 673-7001 · 2111 BEECHWOOD · ABILENE, TX 79603
PHONE (505) 393-2326 · 101 E. MARLAND · HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 12/29/00
Reporting Date: 01/02/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: SEC.30 T21S R36E

Sampling Date: 12/18/00-12/22/00
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)
ANALYSIS DATE:		12/30/00	12/30/00
H5474-2	VMH1-15	<50	192
H5474-5	VMH2-20	<50	325
H5474-8	VMH3-25	561	3760.0
H5474-10	VMH4-10	<50	72.1
H5474-12	VMH6-15	<50	52.3
H5474-15	VMH8-15	<50	66.7
H5474-17	VMH9-15	<50	52.6
H5474-19	VMH10-15	<50	<50
H5474-22	VMH11-15	<50	319
H5474-24	VMH12-15	<50	<50
H5474-26	VMH13-15	<50	<50
H5474-27	VMH14-10	<50	220
H5474-28	VMH14-15	<50	213
H5474-29	VMH14-20	<50	227
H5474-30	VMH14-25	<50	<50
H5474-32	VMH14-45	<50	<50
Quality Control		929	1049
True Value QC		1000	1000
% Recovery		92.9	105
Relative Percent Difference		8.5	7.8

METHOD: SW-846 8015 M

Chemist

1/2/01
Date

H5474B.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
500 N. LORAINE
MIDLAND, TX 79702
FAX TO: 915-688-4751

Receiving Date: 12/29/00
Reporting Date: 01/03/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: SEC. 30 T21S R36E

Sampling Date: 12/18/00~12/22/00
Sample Type: SOIL
Sample Condition: COOL, INTACT
Sample Received By: BC-HOBBS
Analyzed By: JA

LAB NUMBER	SAMPLE ID	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE		01/02/01	01/02/01	01/02/01	01/02/01
H5474-2	VMH1-15	0.003	0.006	0.006	0.011
H5474-5	VMH2-20	0.004	0.003	0.004	0.015
H5474-8	VMH3-25	0.729	0.408	7.19	11.2
H5474-10	VMH4-10	<0.002	<0.002	<0.002	<0.006
H5474-12	VMH6-15	<0.002	<0.002	<0.002	<0.006
H5474-15	VMH8-15	<0.002	<0.002	<0.002	<0.006
H5474-17	VMH9-15	<0.002	<0.002	<0.002	<0.006
H5474-19	VMH10-15	<0.002	<0.002	<0.002	<0.006
H5474-22	VMH11-15	<0.002	<0.002	<0.002	<0.006
H5474-24	VMH12-15	<0.002	<0.002	<0.002	<0.006
H5474-26	VMH13-15	<0.002	<0.002	<0.002	<0.006
H5474-27	VMH14-10	0.048	0.027	0.191	0.530
H5474-28	VMH14-15	<0.002	<0.002	<0.002	<0.006
H5474-29	VMH14-20	<0.002	<0.002	<0.002	<0.006
H5474-30	VMH14-25	<0.002	<0.002	<0.002	<0.006
H5474-31	VMH14-35	<0.002	<0.002	<0.002	<0.006
H5474-32	VMH14-45	<0.002	<0.002	<0.002	<0.006
Quality Control		0.0908	0.0977	0.0883	0.274
True Value QC		0.100	0.100	0.100	0.300
% Accuracy		90.8	97.7	88.3	91.3
Relative Percent Difference		4.6	0.7	4.8	2.7

METHOD: EPA SW 846-8020, 5030, Gas Chromatography

Chemist

1-3-01
Date

H5474SHOBBSTEXACOBTEXONLY

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX
FAX TO:

Receiving Date: 01/06/01
Reporting Date: 01/09/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: SEC. 30 T21S R37E

Sampling Date: 12/29/00 & 01/03/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	Cl^- (mg/Kg)
ANALYSIS DATE		01/08/01	01/08/01	01/09/01
H5502-1	VMHGP14-55	<50	<50	3710
H5502-2	VMHGP15-2	<50	<50	66
H5502-3	VMHGP15-15	<50	<50	248
H5502-4	VMHGP16-2	<50	596	50
H5502-5	VMHGP16-15	<50	<50	50
H5502-6	VMHGP17-2	<50	84.0	248
H5502-7	VMHGP17-10	124	4940	1160
H5502-8	VMHGP17-25	210	4440	1410
H5502-9	VMHGP17-30	59.9	3080	845
H5502-10	VMHGP17-35	93.8	3470	1110
H5502-11	VMHGP18-2	<50	700	282
H5502-12	VMHGP18-5	<50	4110	845
H5502-13	VMHGP18-10	<50	682	480
H5502-14	VMHGP18-15	<50	578	1822
H5502-15	VMHGP19-2	53	9530	265
H5502-16	VMHGP19-5	<50	15000	812
H5502-17	VMHGP19-10	144	12600	911
H5502-18	VMHGP19-15	<50	1150	795
Quality Control		755	783	994
True Value QC		800	800	1000
% Recovery		94.3	97.9	99.4
Relative Percent Difference		6.1	0.9	1.0

55' Center of site

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl^-: Std. Methods 4500-ClB
*Analyses performed on 1:4 w:v aqueous extracts

Chemist

1/9/01
Date

H5502A.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 12/29/00
Reporting Date: 01/03/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: SEC. 30 T21S R36E

Sampling Date: 12/18/00-12/22/00
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	TPH (mg/Kg)	Cl* (mg/Kg)
ANALYSIS DATE:		01/02/01	01/03/01
H5474-1	VMH1-10	58.2	182
H5474-2	VMH1-15	1250	282
H5474-3	VMH2-2	26700	464
H5474-4	VMH2-10	1000	861
H5474-5	VMH2-20	1720	1280
H5474-6	VMH3-10	7010	182
H5474-7	VMH3-20	12100	298
H5474-8	VMH3-25	10400	348
H5474-9	VMH4-2	<10	66
H5474-10	VMH4-10	<10	50
H5474-11	VMH5-2	104	50
H5474-12	VMH6-15	<10	50
H5474-13	VMH7-2	<10	50
H5474-14	VMH8-5	18600	282
H5474-15	VMH8-15	41.6	679
H5474-16	VMH9-5	31700	431
H5474-17	VMH9-15	148	845
H5474-18	VMH10-5	3650	1460
H5474-19	VMH10-15	<10	1140
H5474-20	VMH11-5	2700	66
H5474-21	VMH11-10	1480	83
H5474-22	VMH11-15	1260	33
H5474-23	VMH12-2	11100	83
H5474-24	VMH12-15	<10	83
H5474-25	VMH13-2	<10	83

H5474A1.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 12/28/00
Reporting Date: 01/03/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: SEC. 30 T21S R36E

Sampling Date: 12/18/00-12/22/00
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	TPH (mg/Kg)	Cl* (mg/Kg)
ANALYSIS DATE:		01/02/01	01/03/00
H5474-26	13-15	<10	50
H5474-27	14-10	6630	2220
H5474-28	14-15	493	3430
H5474-29	VMH 14-20	485	7870
H5474-30	VMH 14-25	78.3	5380
H5474-31	VMH 14-35	328	6211
H5474-32	VMH 14-45	<10	4560
Quality Control		237	1004
True Value QC		240	1000
% Recovery		98.6	100
Relative Percent Difference		7.4	7.2

METHODS: TPH-EPA 600/4-79-020 418.1; Cl-Std. Methods 4500-ClB
*Analyses performed on 1:4 w:v aqueous extracts.

Chemist

1/3/01
Date

H5474A2.XLS

CARDINAL LABORATORIES

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PHONE (505) 393-2326 · 101 E. MARLAND · HOBBS NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 02/08/01
Reporting Date: 02/09/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: NOT GIVEN

Sampling Date: 02/08/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: AH
Analyzed By: BC

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE:		02/09/01	02/09/01	02/08/01	02/08/01	02/08/01	02/08/01
H5589-1	S2801THSEC1	144	3130	0.155	0.649	2.94	3.32
H5589-2	S2801THNEC1	<50	1020	<0.010	<0.010	0.025	0.072
H5589-3	S2801THSWC1	<50	2120	0.087	0.077	0.726	2.02
H5589-4	S2801THNWC1	<50	1380	<0.010	<0.010	0.247	0.386
Quality Control		728	778	0.106	0.103	0.104	0.313
True Value QC		800	800	0.100	0.100	0.100	0.300
% Recovery		91.0	97.3	106	103	104	104
Relative Percent Difference		2.3	2.5	2.0	6.0	6.6	4.7

METHODS: TPH GRO & DRO - EPASW-846 8015 M; BTEX - SW-846 8260.

Burgess J.A. Cooke, Ph. D.

2/9/01
Date

H5589.xls

CARDINAL LABORATORIES

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PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 02/08/01
Reporting Date: 02/12/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: NOT GIVEN

Analysis Date: 02/12/01
Sampling Date: 02/08/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: AH
Analyzed By: AH

LAB NUMBER	SAMPLE ID	Cl^- (mg/Kg)
H5589-1	S2801THSEC1	1070
H5589-2	S2801THNEC1	275
H5589-3	S2801THSWC1	2180
H5589-4	S2801THNWC1	2180
Quality Control		1051
True Value QC		1000
% Recovery		105
Relative Percent Difference		6.8

METHOD: Standard Methods	4500-ClˉB

NOTE: Analyses performed on 1:4 w:v aqueous extracts.

Amy Hill
Chemist

2-12-01
Date

H5589B.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 · 2111 BEECHWOOD · ABILENE, TX 79603
PHONE (505) 393-2326 · 101 E. MARLAND · HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 03/19/01
Reporting Date: 03/20/01
Project Number: NOT GIVEN
Project Name: NOT GIVEN
Project Location: NOT GIVEN

Sampling Date: 03/16/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC

LAB NO.	SAMPLE ID	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE		3/19/01	3/19/01	3/19/01	3/19/01
H5716-1	TVM31601NWQ	<0.005	<0.005	<0.005	<0.015
H5716-2	TVM31601NEQ	<0.005	<0.005	<0.005	0.020
H5716-3	TVM31601SEQ	<0.005	<0.005	<0.005	0.019
Quality Control		0.100	0.096	0.100	0.308
True Value QC		0.100	0.100	0.100	0.300
% Recovery		100	96.4	99.6	103
Relative Percent Difference		3.3	7.9	11.6	6.5

METHOD: EPA SW-846 8260

Chemist

3/20/01
Date

H5716B.XLS

CARDINAL LABORATORIES

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PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 03/ /01
Reporting Date: 03/ /01
Project Number: NOT GIVEN
Project Name: NOT GIVEN
Project Location: NOT GIVEN

Sampling Date: 03/16/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	Cl^- (mg/Kg)
ANALYSIS D		03/19/01	03/19/01	03/20/01
H5716-1	M31601NWQ	<50	<50	2750
H5716-2	M31601NEQ	<50	237	80
H5716-3	M31601SEQ	<50	241	560
Quality Cont.		749	723	970
True Value (		800	800	1000
% Recovery		93.6	90.4	97.0
Relative Perc	Difference	1.5	5.0	7.6

METHODS: GRO & DRO: EPA SW-846 8015 M; Cl: Std. Methods 4500-Cl'B
Analyses performed on 1:4 w:v aqueous extracts.

Chemist

3/20/01
Date

CARDINAL LABORATORIES, INC.

2111 Beechwood, Abilene, TX 79603 101 East Marland, Hobbs, NM 88240
(915) 673-7001 Fax (915) 673-7020 (505) 393-2326 Fax (505) 393-2476

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page ____ of ____

Company Name: TEXACO / EPI	BILL TO
Project Manager:	P.O. #:
Address: 1324 M.	Company:
City: Eunice NM State: NM Zip: 88231	Attn:
Phone #: 394-3481 Fax #:	Address:
Project #: Project Owner:	City:
Project Name:	State: Zip:
Project Location:	Phone #:
Sampler Name:	Fax #:

FOR LAB USE ONLY				MATRIX						PRESERV			SAMPLING		ANALYSIS REQUEST		
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	ACID/BASE:	ICE / COOL	OTHER:	DATE	TIME	TPH 8015	BETEX	Cl.
H5716-1	TVM31601NW Q		1			X					X		3-16	300	X	X	X
-2	TVM31601 [illegible] NE Q		1			X					X		3-16	305	X	X	X
-3	TVM31601SE Q		1			X					X		3-16	310	X	X	X

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Terms and Conditions: Interest will be charged on all accounts more than 30 days past the date of the invoice at 1.5% per month from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished: Cody Miller	Date:	Received By:	Phone Result: ☐ Yes ☐ No Add'l Phone #:
	Time:		Fax Result: ☐ Yes ☐ No Add'l Fax #:
Relinquished By:	Date: 3/19/01	Received By: (Lab Staff)	REMARKS:
	Time: 18:20		
Delivered By: (Circle One)	Sample Condition: Cool: Yes / No; Intact: Yes / No	CHECKED BY: (Initials)	
Sampler - UPS - Bus - Other:			

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476.

CARDINAL LABORATORIES

PHONE (915) 673-7001 · 2111 BEECHWOOD · ABILENE, TX 79603
PHONE (505) 393-2326 · 101 E. MARLAND · HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 03/21/01
Reporting Date: 03/22/01
Project Number: NOT GIVEN
Project Name: NOT GIVEN
Project Location: NOT GIVEN

Sampling Date: 03/21/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	Cl* (mg/Kg)
ANALYSIS DATE		03/21/01	03/21/01	03/21/01
H5725-1	TVM32101WP	<50	774	112
Quality Control		716	801	970
True Value QC		800	800	1000
% Recovery		89.5	100	97.0
Relative Percent Difference		1.7	1.9	7.6

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl: Std. Methods 4500-ClB
*Analysis performed on a 1:4 w:v aqueous extract.

Chemist

3/22/01
Date

H5725A.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 · 2111 BEECHWOOD · ABILENE, TX 79603
PHONE (505) 393-2326 · 101 E. MARLAND · HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 03/21/01
Reporting Date: 03/22/01
Project Number: NOT GIVEN
Project Name: NOT GIVEN
Project Location: NOT GIVEN

Sampling Date: 03/21/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC

LAB NO.	SAMPLE ID	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE		03/21/01	03/21/01	03/21/01	03/21/01
H5725-1	TVM32101WP	<0.005	<0.005	<0.005	0.018
Quality Control		0.093	0.097	0.100	0.299
True Value QC		0.100	0.100	0.100	0.300
% Recovery		93.1	97.0	99.7	100
Relative Percent Difference		9.7	6.0	4.7	3.7

METHOD: EPA SW-846 8260

Burgess J.R. Cooke
Chemist

3/22/01
Date

H5725B.XLS

CHAIN-OF CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES, INC.
2111 Beechwood, Abilene, TX 79603 101 East Marland, Hobbs, NM 88240
(915) 673-7001 Fax (915) 673-7020 (505) 393-2326 Fax (505) 393-2476

Page ____ of ____

Company Name:	Texaco Ex P, Inc.	BILL TO	PO #:
Project Manager:	Rodney Bailey, Hobbs Old	Company:	SAME
Address:	500 N. Loraine	Attn:	
City:	Midland State: TX Zip: 79702	Address:	
Phone #:	915.688.2921 / 505.631.9005	City:	
Fax #:	915.688.4751	State: Zip:	
Project #:	Project Owner:	Phone #:	
Project Name:		Fax #:	
Project Location:			

ANALYSIS REQUEST

FOR LAB USE ONLY LAB I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	PRES.: ACID	ICE / COOL	OTHER:	SAMPLING: DATE	TIME	TPH 8015 ext	TPH 418.1	Chlorides 4500 CTE	BTEX 8021B
H3725-1	TVMH3X101WP		1			X					X		3-21-01	6:37	X		X	X

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims, including those for negligence and any other cause whatsoever, shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above-stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice and all costs of collections, including attorney's fees.

Sampler Relinquished: Andy Miller	Date: 3-21-01 Time:	Received By:	Phone Result: ☐ Yes ☐ No Additional Fax #: 505.564.2601 - EPI
Relinquished By:	Date: 3/21/01 Time: 9:05	Received By: (Lab Staff) Burgett Hooks	Fax Result: ☒ Yes ☐ No
Delivered By: (Circle One) Sampler UPS Bus Other		Sample Condition: Cool / Intact: ☒ Yes ☐ No; ☒ Yes ☐ No	CHECKED BY: (Initials)

REMARKS: CofC Requested

† Cardinal cannot accept verbal changes. Please fax written changes to 915-673-7020

2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

Company Name:	TEXACO
Project Manager:	Rodney Bailey
Address:	
City:	State: Zip:
Phone #:	Fax #:
Project #:	Project Owner:
Project Name:	V.M. HENDERSON
Project Location:	V.M. HENDERSON
Sampler Name:	B. BLEVINS

BILL TO

P.O. #:	
Company:	TEXACO
Attn:	Rodney Bailey
Address:	
City:	
State:	Zip:
Phone #:	
Fax #:	

ANALYSIS REQUEST

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	PRESERV: ACID/BASE:	ICE / COOL	OTHER:	SAMPLING DATE	SAMPLING TIME	BETX	TPH 8015M	Chlorides
18764	VMH5412015WQ1	✓	1			✓					✓		4-12-01	11:50	✓	✓	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished: Bradley Blevins	Date: 4-13 Time: 9:45	Received By:	
Relinquished By:	Date: Time:	Received By: (Lab Staff)	
Delivered By: (Circle One) Sampler - UPS - Bus - Other:		Sample Condition: Cool Yes / No; Intact Yes / No	CHECKED BY (Initials)

Phone Result: ☐ Yes ☐ No Add'l Phone #:
Fax Result: ☑ Yes ☐ No Add'l Fax #:
REMARKS: EPI - ATTN P MCCASLAND

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 04/13/01
Reporting Date: 04/16/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: V.M. HENDERSON

Sampling Date: 04/12/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC

LAB NO.	SAMPLE ID	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE		04/13/01	04/13/01	04/13/01	04/13/01
H5784-1	VMHS41201SWQ1	<0.005	0.007	0.023	0.077
Quality Control		0.095	0.091	0.090	0.275
True Value QC		0.100	0.100	0.100	0.300
% Recovery		95.1	91.0	90.3	91.7
Relative Percent Difference		0.6	7.3	2.3	0.6

METHOD: EPA SW-846 8260

Chemist

4/16/01
Date

H5784B.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 04/13/01
Reporting Date: 04/16/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: V.M. HENDERSON

Sampling Date: 04/12/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	Cl* (mg/Kg)
ANALYSIS DATE		04/13/01	04/13/01	04/16/01
H5784-1	VMHS41201SWQ1	<50	191	2270
Quality Control		744	753	960
True Value QC		800	800	1000
% Recovery		92.9	94.1	96.0
Relative Percent Difference		1.4	4.9	6.3

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl⁻: Std. Methods 4500-Cl⁻B
NOTE: Analysis performed on a 1:4 w:v aqueous extract.

Chemist

4/16/01
Date

H5784A.XLS

CHAIN OF CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES, INC.

2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

Page 1 of 1

Company Name: TEXACO E+P	BILL TO
Project Manager: Rodney Bailey	P.O. #:
Address:	Company: TEXACO
City: State: Zip:	Attn: Rodney Bailey
Phone #: 505-631-9005 Fax #:	Address:
Project #: 5 Project Owner:	City:
Project Name:	State: Zip:
Project Location: VM HENDERSON	Phone #:
Sampler Name: R Boone	Fax #:

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	PRESERV: ACID/BASE:	ICE / COOL	OTHER:	SAMPLING: DATE	TIME	ANALYSIS REQUEST: BTEX	TPH 8015M	Chlorides
H5797-1	5430 VMEC1	✓	1			1					1		4-16	2:30	✓	✓	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoicing, and all costs of collections, including attorney's fees.

Sampler Relinquished: Roger Boone	Date: 4-17-01 Time: 1630	Received By:	Phone Result: ☐ Yes ☐ No Add'l Phone #:
Relinquished By:	Date: 04/17/01 Time: 4:35P	Received By: (Lab Staff)	Fax Result: ☑ Yes ☐ No Add'l Fax #:
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition: Cool: ☑ Yes ☐ No Intact: ☑ Yes ☐ No	CHECKED BY (Initials)	REMARKS: EDI PAT MCCASLAND

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

PAGE 01 CARDINAL LAB HOBBS 5053932476 09:54 04/19/2001

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 04/17/01
Reporting Date: 04/19/01
Project Number: NOT GIVEN
Project Name: NOT GIVEN
Project Location: V.M. HENDERSON

Sampling Date: 04/16/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: GP
Analyzed By: BC

LAB NO.	SAMPLE ID	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE		04/17/01	04/17/01	04/17/01	04/17/01
H5797-1	S4301VMEC1	<0.005	<0.005	<0.005	0.022
Quality Control		0.101	0.097	0.100	0.290
True Value QC		0.100	0.100	0.100	0.300
% Recovery		101	96.7	100	96.6
Relative Percent Difference		5.8	3.3	1.2	3.7

METHOD: EPA SW-846 8260

Burgett A Cooke
Chemist

4/19/01
Date

H5797B.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 04/17/01
Reporting Date: 04/19/01
Project Number: NOT GIVEN
Project Name: NOT GIVEN
Project Location: V.M. HENDERSON

Sampling Date: 04/16/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: GP
Analyzed By: BC/AH

LAB NO.	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	Cl* (mg/Kg)
ANALYSIS DATE		04/17/01	04/17/01	04/18/01
H5797-1	S4301VMEC1	<50	688	80
Quality Control		776	726	960
True Value QC		800	800	1000
% Recovery		97.0	90.7	96.0
Relative Percent Difference		1.3	2.7	6.3

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl: Std. Methods 4500-ClB
*Analysis performed on a 1:4 w:v aqueous extract.

Chemist

4/19/01
Date

H5797A.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO: (915) 688-4751

Receiving Date: 06/01/01
Reporting Date: 06/04/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: NOT GIVEN

Sampling Date: 06/01/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC/HM

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	Cl^* (mg/Kg)
ANALYSIS DATE		06/02/01	06/02/01	06/04/01
H5896-1	S6101VMHSBH	<50	119	482
Quality Control		719	833	991
True Value QC		800	800	1000
% Recovery		89.9	104	99.1
Relative Percent Difference		0.1	7.7	2.0

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl^-: Std. Methods 4500-Cl^-B
*Analysis performed on a 1:4 w:v aqueous extract.

Chemist

6/4/01
Date

H5896A.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO: (915) 688-4751

Receiving Date: 06/01/01
Reporting Date: 06/04/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: NOT GIVEN

Sampling Date: 06/01/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC

LAB NO.	SAMPLE ID	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE		06/02/01	06/02/01	06/02/01	06/02/01
H5896-1	S6101VMHSBH	<0.005	<0.005	<0.005	<0.015
Quality Control		0.106	0.105	0.104	0.298
True Value QC		0.100	0.100	0.100	0.300
% Recovery		106	105	104	99.4
Relative Percent Difference		3.0	3.2	2.1	1.1

METHOD: EPA SW-846 8260

Chemist

6/4/01
Date

H5896B.XLS

2111 Beechwood, Abilene, TX 79603 101 East Marland, Hobbs, NM 88240
(915) 673-7001 Fax (915) 673-7020 (505) 393-2326 Fax (505) 393-2476

Company Name: Texaco E&P	BILL TO
Project Manager: Rodney Baily	P.O. #: Same
Address: 500 N Loraine	Company:
City: Midland State: Tx Zip: 79702	Attn:
Phone #: 915-688-7921 Fax #: 915-688-4251	Address:
Project #: Project Owner:	City:
Project Name: V.M Henderson	State: Zip:
Project Location:	Phone #:
Sampler Name: Bradley Blevins	Fax #:

ANALYSIS REQUEST

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	PRESERV: ACID/BASE	ICE / COOL	OTHER:	SAMPLING: DATE	TIME	TPH 8015m	BTEX 8020 - 8260	Chloride
H58464	SG101 VMHSBH	C	1			X					X		6-1-01	6:15	X	X	X

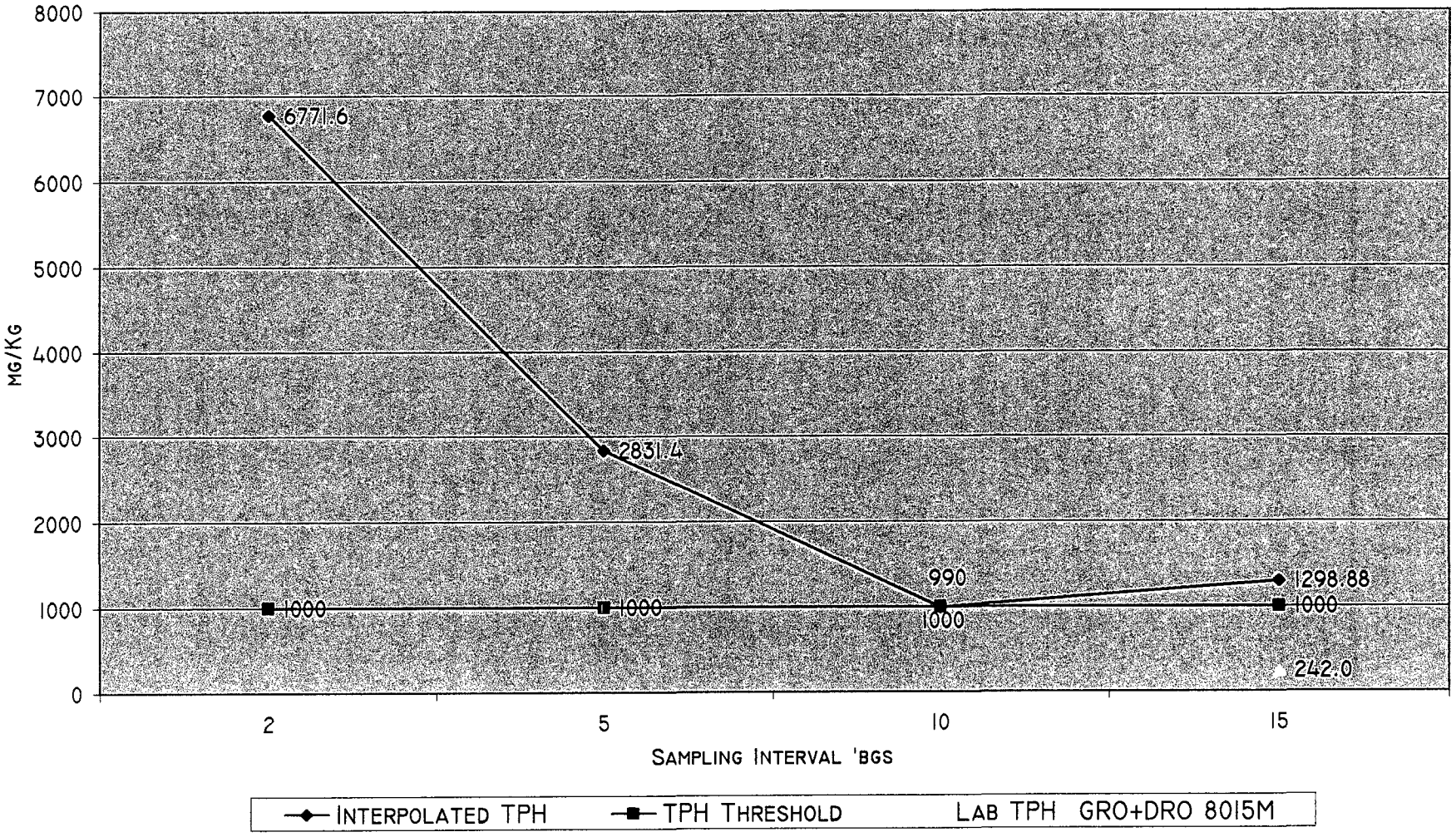
Cardinal Note: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analysis. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

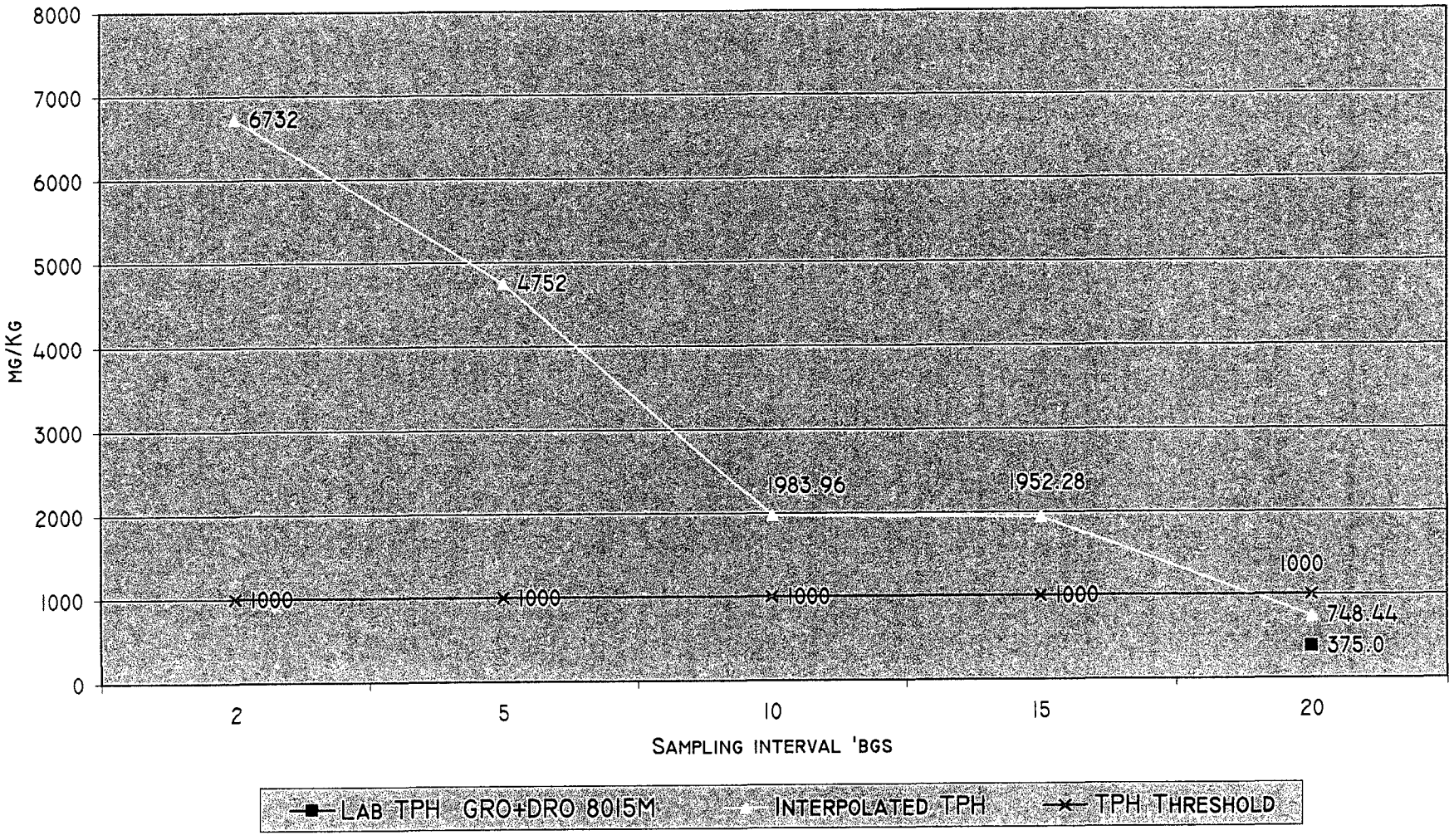
Sampler Relinquished: Bradley Blevins	Date: 6-1-01 Time: 0400	Received By:	Phone Result: ☐ Yes ☐ No Add'l Phone #:
Relinquished By:	Date: 6/1/01 Time: 4:20PM	Received By: (Lab Staff) Bernes McCasland	Fax Result: ☑ Yes ☐ No Add'l Fax #: 505.394.2601
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition: Cool: ☑ Yes ☐ No Intact: ☑ Yes ☐ No	CHECKED BY: (Initials)	REMARKS: ATT: P.M McCasland

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

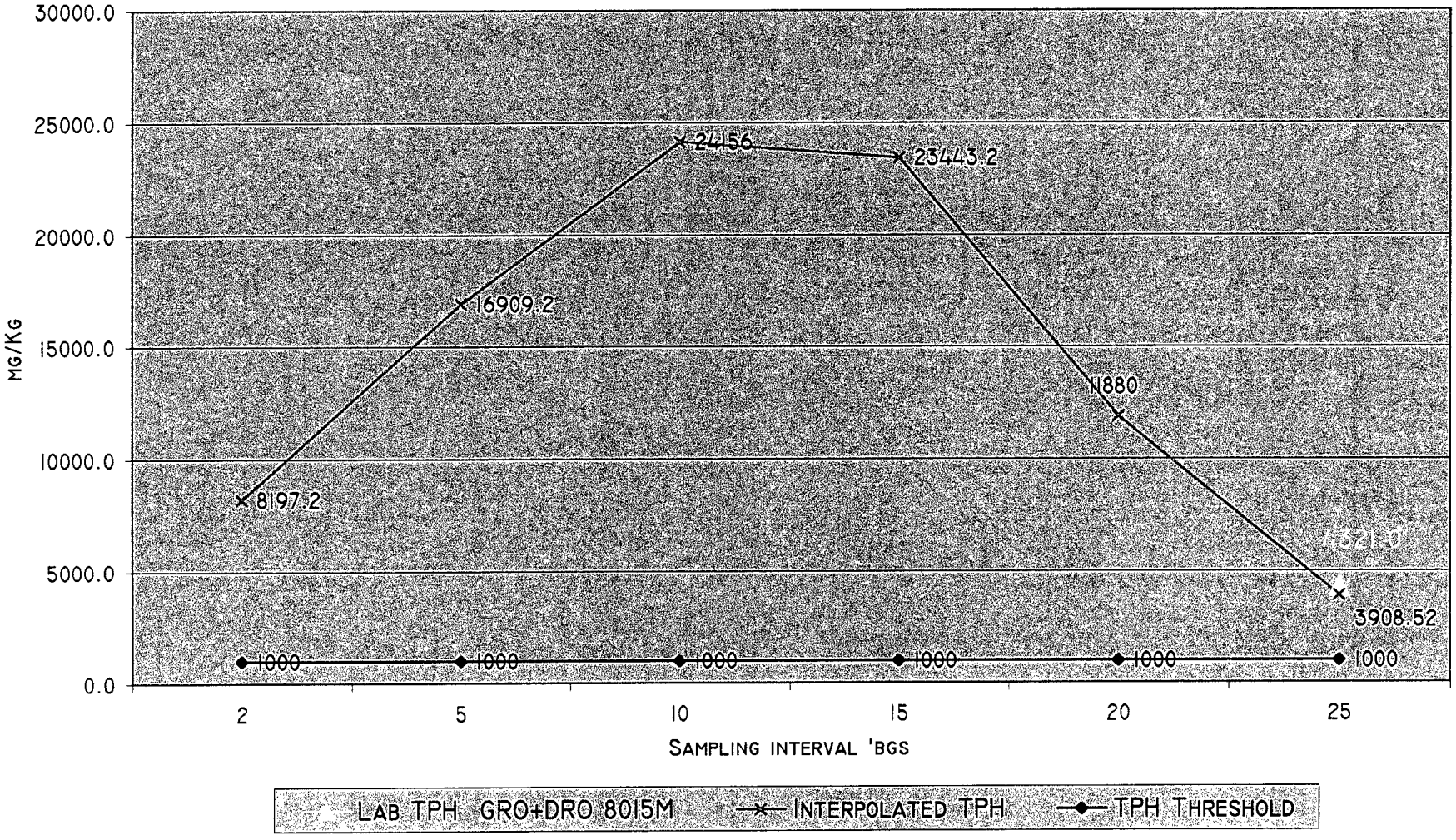
TEXACO
V.M.HENDERSON
BOREHOLE 1 - TPH



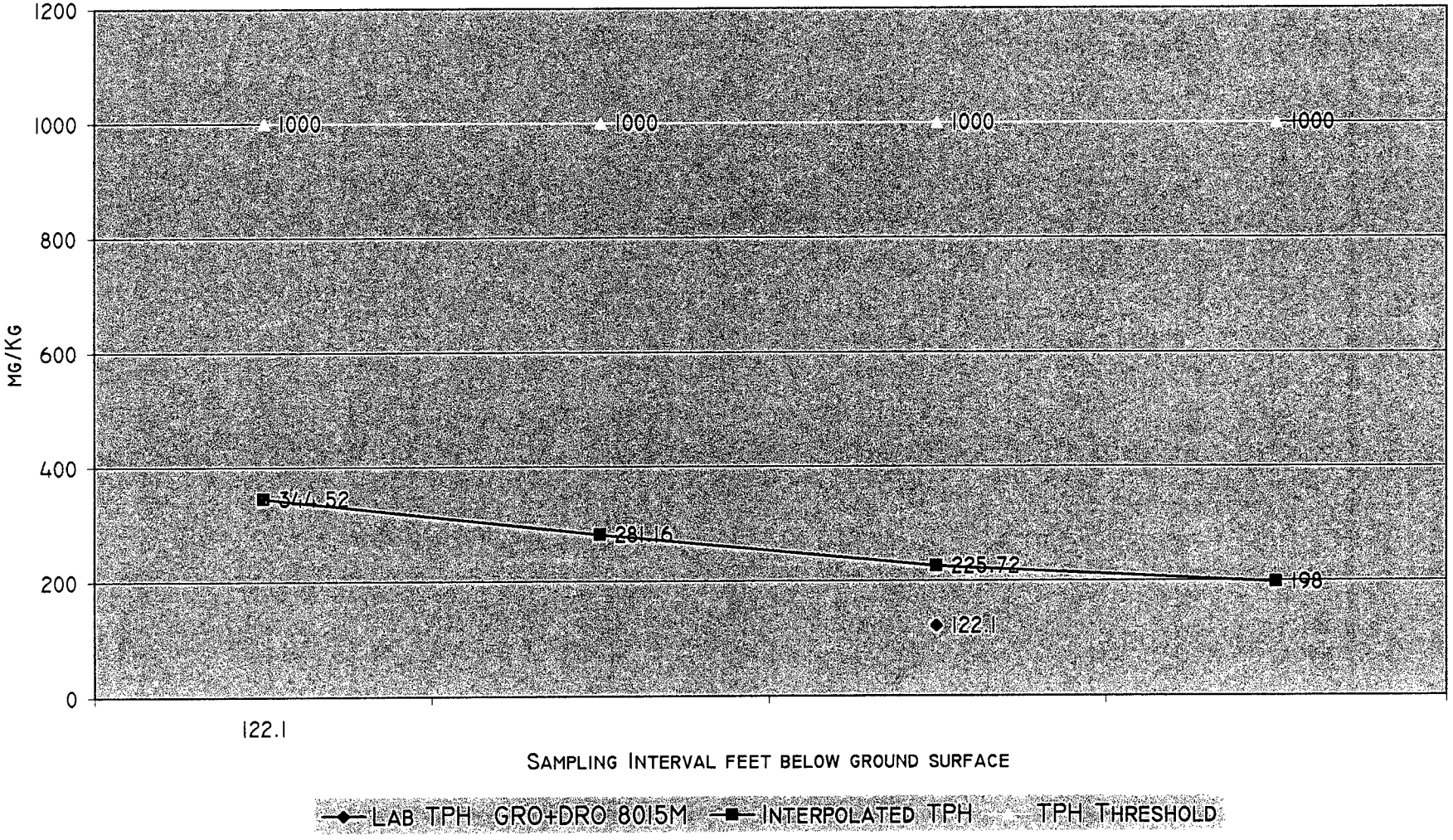
TEXACO
V.M. HENDERSON
BOREHOLE #2 - TPH



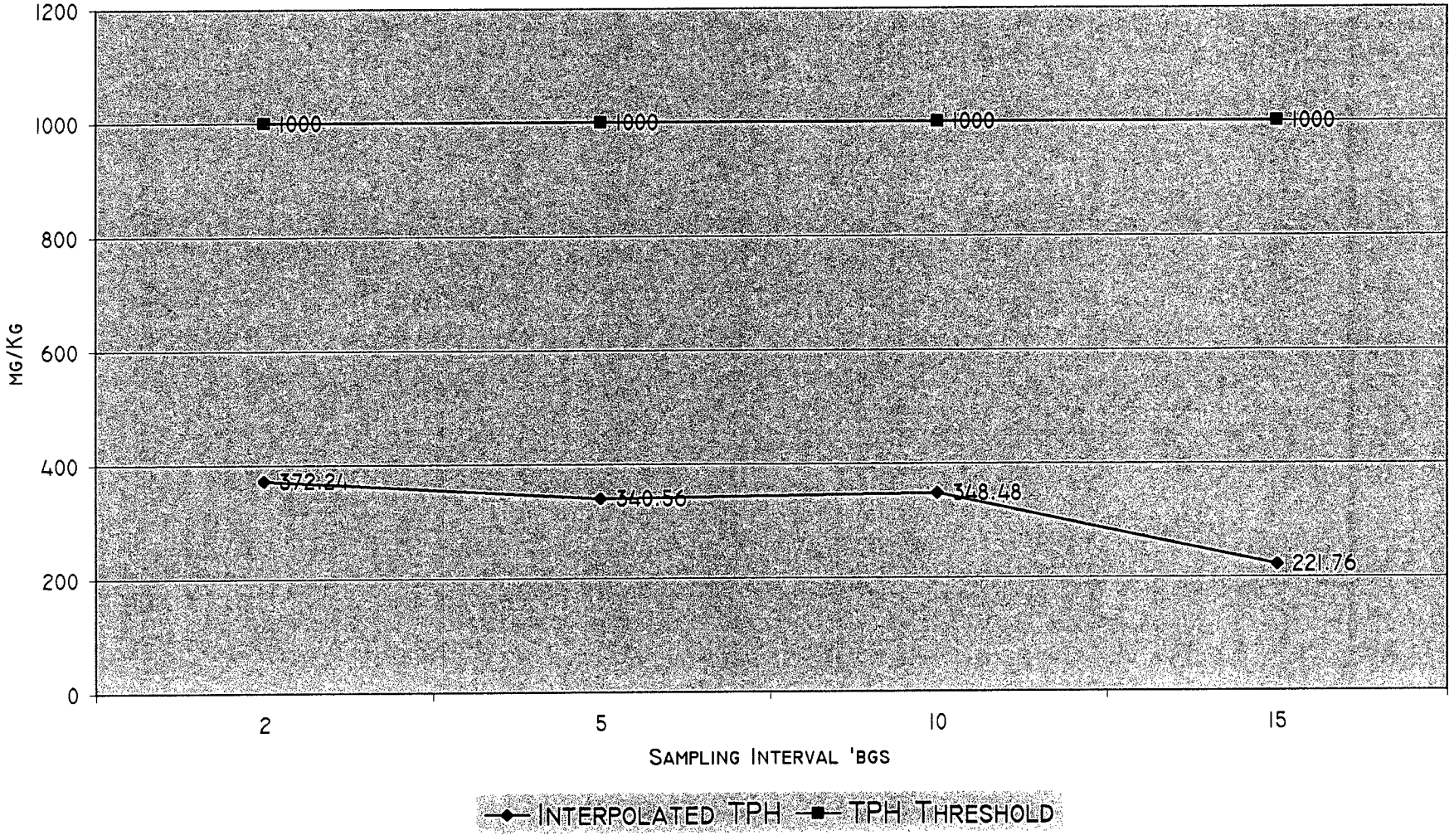
TEXACO
V.M. HENDERSON
BOREHOLE #3 - TPH



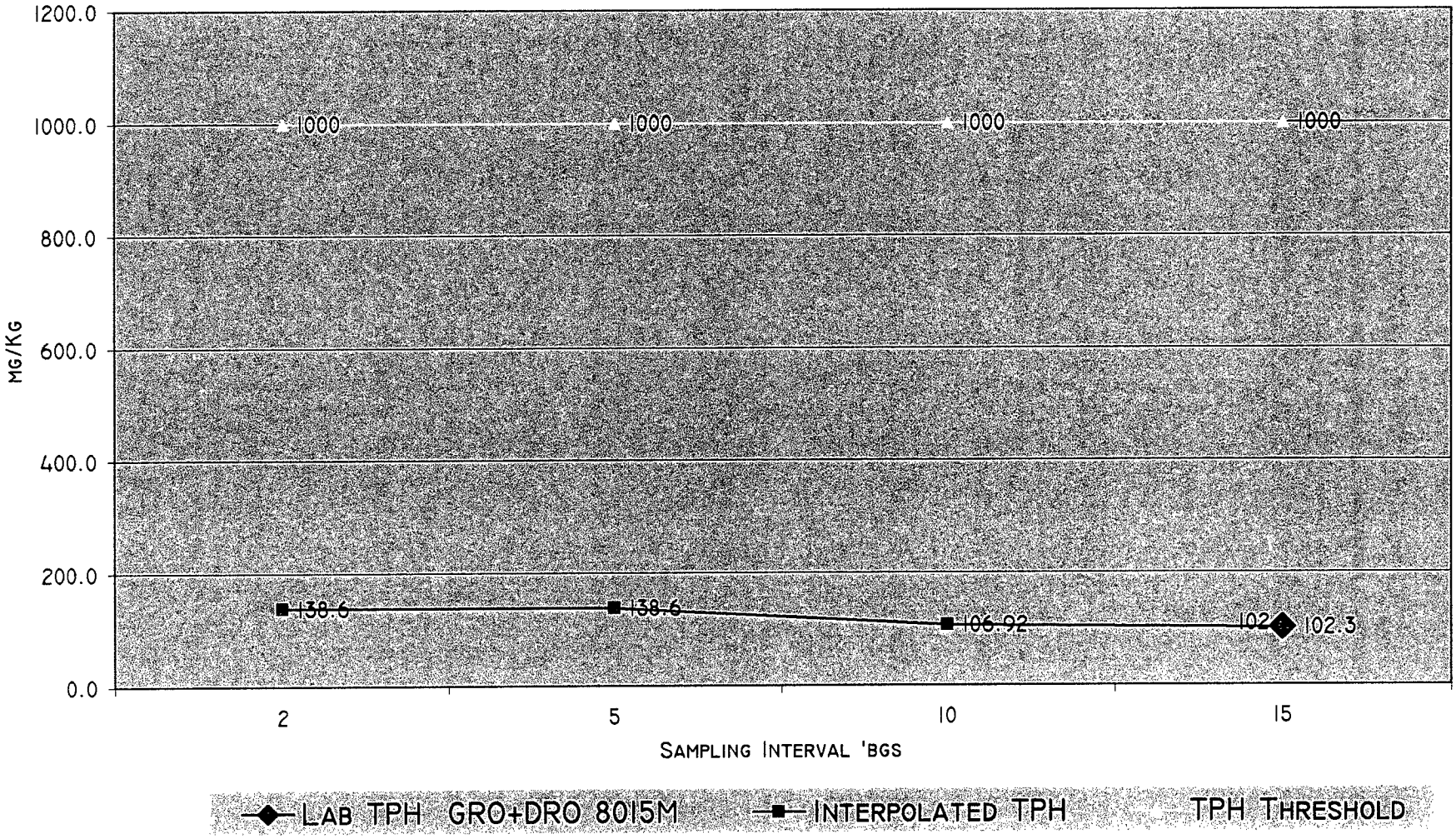
TEXACO
V.M. HENDERSON
BOREHOLE #4 - TPH



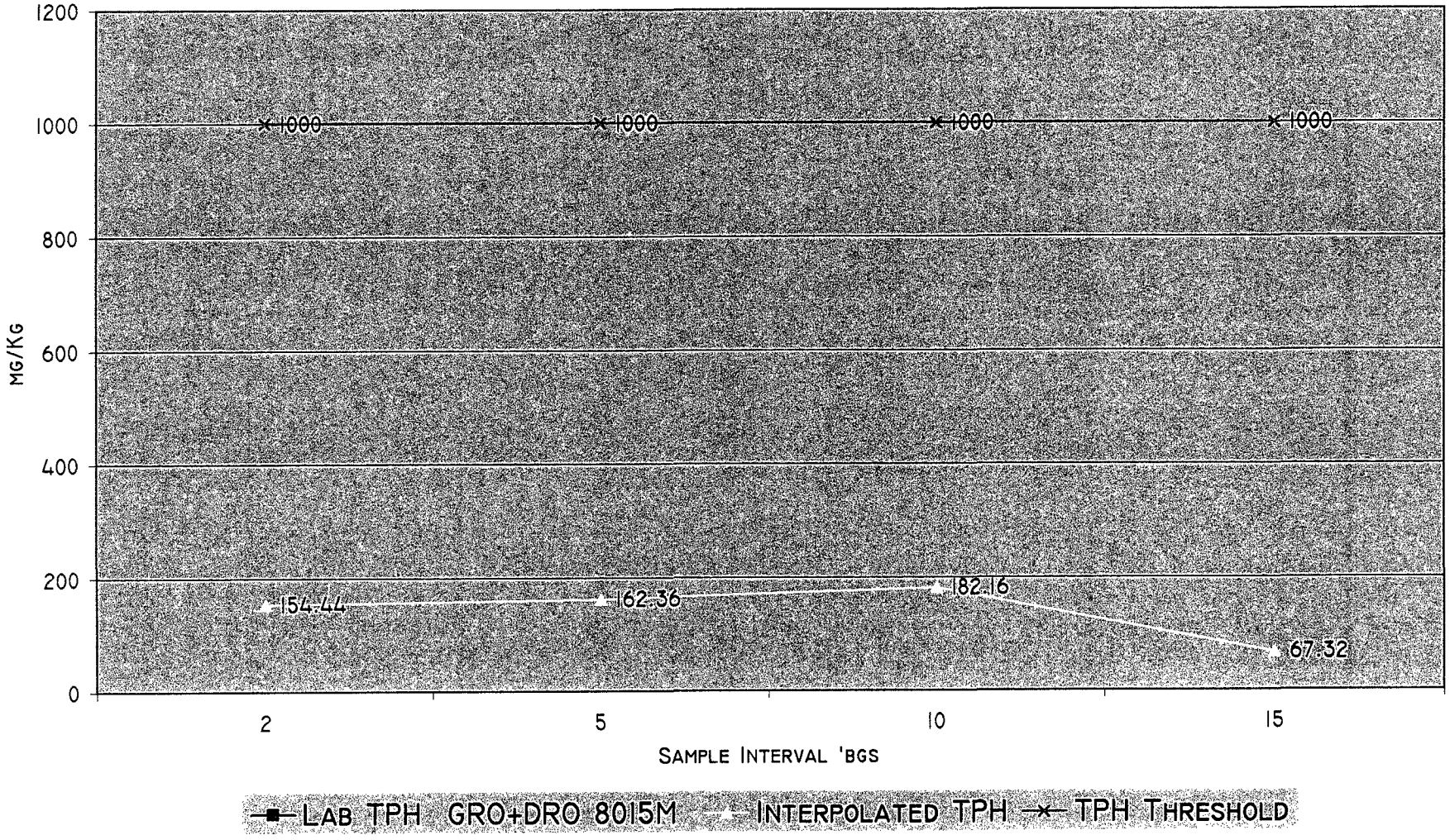
TEXACO
V.M HENDERSON
BOREHOLE #5 - TPH



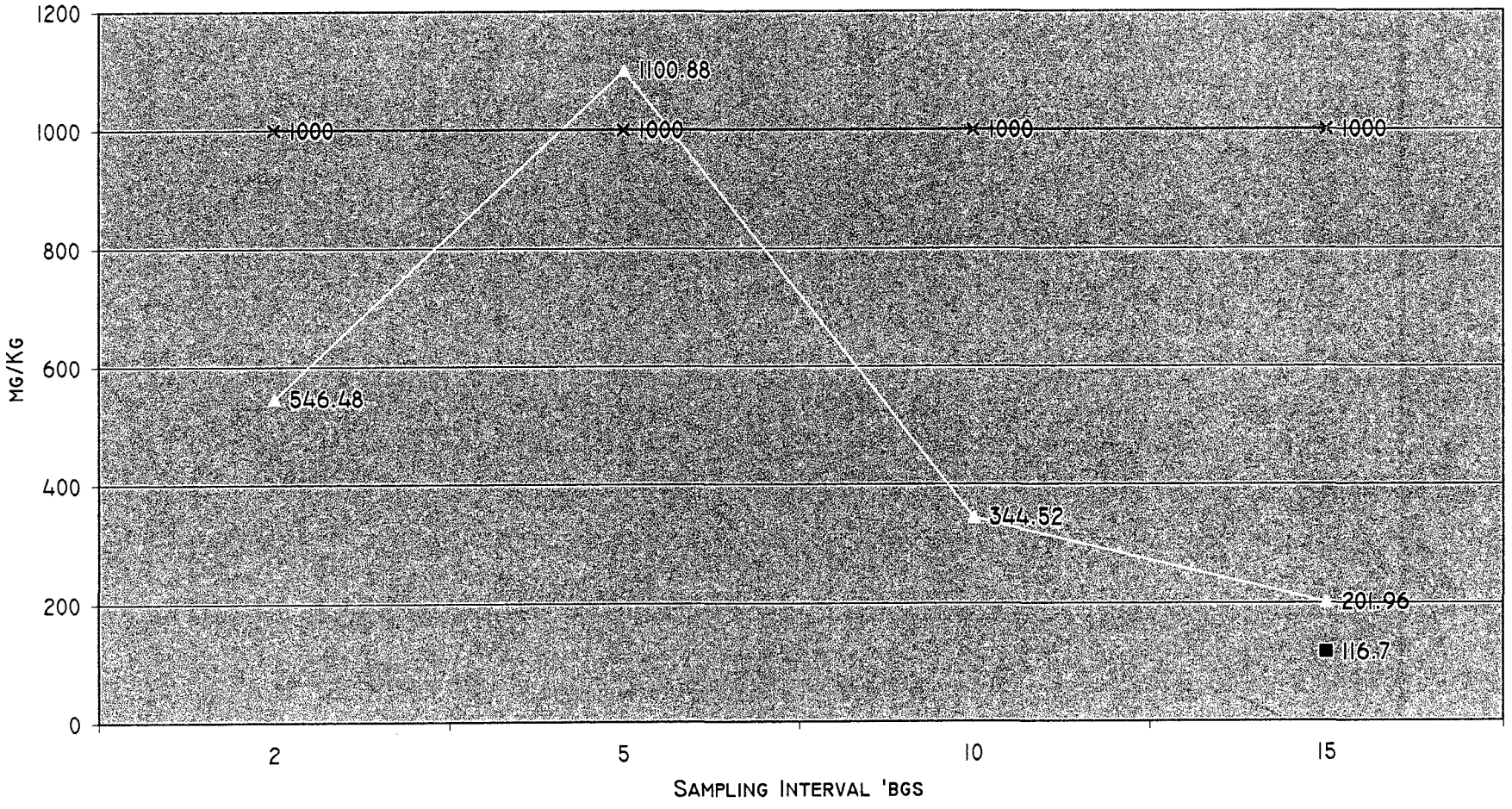
TEXACO
V.M. HENDERSON
BOREHOLE #6 - TPH



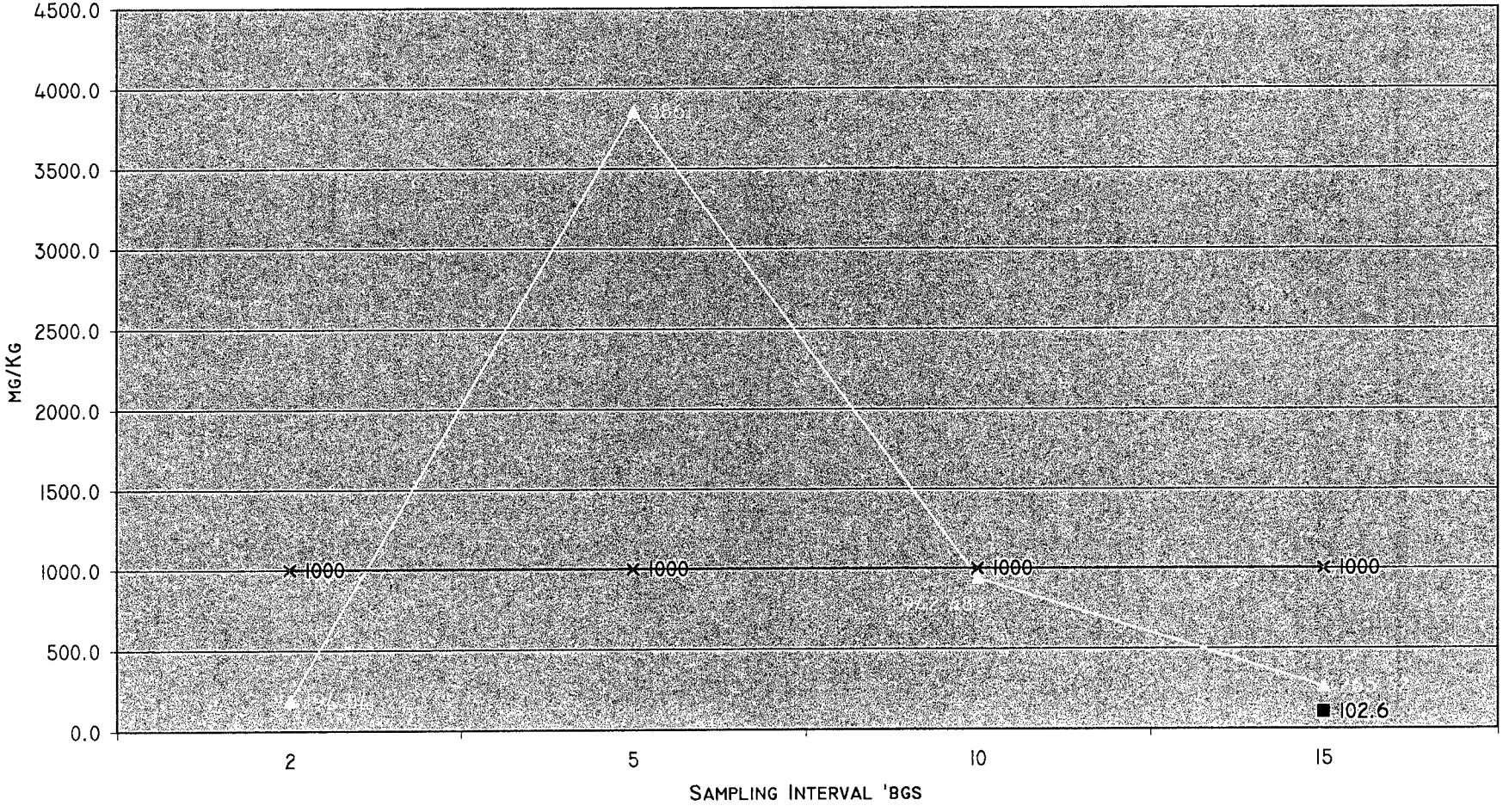
TEXACO
V.M. HENDERSON
BOREHOLE B#7 - TPH



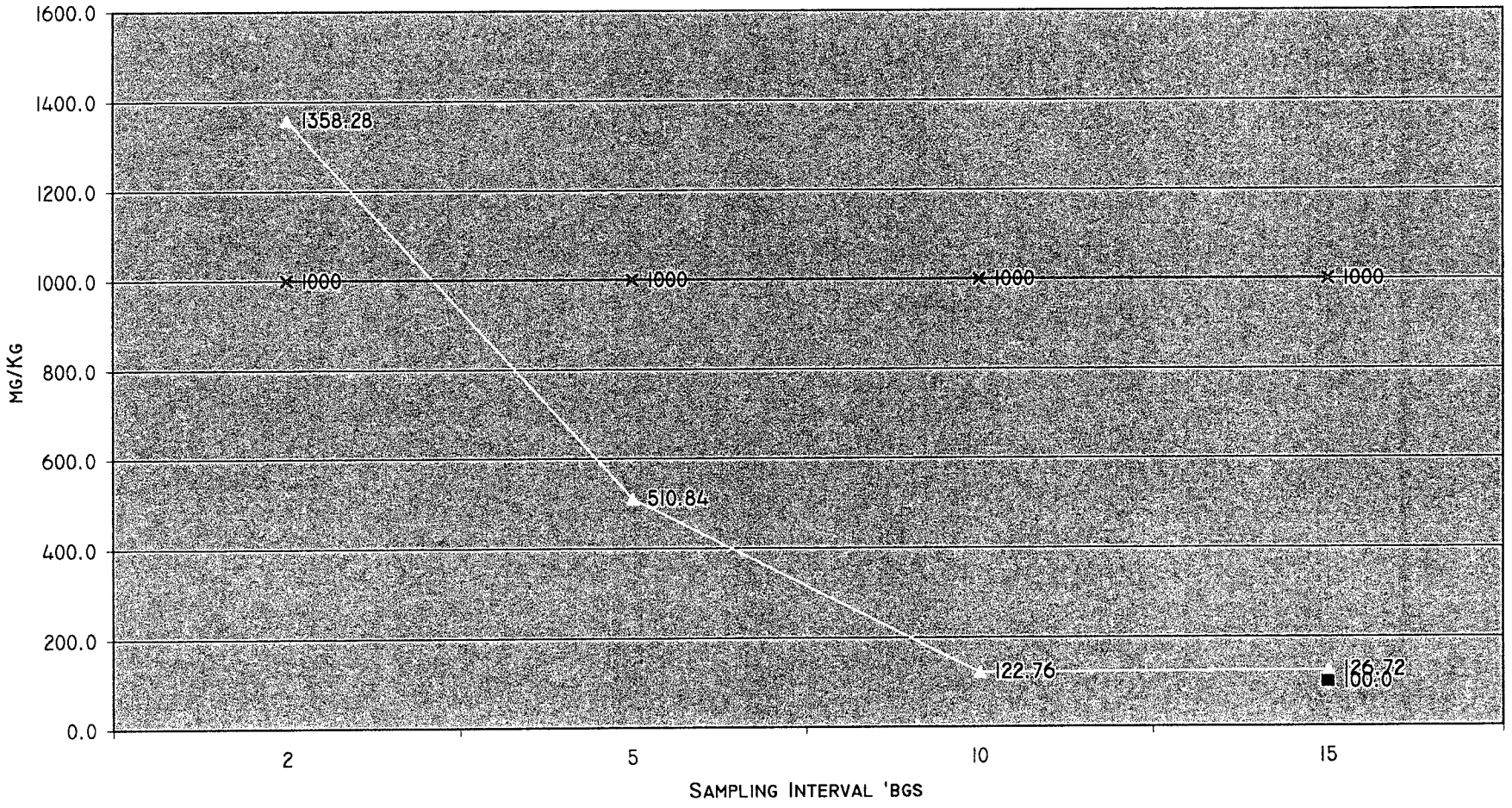
TEXACO
V.M. HENDERSON
BOREHOLE #8 - TPH



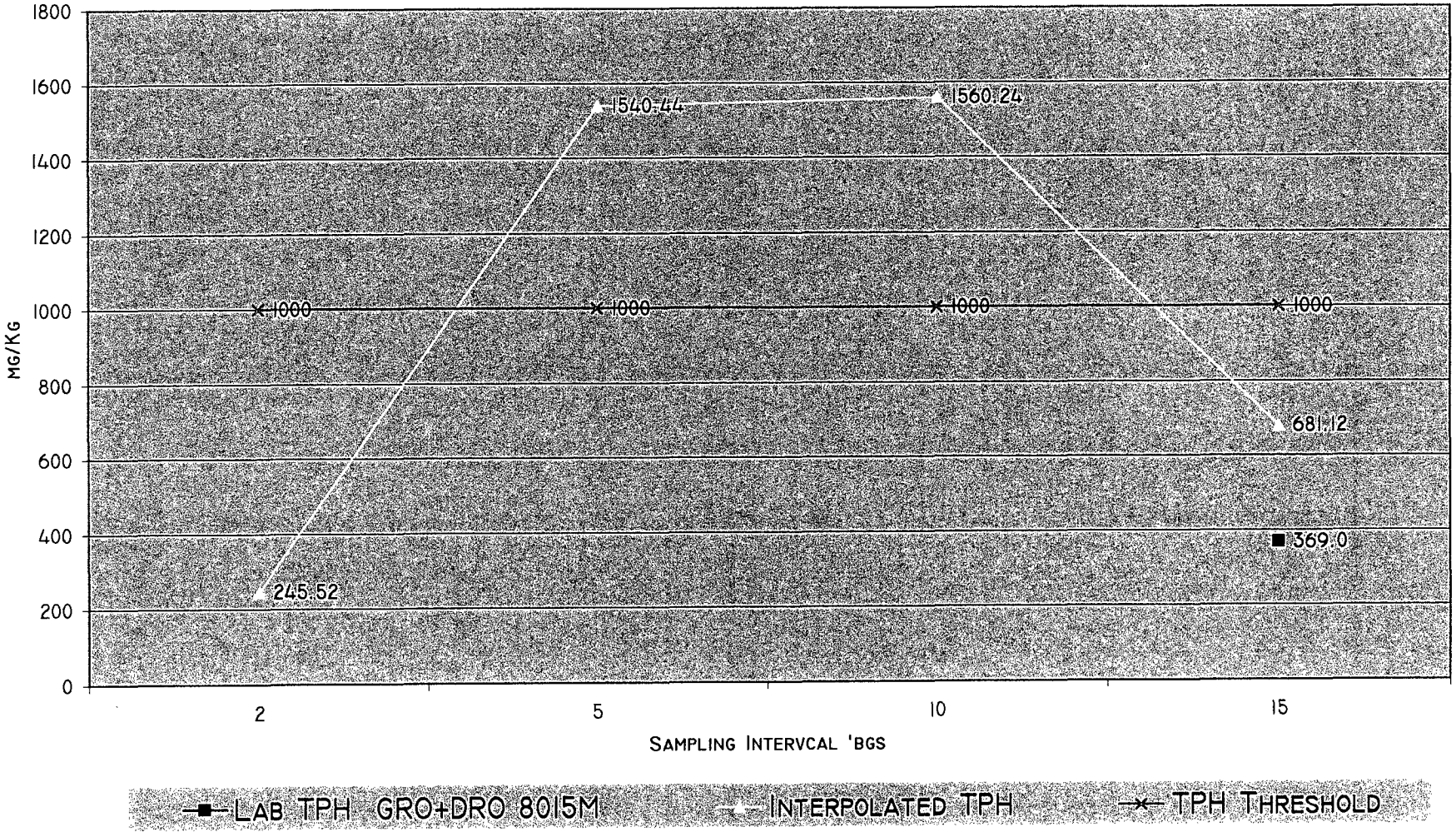
TEXACO
V.M. HENDERSON
BOREHOLE #9 - TPH



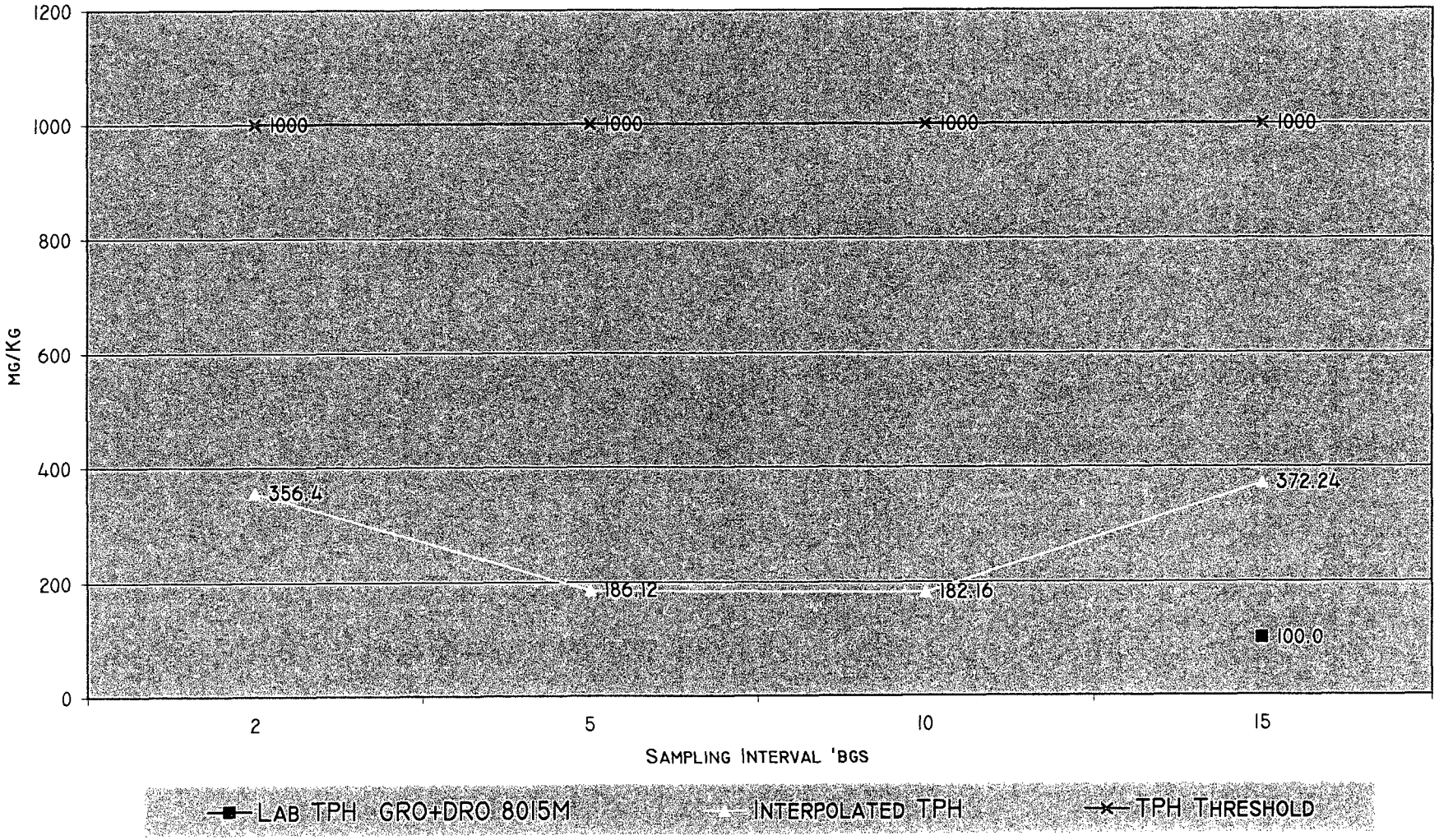
TEXACO
V.M. HENDERSON
BOREHOLE #10 - TPH



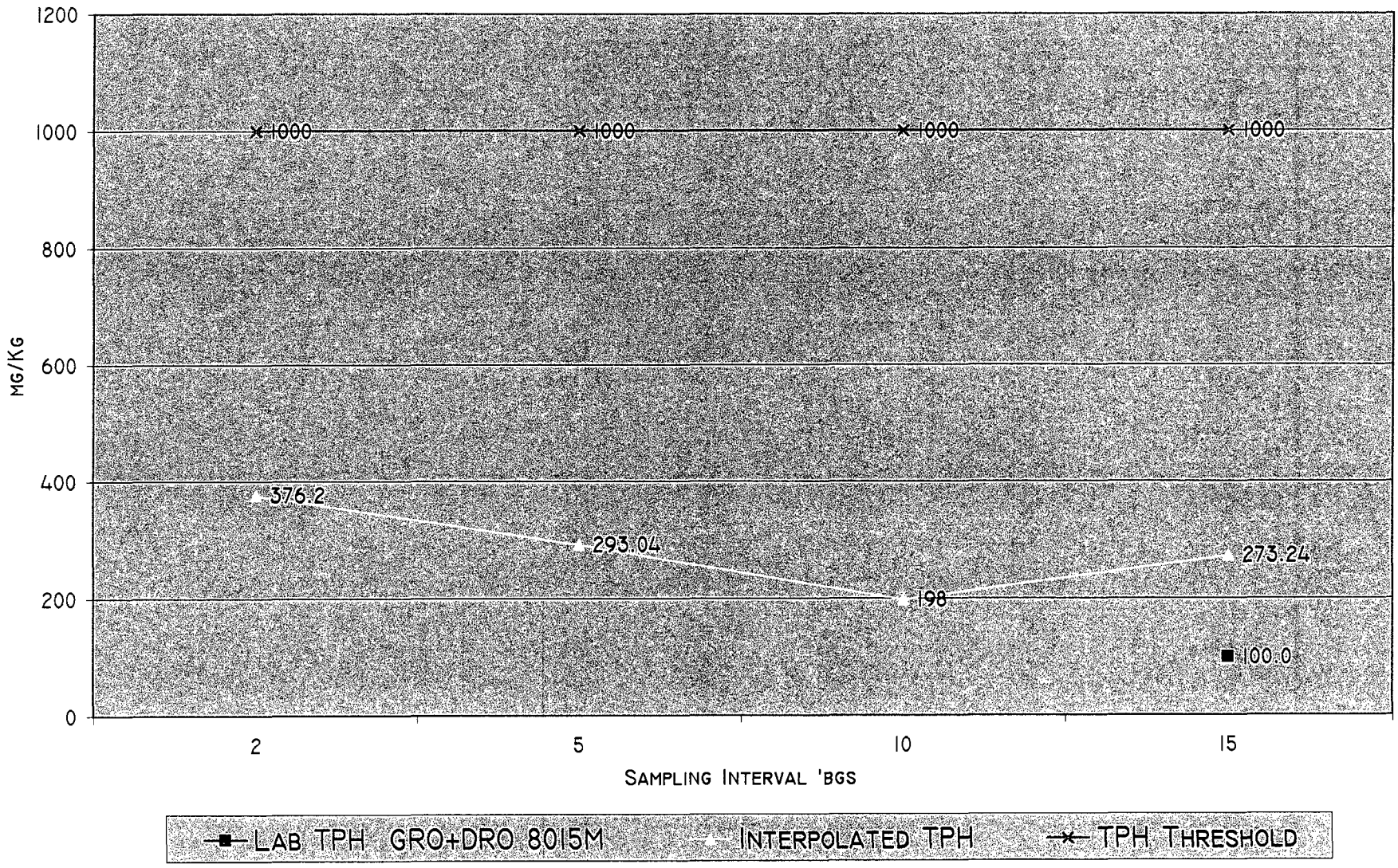
TEXACO
V. M. HENDERSON
BOREHOLE #11 - TPH



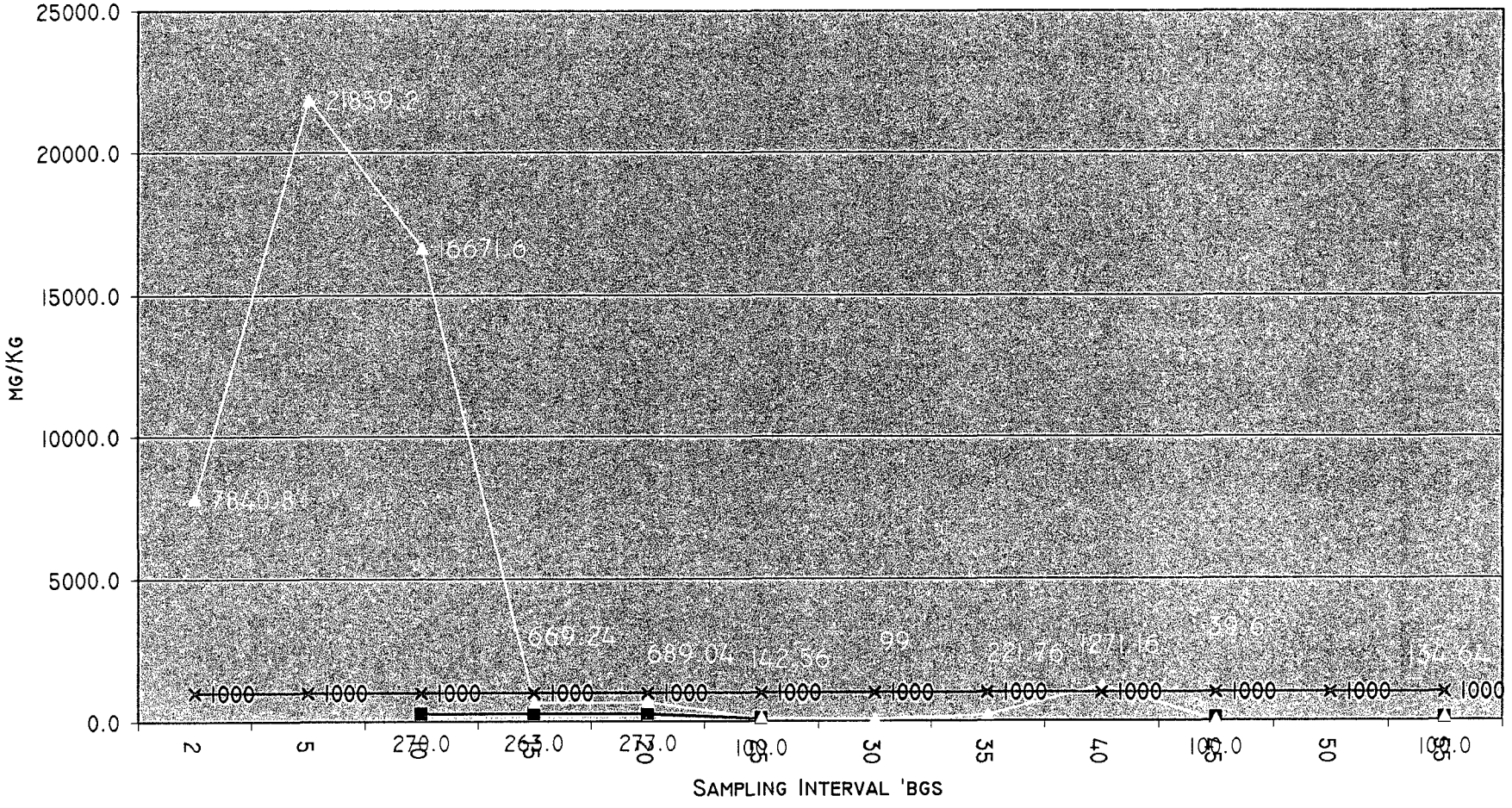
TEXACO
V.M.HENDERSON
BOREHOLE #12 - TPH



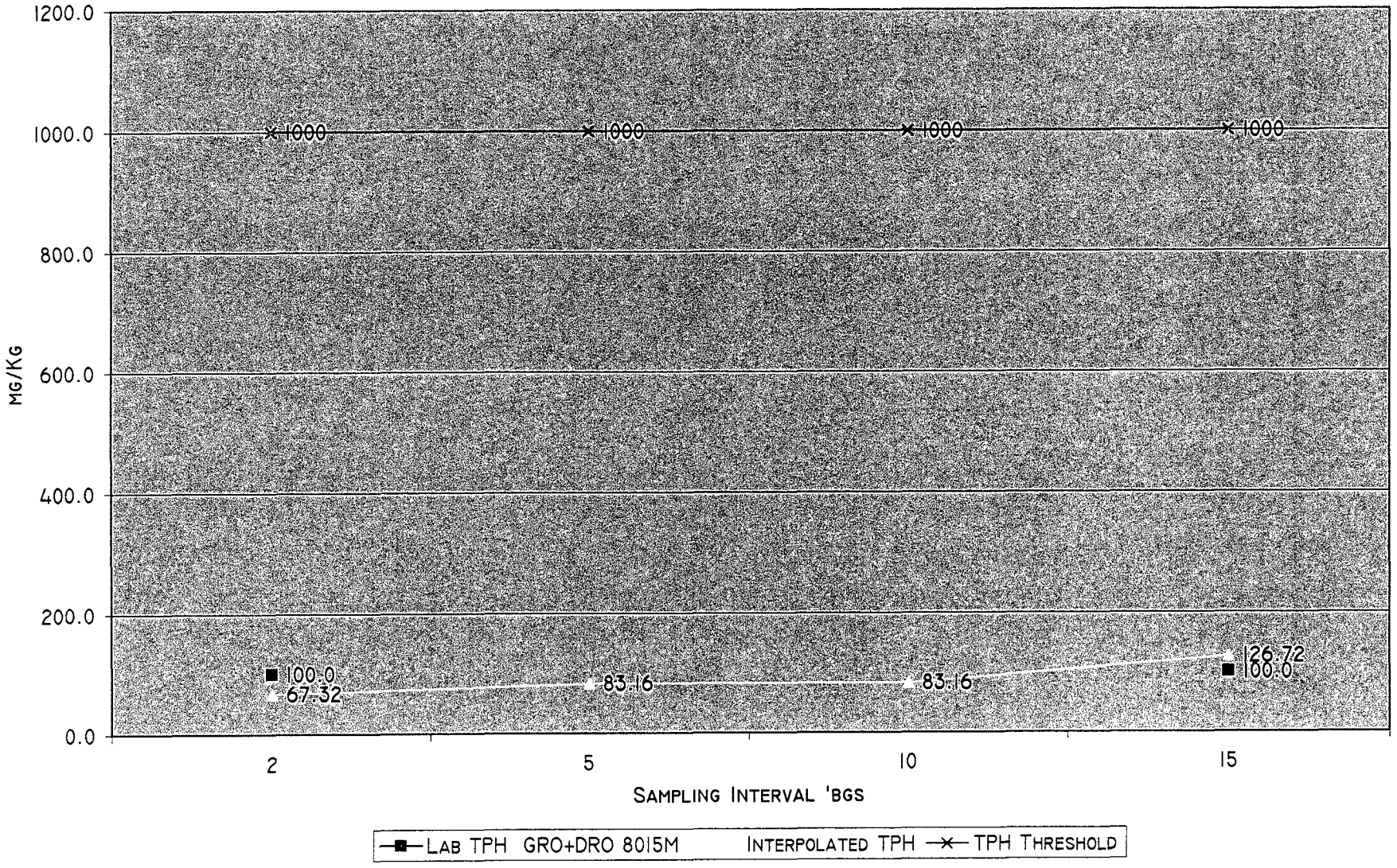
TEXACO V.M. HENDERSON
BOREHOLE #13 - TPH



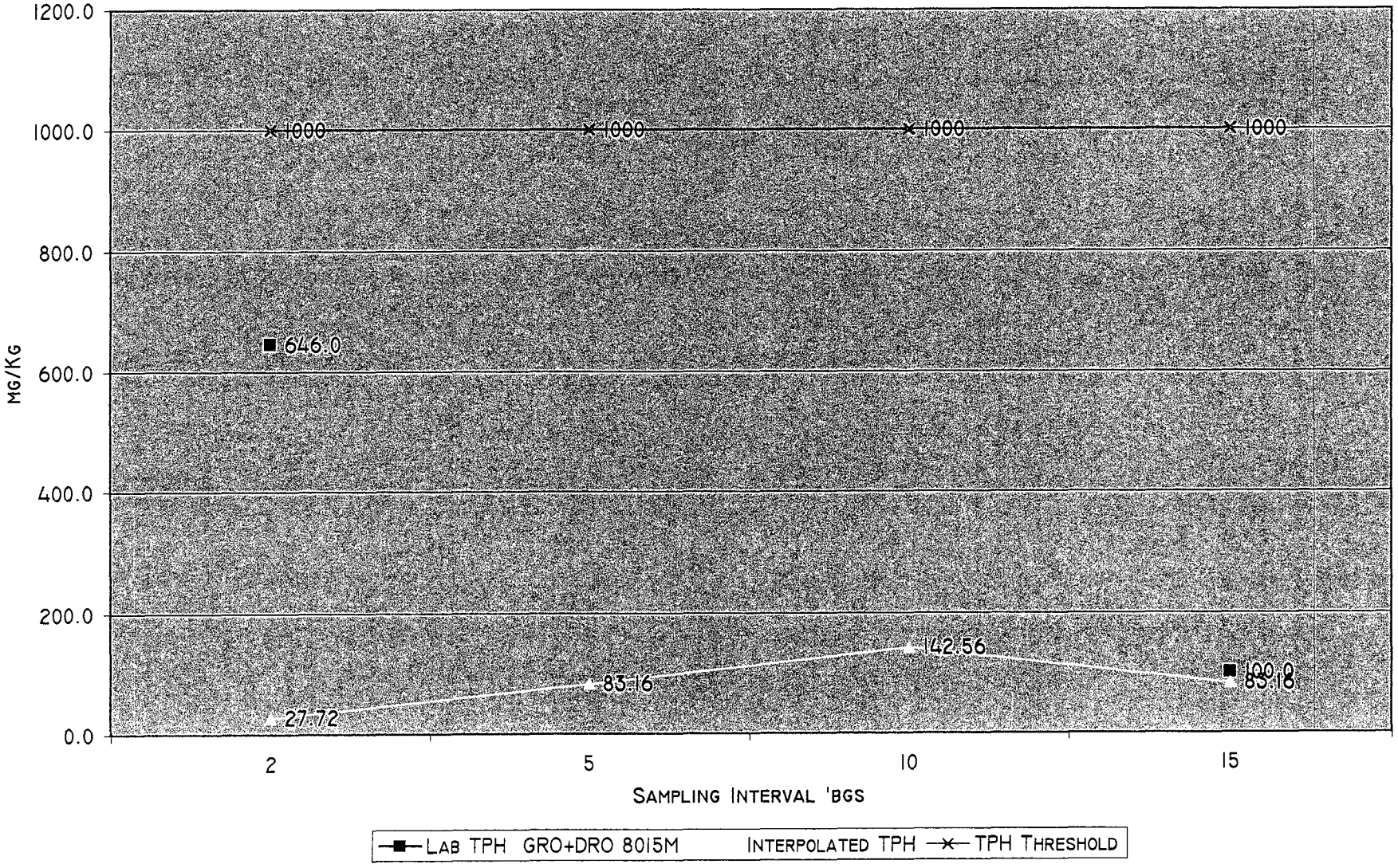
TEXACO
V.M. HENDERSON
BOREHOLE #14 - TPH



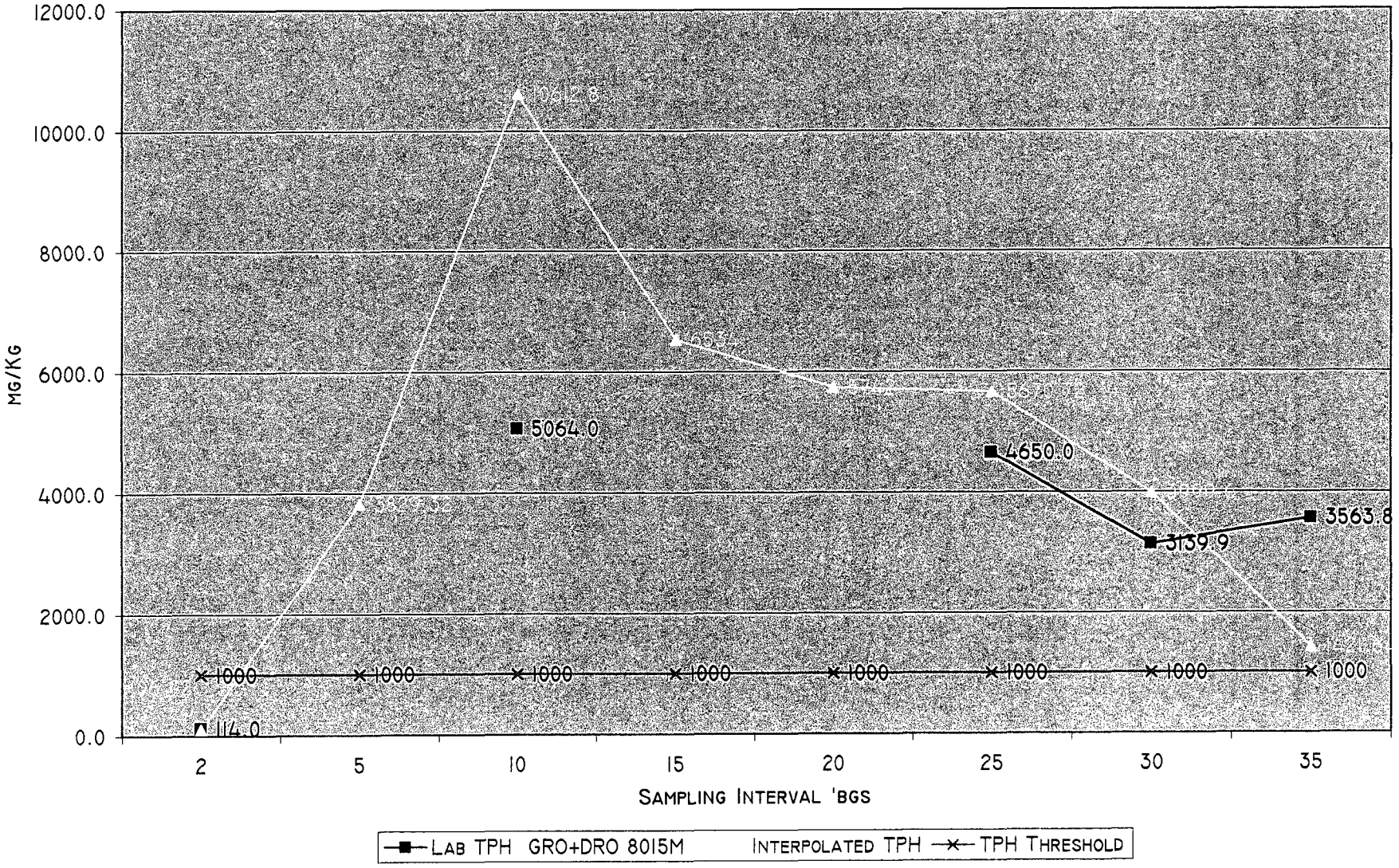
TEXACO V.M. HENDERSON BOREHOLE #15 - TPH



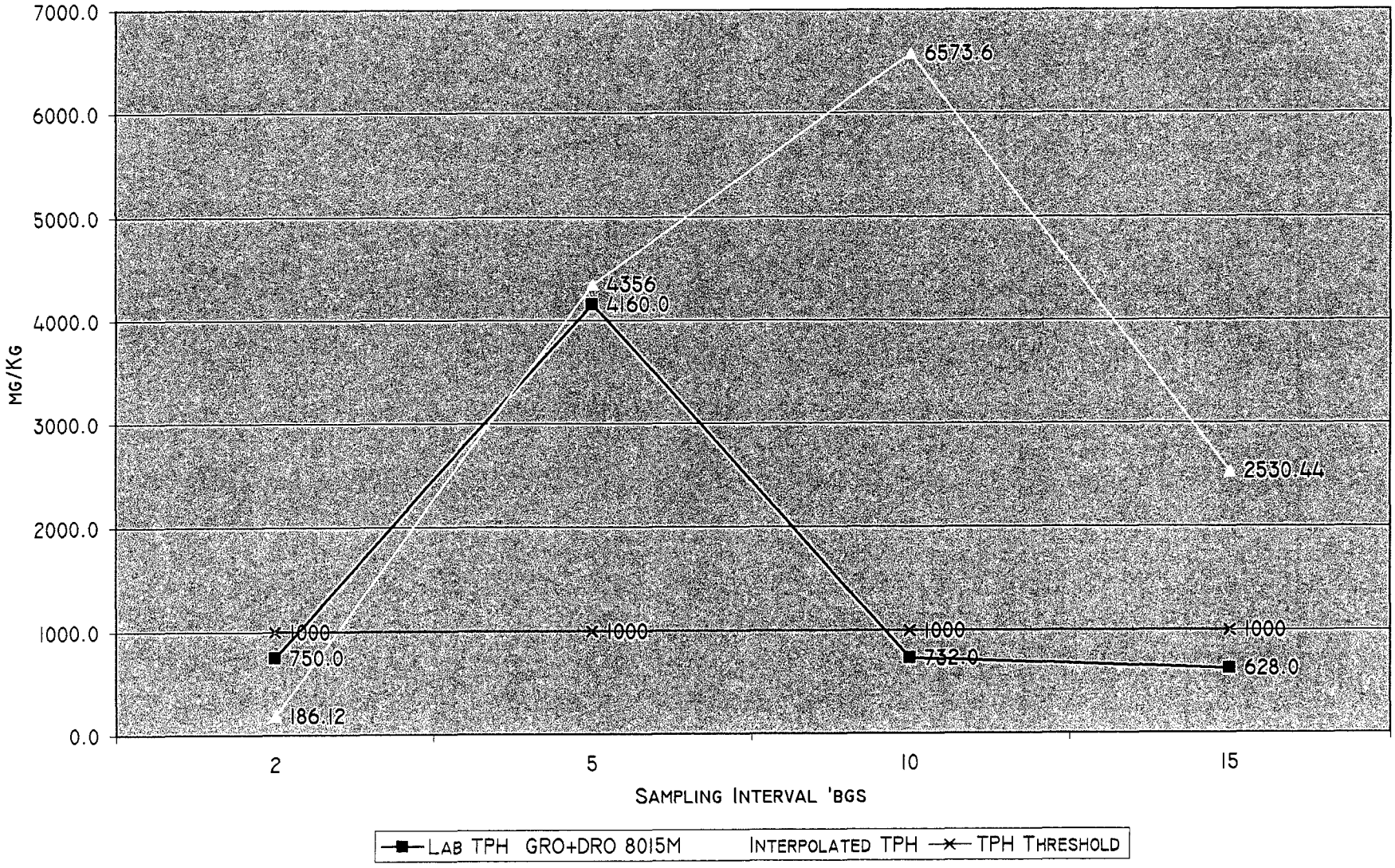
TEXACO V.M. HENDERSON BOREHOLE #16 - TPH



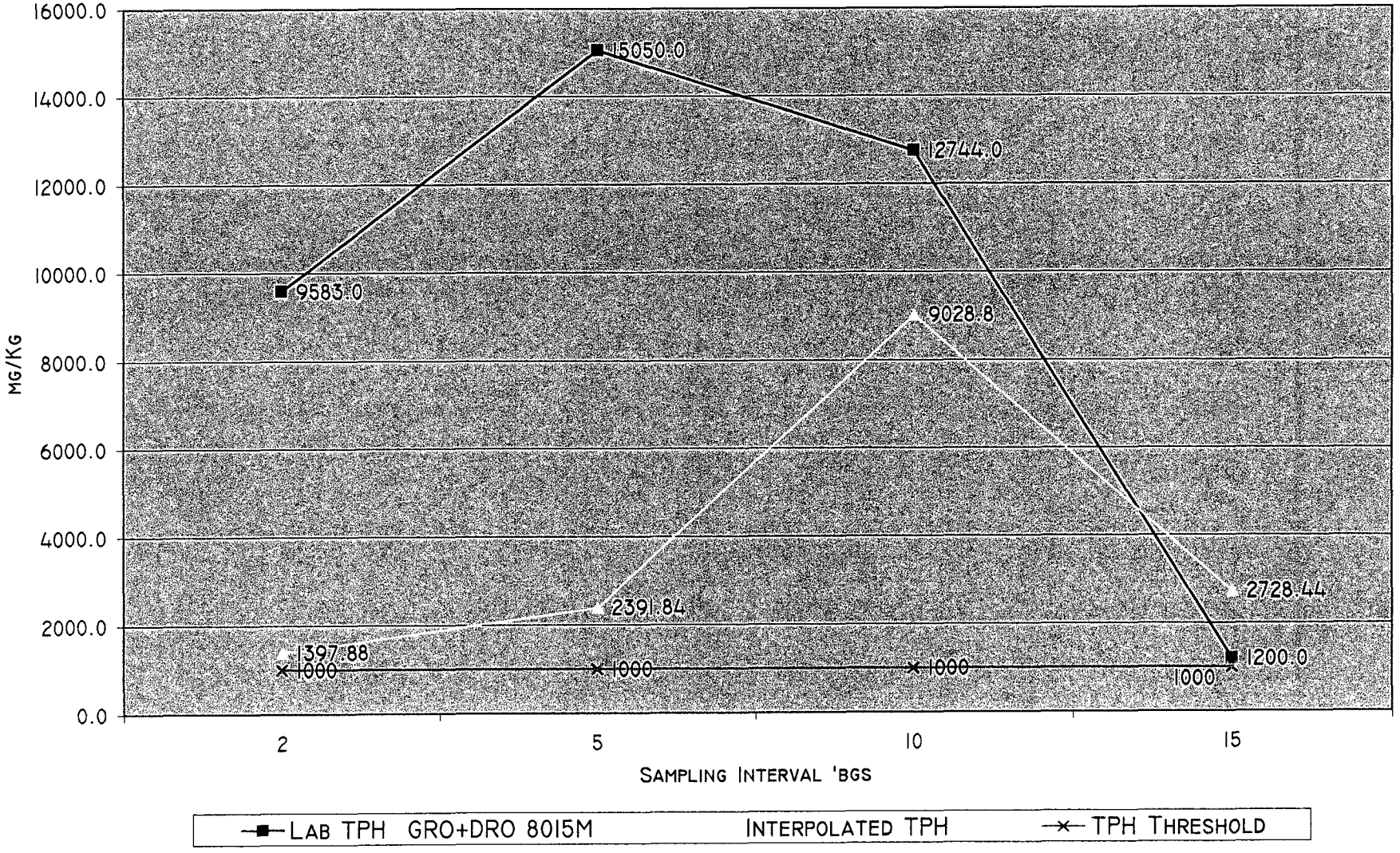
TEXACO V.M. HENDERSON BOREHOLE #17 - TPH



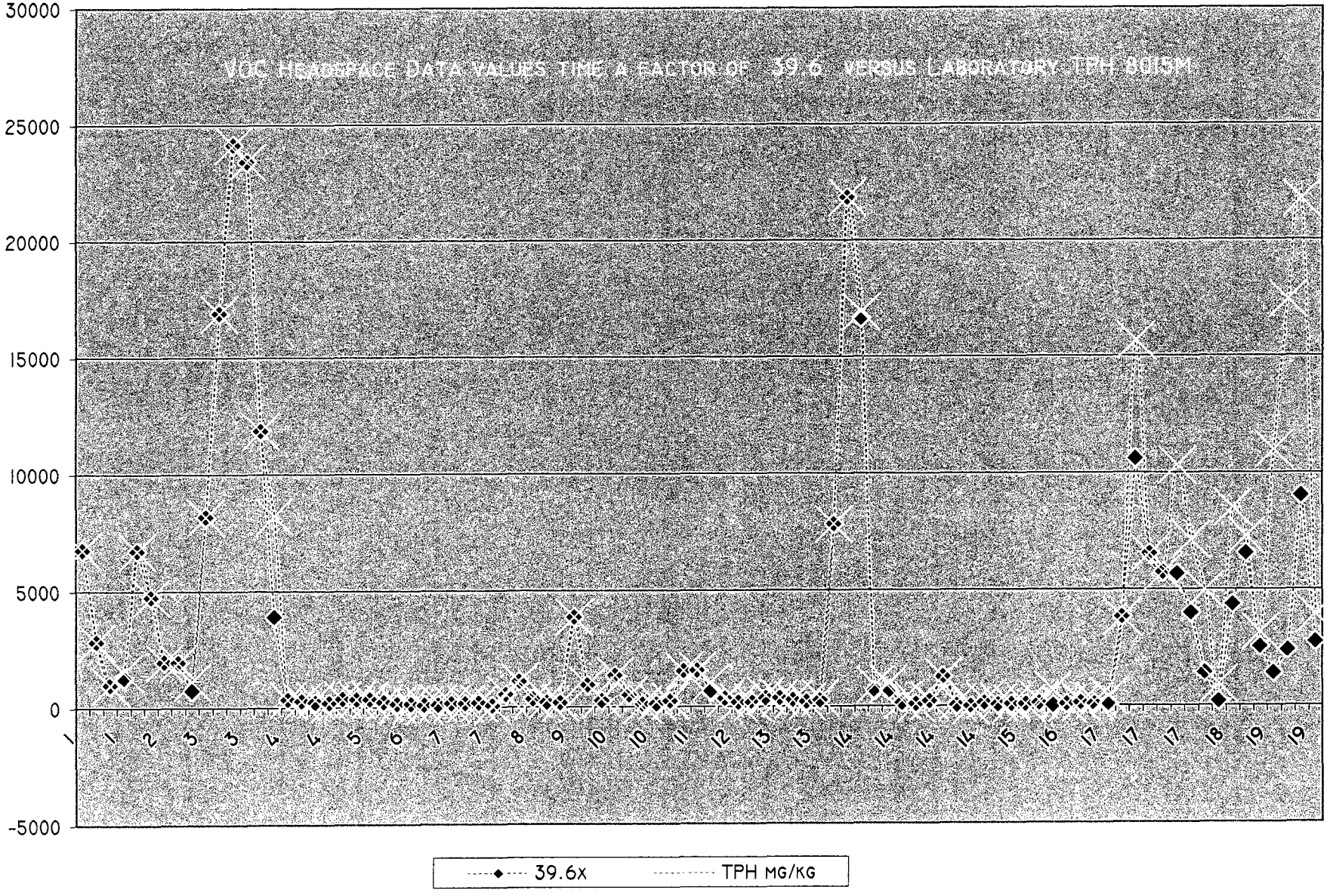
TEXACO V.M. HENDERSON BOREHOLE #18 - TPH



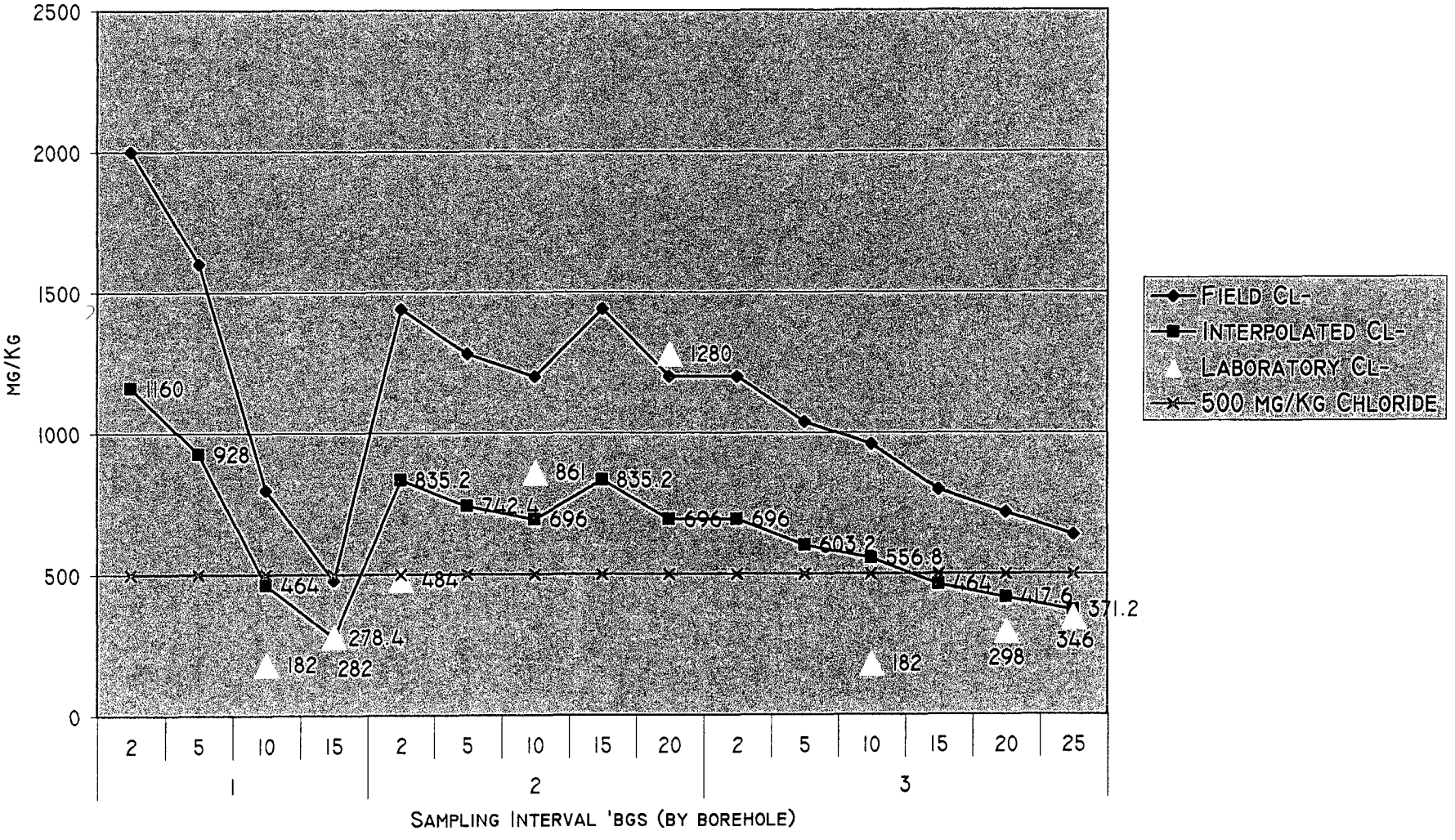
TEXACO V.M. HENDERSON BOREHOLE #19 - TPH



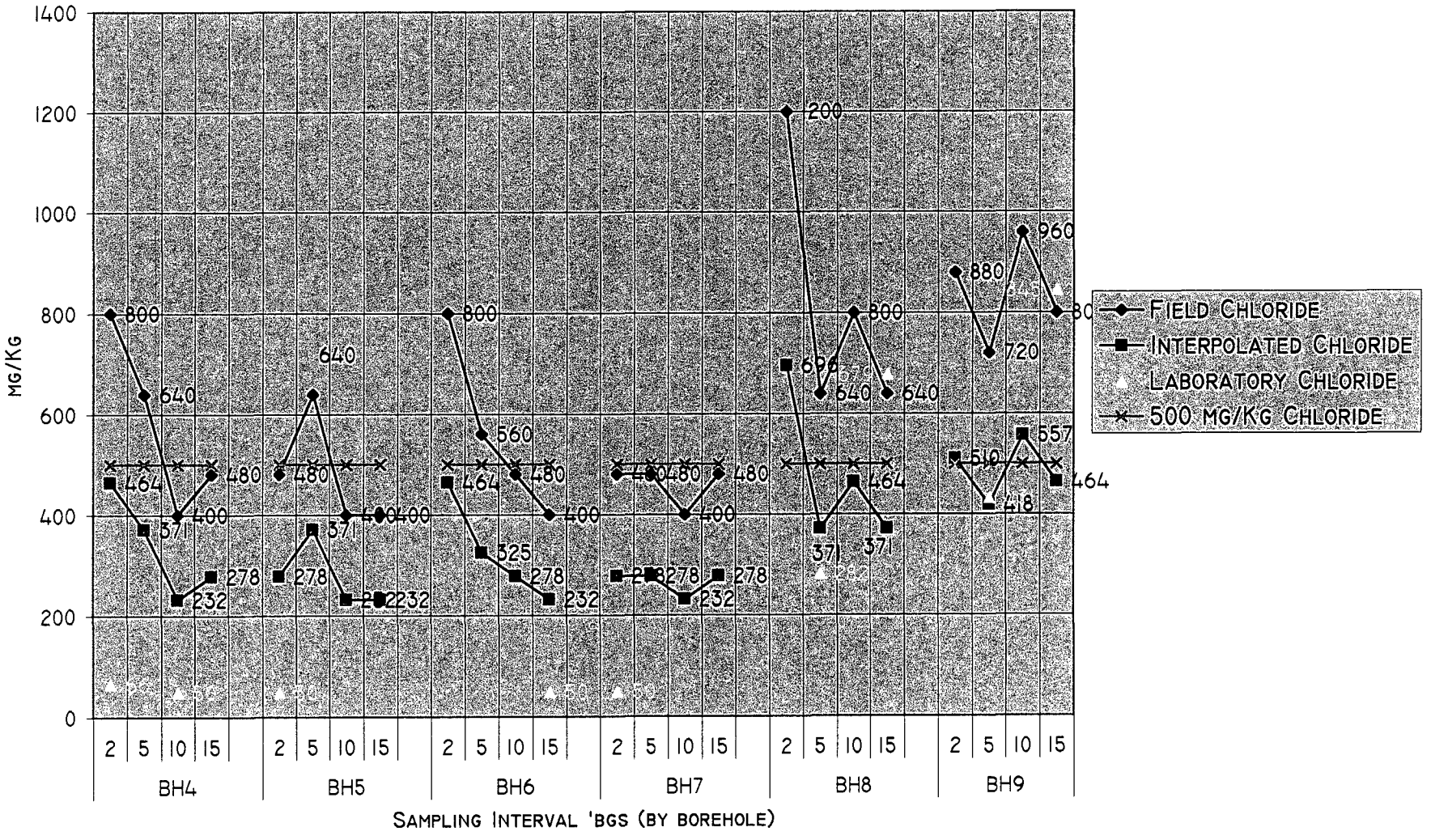
TEXACO
V.M. HENDERSON



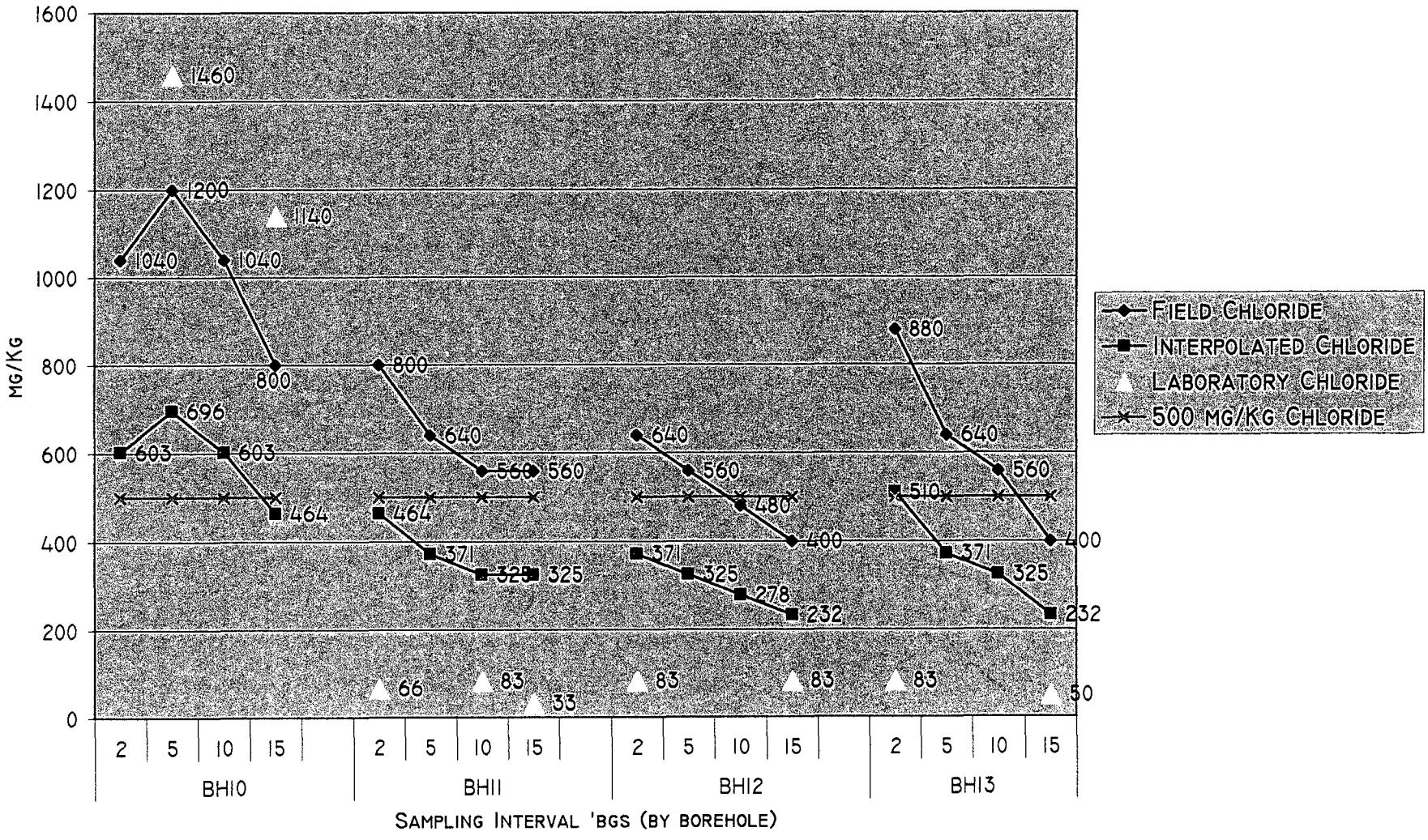
TEXACO V.M. HENDERSON
CHLORIDE DATA FROM BOREHOLES #1, #2, AND #3



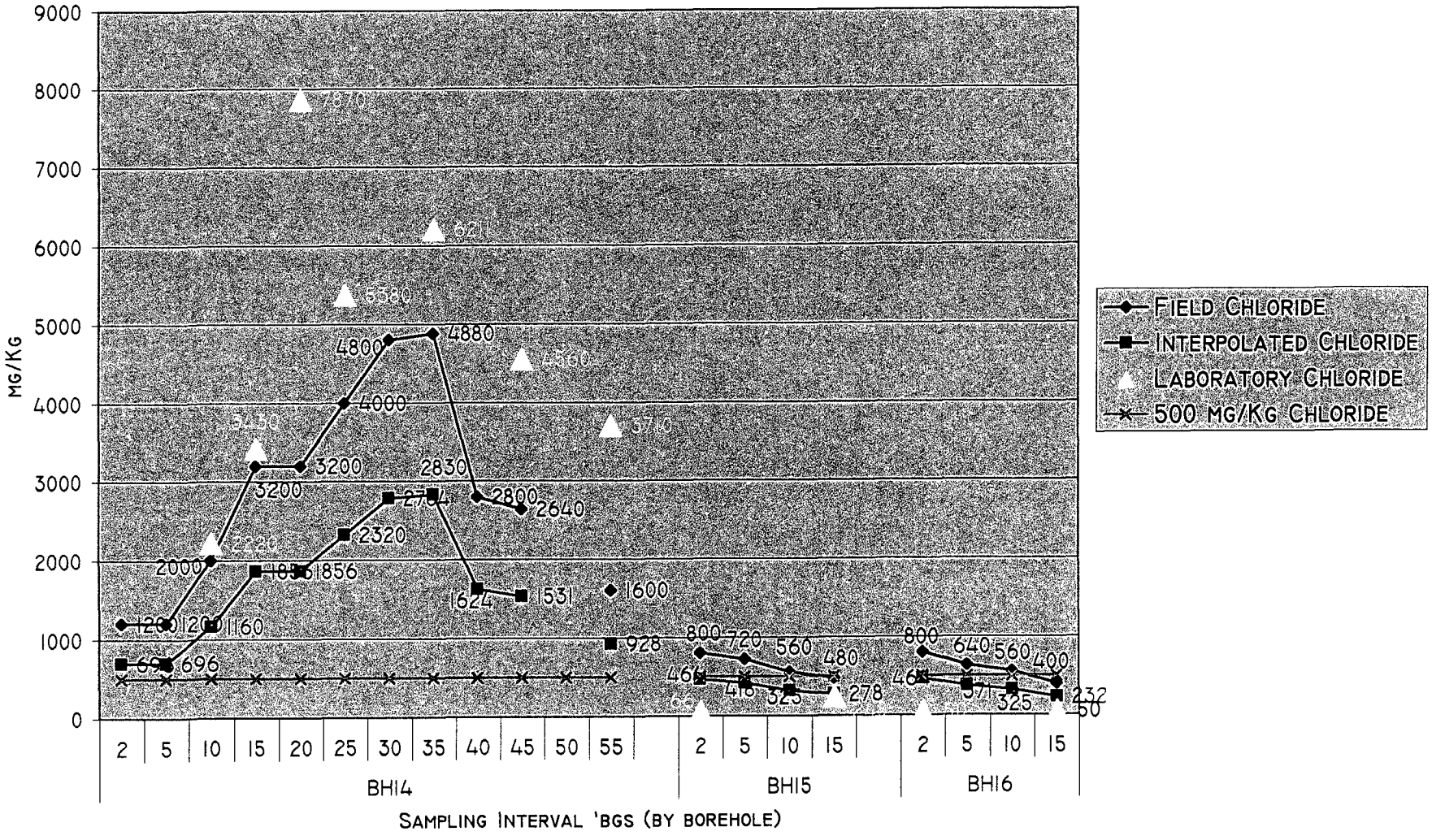
TEXACO V.M. HENDERSON
CHLORIDE DATA FROM BOREHOLES #4, #5, #6, #7, #8, #9



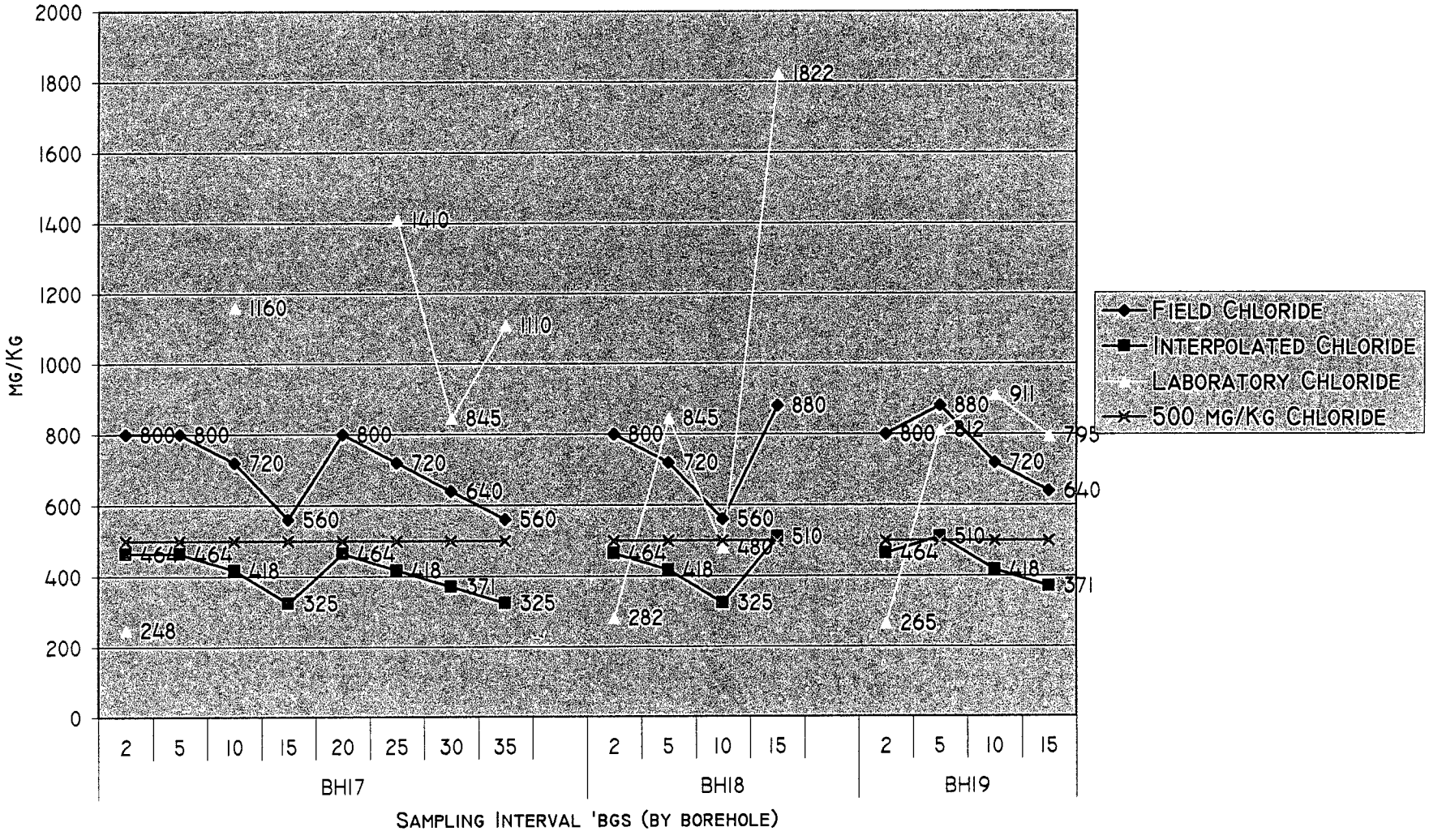
TEXACO V.M. HENDERSON
CHLORIDE DATA FROM BOREHOLES #10, #11, #12, #13



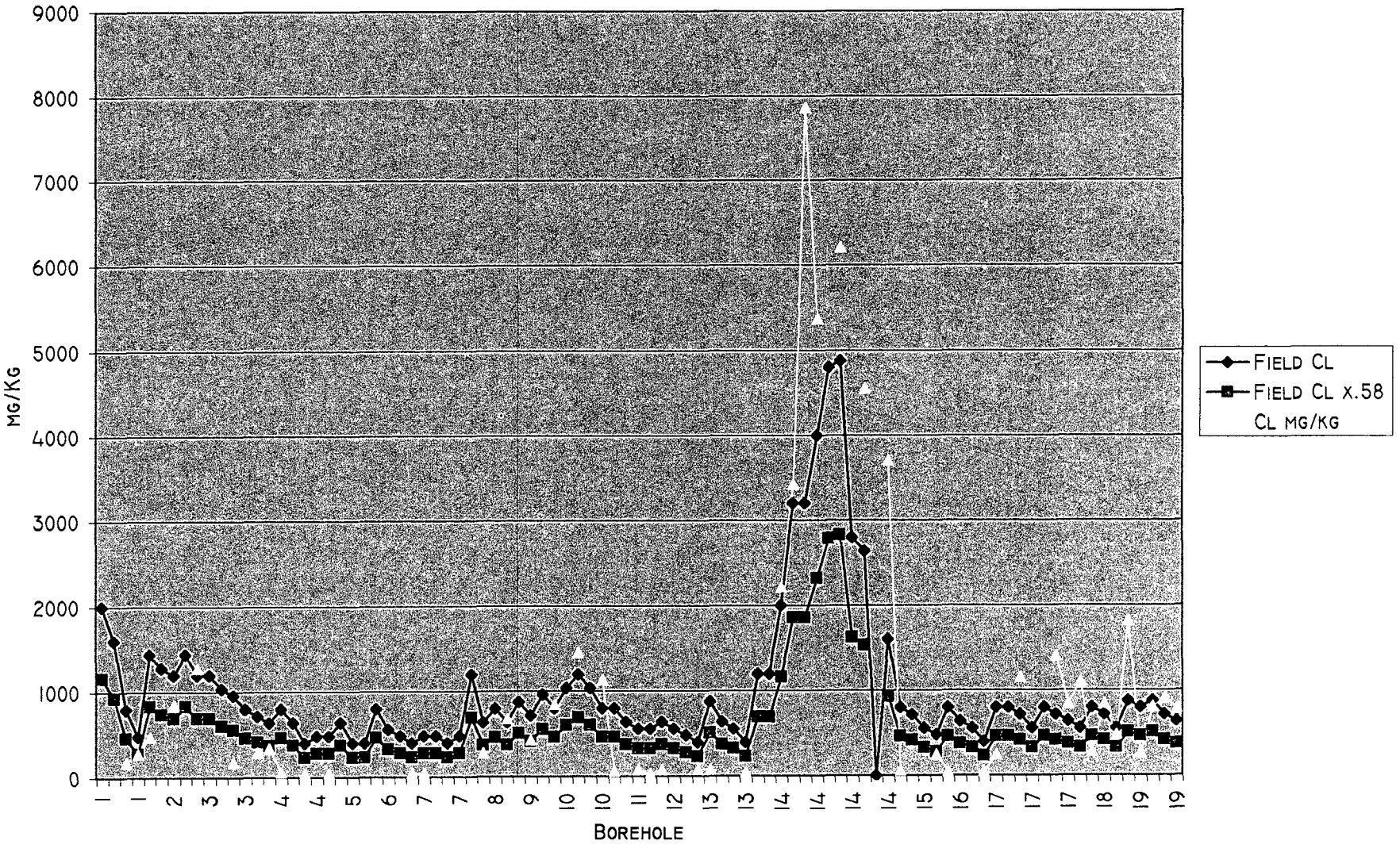
TEXACO V.M. HENDERSON
CHLORIDE DATA FROM BOREHOLES #14, #15, #16



TEXACO V.M. HENDERSON
CHLORIDE DATA FROM BOREHOLES #17, #18, #19



TEXACO V.M. HENDERSON CHLORIDE DATA - LABORATORY, FIELD, AND INTERPOLATED



APPENDIX B

ARS Report

AMERICAN RADIATION SERVICES, INC.

1726 Wooddale Court • Baton Rouge, Louisiana 70806
1 (800) 401-4277 • Fax (225) 927-6822

American Radiation Services, Inc.

Laboratory Analysis Report

Prepared For:

Larson & Associates, Inc.
Mr. Mark Larson
507 N. Marienfeld Street, Ste. 202
Midland, TX 79701
Phone: (915) 687-0901
Fax: (915) 687-0456

Quality Assurance Review

Danny L. Coleman
Laboratory Manager

Notes: American Radiation Services, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.

AMERICAN RADIATION SERVICES, INC.

1726 Wooddale Court • Baton Rouge, Louisiana 70806
1 (800) 401-4277 • Fax (225) 927-6822

ARS Tracking Number:	ARS-01-0476	**P.O. Number:**	01-0103
Client I.D.:	Henderson #001	**ARS Sample I.D.:**	ARS-01-2513
Date Sampled:	03/26/01	**Date Received:**	4/2/01
Time Sampled:	1330.	**Time Received:**	1320
Type of Sample:	Solid	**Date of Report:**	4/3/01

Analysis Description	Analysis Result	Analysis Error ±2 Sigma	Analysis Units	Analysis Result	Analysis Error ±2 Sigma	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Ra-226	15.09	0.73	pCi/gm	0.558	0.027	Bq/gm	EPA 901.1M	04/02/01 13:37	rb
Ra-228	0.33	0.06	pCi/gm	0.012	0.002	Bq/gm	EPA 901.1M	04/02/01 13:37	rb
Pb-210	10.29	0.68	pCi/gm	0.381	0.025	Bq/gm	EPA 901.1M	04/02/01 13:37	rb
Total Activity	45.47	N/A	pCi/gm	1.682	N/A	Bq/gm	EPA 901.1M	04/02/01 13:37	rb

Notes:

Quality Assurance Review

AMERICAN RADIATION SERVICES, INC.
1726 Wooddale Court • Baton Rouge, Louisiana 70806
1 (800) 401-4277 • Fax (225) 927-6822

Notes:

Comments:

1.0) Soil and Sludge analysis are reported on a wet basis or an as received basis unless otherwise indicated.
2.0) The data in this report are within the limits of uncertainty specified in the reference method unless specified.
3.0) Modified analysis procedures are procedures that are modified to meet the certain specifications. An example may be the use of a water method to analyze a solid matrix due to the lack of an officially recognized procedure for the analysis of the solid matrix.
4.0) Derived Air Concentrations and Effluent Release Concentrations are obtained from 10 CFR 20 Appendix B.
5.0) Total activity is actually total gamma activity and is determined utilizing the prominent gamma emitters from the naturally occurring radioactive decay chains and other prominent radioactive nuclides. Total activity may be lower than actual total activity due to the extent of secular equilibrium achieved in the various decay chains at the time of analysis. The total activity is not representative of nuclides that emit soley alpha or beta particles.
6.0) Ra-228 is determinded via secular equilibrium with its daughter, Actinium 228. (Gamma Spectroscopy only).
7.0) U-238 is determined via secular equilibrium with its daughter, Thorium 234. (Gamma Spectroscopy only).
8.0) All Gamma spectroscopy was performed utilizing high purity germanium detectors (HPGe).

Method References:

1.0) EPA 600/4-80-032, Prescribed Procedures for the Measurements of Radioactivity in Drinking Water, August 1980.
2.0) Standard Methods for the Examination of Water and Waste Water, 18th, 1992.
3.0) EPA SW-846, Test Methods for Evaluating Solid Waste, Third Edition, (9/86). (Updated through 1995).
4.0) EPA 600/4/79-020, Methods for Chemical Analysis of Water and Waste, March 1983.
5.0) HASL 300

Definitions:

1.0)	BDL	Analyte not detected because the value was below the detection limit.
2.0)	ND	Not detected above the detection limit.
3.0)	Detection Limit	The minimum amount of the analyte that ARS can detect utilizing the specific analysis.
4.0)	B	Method Bank
5.0)	D	Method Duplicate
6.0)	MS	Matrix Spike
7.0)	S	Spike
8.0)	RS	Reference Spike
9.0)	*SC	Subcontracted out to another qualified laboratory
10.0)	NR	Not Referenced
11.0)	N/A	Not Applicable

American Radiation Services, Inc 1776 Wooddale Ct. Baton Rouge, LA 70806 Phone: (504) 927-9935 Fax: (504) 927-6822

Client: Larson and Associates, Inc. Date: 03/28/01

Address: 507 N. Marienfeld St. Ste 202 Midland, TX 79701 Phone #: (915) 687-0901 Fax #: (915) 687-0456 Purchase Order #: Job #: 01-0103 Contact: Mark Larson

Date	Time	Sample. ID.	Type	Number of containers	Radiochemistry								Gamma Spectroscopy			
					Gross		Ra-226	Ra-228	Tot. Rad.	Sr89/ Sr90	Nat. Uran.	Am/ Pu/Cu/ Np/U	Fission	NORM (Natural)	Tot. Gamma	Other
					Alpha	Beta										
3/26/01	13:30	Henderson #001	Soil	1			✓	✓	✓					✓		Pb-210

Relinquished by: (Signature)	Date	Time	Received By: (Signature)	Date	Time
	3/29/01	13:30	Rabin Buland	RB 4/2/01	1300

of

APPENDIX C

Cardinal Laboratories, Inc. Reports

507 North Marienfeld, Suite 202 ◆ Midland, Texas 79701 ◆ Ph. (915) 687-0901 ◆ Fax (915) 687-0456

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX
FAX TO:

Receiving Date: 01/06/01
Reporting Date: 01/09/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: SEC. 30 T21S R37E

Sampling Date: 12/29/00 & 01/03/01
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	Cl^- (mg/Kg)
ANALYSIS DATE		01/08/01	01/08/01	01/09/01
H5502-1	VMHGP14-55	<50	<50	3710
H5502-2	VMHGP15-2	<50	<50	66
H5502-3	VMHGP15-15	<50	<50	248
H5502-4	VMHGP16-2	<50	596	50
H5502-5	VMHGP16-15	<50	<50	50
H5502-6	VMHGP17-2	<50	84.0	248
H5502-7	VMHGP17-10	124	4940	1160
H5502-8	VMHGP17-25	210	4440	1410
H5502-9	VMHGP17-30	59.9	3080	845
H5502-10	VMHGP17-35	93.8	3470	1110
H5502-11	VMHGP18-2	<50	700	282
H5502-12	VMHGP18-5	<50	4110	845
H5502-13	VMHGP18-10	<50	682	480
H5502-14	VMHGP18-15	<50	578	1822
H5502-15	VMHGP19-2	53	9530	265
H5502-16	VMHGP19-5	<50	15000	812
H5502-17	VMHGP19-10	144	12600	911
H5502-18	VMHGP19-15	<50	1150	795
Quality Control		755	783	994
True Value QC		800	800	1000
% Recovery		94.3	97.9	99.4
Relative Percent Difference		6.1	0.9	1.0

55' Center of site

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl^-: Std. Methods 4500-ClB
*Analyses performed on 1:4 w:v aqueous extracts

Chemist

1/9/01
Date

H5502A.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 12/29/00
Reporting Date: 01/03/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: SEC. 30 T21S R36E

Sampling Date: 12/18/00-12/22/00
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	TPH (mg/Kg)	Cl* (mg/Kg)
ANALYSIS DATE:		01/02/01	01/03/01
H5474-1	VMH1-10	58.2	182
H5474-2	VMH1-15	1250	282
H5474-3	VMH2-2	26700	484
H5474-4	VMH2-10	1000	881
H5474-5	VMH2-20	1720	1280
H5474-6	VMH3-10	7010	182
H5474-7	VMH3-20	12100	298
H5474-8	VMH3-25	10400	348
H5474-9	VMH4-2	<10	66
H5474-10	VMH4-10	<10	50
H5474-11	VMH5-2	104	50
H5474-12	VMH6-15	<10	50
H5474-13	VMH7-2	<10	50
H5474-14	VMH8-5	18600	282
H5474-15	VMH8-15	41.6	679
H5474-16	VMH9-5	31700	431
H5474-17	VMH9-15	148	845
H5474-18	VMH10-5	3650	1460
H5474-19	VMH10-15	<10	1140
H5474-20	VMH11-5	2700	66
H5474-21	VMH11-10	1480	83
H5474-22	VMH11-15	1280	33
H5474-23	VMH12-2	11100	83
H5474-24	VMH12-15	<10	83
H5474-25	VMH13-2	<10	83

H5474A1.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 12/29/00
Reporting Date: 01/03/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: SEC. 30 T21S R36E

Sampling Date: 12/18/00-12/22/00
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	TPH (mg/Kg)	Cl* (mg/Kg)
ANALYSIS DATE:		01/02/01	01/03/00
H5474-26	13-15	<10	50
H5474-27	14-10	6630	2220
H5474-28	14-15	493	3430
H5474-29	VMH 14-20	485	7870
H5474-30	VMH 14-25	78.3	5380
H5474-31	VMH 14-35	328	6211
H5474-32	VMH 14-45	<10	4560
Quality Control		237	1004
True Value QC		240	1000
% Recovery		98.8	100
Relative Percent Difference		7.4	7.2

METHODS: TPH-EPA 600/4-79-020 418.1; Cl-Std. Methods 4500-ClB
*Analyses performed on 1:4 w:v aqueous extracts.

Chemist

1/3/01
Date

H5474A2.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 · 2111 BEECHWOOD · ABILENE, TX 79603
PHONE (505) 393-2326 · 101 E. MARLAND · HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
P.O. BOX 3109
MIDLAND, TX 79702
FAX TO:

Receiving Date: 12/29/00
Reporting Date: 01/02/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: SEC.30 T21S R36E

Sampling Date: 12/18/00-12/22/00
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: BC

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)
ANALYSIS DATE:		12/30/00	12/30/00
H5474-2	VMH1-15	<50	192
H5474-6	VMH2-20	<50	325
H5474-8	VMH3-25	561	3760.0
H5474-10	VMH4-10	<50	72.1
H5474-12	VMH6-15	<50	52.3
H5474-15	VMH8-15	<50	66.7
H5474-17	VMH9-15	<50	52.6
H5474-19	VMH10-15	<50	<50
H5474-22	VMH11-15	<50	319
H5474-24	VMH12-15	<50	<50
H5474-26	VMH13-15	<50	<50
H5474-27	VMH14-10	<50	220
H5474-28	VMH14-15	<50	213
H5474-29	VMH14-20	<50	227
H5474-30	VMH14-25	<50	<50
H5474-32	VMH14-45	<50	<50
Quality Control		929	1049
True Value QC		1000	1000
% Recovery		92.9	105
Relative Percent Difference		8.5	7.8

METHOD: SW-846 8015 M

Chemist

1/2/01
Date

H5474B.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
TEXACO E&P, INC.
ATTN: RODNEY BAILEY
500 N. LORAINE
MIDLAND, TX 79702
FAX TO: 915-688-4751

Receiving Date: 12/29/00
Reporting Date: 01/03/01
Project Number: NOT GIVEN
Project Name: V.M. HENDERSON
Project Location: SEC. 30 T21S R36E

Sampling Date: 12/18/00~12/22/00
Sample Type: SOIL
Sample Condition: COOL, INTACT
Sample Received By: BC-HOBBS
Analyzed By: JA

LAB NUMBER	SAMPLE ID	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE		01/02/01	01/02/01	01/02/01	01/02/01
H5474-2	VMH1-15	0.003	0.006	0.006	0.011
H5474-5	VMH2-20	0.004	0.003	0.004	0.015
H5474-8	VMH3-25	0.729	0.408	7.19	11.2
H5474-10	VMH4-10	<0.002	<0.002	<0.002	<0.006
H5474-12	VMH6-15	<0.002	<0.002	<0.002	<0.006
H5474-15	VMH8-15	<0.002	<0.002	<0.002	<0.006
H5474-17	VMH9-15	<0.002	<0.002	<0.002	<0.006
H5474-19	VMH10-15	<0.002	<0.002	<0.002	<0.006
H5474-22	VMH11-15	<0.002	<0.002	<0.002	<0.006
H5474-24	VMH12-15	<0.002	<0.002	<0.002	<0.006
H5474-26	VMH13-15	<0.002	<0.002	<0.002	<0.006
H5474-27	VMH14-10	0.048	0.027	0.191	0.530
H5474-28	VMH14-15	<0.002	<0.002	<0.002	<0.006
H5474-29	VMH14-20	<0.002	<0.002	<0.002	<0.006
H5474-30	VMH14-25	<0.002	<0.002	<0.002	<0.006
H5474-31	VMH14-35	<0.002	<0.002	<0.002	<0.006
H5474-32	VMH14-45	<0.002	<0.002	<0.002	<0.006
Quality Control		0.0908	0.0977	0.0883	0.274
True Value QC		0.100	0.100	0.100	0.300
% Accuracy		90.8	97.7	88.3	91.3
Relative Percent Difference		4.6	0.7	4.6	2.7

METHOD: EPA SW 846-8020, 5030, Gas Chromatography

Chemist

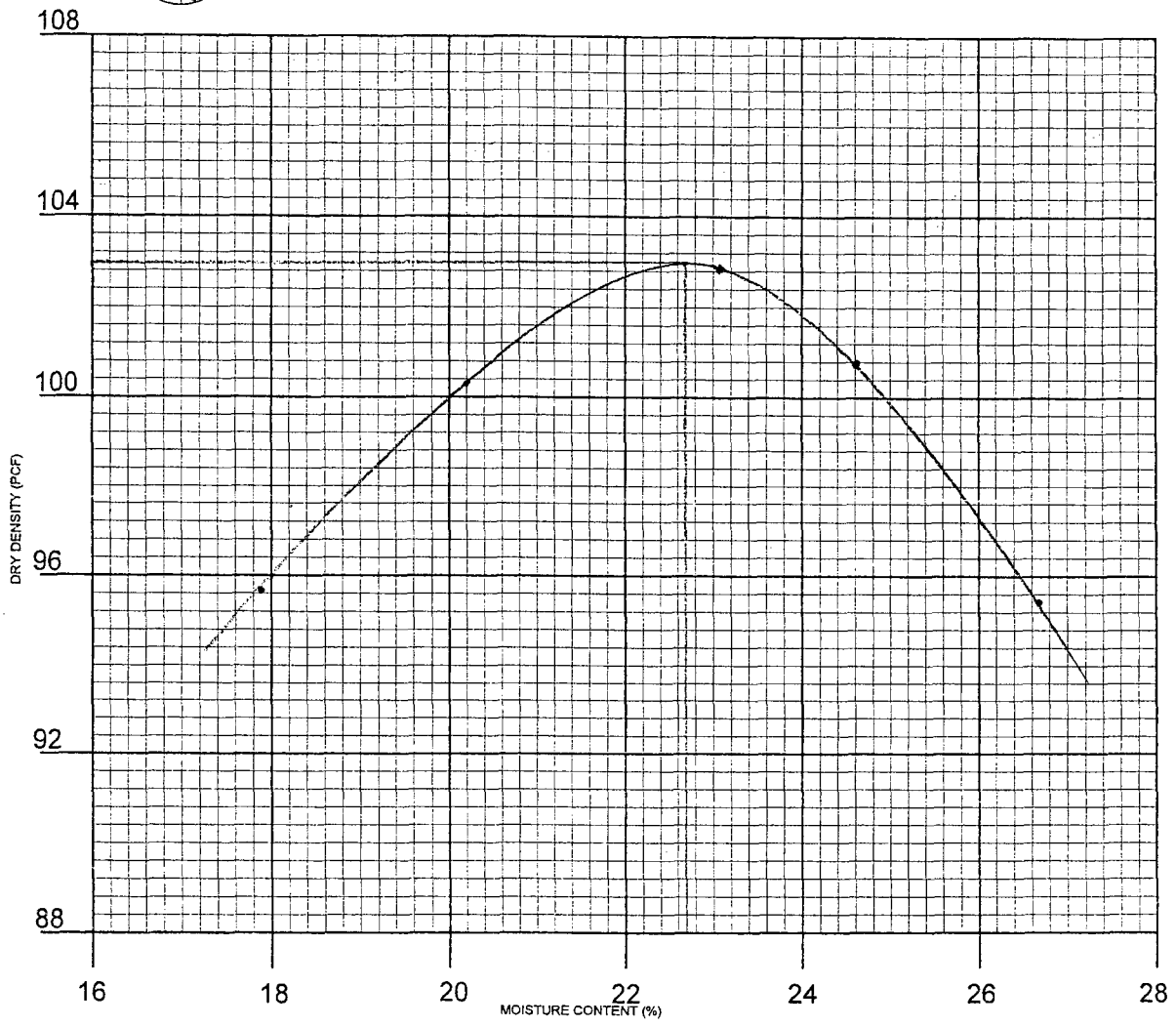
1-3-01
Date

H5474SHOBBSTEXACOBTEXONLY

APPENDIX D

Pettigrew and Associates, Inc. Report

PETTIGREW and ASSOCIATES
CONSULTING ENGINEERS



CLIENT: Environmental Plus PROJECT: General Information

SAMPLE LOCATION: Stockpile

SOIL DESCRIPTION: Red Clay

SOIL CLASSIFICATION: _____ TEST METHOD: ASTM: D 698

ATTERBERG: LL ___ PI ____ Sampled & Delivered 10/22/01

DATE: 10/19/01 LAB NO. 01-2155-2156

DRY WEIGHT LB/CU. FT. 103.0 MOISTURE CONTENT % 22.7

SIEVE ANALYSIS - % PASSING									

COPIES: Environmental Plus

PETTIGREW and ASSOCIATES

BY: Elton Pettigrew S.E.T.

LABORATORY TEST REPORT

PETTIGREW and ASSOCIATES

1110 N. GRIMES
HOBBS, NM 88240
(505) 393-9827

DEBRA P. HICKS, P.E./ L.S.I.
WILLIAM M. HICKS, III, P.E./P.S.

TO: Environmental Plus, Inc.
Attn: Roger Boone
P.O. Box 1558
Eunice, NM 88231

MATERIAL: Red Clay

PROJECT: VM Henderson

TEST METHOD: AASHTO: T 238

DATE OF TEST: October 22, 2001

DEPTH: 1' Below Finished Subgrade

TEST NO.	LOCATION	DRY DENSITY % Maximum	% MOISTURE	DEPTH
SG-1	Pit W. of Tank Battery - 75' ± NW of the SE Corner	105.0	12.1	
SG-2	Pit W. of Tank Battery - 75' ± NW & 30' N. of the SE Corner	101.6	12.4	
SG-3	Pit W. of Tank Battery - 105' ± SW of the NE Corner	98.2	11.9	
SG-4	Pit W. of Tank Battery - 153' W. & 60' S. of the NE Corner	99.7	11.3	
SG-5	Pit W. of Tank Battery - 150' W. & 120' S. of the NE Corner	101.9	12.0	
SG-6	Pit W. of Tank Battery - 150' W. & 180' S. of the NE Corner	99.2	13.9	
SG-7	Pit W. of Tank Battery - 220' W. & 180' S. of the NE Corner	103.7	13.0	
SG-8	Pit W. of Tank Battery - 220' W. & 120' S. of the NE Corner	103.9	12.4	
SG-9	Pit W. of Tank Battery - 220' W. & 60' S. of the NE Corner	99.7	12.5	
SG-10	Pit S. of Tank Battery - Center of Pit	98.5	11.8	
SG-11	Pit E. of Tank Battery - Center of Pit	100.0	11.4	

CONTROL DENSITY: 107.2
AASHTO: T 99

OPTIMUM MOISTURE: 18.0%

REQUIRED COMPACTION: 95%

LAB NO.: 01 2100-2111

COPIES TO: Environmental Plus

PETTIGREW and ASSOCIATES

BY: [signature] E.I.T.

LABORATORY TEST REPORT
PETTIGREW and ASSOCIATES
1110 N. GRIMES
HOBBS, NM 88240
(505) 393-9827

DEBRA P. HICKS, P.E./ L.S.I.
WILLIAM M. HICKS, III, P.E./P.S.

TO: Environmental Plus, Inc.
Attn: Roger Boone
P.O. Box 1558
Eunice, NM 88231

MATERIAL: Red Clay

PROJECT: VM Henderson

TEST METHOD: ASTM: D 2922

DATE OF TEST: October 26, 2001

DEPTH: Finished Subgrade

TEST NO.	LOCATION	DRY DENSITY % Maximum	% MOISTURE	DEPTH
SG-12	Pit SW of Tank Battery - Center of Pit	105.0	10.9	
SG-13	Pit E. of Tank Battery - Center of Pit	103.5	12.3	
SG-14	Pit W. of Tank Battery - 81' W. & 63' N. of the SE Corner	97.6	12.5	
SG-15	Pit W. of Tank Battery - 81' W. & 140' N. of the SE Corner	102.2	11.1	
SG-16	Pit W. of Tank Battery - 81' W. & 220' N. of the SE Corner	98.6	12.8	
SG-17	Pit W. of Tank Battery - 160' W. & 220' N. of the SE Corner	97.5	13.7	
SG-18	Pit W. of Tank Battery - 160' W. & 140' N. of the SE Corner	98.7	13.5	
SG-19	Pit W. of Tank Battery - 160' W. & 63' N. of the SE Corner	96.5	13.9	
SG-20	Pit W. of Tank Battery - 230' W. & 63' N. of the SE Corner	100.7	12.8	
SG-21	Pit W. of Tank Battery - 230' W. & 140' N. of the SE Corner	98.0	12.9	
SG-22	Pit W. of Tank Battery - 230' W. & 220' N. of the SE Corner	99.0	12.7	

CONTROL DENSITY: 103.0
AASHTO: T 99

OPTIMUM MOISTURE: 22.7%

REQUIRED COMPACTION: 95%

LAB NO.: 01 2143-2154

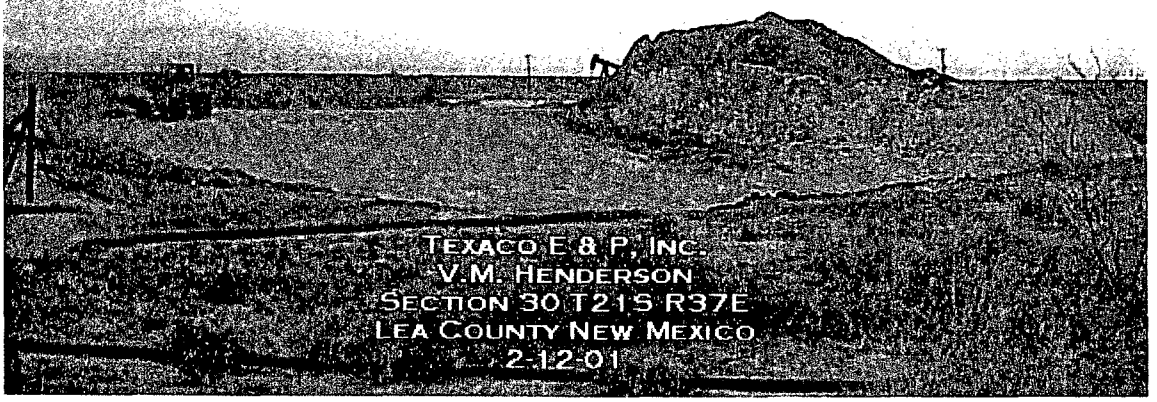
COPIES TO: Environmental Plus

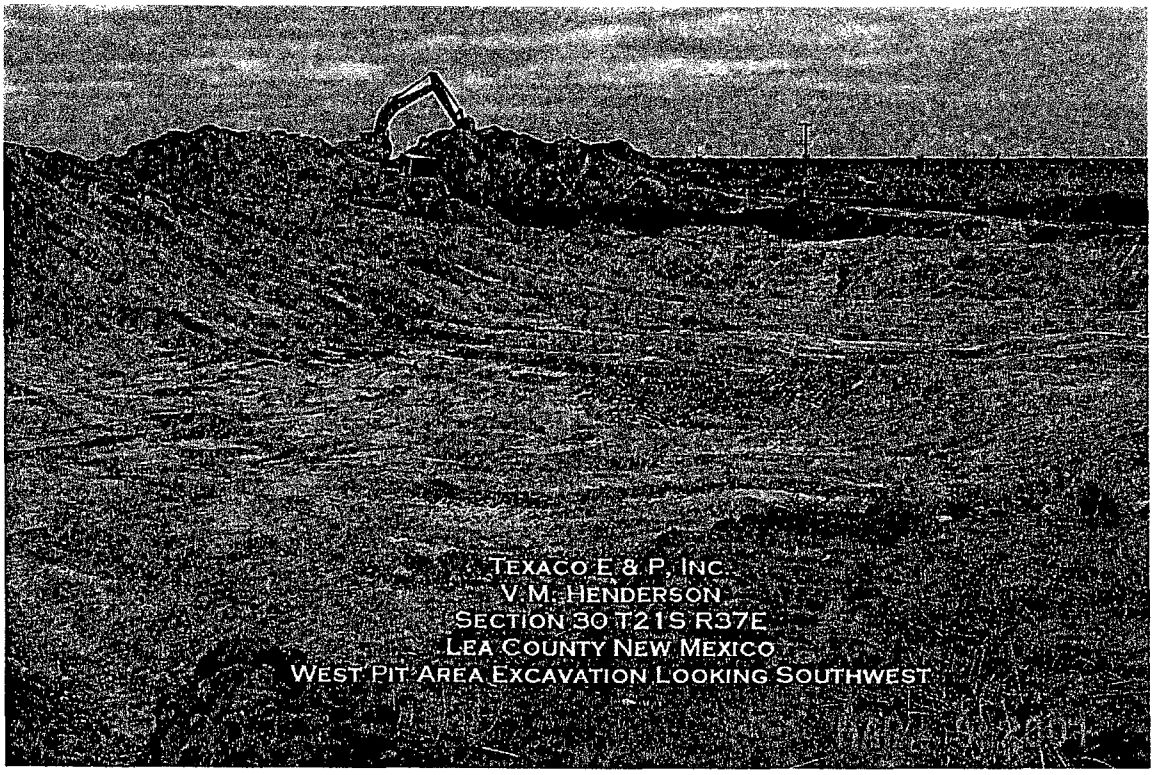
PETTIGREW and ASSOCIATES

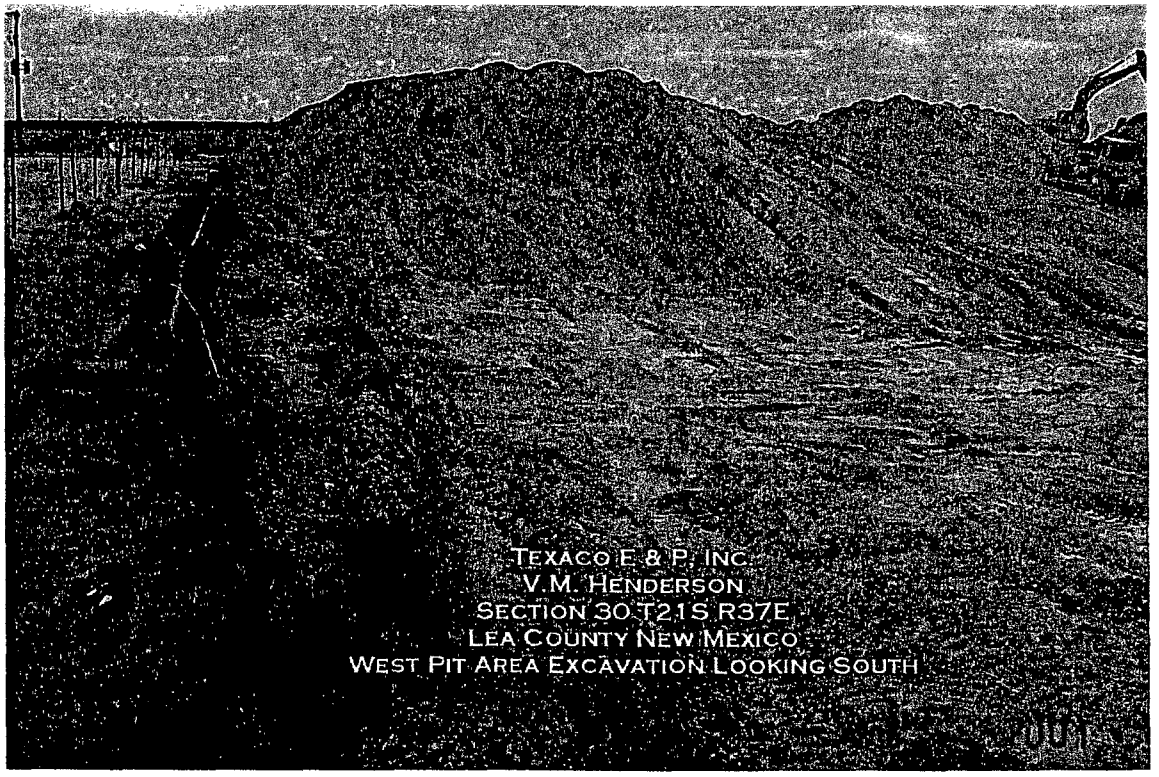
BY:

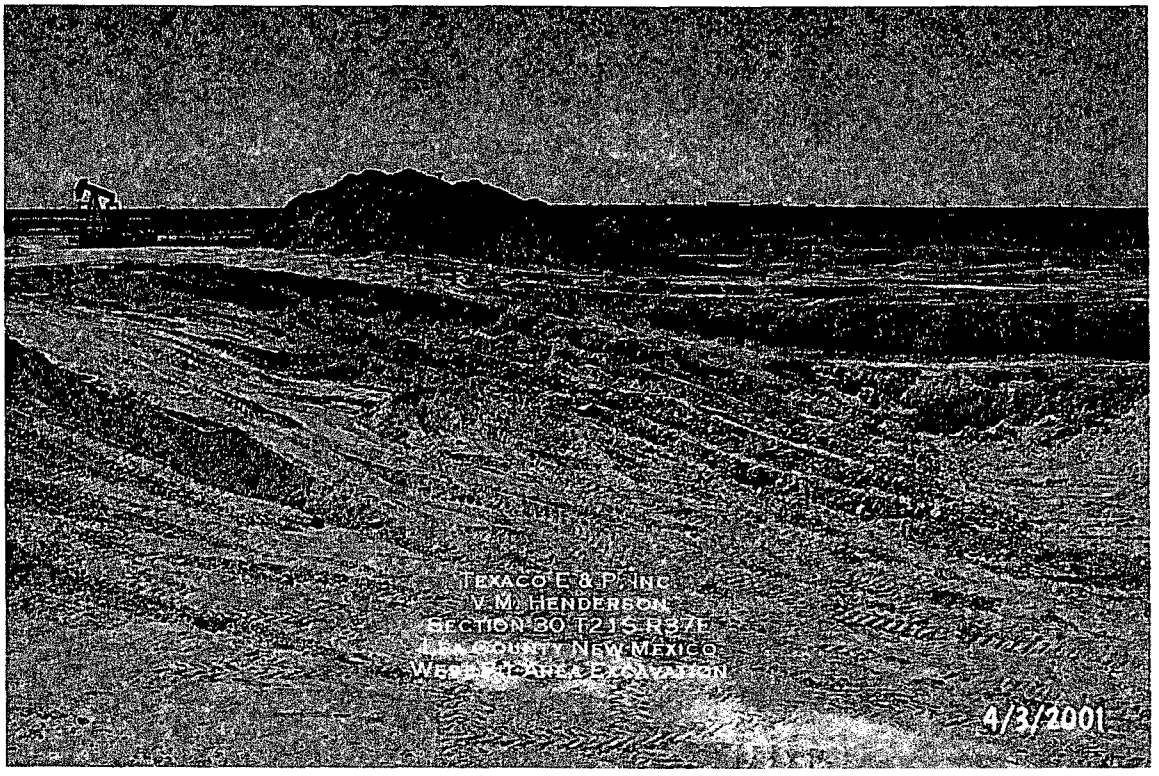
APPENDIX E

Photographs

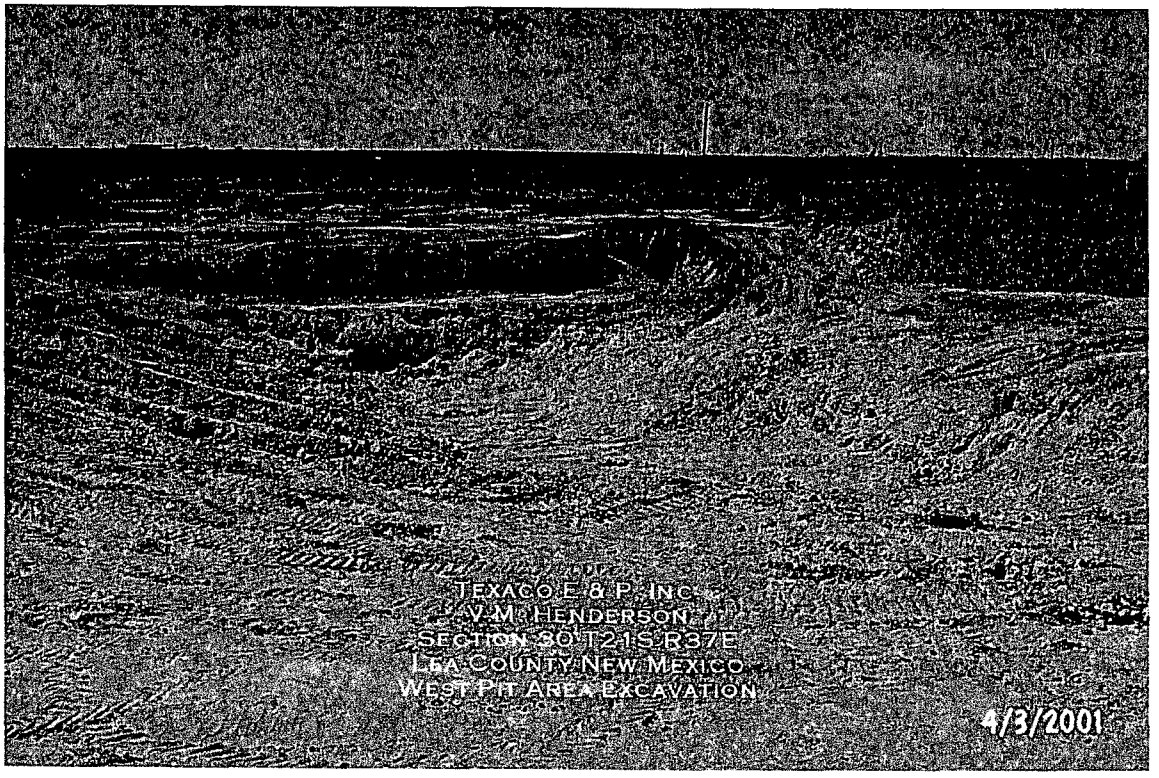

TEXACO E & P, INC.
V.M. HENDERSON
SECTION 30 T21S R37E
LEA COUNTY NEW MEXICO
2-12-01

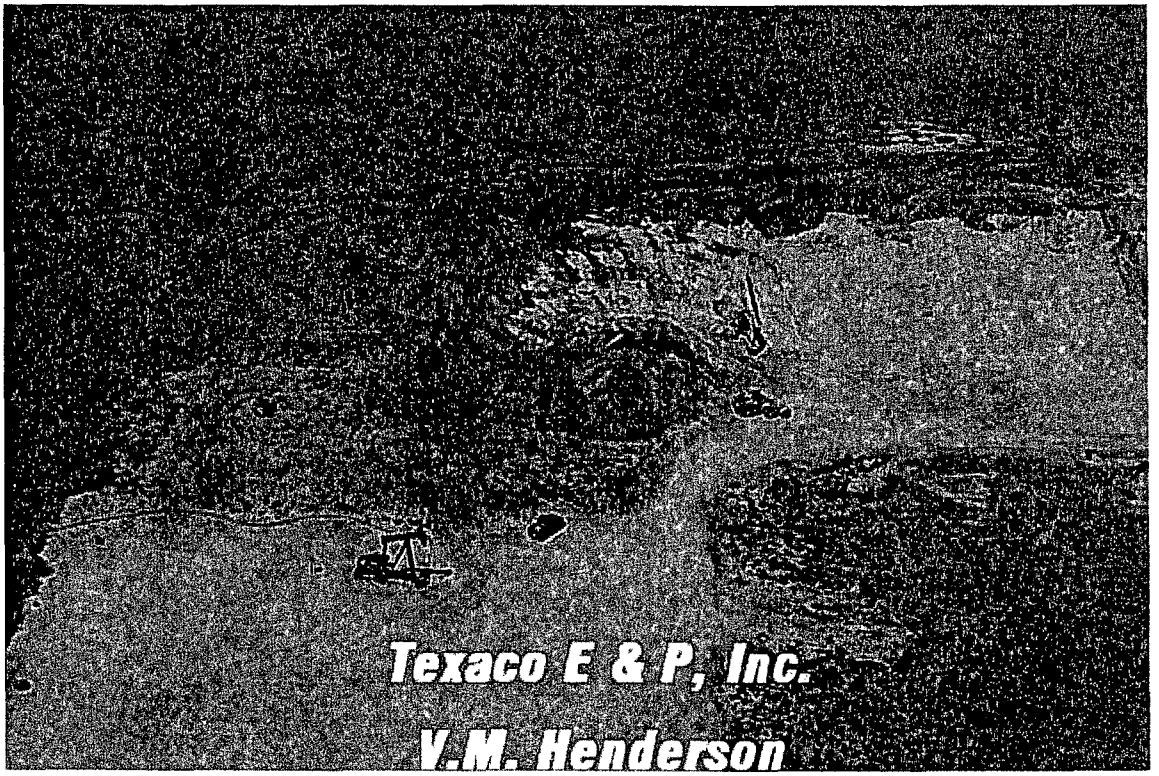

TEXACO E & P, INC.
V.M. HENDERSON
SECTION 30 T21S R37E
LEA COUNTY NEW MEXICO
WEST PIT AREA EXCAVATION LOOKING SOUTHWEST

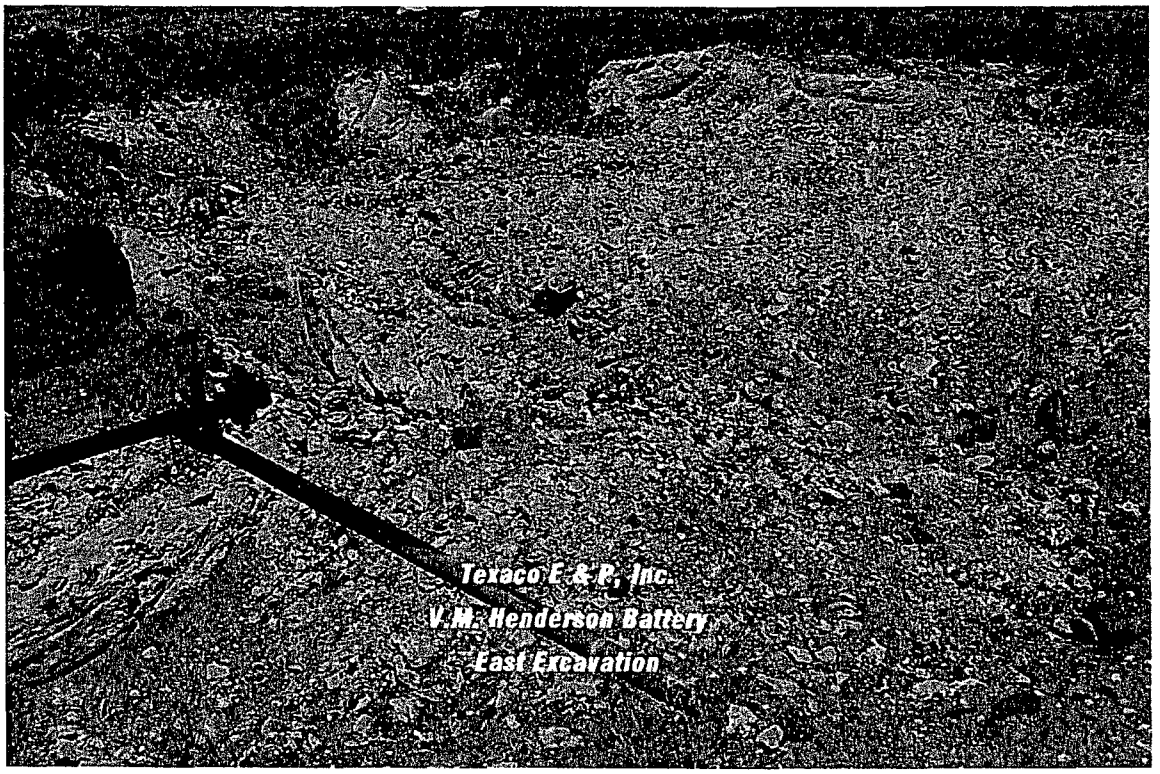

TEXACO E & P, INC
V.M. HENDERSON
SECTION 30 T21S R37E
LEA COUNTY NEW MEXICO
WEST PIT AREA EXCAVATION LOOKING SOUTH

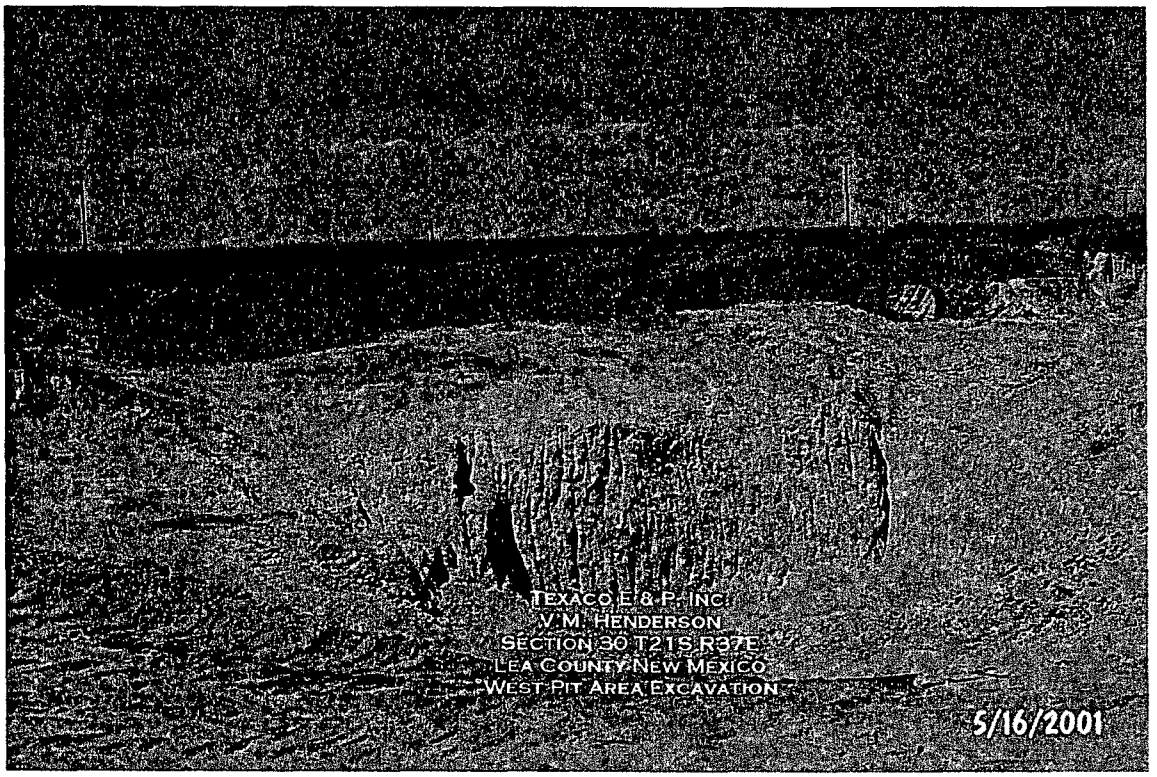

TEXACO E & P, INC
V.M. HENDERSON
SECTION 30 T21S R37E
LEA COUNTY NEW MEXICO
4/3/2001

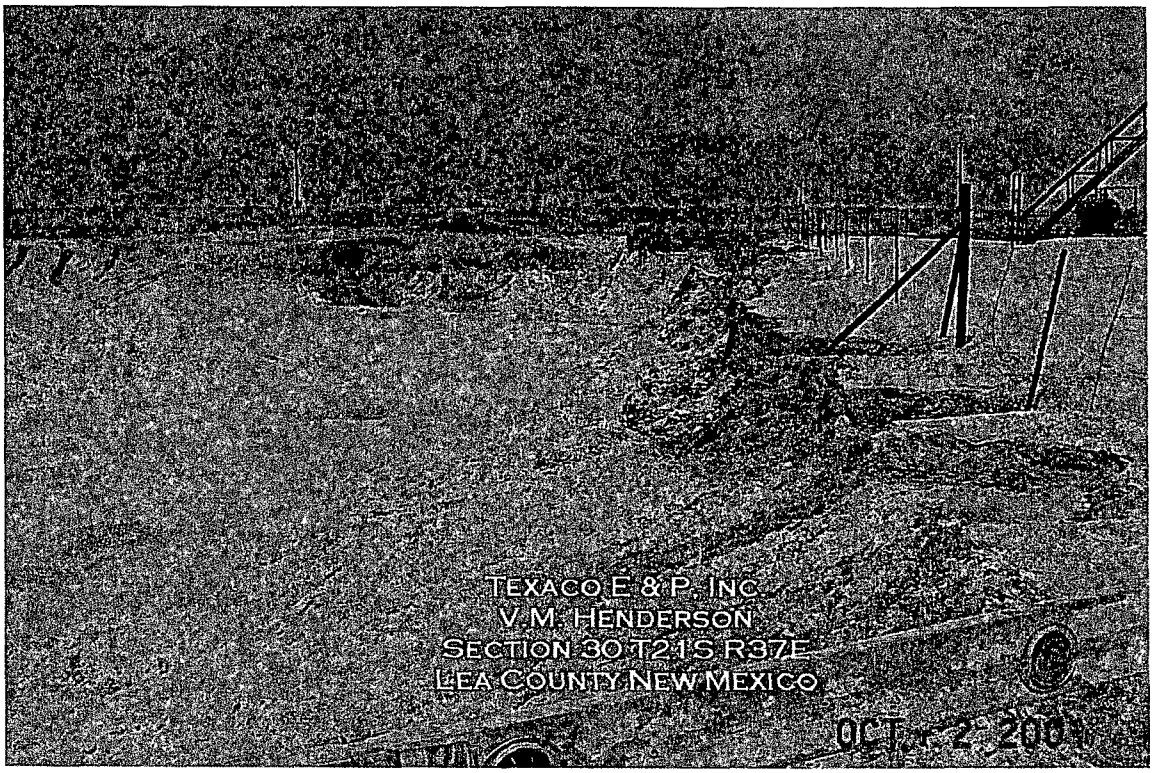

TEXACO E & P, INC.
V.M. HENDERSON
SECTION 30 T-21-S R37E
LEA COUNTY NEW MEXICO
EAST PIT AREA EXCAVATION
4/3/2001

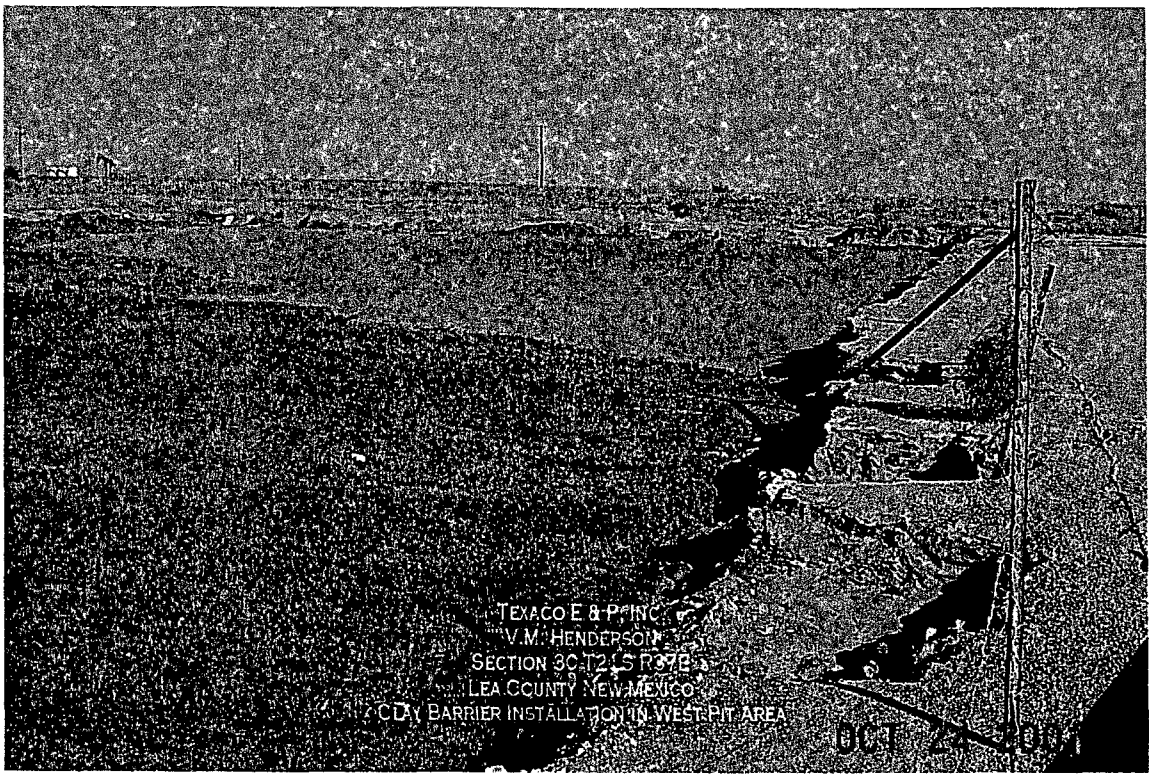

TEXACO E & P, INC.
V.M. HENDERSON
SECTION 30 T-21-S R37E
LEA COUNTY NEW MEXICO
WEST PIT AREA EXCAVATION
4/3/2001

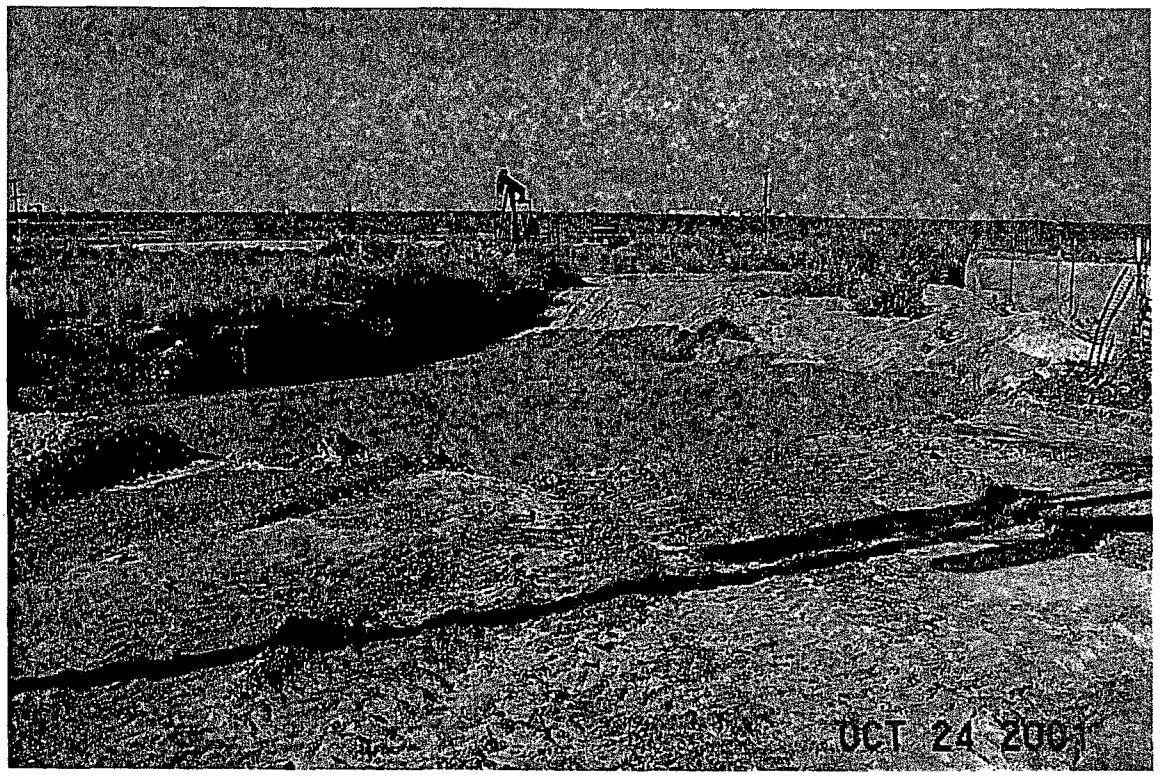

Texaco E & P, Inc.
V.M. Henderson

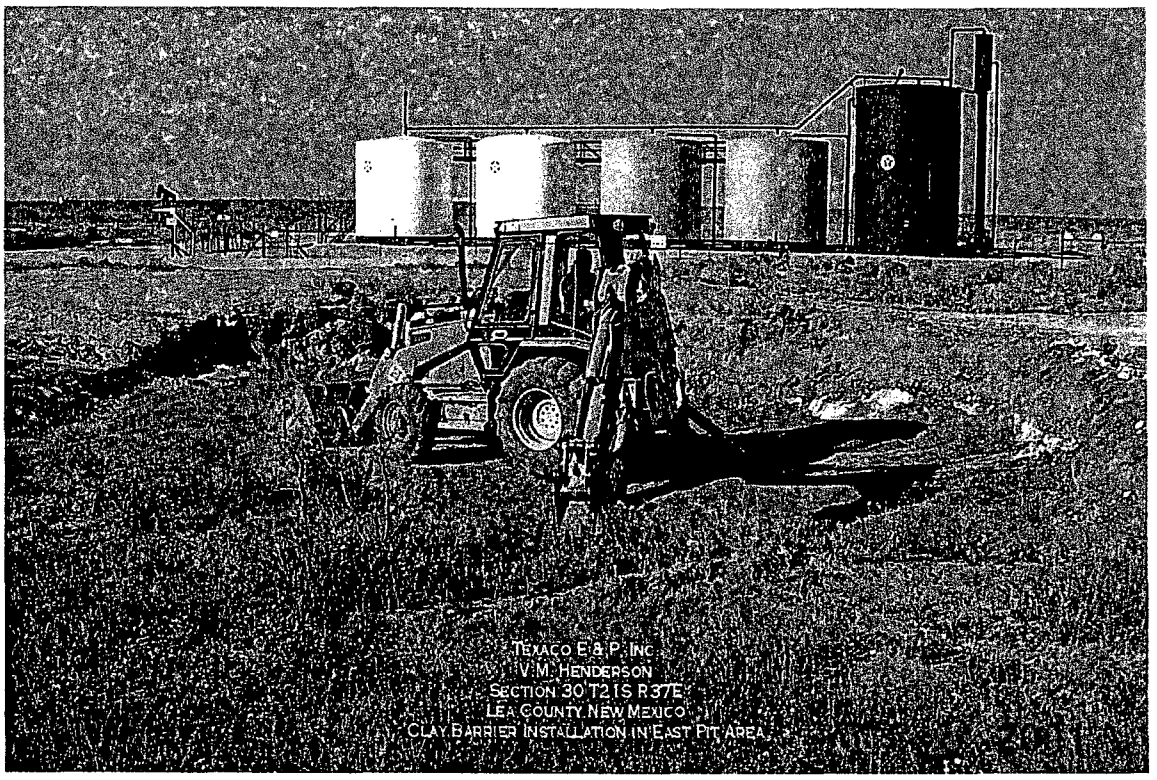

Texaco E & P, Inc.
V.M. Henderson Battery
East Excavation

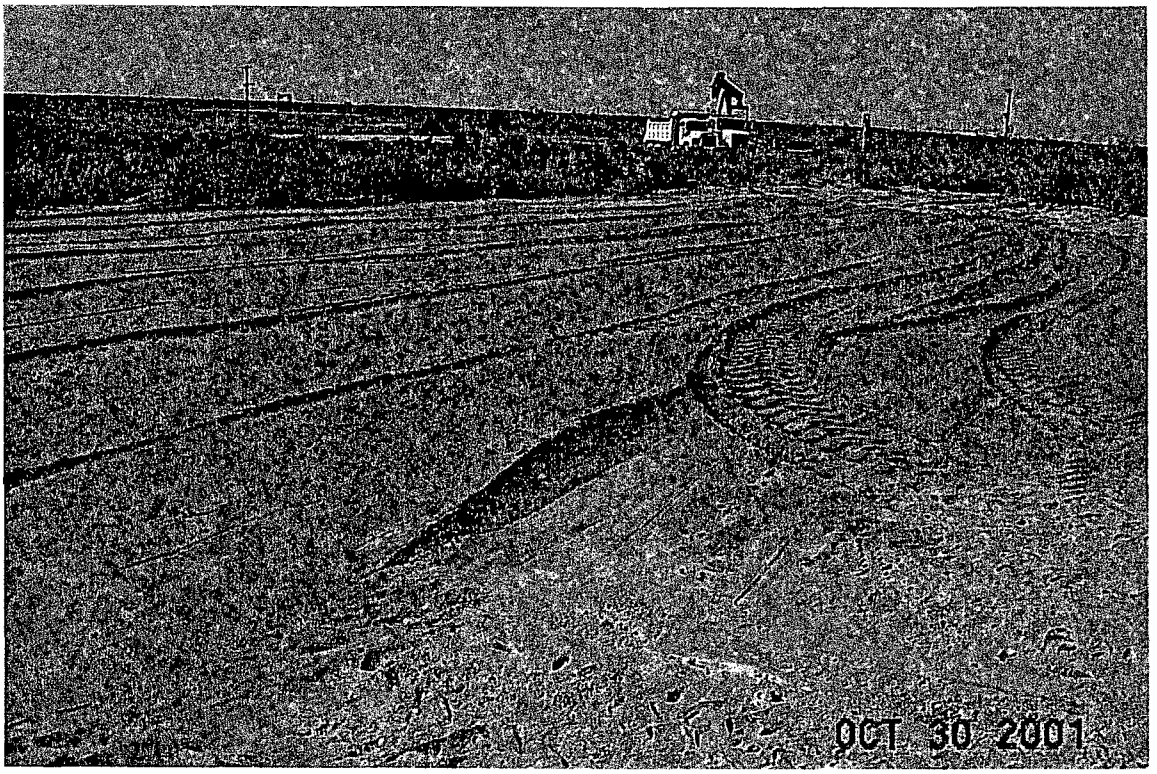

TEXACO E & P, INC.
V.M. HENDERSON
SECTION 30 T21S R37E
LEA COUNTY NEW MEXICO
WEST PIT AREA EXCAVATION
5/16/2001


TEXACO E & P, INC.
V.M. HENDERSON
SECTION 30 T21S R37E
LEA COUNTY NEW MEXICO
OCT. 2 2001


TEXACO E & P INC
V.M. HENDERSON
SECTION 30 T 21 S R 37 E
LEA COUNTY NEW MEXICO
CLAY BARRIER INSTALLATION IN WEST PIT AREA
OCT 24 2001


OCT 24 2001


TEXACO E & P, INC
V. M. HENDERSON
SECTION 30 T21S R37E
LEA COUNTY NEW MEXICO
CLAY BARRIER INSTALLATION IN EAST PIT AREA


OCT 30 2001

APPENDIX F

ELT Reports

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

LARSON & ASSOCIATES, INC.
ATTN: MR. MARK LARSON
P.O. BOX 50685
MIDLAND, TEXAS 79710-0685
FAX: 687-0456

Sample Type: Soil
Sample Condition: Intact/ Iced/ 7 deg C
Project Name: Texaco-V.M. Henderson
Project #: 01-0109
Project Location: Lea County, NM

Sampling Date: See Below
Receiving Date: 09/07/01
Analysis Date: 09/10/01

ELT#	FIELD CODE	Chloride mg/kg	SAMPLE DATE
0101522-01	BH-1, 0-2'	18	9/06/01
0101522-03	BH-1, 20'	35	9/06/01
0101522-05	BH-1, 40'	71	9/06/01
0101522-07	BH-1, 70'	35	9/06/01
0101522-09	BH-2, 0-1'	329	9/06/01
0101522-11	BH-2, 20'	39	9/06/01
0101522-13	BH-2, 40'	51	9/06/01
0101522-15	BH-2, 70'	18	9/07/01
0101522-17	BH-3, 0-1'	1290	9/07/01
0101522-19	BH-3, 20'	748	9/07/01
0101522-21	BH-3, 40'	257	9/07/01
0101522-23	BH-3, 60'	346	9/07/01
0101522-24	BH-4, 0-1'	89	9/07/01
0101522-26	BH-4, 20'	71	9/07/01
0101522-28	BH-4, 40'	354	9/07/01
0101522-30	BH-4, 60'	160	9/07/01
	QUALITY CONTROL	5140	
	TRUE VALUE	5000	
	% INSTRUMENT ACCURACY	103	
	SPIKED AMOUNT	500	
	ORIGINAL SAMPLE	160	
	SPIKE	674	
	SPIKE DUP	665	
	% EXTRACTION ACCURACY	101	
	BLANK	<5.00	
	RPD	1.34	

Methods: SW 846-9253

Raland K. Tuttle

9-11-01
Date

Environmental Lab of Texas, Inc.

12600 West I-20 East
Odessa, Texas 79763
Phone: 915-563-1800
Fax: 915-563-1713

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Jan 23 03 09:46a

Project Manager: Mark Larson
Company Name: Larson and Associates, Inc.
Company Address: P.O. Box 50685
City/State/Zip: Midland TX 79710-0685
Telephone No: (915) 687-0901 Fax No: (915) 687-0456
Sampler Signature:

Project Name: Texaco - V. M. Henderson
Project #: 01-0109
Project Loc: Lea County, NM
PO #:

LAB # (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice	HNO3	HCl	NaOH	H2SO4	None	Other (Specify)	Matrix: Water	Sludge	Soil	Other (specify)	Analyze For: TCLP / TOTAL: TDS / Cl / SAR / EC	TPH 418.1	TPH TX 1005/1006	TPH 8015M GRO/DRO	Metals As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	BTEX 8021B/5030	RUSH TAT (Pre-Schedule)	Standard TAT
010522-01	Bit-1 0-2'	9-6-01	1242	1									✓			✓									
02	10'		1245	1									✓												
03	20'		1300	1									✓		✓										
04	30'		1308	1									✓												
05	40'		1315	1									✓		✓										
06	50'		1327	1									✓												
07	70'		1400	1									✓		✓										
08	↓ 80'		1410	1									✓												
09	Bit-2 0-1'		1455	1									✓		✓										
10	" 10'	↓	1502	1									✓												

Special Instructions:

Sample Containers Intact? Y N
Temperature Upon Receipt:
Laboratory Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
	9/7/01	1635			
Relinquished by:	Date	Time	Received by ELOT:	Date	Time
				9-7-01	1635

Environmental Lab of Texas, Inc.

12600 West I-20 East
Odessa, Texas 79763
Phone: 915-563-1800
Fax: 915-563-1713

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Mark Larson
Company Name: Larson and Associates, Inc.
Company Address: P. O. Box 50685
City/State/Zip: Midland, TX 79710-0685
Telephone No: (915) 687-0901 Fax No: (915) 687-0456
Sampler Signature:

Project Name: Texaco - V. M. Henderson
Project #: 01-0109
Project Loc: Lea County, NM
PO #:

LAB # (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice	HNO3	HCl	NaOH	H2SO4	None	Other (Specify)	Matrix: Water	Sludge	Soil	Other (specify)	Analyze For: TCLP/TOTAL: TDS / SAR / EC	TPH 418.1	TPH TX 1005/1006	TPH 8015M GRO/DRO	Metals As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	BTEX 8021B/5030	RUSH TAT (Pre-Schedule)	Standard TAT
10152-11	BH-2, 20'	9-6-01	1512	1									✓			✓									
12	30'		1524	1									✓												
13	40'		1534	1									✓												
14	50'	↓	1542	1									✓												
15	70'	9-7-01	0855	1									✓			✓									
16	80'		0905	1									✓												
17	BH-3, 0-1'		0925	1									✓			✓									
18	10'		0932	1									✓												
19	25'		0940	1									✓			✓									
20	30'	↓	0947	1									✓												

Special Instructions:

Sample Containers Intact? Y N
Temperature Upon Receipt:
Laboratory Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
	9/7/01	1635			
Relinquished by:	Date	Time	Received by ELOT:	Date	Time
				9-7-01	1635

Environmental Lab of Texas, Inc.

1910 West I-20 East
Odessa, Texas 79761
Phone: 915-563-1800
Fax: 915-563-1713

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Mark Larson
Company Name: Larson and Associates, Inc.
Company Address: P.O. Box 50685
City, State, Zip: Midland, Tx 79710-0685
Telephone No: (915) 687-0901 Fax No: (915) 687-0456
Sampler Signature:

Project Name: Texaco - V. M. Hendrson
Project #: 01-0109
Project Loc: Lea County, NM
PO #:

Page 3 of 3

LAB # (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice	HNO3	HCl	NaOH	H2SO4	None	Other (Specify)	Matrix: Water	Sludge	Soil	Other (specify)	Analyze For: TCLP / TOTAL: TDS / Cl / SAR / EC	TPH 418.1	TPH TX 1005/1006	TPH 8015M GRO/DRO	Metals As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	BTEX 8021B/5030	RUSH TAT (Pre-Schedule)	Standard TAT
01022-21	BH-3 40'	9-7-01	0955	1	✓								✓			✓									
22	50'		1007	1	✓								✓												
23	↓ 60'		1025	1	✓								✓			✓									
24	BH-4 0-1'		1105	1	✓								✓												
25	10'		1115	1	✓								✓			✓									
26	20		1120	1	✓								✓												
27	30		1128	1	✓								✓			✓									
28	40		1134	1	✓								✓												
29	50		1144	1	✓								✓			✓									
30	↓ 60'	↓	1155	1	✓								✓												

Special Instructions:

Sample Containers Intact? Y N
Temperature Upon Receipt:
Laboratory Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
	9/7/01	1635			
Relinquished by:	Date	Time	Received by ELOT:	Date	Time
			Richard Jones	9-7-01	1635

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

LARSON & ASSOCIATES, INC.
ATTN: MR. MARK LARSON
P.O. BOX 50685
MIDLAND, TEXAS 79710-0685
FAX: 687-0456

Sample Type: Soil
Sample Condition: Intact/ Iced/ 1.0 deg C
Project Name: Texaco-V.M. Henderson
Project #: 01-0109
Project Location: Lea County, NM

Sampling Date: 09/10/01
Receiving Date: 09/12/01
Analysis Date: 09/12/01

ELT#	FIELD CODE	Chloride mg/kg
0101545-01	BH-5, 0-1'	514
0101545-03	BH-5, 20'	81
0101545-05	BH-5, 40'	116
0101545-07	BH-5, 70'	67
0101545-09	BH-6, 0-1'	26
0101545-11	BH-6, 20'	14
0101545-13	BH-6, 40'	16
0101545-14	BH-6, 50'	14
0101545-15	BH-7, 0-1'	30
0101545-17	BH-7, 20'	768
0101545-19	BH-7, 40'	993
0101545-20	BH-7, 50'	35

QUALITY CONTROL	5250
TRUE VALUE	5000
% INSTRUMENT ACCURACY	105
SPIKED AMOUNT	500
ORIGINAL SAMPLE	514
SPIKE	1030
SPIKE DUP	1030
% EXTRACTION ACCURACY	103
BLANK	<5.00
RPD	0

Methods: SW 846-9253

Raland K. Tuttle

9-12-01
Date

Environmental Lab of Texas, Inc.

12600 West I-20 East
Odessa, Texas 79763
Phone: 915-563-1800
Fax: 915-563-1713

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Mark Larson
Company Name: Larson and Associates Inc.
Company Address: P.O. Box 50685
City/State/Zip: Midland, Tx 79710-0685
Telephone No: (915) 687-0901 Fax No: (915) 687-0456
Sampler Signature:

Project Name: Texaco - V.M. Henderson
Project #: 01-0109
Project Loc: Lea County, NM
PO #:

LAB # (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice	HNO_3	HCl	NaOH	H_2SO_4	None	Other (Specify)	Matrix: Water	Sludge	Soil	Other (specify)	Analyze For: TCLP/TOTAL: TDS (Cl)	SAR / EC	TPH 418.1	TPH TX 1005/1006	TPH 8015M GRO/DRO	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	BTEX 8021B/5030	RUSH TAT (Pre-Schedule)	Standard TAT
010 1545-01	Bit-5 0-1'	9-10-01	0810	1									✓		✓	✓										
02	10'		0817	1									✓			✓										
03	20'		0826	1									✓			✓										
04	30'		0835	1									✓			✓										
05	40'		0845	1									✓			✓										
06	60'		0920	1									✓			✓										
07	70'		0930	1									✓			✓										
08	90'		0940	1									✓			✓										
09	Bit-6 -		-	-																						
10	" -		-	-																						

Special Instructions:

Sample Containers Intact? (Y) N
Temperature Upon Receipt: 1.0 °C
Laboratory Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
	9/12/01	075			
Relinquished by:	Date	Time	Received by ELOT:	Date	Time
			Jaime Mayberry	9-12-01	0930

Environmental Lab of Texas, Inc.

12600 West I-20 East
Odessa, Texas 79763
Phone: 915-563-1800
Fax: 915-563-1713

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Mark Larson
Company Name: Larson and Associates, Inc.
Company Address: P.O. Box 50685
City/State/Zip: Midland, TX 79705-0685
Telephone No: (915) 687-0901 Fax No: (915) 687-0456
Sampler Signature:

Project Name: Texaco - V.M. Henderson
Project #: 01-0109
Project Loc: Lea County, NM
PO #:
Page 2 of 3

LAB # (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice	HNO3	HCl	NaOH	H2SO4	None	Other (Specify)	Matrix: Water	Sludge	Soil	Other (specify)	Analyze For: TCLP / TOTAL: TDS / Cl / SAR / EC	TPH 418.1	TPH TX 1005/1006	TPH 8015M GRO/DRO	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	BTEX 8021B/5030	RUSH TAT (Pre-Schedule)	Standard TAT
01015US-09	BH-6 0-1'	9-10-01	1025	1									✓		✓	✓									
10	10'		1032	1									✓		✓										
11	20'		1040	1									✓		✓										
12	30'		1100	1									✓		✓										
13	40'		1105	1									✓		✓										
14	50'		1115	1									✓		✓										
15	BH-7 0-1'		1132	1									✓		✓	✓									
16	10'		1140	1									✓												
17	20'		1150	1									✓												
18	30'	↓	1200	1									✓												

Special Instructions:

Sample Containers Intact? (Y) N
Temperature Upon Receipt: 1.0°C
Laboratory Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
	9/12/01	0715			
Relinquished by:	Date	Time	Received by ELOT:	Date	Time
				9-12-01	0800

Jan 23 03 09:49a

p.8

Environmental Lab of Texas, Inc.

12600 West I-20 East
Odessa, Texas 79763
Phone: 915-563-1800
Fax: 915-563-1713

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Mark Larson
Company Name: Larson and Associates, Inc.
Company Address: P.O. Box 50685
City/State/Zip: Midland, Tx 79710-0685
Telephone No: (915) 687-0901
Fax No: (915) 687-0456
Sampler Signature: [signature]

Project Name: Texaco - V.M. Henderson
Project #: 01-0109
Project Loc: Lea County, NM
PO #:
Page 3 of 3

LAB # (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice	HNO_3	HCl	NaOH	H_2SO_4	None	Other (Specify)	Matrix: Water	Sludge	Soil	Other (specify)	Analyze For: TDS / (Cl) / SAR / EC	TPH 418.1	TPH TX 1005/1006	TPH 8015M GRO/DRO	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	BTEX 8021B/5030	RUSH TAT (Pre-Schedule)	Standard TAT
0101545-19	BH-7 40'	9-10-01	1205	1										✓		✓									
20	" 50'	9-10-01	1215	1										✓		✓									

TCLP:
TOTAL:

Special Instructions:

Sample Containers Intact? (Y) N
Temperature Upon Receipt: 1.0°C
Laboratory Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	9/12/01	0715			
Relinquished by:	Date	Time	Received by ELOT: [signature]	9-12-01	0800

ENVIRONMENTAL LAB OF , INC.

"Don't Treat Your Soil Like Dirt!"

LARSON & ASSOCIATES, INC.
ATTN: MARK LARSON
507 N. MARIENFIELD, STE. 202
MIDLAND, TEXAS 79701
FAX: 687-0456

Sample Type: Soil
Sample Condition: Intact/ 20.5 deg C
Project Name: V.M. Henderson
Project #: 1-0109
Project Location: Lea County, NM

Sampling Date: See Below
Receiving Date: 12/04/01
Analysis Date: 12/05/01

ELT#	FIELD CODE	Chloride mg/kg	Sample Date
0102132-01	BH-8, 40'	19	12/03/01
0102132-02	BH-8, 50'	44	12/03/01
0102132-03	BH-8, 60'	18	12/03/01
0102132-04	BH-8, 70'	18	12/04/01
0102132-05	BH-8, 80-82'	18	12/04/01
0102132-06	BH-8, 90-92'	18	12/04/01
0102132-07	BH-8, 100-102'	18	12/04/01

QUALITY CONTROL	5050
TRUE VALUE	5000
% INSTRUMENT ACCURACY	101
SPIKED AMOUNT	500
ORIGINAL SAMPLE	18
SPIKE	523
SPIKE DUP	523
% EXTRACTION ACCURACY	101
BLANK	<5.00
RPD	0.0

Methods: SW 846-9253

Celey D. Keene
Raland K. Tuttle

12-07-01
Date

Environmental Lab of Texas, Inc.

12600 West I-20 East
Odessa, Texas 79763
Phone: 915-563-1800
Fax: 915-563-1713

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Mark Larson
Company Name: Larson and Associates, Inc.
Company Address: 507 N Marienfeld, Ste 202
City/State/Zip: Midland Texas 79701
Telephone No: (915) 687-0901
Fax No: (915) 687-0456
Sampler Signature:

Project Name: V. M. Henderson
Project #: 1-0109
Project Loc: Lea County, NM
PO #:

LAB # (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice	HNO3	HCl	NaOH	H2SO4	None	Other (Specify)	Matrix: Water	Sludge	Soil	Other (specify)	Analyze For: TCLP: TDS ACL / SAR / EC	TPH 418.1	TPH TX 1005/1006	TPH 8015M GRO/DRO	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	BTEX 8021B/5030	RUSH TAT (Pre-Schedule)	Standard TAT
0102132-01	BH-5 40'	12/3/01	1230	1										✓		✓									
02	" 50'	"	1350	1										✓		✓									
03	" 60'	"	1605	1										✓		✓									
04	" 70'	12/4/01	0750	1										✓		✓									
05	" 80-82'	"	0815	1										✓		✓									
06	" 90-92'	"	0825	1										✓		✓									
07	" 100-102'	"	0845	1										✓		✓									

Special Instructions:

Sample Containers Intact? (Y) N
Temperature Upon Receipt: 20.5°C
Laboratory Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
	12/4/01	1352			
Relinquished by:	Date	Time	Received by ELOT:	Date	Time
				12-04-01	1352

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APPENDIX G

Geologic Logs

Project No: V.M.Henderson

Project: 01-0109

Client: Texaco

Location:

Log: BH-1

Page: 1 of 1

Geologist: M.J.Larson

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Number	Type	Recovery	PID (ppm) 5 15 25 35 45	Notes
0		Ground Surface					
0–25		***Silty Sand*** 7.5 YR 4/6,strong brown,very fine grained quartz sand,poorly sorted,dry,loose				8.7 8.5 8.0	
25–40		***Caliche*** 10 YR 7/4,pink,sandy,very fine grained quartz sand,moderatly hard				8.2 8.1	
40–80		***Sand*** 10 YR 7/3,pink,very fine grained quartz sand,moderatly sorted,round,dry,slightly consolidated				7.4	
80		TD:91 Feet					

Drill Method: Air Rotary

Drill Date: 06-Sept-01

Hole Size:

Larson and Associates, Inc.
507 N. Marienfeld, Suite 202
Midland, Texas 79701
(915) 687-0901

Datum: Ground

Checked by: MJL

Drilled by : Scarbrough Drilling

Project No: V.M.Henderson

Project: 01-0109

Client: Texaco

Location:

Log: BH-2

Page: 1 of 1

Geologist: M.J.Larson

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Number	Type	Recovery	PID (ppm) 5 15 25 35 45	Notes
0		Ground Surface					
0–5		***Caliche*** 10 YR 7/3,very pale brown,sandy,very fine grained quartz sand,moderatly hard				15.2	
5–10						15.0	
10–15							
15–20						13.8	
20–25		***Sand*** 7.5 YR 7/3 to 7/4,pink,very fine grained quartz sand,poorly sorted,moderatly consolidated					
25–30						9.8	
30–35							
35–40						10.1	
40–45							
45–50							
50–55							
55–60							
60–65							
65–70							
70–75							
75–80							
80		TD:80 Feet					
80–85							
85–90							
90–95							
95–100							
100–105							
105–110							
110–115							
115–120							
120–125							
125–130							
130–135							
135–140							
140–145							
145–150							

Drill Method: Air Rotary

Drill Date: 06-Sept-01

Hole Size:

Larson and Associates, Inc.
507 N. Marienfeld, Suite 202
Midland, Texas 79701
(915) 687-0901

Datum: Ground

Checked by: MJL

Drilled by : Scarbrough Drilling

Project No: 01-0101

Project: V.M. Henderson

Client: Texaco

Location:

Log: BH-3

Page: 1 of 1

Geologist: M.J. Larson

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Number	Type	Recovery	PID (ppm) 5 15 25 35 45	Notes
0		Ground Surface				5.4	
5		***Caliche*** 7.5 YR 7/4,pink,sandy,very fine grained quartz sand				4.8	
10							
15							
20		***Sand*** 7.5 YR 7/4,pink,very fine grained quartz sand,poorly sorted				1.4	
25							
30						5.6	
35							
40						4.9	
45		7.5 YR 6/6,reddish yellow below 50'					
50						6.4	
55							
60						5.1	
65							
70		TD:70 Feet					
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							
125							
130							
135							
140							
145							
150							

Drill Method: Air Rotary

Drill Date: 7-Sept-01

Hole Size:

Larson and Associates, Inc.
507 N. Marienfeld, Suite 202
Midland, Texas 79701
(915) 687-0901

Datum: Ground

Checked by: MJL

Drilled by : Scarborough Drilling

Project No: 01-0101

Project: V.M. Henderson

Client: Texaco

Location:

Log: BH-4

Page: 1 of 1

Geologist: M.J. Larson

SUBSURFACE PROFILE | **SAMPLE**

Depth	Symbol	Description	Number	Type	Recovery	PID (ppm) 5 15 25 35 45	Notes
0		Ground Surface				20.0	
5		***Caliche*** 7.5 YR 7/4,pink,sandy,very fine grained quartz sand,moderately hard				14.2	
10							
15						16.6	
20		***Sand*** 7.5 YR 7/4,pink,very fine grained quartz sand,poorly sorted,moderately consolidated					
25						14.6	
30							
35						8.1	
40							
45		7.5 YR 6/6,reddish yellow below 50'				9.5	
50							
55							
60						8.0	
65		***Sandstone*** 2.5 YR 6/4,red,very fine grained quartz sand,very hard					
70							
75							
80		TD:63 Feet					
85							
90							
95							
100							
105							
110							
115							
120							
125							
130							
135							
140							
145							
150							

Drill Method: Air Rotery

Drill Date: 7-Sept-01

Hole Size:

Larson and Associates, Inc.
507 N. Marienfeld, Suite 202
Midland, Texas 79701
(915) 687-0901

Datum: Ground

Checked by: MJL

Drilled by : Scarborough Drilling

Project No: 01-0101

Project: V.M.Henderson

Client: Texaco

Location:

Log: BH-5

Page: 1 of 1

Geologist: M.J.Larson

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Number	Type	Recovery	PID (ppm) 5 15 25 35 45	Notes
0		Ground Surface				6.8	
0–20		***Caliche*** 7.5 YR 8/3,pink,sandy,very fine grained quartz sand,consolidated,moderately hard,dry				8.4, 8.1	
20–50		***Sand*** 5 YR 7/3,pink,very fine grained quartz sand,poorly sorted,weakly cemented				7.6, 8.4	
50–65		5 YR 6/6,reddish yellow below 50',loose sand				7.8	
65–80		thin units of sandstone,quartzite below 60'				8.0, 9.1	
80		TD:80 Feet					

Drill Method: Air Rotery

Drill Date: 10-Sept-01

Hole Size:

Larson and Associates, Inc.
507 N. Marienfeld, Suite 202
Midland, Texas 79701
(915) 687-0901

Datum: Ground

Checked by: MJL

Drilled by : Scarborough Drilling

Project No: 01-0101

Project: V.M.Henderson

Client: Texaco

Location:

Log: BH-6

Page: 1 of 1

Geologist: M.J.Larson

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Number	Type	Recovery	PID (ppm) 5 15 25 35 45	Notes
0		Ground Surface				8.5	
5		***Slity Sand*** 5 YR 6/6,yellowish red,very fine grained quartz sand,poorly sorted,loose,dry				9.0	
10							
15							
20						8.3	
25		***Sand*** 5 YR 5/4 to 6/4,reddish brown,very fine grained quartz sand,poorly sorted,weakly cemented,interbedded with thin units of caliche					
30						8.9	
35							
40						8.8	
45							
50		TD:50 Feet				8.8	
55							
60							
65							
70							
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							
125							
130							
135							
140							
145							
150							

Drill Method: Air Rotery

Drill Date: 10-Sept-01

Hole Size:

Larson and Associates, Inc.
507 N. Marienfeld, Suite 202
Midland, Texas 79701
(915) 687-0901

Datum: Ground

Checked by: MJL

Drilled by : Scarborough Drilling

Project No: 01-0101

Project: V.M.Henderson

Client: Texaco

Location:

Log: BH-7

Page: 1 of 1

Geologist: M.J.Larson

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Number	Type	Recovery	PID (ppm) 5 15 25 35 45	Notes
0		Ground Surface				9.8	
5		***Silty Sand*** 5 YR 6/4,light reddish brown,very fine to fine grained quartz sand,poorly sorted,loose,dry				7.4	
10							
15							
20						8.1	
25		***Caliche*** 10 YR 8/1,white sandy,very fine grained quartz sand,moderatly hard					
30						8.1	
35							
40						8.1	
45		***Sand*** 10 YR 7/3 to 8/3,very pale brown,very fine grained quartz sand,poorly sorted,weakly cemented,dry					
50						7.8	
55		TD:50 Feet					
60							
65							
70							
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							
125							
130							
135							
140							
145							
150							

Drill Method: Air Rotery

Drill Date: 10-Sept-01

Hole Size:

Larson and Associates, Inc.
507 N. Marienfeld, Suite 202
Midland, Texas 79701
(915) 687-0901

Datum: Ground

Checked by: MJL

Drilled by : Scarborough Drilli8ng

Project No: 01-0101

Project: V.M.Henderson

Client: Texaco

Location:

Log: BH-8

Page: 1 of 1

Geologist: M.J.Larson

SUBSURFACE PROFILE

Depth	Description
0	Ground Surface
0–5	***Sand*** 5 YR 5/6 to 5/8,very fine grained quartz sand,loose fill
5–25	***Clay*** 2.5 YR 4/6,red,compacted shale fill
25–40	***Silty Sand / Caliche*** 5 YR 7/2 to 8/4,pinkish gray to pink,very fine grained quartz sand,loose fill
40–100	***Sandstone*** 7.5 YR 7/4,pink,very fine grained quartz sand,poorly sorted,round,interbedded units of hard sandstone and soft sand 7.5 YR 6/6,reddish yellow below 60',moderatly hard sandstone,fine grained quartz sand,round,poorly sorted
100	Slightly moist at 70'
100–120	dry,very fine grained quartz sand,round,moderatly sorted
120–135	interbedded with thin units of very well cemented sandstone (quartzite),very moist at 103'
135	TD:103 Feet

SAMPLE

Number	Type	Recovery

PID (ppm) 5 15 25 35 45

26.4
13.6
14.7
46.3
14.5
18.1

Notes

Drill Method: Hallow Stem Auger/Air

Drill Date: 3-Dec-01

Hole Size:

Larson and Associates, Inc.
507 N. Marienfeld, Suite 202
Midland, Texas 79701
(915) 687-0901

Datum: Ground

Checked by: MJL

Drilled by : E.T.G.I