

REPORTS

YEAR(S):



Addendum to Phase IV Report of Subsurface Investigation, Phillips 66 Natural Gas Company, Lee Gas Plant

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September 24, 1991

Prepared for:

Mr. Ralph McCord PHILLIPS PETROLEUM COMPANY 4001 Penbrook Odessa, Texas

Prepared by:

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Volume	Temperature	Conductivity	pН	Time
13	24.1	1000	7.06	1307
25	21.1	980	7.03	1310
35	20.7	1010	7.16	1311
45	20.6	97 0	7.17	1312
55	20.6	1010	7.30	1313
65	20.5	990	7.20	1314
75	20.5	97 0	7.20	1315

MW-12

Volume = Cumulative gallons Temperature = Celsius Conductivity = Micro ohms

Time = Hours on 6/26/91

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MW-11

Volume	Temperature	Conductivity	рН	Time
10	22.8	1360	6.87	1410
20	21.7	1020	6.87	1413
30	21.4	860	6.90	1416
40	21.4	790	6.87	1419
50	21.4	750	6.90	1423
60	21.6	700	6.96	1427
70	21.9	500	6.95	1433

Volume = Cumulative gallons Temperature = Celsius Conductivity = Micro ohms Time = Hours on 6/26/91

olume	Temperature	Conductivity	рН	Time
2	25.3	NA	6.94	1534
10	21.6	1100	6.97	1535
20	21.6	1210	6.91	1538
30	20.9	1150	6.93	1540
40	21.1	1050	6.94	1543
50	21.2	1070	6.92	1547

Volume = Cumulative gallons Temperature = Celsius Conductivity = Micro ohms Time = Hours on 6/26/91 NA = Not Available

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MW-14

Volume	Temperature	Conductivity	рН	Time
2	20.7	1100	6.86	0558
20	20.2	1050	6.83	0602
30	20.0	1100	6.87	0604
40	20.1	1110	6.86	0605
50	20.2	1100	6.82	0607

Volume = Cumulative gallons Temperature = Celsius Conductivity = Micro ohms Time = Hours on 6/27/91

MW-13

olume	Temperature	Conductivity	рН	Time
10	20.5	610	7.06	0726
20	21.0	500	7.04	0745
30	20.6	500	7.02	0817

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Volume	Temperature	Conductivity	рН	Time
10	21.7	1310	6.73	0911
20	21.1	1160	6.77	0912
30	21.0	1050	6.76	0913
40	21.0	1030	6.78	0915
50	20.9	1010	6.78	0916
60	21.0	1010	6.79	0917

Volume = Cumulative gallons Temperature = Celsius Conductivity = Micro ohmsTime = Hours on 6/27/91

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MW-9

Volume	Temperature	Conductivity	рН	Time
5	22.6	900	7.60	1043
25	21.9	880	7.56	1045
75	21.9	800	7.51	1056
125	21.6	760	7.54	1104
175	21.7	760	7.58	1111
230	21.8	740	7.55	1119
285	21.7	745	7.57	1128

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MW-3

Volume	Temperature	Conductivity	рН	Time
1	21.8	780	7.03	1330
2	21.2	780	7.06	1334
2.5	21.1	780	7.06	1337
3	21.0	740	7.00	1342
3.5	21.0	710	7.01	1346

Volume = Cumulative gallons Temperature = Celsius Conductivity = Micro ohms Time = Hours on 6/27/91 WS-2

Volume	Temperature	Conductivity	рН	Time
.5	22.4	550	7.00	1452
1.5	21.2	560	7.03	1458
3	21.1	550	6.95	1501
3.5	21.2	550	6.97	1505

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MW-1

Volume	Temperature	Conductivity	рН	Time
.5	22.0	590	7.10	1535
1	21.0	520	7.02	1538
1.25	20.7	500	6.76	NA
1.5	20.5	500	6.97	1542
2	20.5	490	6.98	1546

Volume = Cumulative gallons Temperature = Celsius Conductivity = Micro ohms Time = Hours on 6/27/91 NA = Not available

MW-2

olume	Temperature	Conductivity	рН	Time
5	21.5	900	6.82	1614
8	21.6	1020	6.28	1618
12	21.8	1060	6.96	1622
34.5	22.0	1100	6.85	1635
42	22.0	1080	6.91	1645

24

MW-10

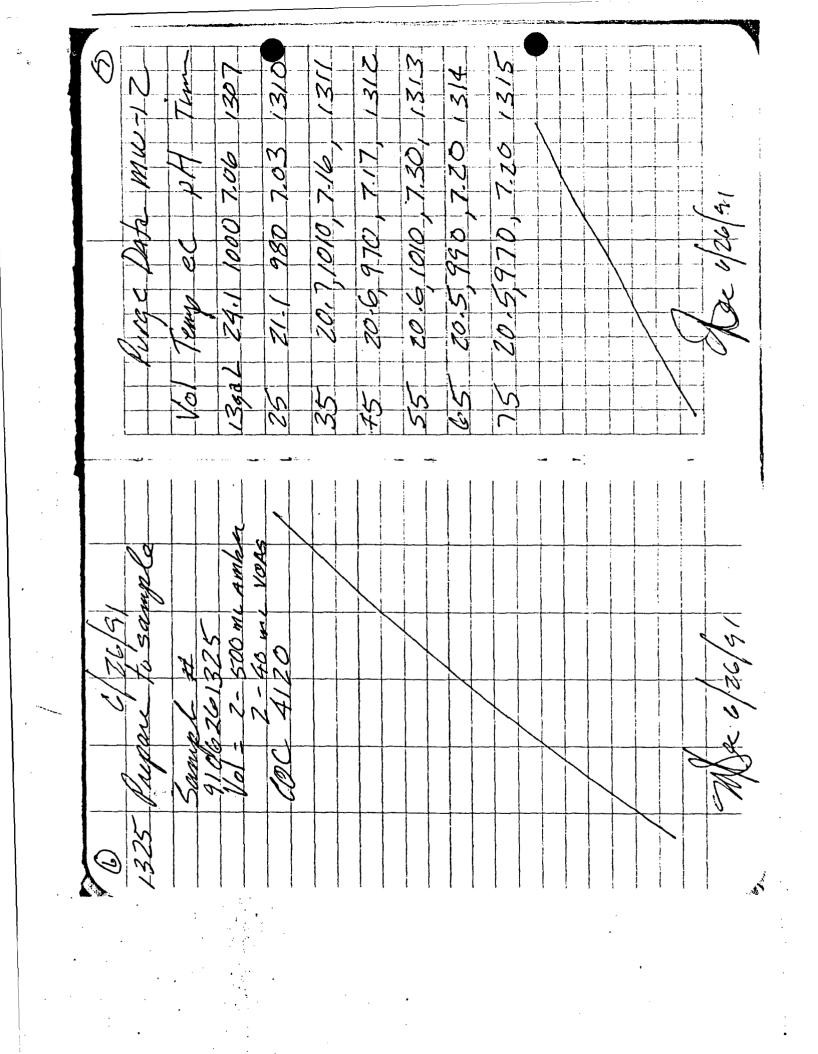
Volume	Temperature	Conductivity	рН	Time
10	21.2	1480	6.80	1656
20	21.0	1450	6.80	1658
30	21.1	1470	6.81	1660
40	21.1	1440	6.81	1703

Volume = Cumulative gallons Temperature = Celsius Conductivity = Micro ohms Time = Hours on 6/27/91 **MW-7**

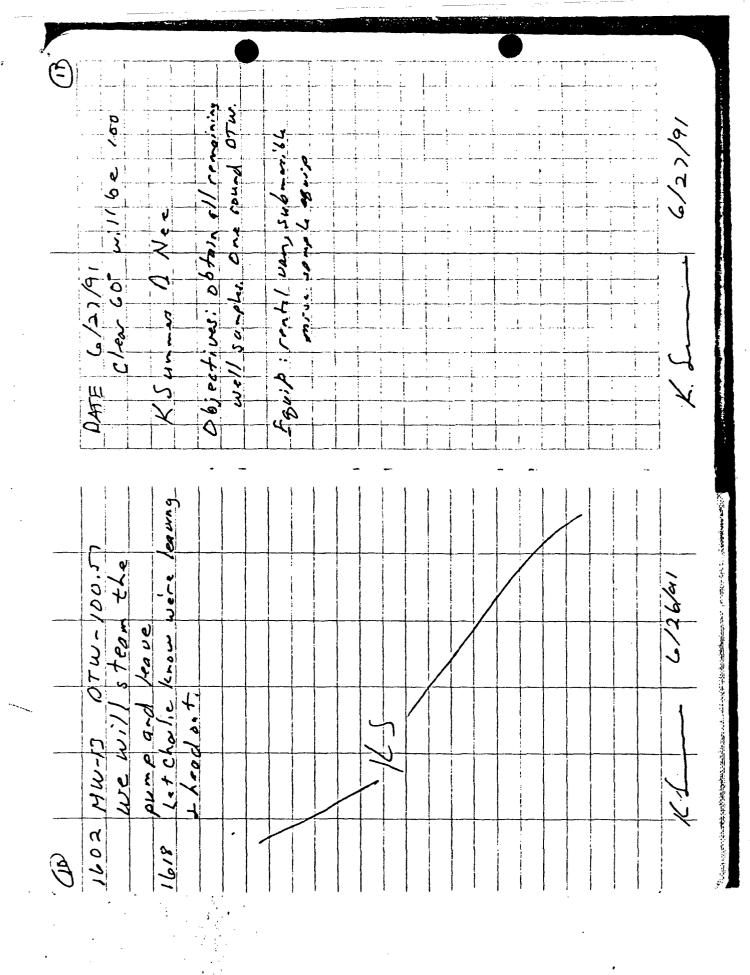
olume	Temperature	Conductivity	рН	Time
10	20.8	1390	7.17	1718
20	20.9	1240	7.19	1723
30	20.8	1200	7.16	1727
40	20.8	1200	7.18	1735

MW-8

0528/P4COND.DAT



 (\mathcal{F}) С Ф Q7F X 6/20 ì 00 ð 6 NV q 80 45 ×7016# DTE 1† ر م 05 0 > 0 210 050 o pullar 7 t as 124-1 6 ר מ 805 \$ \$ 1 00 ę 2 910 en/a ニシタビ n n -7 3 50. 00 7 500 540 0 0 0 0 200 4 4 U € 50 4/6 52 419 520 633 Erk. (e.87 300 10/10 0.87 .90 うと HO. 6.87 TPUL - Soft 3 96.9 5 BJEX 3 † のてくい water very clear de la ~ • + + ~ 4 ~ 4 ~ ~ water starts as sample adte pump Ame take wota Voe. 240 000 860 790 250 025 602 2 E trod 3015 Sampling Finish JH 9106261440 backgrund 7-500 " 1005 シャンド 1-1-12 ų rypE Med 32.8 2.7 e tro 1 2 1 CUCZ Cond 71.4 21.4 b J ATT μ. . Hau 1 r R (1) E 80% 2 ¢, С Ъ 5 5 0 30 50 50 40



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(j) 10/27/2	Deyl Lpekfor operator to move	tank to MW-5	U648 Woiting on Operator.		07/13 Operator thes moved tonk to	murst we will begin place	para cuoter is nucleor of	1)25 Well aprov to be purpine clew	and the second	L L L	10 20.5 N.610 7.06 0124	21.0 500	e r r	+0tel purgod to 359.01	that = Open			0737 Well dong not apprate be	property de un loped. There is	a lot of silt -leckenthere		word Charl 70 of hele	Well rs and open to age or 99'	+011/ million of po so da (20	valce/2
7.		to Hu-14	set.	and Copan			pere.	PH Tw	6.86 9558	6.83 0602	Let Doot		6.82 0607		t good		Dulled		6270615	BTEX		76			(2)/2/
6/27/94	Arrive onite	have relocoted	pump has been	N	m 0 2. 50 9		Purse Purpas	and level	Z	201 200	0011 0.02	20.1 11 VOG	2011 2,212		laramaters at	stop pulging		MW-14	Samplet 9106	TYPE Mad 8215	500-1	Han 1- 04		Steam Pump	
					0226					<u>``</u>	30		502		0608	5	 12		\sim	\mathcal{L}	γ	ά		0636 5	

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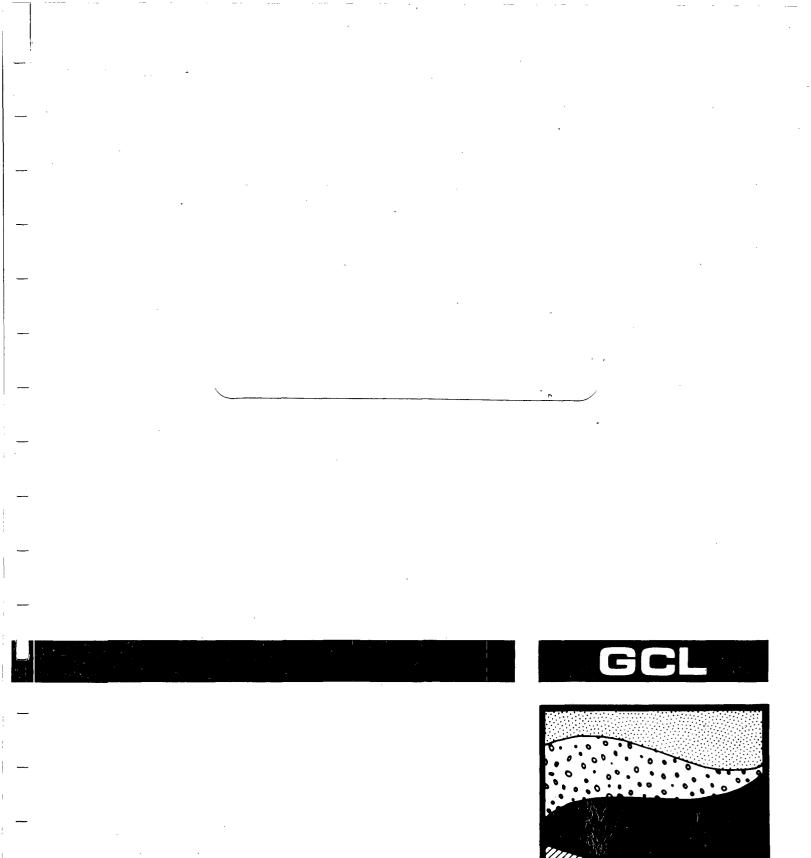
 $\widehat{\mathbb{C}}$ purged up/4-e305 x 34 6 C 0 1 1 7106271145 on 641000 E= 706 54 4 ようのし 3 9 6/24/9 0 0 VOA Ant Done tompling oumpol locote Sample At mod 801 1143 dene wit ATI Labs 3 . م 20.01 poiliod . 2.500× - 017-6 2 S. Lunci Back 001 For S DIE total Core 2 _0 _p 1 5 230 1300 1320 22/9 5701 5001 ìf 1056 704 1128 ~300 go/lows to purge 6 137, 4070 ノノノ David + operator 40 to 4.44 9420 Stubilized butmicky a ptt j. Gegin purge WS-2 seperator 7.5.4 5.00 7.60 7.56 ていし 5 Br Br 6/27/9, Arrive WS-2 W/1/44. TO 6000 trans HAN = Upon 880 006 (ond 972 140 760 0 45 , N D8.4 ro/ ... purge en ondset en pa 21.2 27.6 ne no 21.7 2:00 1009 5401 0/10 (J: (C) 570 5 8 A BC 1,7 ~ 5

•7 E - myht be a police 4 2 3 C 5 595 2 e 50 mp lo # 910 6221525 トレン 102 - 2 purst on 203 Sumple # 912627 6.9 3 OTEX 6/ (5/9) 0 ١ 2 3 3 303.75 97.02 0,35 10 ~ 0 0 0 0 355 3 Ŀ Jor 8-32 80% 2-500~ 2-100-'n 5 Ч ふ 200 074 -7 7 4004 1460-1 n n 2 Rinsed J. X V 1253 J 5 3 M - wasn't actually 206 7,43 Hd 10' 5466/204 must punc Survey to Kap. 3,0001 # 9/06 27/333 hole uppears to be bailing 122/91 erd. 780 Sample # 9106271350 080 780 240 Finally got lear to MW-2 210 7 2 9 6 2 MW-3 Dove us problem alon oto has T. me 12/141 Brey 95 L/ 334 C 5 5 52 OTEX rowat Nw-2 346 99.15=07W HW-J P-40-1 104-5 106 40 99.2 8015 d explairs ATT 401 -11 010-L 3-500-1 mod You Temp 21.0 21.0 21.0 dr -シント 505 E C -0-L Jup 1 ς η ک کر 3 、ニ・

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PHASE II REPORT OF SUBSURFACE INVESTIGATION PHILLIPS 66 NATURAL GAS COMPANY LEE GAS PLANT

RECEIVED

OCT 2 2 1990

October 9, 1990

OIL CONSERVATION DIV. SANTA FE

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PHASE II **REPORT OF SUBSURFACE INVESTIGATION** PHILLIPS 66 NATURAL GAS COMPANY LEE GAS PLANT

SUBMITTED BY:

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GCL Project Director

all GCL Senior Advisory Committee

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GCL Principal-In-Charge



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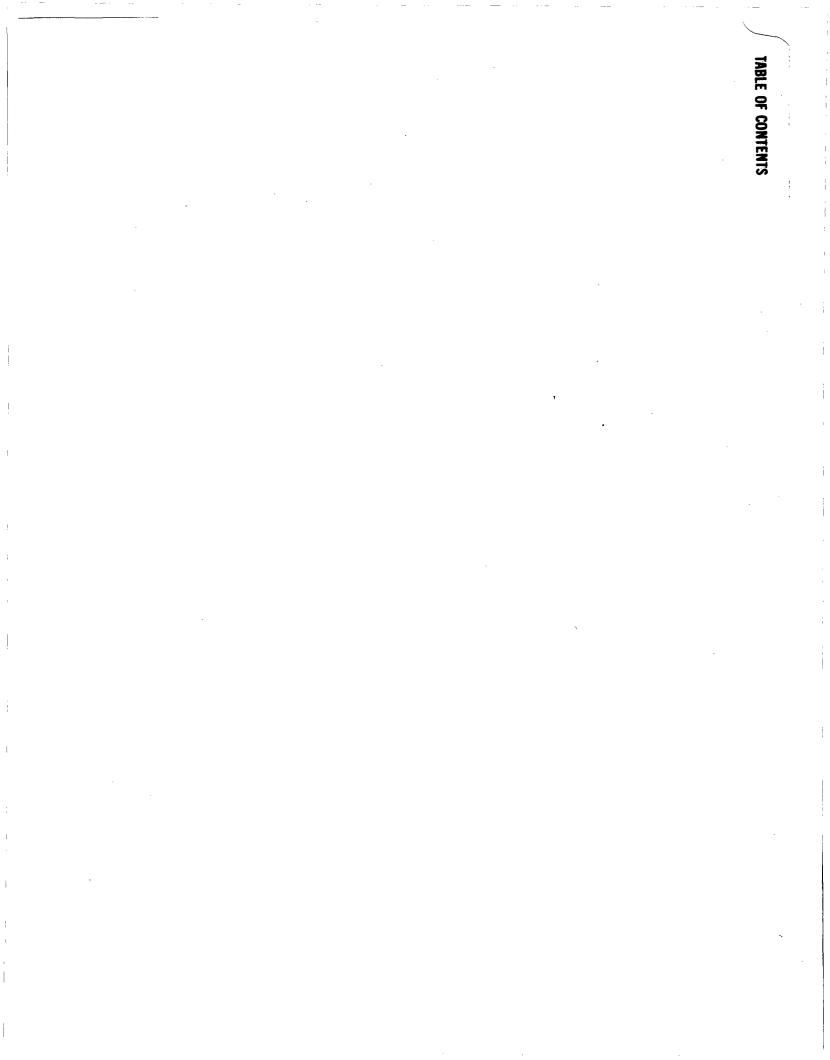


TABLE OF CONTENTS

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1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION	2
3.0	TECHNICAL APPROACH	3
4.0	RESULTS	6
5.0	GEOLOGY	12
6.0	HYDROGEOLOGY6.1 Regional Hydrogeology6.2 Site Hydrogeology	14
7.0	CONCLUSIONS	17
8.0	RECOMMENDATIONS	18
9.0	REFERENCES	20

LIST OF TABLES

Table

4-1	Analytical Results from March 1990 Sampling Event	7
4-2	Analytical Results from April 1990 Sampling Event	8
4-3	Analytical Results from August 1990 Sampling Event	10
6-1	Well and Water Surface Elevation Data May 8, 1990	15
6-2	Well and Water Surface Elevation Data October 2, 1990	16

LIST OF PLATES

Plate

- 1 Monitor Well Location Map
- 2 Potentiometric Water Surface Map/Plume Boundary Map
- 3 BTEX and TPH Concentration Map

LIST OF APPENDICES

Appendix

- A Lithologic Logs
- B Monitor Well Completion Diagrams
- C Laboratory Reports

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PHILLIPS 66 LEE GAS PLANT REPORT

1.0 EXECUTIVE SUMMARY

In April and in October 1990, Geoscience Consultants, Ltd. (GCL) continued a subsurface investigation for Phillips 66 Natural Gas Company (Phillips) at the Lee Gas Plant, Buckeye, New Mexico. The investigation, initially required by the New Mexico Environmental Improvement Division (NMEID), is now under the jurisdiction of the New Mexico Oil Conservation Division (NMOCD). Eight monitor wells and one recovery well were installed at the site to define the limits of the plume of floating and dissolved-phase petroleum hydrocarbons and to begin recovery of the free-phase product. These wells modify an existing monitoring system that was installed in 1988.

Mud-rotary drilling techniques were used to install the eight new monitor wells and one recovery well. The ground water from the plant's process water supply well, twelve monitor wells (four 1988 and eight 1990 monitor wells) and the recovery well was sampled by GCL and analyzed by Radian Analytical Services for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX) using modified EPA method 8015. In addition, Phillips' water supply well WS-1 was sampled for BTEX and TPH.

All of the monitor wells and the recovery well were inspected for free-phase hydrocarbon in May, August, September, and October of 1990. Free-phase hydrocarbon has accumulated above the ground water in monitor well MW-4 and recovery well RW-1, and total petroleum hydrocarbon constituents in the dissolved phase were found at all of the wells sampled. Water Quality Control Commission (WQCC) standards for benzene were exceeded at wells MW-7, MW-8, MW-10, and RW-1, all of which are located within or near the leading edge of the plume. WQCC standards for ethylbenzene were exceeded at MW-8. WQCC standards for toluene were exceeded at MW-8.

The free-phase product plume appears to be centered near recovery well RW-1. The dissolved-phase plume forms an northeast-southwest trending, elongate halo around the plume of free-floating product. Phillips has initiated remediation of the dissolved- and free-phase hydrocarbon by pumping ground-water/ product from recovery well RW-1 to the Lee Gas Plant waste-water treatment system.

One additional monitor well is recommended to further delineate the extent of the dissolved-phase hydrocarbon at the leading edge of the known hydrocarbon plume. Additional recommendations are to implement monthly water-level and product-thickness measurements and to initiate semiannual ground-water sampling of the proposed monitoring system.

Ì SECTION 2.0 . I

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2.0 INTRODUCTION

In April 1988, Phillips was issued a compliance Order/Schedule by the New Mexico Environmental Improvement Division (NMEID) to install and sample four ground-water monitor wells at the Lee Gas Plant in southeastern New Mexico. The monitor wells were installed in early 1988 using rotary drilling techniques (GCL, 1988a). The monitor wells modify a ground-water monitoring system (pre-1988) that was previously installed around an abandoned waste-water evaporation pond. The four pre-1988 monitor wells were plugged with a cement/bentonite slurry and abandoned. The results of GCL's initial investigation indicated that both free-phase and dissolved-phase hydrocarbons occur in the saturated zone beneath the site.

In September 1988, a limited soil-vapor survey was conducted to determine potential sources of the hydrocarbons identified in GCL's initial investigation. Two potential sources were identified: the former evaporation pond located east of the main plant, and the small, former evaporation pond located north of the main plant (GCL, 1988b).

Jurisdiction of the Phillips' Lee Plant was transferred from NMEID to the New Mexico Oil Conservation Division (OCD) in January 1990, and on February 16, 1990, GCL submitted a work plan to the OCD for further investigation and implementation of remediation of free-phase product at the Lee Gas Plant. In April 1990, GCL installed four monitor wells and one recovery well at the site to define the limits of the plume of floating product and to begin recovery of the free-phase product.

The second phase of the 1990 subsurface investigation was designed to delineate the maximum lateral migration of the dissolved-phase hydrocarbon plume. Four additional monitor wells were installed in August of 1990 to achieve this objective. These wells further define aquifer conditions and dissolved-phase plume boundaries and could be modified into recovery wells should expansion of the recovery system be required.

SECTION 3.0

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3.0 TECHNICAL APPROACH

Four monitoring wells (MW-5, -6, -7, and -8) and one recovery well (RW-1) were installed in April 1990 at locations that were selected to delineate the maximum extent of hydrocarbons floating on the ground water and to recover the free-phase hydrocarbon (plate 1). The first well, MW-5, was located near a plugged borehole where floating hydrocarbon had been observed during the 1988 investigation. The purpose of this well was to locate the plume boundary at the northern (upgradient) side of Phillips' property. MW-6 was placed south (downgradient) of the north evaporation pond to delineate any plume to the northwest and to determine if the pond (now closed) was a potential source of the hydrocarbons. MW-7 was located directly south (downgradient) of MW-4, where free-phase hydrocarbon has recently been observed. MW-7 was installed to delineate the southern boundary of the plume near MW-4. The recovery well RW-1 was sited downgradient of the former evaporation pond, approximately 60 feet due west of MW-4. The location of RW-1 is within the free-phase plume. Monitor well MW-8 was located approximately 150 feet west of the recovery well in order to delineate the western (downgradient) extent of the product plume. All well locations are shown on plate 1.

During the second phase of the 1990 investigation, four monitoring wells (MW-9, -10, -11 and -12) were installed at locations selected to more precisely delineate the extent of dissolved-phase hydrocarbons present in the ground water (plate 1). This phase of the investigation was conducted in August 1990. The first well, MW-9, was located approximately 150 feet east of MW-8. The purpose of this well was to locate the western dissolved-phase plume boundary. MW-11 was located approximately 165 feet south of MW-7 to define the plume limits to the southeast. Monitor wells MW-10 and MW-12 were located southwest and downgradient of the hydrocarbon plume. The objective of these wells was to determine the location of the leading edge of the plume (See plume diagram, plate 2).

Rotary drilling techniques were employed for drilling the boreholes. All down-hole drilling equipment and the entire drill rig were decontaminated using on-site steam cleaning facilities. Samples of rotary drilling cuttings were collected at 5-foot intervals from each borehole and logged on standard GCL lithologic log forms. The lithologic logs are presented in appendix A. Shallow pits were excavated and lined with plastic to collect the drilling fluid and cuttings that were circulated out of the boreholes during drilling operations. The boreholes were drilled to total depth using clean water as a drilling fluid. Then, guar gum (polymer) was introduced to the clean water and was circulated down-hole to hold back the fine-grained sand and keep the borehole open during well installation. After the monitor wells were installed and developed, the water from the pits was pumped to the plant waste

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water treatment system facility; the remaining cuttings were removed and the pits were backfilled with the original excavated material. Drilling fluid losses were calculated by comparing total volume of water used from the water truck to total volumes of water remaining in the pit after drilling was completed.

Completion diagrams for monitor wells MW-5, -6, -7, -8, and RW-1, which were installed in April, as well as those for wells MW-9, -10, -11 and MW-12, which were installed in August, are included in appendix B. All of the wells were constructed with a 5-foot blank PVC silt trap set beneath 15 feet of wire-wound PVC screen with schedule 40 PVC pipe extending from the top of the screen to above the ground surface. The well casing and screen were inserted through the open borehole, and 12/20 grade silica sand was placed in the borehole to a depth of approximately 3 to 5 feet above the top of screen. Following the installation of the 12/20 sand, approximately 100 gallons of water was bailed from each well to settle the filter pack. Approximately 2 to 3 feet of 20/40 grade silica sand was then placed on top of the 12/20 sand in wells MW-5 through MW-8 and RW-1 to prohibit infiltration of bentonite from above. One 5-gallon bucket of 1/4-inch bentonite pellets was placed above the sand pack in these wells to seal the borehole and to prevent fluids and/or grout from migrating downward and invading the filter pack. The borehole was then grouted to the surface by pumping a neat cement slurry containing 5% bentonite into the borehole annulus through a tremie pipe. A 5-foot long, steel, protective guard pipe was installed around the well casing and into the grout, and a 3-foot-long by 3-foot-wide concrete pad was constructed around the well head. The pad was sloped outward to direct rainfall away from the well head. A locking cover impervious to rainfall was installed on the protective guard pipe. A brass survey cap was set in each pad to mark the location of each well.

The grout in each well was allowed to cure for 24 hours before implementing development activities. Monitor wells MW-5, -6, and -7 were developed using an air-lift pump. This stainless-steel pump does not permit the introduction of air into the well casing and is capable of pumping 1 gpm against 80 feet of head. Monitor wells MW-8, -9, -10, -11 and -12 were developed using GCL's submersible pump. A dedicated submersible pump was installed at recovery well RW-1 for development and product recovery. Each well was periodically surged by moving the air-lift or submersible pump up and down in the well, causing the ground water to surge in and out of the filter pack and dislodge fine-grained particles from the formation wall. The fine-grained particles, along with formational water, were then removed from the well bore by pumping. Each well was developed until an equal volume or more of the drilling water lost to the aquifer during drilling was recovered and until the indicator parameters of pH, conductivity, and temperature had stabilized. The minimum amount of water developed from each well was approximately 2,500 gallons for wells installed in April and approximately 600 to 1,000 gallons for those installed in August.

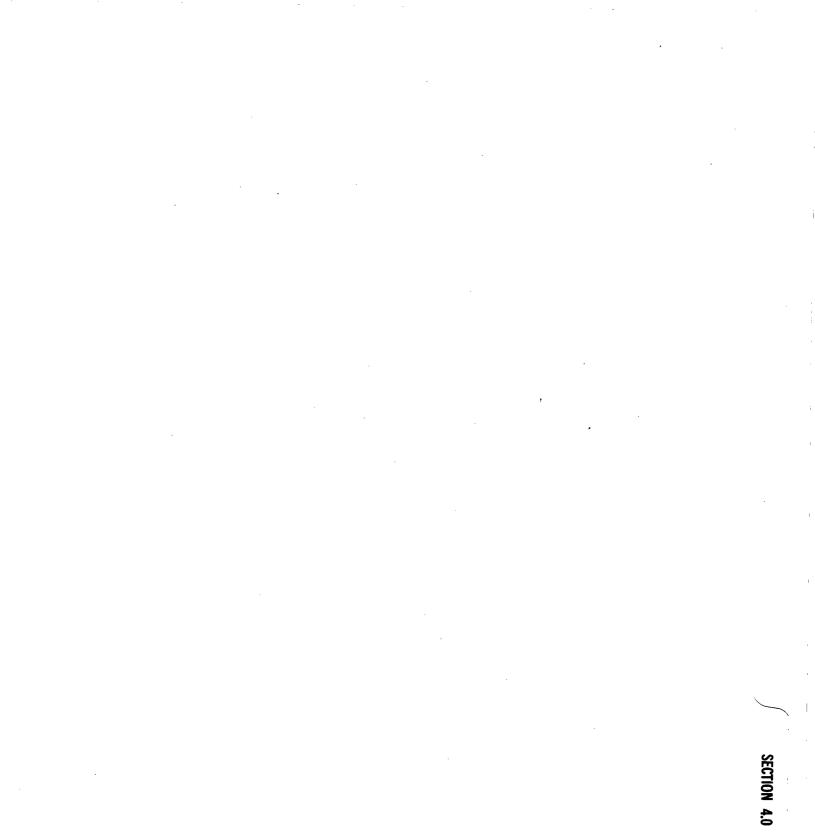
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During the month of April, ground-water samples were collected from all monitor wells as prescribed in the site sampling and analysis plan (GCL, 1988c). In August, monitor wells MW-9, -10, -11, -12, and WS-1 were sampled as recommended in the Report of Subsurface Investigation, Phillips 66 Natural Gas Company, Lee Gas Plant (GCL, 1990d). After these wells were developed, the ground water from each well was sampled for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylene (BTEX) and analyzed using modified EPA method 8015. For the April sampling event, ground-water samples were also collected from each of the four RCRA monitor wells that were installed in 1988. GCL's standard operating procedures for monitor well sampling were followed and the samples were maintained on ice and shipped to Radian Analytical Services in Sacramento, California, following strict chain-of-custody procedures.

Product-thickness and depth-to-water measurements were made one month following installation of the monitor and recovery wells, and these measurements were taken again in October 1990. Because drilling fluid losses may have moved the free-phase hydrocarbon temporarily away from the wells, a one month delay was necessary to allow the aquifer to equilibrate following drilling operations.

Wells were surveyed by Pettigrew & Associates. Standard 3-point surveying techniques were applied, and the wells were located using the Lee Gas Plant's Northing and Easting Coordinate System.



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4.0 RESULTS

No free-phase hydrocarbon was observed in any of the monitor wells that were installed in April and August either during installation or immediately following development and sampling. Return visits to the site were conducted one month following the sampling events to allow the aquifer to recover from well development and to allow potential hydrocarbons that may have been moved away from the boreholes during drilling operations to equilibrate. All of the monitor wells installed before and during April were checked for the presence of free-phase hydrocarbon on May 8, 1990. Hydrocarbons were observed in MW-4. No product had accumulated in any of the other monitor wells. The free-phase hydrocarbon in monitor well MW-4 was measured and found to be 4.52 feet thick. All existing monitor wells, including those installed in August, were again checked for floating product on September 5th and October 1st. Product was found to be present in MW-4 and RW-1 during both the September and October measurements. Product measured in MW-4 during the month of October was found to be 5.17 feet thick. Because RW-1 was and is currently pumping, an accurate product thickness could not be ascertained.

Analytical results for ground-water samples collected in April and August by GCL and analytical results for ground-water samples collected in March by Phillips are shown in tables 4-1, 4-2 and 4-3. The laboratory reports are included as appendix C. Total petroleum hydrocarbon (TPH) constituents were found at all of the wells sampled by GCL, during both sampling events. Phillips did not analyze ground water for TPH during their March 1990 sampling.

The Water Quality Control Commission (WQCC) standard for benzene is 10 micrograms per liter (μ g/l). The concentration of benzene exceeded WQCC standards in ground-water samples collected in April at wells MW-7, MW-8 and RW-1; the concentrations found are 6,100 μ g/l, 18,000 μ g/l and 2,600 μ g/l, respectively. The concentration of benzene in groundwater samples collected in March exceeded the WQCC standard at monitor well MW-3 and water well WS-1; the concentrations are 69 μ g/l and 15 μ g/l, respectively. The WQCC standard for ethylbenzene is 750 micrograms per liter (μ g/l). The WQCC standard for ethylbenzene in ground water is exceeded at MW-8. The concentration of ethylbenzene found in the sample from MW-8 is 830 μ g/l. The WQCC standard for toluene is 620 μ g/l. The WQCC standard for toluene is exceeded at MW-7 and MW-8; the concentrations are 3,900 μ g/l and 7,100 μ g/l, respectively. The concentrations of BTEX and TPH constituents are shown on plate 3.

Results obtained from the August sampling event of MW-9, -10, -11, and WS-1, revealed that benzene concentrations at MW-10 (1300 μ g/l) exceeded WQCC standards. The ground water sampled from each of the other wells did not exceed WQCC standards for benzene,

Tal	ble	4-1
Tal	ble	4-1

Analytical Results from March 1990 Sampling Event

MW-2	MW-3	WS-1	WS-2
ND	69	15	7.1
ND	1.9	4.3	ND
ND	1.4	1.8	.97
ND	1.1	4.1	ND
	ND	ND 1.1	ND 1.1 4.1

Units for analysis are micrograms per liter (ug/l)

ND - Not detected

ANALYTE	MW-1	MW-2	MW-3	MW-4	MW-5
Benzene	2.4	1.8	ND	NA	ND
Ethylbenzene	ND	ND	ND	NA	98.0
Toluene	.38	ND	1.8	NA	ND
Total Xylenes	ND	ND	ND	NA	43
*TPH Gasoline	8500	5800	6500	NA	13000
TPH Diesel	ND	150	220	NA	ND
TPH Jet Fuel	ND	ND	ND	NA	ND
TPH Kerosene	ND	ND	ND	NA	990
TPH Lube Oil	ND	ND	ND	NA	ND

Table 4-2						
Analytical	Results	from	April	1990	Sampling	Event

Units for analysis are micrograms per liter (ug/l)

ND - Not detected

TPH - Total petroleum hydrocarbons

* - TPH Gasoline - quantitates aggregate hydrocarbons with boiling points below approximately 200 degrees celsius

NA - Not available

Table 4-2 (cont'd)

Analytical Results from April 1990 Sampling Event

······································				
ANALYTE	MW-6	MW-7	MW-8	RW-1
Benzene	ND	6100	18000	2600
Ethylbenzene	ND	360	830	320
Toluene	ND	3900	7100	580
Total Xylenes	ND	260	290	190
*TPH Gasoline	1600	440000	1200000	160000
TPH Diesel	5600	200	9500	240
TPH Jet Fuel	ND	ND	ND	ND
TPH Kerosene	ND	ND	ND	ND
TPH Lubricating Oil	ND	ND	ND	ND

Units for analysis are micrograms per liter (ug/l)

ND - Not detected

TPH - Total petroleum hydrocarbons

* - TPH Gasoline - quantitates aggregate hydrocarbons with boiling points below approximately 200 degrees celsius

Table 4-3

Analytical Results from August 1990 Sampling Event

ANALYTE	MW-9	MW-10	MW-11	MW-12	WS-1
Benzene	6.0	1300	1.0	.86	9.7
Ethylbenzene	.88	50	1.6	.51	1.3
Toluene	1.2	34	2.8	.81	1.2
Total Xylenes	1.7	16	6.4	2.9	1.2
ТРН	1230	22,000	690	610	280

Units for analysis are micrograms per liter (ug/l)

ND - Not detected

TPH - Total petroleum hydrocarbons

PHILLIPS 66 LEE GAS PLANT REPORT

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and samples collected from all five of the wells installed in August did not exceed standards for ethylbenzene, xylenes and toluene. Water supply well WS-1 was sampled for TPH and BTEX concentrations. The results from this sampling event did not reveal concentrations at or above action levels.

The recovery well RW-1 is now in operation and the total volume purged as of October 1, 1990, was 358,126 gallons. RW-1 is pumping ground water at an approximate rate of 4.457 gallons per minute into the Oil/Water separator. Over 14 feet of drawdown has been measured in RW-1.

PHILLIPS 66 LEE GAS PLANT REPORT

5.0 GEOLOGY

5.1 Regional Geology

As reported in June 1988 in GCL's "Report On The Installation Of A Ground-Water Monitoring System at Phillips 66 Natural Gas Company, Lee Plant," the Lee Gas Plant is located in southern Lea County, New Mexico, in the Llano Estacado (Staked Plains), which is part of the High Plains section of the Great Plains physiographic province (Fenneman, 1931). Shallow depressions and small sand dunes are the only significant topographic features in the otherwise flat, treeless plain. The depositional surface of the Llano Estacado exhibits low relief, sloping uniformly to the southeast at a topographic gradient of about .003. Total relief in Lea County is about 1,300 feet with an altitude ranging from 2,900 to 4,200 feet above sea level (Nicholson and Clebsch, 1961). Drainage patterns are poorly defined.

Rock exposures in the area are poor and range in age from Triassic to Quaternary. The region is covered by Quaternary-Age eolian deposits ranging in thickness from 1 to 5 feet. Beneath these windblown deposits, a layer of dense, well-developed caliche forms a cap over the Ogallala Formation. The caliche, which decreases in induration with depth (Nicholson and Clebsch, 1961), can range from several feet to up to 60 feet in thickness.

The Tertiary Ogallala Formation underlies the Llano Estacado in southeast New Mexico. It is composed of terrestrial sediments that unconformably overlay the Triassic section. Outcrops of the Ogallala occur along the face of Mescalero Ridge to the south of the Lee Gas Plant. The Ogallala ranges in thickness from several inches to up to 300 feet and is composed primarily of unconsolidated, calcareous sand, clay, silt and gravel.

Jurassic-Age rocks have not been observed in the area, and rocks of the Cretaceous Age have been almost completely removed by erosion (Nicholson and Clebsch, 1961). Rocks of the Triassic Dockum Group are the oldest rocks that crop out in the region. The Dockum Group may be divided into the Chinle Formation and the Santa Rosa Sandstone.

Southeastern New Mexico and west Texas are underlain by large subsurface structural basins with highly complex geology. Southern Lea County includes parts of the Delaware Basin and the Central Basin Platform. The northwestern edge of the Delaware Basin is coincident with the position of the reef-edge as it existed throughout Permian time. The Artesia-Vacuum arch reflects this ancient reef trend; the Lee Gas Plant site is located at the eastern limit of this trend. Triassic rocks in the area exhibit a regional dip of less than one degree to the southeast (Nicholson and Clebsch, 1961). Variations in this regional trend occur in the collapse structures and unconformities that are common to the area.

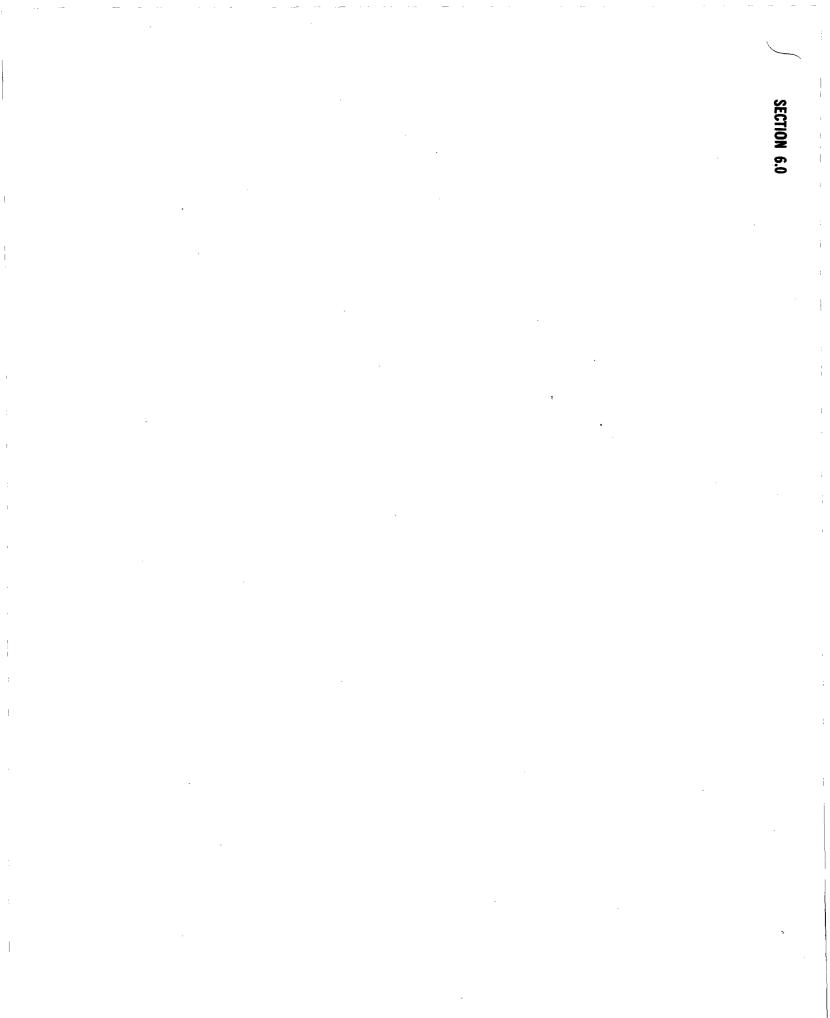
5.2 Site Geology

Lithologic logs (appendix A) for the installation of monitor wells MW-5 through MW-12 and RW-1 are consistent with the previous lithologic logs prepared by GCL in April 1988. Two primary lithologic sequences were encountered at the Phillips' Lee Gas Plant: an upper, caliche-cemented, fine-grained silty sand and sandy silt and an underlying coarser sand. A "topsoil," probably backfill material used during facility construction or modification, was also found during drilling (GCL, 1988a).

Surficial lithologies at the Lee Gas Plant are both natural and anthropogenic. Aeolian sheet sands consisting of poorly-sorted, fine sand are present and are typically less than 5 feet thick (GCL, 1988a). Backfill material consisting of poorly sorted, fine sand to fine pebble-sized sediment is present at most monitor well locations.

Beneath the thin surficial deposits, sediments characterized by highly variable clast size and poor sorting are present. Although the dominant sediment consists of fine-grained, poorly sorted sand, there are clay-, silt-, and gravel-rich sands that are present that have very limited lateral continuity. Caliche in this sedimentary sequence ranges from highly developed Stage IV in the upper horizon to Stage I at approximately 20 to 35 feet below the ground surface. Consolidation of the sediments in this sequence is related to the presence and degree of development of interstitial caliche and, to a lesser degree, the presence of interstitial clay. With few local exceptions, the degree of consolidation decreases with depth (GCL, 1988a).

The lower coarser-grained sand unit in which each of the monitor wells at the Lee Plant was completed comprises the second primary lithology. The coarser sand lacked notable silt and clay particle fractions. The contact between the two lithologies was sharp and occurred at a depth of 35 to 65 feet. The yellowish-brown to brown color, higher percentage of medium-grained sand, and the relative vertical homogeneity distinguished coarser-grained sand from the overlying sediments (GCL, 1988a). Hunt (1977) and Nicholson and Clebsch (1961) identified the outcrop in the Lee Gas Plant area as Tertiary Ogallala Formation. The description of the outcrop provided by Hunt (1977) correlates with observations recorded by GCL personnel during the investigation.



PHILLIPS 66 LEE GAS PLANT REPORT

6.0 HYDROGEOLOGY

6.1 Regional Hydrogeology

As reported in June 1988 in GCL's "Report On The Installation Of A Ground-Water Monitoring System at Phillips 66 Natural Gas Company, Lee Plant," recharge in the region occurs primarily as a result of infiltration of water from short drainages and temporary lakes that form as a result of heavy rainfall events (Nicholson and Clebsch, 1961). Discharge takes place principally in the form of evapo-transpiration and pumping of wells; very small volumes of ground water discharge at springs (GCL, 1988a).

Potable water supplies in the region are derived primarily from aquifers hosted by Quaternary alluvium and the Tertiary Ogallala Formation. Ground water occurring in Triassic sediments is potable but has a poorer quality and is hosted by lithologic units that produce lower well yields than younger formations in the area. The Ogallala Formation mantles the High Plains in the Lee Gas Plant area and has a saturated thickness ranging from 25 to 175 feet (Nicholson and Clebsch, 1961). Ground water in these shallow aquifers generally flows to the southeast at a low hydraulic gradient (GCL, 1988a).

6.2 Site Hydrogeology

Shallow ground water at the Lee Gas Plant is unconfined. The ground water beneath the site is found in unconsolidated, silty to fine-grained sand, which typically exhibits hydraulic conductivities of .001 to 100 gallons per day per square foot (GCL, 1988a). During development of the monitor wells, low well yields were observed. Monitor wells may yield a sustainable pumping rate of up to 2 gallons per minute. This pumping rate is consistent for the fine-grained sediments that occur beneath the site. During the development of RW-1, a sustained flow rate of 3 gallons per minute was achieved.

The potentiometric surface at the Lee Gas Plant is shown on plate 2. Ground water flows to the southwest in a direction of approximately 30 degrees west of due south. The direction of ground-water flow based on calculations from April and October 1990 water level elevations correlates very well with the flow direction calculated in 1988. The well casing elevations, depth to ground water, and water surface elevations are shown in tables 6-1 and 6-2.

Table 6-1

Well and Water Surface Elevation Data May 8, 1990

LOCATION	CASING ELEVATION	DEPTH TO WATER	DEPTH TO PRODUCT	WATER SURFACE ELEVATION
MW-1	3979.25	95.94	NF	3883.31
MW-2	3980.50	97.99	NF	3882.52
MW-3	3980.27	97.83	NF	3882.44
MW-4	3980.16	101.28	96.76	3882.04*
MW-5	3979.82	96.30	NF	3883.52
MW-6	3981.79	97.93	NF	3883.86
MW-7	3978.45	96.42	NF	3882.03
MW-8	3979.96	97.78	NF	3882.18
RW-1	3980.80	98.39	NF	3882.41

* Water surface elevation corrected for floating product using a specific gravity for the product of approximately 0.8

All data is in feet

NF - None found

Table 6-2

LOCATION	CASING ELEVATION	DEPTH TO WATER	DEPTH TO PRODUCT	WATER SURFACE ELEVATION
MW-1	3979.25	96.44	NF	3882.81
MW-2	3980.50	98.58	NF	3881.92
MW-3	3980.27	97.47	NF	3881.80
MW-4	3980.16	102.75	97.58	3881.55*
MW-5	3979.82	96.94	NF	3882.88
MW-6	3981.79	98.56	NF	3883.23
MW-7	3978.45	97.09	NF	3881.36
MW-8	3979.96	98.59	NF	3881.37
MW-9	3980.17	99.00	NF	3881.17
MW-10	3979.66	98.50	NF	3881.16
MW-11	3978.50	97.36	NF	3881.14
MW-12	3978.82	97.86	NF	3880.96
RW-1	3980.80	114.95	NM	3865.85

Well and Water Surface Elevation Data October 2, 1990

* Water surface elevation corrected for floating product using a specific gravity for the product of approximately 0.8

All data is in feet

NF - None found

NM - Product present but no measurement was obtainable

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SECTION 7.0

PHILLIPS 66 LEE GAS PLANT REPORT

7.0 CONCLUSIONS

The lateral extent of free-phase hydrocarbons that are floating on ground water beneath the site has been identified in the area below and around the south evaporation pond (plate 2). At the present time, the only wells in which the free-phase product has been found are MW-4 and RW-1. However, in 1988, the original, aborted borehole for MW-1 contained observable free-phase product. This aborted borehole was located approximately 15 to 20 feet south-southeast of MW-5. The plume boundaries were determined by product thickness measurements taken approximately 4 weeks after wells were installed in April. Those boundaries have been confirmed by similar measurements that were made after monitor wells MW-9, -10, -11 and -12 were installed in August. The measurements were not taken immediately after drilling was complete because it was believed that drilling fluid losses may have forced floating product away from the immediate vicinity of the borehole. Floating product was not observed in monitor well MW-6, which is located north of the plant and directly south (downgradient) from the north evaporation pond.

The results of the ground-water sampling program indicate that dissolved-phase hydrocarbons form an elongate halo around the free-phase plume. Dissolved hydrocarbons were identified in all of the monitor wells at the site. However, hydrocarbon concentrations that exceeded WQCC action levels were restricted to monitor wells MW-7, MW-8, and MW-10 and recovery well RW-1, which are all directly downgradient or crossgradient from the freephase plume. Hydrocarbon concentrations in water collected from WS-1 were found to be below action levels in August. MW-4 was not sampled because the presence of floating product ensured that dissolved hydrocarbons would be present in the ground water at that location in high concentrations.

Monitor wells MW-9, -10, -11 and -12 installed in August 1990 have delineated the boundaries of the dissolved-phase hydrocarbon plume present beneath the site with the exception of a small area at the southwestern-most and leading edge of the plume. Further work will be required to determine the exact location of this portion of the plume boundary (plate 2).

The Lee Gas Plant is located in a producing oil field where improperly operating oil wells and/or improper oil field practices can result in extensive ground-water contamination. Dissolved phase TPH may be present in the ground water throughout the area where the Lee Gas Plant is located. SECTION 8.0

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PHILLIPS 66 LEE GAS PLANT REPORT

8.0 RECOMMENDATIONS

The following recommended actions are based on the assumption that one additional monitor well (MW-13) will adequately delineate the leading edge of the plume. The recommended actions to complete this phase of the investigation and to complete the implementation of ground-water remediation at Phillips' Lee Gas Plant are:

- Install one additional ground-water monitor well (MW-13) downgradient (southwest) from monitor well MW-10 (plate 1). The purpose of this monitor well will be to complete the definition of the lateral extent of the dissolved-phase hydrocarbon plume.
- Continue recovering dissolved-phase and free-floating product from RW-1 following the approved discharge plan modification.
- Measure the depth to water and the product thickness in all monitor wells monthly for one year. After one year continue measurements on a quarterly basis.
- Initiate quarterly sampling of selected monitor wells for BTEX and TPH. The wells that will be sampled as part of the proposed monitoring plan will be MW-1 (upgradient), MW-9, MW-10, MW-12, and MW-13 (proposed).
- Submit a supplement to the Phase II Report after MW-13 has been installed and sampled. This report will present the results of laboratory analyses, depth-to-water and product-thickness measurements, and borehole and monitor well completion data. This report will be submitted within 10 days of receipt of the analytical results.
- Submit quarterly reports to NMOCD presenting the results of the quarterly sampling program.
- After one year of quarterly sampling of the monitoring system, the sampling program should be reevaluated. If recovery system efficacy is satisfactory, then semiannual sampling should be implemented after OCD approval and authorization.
- If monthly water-level and product-thickness measurements and quarterly ground-water sampling show that the one-recovery-well system is not

PHILLIPS 66 LEE GAS PLANT REPORT

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capturing the plume, then an additional recovery well should be added to the existing recovery system.

If ground-water samples from the proposed additional monitor well, MW-13, do not yield analytical results that allow identification of the leading edge of the plume, then additional work will be required. If this is the case, then Phillips will submit recommendations and schedule for further investigation in the supplement to the Phase II Report. SECTION 9.0

PHILLIPS 66 LEE GAS PLANT REPORT

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9.0 REFERENCES

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APPENDIX A

Lithologic Logs

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	Caliche
	Caliche/Sand
	Sand
	Sandstone
	Siltysand
	Clayey Silty Sand
	Caliche/Sandstone
	Clay
	Clayey Sand
	Clay/Caliche
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• Page <u>1</u> of <u>3</u>

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LOCATION MAP:	MW-4		
• RW-1		• MW-3	• MW-2
• MW-7	7		
1/41/41/4	1/4	5 <u>31</u> T <u>17</u>	R_35_

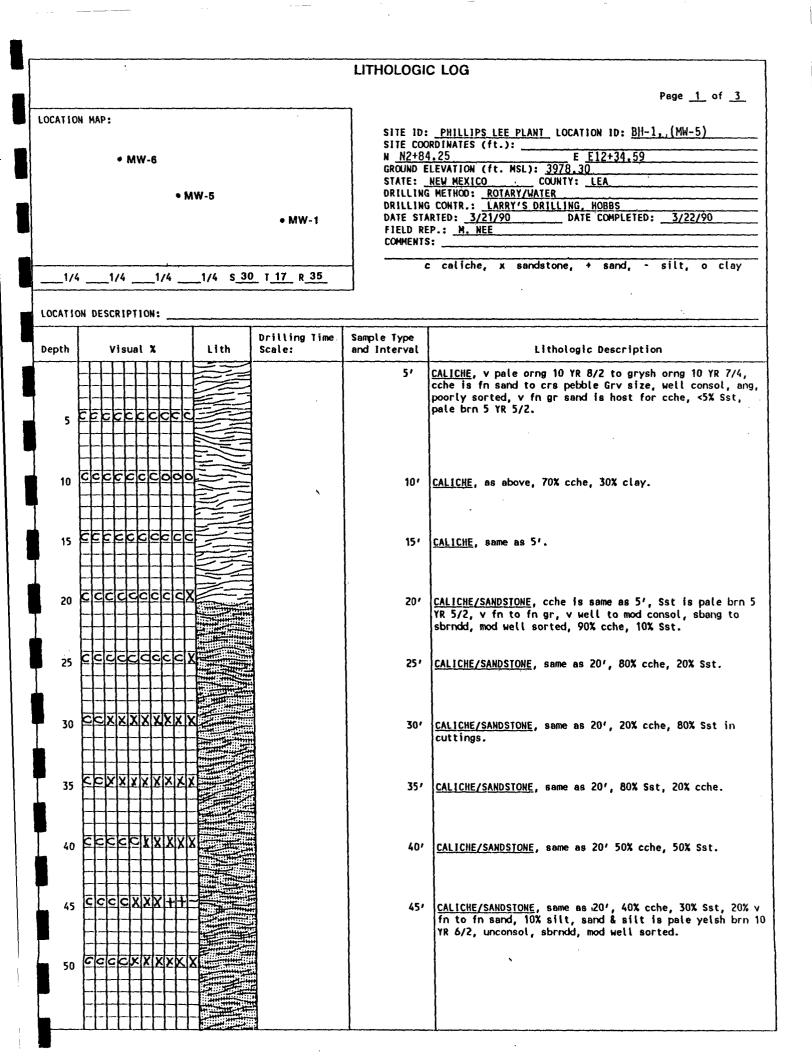
	E E08+95.	41	
(ft. MSL): 39			
:0 COU	NTY: LEA		
ROTARY	_,		
LARRY'S DRI	LING, HOBBS		
27/90	DATE COMPLE	TED: 3/28/	90
	-		
	COU	(ft. MSL): <u>3977.81</u> COLINITY: <u>LEA</u> ROTARY LARRY'S DRILLING, HOBBS (27/90 DATE COMPLE	(ft. MSL): <u>3977.81</u> <u>CO</u> COUNTY: <u>LEA</u> <u>ROTARY</u> <u>LARRY'S DRILLING, HOBBS</u> <u>(27/90</u> DATE COMPLETED: <u>3/28/</u>

LOCATION DESCRIPTION: _

LOCAT	ON DESCRIPTION:			
Depth	Visual X Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
			0-2'	SOIL, cche Bld, heavily stained w/HC, stained soil is dusky brn 5 YR 2/2.
5	cccccccc		5'	<u>CALICHE</u> , v pale orng 10 YR 8/2, v fn sand to fn Pbl size, clay fraction < 5%, org vapors @ 5 ppm from cuttings.
10	CCCCCCCCX		101	<u>CALICHE</u> , same as 5' w/10% Sst, Sst is it brn 5 YR 6/4, v fn gr, tightly consol, 10% clay, 10% Sst, 80% cche.
15	cccX+++++-		151	<u>CALICHE/SAND</u> , v pale orng 10 YR 8/2, sand is v fn gr, unconsol, sbang mod sorted, cche is clay to fn Pbl Grv size, 50% sand, 30% cche, 10% clay, 10% Sst.
20	CCCCXXX+++		20'	<u>CALICHE/SANDSTONE/SAND</u> , pale yelsh brn 10 YR 6/2, as above, 30% sand, 40% cche, 30% Sst.
25			25,	<u>SAND</u> , pale yelsh brn 10 YR 6/2, v fn to fn gr, unconsol, mod well sorted, sbang to sbrndd, 90% sand, 10% cche.
30	C ++++++++++++++++++++++++++++++++++++		30'	SAND, same as 25', < 10% cche in cuttings.
3			35'	SANDSTONE/CALICHE/SAND, same as 20', 30% sand, 50% Sst, 20% cche.
4			40'	<u>SANDSTONE/CALICHE/SAND</u> , same as 35'.
4			45'	SANDSTONE/CALICHE/SAND, same as 35'.
5			50'	<u>SANDSTONE/CALICHE/SAND</u> , same as 35', 20% sand, 40% cche, 40% Sst.

		······	, <u></u>		LITHOLOGIC	C LOG Page <u>2</u> of <u>3</u>
					(Continued	Location ID
De	pth	Visual %		lling Time lle:	Sample Type and Interval	Lithologic Description
	50					
	55	X + + + + + + + + + + -			551	<u>SAND</u> , pale yelsh brn 10 YR 6/2, silt to fn sand, unconsol, sbrndd, well sorted, 90% sand, 10% silt.
	60	+++++++++++			601	<u>SAND</u> , same as 55'.
	65	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$		X		<u>SAND</u> , mod yelsh brn 10 YR 5/4, v fn gr, well sorted, unconsol, sbrndd.
	70	+++++++++++++++++++++++++++++++++++++++			70'	<u>SAND</u> , same as 65', 90% sand, 5% cche, 5% Sst.
	75	CCXX+++++			75'	<u>SANDSTONE/CALICHE/SAND</u> , same as 20', 60% sand, 20% cche, 20% Sst, hard drilling 72-78'.
	80				801	SANDSTONE/CALICHE, pale yelsh brn 10 YR 6/2, 70% cche, 20% Sst, 10% sand, cche/Sst is v fn Pbl Grv size, sand is v fn to fn gr, poorly sorted, sbrndd.
	85	сссс <u>Х</u> +++-			857	<u>SANDSTONE/CALICHE</u> , same as 80', 40% sand, 10% Sst, 50% cche.
	90	+++++++++++++++++++++++++++++++++++++++	E -		901	<u>SAND</u> , dk yelsh brn 10 YR 4/2 to pale yelsh brn 10 YR 6/2 v fn to fn gr, unconsol, sbrndd, well sorted.
	95	+ + + + + + + + + + + + + + + + + + + +	E		95 '	<u>SAND</u> , same as 90'.
	100		Ē		1001	<u>SAND</u> , same as 90'.
	105	4444444444444	T T T		105 '	<u>SAND</u> , same as 90', minor clay < 5%.
	110) <u>+ + + + + + + + + + + + + + + + + + +</u>	-1 		110'	
	115	+++++++++++++++++++++++++++++++++++++++	Ŧ		115,	<u>SAND</u> , same as 90'.

	· · ·		LITHOLOGI	C LOG	Page <u>3</u> of <u>3</u>	
			(Continued		Location ID	
Depth	Visual X Lith	Drilling Time Sample Type Scale: and Interval L		Lithol	Ithologic Description	
115	$\frac{1}{2}$					
120	┝┥┥┾╺┾┥┥┥┥┥ <u>╄╵╋┽╋┨╅╉╉╉╅</u> ╋╂ ┝╴╴╴╴┑╼┍╼╴╴╴╴╴╴		1201	<u>SAND</u> , same as 90′.		
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180						

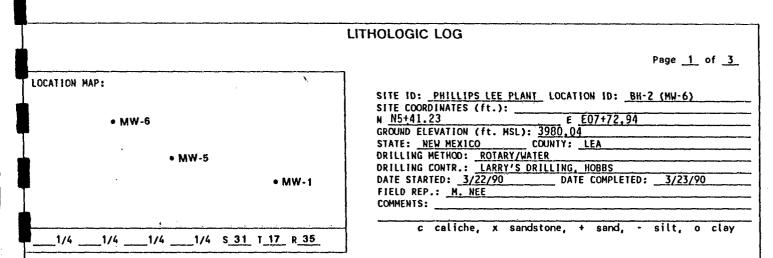


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	•			(Continued	b) Location ID <u>BH-1</u>
Depth	Visual X		Drilling Time Scale:	Sample Type and Interval	Lithologic Description
50				501	<u>CALICHE/SANDSTONE</u> , same as 20', 60% Sst, 40% cche.
55	CEEEXXXXXXX			551	<u>CALICHE/SANDSTONE</u> , same as 20' 60% Sst, 40% cche.
60	CEECXXXXXXX			601	<u>CALICHE/SANDSTONE</u> , same as 20', 60% Sst, 40% cche.
65	CCCCXXXXXXX			651	<u>CALICHE/SANDSTONE</u> , same as 20', 60% Sst, 40% cche.
70	$\frac{1}{2} + \frac{1}{2} + \frac{1}$			70 <i>1</i>	<u>SAND</u> , mod yelsh brn 10 YR 5/4, v fn to fn gr, unconsol, sbrndd, v well sorted.
75	CCCCCCXX+			751	<u>CALICHE/SANDSTONE</u> , same as 20', 70% cche, 20% Sst, 10% v fn sand.
80	CC+++00000			801	<u>SANDY CLAY</u> , grsh orng pink 5 YR 7/2 to mod orng pink 5 YR 8/4, 50% clay, 30% sand, 20% cche.
85	<u>+</u> +++++++++++++++++++++++++++++++++++			851	<u>SAND</u> , pale yelsh brn 10 YR 6/2, v fn to fn sand, unconsol, sbrndd, well sorted.
90				901	<u>SAND</u> , same as 85′.
95				951	<u>SAND</u> , seine as 85'.
100				1001	<u>SAND</u> , same as 85'.
105	<u>+++++++++++++++++++++++++++++++++++++</u>			105*	<u>SAND</u> , mod yelsh brn 10 YR 5/4, v fn to med size, unconsol, mod well sorted, sbrndd.
110		-1 5 -1		110,	' <u>SAND</u> , same as 105'.
115	••••••••••••••••••••••••••••••••••••••			115'	<u>SILTY SAND</u> , pale yelsh brn 10 YR 6/2, silt to med sand, unconsol, mod well sorted, sbrndd, 85% sand, 15% silt.

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				(Continued		Location IDBH-1
D	epth	Visual X Lith	Drilling Time Scale:	a Time Sample Type		Description
	115				· · · · · · · · · · · · · · · · · · ·	
	120			1201	<u>SILTY SAND</u> , same as 115'.	
	125					
	130 135		·			
	135					
	145					
	150					
	155					
	160					
	165 170					
	175				•	
	180					



LOCATION DESCRIPTION:

Dept	ħ	Visual X Lith					Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description				
		_	1	F	-	F	F	F	F				0-11	<u>SOIL</u> , pale yelsh brn, 10 YR 6/2, org rich.
	5			G	X	X	X	X	X	Ī			51	<u>CALICHE/SANDSTONE</u> , cche is v pale orng 10 YR 8/2, clasts are med sand to Pbl Grv size, consol, ang, Sst is pale yelsh brn 10 YR 6/2 gr size is v fn to fn, cemented, consol, sbrndd, 40% cche, 60% Sst.
	10	Ē		:0	C	C	C		X	X			10'	<u>CALICHE/SANDSTONE</u> , same as 5', 80% cche, 20% Sst.
	15		20		20	C	<u>;</u> C		X	X			151	<u>CALICHE/SANDSTONE</u> , same as 5' 80% cche, 20% Sst.
	20	Ē							X	0			20'	<u>CALICHE/SANDSTONE</u> , same as 5′, 70% cche, 20% Sst, 5% silt, 5% v fn to fn sand.
	25	C				X							25'	<u>CALICHE/SANDSTONE/SAND</u> , 50% cche, 20% Sst, 30% sand, sand is grysh orng pink 5 YR 7/2, unconsol, sbrndd, mod well sorted, v fn to med size.
	30	Ē	c c										301	CALICHE/SANDSTONE/SAND, same as 25'.
	35	C	ē -										354	<u>CALICHE/SANDSTONE/SAND/SILT</u> , same as 25', 20% Sst, 30% cche, 30% sand, 20% silt.
Ţ	40		Ē -		XI2	X -			Ē				401	CALICHE/SANDSTONE/SAND/SILT, some as 35'.
Ţ	45												45'	SILIY SAND, grysh orng pink 5 YR 7/2, silt to fn sand, unconsol, mod sorted, sbrndd, 70% v fn to fn sand, 30% silt.
	50												50'	<u>SILTY SAND</u> , same as 45'.
		E]			_						·

ſ		`• 	LITHOLOGI	
			(Continued	
Depth	Visual X Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
50	$\begin{array}{c} \mathbf{f} \mathbf{f} \mathbf{f} \mathbf{f} \mathbf{f} \mathbf{f} \mathbf{f} f$			
55			551	<u>SILTY SAND</u> , same as 45'.
60			60,	<u>SAND</u> , mod yelsh brn 10 YR 5/4, v fn to med size, unconsol, sbrndd, mod well sorted.
65	╉╪╬╪╪╪╪╪╪		651	<u>SAND</u> , same as 60'.
70			70'	<u>SAND</u> , same as 60'.
75			751	<u>CALICHE/SANDSTONE/SAND</u> , pale yelsh brn 10 YR 6/2, 20% cche, 20% Sst, 60% v fn to fn sand.
80	┱╅╪╪╪╪╪╪╪╪		80'	SAND, same as 60′.
85	$\begin{array}{c} - & - & - & - & - & - & - & - & - & - $		851	<u>SILTY SAND</u> , pale yelsh brn 10 YR 6/2, silt to fn sand, unconsol, mod sorted, sbrndd, 80% v fn to fn sand, 20% silt.
90) ++++++++++++++++++++++++++++++++++++		901	<u>SAND</u> , pale yelsh brn 10 YR 6/2, v fn sand to med sand, unconsol, mod sorted, sbang to sbrndd.
95	5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		951	<u>SAND</u> , same as 90'.
100			1001	SAND, same as 90'.
10!	5 ¥¥¥¥¥¥¥¥¥¥ 		1051	SAND, mod yelsh brn 10 YR 5/4, fn to v fn sand, unconsol, sbrndd, mod well sorted.
11	0 1 		110'	<u>SAND</u> , same #8 105'.
11	5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		1157	<u>SAND</u> , same as 105′.

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		•	LITHOLOGI	C LOG	Page <u>3</u> of <u>3</u>
			(Continued		Location ID <u>BH-2</u>
Depth	Visual X Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Desci	iption
115					
120		×	1201	<u>SAND</u> , same as 105'.	
125					
130					
135					
140					
145					
150					
155	5				
160					
165	5				
170					
175	5			1	
180					

LITHOLOGIC LOG

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• MW-2

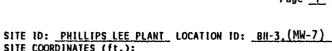
• MW-3

•MW-4

1/4 ____1/4 ____1/4 ____1/4 <u>s_31</u> T_<u>17</u> R_<u>35</u>

• RW-1

• MW-7



SITE COORDINATES (ft.):
S0+04.31 E E10+27.31
GROUND ELEVATION (ft. MSL): 3977,20
STATE: NEW MEXICO COUNTY: LEA
DRILLING METHOD: ROTARY/WATER
DRILLING CONTR.: LARRY'S DRILLING, HOBBS
DATE STARTED: 3/25/90 DATE COMPLETED: 3/25/90
FIELD REP.: M. NEE
COMMENTS:

c caliche, x sandstone, + sand, - silt, o clay

Page <u>1</u> of <u>3</u>

LOCATION DESCRIPTION:

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LOCATION MAP:

Depth	Visual X	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
				0-1/	SOIL, grysh brn 5 YR 8/2, to appears to be HC stained.
5	CCCCCCCC			51	<u>CALICHE</u> , mod orng pink 5 YR 8/4, cuttings are v fn to fn Pbl Grv size, v well consol, 90% cche, 10% Sst, v hard drilling to 5'.
10				10'	<u>CALICHE</u> , as above except poorly consol, 70% cche, 30% clay.
15				15'	SAND, grysh orng pink 5 YR 7/2, v fn to fn gr sand, unconsol, sbang to sbrndd, well sorted, 80% şand, 20% cche.
20		1 - -		20'	<u>SAND</u> , same as 15'.
25				25'	<u>SILTY SAND</u> , pale yelsh brn 10 YR 6/2, silt to fn sand, unconsol, sbang to sbrndd, 80% sand, 10% silt, 10% cche.
30				30'	<u>SILTY SAND</u> , same as 25′, 20% silt, 80% sand.
35				35,	SILTY SAND, same as 25', 10% silt, 10% cche, 80% sand.
40				40'	SILTY SAND, same as 25', 20% silt, 80% sand.
45				45'	<u>SILTY SAND</u> , same as 25', 20% silt, 80% v fn sand.
50				50'	SILTY SAND, same as 25', 20% silt, 10% cche, 70% sand.

			LITHOLOG	IC LOG Page 2 of 3
	T		(Continue	d) Location ID <u>BH-3</u>
Depth	Visual X Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
50				
55			551	<u>SILTY SAND</u> , same as 25′, 30% silt, 70% v fn sand.
60			601	<u>CALICHE/SANDSTONE</u> , cche is v pale orng 10 YR 8/2, clasts are med sand to fn Pbl Grv size, 40% cche, 60% Sst, Sst i pale yelsh brn 10 YR 6/2, gr size is v fn to fn, cemented consol, sbrndd.
65			651	CALICHE/SANDSTONE, same as 60'.
70	CCCXXXXX+-	Ň	70'	<u>CALICHE/SANDSTONE</u> , same as 60', 50% Sst, 30% cche, 10% silt, 10% v fn sand.
75			75 <i>1</i>	<u>SILTY SAND</u> , pale yeish brn 10 YR 6/2, unconsol, weli sorted, sbang to sbrnck, 30% silt, 70% v fn to fn sand.
80			801	<u>SILTY SAND</u> , same as 75'
85			851	SAND, same as 75′, 80% v fn sand, 10% fn sand, 10% silt.
90			901	<u>SAND</u> , same as 85′.
95			95 1	<u>SAND</u> , same as 85′.
100			1001	<u>SAND</u> , mod yelsh brn 10 YR 5/4, unconsol, well sorted, sbang to sbrndd, v fn to fn sand.
105	$\begin{array}{c} \hline \hline$		1051	<u>SAND</u> , same as 100'.
110			110'	<u>CLAYEY SILTY SAND</u> , pale yelsh brn 10 YR 6/2, clay to fn sand, unconsol, mod sorted, sbang to sbrndd, 10% clay, 10 silt, 80% v fn to fn sand.
115	$\frac{1}{1}$		1151	<u>SAND</u> , same as 100'.

			LITHOLOGI	C LOG	Page <u>3</u> of <u>3</u>
			(Continued	1)	Location ID <u>BH-3</u>
Depth	Visual X	Drilling T Lith Scale:	ime Sample Type and Interval	Lithologic De	scription
Deptn		crth scare:			
115					
120			1201	<u>SAND</u> , same as 100′.	
125					
130					
135					
140					
145					;
150					
155	5				
160					
16	5				
17					
17	75				:
18					

			,		1
ſ				LITHOLOGI	CLOG
				_	Page <u>1</u> of <u>3</u>
	LOCATIO	N MAP: • MW-6 • MW-5	• MW-1	SITE COO N <u>N3+60</u> GROUND E STATE: _ DRILLING DATE STA FIELD RE COMMENTS	LEVATION (ft. MSL): <u>3978,79</u> <u>NEW MEXICO</u> METHOD: <u>ROTARY/WATER</u> CONTR.: <u>LARRY'S DRILLING HOBBS</u> RTED: <u>4/03/90</u> P.: <u>M. NEE</u> :
	1/4		S 30 T 17 R 35		caliche, x sandstone, + sand, - silt, o clay
	LOCATIO	DN DESCRIPTION:			
	Depth	Visual % Li	Drilling Time ith Scale:	Sample Type and Interval	Lithologic Description
				0-21	BACKFILL/SOIL, grysh blk N2, fn Pbl to lrg Cbl of cche w/soil, org & trash present.
	5	cccccccc		51	<u>CALICHE</u> , yelsh gry 5 Y 7/2, cuttings are fn sand to med Pbl Grv size, strong HC odor.
	10	CCCCXXXXXX		101	<u>CALICHE/SANDSTONE</u> , Sst is mod yelsh brn 10 YR 5/4, v fn gr, well consol, sbang, well sorted, cche is same as 5' 40% cche, 60% Sst.
	15			151	<u>CALICHE/SANDSTONE</u> , same as 10' w/40% Sat, 50% cche, 10% clay.
	20	+000	1355	201	<u>CLAYEY, SILTY SAND</u> , v pale orng 10 YR B/2, clay to v fn sand, mod consol, poorly sorted, sand grains are sbang, 10% sand, 30% silt, 60% clay.
	25			251	<u>SAND</u> , pale yelsh brn 10 YR 6/2, v fn gr, unconsol, sbang to sbrndd, v well sorted. 27-34' <u>SILTY SAND</u>
	30	<u>+++++++++++++++++++++++++++++++++++++</u>		30'	<u>SILTY SAND</u> , pale yeish brn 10 YR 6/2, silt to sand, unconsol, mod well sorted, sbang to sbrndd, 20% silt, 80% sand.
	35	<u> </u>		351	<u>SANDSTONE</u> , pale brn 5 YR 5/2 pred med Pbl Grv size Frag, v well consol, sand grains are v fn in size, sbrndd.
	40	× X X + + + + +	1412	40'	<u>SANDSTONE/SAND</u> , pale yelsh brn 10 YR 6/2, Sst is the same as 35', sand is the same as 30', 30% Sst, 60% sand, 10% silt.
	45	++++++++++++++++++++++++++++++++++++++		451	<u>SILTY SAND</u> , same as 30'. 1
	50			501	<u>SILTY SAND</u> , same as 30'.
1		┟╴┧╶┧╌┨╌┠╌┥╼┠╼┠╼┠╼┠		<u> </u>	<u> </u>

			LITHOLOGI	C LOG Page 2 of 3	
				(Continue	d) Location ID <u>BH-5</u>
epth	Visual X	Lith	Drilling Time Scale: \	Sample Type and Interval	Lithologic Description
50	4444444444444				
55				55'	<u>SILTY SAND</u> , same as 30'.
60	C x x x + + + + + + -		-	60'	<u>SILTY SAND</u> , grysh orng pink, 5 YR 7/2, 10% silt, 60% sand, 10% cche, 20% Sst.
65	╉╪ ┇ ╋╠╉╪╪╞		-	65'	<u>SAND</u> , mod yelsh brn 10 YR 5/4, v fn to fn gr, unconsol, well sorted, sbang to sbrndd.
70			1440	70'	Same as 65'.
75				75'	SAND, pale yelsh brn 10 YR 6/2, w/<5% v pale orng 10 YR 8/2 clay/cche, v fn gr, unconsol, mod well sorted, sbang.
80	****			801	<u>SAND</u> , same as 75' w/ no clay.
85	£ £ F F F F F F F F		0750	85 '	<u>SAND</u> , same as 75′ w/≈10% clay, clay may be from higher in borehole.
90		- - -	0756	90,	<u>SAND</u> , same as 75', no clay frac.
95	╡	-1 E		95,	<u>SAND</u> , same as 75', no clay frac.
100				100,	<u>SAND</u> , same as 75', no clay.
105	5 1 + + + + + + + + + + + + + + + + + + 	E		1057	<u>SAND</u> , same as 75', no clay.
110	1 1 1 1 1 1 1 1 1 1	E E		110'	' <u>SAND</u> , same as 75', no clay.
115	5 4++++++++++++++++++++++++++++++++++++	4		1157	<u>SAND</u> , same as 75', no clay.

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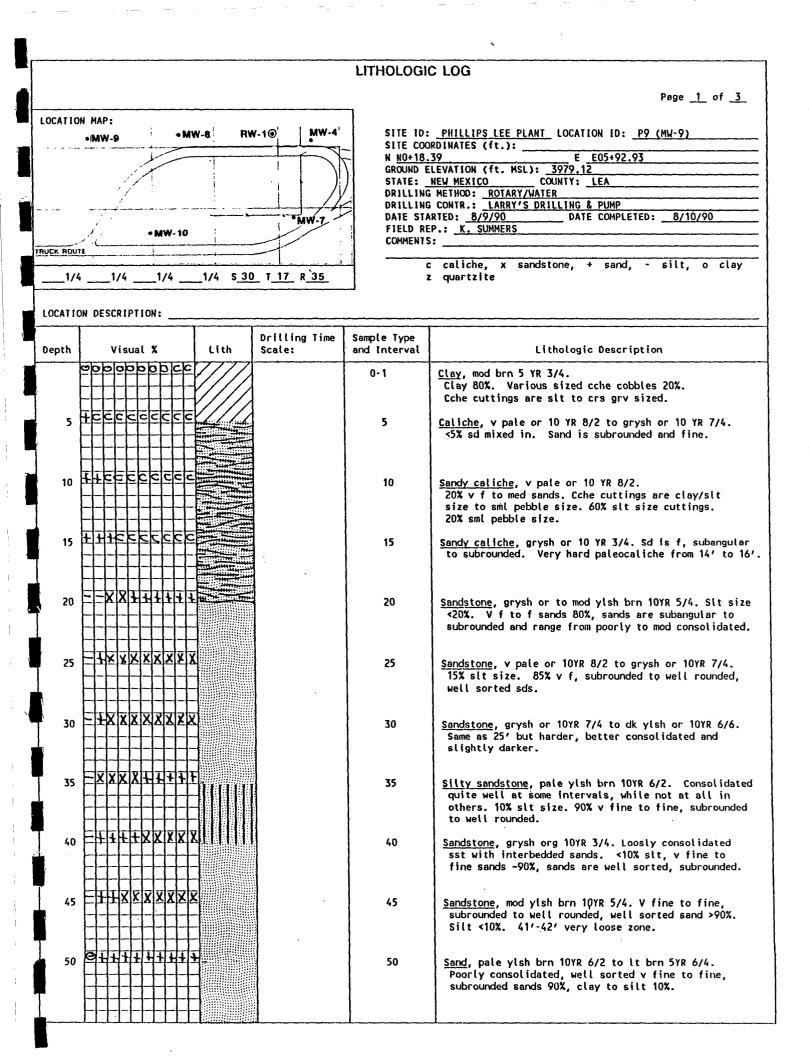
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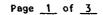
								 	 		LITHOLOG	C LOG	Page <u>3</u> of <u>3</u>
sa .								 		 	(Continue	d)	Location ID <u>BH-5</u>
Depth			v	is	Ua	ıl	×		Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic D	escription
115						- - -							2
120		- + -			Ŧ	4	4			0815	1201	<u>SAND</u> , same as 75', no clay.	
125													
130													
135									-				
140									-				
145													
150									-				
155	, , , , ,								- - - -	x			
160													
165	5												·
170													
17	5						_						
180	0							 					

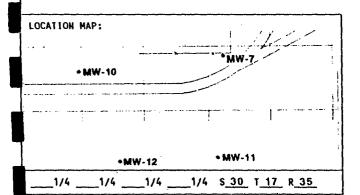


<u> </u>			LITHOLOGI	CLOG Page 2 of 3
			(Continue	d) Location ID <u>P9 (MW-9)</u>
	Depth	Visual X Lith	Drilling Time Sample Type Scale: and Interval	Lithologic Description
Ĩ	50	- c + + + × × × × × × ×		
	55	- <u>c+++xxxxx</u> .	55	<u>Sandstone</u> , grysh or 10YR 7/4 to pale ylsh brn 10YR 6/2. Sit size 10%. V fine sand 85%. Paleocaliche layer at 54".
	60	<u>-+++xxxxxx</u>	60	<u>Sandstone</u> , grysh or 10YR 7/4. Moderately consolidated. <5% slt size. V fine to fine, subangular to subrounded, moderately well sorted sands 95%.
	65	cettttXXXX	65	<u>Sand/sandstone</u> , mod ylsh brn 10YR 5/4. 15% caliche. 85% loose to moderately consolidated, subrounded, well sorted sand. Color transition is obvious. Fast drilling.
	70	EETTTT	70	<u>Sand/sandstone</u> , mod ylsh brn 10YR 5/4. 15% caliche. 85% loose to moderately consolidated, subrounded, well sorted sand. Color transition is obvious. Fast drilling.
	75	©+++++++++++++++++++++++++++++++++++++	75	Sand, mod ylsh brn 10YR 5/4. 95% v fine to fine sand, well sorted, unconsolidated. 5% white clay balls (kaolinitic?).
ĺ	80	<u></u> 0977 <u>7</u> 4 <u>7</u> 4 <u>7</u> 4 <u>7</u>	80	Sand, same as 75' but slightly lighter color due to increased clay content. Clay 15%.
Ì	85		85	Sand, mod yish brn 10YR 5/4. 5% clay. Sit 10%. V fine to fine sand 85%, 2" of v pale or sst at 84'. Sand is well rounded, well sorted primarily unconsolidated.
ļ	90	<u>H</u> H H H H H H H H H H H H H H H H H H	90	<u>Sand</u> , pale yish brn to pale yish or 10YR 8/6. Loose to semi-consolidated silt 30%. V fine to fine sand 70%. Sand is sub to well rounded, well sorted.
	95		95	<u>Sand/sandstone</u> , v pale or 10YR 8/2 to pale yish brn 10 YR 6/2. Clay 15%. Silt 15%. V fine well rounded sand 70%. Mod well sorted, loose to well consolidated. Well consolidated layers are thin.
	100	= X X X I I I I I I I	100	Sand, pale ylsh brn 10YR 6/2. Clay to silt size 5%. V fine sand 90%, loose to mod consolidated, subangular to well rounded, well sorted sands.
ĺ	105		105	<u>Clayey sand</u> , mod ylsh brn 10YR 5/4 to grysh or 10 YR 7/4. White clay balls present ~5%. Silt 5%. V fine to fine sand 85%. Sand is subrounded, well sorted, poorly consolidated.
	110		110	<u>Clayey sand</u> , mod yl brn 10YR 5/4 to grysh or 10 YR 7/4. White clay balls present ~5%. Clay 5%. Silt 5%. V fine to fine sand 85%. Sand is subrounded, well sorted, poorly consolidated.
	115	₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩	115	<u>Sand</u> , mod yl brn 10 YR 5/4. V fine to fine, subrounded to well rounded, well sorted, unconsolidated "flowing sands".

			LITHOLOG	C LOG	Page <u>3</u> of <u>3</u>
	[(Continue	d) 、	Location ID <u>P9 (MW-9)</u>
Depth	Visual X Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic (Description
115			118 118	<u>Sand</u> , same as 115' but with 5 TD	
120				10	
125					
130		•			
135		X			
140					
145					
150				`	
155					
160					
165					
170				•	
175				• •	
180					

LITHOLOGIC LOG





SITE COORDINATES (ft.):	
N \$1+37.89	E E06+97.32
GROUND ELEVATION (ft. M	(SL): 3978.0
STATE: NEW MEXICO	COUNTY: LEA
DRILLING METHOD: _ ROTAR	RY/WATER
DRILLING CONTR .: LARRY	I'S DRILLING & PUMP
DATE STARTED: 8/8/90	DATE COMPLETED: 8/10/90
FIELD REP .: K. SUMMERS	
COMMENTS:	

c caliche, x sandstone, + sand, - silt, o clay z quartzite

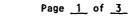
LOCATION DESCRIPTION: ___

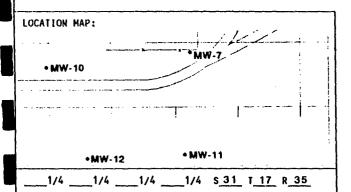
Depth	Visual X Lit	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
			0-2	<u>Clay/Topsoil</u> , mod brn 5YR 4/4. 70% clay/topsoil. Various sized caliche cobbles present at 30%.
5			5	<u>Caliche,</u> grysh or to v pale or 10YR 8/2. Cuttings are sand to small pebble sized, with clay size particles washed away.
10	<u>+++++</u>		10	<u>Caliche/Sand</u> , grysh or 10YR 7/4. Cche to 8', then unconsolidated sands to 10'. Cuttings show 50% v fine to fine, subangular to subrounded, well-sorted
15	$= + + \times $		15	<pre>sand. Caliche cuttings are crs sand size to small pebble size. Sandstone, grysh or to mod ylsh brn 10YR 5/4. <5% qtzt fragments which are crs sd size to med pbl size (wh, semi-vit, scratches glass, does not effervesce in vcl) 5 ed 60% v 4 ed 10% Cuttinge</pre>
20	<u>+++</u> xxxxz		20	HCl). F sd 60%. V f sd 10%. Slt <5%. Cuttings are primarily v crs sd size to sml pebble size. <u>Sandstone</u> , grysh or 10YR 7/4 to mod ylsh brn 10YR 5/4. Same as 15' but not as well-consolidated. Interval of very hard qtzt as above.
25	XXXXXXXCCC		25	Sandstone/caliche, pale yish brn 10YR 6/2. V f to f sd 70%. 5% sit size. Sands are well to subrounded, well-sorted, well consolidated, except from 20-21 unconsol. 25% paleocaliche fragments showing good
30	+ + X X X X X Z C C		30	conchoidal fracture. <u>Sandstone/caliche</u> , same as 25' with v fine grained, well-sorted subrounded "flowing" sands interbedded in thin layers.
35	ŦŦxxxxxccc		35	<u>Sandstone/caliche</u> , same as 25' but cutting size is smaller for the cche - 1/16" to 5/8". Predominant sized sst fragments are crs sd size to v crs sd size.
40	ŦŦĸĸĸĸĸċċċċ		40	<u>Sandstone/caliche</u> , same as 35'.
45	<u>+</u> + <u>x</u> xxxxxcco		45	Sandstone, pale yish brn 10YR 6/2. Sit to fine sd. Well consolidated, subrounded to well rounded, well sorted, caliche cement. Cuttings are v coarse sand size to small pebble size.
50	¥¥XXXXXXX		50	<u>Sandstone</u> , same as 45'.
			<u> </u>	

		**********	LITHOLOG	IC LOG Page 2_ of 3_
	T		(Continue	
Depth	Visual X Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
50	<u>++xxxxxxxxxxx</u>			
55	<u>ŦŦXXXXXXXX</u>		55	<u>Sandstone</u> , same as 45'.
60	<u>ŦŦŦŦŦŦŦ</u>		60	Sand/sandstone, pale yish brn 10YR 6/2 to mod yish brn 10YR 5/4. Moderately unconsolidated. Paleocaliche
65	¥XXXXXXX •		65	<pre><5%. Silt <5%. V fine to fine sand >90%. Sand is subrounded to well rounded, well-sorted. One foot of loose sand at 58'. Sandstone, same as 55-60', but with better consolidation.</pre>
70	XXXXXXXXC		70	Sandstone, mod brn 5YR 3/4. Definite color change. Paleo cche fragments ~1/4" 10%. Sands are v fine to fine, well rounded, well-sorted and well
75	XXXXXXXXX		75	consolidated. Very fine to fine sands 90%. Fragments are approximately 55% small pebble size. <u>Sandstone</u> , same as 70'.
80	-XX XX XX XX XX XX	× .	80	Sand, mod brn 5YR 4/4. Sand is unconsolidated, well rounded to subrounded, well sorted. 85% v fine sand. 15% silt.
85	- XX XX X X X X X X X X		85	Sand, same as 80'.
90	- X I I I I I I I I I I I I I I I I I I I		90	Sand, mod brn 5YR 4/4 to mod ylsh brn 10YR 5/4. Sand is same as 80', only slight color change.
95	-XXX F+F1FF		95	<u>Sand</u> , same as 90' but slightly tighter.
100	= ¥¥¥¥¥¥¥¥¥¥		100	Sand, mod brn 5YR 4/4. Silt <10%. V fine to fine sand 90%. Sands are subrounded to rounded, unconsolidated and well sorted.
105			105	Sand, mod brn 5YR 4/4. Same as 100', but presence of white clay balls <5%.
110	<u>2-111111111111111111111111111111111111</u>		110	Sand, same as 105', but 5% white clay balls.
115	IIIIZZZZZZ.		115	Sand/sandstone, mod brn 5YR 4/4. Silt <5%. Qtzt fragments <5%. V f to f sds 90%. Sds are well rndd, well srtd. Sds and sst interbedded. Sst are mod consolidated.

-			LITHOLOGIC	CLOG Page <u>3</u> of <u>3</u>
			(Continued	
	Depth	Visual % Lith Sc	rilling Time Sample Type cale: and Interval	Lithologic Description
	115			×
	120		118 118	<u>Sand/sandstone</u> , same as 115'. TD
	125			- -
	130			
	135			
	140			
	145			
	150			
	155			
	160			
	165	5		
	170			
	175	5		۹ ۱
	180			

LITHOLOGIC LOG





S2+76.98 ROUND ELEVATION (ft.)	E	EO	9+14,32			
ROUND ELEVATION (ft.)	MSL): 3977.4	41				
TATE: NEW MEXICO	COUNTY:	LEA				
RILLING METHOD: _ROTA	RY/WATER					
RILLING CONTR .: LARR	Y'S DRILLING	& PU	MP CO.			
ATE STARTED: 8/07/90	DA	TE CO	MPLETED	: 8/1	0/90	
IELD REP .: K. SUMMER	S, M. NEE					
OMMENTS:						

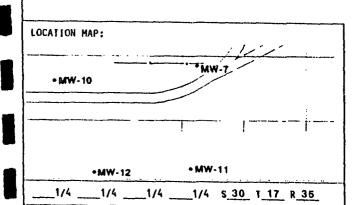
LOCATION DESCRIPTION:

Drill	in the local terms of	
Depth Visual X Lith Scale		Lithologic Description
C+0000000	0-21	<u>Clay</u> , dark yish brn 10YR 4/2. Clay 85%. Silt to fine sand and caliche gravel 15%.
	5'	Sandy caliche, grysh or 10YR 7/4. 80% caliche. 20% clay to fine sand. Sands in clays are subangular to subrounded.
	10'	<u>Sandy caliche</u> , same as 5'.
	15 '	<u>Sandy caliche</u> , same as 5′.
	20*	<u>Sandy caliche</u> , same as 5'.
	251	Sand/caliche, grysh or 10YR 7/4. 40% v fine to fine sand. Sands are subangular to subrounded, poorly consolidated, well-sorted. 60% tight caliche. Fragments are from medium sand size to v coarse
30 = 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4	× 30'	<pre>sand size. Sand, mod ylsh brn 10YR 5/4. <5% silt, >95% v fine to fine sands. Sands are sub to well-rounded, well- sorted and poorly consolidated.</pre>
35 <u>+++++××××××</u>	35'	<u>Sandstone</u> , pale ylsh brn 10YR 6/2. <5% silt size. Sand is v fine to fine, well rounded, well-sorted. Very well consolidated from 32-35'.
	40'	<u>Sand/sandstone</u> , same as 30-35', but not as well consolidated.
	451	<u>Sand</u> , mod ylsh brn 10YR 5/4 to grysh or 10YR 7/4. Mod consolidated sands interbedded with sandstone layers. Sandstones compose 30% of cuttings at 1/32" size.
	50'	<u>Sand</u> , same as 45'.

		 	LITHOLOGI	C LOG Page 2_ of 3_
	r	 	(Continue	d) Location ID <u>P11</u>
Depth	Visual X	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
50				
55	<i>zfffffffffffff</i>	-	551	Sand, mod ylsh brn 10YR 5/4 to grysh or 10YR 7/4.90% v fine to fine sands. <10% silt size. Some dark clay showing, probably from up hole.
60	<u>╤╁╊╁╊╅</u> <u></u>		601	<u>Sand</u> , pale yish brn 10YR 6/2 to mod yish brn 10YR 5/4. >90% v fine to fine sands. <10% silt size. Sands are well-rounded, well-sorted & poorly consolidated.
65	FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF		651	<u>Sand</u> , same as 60', but less silt.
70	╺╴╴╴╴╴╴ ╼		701	Sand, same as 65'.
75	┝─┤╍┤╍┤┙┥┙┥╸┤╺┤╺┤ ┺╡┺┨┺┧┺╛┺┥┺╡┺┥┺╴┱ ╾┥╍┽╍╷╍┥╍┥╸┥╸┥╸┥╸┥		751	Sand, same as 65', but even less silt.
80	·		801	<u>Sand</u> , mod yish brn 10YR 5/4. 90% v fine to fine sands. 10% silt. Sands are unconsolidated, very well-sorted, well-rounded "flowing sands".
85			851	Sand, same as 80'.
90	<u><u></u></u>		901	<u>Sand</u> , same as 80', but lighter. Not enough change to change color on chart.
95	<u>= { + } + } + } + } + } = } = + + + + + + +</u>		951	Sand, pale ylsh brn 10YR 6/2. 10% silt size. 90% v fine to fine sands. Sands are well to subrounded, well-sorted and poorly consolidated.
100	┶┙┥┙┙┙┙┙┙┙┙┙ ╋╋╋╋╋╋╋╋╋╋ ╺╺┙┙┙┙┙┙┙┙┙┙┙		1001	<u>Sand</u> , same as 95'.
105	╾╻╼╎╼╎╼╎╼╎╼╎╼╎╼╎╼┼╼┾╼┥ <u>╉╶╫</u> ╪┋ <u>╉</u> ╉ <u>╉</u> ╉ <u>╋</u> ╋ ╍┥╼┾╍╎╼┥╼┥╼┥╼┥		1051	<u>Sand</u> , same as 95′.
110			110'	<u>Sand</u> , same as 951.
115	┥┥┥┥┥╴┥╴┥╸┥╸┥╸┥ ┺┺╊╋╋╋╋ ╺╋╋╋		1151	<u>Sand</u> , same as 95'.

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					·.				•								ontinue								D <u>P11</u>	
	T										Γ		Dril	ling 1	ime	Sampl	e Type	Т								
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115																										
120				1					I I I I I								120 <i>1</i> 1201		<u>aand</u> , mod ylsh b 5% silt. Sands well-rounded. TD	orn 10YR are und	5/4. consol	95% (idate	v fin d, we	e to i ll-soi	fine s rted,	and. sub to
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LITHOLOGIC LOG



	Page <u>1</u> of <u>3</u>
SITE ID: PHILLIPS LEE PLANT LOCATION ID	: P12 (MW-12)
SITE COORDINATES (ft.);	
N <u>S2+80.20</u> E E07+60	0.87
GROUND ELEVATION (ft. MSL): 3977.3	
STATE: NEW MEXICO COUNTY: LEA	
DRILLING METHOD: ROTARY/WATER	
DRILLING CONTR .: LARRY'S DRILLING & PUMP	co.
DATE STARTED: 8/07/90 DATE COMP	LETED: 8/10/90
FIELD REP .: K. SUMMERS, M. NEE	and the second distance of the second s
COMMENTS:	واجعا يريسانيا مريسان الشعاباني ومحافلات الراسي والمراجبة والمراجبة

c caliche, x sandstone, + sand, - silt, o clay z quartzite

LOCATION DESCRIPTION:

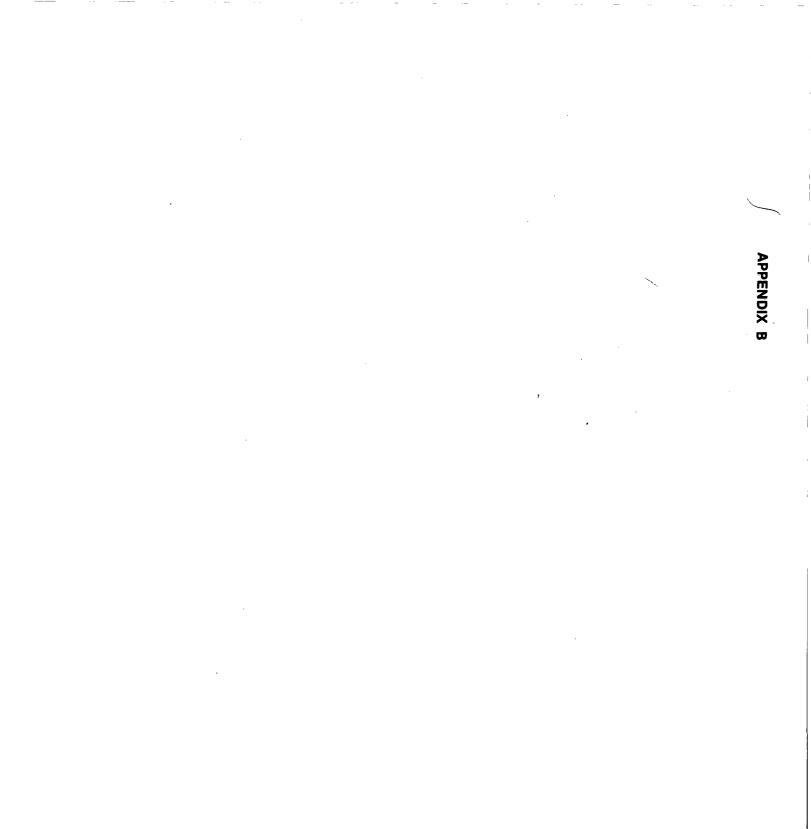
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[Depth			,	, 	vi 1-	รเ T	1a	1	x 				Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
	5		-	1	ĩ	- -					Ē	Ē				51	<u>Clay/caliche</u> , v pale or 10YR 8/2. 80% caliche. 20% clay
	10			Ŧ						Ē	C	5				101	to v fine sand. First 2 feet primarily clay with caliche cobbles. <u>Sandy caliche</u> , grysh or 10YR 7/4. 70% caliche. 10% cl, sit. Approx 20% v fine sand. Sand is well-rounded
	15			Ŧ	Ŧ	C		2	2	ē	<u>c</u>					151	to subrounded, well-sorted and unconsolidated. <u>Sand/caliche</u> , same as 10'.
	20		Ŧ -	- - 7	Ī	G	C			2	Ē	c				201	<u>Sand/caliche</u> , grysh or 10YR 7/4. Approx 3' sand and then back to caliche. 80% caliche in cuttings. Sand is subrounded, unconsolidated, well-sorted, v fine to
	25			<u>c</u>	Ŧ						<u>+</u>		Ŧ			251	fine. Some quartzite fragments 5%. Sand, mod yish brn 10YR 5/4. 80% v fine to fine sand. 20% caliche. Sand is well-sorted, well-rounded, semi consolidated.
	30]			X	X	×	X	×	4		30'	Sandstone, mod yish brn 10YR 5/4 to dk yish brn 10 YR 6/6. Poorly to well consolidated at 29' 70% sand. 30% silt size. Sand is v fine, well-rounded, welt-
	35			Ŧ	1	Ĩ	5		X	X	X	X	×			351	sorted. <u>Sandstone</u> , mod ylsh brn 10YR 5/4, 90% v fine to fine, well consolidated, well-sorted & well-rounded sand. 10% caliche fragments.
	40]		Σ		2	X	x	X	X	X			401	<u>Sandstone</u> , mod yish brn 10YR 5/4, silt to fine sand. Semi-consolidated, well-rounded, well-sorted sand 90%. 10% silt.
	45			X	X	X 					_ 7		Ŧ			451	<u>Sandstone</u> , mod ylsh brn 10YR 5/4 to grysh or 10 YR 7/4. 60% sand. 30% sandstone fragments 1/16". V hard layer at 42'. Sand is v fine, well-sorted, well-rounded.
	50					- - -				X	X -	X	X 			501	<u>Sand/sandstone</u> , mod yish brn 10YR 5/4. 75% sand/ sandstone 25% caliche. Sand is v fine, well-rounded, well-sorted, moderately consolidated. Caliche is very tight.

			LITHOLOG	IC LOG Page <u>2</u> of <u>3</u>
	1	· · · · · · · · · · · · · · · · · · ·	(Continue	
Depth	Visual X Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
50				
55			551	<u>Sand/sandstone</u> , pale yish brn 10YR 6/2. Thin layers of v light colored sandstone. Sandstone v fine, well-sorted, sub to well-rounded. Some layers are
60	<u></u>		601	very well-consolidated. >90% sand. <20% silt size. <u>Sand/sandstone</u> , mod yish brn 10YR 5/4 to mod brn 5YR 4/4. Other than color change, sands are same as 55'.
65	XXX <u>FFFF</u>		651	<u>Sand/sandstone</u> , same as 60', but slightly less consolidated.
70	<u> </u>		701	<u>Sand</u> , mod brn 5YR 5/4. Same as 60'. 6" of tight callche at 69'.
75	<u> </u>		75 ن	Sand, same as 70' with some caliche fragments.
80	-XHHHHHHH		80,	Sand, mod yish brn 10YR 5/4. 90% v fine to fine sandstones. 10% silt size materials. Sands are well- sorted, sub to well-rounded. Mostly unconsolidated. Distinctive color change.
85	ZZ++++++++++++++++++++++++++++++++++++		851	Sand, same as 80', but small quartzite fragments <5%.
90	ZX H+		901	<u>Sand</u> , same as 80'.
95	- X I I I I I I I I I I I I I I I I I I I		951	<u>Sand</u> , mod yish brn 10YR 5/4. 90% v fine to fine, sub-rounded, well-sorted, mostly unconsolidated. Sandstones at 93', but very thin. 10% silt size
100	= X I I I I I I I I I I I I I I I I I I		1001	particles. Sand, same as 95', without sandstone.
105			1057	Sand, mod yish brn 10YR 5/4 to mod brn 5YR 4/4. Sub to well-rounded, well-sorted quartz sands. Sands are v fine to fine and unconsolidated at 95%.
110	<u>→</u> → <u>→</u> → <u>→</u> → <u>→</u> → <u>→</u> → <u>→</u> → → → → → →		1104	5% silt size. Sand, same as 105'.
115 1			1157	Sand, same as 105'.

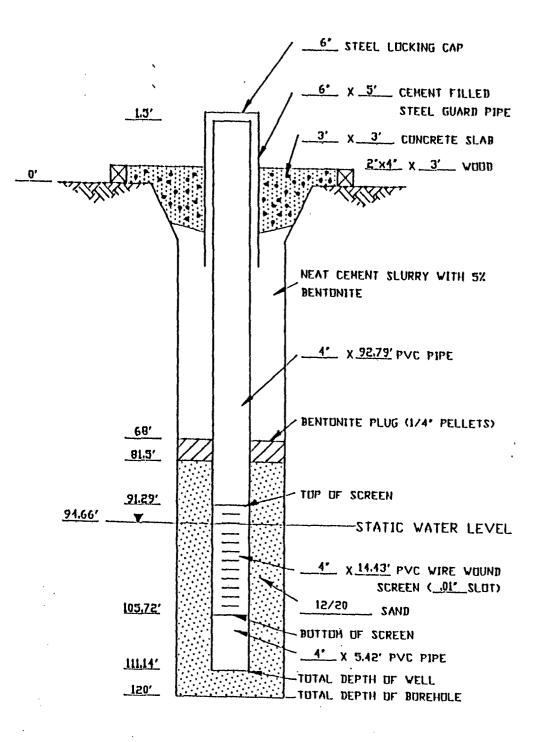
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			`	LITHOLOG		Page <u>3</u> of <u>3</u>			
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Depth	Visual X	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic D	escription			
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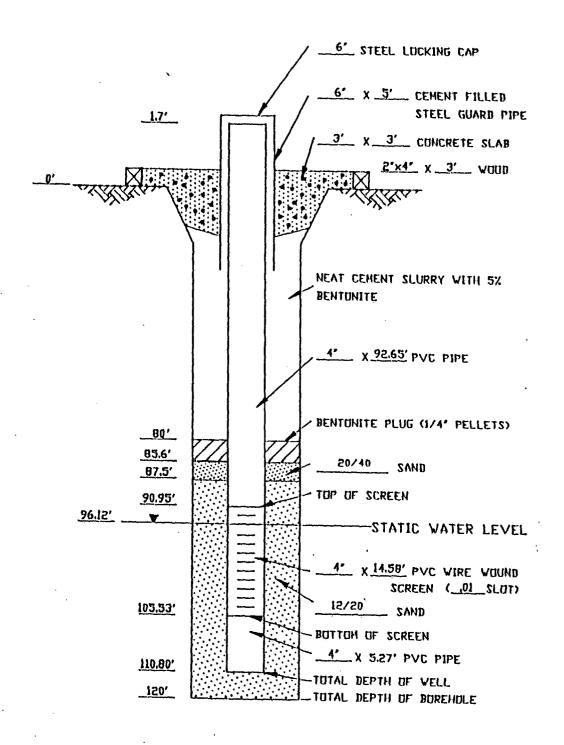


APPENDIX B

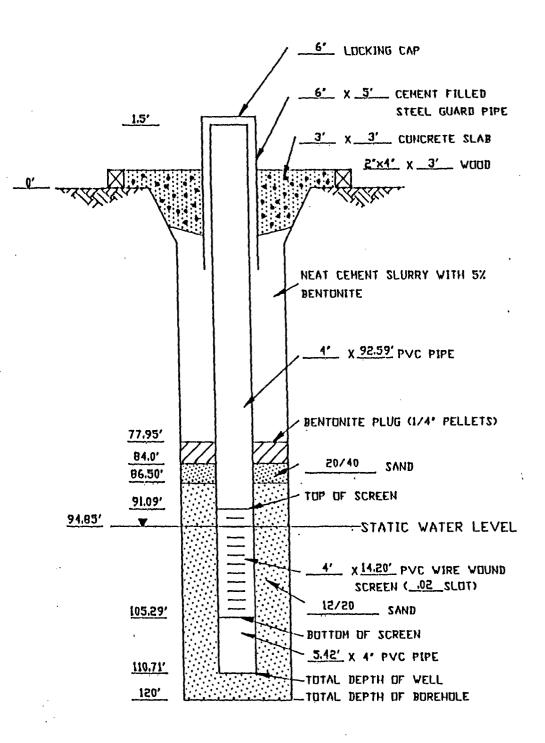
Monitor Well Completion Diagrams



MUNITUR WELL MW-5 PHILLIIPS LEE PLANT

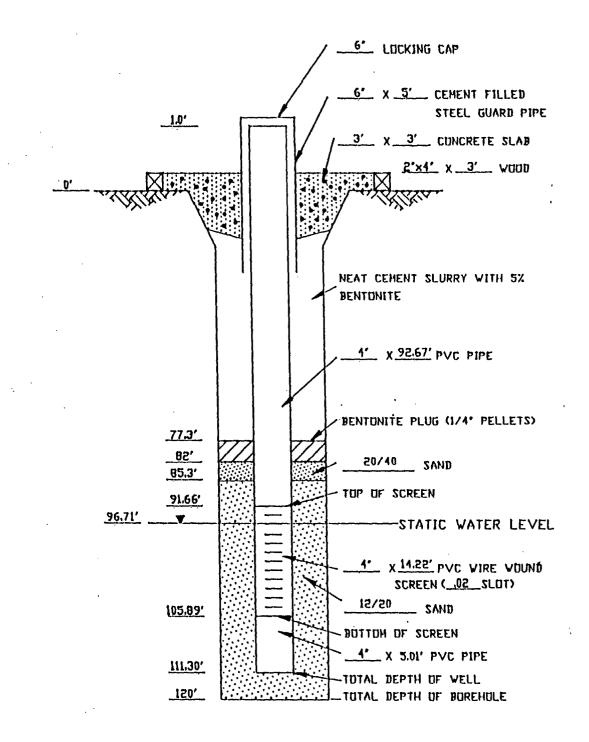


MUNITUR WELL MW-6 PHILLIIPS LEE PLANT

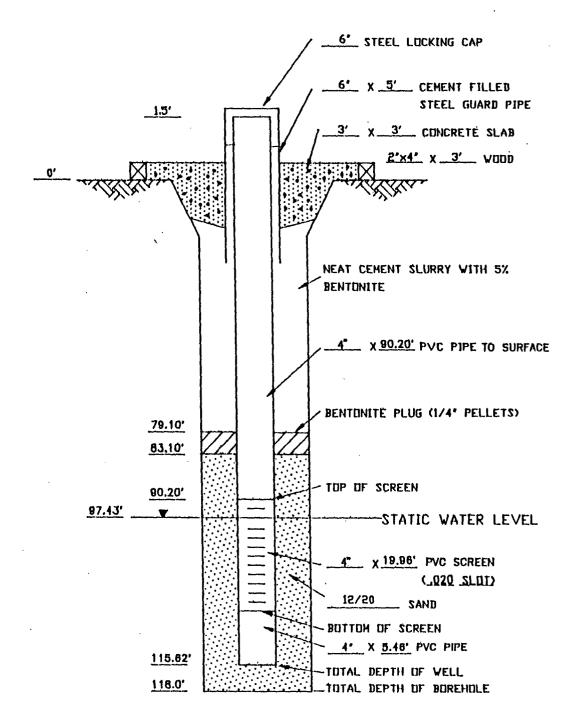


MONITOR WELL MW-7 PHILLIIPS LEE PLANT

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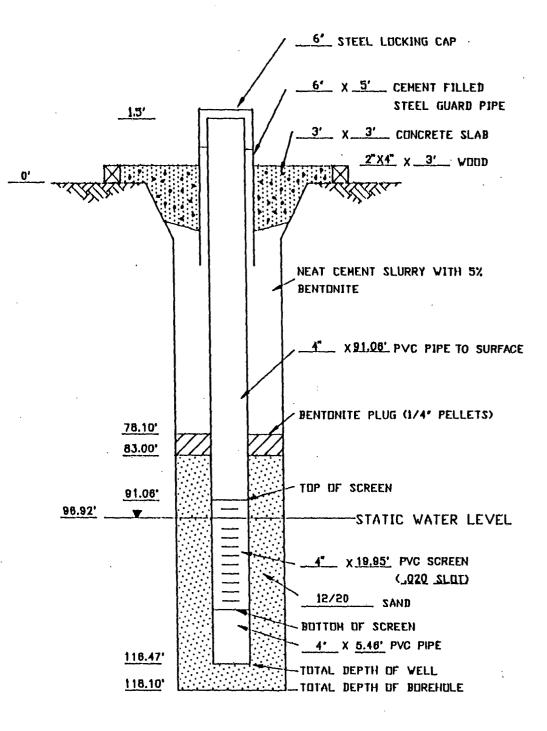


MONITOR WELL MW-B PHILLIIPS LEE PLANT



MONITOR WELL MW-9 COMPLETION DIAGRAM

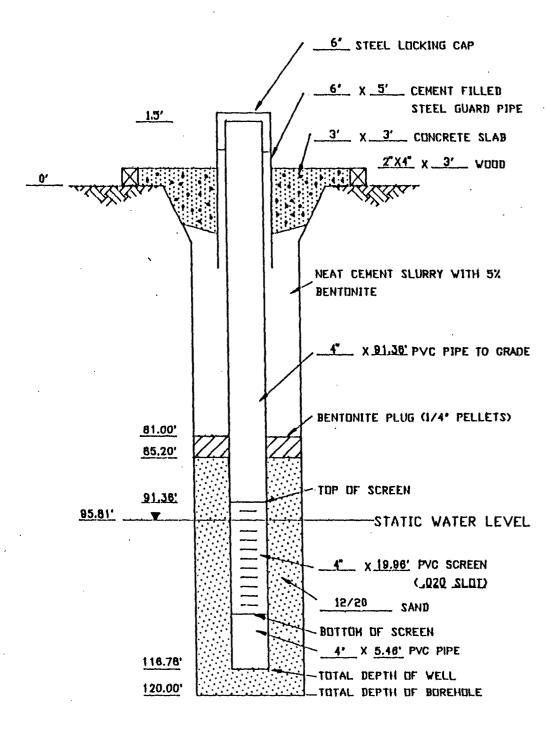
PHILLIIPS LEE PLANT



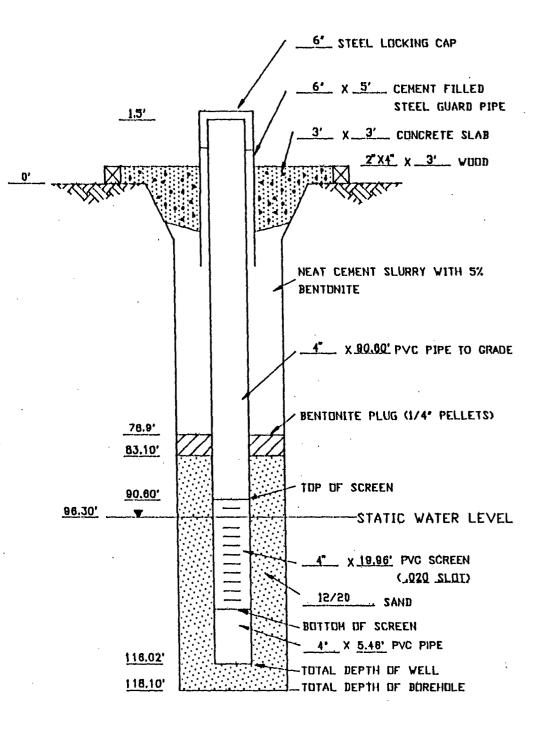
MONITOR WELL MW-10 COMPLETION DIAGRAM

PHILLIIPS LEE PLANT

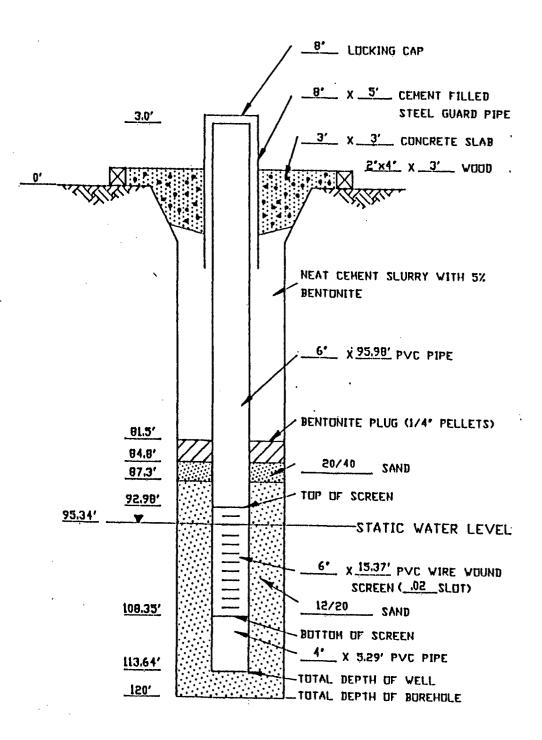
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MONITOR WELL MW-11 COMPLETION DIAGRAM PHILLIIPS LEE PLANT



MONITOR WELL MW-12 COMPLETION DIAGRAM PHILLIIPS LEE PLANT



RECOVERY WELL RW-1 PHILLIIPS LEE PLANT

APPENDIX C

APPENDIX C

Laboratory Reports

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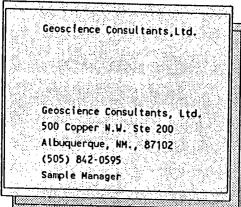
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Radian Work Order SO-03-244

Analytical Report 04/17/90



RECEIVED APR 2 0 1990

Customer Work Identification Phillips Purchase Order Number

Contents; °., , Analytical Data Summary 2 Sample History 3 Comments Summary Notes and Definitions

Radian Analytical Services 10395 Old Placerville Road Sacramento, CA 95827

916-362-5332

Client Services Coordinator: LWKELLY

Certified by: Mand 14 Tale

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Analytical Data Summary

Page: 2

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Geoscience Consultants,Ltd. Radian Work Order: \$0-03-244

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latrix:	water	02A Water	03Å Nater	04A Water
	Result Det. Limit	Result Det. Limit	Result Det.Limit	Result Det. Limit
Diesel (2)	ND 50	<u>220 a 50</u>	<u>150 a</u> 50	ND 50
Jet fuel (2)	ND 100	ND 100	ND 100	ND 100
(erosene (2)	<u>990</u> 100	ND 100	ND 100	ND 100
Lubricating oil (2)	ND 100	ND 100	ND 100	ND 100
ND Not detected at specified d	etection limit	a Fst: resul	lt less that 5 times det	action limit
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RADIAN	Analytical	Data Summary		Page: 3
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Diesel (2) Jet fuel (2) Kerosene (2) Lubricating oil (2)	Result Det. Limit ND 50 ND 100 ND 100 ND 100 ND 100	Result Det. Limit	Result Det. Limit	Result Det.Limit
ND Not detected at specified (1) For a detailed descriptio (2) Extraction By SW3520 (con SW3550 (sonication) follo detectors,	h of flegs and technica tinuous liquid/liquid) wed by GC analysis with	l terms in this report o or FID		
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Geoscience Consultants, Ltd. Radian Work Order: \$0-03-244

Factor:	5	1	1	
Results in:	ug/L	ug/L	ug/L	ug/L
	01B	028	038	048
Matrix:	wäter	water	water	water
Gasoline (2) Toluene (2) Xylenes (total) (2)	<u>13000</u> 250 ND 1.5 <u>43 C</u> 2.5	<u>6500</u> 50 <u>1.8 C</u> 0.30 ND 0.50	5800 50 ND 0.30 ND 0.50	8500 50 0.38 ca 0.30 ND 0.50
ND Not detected at specifie	d detection limit	C Confirmed	on second column or by	GC/MS

RADIAN

Analytical Data Summary

Geoscience Consultants,Ltd. Radian Work Order: 50-03-244

Method:TPH-Gasoline by mod.SW8015 (1) List:Gasoline and BTEX list Sample ID: REAGENT BLANK

Factor: 1 1 Results in: ug/L ug/L ug/L 05A 05B

Matrix; water water

	{							
	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Benzene (2)	ND	0.30	ND	0.30				
Ethylbenzene (2)	ND	0,30	ND	0.30				
Gasoline (2)	ND	50	ND	50	}		ŀ	
Toluene (2)	ND	0.30	ND	0.30	}		ļ	
Xylenes (total) (2)	ND	0.50	ND	0,50	l_ <u></u>		L	

REAGENT BLANK

ND Not detected at specified detection limit.

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

(2) SW5030 (purge & trap) followed by GC analysis with PID/

FID detectors.

Page: 5

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Sample History

Page:6

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Geoscience Consultants,Ltd. Radian Work Order: \$0-03-244

	Sample Ide	entifications ar	nd Dates		
Sample 1D	9003271300	900328095 0	9003281130	9003281215	REAGENT BLANK
Date Sampled Date Réceived Matrix	03/27/90 03/30/90 Water 01	03/27/90 03/30/90 water 02	03/27/90 03/30/90 Hater 03	03/27/90 03/30/90 water 04	03/30/90 water 05
TPH-Diesel by mod. <u>SW8015</u> Prepared Analyzed Analyst File 1D Blank 1D Instrument Report as TPH-Gasoline by mod. <u>SW8015</u> Prepared Analyzed Analyst File 1D Blank 1D Instrument Report as TPH-Gasoline by mod. <u>SW8015</u> Prepared Analyzed Analyzt File 1D Blank 1D Instrument Report as	04/01/90 04/09/90 JM 820040917 82004094 8 received 04/02/90 BSJ A20040213' A2004021 A received	04/01/90 04/09/90 JM 82004097 82004094 8 received 04/01/90 BSJ A20040116 A received	04/01/90 04/09/90 JM 82004098 82004094 8 received 04/01/90 BSJ A20040117 ' A2004011 A received	04/01/90 04/09/90 JM 820040916 82004094 8 received 04/01/90 BSJ A20040118 A2004011 A received	04/01/90 04/09/90 JM 82004094 8 received 04/01/90 BSJ A2004011 A received 04/02/90 BSJ A2004021 A received

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RADIAN

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Appendix A Comments, Notes and Definitions

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RADIAN

Notes and Definitions

Page: A-2

Geoscience Consultants,Ltd. Radian Work Order: SO-03-244

a ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

C ORGANIC CLP

pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS.

OTHER ORGANIC METHODS

This analysis has been confirmed on a second column or by GC/MS. EXPLANATION

Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.



Notes and Definitions

Geoscience Consultants,Ltd. Radian Work Order: SD-03-244

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CROLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/ digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

نى <u>بىت بىتارىمى</u>		
Units -	ug/L	micrograms per liter (parts per billion);liquids/water
	ug/kg	micrograms per kilogram (parts per billion); soils/solids
	ug/H3	micrograms per cubic meter; air samples
	mg/L	milligrams per liter (parts per million);liguids/water
	mg/kg	milligrams per kilogram (parts per million);soils/solids
	X	percent; usually used for percent recovery of QC standards
	US/cm	conductance unit; microSlemans/centimeter
	mL/hr	milliliters per hour; rate of settlement of matter in water
an a	NTU	turbidity unit; nephelometric turbidity unit
	CU	color unit; equal to 1 mg/L of chloroplatinate salt
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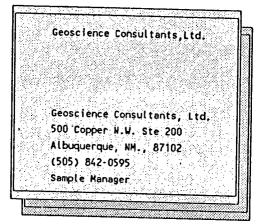
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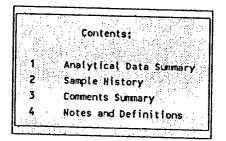
Radian Work Order SD-04-077

RECEIVED APR 2 7 1990

Analytical Report 04/26/90



Customer Work Identification TPH COC:3460 Purchase Order Number



Radian Analytical Services 10395 Old Placerville Road Sacramento, CA 95827

916-362-5332

Client Services Coordinator: LWKELLY

.

Certified by: Sharon K. Person

Analytical Data Summary

Page: 2

Geoscience Consultants,Ltd. Radian Work Order: S0-04-077

List:Complète analyte list ample 1D:	9004061130	REAGENT BLANK	
Betor: Results in:	9.5 ug/L	1 ug/L	
Matrix:	01A Water	04A water	
· · · · · · · · · · · · · · · · · · ·	Result Det. Limit	Result Det. L'imit	
Diesel (2)	<u>9500 G</u> 480	ND 50	
Jet fuel (2)	ND 950	ND 100	
Kerosene (2)	ND 950 ND 950	ND 100	

SW3550 (sonication) followed by GC analysis with FID

detectors.

Page: 3

Geoscience Consultants, Ltd. Radian Work Order: S0-04-077

Sample ID:	9004061130	9004061135	TRIP BLANK	REAGENT BLANK
Factor:	200	1	1	
Results in:	ug/L 01B	ug/L	ug/L	ug/L
latrix:	Wäter	02A water	03A Water	04A Water
Benzene (2) Sthylbenzene (2) Gasoline (2) Foluene (2)	Result Det. Limit <u>18000 C</u> 60 <u>830 C</u> 60 <u>1200000</u> 10000 <u>7100 C</u> 60 <u>290 Ca</u> 100	Result Det. Limit 1.5 C 0.30 1.8 C 0.30 180 a 50 1.5 C 0.30 3.8 C 0.50	Result Det. Limit ND 0,30 ND 0.30 <u>58</u> 50 ND 0,30	Result Det.Limit ND D.30 ND D.30 ND 50 ND 0.30

(2) SW5030 (purge & trap) followed by GC analysis with PID/

FID detectors. MARCE - CH

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Analytical Data Summary

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Page: 4

Geoscience Consultants,Ltd. Radian Work Order: S0-04-077

Method:TPH-Gasoline by mod.SL List:Gasoline and BTEX lis Sample ID: factor: Results in: Matrix;	WB015 (1) t REAGENT BLANK 1 Ug/L D4B Water			
Benzene (2) Ethylbenzene (2) Gasoline (2) Toluene (2) Xylenes (total) (2)	Result Det. Limit ND 0.30 ND 0.30 ND 50 ND 0.30 ND 0.50	Result Det. Limit	Result Det. Limit	Result Det. Limit
ND Not detected at specified (1) For a detailed descriptio (2) SW5030 (purge & trap) fol FID detectors,	on of flags and technical	terms in this report re h PID/	efer to Appendix A in th	l

Sample History

Page:5

Geoscience Consultants,Ltd. Radian Work Order: \$0-04-077

	Sample Iden				
Sample 1D	9004061130	9004061135	TRIP BLANK	REAGENT BLANK	
Date Sampled	04/06/90	04/06/90	04/06/90		
Date Received	04/07/90	04/07/90	04/07/90	04/07/90	
Matrix	water	water	water	Water	
······································	01	02	03	04	
PH-Diesel by mod. SW8015	<u>1965 - 1999 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997</u>	<u> </u>	<u> 19 - 19 - 19 - 19 - 19 - 19 - 19 - 19 </u>	<u> </u>	<u>na serie de la serie de la s</u>
Prepared	04/11/90			04/11/90	
Analyzed	04/19/90		1	04/19/90	
Analyst	ML			JM	
file ID	8-2-00419-50	1		8-2-00419-42	
Blank ID	8-2-00419-42				
Instrument	8			8	
Report as	received			received	
PH-Gasoline by mod.SW8015					
Prepared]			
Analyzed	04/11/90	04/09/90	04/09/90	04/09/90	
Analyst	B21	ES1 LSB	BSJ	BSJ	
File ID	A-2-00411-10		· .	A-2-00409-1	
Blank ID	A-2-00411-1/	A-2-00409-1	A-2-00409-1		
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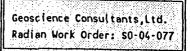
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Appendix A Comments, Notes and Definitions

Report Comments and Narrative



General Comments

Sample #9004061130 contains an unidentified mid-boiling hydrocarbon. This was quantitated from a diesel standard and the result reported as an estimated value.



Notes and Definitions

Page: A-3

Geoscience Consultants,Ltd. Radian Work Order: \$0-04-077

ALL METHODS EXCEPT CLP The results which are less than five times the method specified detection limit. EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

C ORGANIC CLP

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pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS. OTHER ORGANIC METHODS

OTHER ORGANIC HETHODS

This analysis has been confirmed on a second column or by GC/MS. $\ensuremath{\mathsf{EXPLANATION}}$

Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.

G ALL ORGANIC GC METHODS EXCEPT CLP Indicates an estimated GC value due to interferences.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit. EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

Notes and Definitions

TERMS USED IN THIS REPORT:

Geoscience Consultants,Ltd. Radian Work Order: S0-04-077

> Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CROLs (contract required quantitation limits) for organics and CRDLs (contract required detection timits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/ digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units • ug/L	micrograms per liter (parts per billion);l[quids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
Ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million);liquids/water
mg/kg	milligrams per kilogram (parts per million);soils/solids
*	percent; usually used for percent recovery of QC standards
US/cm	conductance unit; microSiemans/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

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	Geoscience 500 copper N.W. Suite 200 Albuquerque, NM (505) 842 0001	178	0395 6 a w	Û	<u> </u>	5	10		<u> </u> .						PROJECT INFORMATION	9		102		37	NS/CC	5	J).	8
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		LAB NAME & ADI AA	ADDRESS	SAMPLERS (SIGNATURE)	SAMPLE NUMBĘR	annan z ILIND	94121200	UNITUTION ON							P.R.O.	PROJECT:	PROJECT	CHARGE CODE NO.	DNId		SPECIAL INSTRUCTIONS/COMMENTS	.7	1.	CICLERE CONTINUE
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Radian Work Order S0-04-075

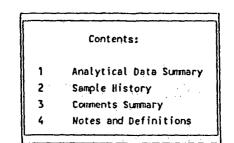
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Analytical Report 04/30/90

Geoscience Consultants, Ltd. ere provedent jahang ola Geoscience Consultants, Ltd. 500 Copper N.W. Ste 200 Albuquerque, NM., 87102 (505) 842-0595 Sample Manager

Customer Work Identification TPH COC:3461 Purchase Order Number



Radian Analytical Services 10395 Old Placerville Road Sacramento, CA 95827

916-362-5332

Client Services Coordinator: LWKELLY

certified by: Aand Hale

RADIAN	Analytical	Data Summary		Page: 2
Geoscience Consultants,Ltd. Radian Work Order: SO-04-075				
Method:TPH-Diese(by mod. SW80 List:Complete analyte list Sample ID:	있는 사람들이 있는 것은 가 있었다. 같은 것 같은 것	ې 9004031600	900404140 🗸	REAGENT BLANK
Factor:		0.95		1
Results in:	Ug/L 01A	ug/L Q2A	ug/L 03A	ug/L 04A
Matrix:	water	water	water	water
Diesel (2) Jet fuel (2) Kerosene (2) Lubricating oil (2)	Result Det.Limit <u>5600 G</u> 50 ND 100 ND 100 ND 100 ND 100	Result Det. Limit <u>200 G@</u> 48 ND 95 ND 95 ND 95	Result Det. Limit <u>240 G@</u> 50 ND 100 ND 100 ND 100	Result Det.Limit ND 50 ND 100 ND 100 ND 100
G Indicates an estimated GC va a Est. result less that 5 time (1) for a detailed description (2) Extraction By SW3520 (con- SW3550 (sonication) follow detectors:	es detection limit n of flags and technica tinuous liquid/liquid)	l terms in this report or	cted at specified detec	

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Page: 3
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limit
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30 30 50 nces

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Geoscience Consultants,ltd. Radian Work Order: SO-04-07	ri			
Method:TPH-Gasoline by mod List:Gasoline and BTEX L Sample ID: Factor: Results in: Matrix:	ist and a second se			
Benzene (2) Ethylbenzene (2) Gasoline (2) Toluene (2) Kylenes (total) (2)	Result Det.Limit ND 0.30 ND 0.30 ND 50 ND 0.30 ND 0.30 ND 0.50	Result Det. Limit	Result Det.Limit	Result Det. Limit
ND Not detected at specifi	ed detection limit	l terms in this report	refer to Appendix A in	this report.

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Sample History

Page:5

Geoscience Consultants,Ltd. Radian Work Order: \$0-04-075

	Sample Ide	entifications ar	nd Dates		
Sample ID	9004031400	9004031600	900404140	REAGENT BLANK	
Date Sampled Date Received	04/04/90 04/06/90	04/04/90 04/06/90	04/04/90 04/06/90	04706790	
Matrix	water 01	water 02	water 03	04	
TPH-Diesel by mod. SW8015					
Prepared	04/11/90	04/11/90	04/11/90	04/11/90	
Analyzed	04/19/90	04/19/90	04/19/90	04/19/90	
Analyst	JM	ML	JM	ML	
File ID	820041947	820041948	820041949/	820041942	
Blank ID	820041942	820041942	820041942′		
Instrument	8	8	8	8	
Report as	received	received	received	received	
TPH-Gasoline by mod.SW8D15					
Prepared	0/ /08 /00	0/ 100 100	0/ /00 /00	0/ (00 (00	
Analyzed Analyst	04/08/90 BSJ	04/09/90 BSJ	04/09/90 BSJ	04/08/90 BSJ	
File ID	A20040814/	A20040917-	A20040816 ⁴	A2004081	
Blank ID	A2004081	A2004091	A2004081		
Instrument	A	A	A		
Report as	received	received	received	received	
TPH-Gasoline by mod.SW8015					
Prepared					
Analyzed				04/09/90	
Analyst				BSJ	
Filė ID		1		A2004091	
Blank ID					
Instrument	1			A	
Report as				received	
		1			



Appendix A Comments, Notes and Definitions

Report Comments and Narrative

Geoscience Consultants,Ltd. Radian Work Order: \$0-04-075

> Diesel samples #9004031400,9004031600 and 900404140 contain unidentifed midboiling hydrocarbons. These were quanitated on a diesel standard and are reported as estimated values.

BTXE/Gas sample #90040031400 reported as estimate value because the profile did not match the gasoline standard.



Notes and Definitions

Geoscience Consultants,Ltd. Radian Work Order: \$0-04-075

ALL METHODS EXCEPT CLP The results which are less than five times the method specified detection limit. EXPLANATION Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

C ORGANIC CLP

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pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS.

OTHER ORGANIC METHODS

This analysis has been confirmed on a second column or by GC/MS. EXPLANATION

Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.

G ALL ORGANIC GC METHODS EXCEPT CLP Indicates an estimated GC value due to interferences.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit. EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

Notes and Definitions

Geoscience Consultants,Ltd. Radian Work Order: SD-04-075

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CROLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/ digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

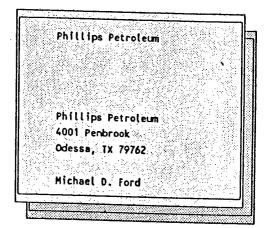
Units -	ug/L	micrograms per liter (parts per billion);liquids/water
	ug/kg	micrograms per kilogram (parts per billion); soils/solids
	ug/M3	micrograms per cubic meter; air samples
	mg/L	milligrams per liter (parts per million);liquids/water
	mg/kg	milligrams per kilogram (parts per million);soils/solids
	*	percent; usually used for percent recovery of OC standards
	uS/cm	conductance unit; microSiemans/centimeter
12 . 	mL/hr	milliliters per hour; rate of settlement of matter in water
	NTU	turbidity unit; nephelometric turbidity unit
	CU	color unit; equal to 1 mg/L of chloroplatinate salt
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Analytical Report 03/16/90



Customer Work Identification Lee Screen Purchase Order Number

Contents; 1 Analytical Data Summary 2 Sample History 3 Comments Summary 4 Notes and Definitions

Radian Analytical Services 8501 Mo-Pac Boulevard P. O. Box 201088 Austin, TX 78720-1088

512/454-4797

Client Services Coordinator: LABENDELE

haullelle-Certified by:

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Analytical Data Summary

Page: 2

Phil	Lips Pe		ះហារ		
Radi	an Vorl	(Orde	er:	90-C	3-105

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Sample ID:	NY-1	MV-2	NV-3	VS+1
		Ξ.		
Factor:	1	1	1	1
Results in:	ug/L	ug/L	ug/L	ug/L
	01A	02A	03A	04A
Matrix:	water	vater	Water	water
	I			
	Result Det. Li	and a second	50000 30000	10 MARCH 100 M
Benzene	$\frac{4.1}{100}$ 0.20		<u>69</u> 0.20	<u>15</u> 0.20
Ethylbenzene Toluene	ND 0.20		$\frac{1.9}{1.4} 0.20$	<u>4.3</u> 0,20 <u>1.8</u> 0,20
Total xylenes	ND 0.20		<u>1.1</u> 0.20	<u>4.1</u> 0.20
Surrogate Recovery(%)				
1-Bromo-4-fluorobenzen e	98	110	102	104
Control Limits: 76 to 140	1,			

.

Phillips Petroleum Radian Work Order: 90-03-105

List:BTEX Sample ID:	WS-2	Trip Blank	Reagent Blank	
Factor: Results in:	l Ug/L	ן עק/L	l vg/L	
(CBUILB III)	05A	06A	07A	
Natrix:	water	water	water	
	l	1	1	r
	Result Det. Limit	Result Det. Limit	Result Det. Limit	Result Det. Limit
Benzene	<u>7.1</u> 0.20	ND 0,20	ND 0,20	
Ethylbenzene	ND 0.20	ND 0.20	ND 0.20	
Toluene	<u>0.97 *</u> 0.20	<u>0.27 *</u> 0.20	ND 0.20	
Total xylenes	ND 0.20	ND 0.20	ND 0.20	
Surrogate Recovery(%)				
1-Brono-4-fluorobenzene	98	96	105	
Control Limits: 76 to 140		2		

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

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Sample History

Page:4

Phillips Petroleum Radian Work Order: 90-03-105

Sample ID	HW-1	MW-2	MV-3	WS-1	VS+2	Trip Blank
Date Sampled Date Received Matrix	03/07/90 03/09/90 Water 01	03/07/90 03/09/90 Water 02	03/07/90 03/09/90 water 03	03/07/90 03/09/90 Water 04	03/07/90 03/09/90 Water 05	03/09/90 Water 06
olatile aromatics Prepared Analyzed Analyst File ID Blank ID	03/15/90 BM dd031517	03/12/90 BM dd03129	03/15/90 BM ckd031516	03/15/90 BM dd031518	03/15/90 BN dd031515	03/15/90 BM dd031519
Instrument Report as	d received	d received	d received	d received	d received	d received



Phillips Petroleum Radian Work Order: 90-03-105

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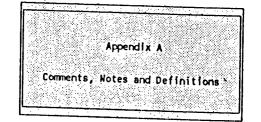
		dentifications	and Dates		
Sample 1D Date Sampled Date Received	Reagent Bla 03/09/90	nk			
Matrix	vater 07				1
olatile aromatics Prepared					
Analyzed	03/15/90				
Analyst File ID	JB dd03155				
Blank ID					
Instrument	d			ł	
Report as	received				1

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Report Comments and Narrative

Page: A-2

General Comments

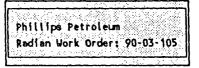
Radian Work Order: 90-03-105

Phillips Petroleum

K-xylene and chlorobenzene coelute.



Notes and Definitions



- ND This flag (or <) is used to denote analytes which are not detected at or above the specified detection limit. The value to the right of the < symbol is the method specified detection limit for the sample.
- * The asterisk(*) is used to flag results which are less than five times the method specified detection limit. Studies have shown that the uncertainty of the analysis will increase exponentially as the method detection limit is approached. These results should be considered approximate.



Notes and Definitions

Page: A-4

Phillips Petroleum Radian Work Order: 90-03-105

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), use of cleanup procedures, or dilution of extracts/ digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Katrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary._____

Units - Ug/L	micrograms per liter (parts per billion);liquids/water
Ug/Kg	micrograms per kilogram (parts per billion); solls/solids
Ug/M3	micrograms per cubic meter; air samples
mg/L mg/Kg	milligrams per liter (parts per million);liquids/water milligrams per kilogram (parts per million);soiis/solids
x	percent; usually used for percent recovery of QC standards
us/cm mL/hr	conductance unit; microSiemans/centimeter milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
ເນ	color unit; equal to 1 mg/L of chloroplatinate salt

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Custody											 			Ë.	<u> </u> (\sum	LEASOBATORYI	150 .11	15 10	5,43
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0		0/2	12/ 625/82	N/29				1	1	1				<u></u>		T	•	d Kc		
Sulte 708 Silver Spring, MD 20910 (301) 587-2088		v111e Rd. 95827		LOCATION	bu // C	Alocin of A	01"W	11/11/14	() / //u	1			SAMPLE RECEIPT	TOTAL NO. OF CONTAINERS CHAIN OF CUSTODY SEALS	REC'D GOOD CONDITION/COLD		526 3113	ic Arsened		
87102	Analytical	BCET	N	MATRIX	044		120	140	22	-1			Π		1	T	933			
Suite 200 Albuquerque, NM 87102 (505) 842-0001	Radian	10395 0 Sacrame 916/362	SIGNATUREI	IUMBER	NS/INTZA	00001	100011		101430		-		PROJECT INFORMATION	sanling	IRECTOR M	uname une muy 54-000	5262 on 1	PED X PED X		
K a 2.4 2.2	LAB NAME	ADDRESS	SAMPLERS (SIGNATURE)	SAMPLE NUMBER	drie,	and in	10000	norul.		nont			PROJE	PROJECT: Phi			SHIPPING ID. NO.	PCC SPECIAL INST	5	

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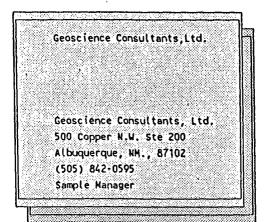


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Radian Work Order S0-08-113

Analytical Report 09/06/90



Customer Work Identification Phillips / COC # 3490 Purchase Order Number 439-000

Contents: Analytical Data Summary 2 Sample History **Comments Summary** Notes and Definitions

Radian Analytical Services 10395 Old Placerville Road Sacramento, CA 95827

916-362-5332

Client Services Coordinator: LWKELLY

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certified by: _____



Page: 2

Geoscience Consultants,Ltd. Radian Work Order: S0-08-113

Sample ID:	9008100730/MW+ 12	9008110900/WA+ TERWELL	9008111000/MW9	9008101430/mw- 11
actor:	1	1	1	1
Results in:	ug/L	ug/L	ug/L	ug/L
latrix:	01A Water	02A water	.03A Water	04A
18171X;	water	water	Water	Hater
<u>,</u>	<u> (19 Berrier 19 Berrier (19 Berrier 19 Berrier (19 Berrier 19 Ber</u>	1		1
	Result Det. Limit	Result Det. Limit	Result Det. Limit	Result Det. Limit
)iesel (2)	<u>180 Ga</u> 50	ND 50	<u>230 Ga</u> 50	<u>240 ga</u> 50
Jet fuel (2)	ND 100	ND 100	ND 100	ND 100
Kerosene (2)	ND 100	ND 100	ND 100	ND 100
	ND 100	ND 100	ND 100	ND 100

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Page: 3

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Geoscience Consultants,Ltd. Radian Work Order: SO-08-113

Method:TPH:Diesel by mod. S List:Complete analyte lis Sample 1D:		REAGENT BLANK		
Factor:	10 1	1		
Results in:	ug/L OSA	ug/L O6A		
Matrix:	water	Water		
Diesel (2) Jet fuel (2) Kerosene (2) Lubricating oil (2)	Result Det.Limit <u>3000 g</u> 50 ND 100 ND 100 ND 100	Result Det. Limit ND 50 ND 300 ND 300 ND 300	Result Det.Limit	Result Det. Limit
G Indicates an estimated G		l terms in this report		

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Page: 4

Geoscience Consultants,Ltd. Radian Work Order: \$0-08-113

ample 1D:	9008100730/MW-	9008110900/WA-	9008111000/Hv9	9008101430/MW-
	12	TERWELL		11
actor:	1	1	1	1
esults in:	ug/L	ug/L	ug/L	ug/L
	01B	02B	03B	048
latrix:	water,	water	Water	water
Benzene (2) Ethylbenzene (2)	<u>0.86 ca</u> 0.30 <u>0.51 ca</u> 0.30	<u>9.7 c</u> 0,30 <u>1.3 ca</u> 0.30	<u>6.0 C</u> 0.30 0.88 Ca 0.30	<u>1.0 ca</u> D.30 <u>1.6 c</u> 0.30
Gasoline (2)	<u>430</u> 50	<u>280</u> 50	<u>1000</u> 50	<u>450</u> 50
Toluene (2)	<u>0.81 ca</u> 0.30	<u>1.2 ca</u> 0.30	<u>1.2 ca</u> 0.30	<u>2.8 c</u> 0.30
Xylenes (total) (2)	2.9 C 0.50	1.2 Ca 0,50	1.7 Ca 0.50	6.4_C0.50

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.
 (2) \$V5030 (purge & trap) followed by GC analysis with PID/

FID detectors.



Page: 5

Geoscience Consultants,Ltd. Radian Work Order: S0-08-113

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ug/L	ug/L		
05B			
water	Water		
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sult Det. Limit	Result Det. Limit	Result Det. Limit	Result Det. Limit
<u>500_CE0.30</u>	ND 0,30		
<u>) C</u> 0.30	ND 0.30		
2000 50	ND 50		
<u>+ C</u> 0.30	ND 0.30		
<u>s c0.50 </u>	ND 0.50		
	ND 0.50		
	058 water ult Det. Limit <u>00 CE</u> 0.30 <u>C</u> 0.30 000 50 <u>C</u> 0.30	D58 D68 water water ult Det. Limit Result Det. Limit <u>00 CE</u> 0.30 ND 0.30 <u>C</u> 0.30 ND 0.30 <u>000</u> 50 ND 50 <u>C</u> 0.30 ND 0.30	D5B D6B water water ult Det. Limit Result Det. Limit 00 CE 0.30 D0 D 0.30 00 CE 0.30 ND 0.30 00 CE 0.30 ND 0.30 000 50 0.30 ND 000 50 ND 0.30

fin detectors.



Sample History

Page:6

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Geoscience Consultants,Ltd. Radian Work Order: \$0-08-113

Sample ID		- 9008110900/WA-	9008111000/MW9			REAGENT BLANK
Date Sampled	12 08/10/90	TERWELL 08/11/90	08/11/90	11 08/10/90	10 08/10/90	
Date Received	08/15/90	방송 요즘 이 방송 옷이 집에서 앉았다.	08/15/90	08/15/90	08/15/90	08/15/90
Natrix	water	water	water	Water	Water	water
	01	02	03	04	05	06
		·····				r
PH-Diesel by mod. SW8015						
Prepared	08/16/90	08/16/90	08/16/90	08/16/90	08/16/90	08/16/90
Analyzed	08/23/90	08/24/90	08/24/90	08/24/90	08/24/90	08/23/90
Analyst	JK	JH	JH ,	JH	JH	JH
File ID	820082314	820082315	820082316	820082317	820082318	820082311
Blank ID	820082311	820082311	820082311	820082311	820082311]
Instrument	8	8	8	8	8	8
Report as	received	received	received	received	received	received
PK-Gasoline by mod.SW8015						
Prepared						
Analyzed	08/24/90	08/24/90	08/24/90	08/24/90	08/24/90	08/24/90
Analyst	лн	JH	JH	ЭH	JH	н
File ID	A20082410	A20082411	A20082412	A20082413	A20082414	A2008242
Blank ID	A2008242	A2008242	A2008242	A2008242	A2008242	
Instrument		A	A	٨	A	A
Report as	received	received	received	received	received	received



Appendix A Comments, Notes and Definitions



Geoscience Consultants,Ltd. Radian Work Order: \$0-08-113 Report Comments and Narrative

Ethylbenzene is reported as an estimated value in TPH-Gasoline sample 9008100730/MW12 due to differences between the primary and the confirmation analyses. The value obtained on our confirmation column was 1.9 ppb.

Diesel is reported as an estimated value in all of the samples except sample 9008110900/WATERWELL. The samples did not match our pattern for diesel.



Notes and Definitions

Page: A-2

Geoscience Consultants,Ltd. Radian Work Order: S0-08-113

ALL METHODS EXCEPT CLP The results which are less than five times the method specified detection limit. EXPLANATION Uncertainty of the analysis will increase as the method detection

limit is approached. These results should be considered approximate.

C ORGANIC CLP

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pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS. OTHER ORGANIC METHODS

This analysis has been confirmed on a second column or by GC/MS. EXPLANATION

Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.

E INORGANIC METHODS INCLUDING CLP

Indicates an estimated value due to interferences. ORGANIC METHODS INCLUDING CLP This flag is applied to identify a GC/MS compound whose concentration exceeds the calibration range for that specific analysis. ORGANIC EXPLANATION Usually, if one or more compounds have a response greater than full scale, the sample or extract is diluted and re-analyzed.

G ALL DRGANIC GC METHODS EXCEPT CLP Indicates an estimated GC value due to interferences.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit. EXPLANATION The value to the right of the < symbol is the method specified detection limit for the analyte.



Notes and Definitions

Page: A-3

Geoscience Consultants,Ltd. Radian Work Order: SO-DB-113

> TERMS USED IN THIS REPORT: Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

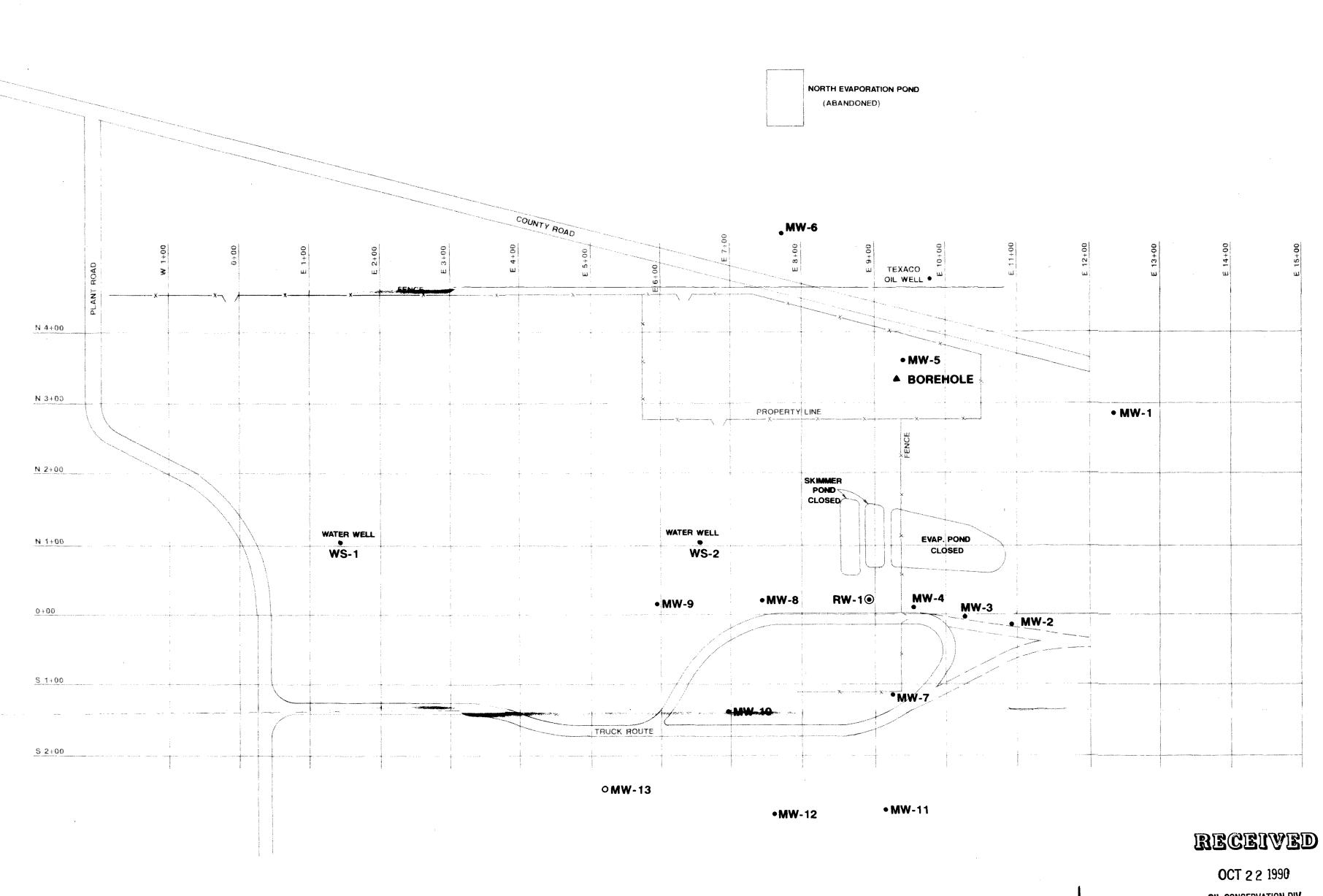
EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/ digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

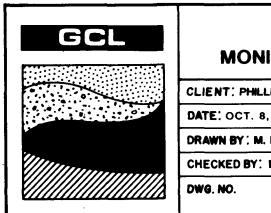
Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

	<u></u>
Units • ug/L	micrograms per liter (parts per billion);liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
Lig/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million);liquids/water
mg/kg	milligrams per kilogram (parts per million);soils/solids
X US/cm	percent; usually used for percent recovery of OC standards conductance unit; microSiemans/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelométric turbidity unit
ຒ	color unit; equal to i mg/L of chloroplatinate salt



OIL CONSERVATION DIV. SANTA FE

FEET



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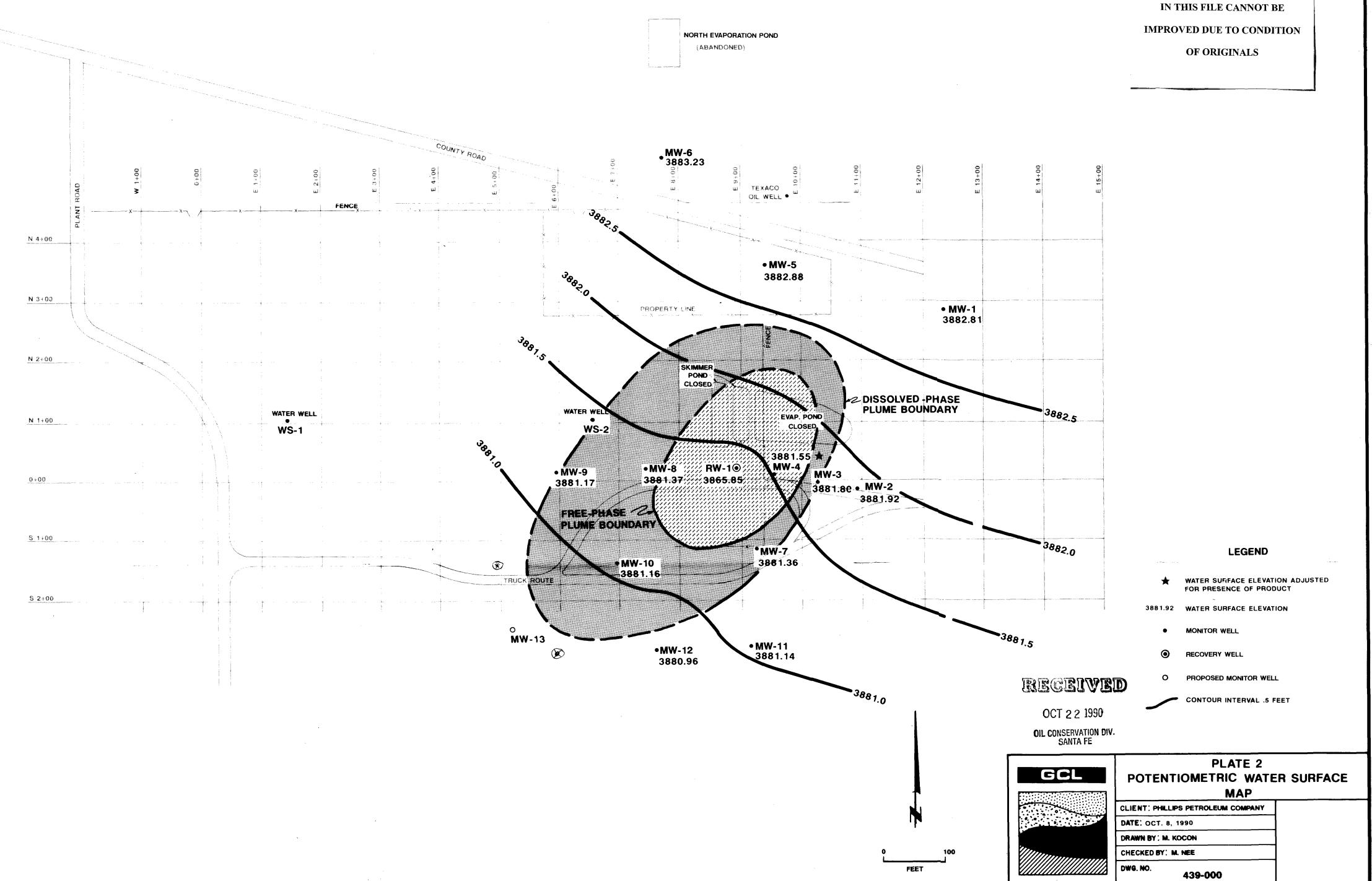


- LEGEND
- MONITOR WELL ۰
- \odot RECOVERY WELL
- PROPOSED MONITOR WELL 0

LOCATION OF ORIGINAL MW-1 BOREHOLE WHERE FLOATING PRODUCT WAS FOUND

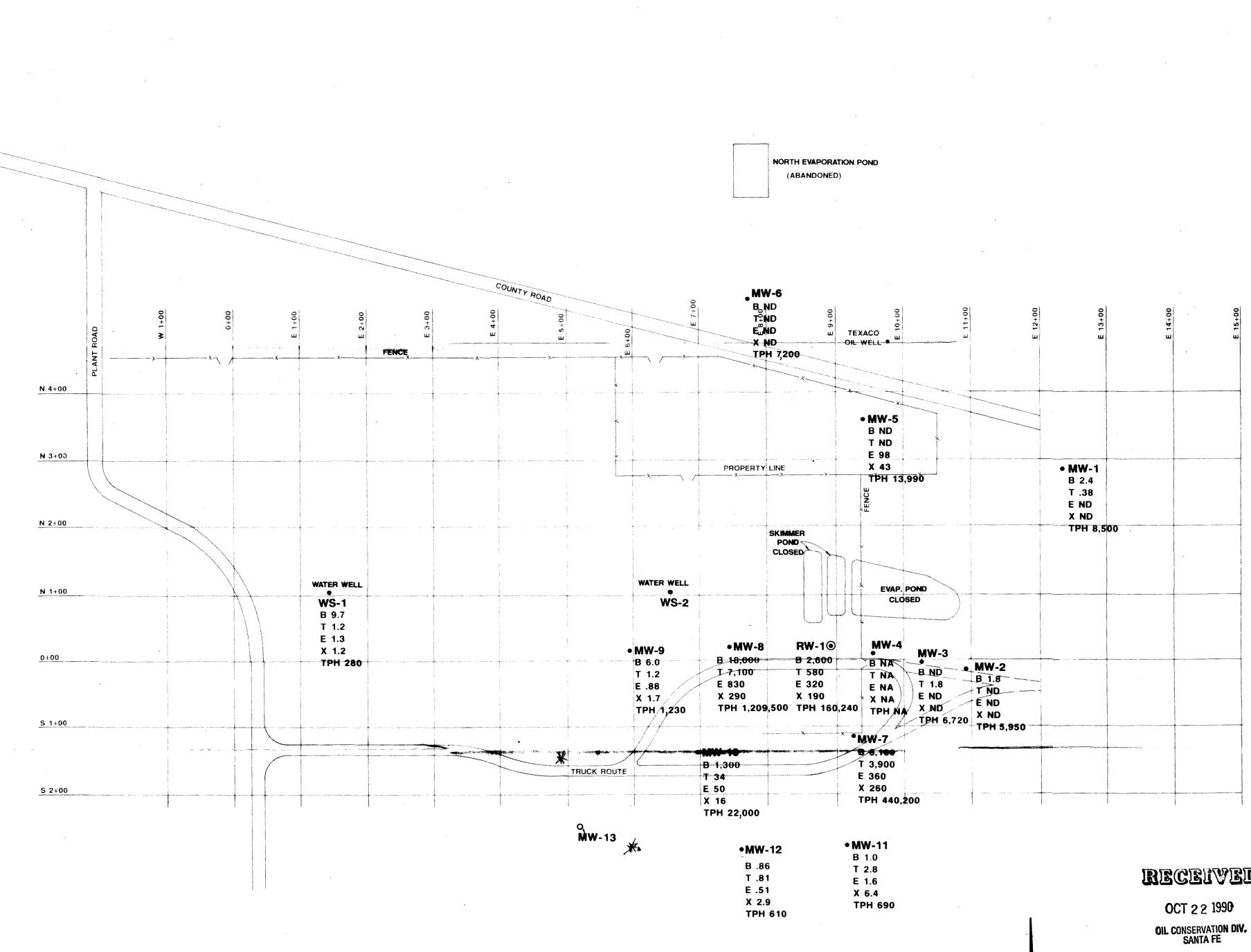
PLATE 1 MONITOR WELL LOCATION MAP

CLIENT: PHILLIPS PETROLEUM COMPANY DATE: OCT. 8, 1990 DRAWN BY ; M. KOCON CHECKED BY: M. NEE 439-000



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REPRODUCTION OF DOCUMENTS



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LEGEND

NA - NOT AVAILABLE

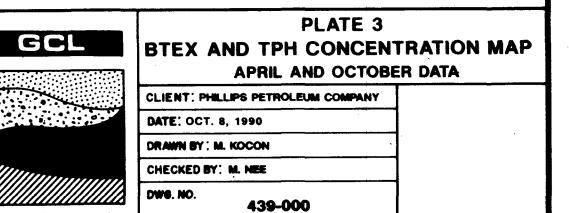
ND - NO DETECTION

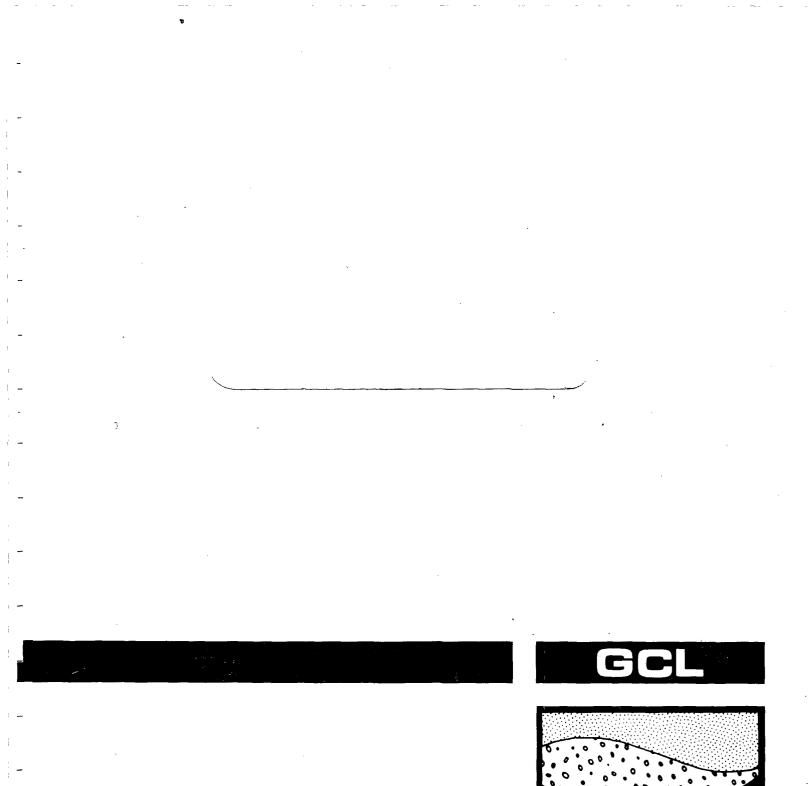
- B BENZENE
- T TOLUENE
- E ETHYLBENZENE
- X TOTALXYLENES
- MONITOR WELL
- \odot RECOVERY WELL

PROPOSED MONITOR WELL 0

TPH TOTAL PETROLEUM HYDROCARBONS

(ALL CONCENTRATIONS GIVEN IN MICROGRAMS PER LITER)





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REPORT OF SUBSURFACE INVESTIGATION PHILLIPS 66 NATURAL GAS COMPANY LEE GAS PLANT

RECEIVED

May 30, 1990

MAY 3 0 1990

OIL CONSERVATION DIV. SANTA FE

Prepared for:

Mr. Mike Ford PHILLIPS PETROLEUM COMPANY 12 B2 Phillips Building Bartlesville, Oklahoma

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C

REPORT OF SUBSURFACE INVESTIGATION PHILLIPS 66 NATURAL GAS COMPANY LEE GAS PLANT

SUBMITTED BY:

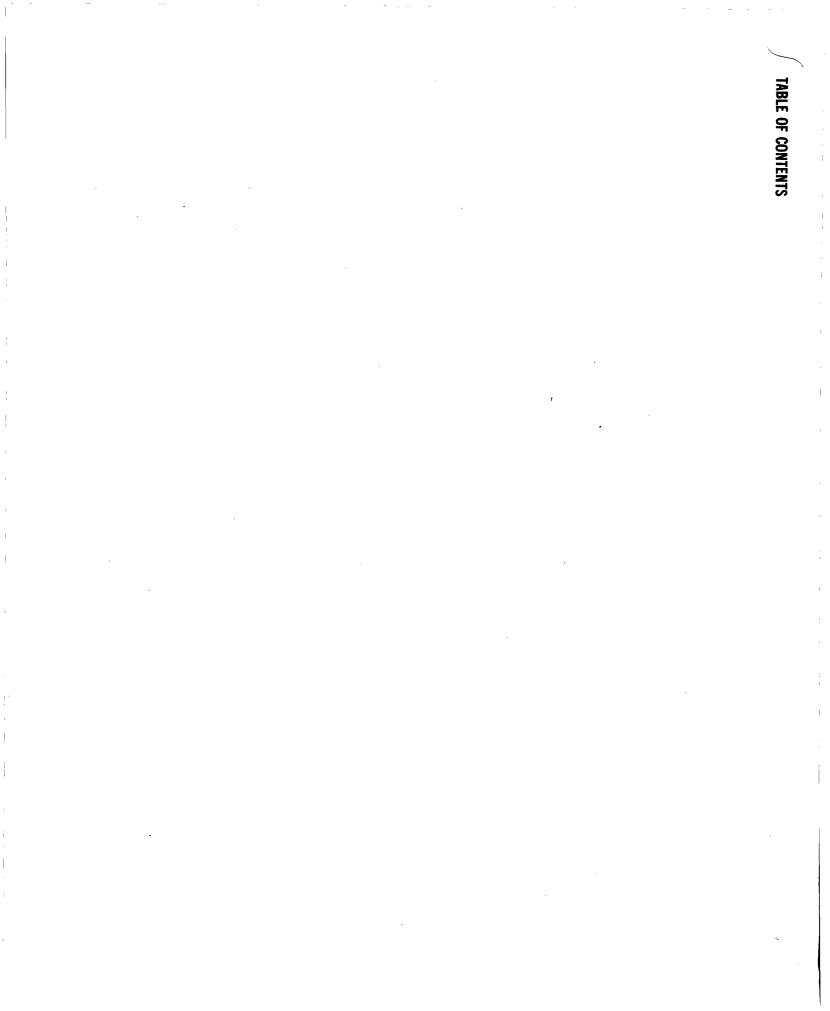
GCL Project Director

L GCL Senior Advisory Committee

GCL Principal-In-Charge

DATE:

1990



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TABLE OF CONTENTS

1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION	2
3.0	TECHNICAL APPROACH	3
4.0	RESULTS	6
5.0	GEOLOGY	7
6.0	HYDROGEOLOGY6.1 REGIONAL HYDROGEOLOGY6.2 SITE HYDROGEOLOGY	10
7.0	CONCLUSIONS	11
8.0	RECOMMENDATIONS	13
9.0	REFERENCES	15

LIST OF FIGURES

FIGURE 3-1	BTEX AND TPH CONCENTRATION MAP
FIGURE 7-1	APPROXIMATE FREE-PHASE HYDROCARBON BOUNDARY MAP

LIST OF TABLES

TABLE 3-1	ANALYTICAL RESULTS FROM APRIL-1990
TABLE 3-2	ANALYTICAL RESULTS FROM MARCH-1990
TABLE 6-1	WELL AND WATER SURFACE ELEVATION DATA

LIST OF PLATES

PLATE 1MONITOR WELL LOCATION MAP LEE PLANTPLATE 2POTENTIOMETRIC WATER SURFACE MAP

LIST OF APPENDICES

APPENDIX A LITHOLOGIC LOGS APPENDIX B MONITOR WELL COMPLETION DIAGRAMS APPENDIX C LABORATORY REPORTS SECTION 1.0

1.0 EXECUTIVE SUMMARY

In April 1990, Geoscience Consultants (GCL) continued a subsurface investigation for Phillips 66 Natural Gas Company (Phillips) at the Lee Gas Plant, Buckeye, New Mexico. The investigation, initially required by the New Mexico Environmental Improvement Division (NMEID), is now under the jurisdiction of the New Mexico Oil Conservation Division (NMOCD). Four monitor wells and one recovery well were installed at the site to define the limits of the plume of floating product and to begin recovery of the free-phase product. These wells modify an existing monitoring system that was installed in 1988.

Mud-rotary drilling techniques were used to install the four new monitor wells and one recovery well. The ground water from eight monitor wells (four 1988 and four 1990 monitor wells) and the recovery well was sampled and analyzed by Radian Analytical Services for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX) using modified EPA method 8015.

All of the monitor wells and the recovery well were inspected for free-phase hydrocarbon one month following installation of the new wells. Free-phase hydrocarbon has accumulated above the ground water in monitor well MW-4 and total petroleum hydrocarbon constituents were found at all of the wells sampled. Water Quality Control Commission (WQCC) standards for benzene were exceeded at MW-7, MW-8 and RW-1, all of which are located near the leading edge of the plume. WQCC standards for ethylbenzene were exceeded at MW-8. WQCC standards for toluene were exceeded at MW-7 and MW-8.

The free-phase product plume at monitor well MW-4 extends less than 100-feet from monitor well MW-4 to the south, east and west and approximately 300-feet to the north. Phillips will initiate remediation of the free-phase hydrocarbon by pumping ground-water/product from the recovery well to the Lee Gas Plant waste-water treatment system.

Three additional monitor wells are recommended to further delineate the extent of the dissolved-phase hydrocarbon.

SECTION 2.0 ţ

2.0 INTRODUCTION

In April 1988, Phillips was issued a compliance Order/Schedule by the New Mexico Environmental Improvement Division (NMEID) to install and sample four ground-water monitor wells at the Lee Gas Plant in southeastern New Mexico. The monitor wells were installed in early 1988 using rotary drilling techniques (GCL, 1988a). The monitor wells modify a former ground-water monitoring system (pre-1988) that was previously installed around an abandoned waste-water evaporation pond. The four pre-1988 monitor wells were plugged with a cement/bentonite slurry and abandoned. The results of GCL's initial investigation indicated that both free-phase and dissolved-phase hydrocarbons occur in the saturated zone beneath the site.

In September 1988, a limited soil vapor survey was conducted to determine potential sources of the hydrocarbons identified in GCL's initial investigation. Two potential sources were identified: the former evaporation pond located east of the main plant, and the small, former evaporation pond located north of the main plant (GCL, 1988b).

Jurisdiction of the Phillip's Lee Plant was transferred from NMEID to the New Mexico Oil Conservation Division (OCD), and on February 16, 1990, GCL submitted a work plan to the OCD for further investigation and implementation of remediation of free-phase product at the Lee Gas Plant. In April 1990 GCL installed four monitor wells and one recovery well at the site to define the limits of the plume of floating product and to begin recovery of the freephase product.



SECTION 3.0

3.0 TECHNICAL APPROACH

Four monitoring wells (MW-5, -6, -7, and -8) and one recovery well (RW-1) were installed at locations that were selected to delineate the maximum extent of hydrocarbons floating on the ground water and to recover the free-phase hydrocarbon (Plate 1). The first well, MW-5, was located near where floating hydrocarbon had been observed in an aborted borehole during the 1988 investigation. The purpose of this well was to locate the plume boundary at the northern (upgradient) side of Phillip's property. MW-6 was placed south (downgradient) of the north evaporation pond to delineate the plume to the northwest and to determine if the pond (now closed) was a potential source of the hydrocarbons. MW-7 was located directly south (downgradient) of MW-4 where free-phase hydrocarbon has recently been observed. MW-7 was installed to delineate the southern boundary of the plume at MW-4. The recovery well, RW-1, was sited downgradient of the former evaporation pond, approximately 60 feet due west of MW-4. The location of RW-1 is within, or near the leading edge of the free-phase plume. Monitor well MW-8 was located approximately 150 feet west of the recovery well. MW-8 was placed west of the recovery well and was intended to delineate the western (downgradient) extent of the product plume. All well locations are shown on Plate 1.

Rotary drilling techniques were employed for drilling the boreholes. All down-hole drilling equipment and the entire drill rig was decontaminated using on-site steam cleaning facilities. Samples of rotary drilling cuttings were collected at 5-foot intervals from each borehole and logged on standard GCL lithologic log forms. The Lithologic Logs are presented in Appendix A. Shallow pits were excavated and lined with plastic to collect the drilling fluid and cuttings that were circulated out of the boreholes during drilling operations. The boreholes were drilled to total depth using clean water as a drilling fluid. Then, guar gum (polymer) was introduced to the clean water and was circulated down-hole to hold back the fine-grained sand, keeping the borehole open during well installation. After the monitor wells were installed and developed, the water from the pits was pumped to the plant waste water treatment system facility; the remaining cuttings removed and the pits backfilled with the original excavated material.

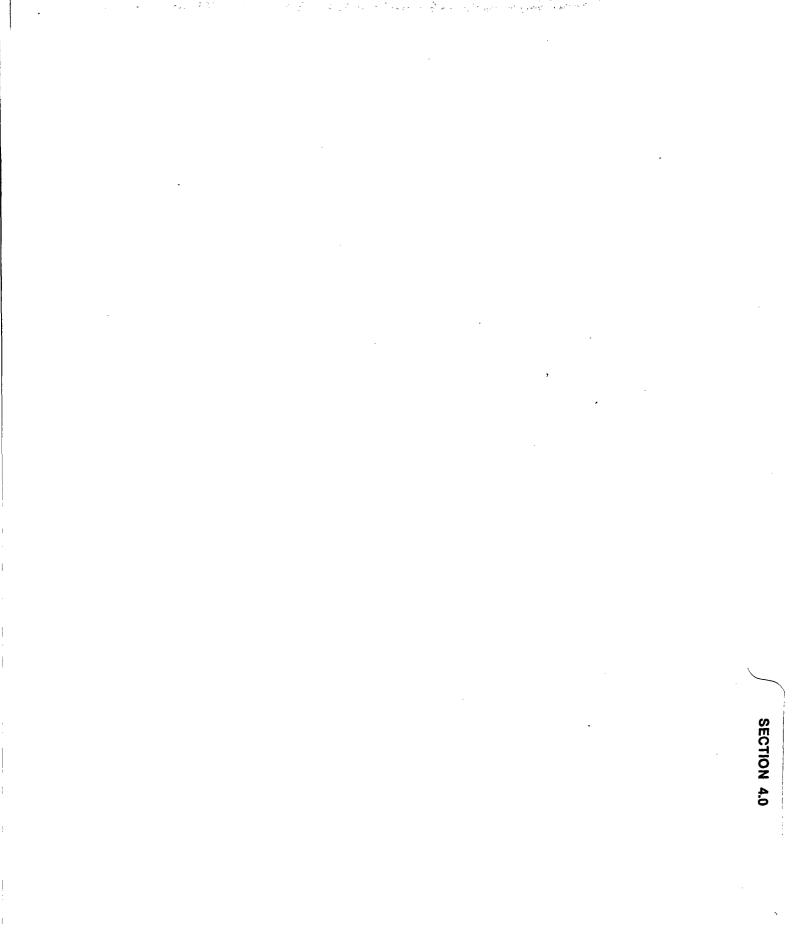
Completion diagrams for monitor wells MW-5, -6, -7, -8 and RW-1 are included in Appendix B. All of the wells are constructed of a 5-foot blank PVC silt trap set beneath 15 feet of wirewound PVC screen with schedule 40 PVC extending from the top of the screen to the ground surface. The well casing and screen were inserted through the open borehole, and 12/20 grade silica sand was placed in the borehole to approximately 3 to 5 feet above the top of screen. Following the installation of the 12/20 sand, approximately 100 gallons of water was bailed from each well to set the filter pack. Approximately 2 to 3 feet of 20/40 grade silica sand was then placed on top of the 12/20 sand to prohibit infiltration of bentonite from above. One 5 gallon bucket of 1/4-inch bentonite pellets was placed above the 20/40 sand to seal the borehole and to prevent fluids and/or grout from migrating downward from above and invading the filter The borehole was then grouted to the surface by pumping a neat cement slurry pack. containing 5% bentonite into the borehole annulus through a tremie pipe. A 5-foot long steel protective guard pipe was installed around the well casing and into the grout, and a 3 foot by 3 foot cement pad was constructed around the well head. The pad is sloped outward to direct rainfall away from the well head. The protective guard pipe has a locking cover and is impervious to rainfall. A brass survey cap was set in each pad to provide a reference location for each well.

The grout in each well was allowed to cure for 24 hours before implementing development activities. Monitor wells MW-5, -6, and -7 were developed using an air-lift pump. This stainless-steel pump does not permit the introduction of air into the well casing and is capable of pumping 1 gpm against 80 feet of head. Each well was periodically surged by moving the air-lift pump up and down in the well, forcing the ground water in and out of the filter pack, dislodging fine grained particles from the formation wall, and allowing them to be removed by pumping along with formational water. A dedicated submersible pump was installed at recovery well RW-1 and GCL's submersible pump was temporarily installed at monitor well MW-8 and used for development at these locations. Each well was developed until an equal volume or more of the drilling water lost to the aquifer during drilling was recovered and until the indicator parameters of pH, conductivity, and temperature had stabilized. The minimum amount of water developed from each well was approximately 2,500 gallons.

GCL

Ground-water samples were collected from all monitor wells as prescribed in the site sampling and analysis plan (GCL, 1988c). Immediately upon completion of development, the ground water from each well was sampled for total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene and xylene (BTEX) using modified EPA method 8015. Ground-water samples were also collected from each of the four RCRA monitor wells that were installed in 1988. The ground water from monitor wells MW-1, -2, -3, and -4 was also sampled for TPH and BTEX constituents using modified EPA method 8015. GCL's standard operating procedures for monitor well sampling were followed and the samples were maintained on ice and shipped to Radian Analytical Services in Sacramento, California, following strict chain of custody procedures.

Product thickness and depth to water measurements were made one month following installation of the monitor and recovery wells. The one month delay allowed for equilibration of the aquifer following drilling operations, which may have moved the free-phase hydrocarbon away from the wells.

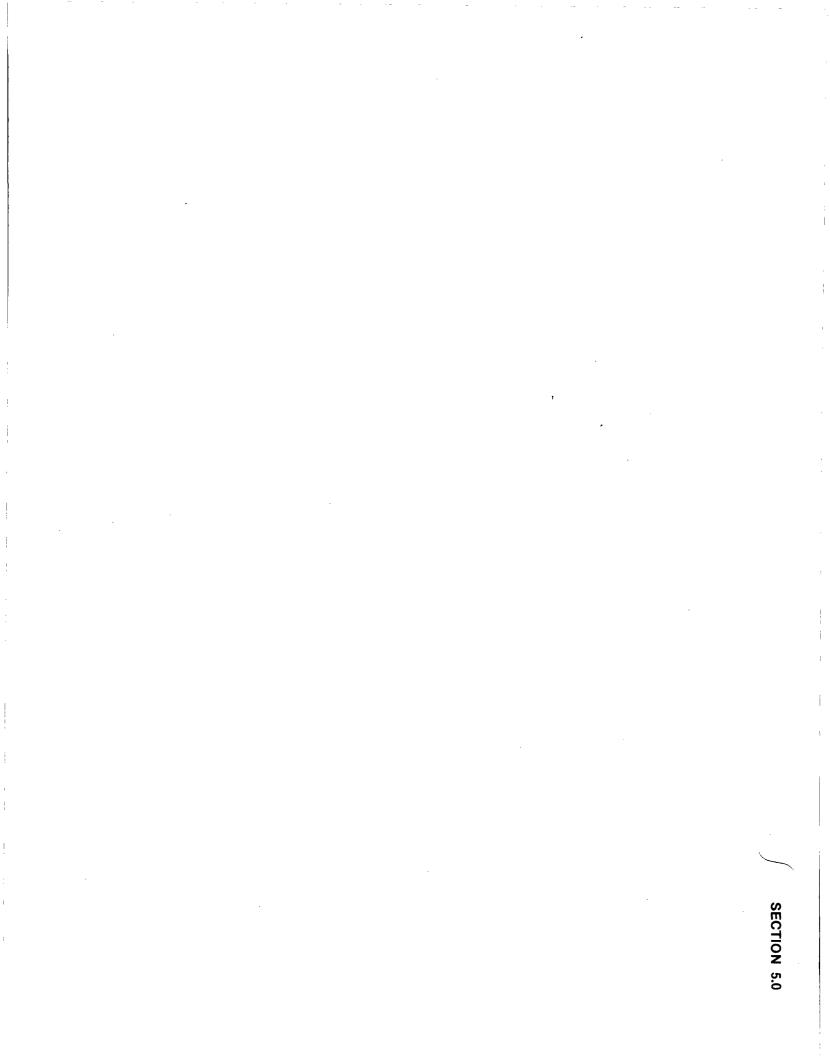


4.0 RESULTS

No free-phase hydrocarbon was observed in any of the new monitor wells during installation or immediately following development and sampling. A return visit to the site was conducted one month following the sampling event, allowing time for the aquifer to recover from well development, and allowing time for potential hydrocarbons that may have been moved during drilling operations to equilibrate. All of the monitor wells were checked for the presence of free-phase hydrocarbon on May 8, 1990. No product had accumulated in any of the monitor wells, except monitor well MW-4, where product had already been observed to occur. The free-phase hydrocarbon in monitor well MW-4 was measured and found to be 4.52 feet thick.

Analytical results for ground-water samples collected in April by GCL and analytical results for ground-water samples collected in March by Phillips are shown in Tables 3-1 and 3-2. The laboratory reports are included as Appendix C. Total petroleum hydrocarbon (TPH) constituents were found at all of the wells sampled by GCL. The ground water was not analyzed for TPH by Phillips during their March 1990 sampling.

The Water Quality Control Commission (WQCC) standard for benzene is 10 parts per billion (ppb). The concentration of benzene exceeded WQCC standards in ground-water samples collected in April at wells MW-7, MW-8 and RW-1; the concentrations found are 6,100 ppb, 18,000 ppb and 2,600 ppb, respectively. The concentration of benzene in ground-water samples collected in March exceeded the WQCC standard at monitor well MW-3 and water well WS-1; the concentrations are 69 ppb and 15 ppb, respectively. The WQCC standard for ethylbenzene is 750 parts per billion (ppb). The WQCC standard for ethylbenzene in ground water is exceeded at MW-8. The concentration of ethylbenzene found in the sample from MW-8 is 830 ppb. The WQCC standard for toluene is 620 ppb. The WQCC standard for toluene is exceeded at MW-7 and MW-8; the concentrations are 3,900 ppb and 7,100 ppb, respectively. The concentrations of BTEX and TPH constituents are shown on Figure 3-1.





5.0 GEOLOGY

5.1 REGIONAL GEOLOGY

As reported in June 1988 in GCL's "Report On The Installation Of A Ground Water Monitoring System at Phillips 66 Natural Gas Company, Lee Plant," the Lee Gas Plant is located in southern Lea County, New Mexico, in the Llano Estacado (Staked Plains) which is part of the High Plains section of the Great Plains physiographic province (Fenneman, 1931). Shallow depressions and small sand dunes are the only significant topographic features in the otherwise flat, treeless plain. The depositional surface of the Llano Estacado exhibits low relief, sloping uniformly to the southeast at a topographic gradient of about .003. Total relief in Lea County is about 1,300 feet with an altitude ranging from 2,900 to 4,200 feet above sea level (Nicholson and Clebsch, 1961). Drainage patterns are poorly defined.

Rock exposures in the area are poor and range in age from Triassic to Quaternary. The region is covered by Quaternary-Age eolian deposits ranging in thickness from 1 to 5 feet. Beneath these windblown deposits, a layer of dense, well developed caliche forms a cap over the Ogallala Formation. The caliche, which decreases in induration with depth (Nicholson and Clebsch, 1961), can range from several feet to up to 60 feet in thickness.

The Tertiary Ogallala Formation underlies the Llano Estacado in southeast New Mexico. It is composed of terrestrial sediments that unconformably overlay the Triassic section. Outcrops of the Ogallala occur along the face of Mescalero Ridge to the south of the Lee Gas Plant. The Ogallala ranges in thickness from several inches to up to 300 feet and is composed primarily of unconsolidated, calcareous sand, clay, silt and gravel.

Jurassic-Age rocks have not been observed in the area, and rocks of the Cretaceous Age have been almost completely removed by erosion (Nicholson and Clebsch, 1961). Rocks of the Triassic Dockum Group are the oldest rocks that crop out in the region. The Dockum Group may be divided into the Chinle Formation and the Santa Rosa Sandstone.

Southeastern New Mexico and west Texas are underlain by large subsurface structural basins with highly complex geology. Southern Lea County includes parts of the Delaware Basin and

the Central Basin Platform. The northwestern edge of the Delaware Basin is coincident with the position of the reef-edge as it existed throughout Permian time. The Artesia-Vacuum arch reflects this ancient reef trend; the Lee Gas Plant site is located at the eastern limit of this trend. Triassic rocks in the area exhibit a regional dip of less than one degree to the southeast (Nicholson and Clebsch, 1961). Variations in this regional trend occur in the collapse structures and unconformities, which are common to the area.

5.2 SITE GEOLOGY

Lithologic logs (Appendix A) for the installation of monitor wells MW-5, -6, -7, -8 and RW-1 are consistent with the previous lithologic logs prepared by GCL in April 1988. Two primary lithologic sequences were encountered at the Phillip's Lee Gas Plant: an upper, caliche-cemented fine-grained silty sand and sandy silt and an underlying coarser sand. A "topsoil", probably backfill material used during facility construction or modification, was also found during drilling (GCL, 1988a).

Surficial lithologies at the Lee Gas Plant are both natural and anthropogenic. Aeolian sheet sands consisting of poorly-sorted fine sand are present and are typically less than 5 feet thick (GCL, 1988a). Backfill material consisting of poorly sorted fine sand to fine pebble-sized sediment was present at most monitor well locations.

Beneath the thin surficial deposits, sediments characterized by highly variable clast size and poor sorting are present. Although the dominant sediment consists of fine-grained, poorly sorted sand, clay-, silt-, and gravel-rich sands are present that have very limited lateral continuity. Caliche in this sedimentary sequence ranges from highly developed stage IV in the upper horizon to stage I at approximately 20 to 35 feet below the ground surface. Consolidation of the sediments in this sequence was related to the presence and degree of development of interstitial caliche and, to a lesser degree, the presence of interstitial clay. With few local exceptions, the degree of consolidation decreased with depth (GCL, 1988a).

The lower coarser grained sand unit in which each of the monitor wells at the Lee Plant was completed comprised the second primary lithology. The coarser sand lacked notable silt and

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clay particle fractions. The contact between the two lithologies was sharp and occurred at a depth of 35-65 feet. The yellowish-brown to brown color, higher percentage of mediumgrained sand, and the relative vertical homogeneity distinguished coarser-grained sand from the overlying sediments (GCL, 1988a). Hunt (1977) and Nicholson and Clebsch (1961) identified the outcrop in the Lee Gas Plant area as Tertiary Ogallala Formation. The description of the outcrop provided by Hunt (1977) correlates particularly well with observations recorded by GCL personnel during the investigation. SECTION 6.0

6.0 HYDROGEOLOGY

6.1 REGIONAL HYDROGEOLOGY

As reported in June 1988 in GCL's "Report On The Installation Of A Ground Water Monitoring System at Phillips 66 Natural Gas Company, Lee Plant", recharge in the region occurs primarily as a result of infiltration of water from short drainages and temporary lakes that form as a result of heavy rainfall events (Nicholson and Clebsch, 1961). Discharge takes place principally in the form of evapo-transpiration and pumping from wells; very small volumes of ground water discharge at springs (GCL, 1988a).

Potable water supplies in the region are derived primarily from aquifers hosted by Quaternary alluvium and the Tertiary Ogallala Formation. Ground water occurring in Triassic sediments is potable, but has a poorer quality and is hosted on lithologic units that produce lower well yields than younger formations in the area. The Ogallala Formation mantles the High Plains in the Lee Gas Plant area and has a saturated thickness ranging from 25 to 175 feet (Nicholson and Clebsch, 1961). Ground water in these shallow aquifers generally flows to the southeast at a low hydraulic gradient (GCL, 1988a).

6.2 SITE HYDROGEOLOGY

Shallow ground water at the Lee Gas Plant is unconfined. The ground water beneath the site is found in unconsolidated, silty to fine-grained sand, which typically exhibits hydraulic conductivities of .001 to 100 gallons per day per square foot (GCL, 1988a). During development of the monitor wells, low well yields were observed. Monitor wells may yield a sustainable pumping rate of up to 2 gallons per minute. This pumping rate is consistent for the fine-grained sediments that occur beneath the site. During the development of RW-1 a sustained flow rate of 3 gallons per minute was achieved.

The potentiometric surface at the Lee Gas Plant is shown on Plate 2. Ground water flows to the southwest in a direction of approximately 30 degrees west of due south. The direction of ground-water flow based on calculations from April, 1990 water level elevations correlates very well with the flow direction calculated in 1988. The well casing elevations, depth to ground water, and water surface elevations are shown in Table 6-1. SECTION 7.0

7.0 CONCLUSIONS

The lateral extent of free-phase hydrocarbons that are floating on ground water beneath the site has been identified in the area below and around the evaporation pond (Figure 7-1). At the present time, the only monitor well in which the free-phase product has been found is MW-4. However, in 1988, the original, aborted borehole for MW-1 contained observable free-phase product. This aborted borehole was located approximately 15 to 20 feet south-southeast of MW-5. The plume boundaries were determined by product thickness measurements taken approximately 4 weeks after the wells were installed. The measurements were not taken immediately after drilling was complete because it was believed that drilling fluid losses may have forced floating product away from the immediate vicinity of the borehole. Although it is believed that there is potential for product to accumulate in other downgradient wells after they have fully equilibrated, it is probable that only RW-1, which is located directly downgradient from the free-phase plume, will contain free-phase hydrocarbons. Floating product was not observed in monitor well MW-6, which is located north of the plant and directly south (downgradient) from the north evaporation pond.

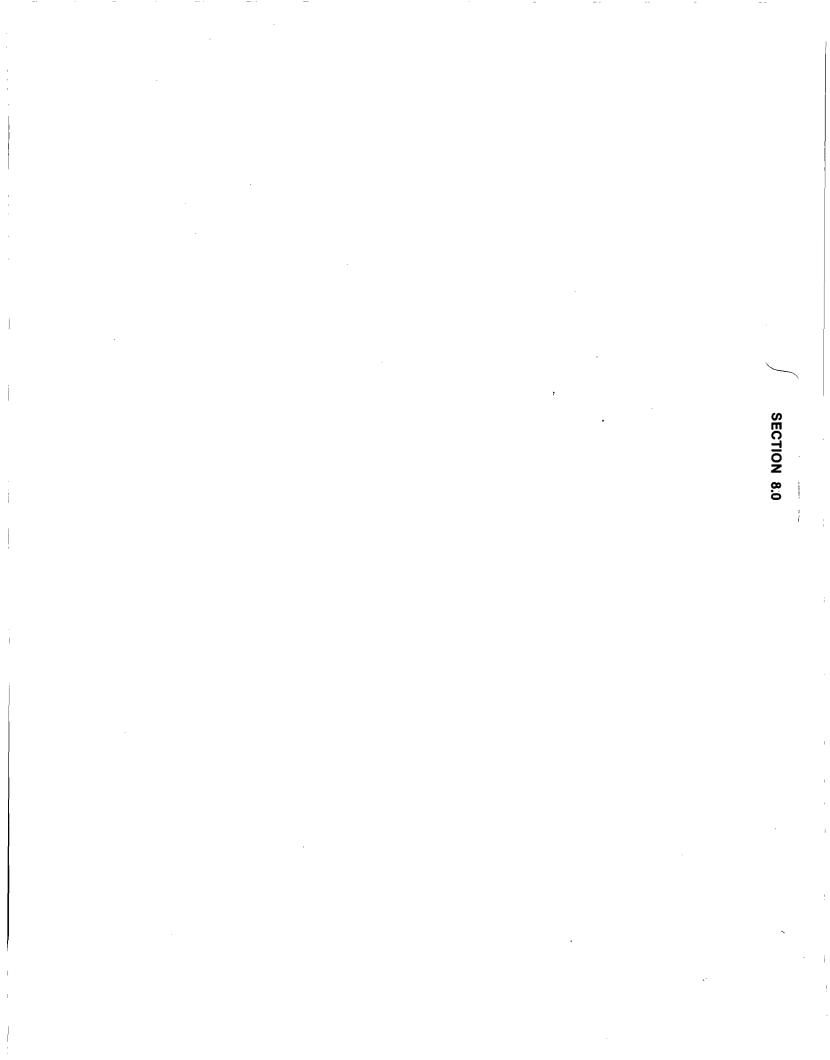
The results of the ground-water sampling program indicate that dissolved-phase hydrocarbons form a halo around the free-phase plume. Dissolved hydrocarbons were identified in all of the monitor wells at the site. However, hydrocarbon concentrations that exceeded WQCC action levels were restricted to monitor wells MW-7 and MW-8 and recovery well RW-1, which are all directly downgradient from the free-phase plume. MW-4 was not sampled because the presence of floating product ensured that dissolved hydrocarbons would be present in the ground water at that location in high concentrations.

The Lee Gas Plant is located in a producing oil field where improperly operating oil wells and/or improper oil field practices can result in extensive ground-water contamination. Dissolved phase TPH may be present in the ground water throughout the area where the Lee Gas Plant is located.

Further work will be required to identify the complete lateral extent of dissolved-phase hydrocarbons in ground water below the site. There are two areas of concern. The area south

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and west of the free-phase plume needs further investigation to define the limits of dissolved hydrocarbons. In addition, the area southwest of MW-6 and the north evaporation pond may need further investigation if dissolved hydrocarbons are found above regulatory action levels to the west of the evaporation pond and under the main plant facilities.





8.0 RECOMMENDATIONS

The following actions are recommended to complete the next phase of the investigation and initiate the remediation of ground water beneath Phillip's Lee Gas Plant:

- Submit draft supplement for the existing site discharge plan.
- Begin recovering free-floating product as soon as final approval is received for the recovery system.
- Conduct an additional investigation to identify the lateral extent of dissolvedphase hydrocarbons in ground water, in the area southwest (downgradient) from the plume of floating product.

A supplement to Discharge Plan GW-2 for Phillips Lee Gas Plant has been drafted for NMOCD review. The draft supplement will be submitted along with this report.

Phillips will pump approximately 3 gallons per minute of water/product from recovery well RW-1 into the plant waste water treatment system. The water/product recovered from RW-1 will be pumped to the oil/water separator. Following separation the oil will be piped to the slop oil tank and the water will be piped to the waste water tanks. The recovery system operation should be started immediately.

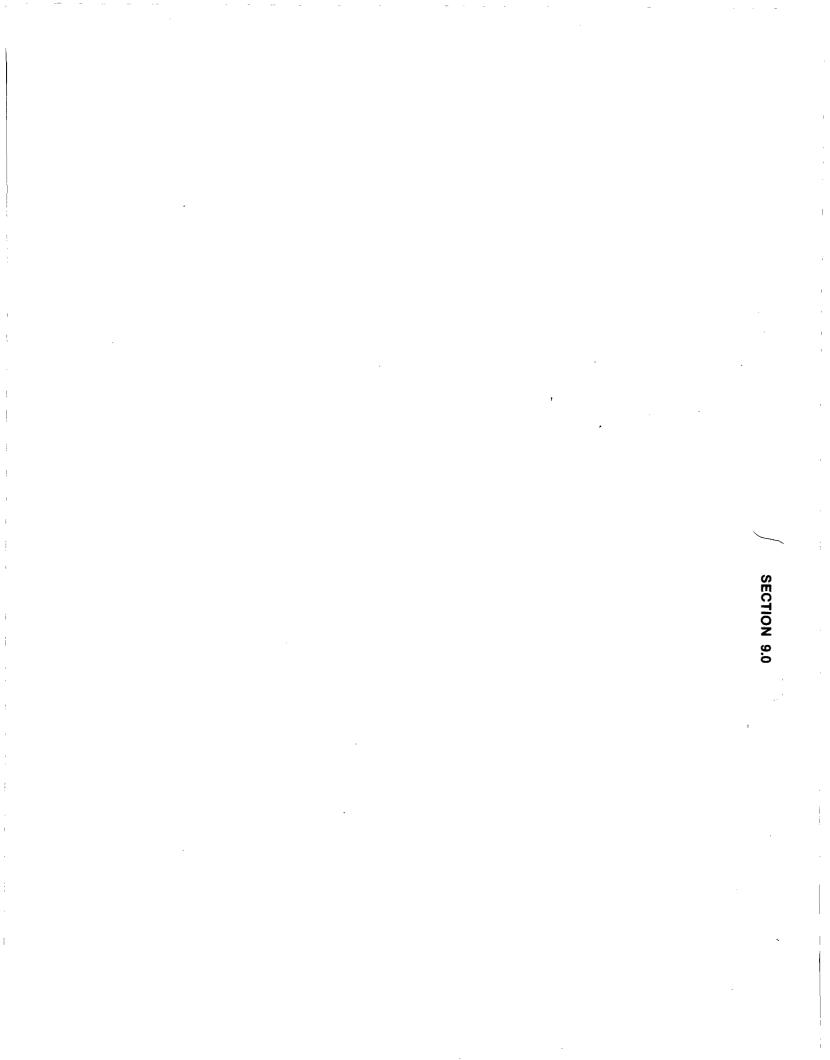
Three additional monitor wells should be installed and the ground water sampled to determine the extent of the dissolved-phase plume. The following locations are recommended:

- One monitor well should be installed at location P9, shown on Plate 1, to the west of monitor well MW-8. This location will determine the extent of westward lateral migration of the dissolved phase plume.
- Monitor wells should be installed downgradient of monitor wells MW-8 and MW-7, locations P10 and P11 (Plate 1). The purpose of these wells is to identify downgradient extent of the dissolved-phase plume to the southwest and south of the known hydrocarbon plume. The well at location P10 may be installed as a 6-inch recovery well.

If substantial hydrocarbons are found in the ground-water at locations P9, P10 and P11, additional monitor wells may be required. If the ground-water at locations P9, P10 and P11 are

hydrocarbon free, they will be proposed as the three downgradient monitoring compliance points.

In addition, water supply well WS-1 should be re-sampled to verify the presence of hydrocarbons that were found as a result of a previous sampling event.



9.0 REFERENCES

- Fenneman, N.M., 1931. Physiography of Western United States, New York, McGraw-Hill Book Company, 534 p.
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FIGURES

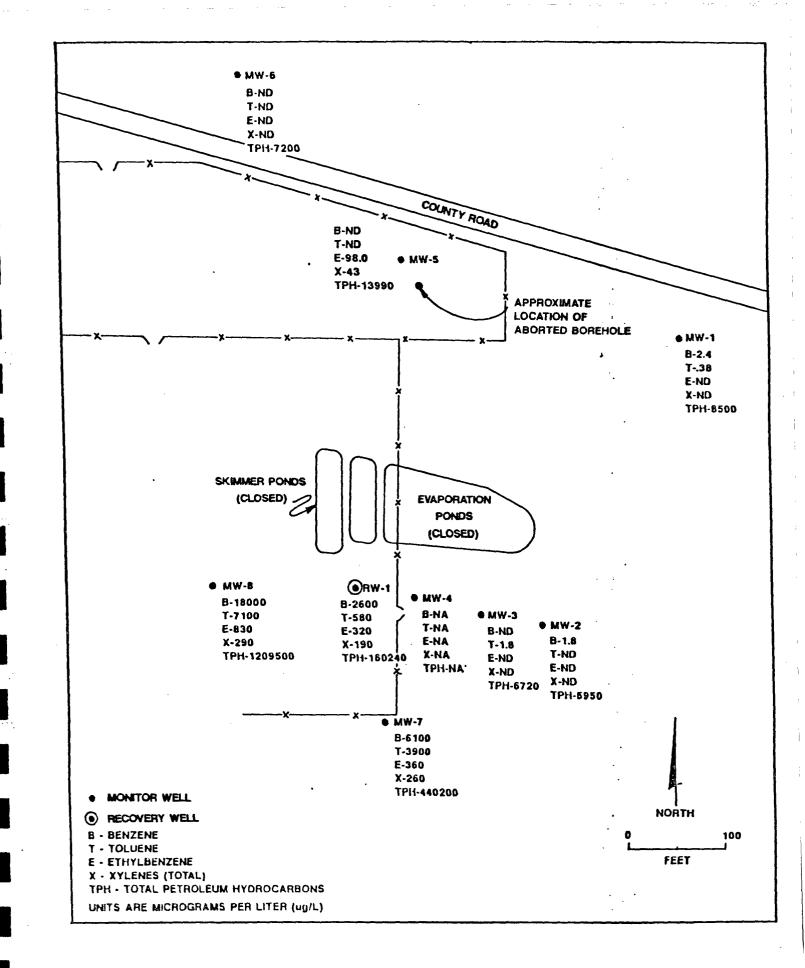


FIGURE 3-1

RELATIVE WELL POSITIONS AND CORRESPONDING BTEX AND TPH CONCENTRATIONS IN GROUNDWATER SAMPLES COLLECTED APRIL 1990

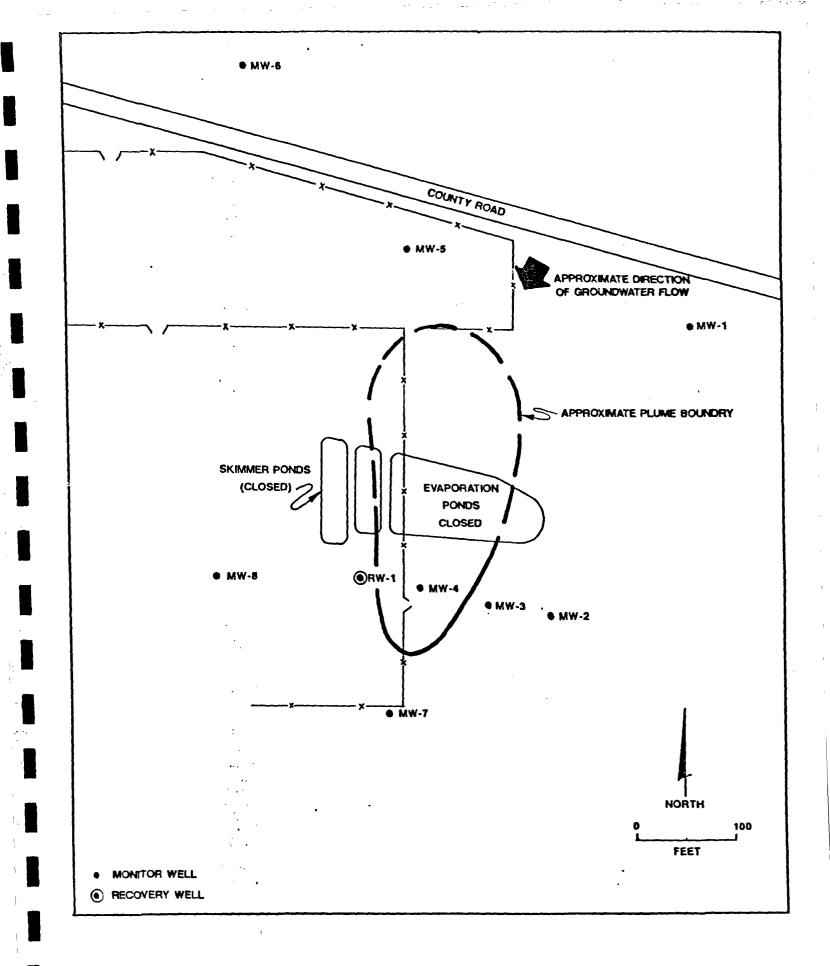
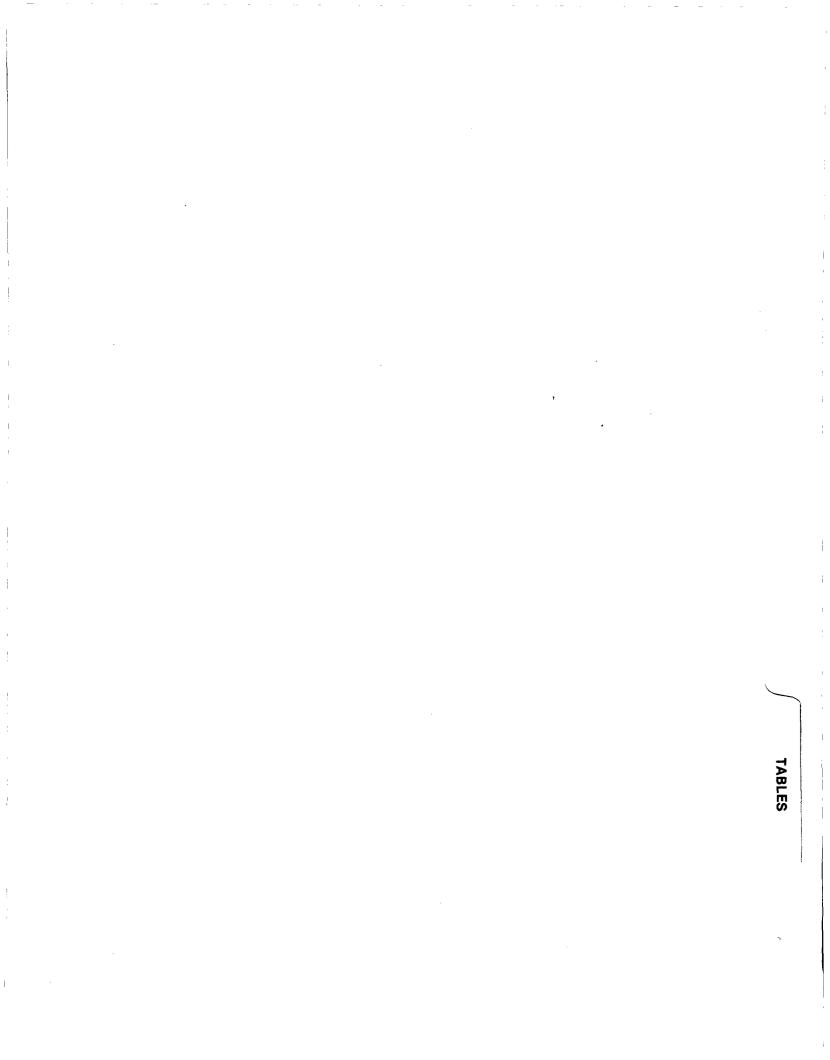


FIGURE 7-1 APPROXIMATE BOUNDARY OF FREE-PHASE HYDROCARBON ON GROUNDWATER SURFACE



	ANALYTE	MW-1	MW-2	MW-3	MW-4	MW-5
	BENZENE	2.4	1.8	ND	NA	ND
	ETHYLBENZENE	ND	ND	ND	NA	98.0
	TOLUENE	.38	ND	1.8	NA	ND
	TOTAL XYLENES	ND	ND	ND	NA	43
*	TPH GASOLINE	8500	5800	6500	NA	13000
	TPH DIESEL	ND	150	220	NA	ND
	TPH JET FUEL	ND	ND	ND	NA	ND
	TPH KEROSENE	ND	ND	ND	NA	990
	TPH LUBE OIL	ND	ND	ND	NA	ND

TABLE 3-1ANALYTICAL RESULTS FROM APRIL 1990

UNITS FOR ANALYSIS ARE MICROGRAMS PER LITER (ug/L)

ND - NOT DETECTED

TPH - TOTAL PETROLEUM HYDROCARBONS

* - TPH GASOLINE - QUANTITATES AGGREGATE HYDROCARBONS WITH BOILING POINTS BELOW APPROXIMATELY 200 DEGREES CELSIUS

C

TABLE 3-1 (cont'd)ANALYTICAL RESULTS FROM APRIL 1990

	ANALYTE	MW-6	MW-7	MW-8	RW-1
	BENZENE	ND	6100	18000	2600
	ETHYLBENZENE	ND	360	830	320
	TOLUENE	ND	3900	7100	580
	TOTAL XYLENES	ND	260	290	190
*	TPH GASOLINE	1600	440000	1200000	160000
	TPH DIESEL	5600	200	9500	240
	TPH JET FUEL	ND	ND	ND	ND
	TPH KEROSENE	ND	ND	ND	ND
	TPH LUBRICATING OIL	ND	ND	ND	ND

UNITS FOR ANALYSIS ARE MICROGRAMS PER LITER (ug/L)

ND - NOT DETECTED

TPH - TOTAL PETROLEUM HYDROCARBONS

* - TPH GASOLINE - QUANTITATES AGGREGATE HYDROCARBONS WITH BOILING POINTS BELOW APPROXIMATELY 200 DEGREES CELSIUS

CC

TABLE 3-2ANALYTICAL RESULTS FROM MARCH 1990

 ANALYTE	MW-1	MW-2	MW-3	WS-1	WS-2
BENZENE	4.1	ND	69	15	7.1
ETHYLBENZENE	ND	ND	1.9	ND	ND
TOLUENE	.26	ND	1.4	1.8	.97
TOTAL XYLENES	ND	ND	1.1	4.1	ND

UNITS FOR ANALYSIS ARE MICROGRAMS PER LITER (ug/L)

ND - NOT DETECTED

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TABLE 6-1
WELL AND WATER SURFACE ELEVATION DATA
MAY 8, 1990

LOCATION	CASING ELEVATION	DEPTH TO WATER	DEPTH TO PRODUCT	WATER SURFACE ELEVATION
MW-1	3979.25	95.94	NF	3883.31
MW-2	3980.50	97.99	NF	3882.52
MW-3	3980.27	97.83	NF	3882.44
MW-4	3980.16	101.28	96.76	3882.04 *
MW-5	3979.82	96.30	NF	3883.52
MW-6	3981.7 9	97.93	NF	3883.86
MW-7	3978.45	96.42	NF	3882.03
MW-8	3979.96	97.78	NF	3882.18
RW-1	3980.80	98.39	NF	3882.41

* WATER SURFACE ELEVATION CORRECTED FOR FLOATING PRODUCT

ALL DATA IS IN FEET

NF - NONE FOUND

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APPENDIX A LITHOLOGIC LOGS

				LITHOLOGI	C LOG
					Page _1_ of _3_
LOCATIO	N MAP:			7	
				SITE ID	: PHILLIPS LEE PLANT_ LOCATION ID: BH-1, (MW-5)
	• MW-6			N N2+8	
					ELEVATION (ft. MSL): <u>3978.30</u> NEW MEXICO COUNTY: <u>LEA</u>
	•	MW-5		DRILLIN	G METHOD: ROTARY/WATER
			• MW-1		G CONTR.: LARRY'S DRILLING, HOBBS ARTED: 3/21/90 DATE COMPLETED: 3/22/90
			• 10/00 - 1	FIELD R	EP.: <u>M. NEE</u>
					S:
1/	41/41/4 _	1/4 s 3	0 T 17 R 35	-1 '	c caliche, x sandstone, + sand, - silt, o clay
LOCATI	ON DESCRIPTION:			Comple Time	Γ
Depth	Visual X	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
	┟┽┿┽┽┽┽┽			5'	CALICHE, v pate orng 10 YR 8/2 to grysh orng 10 YR 7/4
					cche is fn sand to crs pebble Grv size, well consol, a poorly sorted, v fn gr sand is host for cche, <5% Sst.
-	cececece				pale brn 5 YR 5/2.
2					
	┠╂╂╂╂╂┨			l	
	cececcoo				
10				10'	CALICHE, as above, 70% cche, 30% clay.
	$\left \begin{array}{c} + + + + + + + + + + + + + + + + + + +$	HE			
15	cccccccc	¢		151	<u>CALICHE</u> , same as 5'.
	$\left \begin{array}{c} + + + + + + + + + + + + + + + + + + +$				
20	cicciccicc			20'	CALICHE/SANDSTONE, cche is same as 5', Sst is pale bro
				1	YR 5/2, v fn to fn gr, v well to mod consol, sbang to sbrndd, mod well sorted, 90% cche, 10% Sst.
	++++++++++++++++++++++++++++++++++++	HE			
25	cecece		3	25'	CALICHE/SANDSTONE, same as 20', 80% cche, 20% Sst.
	┟┼┽╂┾╁┼╂╉		3		
			3		
30	CEXXXXXXX	X	1	70/	CALICHE/SANDSTONE, same as 20', 20% cche, 80% Sst in
00	FIIIII	HE ==	3		CALICHE/SANDSTONE, same as 20°, 20% cone, bux sst in cuttings.
{			=		
	CCXXXXXXXX		3		
35		TE -	1	35'	CALICHE/SANDSTONE, same as 20', 80% Sst, 20% cche.
ſ	┝┼┼┼┼┼┼┼				
40	CECEXXXX		1	40'	CALICHE/SANDSTONE, same as 20' 50% cche, 50% Sst.
l	┝╁┼┼┼┼┼┼		5		
		THE ST			
45	ccccxxx+	HD Z		451	CALICHE/SANDSTONE, same as 20', 40% cche, 30% Sst, 20
ļ		T	- Ta		Ifn to fn sand, 10% silt, sand & silt is pale yelsh br YR 6/2, unconsol, sbrndd, mod well sorted.
}	┟┾┼┽┽┽┽┼	H = 1			
50	CCCCXXXXX	X			
			E	}	
	$\left \begin{array}{c} \\ \\ \\ \\ \end{array} \right \left \begin{array}{c} \\ \\ \\ \end{array} \right \left \left \left \begin{array}{c} \\ \\ \\ \end{array} \right \left \left $	$+ \leq \leq$	1		
1	┟╌╁╌╁╌╂╶╉╶╉╌╋╸╋╸	+1	-1	1	

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				LITHOLOGI	C LOG Page 2 of 3
				(Continued	i) Location ID <u>BH-1</u>
Depth	Visual X	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
50	CCCCXXXXXXX			50,	<u>CALICHE/SANDSTONE</u> , same as 20', 60% \$st, 40% cche.
55	CEEEXXXXXX			55,	<u>CALICHE/SANDSTONE</u> , same as 20' 60% Sst, 40% cche.
. 60				60,	CALICHE/SANDSTONE, same as 20', 60% Sst, 40% cche.
65				65'	CALICHE/SANDSTONE, same as 20', 60% Sst, 40% cche.
70	+++++++++++++			70'	<u>SAND</u> , mod yelsh brn 10 YR 5/4, v fn to fn gr, unconsol, sbrndd, v well sorted.
75	CCCCCCXX			75'	<u>CALICHE/SANDSTONE</u> , same as 20', 70% cche, 20% Sst, 10% v fn sand.
80	CC+++0000			801	<u>SANDY CLAY</u> , grsh orng pink 5 YR 7/2 to mod orng pink 5 YR 8/4, 50% clay, 30% sand, 20% cche.
85				851	SAND, pale yelsh brn 10 YR 6/2, v fn to fn sand, unconsol sbrndd, well sorted.
90				901	<u>SAND,</u> same as 85'.
95				95 '	<u>SAND</u> , same as 85'.
100				· 1001	<u>SAND</u> , same as 85′.
105	5 4444444			105 '	SAND, mod yelsh brn 10 YR 5/4, v fn to med size, unconso mod well sorted, sbrndd.
110	0 ++++++++++++++++++++++++++++++++++++			110'	<u>SAND</u> , same as 105'.
115	5 44 4 44 44 44 44			115'	<u>SILTY SAND</u> , pale yeish brn 10 YR 6/2, silt to med sand, unconsol, mod well sorted, sbrndd, 85% sand, 15% silt.

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[<u></u>		LITHOLOGI	CLOG Page 3 o	f <u>3</u>
			(Continue		
Depth	Visual X Lith	Dritling Time Scate:	Sample Type and Interval	Lithologic Description	
			120'	<u>SILTY SAND</u> , same as 115'.	
125					
130					
135					
140					
145					
150					
155					
160	, 				
165	5 + + + + + + + + + + + + + + + + + +				
170					
17:	5				
180					

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				LITHOLOGI	C LOG	
					Page <u>1</u> of <u>3</u>	
LOCATION MAP: • MW-6 • MW-5 • MW-1				SITE ID: Phillips_lee_plant_location ID: BH-2 (MW-6) SITE COORDINATES (ft.): E E07+72.94 GROUND ELEVATION (ft. MSL): 3980.04 STATE: NEW MEXICO DRILLING METHOD: ROTARY/WATER DRILLING CONTR.: LARRY'S DRILLING, HOBBS DATE STARTED: JATE COMPLETED: J23/90 FIELD REP.: M. NEE COMMENTS:		
1/4	1/41/4	_1/4 s_3	<u>1 1 17 R 35</u>		c caliche, x sandstone, + sand, - silt, o clay	
LOCATIO	DN DESCRIPTION:					
Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description	
				0-11	<u>SOIL</u> , pale yelsh brn, 10 YR 6/2, org rich.	
5	ccccxxxxxxx			51	CALICHE/SANDSTONE, cche is v pale orng 10 YR 8/2, clasts are med sand to Pbl Grv size, consol, ang, Sst is pale yelsh brn 10 YR 6/2 gr size is v fn to fn, cemented, consol, sbrndd, 40% cche, 60% Sst.	
10				10'	CALICHE/SANDSTONE, same as 5', 80% cche, 20% Sst.	
15	cccccccxx			15'	CALICHE/SANDSTONE, same as 5' 80% cche, 20% Sst.	
20	ccccccxxc			20'	<u>CALICHE/SANDSTONE</u> , same as 5', 70% cche, 20% Sst, 5% sil 5% v fn to fn sand.	
ප	eeccexx+++			25'	CALICHE/SANDSTOWE/SAND, 50% cche, 20% Sst, 30% sand, san is grysh orng pink 5 YR 7/2, unconsol, sbrndd, mod well sorted, v fn to med size.	
30	cccccxx+++			30'	CALICHE/SANDSTONE/SAND, same as 25'.	
35	C C C Y Y + + + + - =			35'	CALICHE/SANDSTONE/SAND/SILT, same as 25', 20% Sst, 30% cche, 30% sand, 20% silt.	
40	CCCXX44+			40'	CALICHE/SANDSTONE/SAND/SILT, same as 35'.	
45				45'	SILTY SAND, grysh orng pink 5 YR 7/2, silt to fn sand, unconsol, mod sorted, sbrndd, 70% v fn to fn sand, 30% silt.	
50				50'	<u>SILTY SAND</u> , same as 45'.	

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Ucontinued Location 10Bic2 Depti Visal X Uth Defiting 11 ms Sample Type and Interval Lithologic Description 50 1				LITHOLOGI	C LOG Page 2 of 3
Depth Visual X Uth Sealer; and Interval Lithologic Bescription 50 1111 State 1111 State 1111 State 1111 State 1111 State 51 1111 State 1111 State 1111 State 1111 State 1111 State 55 1111 State 1111 State 1111 State 1111 State 1111 State 60 1111 State 1111 State 1111 State 1111 State 1111 State 1111 State 61 1111 State 1111 State <th></th> <th></th> <th></th> <th> (Continue)</th> <th>d) Location ID <u>BH-2</u></th>				 (Continue)	d) Location ID <u>BH-2</u>
55 51 51 <	Depth	Visual X	Lith		Lithologic Description
60 Extra transmission 60 Extra transmission 61 Extra transmission 62 Extra transmission 63 Extra transmission 64 Extra transmission 65 Extra transmission 66 Extra transmission 67 Extra transmission 70 Extra transmission 71 Extra transmission 72 Extra transmission 73 Extra transmission 74 Extra transmission 75 Extra transmission 76 Extra transmission 77 Extra transmission 78 Extra transmission 79 Extra transmission 70 Extra transmission 71 Extra transmission 72 Extra transmission 73 Extra transmission 74 Extra transmission 75 Extra transmission 76 Extra transmission 77 Extra transmission 78 Extra transmission 78 Extra tra					
65 10 <td< td=""><td></td><td></td><td></td><td></td><td></td></td<>					
70 222223232323242414 70 2222232323242414 70 2222232323242444 70 2222232323242444 70 2222232323242444 70 22222323242444 70 222223242444 70 222223242444 70 222223242444 70 222223242444 70 222223242444 70 222223242444 70 222223242444 70 222223242444 70 222223242444 70 2222242444 70 2222242444 70 22222444 70 22222444 70 2222244 70 2222444 70 2222444 70 2222444 70 2222444 70 2222444 70 2222444 70 2222444 70 2222444 70 2222444 70 2222444 70 222244 70 2222444					sbrndd, mod well sorted.
10 10 <td< td=""><td></td><td></td><td></td><td></td><td></td></td<>					
00 00 <td< td=""><td>75</td><td>CCXX+++++</td><td></td><td>יאי</td><td><u>CALICHE/SANDSTONE/SAND</u>, pale yelsh brn 10 YR 6/2, 20% cche, 20% Sst, 60% v fn to fn sand.</td></td<>	75	CCXX+++++		יאי	<u>CALICHE/SANDSTONE/SAND</u> , pale yelsh brn 10 YR 6/2, 20% cche, 20% Sst, 60% v fn to fn sand.
90 90 <td< td=""><td>80</td><td></td><td></td><td>80'</td><td><u>SAND,</u> same as 60'.</td></td<>	80			80'	<u>SAND,</u> same as 60'.
95 100 100' SAND, same as 90'. 100 100' SAND, same as 90'. 105 105' SAND, mod yetsh brn 10 YR 5/4, fn to v fn sand, unconso 110 105' SAND, same as 105'.	85			851	unconsol, mod sorted, sbrndd, 80% v fn to fn sand, 20%
100 100' SAND, same as 90'. 105 105' SAND, mod yelsh brn 10 YR 5/4, fn to v fn sand, unconso sbrndd, mod well sorted. 110 110' SAND, same as 105'.	90		E - -	90'	<u>SAND</u> , pale yelsh brn 10 YR 6/2, v fn sand to med sand, unconsol, mod sorted, sbang to sbrndd.
100 100 <td>95</td> <td></td> <td>¥</td> <td>95'</td> <td>SAND, same as 90'.</td>	95		¥	95'	SAND, same as 90'.
110 SAND, same as 105'.	100		¥	1007	SAND, same as 90'.
	105		¥ 	1057	

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r			LITHOLOGI	C 10G	Prop. 3 of 7
			(Continue		Page <u>3</u> of <u>3</u> Location 1D <u>BH-2</u>
	TT	Dritting Time			
Depth	Visual % Lith	Scale:	Sample Type and Interval	Lithologic D	escription
120			120'	<u>SAND</u> , same as 105'.	
125					
130					
135					
140					
145					
150					
155					
160					
165					
170					
175	5				
180					

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··				LITHOLOGI	IC LOG
					Page <u>1</u> of <u>3</u>
DCATIO	N MAP:	¥-4		SITE ID	Page or
	• BW-1	•	MW-3 • MW-2	SITE CO	DRDINATES (ft.):E E10+27,31
	- ////-1			GROUND	ELEVATION (ft. MSL): 3977,20
				DRILLIN	NEW MEXICO COUNTY: LEA G METHOD: ROTARY/WATER
				DRILLING	G CONTR.: LARRY'S DRILLING, HOBBS ARTED: 3/25/90 DATE COMPLETED: 3/25/90
				FIELD R	EP.: <u>M. NEE</u>
	• MW-7				S:
1/4	1/41/4	_1/4 s_31	L T <u>17</u> R <u>35</u>] '	c caliche, x sandstone, + sand, - silt, o clay
	DN DESCRIPTION:				
Depth	Visual X	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
	╺┽┽┽┽┽┽┽┥┥			0-1/	SOIL, grysh brn 5 YR 8/2, to appears to be HC stained.
5	ccccccccx			51	CALICHE, mod orng pink 5 YR 8/4, cuttings are v fn to t
	┟╂┼┟┨┟┨╋┥				PbL Grv size, v well consol, 90% cche, 10% Sst, v hard drilling to 5'.
	┝╁┽┟┼┽┽┽┽┼┤				
10	cecececooo			10'	CALICHE, as above except poorly consol, 70% cche, 30%
	┝╋╋╋				clay.
	┝┽┽┽┽┽┽┾┼┽┽┥				
15	$\mathbf{c}\mathbf{c}\mathbf{+}\mathbf{+}\mathbf{+}\mathbf{+}\mathbf{+}\mathbf{+}\mathbf{+}\mathbf{+}\mathbf{+}+$			157	SAND, grysh orng pink 5 YR 7/2, v fn to fn gr sand,
	┝┼┼┽┽┽╅┿┽				unconsol, sbang to sbrndd, well sorted, 80% sand, 20% cche.
	┝╅╼╌		1		
20	cc+++++++++			20'	SAND, same as 15'.
	[+ + + + + + + + + + + + + + + + + + +				
25	C+++++++++++		1	25'	SILTY SAND, pale yelsh brn 10 YR 6/2, silt to fn sand, unconsol, sbang to sbrndd, 80% sand, 10% silt, 10% cch
	+ + + + + + + + + + + + + + + + + + +	相相相	1	[and sold brand to surrive, was sain, to sitt, the Cur
			•		
30	+++++++++			30'	SILTY SAND, same as 25', 20% silt, 80% sand.
	C + + + + + + + + + + -				
35				357	SILTY SAND, same as 25', 10% silt, 10% cche, 80% sand.
40	+++++++++++++++++++++++++++++++++++++++			40'	SILTY SAND, same as 25', 20% silt, 80% sand.
40	$\left + + + + + + + + + + + + + + + + + + +$		H	40'	ULLI UNIV, DOINE OS ES , LUA SILL, UNA SOLU-
45	╃╁╪╪╪			451	SILTY SAND, same as 25', 20% silt, 80% v fn sand.
	┟╁┽┽┽┽┽┾┾				
50			H	50'	SILTY SAND, same as 25', 20% silt, 10% cche, 70% sand.
			F		
	$\left \begin{array}{c} + + + + + + + + + + + + + + + + + + +$				
				<u> </u>	

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				LITHOLOGI	C LOG Page 2 of 3
				(Continued	i) Location ID <u>BH-3</u>
Depth	Visual X	Drit Lith Scal	ling Time e:	Sample Type and Interval	Lithologic Description
50	C + + + + + + + + +				
55				55'	<u>SILTY SAWD</u> , same as 25', 30% silt, 70% v fn sand.
60				601	<u>CALICHE/SANDSTONE</u> , cche is v pale orng 10 YR 8/2, clasts are med sand to fn Pbl Grv size, 40% cche, 60% Sst, Sst is pale yelsh brn 10 YR 6/2, gr size is v fn to fn, cemented, consol, sbrndd.
65				651	CALICHE/SANDSTONE, same as 60'.
70	cccxxxxxx+-			70'	<u>CALICHE/SANDSTONE</u> , same as 60', 50% Sst, 30% cche, 10% silt, 10% v fn sand.
מ				ינק	<u>SILTY SAND</u> , pale yelsh brn 10 YR 6/2, unconsol, well sorted, sbang to sbrndd, 30% silt, 70% v fn to fn sand.
80				80'	<u>SILTY SAND</u> , same as 75'
85	+ + + + + + + + + +			85'	SAND, same as 75', 80% v fn sand, 10% fn sand, 10% silt.
90				901	<u>SAND</u> , same as 85'.
95				951	<u>SAND</u> , same as 85'.
100	, * * * * * * * * * * * *			100'	SAND, mod yelsh brn 10 YR 5/4, unconsol, well sorted, sbang to sbrndd, v fn to fn sand.
105				105 '	<u>SAND</u> , same as 100'.
110	$\begin{array}{c} \hline \\ \hline $			110'	<u>CLAYEY SILTY SAND</u> , pale yelsh brn 10 YR 6/2, clay to fn sand, unconsol, mod sorted, sbang to sbrndd, 10% clay, 1 silt, 80% v fn to fn sand.
115			,	115'	

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							 	 				LITHOLOG	C LOG			P	age <u>3</u>	of _3	
												(Continue	d)			L	ocation	1D	<u>BH-3</u>
Depth		,	/15	su	al	2		 Ι	Lith	Drilling Time Sample h Scale: and Int			mple Type d Interval Lithologic Descri			escrip	otion		é
115															,				
120												120'	<u>SAND,</u> same as '	100'.					
125																			
130																			
135																			
140																			
145																			
150																			
155																			
160																			
165																			
170																			
175																			
180) 																		

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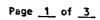
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LITHOLOGIC LOG



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LOCATION MAP: • MW-4		SITE ID:			
- 514 4	• MW-3 • MW-2	SITE COORDINATES (ft.): N N0+18.31 E E08+95.41			
• RW-1	• BE IT - Z	GROUND ELEVATION (ft. MSL): 3977.81			
		STATE: NEW NEXICO COUNTY: LEA			
		DRILLING METHOD: ROTARY			
		DRILLING CONTR.: LARRY'S DRILLING, HOBBS			
		DATE STARTED: 3/27/90 DATE COMPLETED: 3/28/90			
		FIELD REP .: M. NEE			
		COMMENTS:			
• MW-7					
1/41/41/4	S <u>31</u> T <u>17</u> R <u>35</u>	c caliche, x sandstone, + sand, - silt, o clay			

LOCATION DESCRIPTION: ____

5			and Interval	Lithologic Description
5			0-21	<u>SOIL</u> , cche Bld, heavily stained w/HC, stained soil is dusky brn 5 YR 2/2.
- F	cccccccc		5,	<u>CALICHE</u> , v pale orng 10 YR 8/2, v fn sand to fn Pbl size clay fraction < 5%, org vapors a 5 ppm from cuttings.
10 5	cccccccx		10'	CALICHE, same as 5′ w/10% Sst, Sst is lt brn 5 YR 6/4, v fn gr, tightly consol, 10% clay, 10% Sst, 80% cche.
15	cccX+++++-		157	<u>CALICHE/SAND</u> , v pale orng 10 YR 8/2, sand is v fn gr, unconsol, sbang mod sorted, cche is clay to fn Pbl Grv size, 50% sand, 30% cche, 10% clay, 10% Sst.
20	CCCCXXX+++		20'	<u>CALICHE/SANDSTONE/SAND</u> , pale yelsh brn 10 YR 6/2, as above, 30% sand, 40% cche, 30% Sst.
25	C+++++++++		25'	SAND, pale yelsh brn 10 YR 6/2, v fn to fn gr, unconsol mod well sorted, sbang to sbrndd, 90% sand, 10% cche.
30	C+++++++++		30'	<u>SAND</u> , same as 25', < 10% cche in cuttings.
35	CCXXXXX+++		351	<u>SANDSTONE/CALICHE/SAND</u> , same as 20', 30% sand, 50% Sst, 20% cche.
40	CCXXXXX++1		40'	SANDSTONE/CALICHE/SAND, same as 35'.
45	CCXXXXX++		45'	SANDSTONE/CALICHE/SAND, same as 35'.
50		H H	507	SANDSTONE/CALICHE/SAND, same as 35', 20% sand, 40% cche 40% Sst.

		 	LITHOLOGI	C LOG Page 2 of 3
			(Continued	f) Location ID <u></u>
Depth	Visual X	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
50			55,	SAND, pele yelsh brn 10 YR 6/2, silt to fn sand, unconsol,
60				sbrndd, well sorted, 90% sand, 10% silt.
65				<u>SAND</u> , mod yelsh brn 10 YR 5/4, v fn gr, well sorted, unconsol, sbrndd.
70			70'	<u>SAND</u> , same as 65', 90% sand, 5% cche, 5% Sst.
75			75'	SANDSTONE/CALICHE/SAND, same as 20', 60% sand, 20% cche, 20% Sst, hard drilling 72-78'.
80			80'	SANDSTONE/CALICHE, pale yelsh brn 10 YR 6/2, 70% cche, 20% Sst, 10% sand, cche/Sst is v fn Pbl Grv size, sand is v fr to fn gr, poorly sorted, sbrndd.
85			851	SANDSTONE/CALICHE, same as 80', 40% sand, 10% Sst, 50% cche.
90			901	SAND, dk yelsh brn 10 YR 4/2 to pale yelsh brn 10 YR 6/2 y fn to fn gr, unconsol, sbrndd, well sorted.
95			951	<u>SAND</u> , same as 90'.
100	★ ★ ★ ★ ★ ★ ★ ★		1001	<u>SAND</u> , same as 90'.
105	5 \$ 1 1 1 1 1 1 1 1 1 1		1051	SAND, same as 90', minor clay < 5%.
110			110'	SAND, same as 90', minor clay < 5%.
115	5 +++++++++++++++++++++++++++++++++++++		115,	<u>SAND</u> , same as 90'.

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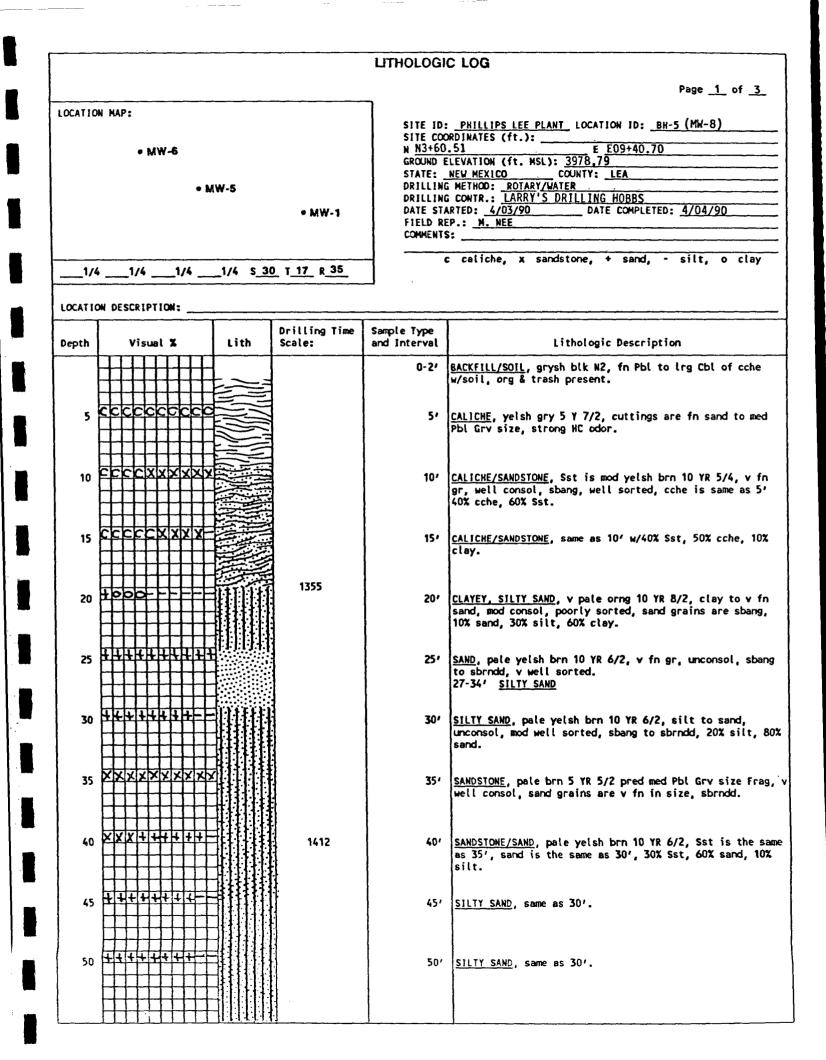
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[LITHOLOGI	C LOG	Page <u>3</u> of <u>3</u>
			(Continue		Location ID
		Drilling Time	Sample Type and Interval	· · · · · · · · · · · · · · · · · · ·	
Depth	Visual X Lith	Scale:	and Interval	Lithologic	Description
120			120'	<u>SAND</u> , same as 90'.	
125					
130					
135					
140					
145					
150					
155					
160					
165					
170					
175	5 + + + + + + + + + + + + + + + + + +				
180					· · ·

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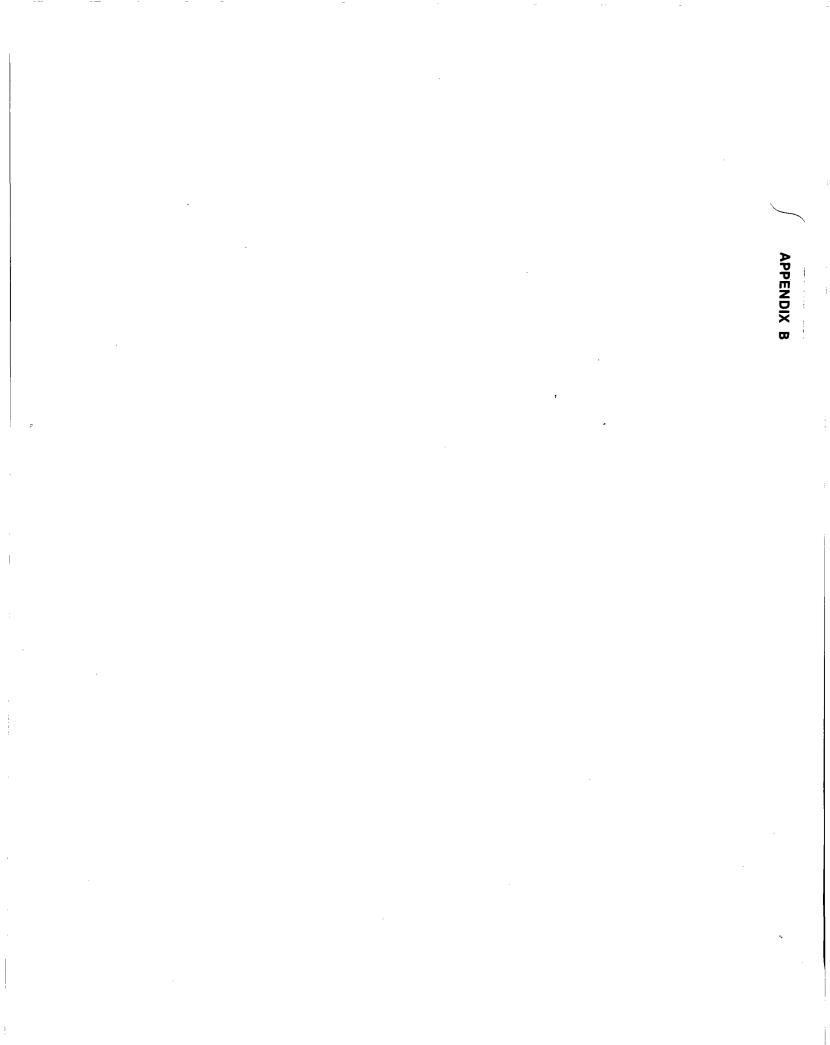


			LITHOLOGI	C LOG Page <u>2</u> of <u>3</u>
			(Continue	d) Location ID <u>BH-5</u>
Depth	Visual X Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
20				
				<u>SILTY SAND</u> , same as 30'.
60				SILTY SAND, grysh orng pink, 5 YR 7/2, 10% silt, 60% san 10% cche, 20% Sst.
65				SAND, mod yelsh brn 10 YR 5/4, v fn to fn gr, unconsol, well sorted, sbang to sbrndd.
70		1440		Same as 65'.
75				SAND, pale yelsh brn 10 YR 6/2, w/<5% v pale orng 10 YF 8/2 clay/cche, v fn gr, unconsol, mod well sorted, sbar
80			801	<u>SAND</u> , same as 75' w/ no clay.
85		0750	85'	<u>SAND</u> , same as 75′ w/≈10% clay, clay may be from higher borehole.
90		0756	90'	<u>SAND</u> , same as 75', no clay frac.
95			95'	<u>SAND</u> , same as 75', no clay frac.
100			100'	<u>SAND</u> , same as 75', no clay.
105			1051	<u>SAND</u> , same as 75′, no clay.
110			110'	<u>SAND</u> , same as 75', no clay.
115	€+++ €€€€		1151	<u>SAND</u> , same as 75′, no clay.

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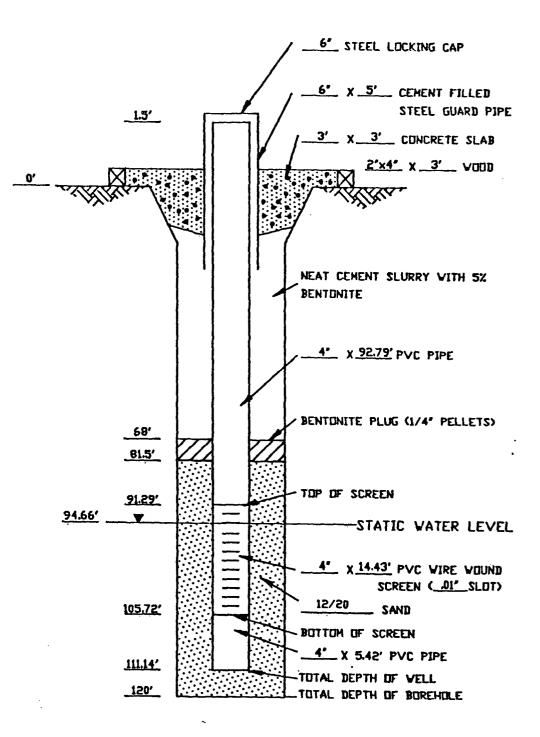
				LITHOLOGI	C 1.0C	
1						Page <u>3</u> of <u>3</u>
	r			(Continue)		Location ID <u>BH-5</u>
Depth	Visual X	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic De	scription
	<u>→ → → → → → → → → → → → → → → → → → → </u>					
	┝ ╡╡╡╡ ┥ ┥ ┥ ┥				•	
120			0815	120'	<u>SAND</u> , same as 75', no clay.	
125						
130						
135						
140		-				
145						
150						
155						
160						
165	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;					
170	,					
175	5					
180						

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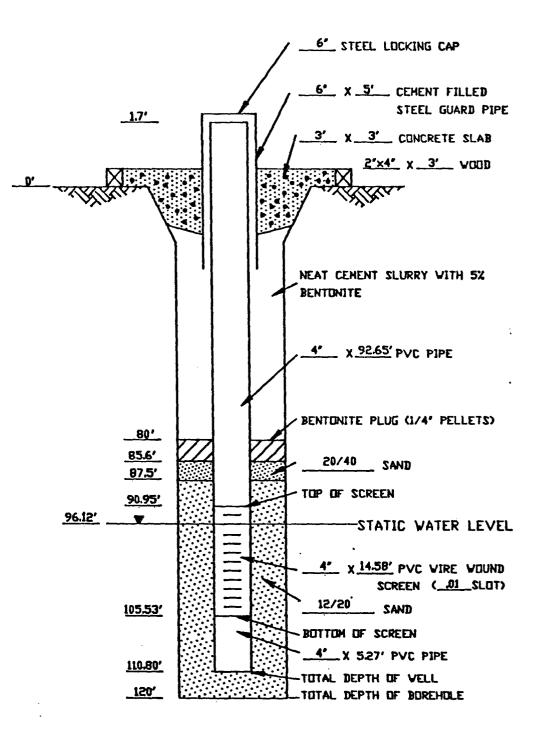




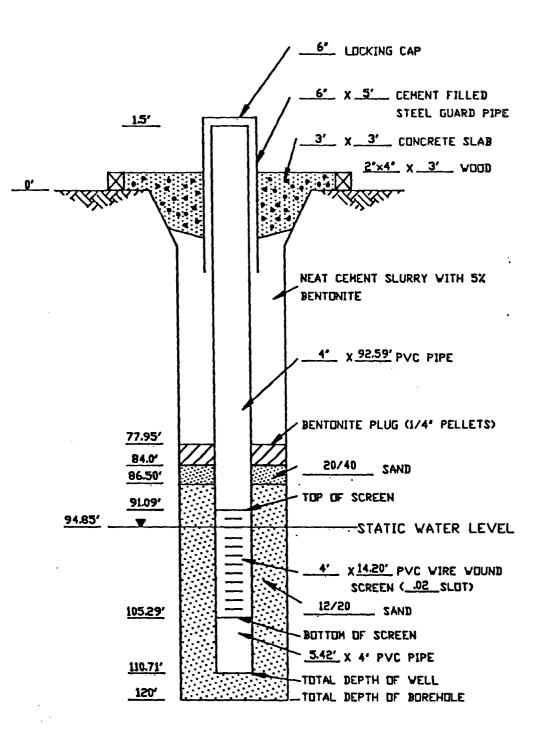
APPENDIX B MONITOR WELL COMPLETION DIAGRAMS



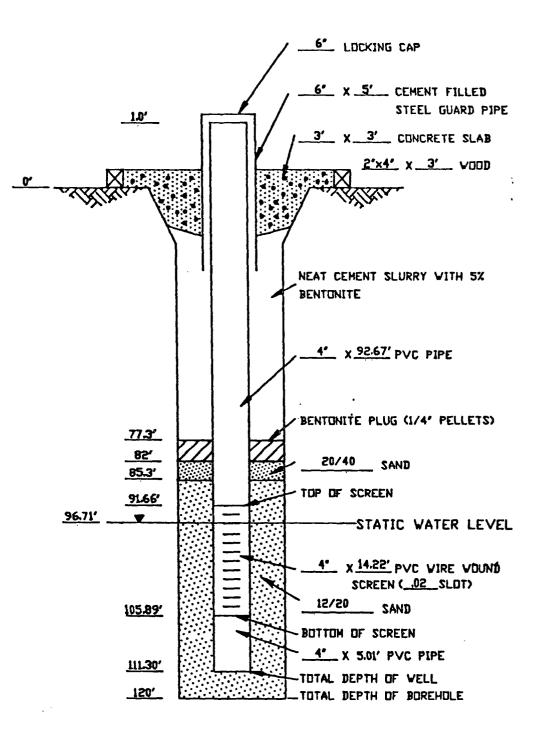
MONITOR WELL MW-5 PHILLIIPS LEE PLANT



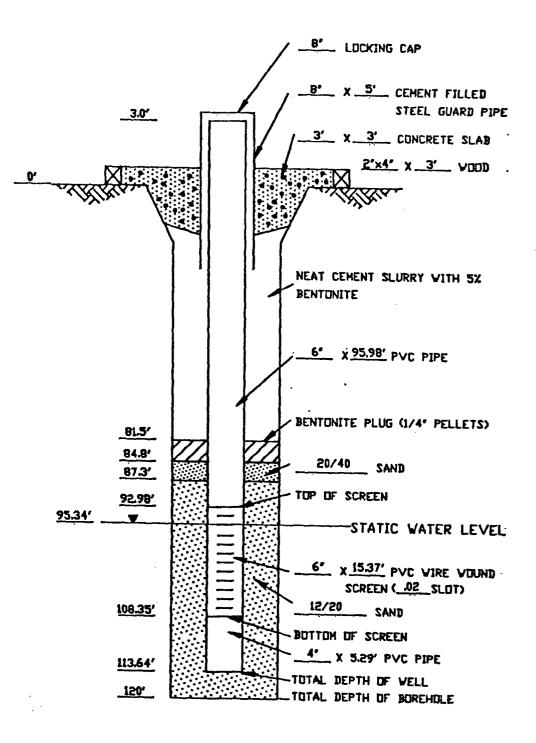
MUNITUR VELL MW-6 PHILLIIPS LEE PLANT



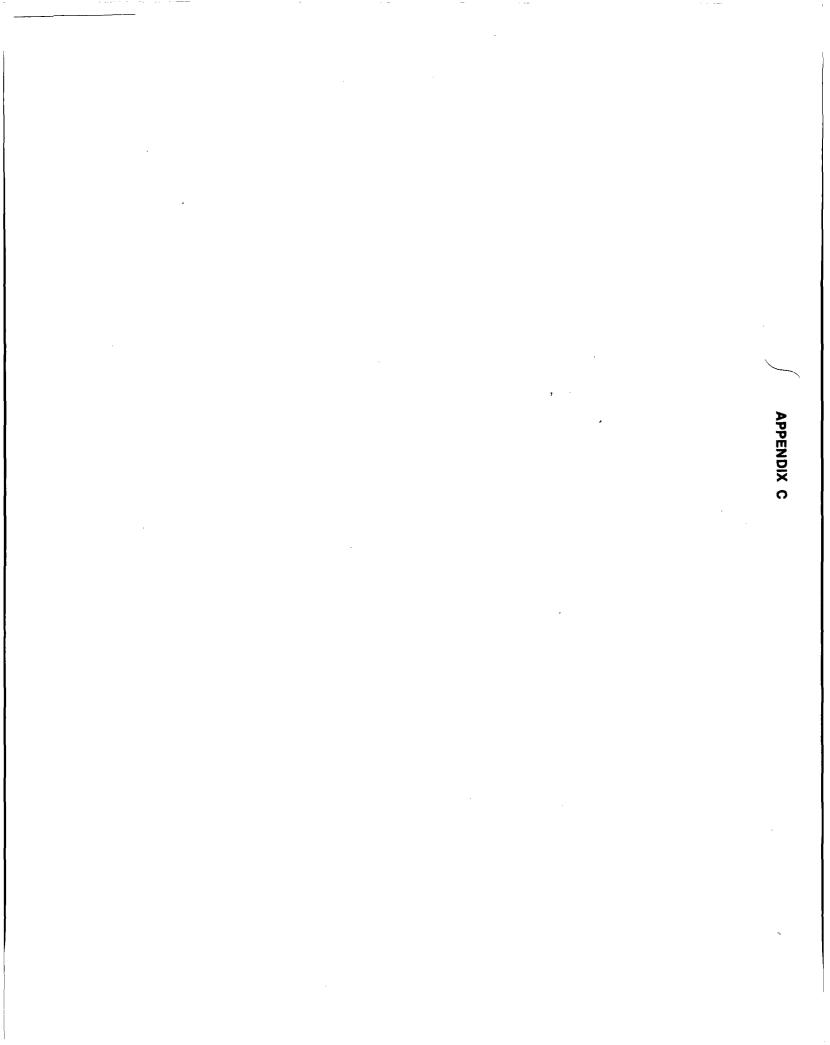
MONITOR WELL MW-7 PHILLIIPS LEE PLANT



MONITOR WELL MW-8 PHILLIIPS LEE PLANT



RECOVERY VELL RV-1 PHILLIIPS LEE PLANT



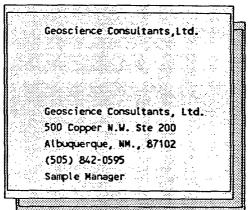
Gel

APPENDIX C LABORATORY REPORTS



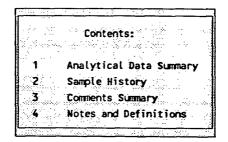
Radian Work Order \$0-03-244

Analytical Report 04/17/90



RECEIVED APR 2 0 1990

Customer Work Identification Phillips Purchase Order Number



Radian Analytical Services 10395 Old Placerville Road Sacramento, CA 95827

916-362-5332

Client Services Coordinator: LWKELLY

Certified by: Mand 14 Tale

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Analytical Data Summary

Page: 2

Geoscience Consultants,Ltd. Radian Work Order: S0-03-244

	9003271300	9003280950	9003281130	9003281215
ector:	1	1		na sina kana kana sina sina sina sina sina sina sina s
esults in:	Ug/L	ug/L	ug/L	ug/L
atrix:	01A water	02A Water	03A Water	04 A
esel (2) It fuel (2) Posene (2) bricating oil (2)	Result Det. Limit ND 50 ND 100 <u>990</u> 100 ND 100	Result Det. Limit <u>220 a</u> 50 ND 100 ND 100 ND 100	Result Det. Limit <u>150 a</u> 50 ND 100 ND 100 ND 100	Result Det. Limit ND 50 ND 100 ND 100 ND 100 ND 100
Not detected at specifie	ed detection limit	2 Fat	It less that 5 times de	

ar Sair

detectors.

R	A	D	E/	A	N	
СО	RP	OR	A 1	T ł	O N	

Analytical Data Summary

Page: 3

Geoscience Consultants,Ltd. Radian Work Order: \$0-03-244

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Method:TPH-Diesel by mod. SW List:Complete analyte list Sample 1D:	입법은 고영에는 동안하는 것 같은 그렇게 가지 않는 것을 하셨다.			
Factor: Results in: Matrix:	1 Ug/L OSA Water			
Diesel (2) Jet fuel (2) Kerosene (2) Lubricating oil (2)	Result Det. Limit ND 50 ND 100 ND 100 ND 100 ND 100	Result Det. Limit	Result Det. Limit	Result Det. Limit
ND Not detected at specified (1) For a detailed descripti (2) Extraction By SW3520 (co SW3550 (sonication) foll detectors.	on of flags and technica	or	efer to Appendix A in a	this report.



Page: 4

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Geoscience Consultants, Ltd. Radian Work Order: \$0-03-244

Factor:			1		1				
ractor: Results in:	o ug/L		ug/L				ug/L		
Matrix:	01B water		028 Water		038 water		04B water		
Benzene (2)	Result D	et. Limit 1.5	Result E ND	Det. Limit 0.30	Result 1.8 C	Det. Limit 0.30	Result De 2.4 C	et. Limit 0.30	
Ethylbenzene (2)	V 98 C	1.5	ND	0.30	ND	0.30	ND	0.30	
Gasoline (2)	13000	250	<u>6500</u>	50	5800	50	8500	_ 50	
Toluene (2)	ND	1.5	<u>1.8 C</u>	_ 0.30	ND	0.30	<u>0.38 Ca</u>	_ 0.30	
Xylenes (total) (2)	43 C	2.5	ND	0,50	ND	0.50	ND	0.50	

FID detectors.

Analytical Data Summary

Geoscience Consultants,Ltd. Radian Work Order: S0-03-244

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List:Gasoline and BIEX [Sample ID:	REAGEN	T BLANK	1 - 1. MOODAGE	IT BLANK		i A Anna	an an an an Arthur Margan an Arthur	a da Balancia
					ara fa se far de Calendar e ta		이 이는 것 가슴가 가 제 국왕이는 것 같아요.	
Factor:	1		1					
Results in:	ug/L		Ug/L					
	05A		05B			• •		
Matrix:	water		water	고 꽃 고고 문				• •
			n angel de s La tradition de s					
•		et. Limit	1	Det. Limit	Result D	et. Limit	Result Det.	Limit
Benzene (2)	ND	Ð.30	ND	0.30				
Ethylbenzene (2)	ND	0.30	ND	0.30	1			
Gasoline (2)	ND	50	ND	50				
	ND	0.30	ND	0.30				
Toluene (2)	ND	0.50	ND	0.50	1	0000000000		
	ND	0.50	ND	0.50	_l			
Toluene (2) Xylenes (total) (2)			<u> ND</u>	A.T.T. A.Y.C.				
Toluene (2)			ND	A.T.T. A.Y.C.				
Toluene (2) Xylenes (total) (2)	ed detection li	mit				andix & in	this conort	

Page: 5

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Sample History

Page:6

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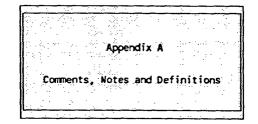
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Geoscience Consultants,Ltd. Radian Work Order: S0-03-244

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	Sampte Ide	entifications a	na vates		
Sample 1D	9 003271300	900328095 0	9003281130	9003281215	REAGENT BLANK
Date Sampled	03/27/90	03/27/90	03/27/90	03/27/90	
Date Received	03/30/90	03/30/90	03/30/90	03/30/90	03/30/90
Natrix	water	water	water	water	water
	01	02	03	04	05
IPH-Diesel by mod. SW8015					
Prepared	04/01/90	04/01/90	04/01/90	04/01/90	04/01/90
Analyzed	04/09/90	04/09/90	04/09/90	04/09/90	04/09/90
Analyst	JM	ML	ML	JM	ML
File ID	820040917	82004097 /	82004098	820040916	82004094
Blank ID	82004094	82004094	82004094	82004094	
Instrument	8	8	8	8	8
Report as	received	received	received	received	received
TPH-Gasoline by mod. <u>SW801</u> 5		1			
Prepared					
Analyzed	04/02/90	04/01/90	04/01/90	04/01/90	04/01/90
Analyst	BSJ	BSJ	BSJ	BSJ	BSJ
File ID	A20040213	A20040116'	A20040117 1	A20040118	A2004011
Blank ID	A2004021	A2004011	A2004011	A2004011	
Instrument	A	A	A	Α	A
Report as	received	received	received	received	received
TPH-Gasoline by mod. <u>SW8015</u>					
Prepared			1		1
Analyzed			i		04/02/90
Analyst					BSJ
File ID					A2004021
Blank ID					
Instrument					A
Report as					received





Geoscience Consultants,Ltd. Radian Work Order: S0-03-244

a ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

C ORGANIC CLP

pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS.

OTHER ORGANIC METHODS

This analysis has been confirmed on a second column or by GC/MS. EXPLANATION

Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.



Geoscience Consultants,Ltd. Radian Work Order: S0-03-244

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/ digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion);liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/H3	micrograms per cubic meter; air samples
ng/L	milligrams per liter (parts per million);liquids/water
ng/kg	milligrams per kilogram (parts per million);soils/solids
*	percent; usually used for percent recovery of QC standards
បន/គោ	conductance unit; microSiemans/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

Notes and Definitions

Chain of Custody		NICS	(8) 214 499904 23327944 200057 820057 8211 3211 3211	111LC		1					2. RELINQUISHED BY 3.		(Time) (Signature) (Time)	(Date) (Printed Name) (Date)	(Company)	2. RECEIVED BY (LABORATORY) 1	N	(Company)	WHITE, CANARY - LABORATORY • PINK - GEOSCIENCE CONSULTANTS, LTD.
	A DAMA REQUEST		VT2 (13) BILA DOI BILA DOI BIED 8016 OFENM	8739 8078 1004 1008	XX	Х X			-		RELINQUISHED BY	22 a the Lad	(Elgrianski)	(Printed Name)	(Company)	RECEIVED BY	Logistical Contraction	(Company)	VHITE, CANARY - LABORA'
Beach Cruces Street P.C. Las Cruces Breet, CA 22660 (200) 124-8204		IIC	NUCLES MATIC 61 DOLS, SUB DOLS, SUB DOLS, SUB MATIC VO	ARON 604/8 4804 602/8 501/8 500/80000000000					3		RELINQUISHED BY 1.	- Nee	DAVID NEE 1500	14/82/80		RECEIVED BY UD401.	-12- A2-5-	(Company)	APR 2 n 1990 distribution: w
2001 2001 2001 2001 2001 2001 2001 2001			ICIDE2\6C 2\ 634\83 11FE CINE 2\ 632\83	BEST		N	2		 :			TAINERS			201				RECEIVED A
Ce Consultants, Ltd. Ue Silver Spring 8. W. Buile 706 NM 87102 Silver Spring 81.	ANA	old Piader Wile Arn to, CA 9582-		MATRIX LOCATION	H-O MMS			 ·		 •	ON ************************************	TOTAL NO. OF CONTAINERS	CHAIN OF CUSTODY SEALS		LAB NO.	50-03		ر) ٥ / ٧	ID# 6211B69591
Geoscience Co IV Albuquerque 600 Copper N.W. Bulte 200 Albuquerque, NM 87102 (506) 842-0001		ADDRESS 10395 010 SACEAMEN 40	SAMPLERS (SIGNATURE)	SAMPLE NUMBER	9003271300						PROJECT INFORMATION	PROJECT: PHILLIPS	PROJECT DIRECTOR NU A FF	CHARGE CODE NO. 349-000	SHIPPING ID. NO. / UC / OLO	VIA: 4ED.X			New Shipping ID

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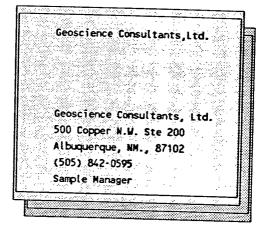


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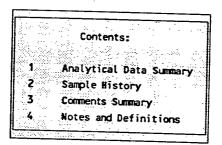
Radian Work Order S0-04-077

RECEIVED APR 2 7 1990

Analytical Report 04/26/90



Customer Work Identification TPH COC:3460 Purchase Order Number



Radian Analytical Services 10395 Old Placerville Road Sacramento, CA 95827

916-362-5332

Client Services Coordinator: LWKELLY

Certified by: Sharon K. Parson

Analytical Data Summary

Page: 2

Geoscience Consultants,Ltd. Radian Work Order: S0-04-077

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Method:TPH-Diesel by mod. Sw List:Complete analyte list Sample ID:		REAG	ENT BLANK			
Factor: Results in:	9.5 ug/L	1 ug/L				
Matrix:	01A Water	04A Water	•			
Diesel (2) Jet fuel (2) Kerosene (2) Lubricating oil (2)	Result Det. Limit <u>9500 G</u> 480 ND 950 ND 950 ND 950	Result ND ND ND ND	Det. Limit 50 100 100 100			
G Indicates an estimated GC v		ces.	ND Not detect	ed at specified d	· · · ·	
 For a detailed descriptio Extraction By SW3520 (con SW3550 (sonication) follo detectors. 	(indone ridnig/ridnig)	OF	this report re	fer to Appendix A	in this report.	

Analytical Data Summary

Page: 3

Geoscience Consultants,Ltd. Radian Work Order: S0-04-077

Sample ID:	9004061130	9004061135	TRIP BLANK	REAGENT BLANK
Factor:	200			ning Selation of the second second second second second second second second second second second second second secon
Results in:	ug/L	ug/L	Ug/L	ug/L
	018	02A	03A	04A
Matrîx:	water	water	water	water
Benzene (2)	Result Det.Limit <u>18000 C</u> 60	Result Det. Limit <u>1.5 C</u> 0.30	Result Det. Limit ND 0.30	Result Det.Limit ND D.30
Benzene (2) Ethylbenzene (2)	9100100000	5000000000	2000.000000	200120000000
Ethylbenzene (2)	<u>18000 c</u> 60	<u>1.5 c</u> 0.30	ND 0.30	ND 0.30
•••	<u>18000 C</u> 60 <u>830 C</u> 60	<u>1.5 C</u> 0.30 <u>1.8 C</u> 0.30	ND 0.30 ND 0.30	ND 0.30 ND 0.30

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

(2) Sw5030 (purge & trap) followed by GC analysis with PID/ FID detectors.



Analytical Data Summary

Page: 4

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Geoscience Consultants,Ltd. Radian Work Order: S0-04-077

Method:TPH-Gasoline by mod List:Gasoline and BTEX l Sample 1D:				
Factor: Results in:	1 ug/L 048			
Matrix:	water			
	Result Det. Limit	Result Det. Limit	Result Det. Limit	Result Det. Limit
Benzene (2)	ND 0.30 ND 0.30			
Ethylbenzene (2) Gasoline (2)	ND 58			1
Toluene (2)	ND 0.30			
Xylenes (total) (2)	ND 0.50			
	ed detection limit stion of flags and technica followed by GC analysis wi	(4) 111 (20) 111		this report.

Sample History

Page:5

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Geoscience Consultants,Ltd. Radian Work Order: \$0-04-077

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	Sample 1der	ntifications and	Dates		
Sample 1D	9004061130	9004061135	TRIP BLANK	REAGENT BLANK	
Date Sampled Date Received Matrix	04/06/90 04/07/90 water 01	04/06/90 04/07/90 water 02	04/06/90 04/07/90 water 03	04/07/90 water 04	
TPH-Diesel by mod. SW8015					
Prepared	04/11/90			04/11/90	
Analyzed	04/19/90			04/19/90	
Analyst	ML	[ļ	ML	ļ
File ID	8-2-00419-50'			8-2-00419-42	
Blank ID	8-2-00419-42				
Instrument	8			8	
Report as	received		5	received	
TPH-Gasoline by mod.SW8015					1
Prepared			1		
Analyzed	04/11/90	04/09/90	04/09/90	04/09/90	
Analyst	BSJ	BSJ	BSJ	BSJ	
File ID	A-2-00411-10	A-2-00409-19		A-2-00409-1	
Blank ID	A-2-00411-1	A-2-00409-1	A-2-00409-1		
Instrument	Α	A	A	A	
Report as	received	received	received	received	
TPH-Gasoline by mod.SW8015					
Prepared			1		
Analyzed			1	04/11/90	
Analyst				BSJ	
File ID				A-2-00411-1	
Blank ID					
Instrument				Α	
Report as				received	



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Appendix A Comments, Notes and Definitions

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Geoscience Consultants,Ltd. Radian Work Order: S0-04-077

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General Comments

Sample #9004061130 contains an unidentified mid-boiling hydrocarbon. This was quantitated from a diesel standard and the result reported as an estimated value.

Report Comments and Narrative



Notes and Definitions

Geoscience Consultants,Ltd. Radian Work Order: S0-04-077

 ALL METHODS EXCEPT CLP The results which are less than five times the method specified detection limit. EXPLANATION Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

C ORGANIC CLP

pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS. OTHER ORGANIC METHODS

OTHER ORGANIC METHODS

This analysis has been confirmed on a second column or by GC/MS. $\ensuremath{\mathsf{EXPLANATION}}$

Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.

G ALL ORGANIC GC METHODS EXCEPT CLP

Indicates an estimated GC value due to interferences.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit. EXPLANATION The value to the right of the coupled in the method escalidized

The value to the right of the < symbol is the method specified detection limit for the analyte.



Notes and Definitions

Geoscience Consultants,Ltd. Radian Work Order: S0-04-077

TERMS USED IN THIS REPORT: Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CR0Ls (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/ digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units	- ug/L	micrograms per liter (parts per billion);liquids/water
	ug/kg	micrograms per kilogram (parts per billion); soils/solids
	ug/M3	micrograms per cubic meter; air samples
	mg/L	milligrams per liter (parts per million);liquids/water
	mg/kg	milligrams per kilogram (parts per million);soils/solids
	X	percent; usually used for percent recovery of QC standards
	us/cm	conductance unit; microSiemans/centimeter
	mL/hr	milliliters per hour; rate of settlement of matter in water
	NTU	turbidity unit; nephelometric turbidity unit
	CU	color unit; equal to 1 mg/L of chloroplatinate salt

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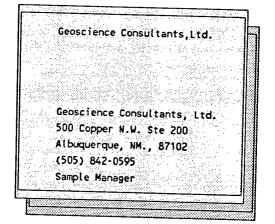


Radian Work Order S0-04-075

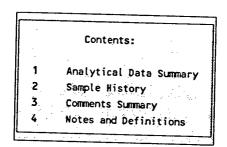
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Analytical Report 04/30/90



Customer Work Identification TPH COC:3461 Purchase Order Number



Radian Analytical Services 10395 Old Placerville Road Sacramento, CA 95827

916-362-5332

Client Services Coordinator: LWKELLY

Certified by: Mand Wale

Analytical Data Summary

Page: 2

Geoscience Consultants,Ltd. Radian Work Order: S0-04-075

Factor:	1	0.95		1
Results in:	ug/L	ug/L	ug/L	ug/L
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latrix:	water	water	water	water
Diesel (2)	Result Det. Limit <u>5600 G</u> 50	Result Det. Limit <u>200 Ga</u> 48	Result Det. Limit <u>240 Ga</u> 50	Result Det.Limit ND 50
Jet fuel (2)	ND 100	ND 95	ND 100	ND 100
(erosene (2)	ND 100	ND 95	ND 100	ND 100
Lubricating oil (2)	ND 100	ND 95	ND 100	ND 100

(2) Extraction By SW3520 (continuous liquid/liquid) or

SW3550 (sonication) followed by GC analysis with FID

detectors.



Analytical Data Summary

Geoscience Consultants,Ltd. Radian Work Order: S0-04-075

List:Gasoline and BTEX (ist in the second second		1979 - F	
Somolo IB:	9004031400		900404140	REAGENT BLANK
Factor: Results in:	2000 1.200 - 1. 1207 (1967) - 2007 - 2007	50 ug/L	10 Ug/L	1 ug/L
reserves int	01B	028	038	04A
a la casa na diné na nata mangénéhé épada na kénéhé				
4atrix:	water	water	water	water
Matrix:	water	water	water	water
Matrix:	water	water Result Det. Limit	water Result Det. Limit	water Result Det. Limit
latrix:	water			
Benzene (2)	water Result Det. Limit	Result Det. Limit	Result Det. Limit	Result Det. Limit
Benzene (2) Ethylbenzene (2)	Result Det. Limit	Result Det. Limit <u>6100 C</u> 35	Result Det. Limit <u>2600 C 3.0</u>	Result Det. Limit ND 0.30
Matrix: Benzene (2) Ethylbenzene (2) Gasoline (2) Toluene (2)	water Result Det. Limit ND D.30 ND D.30	Result Det. Limit <u>6100 C</u> 15 <u>360 C</u> 35	Result Det. Limit <u>2600 c </u> 3.0 <u>320 c </u> 3.0	Result Det. Limit ND 0.30 ND 0.30

ND Not detected at specified detection limit C Confirmed on second column or by GC/MS G Indicates an estimated GC value due to interferences.

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.
 (2) SW5030 (purge & trap) followed by GC analysis with PID/

FID detectors.



Analytical Data Summary

Page: 4

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Geoscience Consultants,Ltd. Radian Work Order: \$0-04-075

actor: lesults in:	1 vg/L				
latrix:	04B water				
Benzene (2)	Result Det.	Limit Resu 1.30	ult Det. Limit	Result Det. Limit	Result Det. Limit
thylbenzene (2) Jasoline (2)	1	.30 0			
Toluene (2)		.30			
(ylenes (total) (2)	ND É	.50			
ND Not detected at specifi	ied detection limit	:	e.		

Sample History

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Geoscience Consultants,Ltd. Radian Work Order: SO-04-075

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			nd Dates		
Sample ID	9004031400	9004031600	900404140	REAGENT BLANK	
Date Sampled	04/04/90	04/04/90	04/04/90		
Date Received	04/06/90	04/06/90	04/06/90	04/06/90	
Matrix	water	water	water	water	
	01	02	03	04	
I-Diesel by mod. SW8015					
Prepared	04/11/90	04/11/90	04/11/90	04/11/90	
Analyzed	04/19/90	04/19/90	04/19/90	04/19/90	
Analyst	JM	JM	JM	JM	
File ID	820041947	820041948	820041949	820041942	
Blank ID	820041942	820041942	820041942	020041742	
Instrument	8	8	8	8	
Report as	received	received	received	received	
-Gasoline by mod.SW8015					
Prepared					
Analyzed	04/08/90	04/09/90	04/09/90	04/08/90	
Analyst	BSJ	BSJ	BSJ	BSJ	
File ID	A20040814/	A20040917*	A20040816 ⁺	A2004081	
Blank ID	A2004081	A2004091	A2004081		
Instrument	A	A	A	A	
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Instrument				A	
Report as				P received	



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Appendix A £., Appendix A Comments, Notes and Definitions

Geoscience Consultants,Ltd. Radian Work Order: S0-04-075 Report Comments and Narrative

Diesel samples #9004031400,9004031600 and 900404140 contain unidentifed midboiling hydrocarbons. These were quanitated on a diesel standard and are reported as estimated values.

BTXE/Gas sample #90040031400 reported as estimate value because the profile did not match the gasoline standard.

Notes and Definitions

Geoscience Consultants,Ltd. Radian Work Order: S0-04-075

ALL METHODS EXCEPT CLP The results which are less than five times the method specified detection limit. EXPLANATION Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

C ORGANIC CLP

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pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS. OTHER ORGANIC METHODS

This analysis has been confirmed on a second column or by GC/MS. EXPLANATION

Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.

G ALL ORGANIC GC METHODS EXCEPT CLP Indicates an estimated GC value due to interferences.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit. EXPLANATION The value to the right of the < symbol is the method specified

detection limit for the analyte.

Geoscience Consultants,Ltd. Radian Work Order: S0-04-075

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

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Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

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micrograms per liter (parts per billion);liquids/water
micrograms per kilogram (parts per billion); soils/solids
micrograms per cubic meter; air samples
milligrams per liter (parts per million); liquids/water
milligrams per kilogram (parts per million);soils/solids
percent: usually used for percent recovery of QC standards
conductance unit; microSiemans/centimeter
milliliters per hour; rate of settlement of matter in water
turbidity unit; nephelometric turbidity unit
color unit; equal to 1 mg/L of chloroplatinate salt

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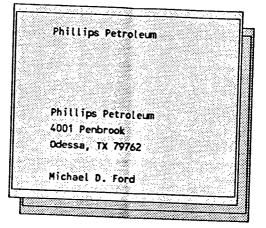


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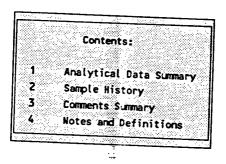
Radian Work Order 90-03-105

Analytical Report 03/16/90



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Customer Work Identification Lee Screen Purchase Order Number



Radian Analytical Services 8501 Mo-Pac Boulevard P. O. Box 201088 Austin, TX 78720-1088

512/454-4797

Client Services Coordinator: LABENDELE

aul lelle-Certified by:



Analytical Data Summary

Page: 2

Phillips Petroleum Radian Work Order: 90-03-105

Factor: Results in: Natrix:	1 ug/L 01A water	1 ug/L 02A water	1 ug/L 03A water	1 Ug/L Q4A water
	Result Det. Límit	Result Det. Limit	Result Det. Limit	Result Det. Limit

Surrogate Recovery(%)1-Bromo-4-fluorobenzene98110102Control Limits: 76 to 140

ND Not detected at specified detection limit * Est. res

* Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.



Analytical Data Summary

Page: 3

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Phillips Petroleum Radian Work Order: 90-03-105

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List:BTEX				
Sample 1D:	vs-2	Trip Blank	Reagent Blank	
Factor:	1	1	1	
Results in:	ug/L	ug/l	ug/L	
	05A	06A	07A	
Mətrix:	water	water	water	
	The second second second second second second second second second second second second second second second se	1	1	<u> </u>
	Result Det. Limit	Result Det. Limit	Result Det. Limit	Result Det. Limit
Benzene	7.1 0.20	ND 0.20	ND 0.20	
Ethylbenzene	ND 0.20	ND 0.20	ND 0.20	
Toluene	0.97 * 0.20	<u>0.27 *</u> 0.20	ND 0.20	
Total xylenes	ND 0.20	ND 0.20	ND 0.20	
Surrogate Recovery(%)				
1-Bromo-4-fluorobenzene	98	96	105	
Control Limits: 76 to 140				
Control Limits: 76 to 140	L	1	1	
ND Not detected at specified o	letection limit	* Est. resu	It less than 5 times de	ection limit
NU NOT DETECTED AT SPECIFIED C		- Est. resu	it less than 5 times det	ection limit

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Sample History

Page:4

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Phillips Petroleum Radian Work Order: 90-03-105

	Sample Id	Bentifications	and Dates			
Sample ID	NU-1	MU-2	NJ-3	¥s-1	WS-2	Trip Blank
Date Sampled	03/07/90	03/07/90	03/07/90	03/07/90	03/07/90	
Date Received	03/09/90	03/09/90	03/09/90	03/09/90	03/09/90	03/09/90
Matrix	water	water	water	water	water	water
	01	02	03	04	05	06
tile aromatics		<u></u>				i i i ili ili anto polo inclui
Prepared						1
Analyzed	03/15/90	03/12/90	03/15/90	03/15/90	03/15/90	03/15/90
Analyst	ВМ	BM	BM	BM	BM	BM
File ID	dd031517	dd03129	dd031516	dd031518	dd031515	dd031519
Blank ID						
Instrument	d	d	d	d	d	d
	received	received	received	received	received	received

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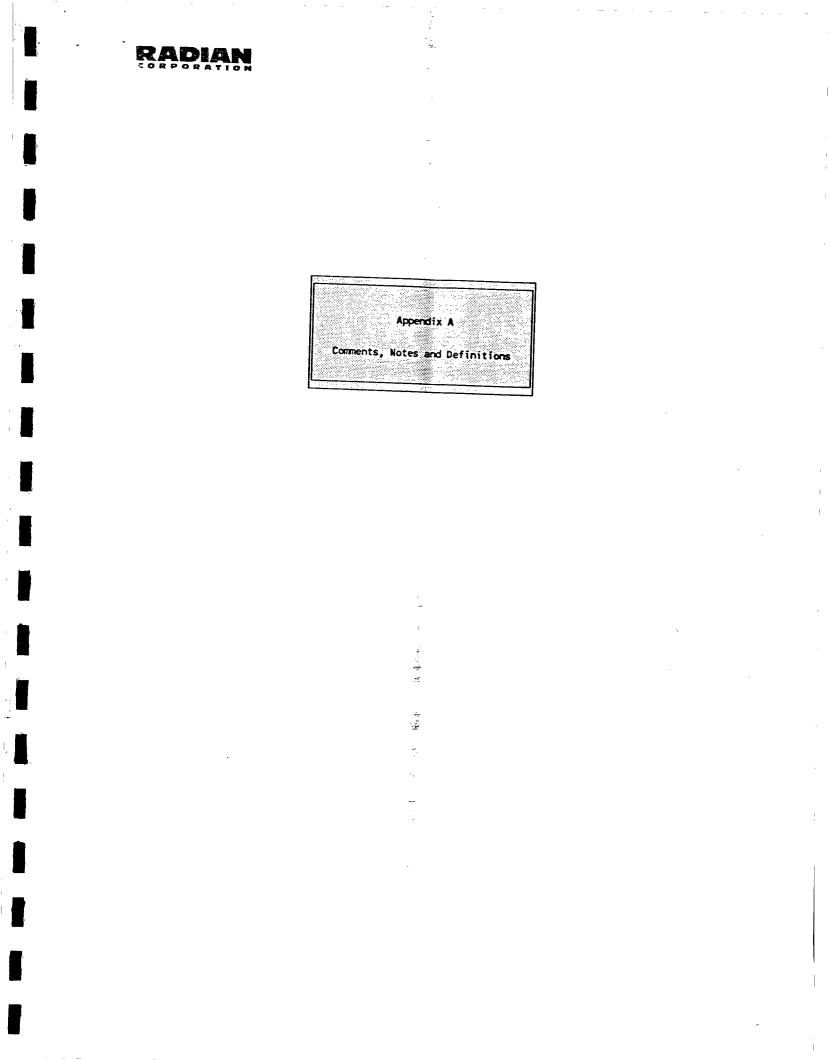
Sample History

Page:5

i.

Phillips Petroleum Radian Work Order: 90-03-105

	Sample Identifications and Dates	
Sample 1D	Reagent Blank	
Date Sampled		
Date Received Matrix	03/09/90 Water 07	
atile aromatics		
Prepared		<u></u>
Analyzed	03/15/90	
Analyst	JB	
File ID	dd03155	
Blank ID		
Instrument	d l	
Report as	received	





Phillips Petroleum Radian Work Order: 90-03-105

> General Comments N-xylene and chlorobenzene coelute.

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Page: A-2



Notes and Definitions

Phillips Petroleum Radian Work Order: 90-03-105

- ND This flag (or <) is used to denote analytes which are not detected at or above the specified detection limit. The value to the right of the < symbol is the method specified detection limit for the sample.
- * The asterisk(*) is used to flag results which are less than five times the method specified detection limit. Studies have shown that the uncertainty of the analysis will increase exponentially as the method detection limit is approached. These results should be considered approximate.

Page: A-3



Phillips Petroleum Radian Work Order: 90-03-105

Notes and Definitions

TERMS USED IN THIS REPORT: Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

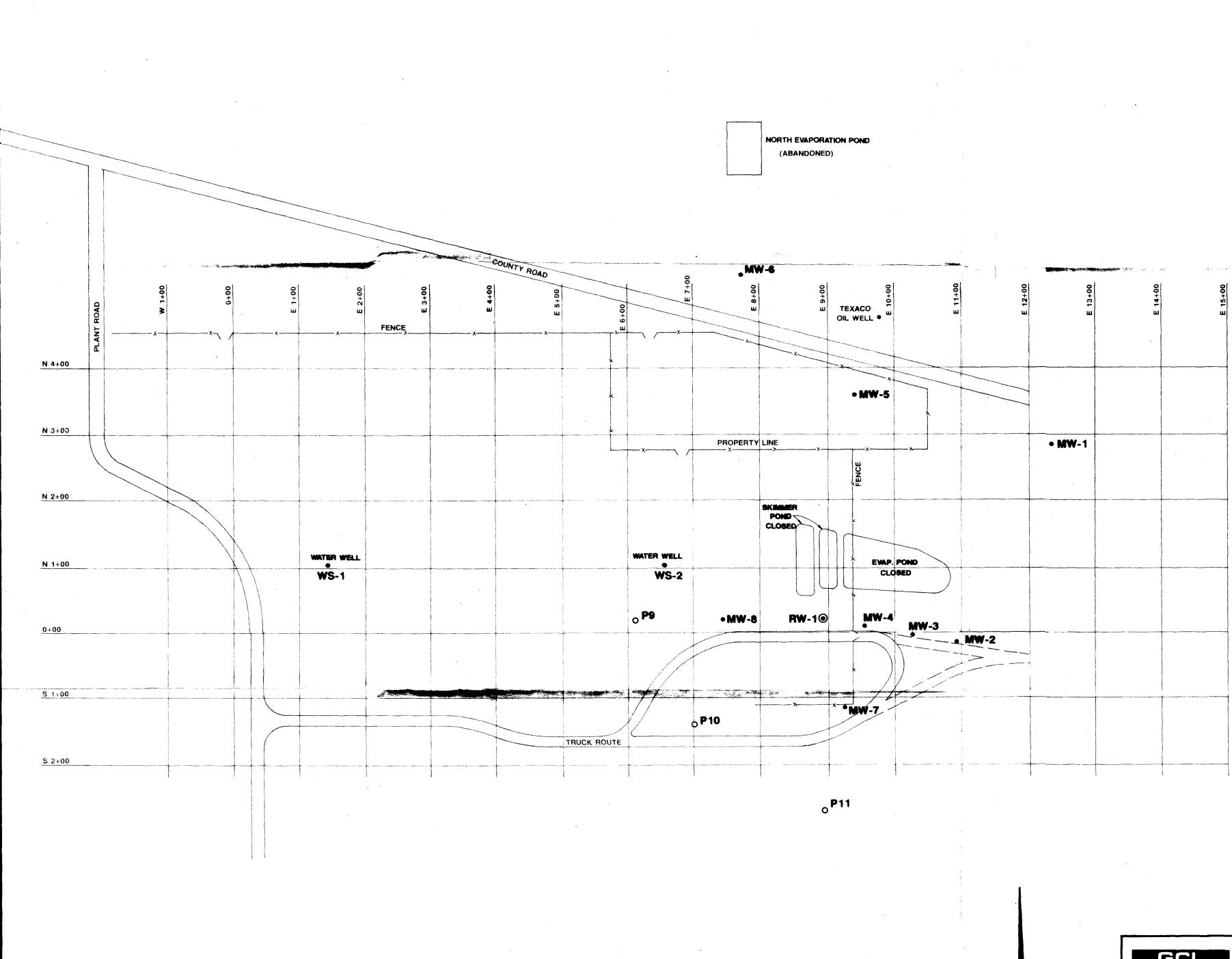
Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), use of cleanup procedures, or dilution of extracts/ digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion);liquids/water
Ug/Kg	Bicrograms per kilonnen (
ug/N3	micrograms per kilogram (parts per billion); soils/solids
	micrograms per cubic meter; air samples
Rg/L	milligrams per liter (parts per million);liquids/water
ng/Kg	milligrams per kilogram (parts per million);soils/solids
*	percent; usually used for percent recovery of or standards
u\$/cm	conductance unit; microSiemans/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	Curbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt
A 12 2 10 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	

Page: A-4



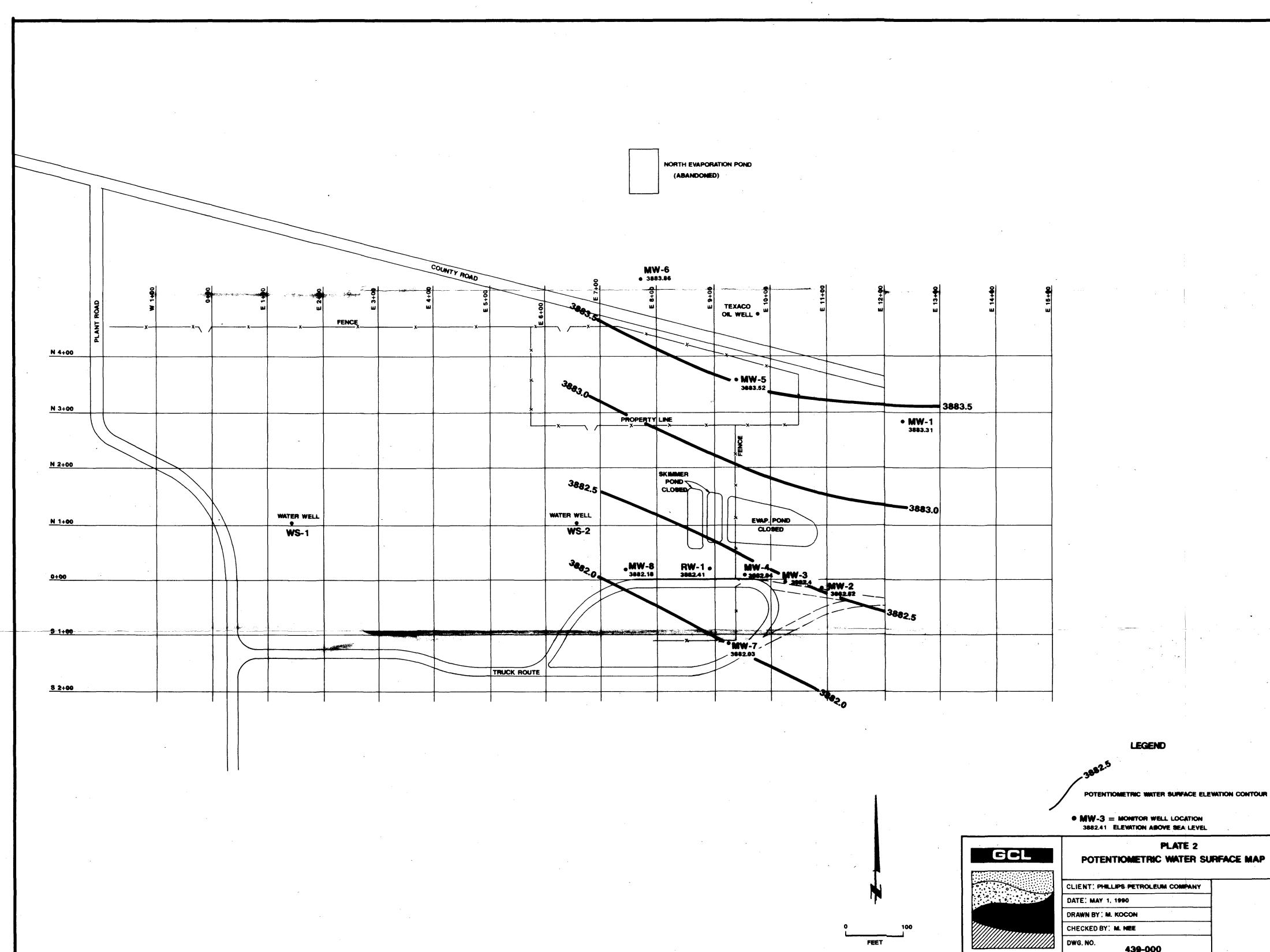
REPRODUCTION OF DOCUMENTS IN THIS FILE CANNOT BE IMPROVED DUE TO CONDITION OF ORIGINALS

FEET

- LEGEND
- MONITOR WELL
- RECOVERY WELL \odot
- 0 PROPOSED MONITOR WELL

PLATE 1 GCL MONITOR WELL LOCATION MAP LEE PLANT CLIENT: PHILLIPS PETROLEUM COMPANY DATE: MAY 1, 1990 . DRAWN BY ; M. KOCON CHECKED BY: M. NEE DWG. NO.

439-000



LEGEND

POTENTIONETRIC WATER SUNFACE ELEVATION CONTOUR

PLATE 2

• MW-3 = MONITOR WELL LOCATION 3882.41 ELEVATION ABOVE SEA LEVEL

CLIENT: PHILLIPS PETROLEUM COMPANY DATE: MAY 1, 1990 DRAWN BY ; M. KOCON

CHECKED BY: M. NEE

439-000

PHILLIPS PETROLEUM COMPANY

BARTLESVILLE, OKLAHOMA 74004

- 130 HAY 18 AM 8 47

QUALITY, ENVIRONMENT AND SAFETY

May 16, 1990

Requested Information Groundwater Remediation Action Lee Gasoline Plant Discharge Plan No. GWR-2

REGISTERED MAIL RETURN RECEIPT NO. P-06

Mr. William C. Olson New Mexico Oil Conservation Division P. O. Box 2088 Santa Fe, New Mexico 87504

Dear Mr. Olson:

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We received your letters containing requirements and requesting additional information regarding the groundwater remediation action at our Lee Plant. A list of the items contained in your letters with our responses follows:

- 1. Water levels must be measured prior to all samplings to determine hydraulic gradient.
- Response: Water levels have been measured in the monitor wells prior to each sampling event. Attachment 1 contains a table which shows the water elevation data to date. Water level data for the additional monitoring/recovery wells recently installed will be provided in the technical report.
- 2. A plot plan is to be submitted that includes the monitor well locations, and that includes the evaporation pond and other topographic features immediately north of the plant.
- Response: A plot plan which shows the above mentioned features has been provided to your office. This plot plan will be updated to show the location of the additional monitoring/recovery wells recently installed. The updated plot plan will be provided in the technical report detailing installation of the additional wells.
- 3. Plant water well #2 is to be sampled after purging sufficient water to obtain a representative aquifer sample. Information as to depth, construction details, screen placement, etc., shall be provided in the May 30th technical report.
- Response: Plant water well #2 was purged of 3 casing volumes of water and sampled on 3/7/90. Samples were analyzed for benzene, ethylbenzene, toluene and total xylenes. The results of these samples are contained in Attachment 2. It should be noted the existing monitor wells and plant water well #1 were also sampled at this time for the same constituents. These analyses are also contained in Attachment 2.

Plant water well #2 was installed in 1944. The drillers log for this well indicates caliche from the surface to a depth of 24 feet and sand from a depth of 24 feet to the total depth of the well (147 feet). The total depth of the well at the time of the recent sampling was measured at 140 feet. Depth to water was 97.5 feet. The well is constructed of 8" steel casing. There was no information available in our files regarding the wells screened length or screened interval.

- 4. Analysis results from sampling of the plant water wells from November, 1988, to the present shall be provided to the OCD.
- Response: All analyses from sampling of the plant water wells from November, 1988, to the present are contained in Attachment 3.
- 5. Please provide the OCD a copy of the following documents that were produced pursuant to investigations that Phillips performed as required by the New Mexico Environmental Improvement Division (NMEID):
 - A. July 24, 1984, "Report of Samples Taken at Phillips Lee".
 - B. July 24, 1984, "Geology Report".
 - C. July 30, 1984, "Chemical and Physical Analyses for Water Samples".
 - D. The results of the September 1988 Soil Vapor Survey.
- Response: The information contained in the above named documents is available in the Closure & Post-Closure Plan Sampling & Analysis Report submitted to the NMEID for this facility. A copy of this report is found in Attachment 4. A copy of the September 1988 Soil Vapor Survey report is found in Attachment 5.
- 6. Please provide the OCD with any documentation of the presence of free-phase hydrocarbons in the saturated zone underlying the facility. The work plan states on page 1 that "the results of the initial investigation indicated that both free-phase and dissolved phase hydrocarbons occurred in the saturated zone beneath the site". Although OCD files contain the results of water quality analyses showing the presence of dissolved phase hydrocarbons in groundwater samples from Phillips monitor wells, no documentation can be found regarding the presence of free-phase hydrocarbons.
- Response: During the drilling of the second set of monitor wells required by the NMEID, we discovered some free-phase hydrocarbon material in what was to be the upgradient well. We secured a sample of this hydrocarbon material for analysis and then plugged the well since it could not be used for upgradient monitoring purposes. Mr. Dave Boyer of your office was then notified in a letter dated August 11, 1988 of a discharge of hydrocarbon material to the uppermost aquifer at Lee Plant. A copy of the analysis of this hydrocarbon material is found in Attachment 6.

Free-phase hydrocarbon material was also discovered in the No. 4 monitoring well at the site during sampling conducted on 3/7/90. Mr. Roger Anderson of your office was notified by phone the same date of this problem. Analysis of the hydrocarbon material from the No. 4 monitoring well is found in Attachment 7.

- 7. Please provide the OCD with documentation about the modified EPA Method 8015 analytical technique.
- Response: Documentation regarding the modified EPA Method 8015 analytical technique will be provided in the technical report.

We appreciate your cooperation in this matter. If you should have any questions regarding this information, please contact me at (918) 661-0478.

Very truly yours,

Michael D. Ford

Michael D. Ford Environmental Scientist

MDF: LEEGWREM

Attachments

cc: Mr. Mike Selke - GCL, Albuquerque

ATTACHMENT 1

Groundwater Monitor Wells

Static Water Levels

Plant LEE

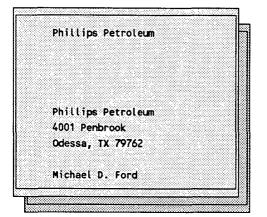
monitor well							1
Number Even to too	MW-1	MW-Z	MW-3	MW-4		·	<u> </u>
erev. to top of casing (2")	3979.27	3980.59	3980.37	3980.29			
8/29/58	3884,69	3883,77	3883.75	3883.75			
10/31/88	3774,43	3873,57	3283,56	3893,57			
1/30/89	3885.24	3883.52	3883,50	3883,51			
3/7/90	3883.49	3882.81	3882,79	3283,72			
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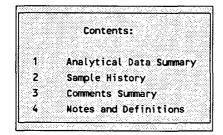
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Radian Work Order 90-03-105

Analytical Report 03/16/90



Customer Work Identification Lee Screen Purchase Order Number



Radian Analytical Services 8501 Mo-Pac Boulevard P. O. Box 201088 Austin, TX 78720-1088

512/454-4797

Client Services Coordinator: LABENDELE

Kinullelle Certified by:



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List:BTEX Sample ID:	NU-1	MW-2	MW-3	DW - 1 HS- 1
	rw (FIN C	FW-3	40- 1
Factor:	1	1	1	1
Results in:	ug/L	ug/L	ug/L	ug/L
	01A	02A	03A	04A
Matrix:	water	water	water	Water
				<u>internet de la della de la della de la della de la della della della della della della della della della della</u>
	Result Det. Limit	Result Det. Limit	Result Det. Limit	Result Det. Limit
Benzene	<u>4.1</u> 0.20	ND 8.20	<u>69</u> 0.20	<u>15</u> 0.20
Ethylbenzene	ND 0.20	ND 0.20	<u>1.9</u> 0.20	<u>4.3</u> 0.20
Toluene	0.26 * 0.20	ND 0.20	<u>1.4</u> 0.20	<u>1.8</u> 0.20
Total xylenes	ND 0.20	ND 0.20	<u>1.1</u> 9.20	<u>4.1</u> 0.20
Surrogate Recovery(%)				
1-Bromo-4-fluorobenzene	98	110	102	104
Control Limits: 76 to 140				
	<u></u>			- Lader var raderer der bezugspäckens bedage uppgart. Ar Bezugster auf der Bezugster var Beitracht uppgart.
ND Not detected at specified o	detection limit	* Est. resul	t less than 5 times de	tection limit



Analytical Data Summary

Page: 3

Phillips Petroleum Radian Work Order: 90-03-105

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Sample ID:	DW-2 16-2	Trip Blank	Reagent Blank	
actor:	1	1	1	
lesults in:	ug/L 05A	ug/L 06A	ug/L 07A	
latrix:	Water	water	Water	······
	Result Det. Limit	Result Det. Limit	Result Det. Limit	Result Det. Limit
Senzene	<u>7.1</u> 0.20	ND 0.20	ND 0.20	
thylbenzene	ND 0.20	ND 0.20	ND 0.20	
Toluene	<u>0.97 *</u> 0.20	<u>0.27 *</u> 0.20	ND 0.20	
iotal xylenes	ND 0.20	ND 0.20	ND 0.20	
Surrogate Recovery(%)				
I-Bromo-4-fluorobenzene	98	96	105	
Control Limits: 76 to 140			, <u></u> ,	
D Not detected at specified c	letection limit	* Est. resu	lt less than 5 times de	tection limit



Sample History

Page:4

Phillips Petroleum Radian Work Order: 90-03-105

	Sample I	dentifications	and Dates			
Sample 1D	MW-1	MW-2	MN-3	DW-1 46-1	DW-2 W5-2	Trip Blank
Date Sampled Date Received Matrix	03/07/90 03/09/90 Water 01	03/07/90 03/09/90 water 02	03/07/90 03/09/90 water 03	03/07/90 03/09/90 water 04	03/07/90 03/09/90 water 05	03/09/90 Water 06
atile aromatics Prepared Analyzed Analyst File ID Blank ID	03/15/90 BM dd031517	03/12/90 BM dd03129	03/15/90 BM dd031516	03/15/90 BM dd031518	03/15/90 BM dd031515	03/15/90 BM dd031519
Instrument Report as	d received	d received	d received	d received	d received	d received



Sample History

Page:5

Phillips Petroleum Radian Work Order: 90-03-105

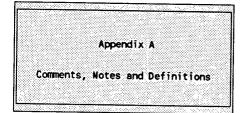
	Sample I	entifications	and Dates			
Sample ID	Reagent Bla	k				
Date Sampled Date Received Matrix	03/09/90 water 07					
latile aromatics						<u></u>
Prepared						
Analyzed	03/15/90					
Analyst	JB					
File ID	dd03155					
Blank ID						
1	d					
Instrument				1	1	



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Phillips Petroleum Radian Work Order: 90-03-105

> General Comments M-xylene and chlorobenzene coelute.

Report Comments and Narrative

Page: A-2



Notes and Definitions

- ND This flag (or <) is used to denote analytes which are not detected at or above the specified detection limit. The value to the right of the < symbol is the method specified detection limit for the sample.
- * The asterisk(*) is used to flag results which are less than five times the method specified detection limit. Studies have shown that the uncertainty of the analysis will increase exponentially as the method detection limit is approached. These results should be considered approximate.

Notes and Definitions

Phillips Petroleum Radian Work Order: 90-03-105

> TERMS USED IN THIS REPORT: Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

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Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L micrograms per liter (parts per billion);liquids/water
ug/Kg micrograms per kilogram (parts per billion); soils/solids
ug/M3 micrograms per cubic meter; air samples
mg/L milligrams per liter (parts per million);liquids/water
mg/Kg milligrams per kilogram (parts per million);soils/solids
<pre>% percent; usually used for percent recovery of QC standards</pre>
uS/cm conductance unit; microSiemans/centimeter
mL/hr milliliters per hour; rate of settlement of matter in water
NTU turbidity unit; nephelometric turbidity unit
CU color unit; equal to 1 mg/L of chloroplatinate salt

	ATTACHMENT 3	
Page 1	RAS ~ Austin REPORT Work Order # 89-06-148	
Received: 06/15/89		
REPORT Phillips Petroleum	PREPARED Radian Analytical Services	J
TO Radian	BY 8501 Mo-pac B1.	/ ;
B1.1	Box 201088	~
Austin	Austin, TX 78720-1088 CERTIFIED BY	1
ATTEN Linda Bendele	ATTEN	
	PHONE 512-454-4797 CONTACT LABENDELE	
CLIENT PHILLIPS P SAM	SAMPLES 5	
COMPANY Phillips Petroleum		
FACILITY <u>Odessa, TX</u>	P-xylene and chlorobenzene coelute.	
WORK ID BTEX		
TRANS UPS		
ТҮРЕ		
INVOICE <u>under separate cover</u>		
SAMPLE IDENTIFICATION	TEST CODES and NAMES used on this report	
	802SWN00 Halogenated aromatics	
05 reagent blank		

ATTACHMENT 3

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Page 2 Received: 06/15/89 SAMPLE ID DW-1 OR WS-1 Instrument Matrix Analyst BM I 6 Date Prepared File ID Date Analyzed 06/15/89 Blank ID Date Prepared RAS - Austin Date & Time Collected 06/13/89 FRACTION 01A Results by Sample TEST CODE <u>802SWN00</u> NAME <u>Halogenated aromatics (1)</u> REPORT 5 LIST . I ļ Work Order # 89-06-148 Units ug/L VER dmv Category _

	1330-20-7	108-88-3	100-41-4	106-46-7	541-73-1	95-50-1	108-90-7	71-43-2	Alt ID	Matrix
Surrogates	Total xylenes	Toluene	Ethylbenzene	1,4-Dichlorobenzene	1,3-Dichlorobenzene	1,2-Dichlorobenzene	Chlorobenzene	Benzene	ANALYTE	vater Factor
% Recovery	1.0	1.1	1.1	<0.30	<0.40	<0.40	<0.20	15	E Result	
Surrogate Limits	0.20	0.20	0.20	0.30	0.40	0.40	0.20	0.20	Det Lim	<u>1</u> Report as
limits			1		1	 			Factor	received

(1) See Appendix A for glossary of report and data flag definitions

1-Bromo-4-fluorobenzene

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76 - 140

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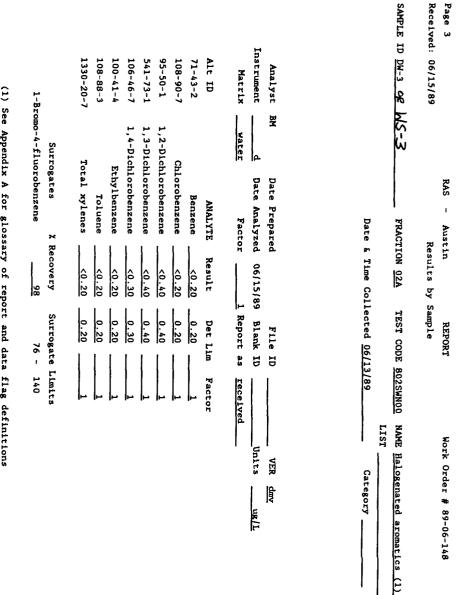
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(1) See Appendix A for glossary of report and data flag definitions

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SAMPLE ID DW-4 OR WS-4 Received: 06/15/89 Page 4 RAS - Austin Results by Sample REPORT Work Order # 89-06-148

1

FRACTION 03A TEST CODE 802SWN00 NAME Halogenated aromatics (1) LIST

Date & Time Collected 06/13/89 Category ___

	1330-20-7	108-88-3	100-41-4	106-46-7	541-73-1	95-50-1	108-90-7	71-43-2	Alt ID	Matrix .
Surrogates	Total xylenes	Toluene	Ethylbenzene	1,4-Dichlorobenzene	1,3-Dichlorobenzene	1,2-Dichlorobenzene	Chlorobenzene	Benzene	ANALYTE	vater Fa
X R	دن ۱	6 1	б I	6 1	10 1	ดั เ	i I	б 1	TE	Factor
% Recovery	<0.20	<0.20	<0.20	<0.30	<0.40	<0.40	<0.20	19	Result	
Surrogate Limits	<0.20 0.20	0.20	0.20	0.30	0.40	0.40	0.20	0.20	Det Lim	<u>1</u> Report as
Limits			_	1		1	1	1	Factor	received

Instrument ____ Analyst BM

a.

Date Prepared File ID Date Analyzed 06/15/89 Blank ID

Units ug/L VER dany

(1) See Appendix A for glossary of report and data flag definitions

1-Bromo-4-fluorobenzene

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76 - 140

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ORGANIC ANALYS	RATORY DIVISION DSS IS REQUEST FORM Wey - Phone: 841-2570
	88-1935- C
REPORT TO: MIKE FORD	S.L.D. No. OR
PHILLIPS PETROLEUM C	
4001 PENBROOK ROOM	443 PRIORITY
* ODESSA , TX. 7976	2 PHONE(S): (915) 367-1316
COLLECTION CITY: PHILLIPS PETROLEUM BUC	KEYE PLANT ; COUNTY: LEA
COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-	Minute) [8]8]1]1[1]5]1]1]15]
LOCATION CODE: (Township-Range-Section-Tracts)	$\frac{15+3151E+310+1}{10006E24342}$
USER CODE: 62000 SUBMITTER:	M. WEBER CODE:
SAMPLE TYPE: WATER LY, SOIL LI, FOOD LI, OT	IER:
This form accompanies Septum Vials, Glass	Jugs. and/or
Samples were preserved as follows:	
NP: No Preservation; Sample stored at room	•
P-Ice Sample stored in an ice bath (Not Froze P-AA Sample Preserved with Ascorbic Acid to	
P-HCl Sample Preserved with Hydrochloric Acid	
ANALYSES REQUESTED: Please check the appropriate box	
required. Whenever possible list specific compounds suspecte	· · · · · · · · · · · · · · · · · · ·
PURGEABLE SCREENS	EXTRACTABLE SCREENS
[753] Aliphatic Headspace (1-5 Carbons) [754] Aromatic & Halogenated Purgeables	(751) Aliphatic Hydrocarbons (755) Base/Neutral Extractables
(134) Flomatic a Malogenated Furgeables	[] (758) Herbicides, Chlorophenoxy acid
(766) Trihalomethanes	(759) Herbicides, Triazines
(774) SDWA VOC's I (8 Regulated +)	(760) Organochlorine Pesticides
(775) SDWA VOC's II (EDB & DBCP)	(761) Organophosphate Pesticides
Other Specific Compounds or Classes	(767) Polychlorinated Biphenyls (PCB's)
	(764) Polynuclear Aromatic Hydrocarbons
	(762) SDWA Pesticides & Herbicides
Remarks: BENZENE SUSPECTED	
* BILL PHILLIPS - CC: RES	ULTS TO ROSWELL EID
FIELD DATA:	
pH=; Conductivity=umho/cm at°C	; Chlorine Residual=mg/l
Dissolved Oxygen=mg/l; Alkalinity=mg/l; Fl	ow Rate
Depth to waterft.; Depth of wellft.; Perfor	
Sampling Location, Methods and Remarks (i.e. odors, etc.)	WS-1
	1 # 1 SAMPLE TAKEN
I certify that the results in this block accurately reflect th activities.(signature collector):	e results of my field analyses, observations and Method of Shipment to the Lab: UPS
CHAIN OF CUSTODY	
I certify that this sample was transferred from	to
at (location)	on/; and that
the statements in this block are correct. Evidentiary Seals:	Not Sealed OR Seals Intact: Yes No
Signatures	

ANALYSES PERFORMED

LAB. No .: Un 1935

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

						Carbons)
	(754)	Aromatic	ł.	Halogen	ated	Purgeables
-						

- (765) Mass Spectrometer Purgeables
- (766) Trihalomethanes
- (774) SDWA VOC's I (8 Regulated +)
- (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

EXTRACTABLE SCREENS

- (751) Aliphatic Hydrocarbons
- (755) Base/Neutral Extractables
- (758) Herbicides, Chlorophenoxy acid
- (759) Herbicides, Triazines
- (760) Organochlorine Pesticides
- (761) Organophosphate Pesticides
- (767) Polychlorinated Biphenyls (PCB's)
- (764) Polynuclear Aromatic Hydrocarbons
- (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC.
BASE / MEUTOALS			
GASOLINE MOL = 150	NO 4250		
Keruseur MDC = 250 _	NO 5 250		
Diesel MOL = 250	NO 6250		
huis oil 476 - 2500	1 1		
PNAO NOC = 5	WPL5	-	
other insurause BIN'S MOL- 5	LOL 5		
PC3'2 MOL = 1000_	WIDE 1000		
Childredanie HIDL = 1000	100 L 1000		
• DETECTION LIMIT • 🗡		+ DETECTION LIMIT + +	
[RESULTS IN BRACKETS] ARE UNCON A	•		
BORATORY REMARKS:	<u></u>	·	
			·····
CERTIFICA	TE OF ANALY	TICAL PERSONNEL	
it the statements on this page accurately reflect (ires on handling the analytical re	and analysis of this sample unless otherwise note sults for this sample.	d and
te(s) of analysis: 11/20185. Analyst's si	gnature: (b)	Currules	
ertify that I have reviewed and concur with the viewers signature: <u>Kminger her</u>	analytical resul	ts for this sample and with the statements in this	block.

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- I II - II - II - II - II - II - II -	SCIENTIFIC LABORATC ORGANIC ANALYSIS REC Organic Section - Phone	QUEST FORM LAPY
P	MIKE FORD PHILLIPS PETROLEUM CO.	88-1938-C S.L.D. No. OR DATE REC/22/88
	1001 PENBROOK, ROOM 443 DDE55A, TX. 79762	PRIORITY PHONE(S): (915) 367-1316
COLLECTION CITY: _	PHILLIPS PETROLEUM BUCKEYE	
COLLECTION DATE/T	'EME CODE: (Year-Month-Day-Hour-Minute)	8181111151111131
	ownship-Range-Section-Tracts) 11715+	
	000 SUBMITTER: M. WE	
SAMPLE TYPE: WAT	er 🔄, soil 📋, food 📋, other:	
Samples were preserved		
	reservation; Sample stored at room temperatur le store i in an ice bath (Not Frozen).	re. ,
	le Preserved with Ascorbic Acid to remove c	hlorine residual.
P-HCI Samp	ols Preserved with Hydrochloric Acid (2 drops	s/40 ml)
	D: Please check the appropriate box(es) below	
	sible list specific compounds suspected or requ FABLE SCREENS	
	adspace (1-5 Carbons)	EXTRACTABLE SCREENS (751) Aliphatic Hydrocarbons
	Halogenated Purgeables	[] (755) Base/Neutral Extractables
[] (785) Mass Spectron	meter Purgeables	(758) Herbicides, Chlorophenoxy acid
(766) Trihalomethan	•	(759) Herbicides, Triazines
	s I (8 Regulated +)	[(760) Organochlorine Pesticides
	II (EDB & DBCP)	[_] (761) Organophosphate Pesticides
	c Compounds or Classes	[_] (767) Polychlorinated Biphenyls (PCB's) [_] (764) Polynuclear Aromatic Hydrocarbons
		[] (762) SDWA Pesticides & Herbicides
Remarks: BENZENE	E SUSPECTED	
BILL P	HILLIPS - CC: ROSWELL EID ON	RESULTS
FIELD DATA:		
pH=; Conductivi	ty=umho/cm atC; Chlorine	Residual=mg/l
	mg/l; Alkalinity=mg/l; Flow Rate	i i i i i i i i i i i i i i i i i i i
	· · · · · ·	rvalft.; Casing:
	ods and Remarks (i.e. odors, etc.) WS-1	
		SAMPLE TAKEN FROM
TAP AT W	ELLHEAD	<u> </u>
I certify that the results activities.(signature collect	in this block accurately reflect the results o for): May Wither	of my field analyses, observations and Method of Shipment to the Lab: <u></u>
CILAIN OF CUSTODY		
I certify that this sample	a was transferred from	to
at (location)	011	1/t bud that
the statements in this bl	lock are correct. Evidentiary Seals: Not Sealed	d OR Seals Intact: Yes No
Signatures		

ANALYSES PERFORMED LABORATORY RESULTS ONLY This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS (753) Aliphatic Headspace (1-5 Carbons) (754) Aromatic & Halogenated Purgeables (765) Mass Spectrometer Purgeables (766) Trihalomethanes (774) SDWA VOC's I (8 Regulated +) (775) SDWA VOC's II (EDB & DBCP) Other Specific Compounds or Classes		EXTRACTABLE SCREENS (751) Aliphatic Hydrocarbons (755) Base/Neutral Extractables (758) Herbicides, Chlorophenoxy acid (759) Herbicides, Triazines (760) Organochlorine Pesticides (761) Organophosphate Pesticides (767) Polychlorinated Biphenyls (PCB's) (764) Polynuclear Aromatic Hydrocarbons		
		(762) SDWA Pesticides & Herbicides	-	
	ANALYTICAL	RESULTS		
COMPOUND(S) DETECTED	CONC.	COMPOUND(S) DETECTED	CONC.	
		· · · · · · · · · · · · · · · · · · ·		

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ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

• DETECTION LIMIT • X

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

+ DETECTION LIMIT + +

.

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

ABORATORY REMARKS:_____

CERTIFICATE OF ANALYTICAL PERSONNEL

eal(s) Not Sealed 🔲 Intact: Yes 🛄 No 🛄. Seal(s) broken by:	date:
certify that I followed standard laboratory procedures on handling and analysis of this sample	unless otherwise noted and
nat the statements on this page accurately reflect the analytical results for this sample.	
ate(s) of analysis: Analyst's signature:	
certify that I have reviewed and concur with the analytical results for this sample and with t	

eviewers signature:

STATE O	F NEW	MEXICO
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HEALTH AND ENVIRONMENT DEPARTMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud, NE Albuquerque, NM 87106 [505]-841-2500 ORGANIC CHEMISTRY SECTION [505]-841-2570

February 20, 1989

To:

ANALYTICAL REPORT SLD Accession No. OR-88-1938

<u>Distribution</u> (<u>X</u>) User (X) Submitter

(**I**) Client

(X) SLD Files

From: Organic Chemistry Section Scientific Laboratory Div. 700 Camino de Salud, NE Albuquerque, NM 87106

Re: A purgeable water sample submitted to this laboratory on November 22, 1988

User: EID-Drinking Water Section Room South 2058 1190 St. Francis Dr. Santa Fe, NM 87503

Submitter:	
EID Dist. #4 Office, Ro	oswell
200 East 5th Street	
Roswell, NM 88201	

DEMOGRAPHIC DATA

COLLECTION		LOCATION		
On: 15-Nov-88	By: Web	Township: 17S	Section: 30	
At: 11:13 hrs.	In/Near: other	Range: 35E	Tract:	

ANALYTICAL RESU	LTS: SDWA VO	C's I Sci	reen		
Parameter	Value	Note	MDL	Units	
Aromatic Purgeables (6)	0.00	N	0.50	ppb	
Halogenated Purgeables (33)	0.00	N	0.50	ppb	

Notations & Comments;

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified; T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Seals: Not Sealed X; Intact: No , Yes & Broken By:

WS-1

Laboratory Remarks: Phillips Buckeye Site Well #1

Analyst:" Michael J. Owen

Michael J. Owen Analyst, Organic Chemistry

Reviewed By: Analysis Date

Date:

Richard F. Meyerhein 01/24/89 Supervisor, Organic Chemistry Section

SCIENTIFIC LABORATORY ORGANIC ANALYSIS REQUES Organic Section - Phone: 84	ST FORM 6009				
REPORT TO:	88-1941-C				
	S.L.D. No. OR				
PHILLIPS PETROLEUM CO	DATE REC. 11/22/88				
4001 PENBROOK ROOM 443 _	PRIORITY				
* ODESSA, TX. 79762					
COLLECTION CITY: PHILLIPS PETROLEUM BUCKEVE PLAN					
COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute)					
LOCATION CODE: (Township-Range-Section-Tracts) $\lfloor 1 \rfloor 17 \rfloor 5 + 3 \lfloor 5 \rfloor 5$					
USER CODE: 62000 SUBMITTER: M. WEBE	· · · · · · · · · · · · · · · · · · ·				
SAMPLE TYPE: WATER [4], SOIL [], FOOD [], OTHER:					
This form accompanies Septum Vials, Glass Jugs, and/or					
Samples were preserved as follows:					
NP: No Preservation; Sample stored at room temperature. P-Ice Sample stored in an ice bath (Not Frozen).	,				
P-Ice Sample stored in an ice bath (Not Frozen). P-AA Sample Preserved with Ascorbic Acid to remove chlorine	e residual.				
P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 m					
ANALYSES REQUESTED: Please check the appropriate box(es) below to	indicate the type of analytical screens				
required. Whenever possible list specific compounds suspected or required.					
PURGEABLE SCREENS (753) Aliphatic Headspace (1-5 Carbons)	EXTRACTABLE SCREENS				
	(751) Aliphatic Hydrocarbons (755) Base/Neutral Extractables				
	(758) Herbicides, Chlorophenoxy acid				
	(759) Herbicides, Triazines				
(774) SDWA VOC's I (8 Regulated +)	(760) Organochlorine Pesticides				
[(175) SDWA VOC's II (EDB & DBCP) [((761) Organophosphate Pesticides				
	(767) Polychlorinated Biphenyls (PCB's)				
	(764) Polynuclear Aromatic Hydrocarbons				
	(762) SDWA Pesticides & Herbicides				
Remarks: BENZENE SUSPECTED	•				
BILL PHILLIPS - CC: RESULTS TO	KOSWELL EID				
PIELD DATA:					
pH=; Conductivity=umho/cm at°C; Chlorine Resid					
Dissolved Oxygen=mg/l; Alkalinity=mg/l; Flow Rate	4 · · · ·				
Depth to waterft.; Depth of wellft.; Perforation Interval	ft.; Casing:				
Sampling Location, Methods and Remarks (i.e. odors, etc.) WS-1					
PHILLIPS BUCKEYE SITE WELL # 1 SAMPLE TAKEN					
FROM TAP AT WELLHEAD					
I certify that the results in this block accurately reflect the results of my activities.(signature collector): <u>Manuful una</u> Me					
CHAIN OF CUSTODY					
I certify that this sample was transferred from					
st (location) on					
the statements in this block are correct. Evidentiary Seals: Not Sealed 🦳	OR Seals Intact: Yes No				
Signatures					

ANALYSES PERFORMED

LAB. No .: Un - 2 2 - 1941

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

(753)	Aliphatic	He	adspace	(1-5	Carbons)
(754)	Aromatic	&	Haloge	nated	Purgeables
(765)	Mass Spe	etra	meter	Purge	ables

- (766) Trihalomethanes
- (774) SDWA VOC's I (8 Regulated +)
- [1] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

EXTRACTABLE SCREENS

÷.

- (751) Aliphatic Hydrocarbons
- (755) Base/Neutral Extractables
- (758) Herbicides, Chlorophenoxy acid
- (759) Herbicides, Triazines
- (760) Organochlorine Pesticides
- (761) Organophosphate Pesticides
- (767) Polychlorinated Biphenyls (PCB's)
- (764) Polynuclear Aromatic Hydrocarbons
- (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

	COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND (S) DETECTED	CONC. [PPB]
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION BORATORY REMARKS: Sefer to computer general result for treput. CERTIFICATE OF ANALYTICAL PERSONNEL I(e) Not Sealed] Intact: Yes No . Seal(s) broken by: date:				
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION BORATORY REMARKS: Sefer to computer general result for treput. CERTIFICATE OF ANALYTICAL PERSONNEL I(e) Not Sealed] Intact: Yes No . Seal(s) broken by: date:	······································			
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION BORATORY REMARKS: Sefer to computer general result for treput. CERTIFICATE OF ANALYTICAL PERSONNEL I(e) Not Sealed] Intact: Yes No . Seal(s) broken by: date:				
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION BORATORY REMARKS: Sefer to computer general result for treput. CERTIFICATE OF ANALYTICAL PERSONNEL I(e) Not Sealed] Intact: Yes No . Seal(s) broken by: date:				
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION BORATORY REMARKS: Sefer to computer general result for treput. CERTIFICATE OF ANALYTICAL PERSONNEL I(e) Not Sealed] Intact: Yes No . Seal(s) broken by: date:				
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION BORATORY REMARKS: Sefer to computer general result for treput. CERTIFICATE OF ANALYTICAL PERSONNEL I(e) Not Sealed] Intact: Yes No . Seal(s) broken by: date:				
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION BORATORY REMARKS: Sefer to computer general result for treput. CERTIFICATE OF ANALYTICAL PERSONNEL I(e) Not Sealed] Intact: Yes No . Seal(s) broken by: date:				
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION BORATORY REMARKS: Sefer to computer general result for treput. CERTIFICATE OF ANALYTICAL PERSONNEL I(e) Not Sealed] Intact: Yes No . Seal(s) broken by: date:				
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION BORATORY REMARKS: Sefer to computer general result for treput. CERTIFICATE OF ANALYTICAL PERSONNEL I(e) Not Sealed] Intact: Yes No . Seal(s) broken by: date:				
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION BORATORY REMARKS: Sefer to computer general result for treput. CERTIFICATE OF ANALYTICAL PERSONNEL I(e) Not Sealed] Intact: Yes No . Seal(s) broken by: date:				
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION BORATORY REMARKS: Sefer to computer general result for treput. CERTIFICATE OF ANALYTICAL PERSONNEL I(e) Not Sealed] Intact: Yes No . Seal(s) broken by: date:				
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION BORATORY REMARKS: Sefer to computer general result for treput. CERTIFICATE OF ANALYTICAL PERSONNEL I(e) Not Sealed] Intact: Yes No . Seal(s) broken by: date:	• DETECTION LIMIT • ¥		+ DETECTION LIMIT + T	
I(s) Not Sealed Intact: Yes No Seal(s) broken by:	[RESULTS IN BRACKETS] ARE UNCONF	IRMED AND	OR WITH APPROXIMATE QUANTITATION	<u></u>
I(s) Not Sealed Intact: Yes No Seal(s) broken by:				
ertify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and t the statements on this page accurately reflect the analytical results for this sample. e(s) of analysis: Analyst's signature: ertify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.	CERTIFICAT	TE OF ANALY	TICAL PERSONNEL	
ertify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.	ertify that I followed standard laboratory procedure	res on handlin	g and analysis of this sample unless otherwise note	
ertify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.	e(s) of analysis: Analyst's sig	mature:		
iewers signature:	ertify that I have reviewed and concur with the	analytical resu	Its for this sample and with the statements in this	block.
	/iewers signature:			

STATE OF NEW MEXICO

HEALTH AND ENVIRONMENT DEPARTMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud, NE Albuquerque, NM 87106 [505]-841-2500 ORGANIC CHEMISTRY SECTION [505]-841-2570

December 20, 1988

ANALYTICAL REPORT SLD Accession No. OR-88-1941

<u>Distribution</u>

(<u>×</u>) User

(<u>※</u>) Submitter (■) Client

(X) SLD Files

To: Mike Ford Phillips Petroleum Co. 4001 Penbrook Room 443 Odessa, Texas 79762 From: Organic Chemistry Section Scientific Laboratory Div. 700 Camino de Salud, NE Albuquerque, NM 87106

Re: A purgeable water sample submitted to this laboratory on November 22, 1988

User: EID-Drinking Water Section Room South 2058 1190 St. Francis Dr. Santa Fe, NM 87503 <u>Submitter:</u> EID Dist. #4 Office, Roswell 200 East 5th Street Roswell, NM 88201

DEMOGRAPHIC DATA

CC	DLLECTION	1	LOCATION	
On: 15-Nov-88	By: Web	Township: 17S	Section: 30	
At: 11:13 hrs.	In/Near: other	Range: 35E	Tract:	

ANALYTICAL RESUL	TS: SDWA VO				
Parameter	Value	Note	MDL	Units	
1,2-Dibromoethane (EDB)	0.00	N	0.03	ppb	
1,2-Dibromo-3-chloropropane	0.00	N	0.03	ppb	

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified; T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Date

Seals: Not Sealed []; Intact: No], Yes & Broken By: ____

WS-1

M2-1

Laboratory Remarks: Buckeye Site- Well #1

Analyst: <u>K. D. Sherrell</u>

11/29/88 Reviewed By: 1 Analysis

Date:

K. D. Sherrell Analyst, Organic Chemistry Richard F. Meyerhein 12/20/88 Supervisor, Organic Chemistry Section

-L H ENVIRONMI	SCIENTIFIC LABO 700 Camino	COPY SI UU RATORY DIV de Salud NE 1 87106 841-2570	C	90 y 90
	S.T.D			88-1850 -C 🤇
REPORT TO:	ZIZO AL APTO		S.L.D. No. OR	112/00
	ZIZO N ACTO		DATE REC.	([//00
	Hobbs, NM 8	8240	PRIORITY	2
			PHONE(S): (505	397-5250
COLLECTION CI	ITY: <u>Buckeye</u> .	; co	UNTY: LE	°a
	ATE/TIME CODE: (Year-Month-Day-Hour-		- ·	
	E: (Township-Range-Section-Tracts)			
	5 <u>9300</u> SUBMITTER: <u>Ch</u>	, ,		ODE:
SAMPLE TYPE:	WATER χ , soil \lfloor , food \lfloor , oth	IER:		
This form accom	panies Septum Vials, Glass	Jugs. and/or		RECEIVED
	eserved as follows:			^م نشئية ماين <mark>ي ين</mark> ؤسي
NP:	No Preservation; Sample stored at room			NOV 1 7 1988
	Sample stored in an ice bath (Not Froze			NOT T - (000
$\square P-Na_2S_2O_3$	Sample Preserved with Sodium Thiosulfate	to remove chlorine re	idual.	HOBBS OFFICE
ANALYSES REQ	UESTED: Please check the appropriate bo	x(es) below to indicate	the type of analyt	HUDDO ULLO-
	er possible list specific compounds suspecte			
	PURGEABLE SCREENS	EXTR	ACTABLE SCREE	NS
	tic Headspace (1-5 Carbons)		iphatic Hydrocarbor	
	tic & Halogenated Purgeables Spectrometer Purgeables		se/Neutral Extracta rbicides, Chlorophen	
(766) Trihalo	-		rbicides, Triazines	oxy aciu
Other	Specific Compounds or Classes		ganochlorine Pestici	des
□		[] (761) Or	ganophosphate Pest	cides
x	Benzene.		lychlorinated Bipher	
·		·	lynuclear Aromatic WA Pesticides & 1	•
		(<u> </u>	WA I Children un	Terbicides
Remarker X /	Benzene detected in	Han		
Remarks:	angua cerecter in			
·				
PIELD DATA:				
pH=; Con	nductivity=umho/cm_atC	; Chlorine Residual=	mg/l	
	=mg/l; Alkalinity=mg/l; Fl			•
	ft.; Depth of wellft.; Perfor			
	n, Methods and Remarks (i.e. odors, etc.)			7
_ thilly's	Petwleyn - Buckeye	yand ive.	11 #1 wei	1 head
/	· /			
-	results in this block accurately reflect th collector):			
CHAIN OF CUST	Yaoı			······
I certify that this	sample was transferred from		0	
		L	~	

	WS-1 PAGE FOR LABO	RATORY RESULTS ONLY 1857	·····
This sample was tested using the analytical	screening method(s)	checked below:	
PURGEABLE SCREENS (753) Aliphatic Headspace (1-5 Carbons X (754) Aromatic & Halogenated Purgeable (765) Mass Spectrometer Purgeables (766) Trihalomethanes Other Specific Compounds or Cla	es .	EXTRACTABLE SCREENS (751) Aliphatic Hydrocarbons (755) Base/Neutral Extractables (758) Herbicides, Chlorophenoxy acid (759) Herbicides, Triazines (760) Organochlorine Pesticides (761) Organophosphate Pesticides (767) Polychlorinated Biphenyls (PCB's) (764) Polynuclear Aromatic Hydrocarbon (762) SDWA Pesticides & Herbicides	
	ANALYTICA	L RESULTS	
COMPOUND(S) DETECTED	CONC.	COMPOUND(S) DETECTED	CONC.
hologenated ansmake	12 1 11.11	· · · · · · · · · · · · · · · · · · ·	1
artmatic Jourshealth	2		
Kenzenic	50		
	1		
			_!
			1
		· · · · · · · · · · · · · · · · · · ·	
			1
• DETECTION LIMIT •	,5-18/L	+ DETECTION LIMIT +	!
	LOW THE STATED	DETECTION LIMIT DETECTION LIMIT (NOT CONFIRMED) R WITH APPROXIMATE QUANTITATION	
			······
	FICATE OF ANALY	y: not pick date:	
$L(s)$ Not Sealed \square Intact: Yes \square No \square certify that I followed standard laboratory product the statements on this page accurately reflected and the statements $L(\square / F)$	ocedures on handling lect the analytical res	sults for this sample.	ted and
certify that I followed standard laboratory product the statements on this page accurately reflecte(s) of analysis: $11/7/FS$. Analysis	ocedures on handling lect the analytical res t's signature:	sults for this sample.	

SCIENTIFIC LABORATORY DIVISION 155 ORGANIC ANALYSIS REQUEST FORM WRY Organic Section - Phone: 841-2570
REPORT TO: MIKE FORD S.L.D. No. OR
_ PHILLIPS PETROLEUM CO DATE REC. 11/22/88
_ 4001 PENBROOK ROOM 443
★ _ ODESSA, TX. 79762 PHONE(S): (915) 367-1316
COLLECTION CITY: PHILLIPS PETROLEUM BUCKEVE PLANT; COUNTY: LEA
COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 8 1 1 1 1 5 1 1 4 5
LOCATION CODE: (Township-Range-Section-Tracts) $1175+35+15+315+311+1-1(10N06E24342)$
USER CODE: 62000 SUBMITTER: M. WEBER CODE:
SAMPLE TYPE: WATER [4], SOIL [], FOOD [], OTHER:
This form accompanies Septum Vials, 2_ Glass Jugs, and/or
Samples were preserved as follows: NP: No Preservation; Sample stored at room temperature.
Image: Solution in the store of the stor
P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml) <u>ANALYSES REQUESTED:</u> Please check the appropriate box(es) below to indicate the type of analytical screens
required. Whenever possible list specific compounds suspected or required.
PURGEABLE SCREENS EXTRACTABLE SCREENS
[(753) Aliphatic Headspace (1-5 Carbons) [(751) Aliphatic Hydrocarbons
 [754] Aromatic & Halogenated Purgeables [755] Mass Spectrometer Purgeables [765] Mass Spectrometer Purgeables [758] Herbicides, Chlorophenoxy acid
(766) Trihalomethanes (759) Herbicides, Triazines
[] (774) SDWA VOC's I (8 Regulated +) [] (760) Organochlorine Pesticides
(775) SDWA VOC's II (EDB & DBCP) (761) Organophosphate Pesticides
Other Specific Compounds or Classes (767) Polychlorinated Biphenyls (PCB's)
[] [] (762) SDWA Pesticides & Herbicides
Remarks:
+ BILL PHILLIPS - CC: RESULTS TO ROSWELL EID
FIELD DATA:
pH=; Conductivity=umho/cm at°C; Chlorine Residual=mg/l
Dissolved Oxygen=mg/l; Alkalinity=mg/l; Flow Rate/
Depth to waterft.; Depth of wellft.; Perforation Intervalft.; Casing:
Sampling Location, Methods and Remarks (i.e. odors, etc.) WS-3
PHILLIPS PETROLEUM BUCKEVE PLANT WELL #3. SAMPLE TAKEN FROM HOSE
AT WELL HEAD (EXTREME WIND MADE DIRECT TAP SAMPLING IMPOSSIBLE).
I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): ////////////////////////////////////
CHAIN OF CUSTODY
I certify that this sample was transferred from to
at (location) on/ and that
the statements in this block are correct. Evidentiary Seals: Not Sealed 🗌 OR Seals Intact: Yes 🦳 No 🦳
Signatures

ANALYSES PERFORMED

LAB. No .: UK- 1936

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THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

 PURGEABLE SCREENS
 EXTRACTABLE SCREENS

(753)	Aliphatic Headspace (1-5 Carbons)	(751)	Aliphatic Hydrocarbons
(754)	Aromatic & Halogenated Purgeables	(755)	Base/Neutral Extractables
(765)	Mass Spectrometer Purgeables	(758)	Herbicides, Chlorophenoxy acid
(766)	Trihalomethanes	(759)	Herbicides, Triazines
(774)	SDWA VOC's I (8 Regulated +)	(760)	Organochlorine Pesticides
(775)	SDWA VOC's II (EDB & DBCP)	(761)	Organophosphate Pesticides
	Other Specific Compounds or Classes	(767)	Polychlorinated Biphenyls (PCB's)
		(764)	Polynuclear Aromatic Hydrocarbons
		(762)	SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC.	COMPOUND(S) DETECTED	CONC.
Base / neurnaus			
GASOCINE MOL = 250	NO 4 250		
KerosiNE MOL: 250	_NOL 250_	······································	
Diesel MDL = 250	NO 6 250		
Luis oil more = 2500	<u>NO 22500</u>	······································	
PNAR MOL = 5	NOC 5		
They INDUTIONAL BING MOL	25 NOL 5	· · · · · · · · · · · · · · · · · · ·	
Pebb 1000 1000	NO 6 1000		
chloroane MOL = 1000	000 2 (000)		
· · · · · · · · · · · · · · · · · · ·			
• DETECTION LIMIT • 🗡		+ DETECTION LIMIT + T	
RESULTS IN BRACKETS ARE UNC	•		
ORATORY REMARKS:			
		· · · · · · · · · · · · · · · · · · ·	
CERTIFI	CATE OF ANALYTIC	AL PERSONNEL	
s) Not Sealed 🖸 Intact: Yes 🔲 No 🛄	. Seal(s) broken by:	date:	
tify that I followed standard laboratory proc the statements on this page accurately reflec	edures on handling an	l analysis of this sample unless otherwise no	ted and
(s) of analysis: <u>1/28/88</u> . Analyst's		A	
tify that I have reviewed and concur with			nis block.
were signature: <u>America here</u>			

LINYHOTISENT	SCIENTIFIC LABORA ORGANIC ANALYSIS F Organic Section - Ph	REQUEST FORM	·	
· · · · · ·			88-1939	-C
REPORT TO:	MIKE FORD	S.L.I	D. No. OR	• ,
	PHILLIPS PETROLEUM CO	DAT	E REC. 11/22/88	<u> </u>
	4001 PENBROOK ROOM	443 PRI	ORITY TIL	
. * _	ODESSA, TX 79762			316
COLLECTION CIT	Y: PHILLIPS PETROLEUM - BUCKEY			
COLLECTION DAT	E/TIME CODE: (Year-Month-Day-Hour-Minut	·) 18 18 1111	1151114121	
LOCATION CODE:	(Township-Range-Section-Tracts) 1175	+3151E+31	+ (10N06E:	:4342)
	12 0 0 0 SUBMITTER:			
	VATER $[], soil [], food [], other:$			اسيبيسا ت
SAMPLE TYPE: V	WATER [♥], SOIL [], FOOD [], OTHER:	<u> </u>		<u> </u>
This form accompa	nies _2_ Septum Vials, Glass Jugs,	and/or		
Samples were prese				
	No Preservation; Sample stored at room temper	rature.	,	
	iample stored in an ice bath (Not Frozen). Sample Preserved with Ascorbic Acid to remov	e chlorine residual.		
	Sample Preserved with Hydrochloric Acid (2 d			
ANALYSES REQU	ESTED: Please check the appropriate box(es)	below to indicate the	type of analytical screens	
	possible list specific compounds suspected or			
	URGEABLE SCREENS Headspace (1-5 Carbons)		ABLE SCREENS ic Hydrocarbons	
	& Halogenated Purgeables		eutral Extractables	
-	ectrometer Purgeables		les, Chlorophenoxy acid	
(766) Trihalom		(759) Herbici	les, Triazines	
	VOC's I (8 Regulated +)		chlorine Pesticides	
	VOC's II (EDB & DBCP) pecific Compounds or Classes		phosphate Pesticides prinated Biphenyls (PCB's)	
	pecific Compounds of Classes		elear Aromatic Hydrocarbons	
			Pesticides & Herbicides	
Remarks:				
<u>می الفال منظم منظل کی محمد کہ</u>	BILL PHILLIPS - CC : RE	SULTS TO R	OSWELL EID	
. FIELD DATA:			•	
pH=; Cond	uctivity=umho/cm at°C; Chl	orine Residual=	_mg/l	-
Dissolved Oxygen=_	mg/l; Alkalinity=mg/l; Flow R:	ate/	·	
Depth to water	ft.; Depth of wellft.; Perforation	Interval	ft.; Casing:	
Sampling Location,	Methods and Remarks (i.e. odors, etc.)	WS-3		
PHILLIPS P	ETROLEUM BUCKEVE PLANT	WELL #3.	SAMPLE TAKEN	L
FROM H	HOSE AT WELLHEAD (EXT	REME WIND /	MADE DIRECT TA	<u>P</u>
I certify that the r activities.(signature of	collector): <u>((()))</u>	ilts of my field analyse	s, observations and	
CHAIN OF CUSTO				
I certify that this	sample was transferred from	to		
	his block are correct. Evidentiary Seals: Not S			
Signatures				

ANALYSES PERFORMED

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LAB. No.: UK-

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical	screening method(s)) checked below:	
PURGEABLE SCREENS		EXTRACTABLE SCREENS	
(753) Aliphatic Headspace (1-5 Carbons)		(751) Aliphatic Hydrocarbons	
(754) Aromatic & Halogenated Purgeable	•	(755) Base/Neutral Extractables	
(765) Mass Spectrometer Purgeables		(758) Herbicides, Chlorophenoxy acid	
(766) Trihalomethanes		(759) Herbicides, Triazines	•
(774) SDWA VOC's I (8 Regulated +)		(760) Organochlorine Pesticides	
(775) SDWA VOC's II (EDB & DBCP)		(761) Organophosphate Pesticides	
Other Specific Compounds or Clas	1865	(767) Polychlorinated Biphenyls (PCB's)
		(764) Polynuclear Aromatic Hydrocarbo	ns
		🔲 (762) SDWA Pesticides & Herbicides	
· -		AL RESULTS	
COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]

COMPOUND(S) DETECTED	CONC.	COMPOUND(S) DETECTED	CONC [PPB]
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	/ / /		
• DETECTION LIMIT • 7	¥	+ detection $\lim t + t$	
BREVIATIONS USED: N D = NONE DETECTED AT OR AN T R = DETECTED AT A LEVEL BE [RESULTS IN BRACKETS] ARE UN	LOW THE STATED D		
ATORY REMARKS:			
	······		
CERTI	FICATE OF ANALYTIC	AL PERSONNEL	

certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and at the statements on this page accurately reflect the analytical results for this sample.

.te(s) of analysis:______. Analyst's signature:_____.

certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

	Albugu	IFIC LABORATOR 700 Camino de Salud,	XY DIVI NE 505]-841-2	SION 500	ENT DEPARTMENT
Febr		ANALYTICAL REF Accession No. OR		39	<u>Distribution</u> (※) User (※) Submitte (■) Client (※) SLD Filer
To: Re:	A purgeable water sample subn	From: mitted to this laboratory	Scientif 700 Car Albuqu	•)	ry Div. id, NE 87106
	<u>User:</u> EID-Drinking Water Section Room South 2058 1190 St. Francis Dr. Santa Fe, NM 87503		200 Eas	<u>er:</u> st. #4 Office st 5th Street 1, NM 882	
	COLLECTION	DEMOGRAPHIC DA		LOCATI	0.07
	COLLECTION On: 15-Nov-88 By: Well At: 11:42 hrs. In/Near: oth		<i>nip:</i> 17S <i>age:</i> 35E	<u>LOCATIO</u> S	Section: 31 Tract:
	ANALYTICAL	RESULTS: SDWA VO	C's I Scre	en	- <u>المحمد المحمد u>
Dib Bro	Parameter modichloromethane romochloromethane moform matic Purgeables (6) <u>utions & Comments:</u>	<u>Value</u> 0.00 4.00 21.00 0.00	<u>Note</u> T N	MDL 0.50 0.50 0.50 0.50	<u>Units</u> ppb ppb ppb ppb
<u>Nota</u>	= Minimal Detectable Level		1	but not quantif	ied:
$\frac{Nota}{MDL}$ $A = A$ $T = T$	= Minimal Detectable Level. Approximate Value; N = None Detected abo Frace (<detection i<br="" limit);="" u="Compound">Not Sealed ; Intact: No , Yes &</detection>	Identity Not Confirmed.		Date:	,

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ENVYRONMENT	SCIENTIFIC LABORA ORGANIC ANALYSIS F Organic Section - Ph	EQUEST FORM	715 2p4
REPORT TO:	MIKE FORD PHILLIPS PETROLEUM CO. 4001 PENBROOK ROOM 44: ODESSA, TX. 79762	PRIORITY	100
COLLECTION CITY: PHILLIPS PETROLEUM ; COUNTY: LEA			
COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 181811111511114121			
LOCATION CODE: (Township-Range-Section-Tracts) $\lfloor 7 5 + 3 5 E + 3 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1$			
Samples were preserve NP: No P-Ice Sam P-AA San P-AA San P-HCI Sar ANALYSES REQUES: required. Whenever po <u>PUR</u> (753) Aliphatic H (754) Aromatic & (765) Mass Spectr (766) Trihalometh (774) SDWA VOO V(775) SDWA VOO Other Spec Remarks:	Preservation; Sample stored at room temper ple stored in an ice bath (Not Frozen). aple Preserved with Ascorbic Acid to remove nple Preserved with Hydrochloric Acid (2 do <u>FED:</u> Please check the appropriate box(es) is basible list specific compounds suspected or <u>GEABLE SCREENS</u> eadspace (1-5 Carbons) Halogenated Purgeables roometer Purgeables anes C's I (8 Regulated +) C's II (EDB & DBCP) dific Compounds or Classes	e chlorine residual. rops/40 ml) below to indicate the type of required. EXTRACTABLE S (751) Aliphatic Hydro (755) Base/Neutral E. (758) Herbicides, Chlo (759) Herbicides, Tria (760) Organochlorine (761) Organophosphate (761) Organophosphate (764) Polynuclear Aro (762) SDWA Pesticide	analytical screens <u>CREENS</u> bocarbons xtractables rophenoxy acid zines Pesticides Biphenyls (PCB's) matic Hydrocarbons es & Herbicides
* BILL PHILLIPS - CC: RESULTS TO ROSWELL EID			
FIELD DATA: pH=; Conductivity=umho/cm at°C; Chlorine Residual=mg/l Dissolved Oxygen=mg/l; Alkalinity=mg/l; Flow Rate Depth to waterft.; Depth of wellft.; Perforation Intervalft.; Casing: Sampling Location, Methods and Remarks (i.e. odors, etc.) WS-3 PHILLIPS_PETROLEUM_BUCKEYE PLANT_WELL # 3. SAMPLE_TAKEN_FROM HOSE_AT_WELLHEAD (EXTREME WIND MADE_DIRECT_TAP SAMPLING IMPOSSIBLE) I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector):MUMM Method of Shipment to the Lab: CHAIN OF CUSTODY			
CHAIN OF CUSTODY I certify that this sample was transferred from to			
at (location) on on and that			
the statements in this block are correct. Evidentiary Seals: Not Sealed OR Seals Intact: Yes No			
Signatures			
• •••••••••••••••••••••••••••••••••••••			

i.

ANALYSES PERFORMED

LAB.	No.: Care	88-1892
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THIS PAG	E FOR LABO	RATORY RESULTS ONLY		
This sample was tested using the analytical screening method(s) checked below:				
PURGEABLE SCREENS (753) Aliphatic Headspace (1-5 Carbons) (754) Aromatic & Halogenated Purgeables (765) Mass Spectrometer Purgeables (766) Trihalomethanes (774) SDWA VOC's I (8 Regulated +) (775) SDWA VOC's II (EDB & DBCP) Other Specific Compounds or Classes		EXTRACTABLE SCREENS (751) Aliphatic Hydrocarbons (755) Base/Neutral Extractables (758) Herbicides, Chlorophenoxy acid (759) Herbicides, Triazines (760) Organochlorine Pesticides (761) Organophosphate Pesticides (767) Polychlorinated Biphenyls (PCB's) (764) Polynuclear Aromatic Hydrocarbons (762) SDWA Pesticides & Herbicides		
	ALYTICA	L RESULTS		
COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]	
• DETECTION LIMIT • ¥		+ DETECTION LIMIT + $+$		
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE T R = DETECTED AT A LEVEL BELOW [RESULTS IN BRACKETS] ARE UNCON BORATORY REMARKS: $\frac{2}{5} e^{\frac{1}{5}} e^{\frac{1}{5}} \frac{1}{5} \frac{1}{5} \frac{1}{5}$	THE STATED	D DETECTION LIMIT D DETECTION LIMIT (NOT CONFIRMED) OR WITH APPROXIMATE QUANTITATION energied result for report		
CERTIFICA	TE OF ANALY	TICAL PERSONNEL		

te(s) of analysis:_____. Analyst's signature:____

certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. viewers signature: **و ۱**۰

STATE OF NEW MEXICO

HEALTH AND ENVIRONMENT DEPARTMENT

SCIENTIFIC LABORATORY DIVISION

700 Camino de Salud, NE Albuquerque, NM 87106 [505]-841-2500 ORGANIC CHEMISTRY SECTION [505]-841-2570

December 20, 1988

28.

ANALYTICAL REPORT

SLD Accession No. OR-88-1942

<u>Distribution</u>

(X) User (X) Submitter

(
) Client

(X) SLD Files

To: Mike Ford Phillips Petroleum Co. 4001 Penbrook Room 443 Odessa, Texas 79762

From: Organic Chemistry Section Scientific Laboratory Div. 700 Camino de Salud, NE Albuquerque, NM 87106

A purgeable water sample submitted to this laboratory on November 22, 1988 Rc:

<u>User:</u>

EID-Drinking Water Section Room South 2058 1190 St. Francis Dr. Santa Fe, NM 87503

Submitter: EID Dist. #4 Office, Roswell 200 East 5th Street Roswell, NM 88201

Date: _

1.

DEMOGRAPHIC DATA

CO	LLECTION	<i>L</i>	OCATION	
On: 15-Nov-88	By: Web	Township: 17S	Section: 31	
At: 11:42 hrs.	In/Near: other	Range: 35E	Tract:	

ANALY II CAL RESULTS: SDWA VOC'S II Screen					
Parameter	Value	Note	MDL	Units	
1,2-Dibromoethane (EDB)	0.00	N	0.03	ppb	
1,2-Dibromo-3-chloropropane	0.00	N	0.03	ppb	

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified;T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

D DOTT DO

Seals: Not Sealed 2, Intact: No , Yes & Broken By: _

WS-3

Laboratory Remarks: Buckeye Site- Well #3

Analyst:	E. Sherrell	11/29/58	Reviewed By: Kmeyerheim
·	K. D. Sherrell	Analysis	Richard F./Meyerhein 12/20/88
	Analyst, Organic Chemistry	Date	Supervisor, Organic Chemistry Section

, , * •	FIERDE SENCE COPY B SCIENTIFIC LABORATORY DIVISION COPY WP 700 Camino de Salud NE
î,	Albuquerque, NM 87106 841-2570
	REPORT TO: <u>Environmental Injouvement Divis S.L.D. No. OR-</u> 88-1849-C
	ZIZO N ALTO DATE REC. 11/7/88
	<u>Holibs NM 88240</u> PRIORITY 2
l	PHONE(S): (305) 397-575
	COLLECTION CITY: Buckeye ; COUNTY: Lea
-	COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 11038810005000
	LOCATION CODE: (Township-Range-Section-Tracts) $T 1 7S + K 3 SE + S 3 + - (10N06E24342)$
	USER CODE: 15191310101 SUBMITTER: Challes AUXIM CODE:1_1_1
	SAMPLE TYPE: WATER [X], SOIL [], FOOD [], OTHER:
	This form accompanies Z Septum Vials, Glass Jugs, and/or NUV 17 1000
-	NP: No Preservation; Sample stored at room temperature.
	$\sum_{\substack{n=1\\n}}^{\infty} P-Ice \qquad \text{Sample stored in an ice bath (Not Frozen).} \qquad HOBBS OFFICE$
1	ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens
	required. Whenever possible list specific compounds suspected or required.
	PURGEABLE SCREENS
	(753) Aliphatic Headspace (1-5 Carbons)
Ì	[(754) Aromatic & Halogenated Purgeables [(755) Base/Neutral Extractables
	🗌 (765) Mass Spectrometer Purgeables 🦳 (758) Herbicides, Chlorophenoxy acid
2 1	(766) Trihalomethanes (759) Herbicides, Triazines
i	Other Specific Compounds or Classes (760) Organochlorine Pesticides
	(761) Organophosphate Pesticides
	Binzene (767) Polychlorinated Biphenyls (PCB's) (764) Polynuclear Aromatic Hydrocarbons
1	(762) SDWA Pesticides & Herbicides
1	
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1	Remarks:
ĺ	
	PIELD DATA:
	pH=; Conductivity=umho/cm at°C; Chlorine Residual=mg/l
ļ	Dissolved Oxygen=mg/l; Alkalinity=mg/l; Flow Rate/
1	Depth to waterft.; Depth of wellft.; Perforation Intervalft.; Casing:
-	
	Sampling Location, Methods and Remarks (i.e. odors, etc.) WS-3 <u>PM/145 PETRO PEUM - Buckeye yard - Conjerence room [ive 11 #3</u>
	I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Method of Shipment to the Lab:
; ,	CILAIN OF CUSTODY
i	I certify that this sample was transferred from to to
1	A A CANADA AND A AND A CANADA AND A

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the statements in this block are correct. Evidentiary Seals: Not Sealed 🗌 OR Seals Intact: Yes 🛄 No 🧰

y gen and a second second second second second second second second second second second second second second s	WS-3	RAMONY DESITI ON A 10/19	
This sample was tested using the analytical so		Checked below:	
PURG EABLE SCREENS (753) Aliphatic Headspace (1-5 Carbons) (754) Aromatic & Halogenated Purgeables (765) Mass Spectrometer Purgeables (766) Trihalomethanes Other Specific Compounds or Classe	18	EXTRACTABLE SCREENS (751) Aliphatic Hydrocarbons (755) Base/Neutral Extractables (758) Herbicides, Chlorophenoxy acid (759) Herbicides, Triazines (760) Organochlorine Pesticides (761) Organophosphate Pesticides (767) Polychlorinated Biphenyls (PCB's) (764) Polynuclear Aromatic Hydrocarbons (762) SDWA Pesticides & Herbicides	
COMPOUND(S) DETECTED	NALYTICA coñc.	<u>L RESULTS</u> compound(s) detected	CONC.
	[PPB]	· · · · · · · · · · · · · · · · · · ·	[PPB]
habgerated purpaper-			
- Ucallander m. I.	1.5		
Komedicklownethane	1.3.5		
clipsonalfermattane			
Asmann in	1.22		
momalie susgeables_	N.D.	<u>}</u>	
	!	i	
DETECTION LIMIT *	1.5-19/2	+ DETECTION LIMIT +	
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOV T R = DETECTED AT A LEVEL BELO [RESULTS IN BRACKETS] ARE UNCO LABORATORY REMARKS:	W THE STATED NFIRMED AND/O	DETECTION LIMIT (NOT CONFIRMED) OR WITH APPROXIMATE QUANTITATION	
·····			
CERTIFIC Seal(s) Not Sealed \square Intact: Yes \square No \square . I certify that I followed standard laboratory proce that the statements on this page accurately reflect Date(s) of analysis: $\frac{n/2}{88}$. Analyst's I certify that I have reviewed and concur with the	Seal(s) broken to dures on handling the analytical re- signature:	and analysis of this sample unless otherwise note sults for this sample.	
			, oloca,

SCIENTIFIC LABORA ORGANIC ANALYSIS Organic Section - Pl	REQUEST FORM WET
RÉPORT TO:	88-1937-C
REPORT TO: MIKE FORD PHILLIPS PETROLEUM CC	$\sum_{n=1}^{n} \text{ S.L.D. No. OR} = \sum_{n=1}^{n} \text{ DATE REC. } \frac{11/22/88}{8}$
4001 PENBROOK ROOM 4	
* ODESSA, TX. 79762	
COLLECTION CITY: PHILLIPS PETROLEUM BUCKE	
COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minut	
LOCATION CODE: (Township-Range-Section-Tracts)	
USER CODE: 62000 submitter: M.	
SAMPLE TYPE: WATER [], SOIL [], FOOD [], OTHER:	
This form accompanies Septum Vials, 2 Glass Jugs, Samples were preserved as follows: NP: No Preservation; Sample stored at room tempe P-Ice Sample store! in an ice bath (Not Frozen). P-AA Sample Preserved with Ascorbic Acid to remov P-HCI Sample Preserved with Hydrochloric Acid (2 cd ANALYSES REQUESTED: Please check the appropriate box(cs) required. Whenever possible list specific compounds suspected or PURGEABLE SCREENS (753) Aliphatic Headspace (1-5 Carbons) (754) Aromatic & Halogenated Purgeables (765) Mass Spectrometer Purgeables (766) Trihalomethanes (774) SDWA VOC's I (8 Regulated +) (775) SDWA VOC's II (EDB & DBCP) Other Specific Compounds or Classes Remarks:	and/or rature. we chlorine residual. drops/40 ml) below to indicate the type of analytical screens
BILL PHILLIPS - CC: RESULTS	TO ROSWELL EID
FIELD DATA:	
pH=; Conductivity=umho/cm at°C; Chl	orine Residual=mg/l
Dissolved Oxygen=mg/l; Alkalinity=mg/l; Flow R:	ste/
Depth to waterft.; Depth of wellft.; Perforation	Intervalft.; Casing:
Sampling Location, Methods and Remarks (i.e. odors, etc.)	5-4
PHILLIPS BUCKEVE SITE WELL	- # A, SAMPLE
TAKEN FROM TAP AT WELL	HEAD
I certify that the results in this block accurately reflect the resu activities.(signature collector):	lts of my field analyses, observations and Method of Shipment to the Lab:
CHAIN OF CUSTODY	
I certify that this sample was transferred from	
st (location)	on/: and that
the statements in this block are correct. Evidentiary Seals: Not S	ealed OR Seals Intact: Yes No
Signatures	

ANALYSES PERFORMED

LAB. No.: UK- 1937

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THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- (753) Aliphatic Headspace (1-5 Carbons)
 (754) Aromatic & Halogenated Purgeables
- (765) Mass Spectrometer Purgeables
- (766) Trihalomethanes

П

- (774) SDWA VOC's I (8 Regulated +)
- (775) SDWA VOC's II (EDB & DBCP)
 - Other Specific Compounds or Classes

EXTRACTABLE SCREENS

- (751) Aliphatic Hydrocarbons
- (755) Base/Neutral Extractables
- (758) Herbicides, Chlorophenoxy acid
- (759) Herbicides, Triazines
- (760) Organochlorine Pesticides
- (761) Organophosphate Pesticides
- (767) Polychlorinated Biphenyls (PCB's)
- (764) Polynuclear Aromatic Hydrocarbons
- (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

Basis / Their TRACS Gassering MDL = 250 NDL = 2500 NDL = 1000 NDL = 1000 ND = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION MDL = 890 BORATORY REMARKS: <th>.</th>	.
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CERTIFICATE OF ANALYTICAL PERSONNEL	
l(s) Not Sealed Intact: Yes No . Seal(s) broken by: date:	-
:=(s) of analysis: 11/28/88 Analyst's signature: OS Buckley	<u> </u>
ertify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. iewers signature:	

SCIENTIFIC LABORATORY DIVISION 774 ORGANIC ANALYSIS REQUEST FORM WP4 Organic Section - Phone: 841-2570	
REPORT TO:MIKE FORDS.L.D. No. OR-PHILLIPS PETROLEUM CO.DATE REC. $11/22/88$ A001 PENBROOK ROOM 443PRIORITY $11/22/88$ ODESSA, TX. 79762PHONE(S): (915)367-1316	-
COLLECTION CITY: PHILLIPS PETROLEUM BUCKEYE PLANT; COUNTY: LEA	
COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 1818 1111151111515	
LOCATION CODE: (Township-Range-Section-Tracts) 11715+3151E+311+ 1 (10N06E24342)	
USER CODE: 62000 SUBMITTER: M.WEBER CODE:	
SAMPLE TYPE: WATER [1], SOIL [], FOOD [], OTHER:	
This form accompanies 2 Septum Vials,Glass Jugs, and/or	
PIELD DATA:	
pH=; Conductivity=umho/cm at°C; Chlorine Residual=mg/l	_
Dissolved Oxygen=mg/l; Alkalinity=mg/l; Flow Rate/	~
Depth to waterft.; Depth of wellft.; Perforation Intervalft.; Casing:	
Sampling Location, Methods and Remarks (i.e. odors, etc.) $WS-4$	
PHILLIPS BUCKEVE SITE WELL # 4 SAMPLE TAKEN	
FROM TAP AT WELLHEAD	
I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): UAU //////////////////////////////////	
CHAIN OF CUSTODY	
I certify that this sample was transferred from to to	
at (location) on and that	
the statements in this block are correct. Evidentiary Seals: Not Sealed <u>OR</u> Seals Intact: Yes No	
Signatures]

ANALYSES FERFORMED

LAB. No.: Un-

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

(753) Aliphatic Headspace (1-5 Carbons) (754) Aromatic & Halogenated Purgeables (765) Mass Spectrometer Purgeables (766) Trihalomethanes

- (774) SDWA VOC's I (8 Regulated +)
- (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

EXTRACTABLE SCREENS

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- (758) Herbicides, Chlorophenoxy acid
- (759) Herbicides, Triazines
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- (761) Organophosphate Pesticides
- (767) Polychlorinated Biphenyls (PCB's)
- (764) Polynuclear Aromatic Hydrocarbons
- (762) SDWA Pesticides & Herbicides

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC.	COMPOUND(S) DETECTED	CONC.
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	┦┦╏		
	<u> </u>		
• DETECTION LIMIT • 🗡	1 11	+ detection $\lim t + t$	
[RESULTS IN BRACKETS] ARE UNCON			
BORATORY REMARKS:			
-			<u></u>
CERTIFICA	TE OF ANALY	TICAL PERSONNEL	
l(s) Not Sealed Intact: Yes No . ertify that I followed standard laboratory procedu t the statements on this page accurately reflect t	res on handling	and analysis of this sample unless otherwise note	
e(s) of analysis: Analyst's sig	mature:		
ertify that I have reviewed and concur with the	analytical result	s for this sample and with the statements in thi	s block.
iewers signature:			

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	SCIENTIFIC LABORATORY DIVISION 700 Camino de Salud, NE			
	Albuquerque, NM 87106 [505]-841-2500 ORGANIC CHEMISTRY SECTION [505]-841-2570			
February 20, 1989	ANALYTICAL REPORT			

Distribution (※) User (※) Submitter (■) Client

(X) SLD Files

From: Organic Chemistry Section Scientific Laboratory Div. 700 Camino de Salud, NE Albuquerque, NM 87106

EID Dist. #4 Office, Roswell

HEALTH AND ENVIRONMENT DEPARTMENT

Re: A purgeable water sample submitted to this laboratory on November 22, 1988

User: EID-Drinking Water Section Room South 2058 1190 St. Francis Dr. Santa Fe, NM 87503

DEMOGRAPHIC DATA

SLD Accession No. OR-88-1940

C(DLLECTION	Z	OCATION
On: 15-Nov-88	By: Web	Township: 17S	Section: 31
At: 11:55 hrs.	In/Near: other	Range: 35E	Tract:

ANALYTICAL RESULTS: SDWA VOC's I Screen

Parameter	Value	Note	MDL	Units	
Aromatic Purgeables (6)	0.00	N	0.50	ppb	
Halogenated Purgeables (33)	0.00	N	0.50	ppb	

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified; T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Seals: Not Sealed 🔀; Intact: No , Yes & Broken By: _

WS-4

Laboratory Remarks: Phillips Buckeye Site Well #4

Analyst:

Date

Michael J. Owen Analyst, Organic Chemistry

Reviewed By: Richard F. Meyerhein 01/24/89 Supervisor, Organic Chemistry Section

Date: _____

200 East 5th Street Roswell, NM 88201

Submitter:

STATE OF NEW MEXICO

To:

- a st	SCIENTIFIC LABORAT(ORGANIC ANALYSIS RE Organic Section - Phon	QUEST FORM	775 wp4
P	MIKE FORD HILLIPS PETROLEUM (DATE REC.	- 88-1943 C
	OOI PENBROOK ROOM 4	43 PRIORITY	
	ODESSA, TX. 79762 LIPS PETROLEUM BUCKEYE		015) 367 <u>1</u> 316
	CODE: (Year-Month-Day-Hour-Minute)	a	
	ip-Range-Section-Tracte) $\lfloor 1 \rfloor 7 \rfloor 5 +$		
	O O SUBMITTER: <u>M. W</u>		
	[], soil [], food [], other:		
	_ Septum Vials, Glass Jugs, and	1/or	
Samples were preserved as for NP: No Preserved As for No Preserved As	ollows: ration; Sample stored at room temperatu	·	
	ored in an ice bath (Not Frozen).	ire.	1
personal and a second se	eserved with Ascorbic Acid to remove		
	reserved with Hydrochloric Acid (2 drop lease check the appropriate box(es) belo		Instant servers
	list specific compounds suspected or req		alytical screens
	E SCREENS	EXTRACTABLE SCR	EENS
(753) Aliphatic Headspace	· ·	(751) Aliphatic Hydroca	
(754) Aromatic & Halog (765) Mass Spectrometer		(753) Base/Neutral Extr (758) Herbicides, Chlorop	
(766) Trihalomethanes		(759) Herbicides, Triazin	
(774) SDWA VOC's I (8 Regulated +)	(760) Organochlorine Per	
(775) SDWA VOC's 11	-	(761) Organophosphate F	
	impounds or Classes	(767) Polychlorinated Bij (764) Polynuclear Aroma	
		[_] (762) SDWA Pesticides	
•; <u>,,</u> ,,	PHILLIPS - CC: RESU		
FIELD DATA:			
pH=; Conductivity=	umho/cm at°C; Chlorin	e Residual=mg/l	_
	/l; Alkalinity=mg/l; Flow Rate_		
	Depth of wellft.; Perforation In	í.	·
Sampling Location, Methods s	and Remarks (i.e. odors, etc.) $WS-4$		
PHILLIPS BUCH	KEVE SITE WELL	#4. SAMPLE	TAKEN
FROM TAP	AT WELLHEAD		
I certify that the results in activities.(signature collector):_	this block accurately, reflect the results	of my field analyses, observati Method of Shipment to th	ions and e Lab: UPS
CHAIN OF CUSTODY	<u></u>		
	s transferred from		
	are correct. Evidentiary Seals: Not Seal		
Signatures			
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ANALYSES FERFORMED

LAB. No .: Un- 28-1843

THIS PAGE FOR LABORATORY RESULTS ONLY

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ANALYTICAL RESULTS

	COMPOUND(S) DETECTED	CONC.	COMPOUND(S) DETECTED	CONC.
ABBREVIATIONS USED: N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED) [RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION				
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CERTIFICATE OF ANALYTICAL PERSONNEL al(s) Not Sealed Intact: Yes No . Seal(s) broken by: date: certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and at the statements on this page accurately reflect the analytical results for this sample. te(s) of analysis: Analyst's signature:				
al(s) Not Sealed Intact: Yes No Seal(s) broken by: date:	BORATORY REMARKS: Befer to c	imputer !	gonerated form for result.	
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viewers signature:	certify that I have reviewed and concur with the	analytical resu	ilts for this sample and with the statements in thi	s block.
	viewers signature:			

ber 20, 1988					
		YTICAL REF ision No. OR		3	<u>Distrib</u> (※) Use (<u>※</u>) Sub (■) Clie (<u>※</u>) SLI
001 Penbrook Ro	om 443	From:	Scientifi 700 Cam	c Laboratory ino de Salud	y Div. I, NE
A purgeable water	sample submitted to) this laboratory	on Novem	ber 22, 1988	
Room South 2058 190 St. Francis Dr	7503	OCDAPHIC D	200 East Roswell,	5th Street	
COLL				LOCATIO	N
<i>On:</i> 15-Nov-88	<i>By:</i> Web		-	Se	ection: 31 Tract:
ANA	LYTICAL RESULT	rs: Sdwa vo	C's II Scre	en	
	• •	<u>Value</u> 0.00	<u>Note</u> N N	MDL 0.03	<u>Units</u> ppb ppb
o <u>ns & Comments:</u> Minimal Detectable Level	 				
ce (<detection limit);="" td="" u<=""><td>J = Compound Identity No □[, Yes]] & Broken B</td><td>ot Confirmed.</td><td>ound Present,</td><td>Dut not quantifie</td><td></td></detection>	J = Compound Identity No □[, Yes]] & Broken B	ot Confirmed.	ound Present,	Dut not quantifie	
	WS-4	1			
	Phillips Petroleum 001 Penbrook Ro 001 Penbrook Ro Odessa, Texas 7976 A purgeable water Iser: EID-Drinking Wate Room South 2058 190 St. Francis Dr Santa Fe, NM 8' COLL On: 15-Nov-88 At: 11:55 hrs. In ANA Parameter Oibromo-3-chlcomosthane Oibromo-3-chlcomostale Level roximate Value; N = No ce (<detection limit);="" td="" u<=""></detection>	Phillips Petroleum Co. 001 Penbrook Room 443 Odessa, Texas 79762 A purgeable water sample submitted to Iser: EID-Drinking Water Section Room South 2058 190 St. Francis Dr. Santa Fe, NM 87503 DEMO COLLECTION On: 15-Nov-88 By: Web At: 11:55 hrs. In/Near: other Dibromoethane (EDB) Oibromo-3-chloropropane Ons & Comments: Minimal Detectable Level. roximate Value; N = None Detected above Detection ce (<detection identity="" limit);="" no<="" td="" u="Compound"></detection>	Phillips Petroleum Co. 001 Penbrook Room 443 Odessa, Texas 79762 A purgeable water sample submitted to this laboratory Iser: EID-Drinking Water Section Room South 2058 190 St. Francis Dr. Santa Fe, NM 87503 DEMOGRAPHIC DA COLLECTION On: 15-Nov-88 By: Web Townsi At: 11:55 hrs. In/Near: other Rander Value Oibromoethane (EDB) 0.00 Oibromo-3-chloropropane 0.00 Ons & Comments: Minimal Detectable Level.	Phillips Petroleum Co. Scientifi 001 Penbrook Room 443 700 Cam Odessa, Texas 79762 Albuque A purgeable water sample submitted to this laboratory on Novem Submitte Iser: Submitted to this laboratory on Novem Iser: Submitted EID-Drinking Water Section EID Disi Room South 2058 200 East 190 St. Francis Dr. Roswell, Santa Fe, NM 87503 Township: 17S Martin Fe, NM 87503 Township: 17S Martin Fe, NM 87503 ANALYTICAL RESULTS: SDWA VOC's II Screet Parameter Value Obbromoethane (EDB) 0.00 Oibromo-3-chloropropane 0.00 Oibromo-3-chloropropane 0.00 Minimal Detectable Level. roximate Value; N = None Detected above Detection Limit; P = Compound Present, Texe (<detection confirmed.<="" identity="" limit);="" not="" td="" u="Compound"></detection>	Phillips Petroleum Co. Scientific Laboratory 001 Penbrook Room 443 700 Camino de Saluc Odessa, Texas 79762 Albuquerque, NM A purgeable water sample submitted to this laboratory on November 22, 1988 Iser: Submitter: EID-Drinking Water Section EID Dist. #4 Office, Room South 2058 200 East 5th Street 190 St. Francis Dr. Roswell, NM 8820 Janta Fe, NM 87503 DEMOGRAPHIC DATA LOCATIO Dr. 15-Nov-88 By: Web Township: 17S Set Alt: 11:55 hrs. In/Near: other Range: 35E ANALYTICAL RESULTS: SDWA VOC's II Screen Dibromoethane (EDB) 0.00 N 0.03 Oilbromo-3-chloropropane 0.00 N 0.03 Oilbromo-15: Winimal Detectable Level. roximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantifiere (<detection confirmed.<="" identity="" limit);="" not="" td="" u="Compound"></detection>

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ATTACHMENT 3 7

MONITORING WELL IDENTIFICATION REPORT

Ele Copy

ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1196 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO 87503						
FACILITY NAME	LEE GASOLINE PLANT					
EPA I.D. NUMBER	NMD000709659					
COUNTY	LEA					
WELL NUMBER	FI UPGRADIENT					
WELL LOCATION (LON						
WELL LOCATION (LAT						
AQUIFER NAME	OGALLALA FORMATION					
AQUIFER CONFINED	UNCONFINED X					
WELL INSTALLATION I	DATE 4/25/88					
DRILLING METHO	AIPRT					
INNER CASING I	DIAMETER 2.25"					
BOREHOLE DIAME	IETER <u>6.50"</u>					
CASING MATERIA	AL SS3/6 E PVC					
METHOD OF DEVI	PELOPMENT <u>PUMPD</u>					
elev bottom of bori	zehole <u>3862,5</u>					
elev bottom of well	L CASING					
ELEV BOTTON OF SCRI	REENED INT 3874.73					
elevation of screen	INED INT	•				
SURVIEVED ELEV OF CI	CASING TOP_ <u>3979.27</u>	•				

DATE OF REPORT 2/23/89

SIGNATURE Michael D. Ford

NAME (TYPED) _____Mike Ford _____

b:wellid/bas

ANNUAL SUMMARY OF MONITOR WELL DATA BACKGROUND BACKGROUND MONITORING

This form is to be used by facilities currently establishing their background monitoring well values or which have just completed their first year of data collection. This form must be submitted to NMEID before March 1. The annual report should be filled out by all facilities wit RCRA monitoring wells as per HAMR-5. Part VI. Section 265.94(a) and (b).

ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO 87503

 $\mathbf{x}_{1} = \sum_{i=1}^{N} \mathbf{x}_{i}$

FACILITY NAME	Lee Plant
EPA I.D. NUMBER	NM6000 709659
WELL NUMBER	/

SAMPLE DATES

5/13/1 8/30/81 11/1/88

PARAMETERS UNITS VALUE 3885,10 3884.69 3884.43 Elev. of G.Water ft. 7.53 7.21 pH (Avg) S.U. 7.24 470 508 543 Spec Cond (Avg) umhos/cm < 10 _ 5 154 T.O.X. (Avg) ug/l. 5 T.O.C. (Avg) 32 . 5 mg/l28 Chloride 27 27 mg/l < 40 **L**40 Iron _ 37 ug/1120 190 120 Manganese **ug/1** . 15 くこ < 5 Phenols ug/116 16 19 Sodium mg/1_34 25 30 Sulfate mg/1

x, , x,

PARAMETERS	UNITS			VALUE
Arsenic	ug/l		24	<u> </u>
Barium	ug/l	046	120	,90
Cadmium	ug/l	25	25	15
Chromium	ug/l	<u> </u>	< 30	230
Lead	ug/l	<u> </u>	<u> </u>	<u> </u>
Mercury	ug/l	٢.12	<.12	<u> </u>
Selenium	ug/1	<u> </u>	24	<u> </u>
Silver	ug/l	<u> </u>	<u> < 30</u>	< 30
Fluoride	mg/l	<u>< . 2</u>	< 20	4.24
Nitrate	mg/l	21	1.7	<u> </u>
Total Coliform	col/100ml	7-4,000	4100	2760
Turbidity	T.U .	<u>P.Y</u>	_22_	
Radium 226	pCi/l	0.6	1.6	1.7
Radium 228	pCi/l			
Gross Alpha	pCi/l	<u> </u>	39	6
Gross Beta	pCi/l	<u>< 9.6</u>	162	
Endrin	ug/l	2.010	<.010	2.010
Lindane	ug/l	. 1.2	<u>× .010</u>	2.010
Methoxychlor	ug/1	2,050	< . 050	2.050
Toxaphene	ug/l	6.50	<u>در ک</u>	2.50
2,4-D	ug/l	2.50	<u>ح . 50</u>	4.50
2,4,5-TP	ug/l	2.15	<u> </u>	2.15
DATE OF REPORT:	= 2/23/89		SIGNATURI	: Mihael P. For

NAME (TYPED) : Mike Ford

b:backgr.2/bas

INTERIM STATUS MONITORING WELL SAMPLING AND DATA SHEETS

BACKGROUND QUARTERLY REPORTS

This set of forms is to be completed for each of your facility's quarterly evaluations during establishment of the background data for each well. The forms are to be submitted in addition to the raw data sheets provided by your laboratory. In order to be acceptable, the raw lab data sheets must include 1) the date the sample was taken, 2) the extraction date, if any, and 3) the date of analysis.

ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR. /HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO 87503

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FACILITY NAME	- Lee Plant	EPA I.D. # <u>NMD000</u> 709659
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N. AVIA

Well NUMBER		SAMPLE COLLECTIO	DN BY	S. DUBYK	_
LABORATORY NAME	Redisi	Conp	DATE SAMPLED	5/13/88	
LABORATORY SAMPLE	I.D. # _	8805131430	TIME SAMPLED	<u></u> 30 =	
DATE RECIEVED BY I	LAB	5/.4/12			

PARAMETERS	STORET CODE	UNITS	VALUE	DATE Analyzed
Elevation of G.Water	71993	ft.	3285,10	5/13/28
Well Depth		ft.	105,36	11
Well Casing Volume		gal.	2.11	11
Pump Rate		gal/min	0.20	<u> </u>
Pump Period	72004	min.	8000	
Volume Evecneted	73675	gal.	1600	11
Sampler Material				N/A
Well Sampling	Method:	BFB	· ·	

INDICATOR PARAMETERS [HWMR-5 Part VI, Section 265.92(b)(3)]

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PARAMETERS		UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
pH	00400	s.v.	7.55	NA	5/14/88	
	00400	S.U.	7.53	N/A_		EPA 150.1
	00400	s.u.	7.50	NA		CPF 130
	00400	S.U.	7.55	NA		
Specific	00095	umhos/cm	470	0	5/14/88	
Conductivity	00095	unhos/cn	470		II 	E01 12 1
	00095	umhos/cm	470	<u> </u>	i) 	EPA 170.1
	00095	umhos/cm	470	0	li 	-
T.O.X.	70354	ug/1	220	(D	5/14/88	
	70354	ug/1	< 20			9000
	70354	ug/l	< 20	/•		(SW PVL)
	70354	ug/1	5	10		
T.O.C.	00680	mg/l	_5	/	5/14/88	
	00680	ng/l				EPA 415.1
	00680	mg/l	5			<u>F. P.A. 713.</u> 1
	00680	mg/l	_,5		11	
		-				

GROUND WATER QUALITY STANDARDS [HWMR-5 Part VI Section 265.92(b)(2)]

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
(Values for	metals	must be fo	or <u>total</u> me	tals.)	*****	
Chloride	00940	mg/l	28	.5	5/14/88	EPA 300.0
Iron	01045	ug/l	_37	40	5/23/88	EPA 200.1
Manganese	71883	ug/1	120	10	5/23/88	<u>EPA 200.</u> 7
Phenols	32730	ug/l	<5	5	5/14/28	EA4 420.2
Sodium	00929	mg/l	_16		5/14/38	EPA 200.7
Sulfate	00945	mg/l	_35	2	5/14/08	EPA 300.0

PRIMARY DRIN (Values for a				Part VI, App ls)	endix III]	
Arsenic	01002	ug/1		4	5/16/28	EA 206. 2
Barium	01007	ug/1	مدد_		5/23/00	EPA 200.7
Cadmium	01027	ug/l	_25		5/3/88	ETA 200.7
Chromium	01034	ug/l	130		5/22/88	<u>EPA 200</u> 7
Lead	01051	ug/l	<2	<u> </u>	5/16/80	EPA 239.2
Mercury	71900	ug/l	4.12	.12	5/23/81	E1A 245.1
Selenium	01149	ug/l	<u> </u>	5	5/16/88	EP# 270.2
Silver	01077	ug/1	< 3		5/2/88	FPA 200.7
Fluoride	00950	mg/1	2,2	<u> </u>	<u>5/H/88</u>	EA 300.0
Nitrate	90620	mg/l	, /	. 02	<u>_5/14/28</u>	EPA 353.1
Total Coliform		col/100ml	7-14,000	20/100 ml	5/14/88	SM 908A

PRIMARY DRINKING WATER STANDARDS (continued)

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
Turbidity	00076	Ť.U.	8.8	INTU	5/14/18	<u>EPA 130.1</u>
Radium 226	09501	pCi/l	0.6	1pCill	5/14/88	EPA 903.0
Radium 228	11501	pCi/l				
Gross Alpha	01501	pCi/l	24.6	3,C.1L	5/14/88	EPA 900.0
Gross Beta	03501	pCi/l	< 9.6	4 pC.1L	5/14/88	<u>EPA 900</u> .0
PARAMETERS	STOR	-	VALUE	DETECTION LIMIT	DATE Extracted	DATE ANALYZED
Endrin	39390	ug/l	2,010	0.010	5/16/84	6/strr
Lindane	39782	ug/l	/2	0 010	5/10/21	6/5/84
Methoxychlor	39480	ug/1	2.050	.050	5/16/88	615/88
Toxaphene	39400	ug/1	1,50	0.50	5/10/01	6/5/00
2,4-D	39730	ug/1	2.50	0.50	5/20/m	5/26/01
					,	•

Analytical method used for the above six parameters: <u>SW 846</u>

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2/16/89 DATE OF REPORT_

SIGNATURE: Michael D. Ford NAME (PRINTED) : MICHAEL D. FORP

INTERIM STATUS MONITORING WELL SAMPLING AND DATA SHEETS

BACKGROUND QUARTERLY REPORTS

This set of forms is to be completed for each of your facility's quarterly evaluations during establishment of the background data for each well. The forms are to be submitted in addition to the raw data sheets provided by your laboratory. In order to be acceptable, the raw lab data sheets must include 1) the date the sample was taken, 2) the extraction date, if any, and 3) the date of analysis.

ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO \$7503

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FACILITY NAME ______ EPA I.D. # NMD000709659

ELL NUMBER		LE COLLECT		- M Incl PLED 8/30/28
ABORATORY SAMPLE I.D. # Ate recieved by LAB.				
PARAMETERS	STORET CODE	UNITS	VALUE	DATE ANALYZED
Elevation of G.Water	71993	ft.	3884.69	8/29/88
Well Depth		ft.	105,36	8/201/88
Well Casing Volume		gal.	2,22	8/29/28
Pump Rate		gal/min		
Pump Period	72004	min.		
Volume Evacuated	73675	gal.	7,00	8129/88
Sampler Material	:		TEFLN	N/A
Well Sampling	Method:	BAIL	-	

INDICATOR PARAMETERS [HWMR-5 Part VI, Section 265.92(b)(3)]

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION	DATE Analyzed	METHOD USED
рН	00400	s.v.	7.22	NA	9/1/88	
	00400	S.U.	7.21	NA		
	00400	S.U.	7.19	NA	11	<u>13974 150.1</u>
	00400	S.U.	7.11	NA	11	
Specific	00095	umhos/cm	514		9/1/88	
Conductivity	00095	umhos/cm	510	_0		HPA 120.1
	00095	umhos/cm	502	0		HI POIL
	00095	umhos/cm	504	0		
T.O.X.	70354	ug/l	<10	_/0	9/1/38	
	70354	ug/1	<10		<u> </u>	0010
	70354	ug/1	<10	10		9020 (SW 346)
	70354	ug/1	<10	10		
T.O.C.	00680	ng/l			9/1/58	
	00680	ng/l	24			
	00680	mg/l	_39		('	<u>1399</u> 415,
	00680	mg/l	42			

GROUND WATER QUALITY STANDARDS [HWMR-5 Part VI Section 265.92(b)(2)]

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
(Values for	netals	must be fo	r <u>total</u> me	tals.)		
Chloride	00940	mg/l		5	9/1/88	EPA 300.0
Iron	01045	ug/l	240	_40	9/16/88	EPH 200.7
Manganese	71883	ug/l	190		9/16/28	<u> 599 200 7</u>
Phenols	32730	ug/l	25	_5	9/1/88	<u>(7</u> 79 420.2
Sodium	00929	mg/l			7/1/88	EPA 200.7
Sulfate	00945	mg/l			9/1/88	BA-300.0

PRIMARY DRINKING WATER STANDARDS [HWMR-5 Part VI, Appendix III] (Values for metals must be for <u>total</u> metals)

01002 ug/l	_24		9/6/88	ETA 206.2
01007 ug/l	120	10	9/16/18	4PA 200.7
01027 ug/l	25		9/16/58	ERA 200.7
01034 ug/l	<u> </u>	_30	9/16/58	<u>EPA 200.7</u>
01051 ug/l	<u> 22</u>		9/1/88	ERA 239.2
71900 ug/l	L. 18	18	9/14/11	<u>EPA 245. </u>
01149 ug/l	14	5	9/6/88	BPA 2702
01077 ug/l	< 30		9/16/æP	EPA 200.7
00950 mg/1	2.20	20	9/1/8P	4PA 300.0
00620 mg/l	1.7	.02	9/1/28	6PA 353.
31501 col/100ml	4100	20/100 ml.	9/1/88	SM908A
	01007 ug/l 01027 ug/l 01034 ug/l 01051 ug/l 71900 ug/l 01149 ug/l 01077 ug/l 00950 mg/l 00950 mg/l	01007 ug/1 $/20$ 01027 ug/1 <5 01034 ug/1 <30 01051 ug/1 <22 71900 ug/1 $\frac{2}{\sqrt{8}} 01149 ug/1 \frac{2}{\sqrt{8}} 01077 ug/1 <30 00950 ng/1 \frac{2}{\sqrt{20}} 00950 ng/1 \frac{1}{\sqrt{7}} $	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	01007 ug/1 <u>/20</u> <u>10</u> <u>$7/16 k8$</u> 01027 ug/1 <u>45</u> <u>5</u> <u>$7/16 k8$</u> 01034 ug/1 <u>430</u> <u>30</u> <u>$9/16 k8$</u> 01051 ug/1 <u>42</u> <u>3</u> <u>$9/16 k8$</u> 71900 ug/1 <u>$4.k8$</u> <u>18</u> <u>$5/14/n1$</u> 01149 ug/1 <u>44</u> <u>5^{-5}</u> <u>$9/6 k8$</u> 01077 ug/1 <u>44</u> <u>5^{-5}</u> <u>$9/16 k8$</u> 01077 ug/1 <u>430</u> <u>30</u> <u>$9/16 k8$</u> 00980 ng/1 <u>1.200</u> <u>300</u> <u>$9/16 k8$</u> 00980 ng/1 <u>1.200</u> <u>300</u> <u>$9/16 k8$</u> 00980 ng/1 <u>1.77</u> <u>02</u> <u>$9/1 k89$</u>

PRIMARY DRINKING WATER STANDARDS (continued)

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION	DATE ANALYZED	Method Used
Turbidity	00076	T.U.		1.0 MTU	91.14	EPA 180.1
Radium 226	09501	pCi/l	1.6	1pG/L	9/1/88	EPA 903.0
Radium 228	11501	pCi/l			•	
Gross Alpha	01501	pCi/l	39	30 GIL	9/1/28	<u>1279 900.0</u>
Gross Beta	03501	pCi/l	162	4pG/L	9/1/88	EPP 900.0

	STORET			DETECTION	DATE	DATE			
PARAMETERS	CODE	UNITS	VALUE	LIMIT	EXTRACTED	ANALYZED			

Endrin	39390	ug/1	<u>~ ,010</u>	,0/0	0/3/88	10/28
Lindane	39782	ug/l	2,010	,0/0	10/3/88	10/3/88
Methoxychlor	39480	ug/l	6.050	,050	10/3/88	10/3/28
Toxaphene	39400	ug/1	<u>, 50 x x</u>	,50	10/2/88	10/3/28
2,4-D	39730	ug/1	< ,50	,50	10/3/08	10/2/28
2,4,5-TP		ug/1	<.15	_,15	10/3/88	10 BBP

DATE OF REPORT 2/20/89

michael D. Ford SIGNATURE:

NAME (PRINTED): MICHAEL D. FORD

INTERIM STATUS MONITORING WELL SAMPLING AND DATA SHEETS

BACKGROUND QUARTERLY REPORTS

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ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO 87503

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FACILITY	NAME	Lee	Pleat	<u> </u>	EPA	I.D.	#	NMD 000709659
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Well NUMBER	SAMPLE COLLEC	TION BY	m. Jad
LABORATORY NAME	him Corp.	DATE SAM	PLED _////88
LABORATORY SAMPLE I.D.	* 5811011016 - 103	3/ TIME SA	MPLED 00 A.M.
DATE RECIEVED BY LAB.	11/3/88		
****	STORET		DATE
PARAMETERS	CODE UNITS	VALUE	ANALYZED

Elevation of G.Water	71993	ft.	3884,43	10/31/88
Well Depth		ft.	105,36	10/3/88
Well Casing Volume		gal.	2.17	88/12/01
Pump Rate		gal/min		
Pump Period	72004	min.		
Volume Evacuated	73675	gal.	7,00	10/31/88
Sampler Material		•	TEFLN	N/A
Well Sampling	Method:	BAIL		

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INDICATOR PARAMETERS [HWMR-5 Part VI, Section 265.92(b)(3)]

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	Method Used
Hq	00400	s.v.	7.20	NA	11/3/88	
	00400	S.U.	7.24	NA		non in l
	00400	S.U.	7 +0	NA	11	BPA ISO. 1
	00400	S.U.	7.24	NA	1/	
Specific Conductivity	00095	umhos/cm	540	0	11/3/88	
Conductivity	00095	unhos/cn	_540	_0		49A 120, 1
	00095	umhos/cm	557	0		<u>arn 1001</u>
	00095	unhos/cn	540	_0		
r.o.x.	70354	ug/1	490	/0	11/3/88	•
	70354	ug/l	50			20 10
	70354	ug/l		10	11	9020 (Sursy 6)
	70354	ug/l	- 70	10	11	
F.O.C.	00680	ng/l	5		11/3/88	
	00680	mg/1	5			INA ULC
	00680	mg/l	5			uppa 415,
	00680	mg/l	.5			
	2			,		

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GROUND WATER QUALITY STANDARDS [HWMR-5 Part VI Section 265.92(b)(2)]

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	Method Used
(Values for	metals	must be f	or <u>total</u> met	tals.)		*********
Chloride	00940	mg/l	7	5_	11/3/88	EPA 300,0
Iron	01045	ug/l	_ 2 40	40	11/11/88	HTA 200.7
Manganese	71883	ug/l	120		11/11/88	HA 200.7
Phenols	32730	ug/l	<u> </u>		11/3/88	LPA 420,2
Sodium	00929	mg/l	19	_/	11/3/88	EPA 200.7
Sulfate	00945	mg/l	<u>_34`</u>	2	11/3/88	EPA 300.0

PRIMARY DRINKING WATER STANDARDS [HWMR-5 Part VI, Appendix III] (Values for metals must be for <u>total</u> metals)

•				
Arsenic	01002 ug/l	<u> </u>	<u> </u>	11/14/28 BA 206.2
Barium	01007 ug/l	190		11/11/38 EFA 200.7
Cadmium	01027 ug/l	< 5		1.005 ATA 300.7
Chromium	01034 ug/l	<u> </u>		11/11/88 5PA 200.7
Lead	01051 ug/l	22	_2	11/14/88 EPA 239.2
Mercury	71900 ug/l	2.20	.20	11/10/11 EPA 245.1
Selenium	01149 ug/l	24		11/14/88 1974, 270, 2
Silver	01077 ug/l	<u> 2 30</u>	30	11/11/88 EPA 200.7
Fluoride	00980 mg/l	2,20	.20	11/3/88 EPA 3040
Nitrate	00620 mg/1	23	,02-	11/3/28 LPA 353.1
Total Coliform	31501 col/100ml	2700	<u> 20/100ml.</u>	11/3/88 SM908A

PRIMARY DRINKING WATER STANDARDS (continued)

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
Turbidity	00076	T.U.	7 لم	1.0	11/3/175	EPA HU.
Radium 226	09501	pCi/l	1.7	1pG/L	11/3/88	HPA 903.0
Radium 228	11501	pCi/l				
Gross Alpha	01501	pCi/l	6	3pGi/L	11/3/88	<u>LPA 900.0</u>
Gross Beta	03501	pCi/l		4pG/L	88/2/11	<u>EPA 900.0</u>
PARAMETERS	STOR		VALUE	DETECTION LIMIT	DATE Extracted	DATE ANALYZED
Endrin	39390	ug/1	<.010	.010	<u>p 2 88</u>	ph/88

Lindane	39782	ug/1	2:010	. 0/0	8660/21	w/7/88
Methoxychlor	39480	ug/1	<.050	,050	6444	white
Toxaphene	39400	ug/1	<,50	,50	66/88	12/1/88
2,4-D	39730	ug/1	<u> <.50</u>	,50	12/6/28	Blaker
2,4,5-TP	39045	ug/1	< ,15	,15	16/88	12/6/58

Analytical method used for the above six parameters: ____ SW 846

DATE OF REPORT 2/29

SIGNATURE: Michael D. Ford

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NAME (PRINTED): MICHAEL D FORD

MONITORING WELL IDENTIFICATION REPORT

FACILITY NAME $\[\] LEE \[GASOUNE \[PLANT \] \\ EPA I.D. NUMBER \[NMD OOO 709659 \] \\ COUNTY \[\] LEA \] \\ WELL NUMBER \[\] H 2 \] DOWN GRADIENT \] \\ WELL LOCATION (LONGITUDE) \[\] /03 \] 29 \] 35 \] \\ WELL LOCATION (LATITUDE) \] 32 \] 47 \] 55 \] \\ WELL LOCATION (LATITUDE) \] 32 \] 47 \] 55 \] \\ AQUIFER NAME \[\] OGAUALA FOPMATION \] \\ AQUIFER CONFINED \] UNCONFINED \] X \] \\ WELL INSTALLATION DATE \] \] 4/26/38 \] \\ WELL INSTALLATION DATE \] 4/26/38 \] \\ WELL INSTALLATION DATE \] 4/26/38 \] \\ DRILLING METHOD \] \] AIRRT \] \\ INNER CASING DIAMETER \] 2.25 \] \\ BOREHOLE DIAMETER \] 6.50 \] \\ CASING MATERIAL \] SS3/6 \] E PVC \] \\ METHOD OF DEVELOPMENT \] PUMPD \] \\ ELEV BOTTOM OF BOREHOLE \] 3969.63 \] \\ ELEV BOTTOM OF SCREENED INT \] 3886.444 \] \\ SURVEYED ELEV OF CASING TOP \] 3780.59 \] \\ \]$	ENVIRONMENTAL IMPROVEMENT DIVI Hazardous Waste Section 1190 St. Francis Dr./Harold Ru Santa FE, NEW MEXICO 87503	
COUNTY LEA WELL NUMBER $\#2$ DOWN GRADIENT WELL LOCATION (LONGITUDE) $1/3$ 29 $35''$ WELL LOCATION (LATITUDE) 32 47 $55''$ AQUIFER NAME $OGAUGALA$ FORMATION AQUIFER CONFINED UNCONFINED X WELL INSTALLATION DATE $4/26/89$ DRILLING METHOD $AIRRT$ INNER CASING DIAMETER $2.25''$ BOREHOLE DIAMETER $6.50''$ CASING MATERIAL $SS3/6 \ E \ PVC$ METHOD OF DEVELOPMENT $PUMPD$ ELEV BOTTOM OF BOREHOLE 3862.63 ELEV BOTTOM OF SCREENED INT 3870.78 ELEVATION OF SCREENED INT $3876.44'$	FACILITY NAMELEE GAS	SOLWE PLANT
WELL NUMBER $\#2$ DOWNGRADIENT WELL LOCATION (LONGITUDE) $/03 \circ 29 \cdot 35''$ WELL LOCATION (LATITUDE) $32 \circ 47 \cdot 55''$ AQUIFER NAME OGALALA FORMATION AQUIFER CONFINED UNCONFINED X WELL INSTALLATION DATE $4/26/88$ DRILLING METHOD AIR $2.25''$ BOREHOLE DIAMETER $2.25'''$ BOREHOLE DIAMETER $6.50'''$ CASING MATERIAL $553/6 \epsilon PVC$ METHOD OF DEVELOPMENT $PUMPD$ ELEV BOTTOM OF BOREHOLE 3862.63 ELEV BOTTOM OF WELL CASING 3868.53 ELEV BOTTOM OF SCREENED INT 3870.78 ELEVATION OF SCREENED INT $3876.44'$	EPA I.D. NUMBERNMDOC	0709659
WELL LOCATION (LONGITUDE) $/03^{\circ}$ 29° 35° WELL LOCATION (LATITUDE) 32° 47° 55° AQUIFER NAME $\bigcirc \bigcirc \bigcirc \frown \bigcirc \frown \bigcirc \bigcirc \frown \bigcirc \bigcirc \frown \bigcirc \bigcirc \frown \bigcirc \bigcirc \bigcirc \bigcirc \frown \bigcirc$	COUNTY LEA	
WELL LOCATION (LONGITUDE) 103 29 35 WELL LOCATION (LATITUDE) 32 47 55 AQUIFER NAME OGAUALA FORMATION AQUIFER CONFINED UNCONFINED X MELL INSTALLATION DATE 4/26/88 DRILLING METHOD AIRRT INNER CASING DIAMETER 2.35" BOREHOLE DIAMETER 6.50" CASING MATERIAL SS3/6 E PVC METHOD OF DEVELOPMENT PUMPD ELEV BOTTOM OF BOREHOLE 3869.63 ELEV BOTTOM OF WELL CASING 3869.53 ELEV BOTTOM OF SCREENED INT 3870.78 ELEVATION OF SCREENED INT 3876.44	Well NUMBER #2 DOWN	NGRADIENT
WELL LOCATION (LATITUDE) <u>32</u> 47 <u>S5</u> AQUIFER NAME <u>OGALIALA FOPMATION</u> AQUIFER CONFINED <u>UNCONFINED X</u> WELL INSTALLATION DATE <u>4/26/88</u> DRILLING METHOD <u>AIRRT</u> INNER CASING DIAMETER <u>2.25"</u> BOREHOLE DIAMETER <u>6.50"</u> CASING MATERIAL <u>SS3/6 E PVC</u> METHOD OF DEVELOPMENT <u>PUMPD</u> ELEV BOTTOM OF BOREHOLE <u>3869.53</u> ELEV BOTTOM OF SCREENED INT <u>3870.78</u> ELEVATION OF SCREENED INT <u>3896.444</u>	WELL LOCATION (LONGITUDE) _	
AQUIFER CONFINED UNCONFINED X WELL INSTALLATION DATE 4/26/88 DRILLING METHOD AIRRT INNER CASING DIAMETER 2.25" BOREHOLE DIAMETER 6.50" CASING MATERIAL SS3/6 E PVC METHOD OF DEVELOPMENT PUMPD ELEV BOTTOM OF BOREHOLE 3868.53 ELEV BOTTOM OF SCREENED INT 3870.78 ELEVATION OF SCREENED INT 3886.444	WELL LOCATION (LATITUDE)	
WELL INSTALLATION DATE 4/26/88 DRILLING METHOD AIRRT INNER CASING DIAMETER 2.25" BOREHOLE DIAMETER 6.50" CASING MATERIAL SS3/6 E PVC METHOD OF DEVELOPMENT PUMPD ELEV BOTTOM OF BOREHOLE 3862.63 ELEV BOTTOM OF WELL CASING 3868.53 ELEV BOTTOM OF SCREENED INT 3870.78	AQUIFER NAME OGALL	ala Formation
DRILLING METHOD <u>AIRRT</u> INNER CASING DIAMETER <u>2.25"</u> BOREHOLE DIAMETER <u>6.50"</u> CASING MATERIAL <u>SS3/6 E PVC</u> METHOD OF DEVELOPMENT <u>PUMPD</u> ELEV BOTTOM OF BOREHOLE <u>3862.63</u> ELEV BOTTOM OF WELL CASING <u>3868.53</u> ELEV BOTTOM OF SCREENED INT <u>3870.78</u> ELEVATION OF SCREENED INT <u>3896.44</u>	AQUIFER CONFINED	UNCONFINED X
INNER CASING DIAMETER 2.25" BOREHOLE DIAMETER 6.50" CASING MATERIAL 553/6 E PVC METHOD OF DEVELOPMENT PUMPD ELEV BOTTOM OF BOREHOLE 3862.63 ELEV BOTTOM OF WELL CASING 3868.53 ELEV BOTTOM OF SCREENED INT 3870.78 ELEVATION OF SCREENED INT 3876.44	WELL INSTALLATION DATE	4/26/88
BOREHOLE DIAMETER6.50"CASING MATERIALSS3/6 E PVCMETHOD OF DEVELOPMENTPUMPDELEV BOTTOM OF BOREHOLE3862.63ELEV BOTTOM OF WELL CASING3868.53ELEV BOTTOM OF SCREENED INT3870.78ELEVATION OF SCREENED INT3886.44	DRILLING METHOD	AIRPT
CASING MATERIAL <u>SS3/6 E PVC</u> METHOD OF DEVELOPMENT <u>PUMPD</u> ELEV BOTTOM OF BOREHOLE <u>3862.63</u> ELEV BOTTOM OF WELL CASING <u>3868.53</u> ELEV BOTTOM OF SCREENED INT <u>3870.78</u> ELEVATION OF SCREENED INT <u>3896.44</u>	INNER CASING DIAMETER	2.25"
METHOD OF DEVELOPMENT <u>PUMPD</u> ELEV BOTTOM OF BOREHOLE <u>3862.63</u> ELEV BOTTOM OF WELL CASING <u>3868.53</u> ELEV BOTTOM OF SCREENED INT <u>3870.78</u> ELEVATION OF SCREENED INT <u>3896.44</u>	BOREHOLE DIAMETER	6.50"
ELEV BOTTOM OF BOREHOLE <u>3862.63</u> ELEV BOTTOM OF WELL CASING <u>3868.53</u> ELEV BOTTOM OF SCREENED INT <u>3870.78</u> ELEVATION OF SCREENED INT <u>3896.44</u>	CASING MATERIAL	SS316 E PVC
ELEV BOTTOM OF WELL CASING <u>3868.53</u> ELEV BOTTOM OF SCREENED INT <u>3870.78</u> ELEVATION OF SCREENED INT <u>3886.44</u>	METHOD OF DEVELOPMENT _	PUMPD
ELEV BOTTON OF SCREENED INT 3870.78 ELEVATION OF SCREENED INT 3886.44	elev bottom of borehole	3862.63
ELEVATION OF SCREENED INT 3886.44	ELEV BOTTOM OF WELL CASING	3868.53
	ELEV BOTTOM OF SCREENED INT	3890.98
SURVEYED ELEV OF CASING TOP_3980.59	ELEVATION OF SCREENED INT	3886.44
	SURVEYED ELEV OF CASING TOP	3980.59

SIGNATURE Michael P. For DATE OF REPORT 2/22/89 NAME (TYPED) Mike Ford

b:wellid/bas

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ANNUAL SUMMARY OF MONITOR WELL DATA BACKGROUND BACKGROUND MONITORING

This form is to be used by facilities currently establishing their background monitoring well values or which have just completed their first year of data collection. This form must be submitted to NMEID before March 1. The annual report should be filled out by all facilities wit RCRA monitoring wells as per HAMR-5, Part VI. Section 265.94(a) and (b).

ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO 87503

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FACILITY N	IAME	Lee Plant
EPA I.D. N	IUMBER	IVAL 000 109659
WPT.T. NIMBE	e e	ュ

SAMPLE DATES

5/13/1 8/30/11 11/1/1V

PARAMETERS	UNITS		VAL	UE	
Elev. of G.Water	ft.	3APY. 38	3883.77	3883.57	
pH (Avg)	s.u.	7.21	6.81	7.10	
Spec Cond (Avg)	umhos/cm	1175	<u> </u>	2250	<u>,,,</u>
T.O.X. (Avg)	ug/l		_55_		****
T.O.C. (Avg)	mg/1	64	29	26	
Chloride	mg/l	190	580	480	
Iron	ug/1	100	2 40	2 40	·
Manganese	ug/1	400	1000	930	
Phenols	ug/1	: 45	<u> </u>	15	
Sodium	mg/l	64	120	84	
Sulfate	mg/l	40	20	22	

PARAMETERS	UNITS			VALUE
Arsenic	ug/1		10	<u> </u>
Barium	ug/1	260	570	570
Cadmium	ug/1	63	<u> </u>	25
Chromium	ug/l	< 30	530	<u> </u>
Lead	ug/l	<u> </u>	<u> </u>	<u> </u>
Mercury	ug/l	6.12	<18	2.20
Selenium	ug/1	< 3	<4	24
Silver	ug/l	< 3	< 30	<u> </u>
Fluoride	mg/l	<.2	1.4	4.20
Nitrate	mg/1	0.37	. 14	.15
Total Coliform	col/100ml	930	2900	800
Turbidity	T.U.	2.13	_12	
Radium 226	pCi/l	0.3	0.7	. 95
Radium 228	pCi/l			
Gross Alpha	pCi/l	3.1		2.6
Gross Beta	pCi/l	8.8	19	
Endrin	ug/l	2.010	7.010	2.010
Lindane	ug/1	<u>~ , 8/8</u>	<u>T.010</u>	2.010
Methoxychlor	ug/1	2,050	<.050	2.050
Toxaphene	ug/1	<. 57	5.50	<u>L. 50</u>
2,4-D	ug/1	2.7	5.50	4.50
2,4,5-TP	' ug/l	0.67	5.15	<u>L. 15</u>
DATE OF REPORT:	2/23/89		SIGNATUR	: Mihad D. Ford
			NAME (TYE	BD):Mike_Ford

b:backgr.2/bas

INTERIM STATUS MONITORING WELL SAMPLING AND DATA SHEETS

BACKGROUND QUARTERLY REPORTS

This set of forms is to be completed for each of your facility's quarterly evaluations during establishment of the background data for each well. The forms are to be submitted in addition to the raw data sheets provided by your laboratory. In order to be acceptable, the raw lab data sheets must include 1) the date the sample was taken, 2) the extraction date, if any, and 3) the date of analysis.

ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO \$7503

FACILITY	NAME	Les Plant	EPA	I.D.	#	NMD 000 709659

WELL NUMBER	2	_ SAMPLE COLLECT	ION BY	J.S. DUBYK
LABORATORY NAME	_R.	hini Prop	DATE SAMPLED	5/13/88 .
LABORATORY SAMPLE	I.D. #	880513900	TIME SAMPLED	9:00 A.M.
DATE RECIEVED BY		=/14/12		

PARAMETERS	STORET Code	UNITS	VALUE	DATE Analyzed
Elevation of G.Water	71993	ft.	<u>3884,38</u>	5/13/88
Well Depth		ft.	109,10	11
Well Casing Volume		gal.	2,59	11.
Pump Rate	49992	gal/min	0.20	
Pump Period	72004	min.	4300	
Volume Evacuated	73675	gal.	869	11
Sampler Material	: 		کې	N/A
Well Sampling	Method:	BFB		

INDICATOR PARAMETERS [HWMR-5 Part VI, Section 265.92(b)(3)]

A. 1

PARAMETERS	STORET CEDE	UNITS	VALUE	DETECTION LIMIT	DATE Analyzed	METHOD USED
рH	00400	S.U.	7.26	NA	5/14/8P	
	00400	S.U.	7.19	NA	<i>I</i> I	
	00400	s.u.	7.18	N/A_	/I	EAA 150.1
	00400	s.u.	7.19	N/A	JI	
Specific Conductivity	00095	umhos/cm	1170	0	5/14/28	
conductivity	00095	unhos/cn	1170	0	1(
	00095	unhos/cm	1180	0		<u>EPA 120.</u> 1
	00095	unhos/cm	1180	<u> </u>		•
T.O.X.	70354	ug/l	_5		5/14/28	-
	70354	ug/l	5			A .
	70354	ug/1	<u> </u>		11	9020 (SW 846)
	70354	ug/l	2 20	/0		
T.O.C.	00680	mg/l	60		5/14/28	
	00680	mg/l	65	/	11	FAA U.F
	00680	mg /1	_60	/		EPA 415.
	00680	ng/l	70		+(

GROUND WATER QUALITY STANDARDS [HWMR-5 Part VI Section 265.92(b)(2)]

a. 1,

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE Analyzed	METHOD USED
(Values for	metals	must be fo	or <u>total</u> me	tals.)		
Chloride	00940	mg/l	190	.5	5/14/88	<u>EPA 300.</u> 0
Iron	01045	ug/l	100	40	5/23/88	EPA 2007
Manganese	71883	ug/l	400	10	5/22/28	EPA 200.7
Phenols	32730	ug/l	< 5		5/14/88	EPA 420.2
Sodium	00929	mg/l	64	/	5/14/88	EPA 200.
Sulfate	00945	mg/l	40		_5/rv/88	EPA 300.0

PRIMARY DRINKING WATER STANDARDS [HWMR-5 Part VI, Appendix III] (Values for metals must be for <u>total</u> metals)

Arsenic 01002 ug/1 /3 /4 $5/h5/88$ EPA 206.2 Barium 01007 ug/1 260 /0 $5/b2/88$ EPA 206.2 Cadmiun 01007 ug/1 43 5 $5/b2/88$ EPA 206.7 Cadmiun 01027 ug/1 43 5 $5/b2/88$ EPA 200.7 Chromiun 01034 ug/1 43 5 $5/b2/88$ EPA 200.7 Lead 01051 ug/1 43 5 $5/b2/88$ EPA 200.7 Lead 01051 ug/1 43 5 $5/b2/88$ EPA 200.7 Mercury 71900 ug/1 4.3 5 $5/b2/87$ EPA 245.1 Seleniun 01149 ug/1 43 5 $5/b2/87$ EPA 270.2 Silver 01077 ug/1 43 30 $5/b2/87$ EPA 200.7 Fluoride 00950 $mg/1$ 4.3 30 $5/b2/87$ EPA 200.7 Fluoride 00950 $mg/1$ 4.3 30				•		~
Cadmium 01027 ug/1 $\angle 3$ \leq $\leq b3/98$ $E(A ros)^{-7}$ Chromium 01034 ug/1 $\angle 30$ $\delta 0$ $\leq b3/98$ $E(A ros)^{-7}$ Chromium 01034 ug/1 $\angle 30$ $\delta 0$ $\leq b3/98$ $E(A ros)^{-7}$ Chromium 01034 ug/1 $\angle 30$ $\delta 0$ $\leq b3/98$ $E(A ros)^{-7}$ Lead 01051 ug/1 $\angle 30$ $\delta 0$ $\leq b3/98$ $EPA cos)^{-7}$ Mercury 71900 ug/1 $\angle 3$ \sum $5/16/88$ $EPA cos)^{-7}$ Mercury 71900 ug/1 $\angle ./2$ $$ $5/18/89$ $EPA cos)^{-7}$ Selenium 01149 ug/1 $\angle 3$ 30 $5/18/89$ $EPA cos)^{-7}$ Silver 01077 ug/1 $\langle 3$ 30 $5/13/89$ $EPA cos)^{-7}$ Fluoride 00980 $mg/1$ $\langle 2$ $$ $S/19/89$ $EPA cos)^{-7}$ Nitrate 000820 $mg/1$ $\langle 2$ $$ $S/19/89$ $EPA cos)^{-1}$ Nitrate </th <th>Arsenic</th> <th>01002 ug/l</th> <th>/3</th> <th>4</th> <th>5/16/88</th> <th>EPA 206. 2</th>	Arsenic	01002 ug/l	/3	4	5/16/88	EPA 206. 2
Chromium 01034 ug/1 $\angle 30$ $5/32/89$ E/A 200.7 Lead 01051 ug/1 $\angle 2$ \sum $5/16/89$ E/A 200.7 Mercury 71900 ug/1 $\angle /2$ \sum $5/16/89$ E/A 256.2 Mercury 71900 ug/1 $\angle /2$ \sum $5/16/89$ E/A 245.1 Selenium 01149 ug/1 $\angle 3$ 5 $5/16/89$ E/A 245.1 Silver 01077 ug/1 $\angle 3$ 30 $5/32/89$ E/A 200.7 Silver 01077 ug/1 $\angle 3$ 30 $5/32/89$ E/A 200.7 Fluoride 00980 $mg/1$ $\angle 3$ 30 $5/32/89$ E/A 200.7 Fluoride 00980 $mg/1$ $\angle .2$ $.2$ $S/19/89$ E/A 200.7 Nitrate 00980 $mg/1$ $\Delta .2$ $.2$ $S/19/89$ E/A 200.7 Nitrate 00980 $mg/1$ 0.37 02	Barium	01007 ug/l	260	/0	5/23/88	EPA 2007
Lead 01051 ug/1 42 2 $5/16k98$ $EPA 255.2$ Mercury 71900 ug/1 $4/2$ 12 $5/28/122$ $EPA 245.1$ Selenium 01149 ug/1 43 $5'$ $5/16/89$ $EPA 245.1$ Selenium 01149 ug/1 43 $5'$ $5/16/89$ $EPA 200.2$ Silver 01077 ug/1 43 30 $5/23/89$ $EPA 200.7$ Fluoride 00980 $mg/1$ 4.2 $2'$ $5'$ $5/14/89$ $EPA 200.7$ Fluoride 00980 $mg/1$ 4.2 $2'$ $5/14/89$ $EPA 300.0$ Nitrate 00620 $mg/1$ 0.377 022 $5/14/89$ $EPA 3253.1$ Total $3/14/89$ $EPA 35'3.1$ $3/14/89$ $5/14/89$ $5/14/89$	Cadmium	01027 ug/l	<u> ∠ 3</u>		5/23/28	ELA 100.7
Mercury 71900 ug/1 $\angle ./2$ $./2$ $\underline{5/2/12}$ $\underline{EPA > ES. 1}$ Selenium 01149 ug/1 $\angle 3$ $\underline{5}$ $\underline{5/16/89}$ $\underline{EPA > 10.2}$ Silver 01077 ug/1 $\angle 3$ $\underline{30}$ $\underline{5/23/99}$ $\underline{EPA > 00.2}$ Silver 01077 ug/1 $\angle 3$ $\underline{30}$ $\underline{5/23/99}$ $\underline{EPA > 00.7}$ Fluoride 00980 ug/1 $\angle .2$ $.2$ $\underline{5/14/89}$ $\underline{EPA > 00.7}$ Nitrate 00980 ug/1 $\angle .2$ $.2$ $\underline{5/14/89}$ $\underline{EPA > 00.7}$ Nitrate 00980 ug/1 $\underline{6.37}$ $.2$ $\underline{5/14/89}$ $\underline{EPA > 00.0}$ Nitrate 00920 ug/1 $\underline{0.37}$ $.2$ $\underline{5/14/89}$ $\underline{EPA > 0.2}$ Total $\overline{5/14/89}$ $\underline{5/14/89}$ $\underline{5/14/89}$ $\underline{5/14/89}$ $\underline{5/14/89}$	Chromium	01034 ug/l		30	5/23/28	EPA 200.7
Selenium 01149 ug/1 $\angle 3$ \preceq $\underline{S/16/89}$ \underline{EPA} $\underline{210.2}$ Silver 01077 ug/1 $\angle 3$ $\underline{30}$ $\underline{S/34/89}$ \underline{EPA} $\underline{200.7}$ Fluoride 00980 ug/1 $\angle .2$ $\underline{2}$ $\underline{S/14/89}$ \underline{EPA} $\underline{200.7}$ Fluoride 00980 ug/1 $\angle .2$ $\underline{2}$ $\underline{S/14/89}$ \underline{EPA} $\underline{200.7}$ Nitrate 00980 ug/1 0.377 $.024$ $\underline{S/14/89}$ \underline{EPA} $\underline{200.0}$ Nitrate 009820 ug/1 0.377 $.024$ $\underline{S/14/89}$ \underline{EPA} $\underline{250.0}$ Total $\overline{200.00}$ 200	Lead	01051 ug/l	62	مل	5/16/88	<u>EPA 239.2</u>
Silver 01077 ug/l <3 30 $5/33/98$ EPA 200.7 Fluoride 00980 mg/l <2 2 $5/19/88$ EPA 300.0 Nitrate 00980 mg/l 0.37 02 $5/19/88$ EPA 300.0 Nitrate 00980 mg/l 0.37 02 $5/19/88$ EPA 353.1 Total 300 300 300 300 300 300 300	Mercury	71900 ug/l	4.12	. 12	shelve	EPA 245.1
Fluoride 00980 mg/l $\angle .2$ $.2$ $5/14/28$ $EPA 300.0$ Nitrate 00620 mg/l 0.37 $.02$ $5/14/28$ $EPA 353.0$ Total $2/14/28$ $EPA 353.0$ $2/14/28$ $EPA 353.0$	Selenium	01149 ug/l	3		5/16/88	EPH 270.2
Nitrate 00620 $mg/1$ 0.37 .02 $s/ly/\partial \theta$ EPA 353.1 Total	Silver	01077 ug/l	< 3		5/23/98	EPA 200.7
Total	Fluoride	00950 mg/l	2.2	. 2	5/14/88	EPA 300.0
	Nitrate	00620 mg/l	0.37	. 02	<u> 5/14/88</u>	EPA 353.1
		: 31501 col/100ml	930	is from !	5/1/88	Sm 905H

PRIMARY DRINKING WATER STANDARDS (continued)

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
Turbidity	00076	T.U.	2.13	INTU	5/14/82	EPA 180.1
Radium 226	09501	pCi/l	0.3	1pC:/L	5/14/88	<u>EPA 903.0</u>
Radium 228	11501	pCi/l				
Gross Alpha	01501	pCi/l	/	3pCi/L	5/14/88	EPA 900.0
Gross Beta	03501	pCi/l	8.8	4 pCilL	5/14/28	EPA 900.0
PARAMETERS	STOR		VALUE	DETECTION LIMIT	DATE Extracted	DATE ANALYZED

Endrin	39390	ug/l	4010	.010	-Shold	6/477
Lindane	39782	ug/l	1.010	. 010	5/10/27	45/81
Methoxychlor	39480	ug/1	2,050	. 050	5/16/88	6/5/88
Toxaphene	39400	ug/1	2.50	. 50	5/16/17	6/5/00
2,4-D	39730	ug/l	7.7		5/20/17	5/x/r
2,4,5-TP	39045	ug/1	0.67		Into	Sulle

DATE OF REPORT 3/16/89

SIGNATURE: Michael D. Ford NAME (PRINTED): MICHAEL D. FORD

INTERIM STATUS MONITORING WELL SAMPLING AND DATA SHEETS

BACKGROUND QUARTERLY REPORTS

This set of forms is to be completed for each of your facility's quarterly evaluations during establishment of the background data for each well. The forms are to be submitted in addition to the raw data sheets provided by your laboratory. In order to be acceptable, the raw lab data sheets must include 1) the date the sample was taken, 2) the extraction date, if any, and 3) the date of analysis.

ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO \$7503

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FACILITY NAM	s	en H.	last	EPA	I.D.	* NMD00070965
--------------	---	-------	------	-----	------	---------------

WELL NUMBER	<u>*</u> 2	SAMPLE COLLECTIO	ON BY MI. Jod
LABORATORY I		elin Corp	DATE SAMPLED 8/30/28
LABORATORY S	SAMPLE I.D.	* 580830 L20 - 1234	TIME SAMPLED 12.00 P.M.
DATE RECIEVI	ED BY LAB.	9/,/m	

PARAMETERS	STORET CODE	UNITS	VALUE	DATE Analyzed
Elevation of G.Water	71993	ft.	3883.77	8/29/88
Well Depth		ft.	109.10	8/199/195
Well Casing Volume		gal.	2.54	8/29/28
Pump Rate		gal/min	ختے۔	- <u>میں م</u> الیک کار
Pump Period	72004	min.		
Volume Everymeted	73675	gal.	8,00	8/29/88
Sampler Material			TEFLN	N/A
Well Sampling	Method:	BAIL		

INDICATOR PARAMETERS [HWMR-5 Part VI, Section 265.92(b)(3)]

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	Method Used
pH	00400	S.U.	6.85	NA	9/1/88	
	00400	S.U.	6.80	NA	<u> </u>	
	00400	s.v.	6.80	NA	11	<u>EPA 150. </u>
	00400	S.U.	6.78	NA	·/	
Specific	00095	umhos/cm	2240		9/1/88	
Conductivit	y 00095	unhos/cm	2210		11	EPA DO.1
	00095	umhos/cm	2270	0	11	ETH Poil
	00095	umhos/cm	2230	0	11	
T.O.X.	70354	ug/l	60		9/1/28	
	70354	ug/l	50	10	11	
	70354	ug/1	50	10	11	9020 (Sw246)
	70354	ug/1	60		1(
I.O.C.	00680	mg/l			9/1/85	
	00680	ng/l	27			
	00680	mg/l	33		(l	BA 415.
	00680	mg/l	30			

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
(Values for	metals	must be fo	or <u>total</u> me	tals.)		
Chloride	00940	mg/l	580	5		EPA 300.0
Iron	01045	ug/l	240	40	9/16/38	EPA 200.7
Manganese	71883	ug/l	1000	/0	9/16/88	EPA 200.
Phenols	32730	ug/l	25		7/1/88	EPA 420
Sodium	00929	mg/l	120		9/1/88	EPA 200.7
Sulfate	00945	mg/l	<u></u>	2	<u>al1/88</u>	EPA300.0

PRIMARY DRINKING WATER STANDARDS [HWMR-5 Part VI, Appendix III] (Values for metals must be for <u>total</u> metals)

•					
Arsenic	01002 ug/l		<u> </u>	9/6/88	EPA 206.2
Barium	01007 ug/l	570		9/16/88	68A200.7
Cadmium	01027 ug/l	< 5		5/x/88	EPA 200,7
Chromium	01034 ug/l	< 30	<u> </u>	9 116 188	EPA 200.7
Lead	01051 ug/l	_22_	2	9/6/88	EPA 239,2
Mercury	71900 ug/l	218	.18	9/14/1	LPA 245.1
Selenium	01149 ug/l	24	5	9/6/88	BA 270.2
Silver	01077 ug/l	< 30	30	9/16/88	EPA 200.7
Fluoride	00980 mg/1	1.4	_,2	9/1/88	HPA 300,0
Nitrate	00620 mg/1	0.14	,02	7/1/88	6PA 353.
Total Coliform	31501 col/100ml	2900	20/100 ml.	9/1/88	<u>sm908A</u>

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE Analyzed	METHOD USED
Turbidity	00076	T.U.	/2	I.O NTU	9/.111	LPA 180.1
Radium 226	09501	pCi/l	0.7	1pCilL	9/1/88	HPA 903.0
Radium 228	11501	pCi/l				
Bross Alpha	01501	pCi/l		3pGilL	9/1/38	<u>499</u> 900 0
Gross Beta	03501	pCi/l		4pG/L	9/1/28	EPA 900.0
	STOR	 ET		DETECTION	DATE	DATE
PARAMETERS	CODI	L UNITS	VALUE	LIMIT	EXTRACTED	ANALYZED
		E UNITS	VALUE <.0/0	LIMIT 0/0	EXTRACTED	ANALYZED
Indrin	CODI					
Endrin Lindane	CODI 39390 39782	ug/l	<.0/0		<u>N/3/88</u>	Nata
Endrin Lindane	CODI 39390 39782	ug/l ug/l	<u><.0/0</u> <.0/0	. 010 . 010	<u>N/3/88</u> 10/3/88	<u>edela</u> 8812/0
Endrin Lindane Methoxychlo:	CODI 39390 39782 r 39480	ug/l ug/l ug/l	<.0/0 <.0/0 <.050	. 010 . 010 . 050	<u>N/3/88</u> 10/3/88 10/3/88	<u>10/2/88</u> 10/2/88 10/2/88

Analytical method used for the above six parameters: <u>Sw846</u>

DATE OF REPORT 2/20/89

SIGNATURE: Michael D. Ford

NAME (PRINTED): MICHAEL D. FORD

BACKGROUND QUARTERLY REPORTS

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ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO 87503

FACILITY	NAME	- Lee Alent	EPA	I.D.	#	NMD000 709659

WELL NUMBER	SAMPLE COLLECTIO	ON BY Jour
LABORATORY NAME	Rading long.	DATE SAMPLED _11/1/88
LABORATORY SAMPLE	I.D. # 88/10/1155 - 1211	TIME SAMPLED _/2:00 P.M.
DATE RECIEVED BY I	LAB. <u>11/3/172</u>	

PARAMETERS	STORET CODE	UNITS	VALUE	DATE ANALYZED
Elevation of G.Water	71993	ft.	3883.57	10/31/88
Well Depth		ft.	109.10	10/3/88
Well Casing Volume	~~~~	gal.	2,49	10/2/28
Pump Rate		gal/min		فالتبيب مورجيني
Pump Period	72004	min.		
Volume Evacuated	73675	gal.	8.00	10/31/88
Sampler Material	-		TEFLN	N/A
Well Sampling	Method:	BAIL	-	

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	Method Used
рН	00400	s.v.	6.92	NA	11/3/88	
	00400	S.U.	7.80	NA	<u>н</u>	
	00400	s.u.	6.81	NA		EPA 150,
	00400	S.U.	6.86	NA	<u> </u>	
Specific	00095	umhos/cm	2300	6	11/3/07	
Conductivity	7 00 095	unhos/cm	2300	0	11	
	00095	umhos/cm	2200	0		EPA DOI
	00095	unhos/cm	2200	_0		
						• • •
T.O.X.	70354	ug/l	/30	10	11/3/28	
	70354	ug/1	210	10	11	9020
	70354	ug/1	240			(SW846)
	70354	ug/1	/00		•••	
			2		11/3/20	
T.O.C.	00680	mg/l		<u></u>	11	
	00680	ng/l				EPA 45.
	0680	mg/1	<u> </u>			
	00680	ng/1	8		<u> </u>	

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	Method Used
(Values for	metals	must be fo	or <u>total</u> me	tals.)	****	
Chloride	00940	mg/l	480	5	11/3/88	EPA 300.0
Iron	01045	ug/l	540	40	11/11/28	EPA 200.7
Manganese	71883	ug/l	930		11/11/28	EPA 200.
Phenols	32730	ug/l	<5	_5	11/3/88	HPA 420.
Sodium	00929	mg/l	84	_/	11/2/88	EPA 200.
Sulfate	00945	mg/l	<u></u>	<u> </u>	11/3/88	EPA300.0

PRIMARY DRINKING WATER STANDARDS [HWMR-5 Part VI, Appendix III] (Values for metals must be for <u>total</u> metals)

• • • • • • • • • • • • •					
Arsenic	01002	1 <u>-</u>	44	11/14/88	1994 206 a
Barium	01007	1g/1 _57	10 10	<u></u>	EPA 200.7
Cadmium	01027	1g/1 < <u><</u> 5	- 5	11/11/88	EPA 200,7
Chromium	01034	1 <u>≺3</u>		11/11/188	6PA 200.7
Lead	01051	<u>دے</u> 1/ود	<u> </u>	11/14/88	6PA 239.2
Mercury	71900	1g/1 <u>4</u> .	20 .20	11/10/24	4PA 245.1
Selenium	01149	ug/1 <u> 4</u>	4 5	11/14/88	EPA 270.2
Silver	01077	ug/1 <u>< 3</u>	<u> </u>	11/11/88	EPA 200.7
Fluoride	00950	ng/1 <u></u>	20	11/3/88	EPA.300.0
Nitrate	00620	ng/1 <u>0.1</u>	- ,02	11/2/88	HPA353.1
Total Coliform	31501 co	1/100ml _	00 <u>20/100 m</u>	11/2/28	SM908A

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	Method Used
Turbidity	00076	T.U.	10		11/3/02	130.1
Radium 226	09501	pC1/l	0.95	1pGilL	11/3/88	<u>EPA 903.0</u>
Radium 228	11501	pCi/l		· · · · · · · · · · · · · · · · · · ·	وستاندی 	
Gross Alpha	01501	pCi/l	2.6	3pCilL	11/3/88	67A 900.0
Gross Beta	03501	pCi/l	14	4. Cill	11/3/88	<u>499 900.0</u>

	STORET			DETECTION	DATE	DATE
PARAMETERS	CODE	UNITS	VALUE	LIMIT	EXTRACTED	ANALYZED

Endrin	39390	ug/l	<.010	,010	46/28	BHBB
Lindane	39782	ug/l	2.010	,010	88/6/4	<u>86/1/4</u>
Methoxychlor	39480	ug/l	5.050	,050	<i>b12188</i>	12/7/88
Toxaphene	39400	ug/1	< ,50	_,50	12/2/28	12/7/08
2,4-D	39730	ug/1	<,50	,50	4/4/88	16/88
2,4,5-TP	39045	ug/1	< ,15	.15	4/6/PP	4/6/28

DATE OF REPORT 2/2/89

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SIGNATURE: Mihael D. Fod

NAME (PRINTED): MICHAEL D. FORD

MONITORING WELL IDENTIFICATION REPORT

ENVIRONMENTAL IMPROVEMENT DIVI Hazardous Waste Section 1190 St. Francis Dr./Harold Ru Santa FE, NEW MEXICO 87503	
FACILITY NAME LEE GASOLI	NE PLANT
EPA I.D. NUMBERNMD00070	9659
COUNTY LEA	
WELL NUMBER DOWN (
WELL LOCATION (LONGITUDE)	<u>103 29 36</u>
WELL LOCATION (LATITUDE)	<u>32° 47'55'</u>
AQUIFER NAME OGHLL	ALA FORMATION
AQUIFER CONFINED	UNCONFINED X
WELL INSTALLATION DATE	4/27/88
DRILLING METHOD	AIRRT
INNER CASING DIAMETER	2.25"
BOREHOLE DIAMETER	6.50"
CASING MATERIAL	SS316 E PVC
METHOD OF DEVELOPMENT	pumpd
ELEV BOTTOM OF BOREHOLE	3862,88
ELEV BOTTOM OF WELL CASING	3871,27
ELEV BOTTON OF SCREENED INT	3893,85
ELEVATION OF SCREENED INT	3889.18
SURVEYED ELEV OF CASING TOP	3980.37

SIGNATURE_ Mihael D. Ford DATE OF REPORT 2/23/89 NAME (TYPED) Mike Ford

b:wellid/bes

ANNUAL SUMMARY OF MONITOR WELL DATA BACKGROUND BACKGROUND MONITORING

This form is to be used by facilities currently establishing their background monitoring well values or which have just completed their first year of data collection. This form must be submitted to NMEID before March 1. The annual report should be filled out by all facilities wi RCRA monitoring wells as per HMR-5, Part VI, Section 265.94(a) and (b).

ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO 87503

FACILITY NA	ME Le Ment
EPA I.D. NU	MBER
WELL NUMBER	3

SAMPLE DATES

5/12/14 3/30/81 11/1/81

PARAMETERS	UNITS	VALUE					
Elev. of G.Water	ft.	3234.15	3883.75	3883.56			
pH (Avg)	S.U.	8.08	7.61	7.45			
Spec Cond (Avg)	umhos/cm	810	822	843			
T.O.X. (Avg)	ug/l						
T.O.C. (Avg)	mg/l	/33					
Chloride	mg/l	60	83	180			
Iron	ug/l	46	< 40	<u>L 40</u>			
Manganese	ug/1		510	<u>< 10</u>			
Phenols	ug/1	<u> </u>	55	90			
Sodium	ng/l	170	160	130			
Sulfate	mg/l	46	42	_34			

PARAMETERS	UNITS			VALUE
Arsenic	ug/l	/30	_336	310
Barium	ug/1	60	70	12
Cadmium	ug/l	<u> </u>	<u> </u>	15
Chromium	ug/l	< 3 3	<u> 730</u>	<u>د ع</u> ه
Lead	ug/l	< 2	52	22
Mercury	ug/l	< . 12	.09	2.20
Selenium	ug/l	< 3	<u> </u>	24
Silver	ug/l	< 3	530	230
Fluoride	mg/l	<,2	<u> </u>	6.20
Nitrate	mg/l	0.2	0.10	,/3
Total Coliform	col/100ml	240	\$700	200
Turbidity	T.U.	<u>ح :ک</u>	46	<u> </u>
Radium 226	pCi/l	0.11	0.6	.36
Radium 228	pCi/l			قتين
Gross Alpha	pCi/l	61.4	_5	3.5
Gross Beta	pCi/l	<u> </u>		<u> </u>
Endrin	ug/l	<.010	K.010	2.010
Lindane	ug/1	6.010	< .010	2.010
Methoxychlor	ug/l	2,050	< .050	4.050
Toxaphene	ug/1	<u><.50</u>	< .50	2.50
2,4-D	ug/1		<u> < , 50</u>	4.50
2,4,5-TP	ug/1	<u><.10</u>	< .15	2.15
DATE OF REPORT:	2/23/29		SIGNATURE	: Mital D. Lord
				ARD) . Miko Cond

NAME (TYPED) : Mike Ford

b:backgr.2/bas

BACKGROUND QUARTERLY REPORTS

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ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO \$7503

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PACILITY NAME Su Plant EPA I.D.	#	NMD000709659
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WELL NUMBER	<u> </u>	SAMPLE	COLLECTION B	¥ _W.	S. DUBYK
LABORATORY NAME	Radun	Corp.	DA	TE SAMPLED _	5/12/88
LABORATORY SAMPLE	I.D. #	880512	/850 T	IME SAMPLED	7:00 P.M.
DATE RECIEVED BY L.	AB	5/14	1n	•	
PARAMETERS	ST(CO	DRET DE UI	NITS VA	-	ATE Lyzed

Elevation of G.Water	71993	ft.	3034.15	5/4/88
Well Depth		ft.	106.61	<u> </u>
Well Casing Volume		gal.	2,10	
Pump Rate		gal/min	0.20	11
Pump Period	72004	min.	2750	
Volume Evacuated	73675	gal.	022	11
Sampler Material	-		ک	N/A
Well Sampling	Method:	BFE	3	

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
рH	00400	s.u.	8.13	NA	5/14/88	
	00400	S.U.	8.08	NIA	11	- 4
	00400	S.U.	8.06	NIA		<u>EPA 150</u> .1
	00400	S.U.	8.05	NA	H	
Specific	00095	umhos/cm	810	0	5/14/88	
Conductivity	00095	umhos/cm	\$10	0	·/	EMA 120.1
	00095	umhos/cm	810	<u> </u>		ETH I'VU.I
	00095	umhos/cm	810	•	1(. •
T.O.X.	70354	ug/l	< 70		6/14/88	
	70354	ug/l	< 20		11	
	70354	ug/l	5			<u>9020</u> (Sw 346
	70354	ug/l	< 20			
T.O.C.	06800	ng/l	160		5/14/00	
	00680	ng/l	_115			- AA 11
	00680	mg/l	120		lı	EPA 415.
	00680	mg/l	135		- 1/	

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	Method Used
(Values for	metals	must be fo	or <u>total</u> me	tals.)		
Chloride	00940	mg/l	60	. 5	5/14/88	EPA 300.0
Iron	01045	ug/l	46	40	5/23/28	FPA 200.7
Manganese	71883	ug/l		_/0	5122/28	ETH 200.7
Phenols	32730	ug/l	< 5		5/14/28	EFA +20.2
Sodium	00929	mg/l	170		5/14/28	<u>EPA 200,</u> 7
Sulfate	00945	mg/l	46	<u> </u>	5/14/88	EPA 200.0

PRIMARY DRINKING WATER STANDARDS [HWMR-5 Part VI, Appendix III] (Values for metals must be for <u>total</u> metals)

Arsenic	01002 ug/l	/30		5/K/AP	EPA 206.2
Barium	01007 ug/l	60	/0	5/23/88	EPA 200.7
Cadmium	01027 ug/l	< 3		6/23/28	EPA 200.7
Chromium	01034 ug/l	230	30	5/23/88	EPA 200.7
Lead	01051 ug/l	12		5/16/88	EPA 239.2
Mercury	71900 ug/l	1.12	12	5/23/W	EPA 2451
Selenium	01149 ug/l	< 3	5	5/16/80	EPA 270 2
Silver	01077 ug/l	< 3	30	5/23k88	EPA 2007
Fluoride	00950 mg/l	2,2	. 2	5/14/28	EPA 300.0
Nitrate	00620 mg/l	0.2	102	5/14/28	EPA 2531
Total Coliform	: 31501 col/100	1 240	25/100 ML	5/14/20	<u>CM 908</u>

(* C

<u>5, 1</u> <u>0, 11</u> <u>4, 4</u> <u>3, 3</u>	$\frac{\int NTU}{\int \rho C \cdot \int L}$ $\frac{\int \rho C \cdot \int L}{\int \phi C \cdot \int L}$ DETECTION LIMIT	<u>5/14/87</u> <u>5/14/88</u> <u>5/14/88</u> <u>5/14/88</u> <u>5/14/88</u> <u>5/14/88</u>	<u>EPA 180</u> .1 <u>EPA 903</u> .0 <u>EPA 900</u> .0 <u>EPA 900</u> .0 DATE ANALYZED
<u> </u>	$\frac{3_{p}C_{r}/L}{4_{p}C_{r}/L}$ DETECTION	<u>5/14/78</u> <u>5/14/78</u> <u>5/14/28</u> DATE	<u>EPA 900</u> .0 <u>EPA 900</u> .0 DATE
<u> </u>	<u>4, C, /L</u> Detection	<u>s//y68</u> date	<i><u>E µA</u> 900.0 Date</i>
3.3	<u>4, C, /L</u> Detection	<u>s//y68</u> date	<i><u>E µA</u> 900.0 Date</i>
	DETECTION	DATE	DATE
TS VALUR			

2,010	0.010	<u>_5/14/1/1</u>	19d
2,010	0.010	5/16/11	6KIN
2.050	.050	5/16/88	6/5/88
2,50	<u>ə. 50</u>	5/16/11	6/5/08
	<u>D.50</u>	5/18/21	5/2elor
<u> </u>	• • •	dista	12/10
	1 <u>1.1</u>	1 <u>1.1</u> <u>D.50</u>	,

DATE OF REPORT 3/16/89

SIGNATURE: Michael D. Ford

NAME (PRINTED): MICHAEL D. FORD

BACKGROUND QUARTERLY REPORTS

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ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO 87503

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FACILITY NAM	- Lee	Plant	EPA I.D.	#	NMD000 709659	_

COLTROMIC

GIMDT B

	JAME	NE CONTROL	TON BI	-m.
LABORATORY NAME	eni con	<u>a</u>	DATE SAM	PLED 5/30/88
LABORATORY SAMPLE 1.D.	880830	216 - 231	TIME SA	MPLED 2:00 AM.
DATE RECIEVED BY LAB.	- 9	1.141		
PARAMETERS	STORET CODE	UNITS	VALUE	DATE Analyzed
Elevation of G.Water	71993	ft.	3883.75	8/09/83
Well Depth		ft.	/06.61	8/29/88
Well Casing Volume		gal.	2.06	8/29/28
Pump Rate		gal/min	 حمینیے مسیدی مسید	·
Pump Period	72004	min.		
Volume Evacuated	73675	gal.	7,00	8189/28
Sampler Material			TEFLN	N/A
Well Sampling	Method.	BAIL		

s.

INDICATOR PARAMETERS [HWMR-5 Part VI, Section 265.92(b)(3)]

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE Analyzed	METHOD USED
pH	00400	s.v.	7.60	NA	9/1/88	· · ·
	00400	S.U.	7.55	NA	<u> </u>	
	00400	S.U.	7.66	ALA		<u>epa 150. </u>
	00400	S.U.	7.61	<u>n/a</u>		
Specific	00095	umhos/cm	833	0	9/1/88	
Conductivity	00095	unhos/cm	207	0	11	EPA 120.1
	00095	umhos/cm	812	0		CHI 180,1
	00095	umhos/cm	834	ð	11	
T.O.X.	70354	ug/l			9/1/88	
	70354	ug/l	_5		11	9020
	70354	ug/1	5	10	· · · · · · · · · · · · · · · · · · ·	(SW846)
	70354	ug/1	5	10		
T.O.C.	00680	ng/l	.5		9/1/88	
	00680	mg/l	.5	!	<u> </u>	ma lic
	00680	mg/l	_,5		<u> </u>	68A 415.
	00680	mg/l	_,5		- I C	

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
(Values for	metals	must be fo	or <u>total</u> me	tals.)		
Chloride	00940	mg/l	83	5	9/1/88	EPA 300.0
Iron	01045	ug/l	240	40	9/16/88	6PA 200.7
Manganese	71883	ug/l		_/0	9/16/88	EPA 200.7
Phenols	32730	ug/l	15		9/1/88	EPA 420.2
Sodium	00929	mg/1	160		9/1/88	ERA 200.7
Sulfate	00945	mg/l	42		9/1/88	ETA-300.0

PRIMARY DRINKING WATER STANDARDS [HWMR-5 Part VI, Appendix III] (Values for metals must be for <u>total</u> metals)

Arsenic	01002	ug/l		<u> </u>	9/6/88	EPA 2062
Barium	01007	ug/l	<u> </u>		9/16/28	BPA 200.7
Cadmium	01027	ug/1	15	5	9/16/88	BA200.7
Chromium	01034	ug/1	< 30		9/16/88	EPA2007
Lead	01051	ug/1		<u></u>	9 /6/88	BA 239,2
Mercury	71900	ug/1	.09		3/14/47	BPA 245.1
Selenium	01149	ug/l	24		9/6/38	EPA 270.2
Silver	01077	ug/l	<30	30	9/11/88	EPA 200.7
Fluoride	00950	mg/l	4,2	12	9/1/88	EPA.300.0
Nitrate	00620	mg/l	0,10	,02	91,188	EPA 353.1
Total Coliform	31501	col/100ml	8700	20/100ml.	9/1/28	SM908A

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE Analyzed	METHOD USED
Turbidity	00076	T.U.	46	1.0 NTU	9/1/1	EPA 180.
Radium 226	09501	pCi/l	0.6	IpGi/L	9/1/88	EM 903.0
Radium 228	11501	pCi/l				
Gross Alpha	01501	pCi/l		3pGil	9/1/88	ETA 900.0
Gross Beta	03501	pCi/l		4p Cill	9/1/88	<u>499 900.0</u>
PARAMETERS	STORI Codi		VALUE	DETECTION LIMIT	DATE . Extracted	DATE ANALYZED
Endrin	39390	ug/1	<.010	_010	10/3/88	p/300
Lindane	39782	ug/1	< .010	,010	10/3/88	<u>p/3688</u>
Methoxychlor	-39480	ug/1	<.050	,050	10/2/88	10/2/28
Toxaphene	39400	ug/l	<,50	, 50	10/3/88	10/3/28
2.4-D	39730	ug/l	< ,50	,50	10 kber	Ratelor

<u>e, 15</u>

,15

Analytical method used for the above six parameters: <u>SW846</u>

2,4,5-TP

39045

ug/1

DATE OF REPORT 2/20/89

SIGNATURE: Mihael D. Ford NAME (PRINTED): MICHAEL D. FORD

10/2/28

10/3/20

BACKGROUND QUARTERLY REPORTS

This set of forms is to be completed for each of your facility's quarterly evaluations during establishment of the background data for each well. The forms are to be submitted in addition to the raw data sheets provided by your laboratory. In order to be acceptable, the raw lab data sheets must include 1) the date the sample was taken, 2) the extraction date, if any, and 3) the date of analysis.

ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO \$7503

FACILITY	NAME	her Plant	EPA	I.D.	#	NMD 000709659

WELL NUMBER	#3	SAMPLE COLLEC	TION BY	. Ind
LABORATORY NAME	- Ked	~ lore	DATE SAMPLED	11/1/88
LABORATORY SAMPL	E I.D. #	681101/20 - 135	TIME SAMPLED	1:00 p.m.
DATE RECIEVED BY	LAB.	11/3/147		

PARAMETERS	STORET CODE	UNITS	VALUE	DATE Analyzed
Elevation of G.Water	71993	ft.	3883,56	10/21/88
Well Depth		ft.	107,50	10/31/88
Well Casing Volume		gal.	2.21	11/31/88
Pump Rate		gal/min		م ستندی.
Pump Period	72004	min.		
Volume Evacuated	73675	gal.	7.00	10/31/88
Sampler Material	:		TEFUN	N/A
Well Sampling	Method:	BAIL		

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE Analyzed	METHOD USED
pH	00400	s.v.	7.06	NA	11/3/88	
	00400	S.U.	7.59	N/A	11	
	00400	s.U.	7.66	NA		<u>BPA 150. </u>
	00400	S.U.	7.48	NA	11	
Specific	00095	umhos/cm	1300		11/3/88	
Conductivity	00095	unhos/cn	690	0	11	ron ino l
	00095	umhos/cm	680	0	1	EPA 120.1
	00095	unhos/cm	700	_0	11	
T.O.X .	70354	ug/1	120		11/2/88	
	70354	ug/l	<u>· 5</u>		11	9020
	70354	ug/l	_5	10	11	9020 Guidthe)
	70354	ug/l	_5		• (
T.O.C.	00680	ng/l			113/88	·
	00680	mg/l				FOA ILIC
	00680	mg/l	ð			EPA 415.
	00680	mg/l	9			

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
(Values for	metals	must be fo	r <u>total</u> me	tals.)		
Chloride	00940	mg/l	180	.5	11/3/88	<u>58</u> A 300,0
Iron	01045	ug/l	240	40	11/11/88	EPA 200.7
Manganese	71883	ug/l	210	10	11/11/88	EPA 200.7
Phenols	32730	ug/l	90	5	11/2/88	BRA 420.2
Sodium	00929	mg/l		_/	11/3/88	<u> 48</u> 4 20.7
Sulfate	00945	mg/l	34	<u>_</u>	11/2/88	LPA 300.0

PRIMARY DRINKING WATER STANDARDS [HWMR-5 Part VI, Appendix III] (Values for metals must be for <u>total</u> metals)

206.2 200.7
NA 7
200.7
200.7
<u>239,2</u>
245.1
270.2
200.7
300,0
<u>1.525</u>
908A

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
Turbidity	00076	T.U.		_/, 0	11/3/88	BA 180.1
Radium 225	09501	pCi/l	6.36	1pG/L	11/3/88	<u>4979,903.0</u>
Radium 228	11501	pC1/1				
Gross Alpha	01501	pCi/l	3.5	3pCi/L	11/3/88	LPA 900.0
Gross Beta	03501	pCi/l		40 Cill	11/3/88	EPA 900 O
PARAMETERS	STORI		VALUE	DETECTION LIMIT	DATE Extracted	DATE Analyzed
						1 + 5
Endrin	39390	ug/l	<.010	.010	12/2/28	<u>861719</u>
Lindane	39782	ug/l	< ,010	,010	0/2/88	88/1/4
Methoxychlor	39480	ug/1	< ,050	,050	4/2/78	88/17/28
Toxaphene	39400	ug/1	< .50		6444	12/1/88
						110
2,4-D	39730	ug/1	5,50	_,50	12/6/88	4/6/28

2/22/29 DATE OF REPORT___

SIGNATURE: Michael D. Ford

NAME (PRINTED): MICHAEL D. FORD

MONITORING WELL IDENTIFICATION REPORT

ENVIRONMENTAL IMPROVEMENT DIVI Hazardous Waste Section 1190 St. Francis Dr./Harold Ru Santa FE, NEW MEXICO 87503	
FACILITY NAMELEE GASOL	INE PLANT
EPA I.D. NUMBERNMD00070	29659
COUNTY LEA	
WELL NUMBER _ # 4 DOWNG	RADIENT
WELL LOCATION (LONGITUDE)	
WELL LOCATION (LATITUDE) _	32° 47' 55''
AQUIFER NAME	ALA FORMATION
AQUIFER CONFINED	UNCONFINED X
WELL INSTALLATION DATE	4/28/88
DRILLING METHOD	AIRET
INNER CASING DIAMETER	2.25"
BOREHOLE DIAMETER	6.50"
CASING MATERIAL	SS316 E PVC
METHOD OF DEVELOPMENT	pumpd
elev bottom of borehole	3862.86
ELEV BOTTOM OF WELL CASING	3871.04
ELEV BOTTOM OF SCREENED INT	3813.62
ELEVATION OF SCREENED INT	3888.95
SURVEYED ELEV OF CASING TOP	3980,29

SIGNATURE Mihal D. Ford DATE OF REPORT 2/23/29 NAME (TYPED) Mike Ford

b:wellid/bas

ANNUAL SUMMARY OF MONITOR WELL DATA BACKGROUND BACKGROUND MONITORING

This form is to be used by facilities currently establishing their background monitoring well values or which have just completed their first year of data collection. This form must be submitted to NMEID before March 1. The annual report should be filled out by all facilities wir RCRA monitoring wells as per HMR-5. Part VI. Section 265.94(a) and (b).

ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO 87503

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FACILITY NAME	Lee Blant
EPA I.D. NUMBER	NM 0000 7096-9
WELL NUMBER	4

SAMPLE DATES

5/13/08 8/30/00 11/1/00

<u>PARAMETERS</u>	UNITS		VAL	UE	
Elev. of G.Water	ft.	3294,00	3883 75	3883.57	
pH (Avg)	S.U.	7.47	7.02	7.21	
Spec Cond (Avg)	umhos/cm	1240	1260	//33	
T.O.X. (Avg)	ug/l	_5		40	
T.O.C. (Avg)	mg/l		7		
Chloride	mg/l	180	190	<u></u>	
Iron	ug/l	1300	1700	2200	
Manganese	ug/1	570	620	790	
Phenols	ug/1	. 25	< 5	60	
Sodium	mg/l	161	150	130	
Sulfate	mg/l	34	28	44	

PARAMETERS	UNITS			VALUE
Arsenic	ug/l	/30	156	140
Barium	ug /1	380	410	500
Cadmium	ug/l	<u> </u>	<5	<u>Ls</u>
Chromium	ug/l	621	<u> </u>	<u> </u>
Lead	ug/l	10	<u> < </u>	<u> </u>
Mercury	ug/l	<u>L./L</u>	.09	٢. 20
Selenium	ug/l	<u> </u>	< 4	24
Silver	ug/1	<u> </u>	<30	630
Fluoride	mg/l	2.20	<.2	<u>L.20</u>
Nitrate	mg/l	20.1	0.12	2.02
Total Coliform	col/100ml	2100	84	/ 60
Turbidity	T.U.	18.	12	
Radium 226	pCi/l	0.24	0.5	.65
Radium 228	pCi/l			<u> </u>
Gross Alpha	pCi/l	<u> </u>	17	<u> </u>
Gross Beta	pCi/l	7.1	_19_	<u> </u>
Endrin	ug/l	2.010	< .010	4.010
Lindane	ug/1	6.010	<.010	2.010
Methoxychlor	ug/l	2,050	< . 050	2.050
Toxaphene	ug/1	4.50	< .50	2.53
2,4-D	ug/l	6.5	50	2.50
	ug/1	2.15	5.15	
DATE OF REPORT:	2/23/89	<u>.</u>	SIGNATURE	: miles P. Ford

NAME (TYPED) : Mike Ford

b:backgr.2/bas

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BACKGROUND QUARTERLY REPORTS

This set of forms is to be completed for each of your facility's quarterly evaluations during establishment of the background data for each well. The forms are to be submitted in addition to the raw data sheets provided by your laboratory. In order to be acceptable, the raw lab data sheets must include 1) the date the sample was taken, 2) the extraction date, if any, and 3) the date of analysis.

ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO 87503

FACILITY NAME _____ EPA I.D. # NMD 000 709659

WELL NUMBER	SAMPI	LE COLLECTI	ON BY	W.S. DUBYK	
LABORATORY NAME	mi Co	ρ.	DATE SAMP	LED 5/13/88	
LABORATORY SAMPLE I.D. #	20.85	32150	TIME SAM	PLED 10:00 P.M.	
DATE RECIEVED BY LAB.	5	114/24			
PARAMETERS	STORET CODE	UNITS	VALUE	DATE ANALYZED	
Elevation of G.Water	71993	ft.	<u> 3884,00</u>	5/0/88	
Well Depth		ft.	106.82		
Well Casing Volume		gal.	2/2		
Pump Rate		gal/min	2,0		
Pump Period	72004	min.	4250		
Volume Evacuated	73675	gal.	850		
Sampler Material				N/A	
Well Sampling	Method:	BFB			

PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	Method Used
рH	00400	S.U.	7.52	NA	5/14/28	
	00400	S.U.	750	n/A_	11	
	00400	s.u.	7.43	N/A	11 	<u>EPA 150.1</u>
	00400	S.U.	7.43	N/A		
Specific Conductivity	00095	umhos/cm	/230		5/14/88	
	00095	unhos/cn	1250	6		EPH (20.
	00095	unhos/cm	1240	0		EFF (20.
	00095	umhos/cm	1240	<u> </u>	<u>ار</u>	. •
r .o. x .	70354	ug/l	_5		5/14/88	
	70354	ug/l	<u>د که ا</u>	10		9820
	70354	ug/l	_5		- <u></u>	(SW 840
	70354	ug/l	220	/ 8		
I.O.C.	00680	mg/l	.5		5/14/88	
	00680	ng/l	.5	/		100 11.
	00680	mg/1	5	/		EPA 415
	00680	mg/l	5-		"	

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE Analyzed	Method Used
(Values for	metals	must be fo	r <u>total</u> me	tals.)	****	• • • • • • • • • • • • • • • • • • • •
Chloride	00940	mg/l	130	.5	5/14/88	EPA 300.
Iron	01045	ug/l	1300	40	5/23/88	<u>EPA 200.7</u>
Manganese	71883	ug/l	570	/0	5123/88	EPA 200.7
Phenols	32730	ug/l	< 5		5/14/28	<u>EPA 470.</u> 2
Sodium	00929	mg/l	161	/	s/m/28	EPA 200.
Sulfate	00945	mg/l	34	<u>~</u>	5/14/28	<u>FPA 300.</u>

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PRIMARY DRINKING WATER STANDARDS [HWMR-5 Part VI, Appendix III] (Values for metals must be for <u>total</u> metals)

Arsenic	01002 ug/l	/30		5/16/88	EPA 206.2
Barium	01007 ug/l	380		5/23/88	EPA 200.7
Cadmium	01027 ug/l	< 3		5/23/28	<u>EPA 200.7</u>
Chromium	01034 ug/l	< 28		5/22/28	<u>EPA 200.</u> 7
Lead	01051 ug/l	10	2	5/16/28	<u>EPA 239.</u> 2
Mercury	71900 ug/l	4.12	,12	5/22/11	EDA 245.1
Selenium	01149 ug/l	< 3		5/16/88	EPA 270.2
Silver	01077 ug/l	<3	30	5/23/28	EPA 200.7
Fluoride	00950 mg/l	2.20	.~	5/14/58	EPA 300.0
Nitrate	00620 mg/l	< 0.1	. 02	5/14/88	EPA 353.1
Total Coliform	31501 col/100ml	2100	20/100 ml	5/14/28	<u>5m 908</u> A

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE Analyzed	METHOD USED
Turbidity	00076	Ť.U.	18	INTO	5/14/88	<u>EPA 180.1</u>
Radium 226	09501	pCi/l	0.24	1 pCi/L	5/14/28	EPA 703.0
Radium 228	11501	pCi/l				
Gross Alpha	01501	pCi/l	<1.9	3pCi/L	5/14/82	FRA 900.0
Gross Beta	03501	pCi/l	7.1	4pCi/L	6/14/88	EPA 900.0
PARAMETERS	STORI		VALUE	DETECTION Limit	DATE Extracted	DATE ANALYZED
Endrin	20200					
	39390	ug/l	1.010	.010	Stip for	6/5/00
Lindane	39782	ug/l ug/l	2.010	.010	Stipler Stipler	6/5/00 6/5/01
Lindane Methoxychlor	39782					
	39782	ug/1	2.010	. 010	Sho lot	ulsin
Methoxychlor	39782 39480	ug/l ug/l	2.010 2.050	. 010	5/10/01	6/5/11 6/5/82 6/5/17
Methoxychlor Toxaphene	39782 39480 39400	ug/l ug/l ug/l	2.010 2.050 2.50	. 010 . 050 . 50	<u>5/10/07</u> 5/16/88 5/10/17	6/5/11 6/5/82 6/5/17

used for the above six parameters: 500 246

DATE OF REPORT_ 2/16/89

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SIGNATURE: Michael D. Ford NAME (PRINTED): MICHAEL D. FORD

BACKGROUND QUARTERLY REPORTS

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ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 1190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO 87503

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FACILITY	NAME	he plant	EPA	I.D.	#	NMD000709659
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WELL NUMBER _===	SAMP	LE COLLECT	ION BY	m. Ind
LABORATORY NAME	mi Con	•	DATE SAM	PLED 8/30/88
LABORATORY SAMPLE I.D. #	80830	326 - 341	TIME SA	PLED 3:00 p. M.
DATE RECIEVED BY LAB.	9	lil re		
PARAMETERS	STORET CODE	UNITS	VALUE	DATE Analyzed
Elevation of G.Water	71993	ft.	3893.75	5/29/88
Well Depth		ft.	106.82	8/29/88
Well Casing Volume		gal.	2.12	8/29/88
Pump Rate	*****	gal/min		
Pump Period	72004	min.	معیب 	
Volume Evacuated	73675	gal.	7.00	3/29/88
Sampler Material			TEFLN	N/A

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE Analyzed	Method Used
pH	00400	s.v.	7.06	NIA	9/1/58	
	00400	S.U.	7.01	NA	11	con ich l
	00400	s.u.	7.00	NA	11	<u>EPA 150, 1</u>
	00400	S.U.	7.02	n/A		
Specific	00095	umhos/cm	1270	0	9/1/88	
Conductivity	00095	umhos/cm	1280	0	<i>, </i>	EPA 120.1
	00095	unhos/cm		0		
	00095	unhos/cm	1240	0	11	
r .o. x .	70354	ug/1			9/1/88	
	70354	ug/l	_5		11	
	70354	ug/1				9020 (SW 846)
	70354	ug/1	_5	10		
T.O.C.	00680	mg/l	6		9/1/38	
	00680	mg/l				
	00680	mg/l	<u> </u>			1917A 415.
	00680	mg /1	8			
	-					

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PARAMETERS	STORET CODE	UNITS	VALUE	DETECTION LIMIT	DATE Analyzed	Method Used
(Values for	netals	must be f	or <u>total</u> me	tals.)	, e e e e e e e e e e e e	
Chloride	00940	mg/l	190	.5	9/1/88	EPA 300. (
Iron	01045	ug/1	1700	40	9/16/88	68A 200.7
Manganese	71883	ug/l	620		9/16/88	EPA 200.7
Phenols	32730	ug/l	< 5		9/1/28	<u>EPA 420.3</u>
Sodium	00929	mg/l	150		9/1/88	EPA 200.7
Sulfate	00945	mg/l	28	2	9/1/28	GPA 300.0

PRIMARY DRINKING WATER STANDARDS [HWMR-5 Part VI, Appendix III] (Values for metals must be for <u>total</u> metals)

Arsenic	01002 ug/l	156		96/28	BA 206.2
Barium	01007 ug/l	410		9/16/88	BRA 200.7
Cadmium	01027 ug/l	45		9/16/88	68A 200.7
Chromium	01034 ug/l	<30	30	9/11/88	<u>48</u> A 200.7
Lead	01051 ug/l	_22_	<u>_</u>	9/6/88	EPA 239.2
Mercury	71900 ug/l	.09		5/14/22	EPA 245.1
Selenium	01149 ug/l	<u> </u>	_5	9/6/88	ERAJO.2
Silver	01077 ug/l	530	_30	9/14/88	EPA 200.7
Fluoride	00950 mg/1	1.2	_,2	9/1/88	EPA.300.0
Nitrate	00620 mg/1	0.12	,02	91,188	EPA 353.1
Total Coliform	31501 col/100ml		20/100 ml.	9/1/2P	<u>SM 908 A</u>

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PARAMETERS		UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
Turbidity	00076	T.U.	12	1.0 MTU	9/1/57	LPA 180.1
Radium 225	09501	pCi/l	0.5	1p CilL	9/1/88	EPA 903.0
Radium 228	11501	pCi/l				
Gross Alpha	01501	pCi/l		3pGi/L	9/1/88	<u>1999 900. 0</u>
Gross Beta	03501	pCi/l	/9	4pGi/L	9/1/38	EPA 900. D
PARAMETERS	STORI		VALUE	DETECTION LIMIT	DATE Extracted	DATE Analyzed
Endrin	39390	ug/1	< ,0/0	,0/0	10/3/38	10/28
Lindane	39782	ug/1	< .010	,010	10/3/88	10/3/88
Methoxychlor	39480	ug/l	5.050	,050	10/2/38	10/2/28
Toxaphene	39400	ug/l	< .50	_,50	10/3/28	10/2 BP
2,4-D	39730	ug/1	< ,50	,50	10/2/88	10/3/20
2,4,5-TP	39045	ug/l	5.15	.15	10/3/28	N/Step

DATE OF REPORT 2/20/89

SIGNATURE: Michael D. Ford

NAME (PRINTED): MICHAEL D. FORD

BACKGROUND QUARTERLY REPORTS

This set configures is to be completed for each of your facility's quarterly evaluations during establishment of the background data for each well. The forms are to be submitted in addition to the raw data sheets provided by your laboratory. In order to be acceptable, the raw lab data sheets must include 1) the date the sample was taken, 2) the extraction date, if any, and 3) the date of analysis.

ENVIRONMENTAL IMPROVEMENT DIVISION HAZARDOUS WASTE SECTION 190 ST. FRANCIS DR./HAROLD RUNNELS BLDG. SANTA FE, NEW MEXICO \$7503

<u>_</u>it

6 6 W -

FACILITY	NAME	Les Plant	EPA	I.D.	*	<u>NMD 000 709659</u>
----------	------	-----------	-----	------	---	-----------------------

WELL NUMBER		SAMPLE COLLECTIO	N BY 🥂 🥂 ,	Ind
LABORATORY N	AME Lade	~ loso	DATE SAMPLED	11/1/28 👔
LABORATORY S	SAMPLE I.D. #	8110/323 - 339	_ TIME SAMPLED	3:00 P.M.
DATE RECIEVI	D BY LAB.	11/3/00		

PARAMETERS	STORET CODE	UNITS	VALUE	DATE ANALYZED
Elevation of G.Water	71993	ft.	3883.57	10/21/88
Well Depth		ft.	106.82	10/31/88
Well Casing Volume	*****	gal.	2.08	10/31/88
Pump Rate		gal/min	··· 	
Pump Period	72004	min.		
Volume Evented	73675	gal.	7,00	10 / 1/20 N/A
Sampler Hadiial			TEFUN	A / N
Well Sampling	Method:	BAI	L	

INDICATOR PARAMETERS [HWMR-5 Part VI, Section 265.92(b)(3)]

4

PARAMETERS		UNITS	VALUE	DETECTION	DATE ANALYZED	METHOD USED
рН	00000	s.v.	7.41	NA	11/3/88	
	00400	S.U.	7.18	NA		con in l
	00400	S.U.	7.12	NA	11	<u>eph 150.1</u>
	00400	S.U.	7.13	_n/A	<u> </u>	
Specific	00095	umhos/cm	730	_0	11/3/88	
Conductivity	00095	unhos/cn	1200	_0		~~~ ~~ l
	00095	unhos/cn	1300	0		EPA 100.
	00095	unhos/cn	1300	<u> </u>	·/	-
T.O.X.	70354	ug/l	80	_10	11/2/28	
	70354	ug/l	<u></u>			9020
	70354	ug/1			11	(SW346)
	70354	ug/1	_5		<u> </u>	
T.O.C.	00680	ng/l	9		11/3/88	
	00680	ng/l				
	00680	mg/1	12			<u>EPA 415. </u>
.		ng/1		_/		

PARAMETERS		UNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
(Values for	metals	must be fo	r <u>total</u> me	tals.)		
Chloride	00940	mg/l	28	.5	11/3/88	<u>699</u> 300.0
Iron	01045	ug/l	2200	40	11/11/88	EPA 200.7
Manganese	71883	ug/l	750		11/11/88	EPA 200.7
Phenols	32730	ug/l	60	5	11/2/88	EPA 420.2
Sodium	00929	mg/l		_/	11/3/88	200.7
Sulfate	00945	mg/l	44	2	11/3/08	5PA 300.0

GROUND WATER QUALITY STANDARDS [HWMR-5 Part VI Section 265.92(b)(2)]

PRIMARY DRINKING WATER STANDARDS [HWMR-5 Part VI, Appendix III] (Values for metals must be for <u>total</u> metals)

(,		- A
Arsenic	01002	ug/1	140	4	11/14/28	BADLA
Barium	01007	ug/1		0	n/n/38	EPA 200.7
Cadmium	01027	ug/1	25	_5	<u></u>	12A 200.7
Chromium	01034	ug/l	730	30	11/11/88	ERA 200.7
Lead	01051	ug/1	<u> </u>	2	11/14/28	EPA 2392
Mercury	71900	ug/1	2,20	,20	11/16/11	EPA 245.1
Selenium	01149	ug/l	<4		11/14/38	18A 270.2.
Silver	01077	ug/1	< 30		11 /u/38	<u>efn 200.7</u>
Fluoride	00950	mg/l	1,20	.20	11/3/28	EPA 300.0
Nitrate	10620	mg/l	6.02	,02	11/3/38	EPA353.
Total Coliform	31501 c	51/100ml	100	<u>20/100 ml.</u>	11/3/28	57908A

Y BR .

PARAMETERS		JNITS	VALUE	DETECTION LIMIT	DATE ANALYZED	METHOD USED
Turbidity	00076	T.U.	22		11/3/28	EPA 150.]
Radium 226	09501	pCi/l	0.65	IpCi/L	11/3/28	<u>EPA 903.0</u>
Radium 228	11501	pCi/l			م یسے ب	
Gross Alpha	01501	pCi/l	4	3pGi/L	11/3/88	<u>EPA 900.0</u>
Gross Beta	03501	pCi/l		4pGi/L	11/2/88	<u>EPA 900.0</u>
PARAMETERS	STORE	r Units	VALUE	DETECTION LIMIT	DATE Extracted	DATE Analyzed
Endrin	39390	ug/1	< .010	,0/0	12/2/88	states
Lindane	39782	ug/l	6-010	,010	126/28	4/1/88
Methoxychlor	39480	ug/l	2.050	,050	12/2/88	4/1/38
Toxaphene	39400	ug/1	< ,50	,50	<u>88/49</u>	12/1/88
Toxaphene 2,4-D		-	< ,50 < ,50	,50 ,50	<u> </u>	12/1/88 12/2/88 12/6/88

SIGNATURE: Michael D. Fool NAME (PRINTED): MICHAEL D. FORD

ATTACHMENT 4

bcc: W. J. Woodruff R. B. Copeland J. J. Moon (r) File 388(RC)

October 29, 1984

Lee Plant RCRA Closure EPA ID NMD000709659

CERTIFIED MAIL RETURN RECEIPT REQUESTED

Mr. Raymond R. Sisneros, Manager Hazardous Waste Section New Mexico Environmental Improvement Division 725 St. Michael's Drive (Crown Bldg.) Santa Fe, NM 87504-**0**968

Dear Mr. Sisneros:

Phillips Petroleum Company is in the process of closing a surface impoundment at the Lee Natural Gasoline Plant with respect to the RCRA and New Mexico Hazardous Waste Management Regulations. Mr. Reese B. Copeland's August 3, 1984 letter to Mr. Greg Mello had attached a copy of the amended Lee Plant closure and post closure plan. The Lee Plant closure and post-closure plan described a sampling and analysis program which, when effectuated, would determine, by the use of the EP toxicity test, the chromium concentration of the impoundment sludge and underlying soil. (The Lee Plant impoundment is no longer in service; there is no standing liquid in the Lee impoundment.) In addition, the chromium concentration of the water in the uppermost waterbearing formation and the total chromium concentration of the impoundment sludge and soil would be determined. The Lee Plant sampling and analysis program has been completed and the report presenting the results is attached.

The New Mexico EID should now have all the information needed to commence the formal Lee Plant closure and post-closure plan review process as described in 40 CFR 265 Subpart G and NM EIB/HWMR-2, 206.C.2. When the Lee Plant closure and post-closure plan is successfully processed by the NM EID, the Lee Plant's Interim Status (Part A Permit) will be withdrawn. The Lee Plant will remain in operation as a natural gasoline processing facility.

Phillips requests that the Lee Plant Notification of Hazardous Waste Activity be kept on file after Interim Status is withdrawn so the EPA ID number for the facility will be retained. The Lee Plant should be considered as a "nonhandler" of hazardous waste.

I would appreciate being kept informed of the progress made in the processing of the Lee Plant closure and post-closure plan. If any questions arise or if you require any additional information concerning the Lee Plant, please call Frank P. Collis at (918) 661-1063.

> Very truly yours, Original Signed By B. F. Ballard, Director Environment Control 7 Phillips Building

BFB:FPC:dsg/CE-415A
Attachments
cc: Mr. Peter H. Pache - NM EID
Mr. E. E. Clark - Odessa
Ms. Joyce Stubblefield - EPA Region VI

PHILLIPS PETROLEUM COMPANY LEE NATURAL GASOLINE PLANT CLOSURE & POST-CLOSURE PLAN SAMPLING & ANALYSIS REPORT

1

Lee Plant Impoundment Sampling and Analysis Report TABLE OF CONTENTS

- CERTIFICATION OF CLOSURE
- INTRODUCTION

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- RESULTS
- Fate of Chromium in the Impoundment
- Groundwater Sampling
- APPENDIX 1
 - Lee Plant Groundwater Sampling Well Details
- APPENDIX 2
 - Laboratory Reports
- APPENDIX 3
 - Chain of Custody Manifests
- APPENDIX 4
 - Lee Natural Gasoline Plant Closure and Post-Closure Plan (Updated July 27, 1984)
- APPENDIX 5
 - Copy of Mr. William H. Taylor, Jr.'s February 15, 1984 letter to Mr. Frank Collis, discussing the roles of the U.S. EPA and the New Mexico Environmental Improvement Division in reviewing and approving closure and post-closure plans.

CERTIFICATION OF CLOSURE

Pursuant to 40 CFR 265.115 and the New Mexico Hazardous Waste Management Regulations (106.C.2.f), this is to certify that the Lee Natural Gasoline Plant has been closed in accordance with the specifications contained in that document titled "Closure & Post-Closure Plan For Hazardous Waste Facility (Updated July 27, 1984), Phillips Petroleum Company Lee Natural Gasoline Plant, West Star Route, Lovington, NM."

Authorized Representative of Phillips Pet	roleum Company
Signature: <u>E. E. Clark</u>	Date: <u>October 22, 198</u> 4
Title: Authorized Agent, Phillips Petroleum Co.	
Independent registered professional Signature: Ed Plack Name (typed): P.E. Registration Number: 16097 (Tx)	Date: 10-18-84
Sworn to before me this 30th day of 0ctober	r, 1984.
Notary public signature: <u>Audrey J. Jacks</u> (Audrey J. Jack	ks)
in and for Ector County.	

My commission expires November 30, 1984

CE/415A

INTRODUCTION

This report describes the sampling and analysis program Phillips has undertaken to demonstrate the closure of the Lee Natural Gasoline Plant surface impoundment which had previously received a potentially hazardous waste (cooling tower blowdown containing chromium). The sampling and analysis program undertaken at the Lee Plant is completely described in the Lee Plant closure and post-closure plan (updated July 27, 1984). A copy of the Lee closure and post-closure plan is included in APPENDIX 4 of this report.

Results

In TABLE 1 the "RCRA Impoundment Sampling Results Summary" for the Lee Natural Gasoline Plant is presented. ATTACHMENT 1 shows the locations in the Lee impoundment where sludge and soil samples were procured. The five sludge samples and the five soil samples from each quadrant were combined to form one composite sludge and one composite soil sample from each quadrant.

Phillips is demonstrating the closure of the Lee surface impoundment as specified in 40 CFR 265.228(b) (and EIB/HWMR-2, 206.C.6.f(2)). If it is demonstrated (under 40 CFR 261.3(c) and (d) and EIB/HWMR 201.B.2.c) that none of the sludge and underlying soil remaining at any stage of removal are hazardous wastes, then the impoundment is not subject to the requirements of 40 CFR 265 (and of EIB/HWMR-2, 106.). The results of the sampling performed on the Lee Plant surface impoundment shows that none of the sludge or soil samples from the Lee Plant surface impoundment exhibit the characteristic of EP toxicity for chromium. Since the sampling plan was carefully designed so that representative sampling would be achieved, it is concluded that none of the sludge or soil comprising the Lee Plant surface impoundment exhibits the characteristic of EP Toxicity for chromium.

TABLE 1

Lee Natural Gasoline Plant

CRA Impoundment Sampling Results Summary

Sample	Analysis of I	-	Samples III	from Quadrant IV
		< 0.2		
Impoundment Sludge Chromium (mg/l) (EP Toxicity Test)	< 0.2	< 0.2	< 0.2	< 0.2
Impoundment Sludge Total Available Chromium (PPM)	194	6.8	27.5	1.6
Impoundment Soil Chromium (mg/1) (EP Toxicity Test)	< 0.2	< 0.2	< 0.2	< 0.2
Impoundment Soil Total Available Chromium (PPM)	390	140	115	2.4

(See ATTACHMENT 1 for the sludge and soil sampling locations within Quadrants).

ATTACHMENT 1

LEE PLANT EVAPORATION IMPOUNDMENT

Sludge and Soil Sampling Points

•		-							 		E										
1				•							1									11	
	n									22	12									22	
	23									33	23									35	
•	भ									44	34				#4		#5	,		44	
	45									55	45									<u>1</u> 37	4
Quad 2	56									66	56									66	Quad
Sub-	67							#4		77										77	õ
_	78									88	78		Ø1	#2						88	l
	89									99	89									99	
	#1								#2	110	100									110	
	ul									121	1									121	
	122				#5					132	122									132	
	133									143	133									MB	
	M					#3				154	144		ŀ							154	
	155									165	155									165	
										11	1									11	S
	12									11	12								#5	z	
	23					Γ				33	23				Τ					33	
	34						#4			મમ	34									44	
	45									55	45								#1	55	
	56									66	56					#4				66	·
_	67									77	67									77	
-	78									88	78				₿3					88	
	89					#5				99	89							#2		97	
	100										100	T								110	
면			#3							121	11									121	5
Quad	ددا			#2			İ			133	12									132	Quad 3
	133										183						·			143	
	144										M	-								154	
	155										/66		Γ		T					165	

W

Fate of the Chromium in the Impoundment

The unlined surface impoundment at the Lee Plant consists of sludge and soil. The impoundment is no longer in service; the use of chromiumcontaining corrosion inhibitor chemicals in the Lee Plant cooling tower was discontinued on October 4, 1983. The Lee Plant was built around 1932. Based on data available since 1980, it is estimated that approximately 447 kilograms of chromium per year was discharged to the Lee surface impoundment. It should be noted that this estimate of chromium discharged to the impoundment was computed from field water treatment tests which measured the oxidizable substances present in the cooling tower water, so it is only an estimate. There is no data available to meaningfully estimate the amount of chromium discharged to the Lee impoundment prior to 1980.

Since chromium-containing corrosion inhibitor chemicals have been discharged to the Lee Plant surface impoundment for some time, it is reasonable to inquire about the ultimate fate of the chromium. Referring to TABLE 1, although the EP Toxicity Test has shown that the chromium in both the impoundment sludge and soil is well below the EP Toxicity threshold of 5 parts per million for chromium, the total available chromium is higher. (A portion of all composite sludge and soil samples were ashed with nitric acid and hydrogen peroxide to dissolve all chromium. The leachate from this ashing was analysed by atomic absorption.)

It appears that any Cr^{+6} in the Lee surface impoundment is naturally reduced to the less leachable Cr^{+3} state. The mechanism(s) for this chemical reduction has (have) not been established. Based on a comparison of EP toxicity test chromium levels and the total chromium analysis (ashing) of the Lee Plant impoundment sludge and soil samples, it appears the chromium has settled in the impoundment sludge layer and in the underlying impoundment soil in a stable Cr^{+3} state. Since representative sampling has shown that the Lee Plant impoundment sludge and soil do not exhibit the characteristic of EP Toxicity for chromium, none of the material in the impoundment has to be removed and disposed of as a hazardous waste.

Groundwater Sampling

To further demonstrate that the chromium in the Lee Plant impoundment remains complexed in the impoundment sludge and soil in a non-hazardous state, four groundwater sampling wells were installed as described in the Lee Plant closure and post-closure plan. ATTACHMENT 2 shows the location of the groundwater sampling wells that were installed around the Lee Plant impoundment.

The results of the groundwater sampling are presented in TABLE 2. The results indicate that no groundwater contamination has occurred.

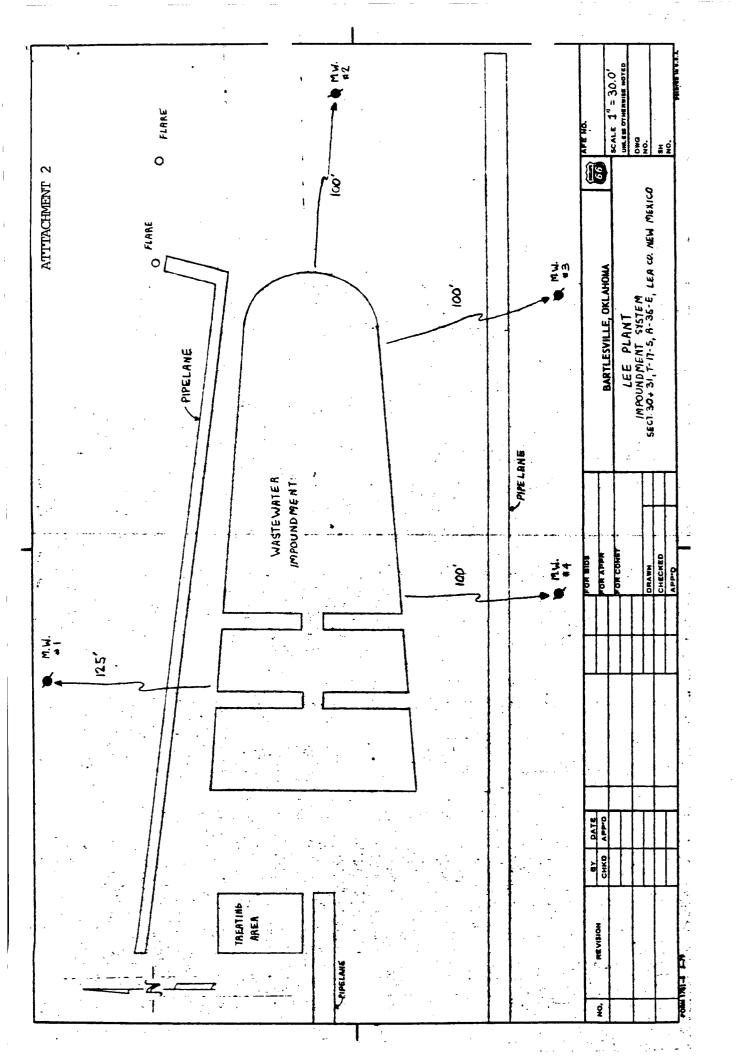


TABLE 2

Lee Natural Gasoline Plant

RCRA Groundwater Sampling Results Summary

		Chromium (mg/l) in Water Well Number		
	I	II	III	IV
Sample at Well Completion	< 0.05	< 0.05	< 0.05	< 0.05
Sample Point 1*	< 0.05	< 0.05	< 0.05	< 0.05
Sample Point 2	< 0.05	< 0.05	< 0.05	< 0.05
Sample Point 3	< 0.05	< 0.05	< 0.05	< 0.05
Sample Point 4	< 0.05	< 0.05	< 0.05	< 0.05
Drilling Water	< 0.05	< 0.05	< 0.05	< 0.05

*Sample points numbered from bottom to top with sample point number 1 being at the bottom. į

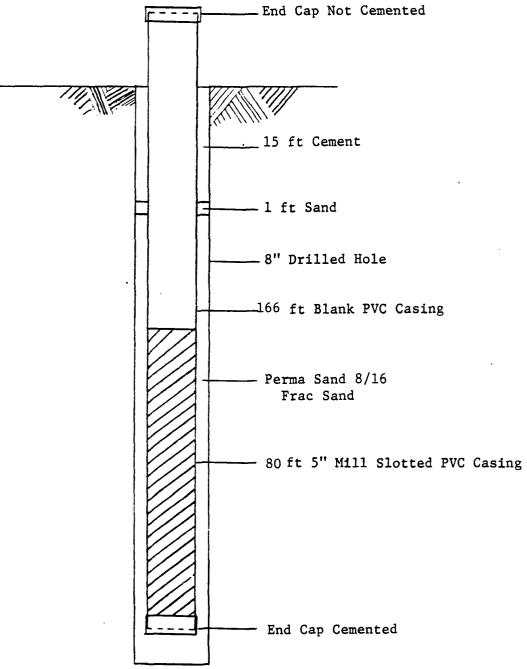
dsg/CE-415A

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APPENDIX 1

- Lee Plant Groundwater Sampling Well Details

Lee Gasoline Plant Groundwater Sampling Well #1





COMPANY: Phillips Petroleum Company

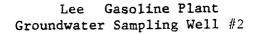
DATE: June 5, 1984 ORDER NO.: Verbal / Robert G. Stubbs LOCATION: Buckeye Gasoline Plant COUNTY: Lea STATE: New Mexico

PROPOSED USE: Monitor Well #1

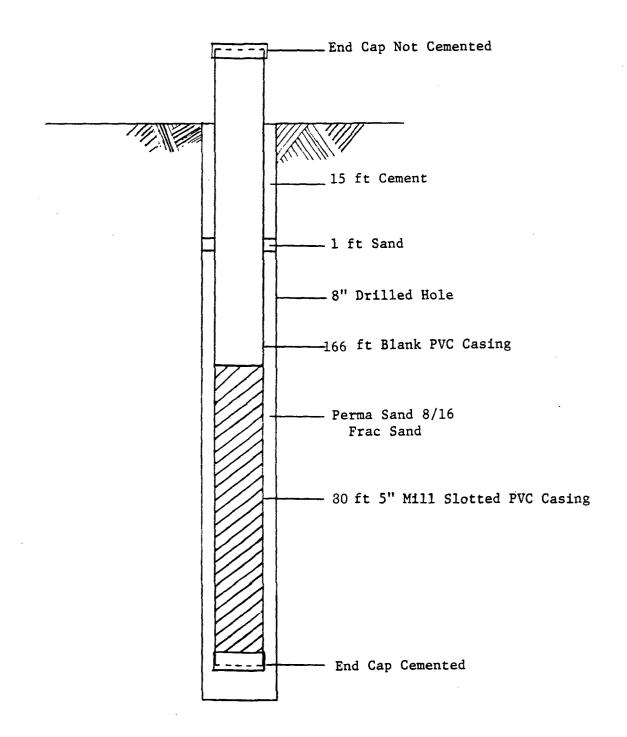
DIAMETER: 8"

DEPTH: 250'

DEPTH FT.	DRILLER'S LOG
5	Limestone
10	Λ
16	
20	
25	V
30	Limestone
35	Sand
	A
50	
55	
60	
65	
70	
<u> </u>	
80	
85	
90	
95	
100	
195	
110	
L 115	
120	
196	
100	
130	
135	
140	
145	
150	
1 5 5	
1.165	
1.20	
175	
180	
185	
190	
195	
200	
205	V
210	Sand
220	Sand & Gravel
220	<u>Λ</u>
225	
230	Sand & Gravel
235	
	Red Clay & Gravel
240	Red Clay Red Clay
245	
250	Red Clay
•	



i.





COMPANY: Phillips Petroleum Company
DATE: June 6, 1984
ORDER NO.: Verbal / Robert G. Stubbs
LOCATION: Buckeye Gasoline Plant
COUNTY: Lea
STATE: New Mexico

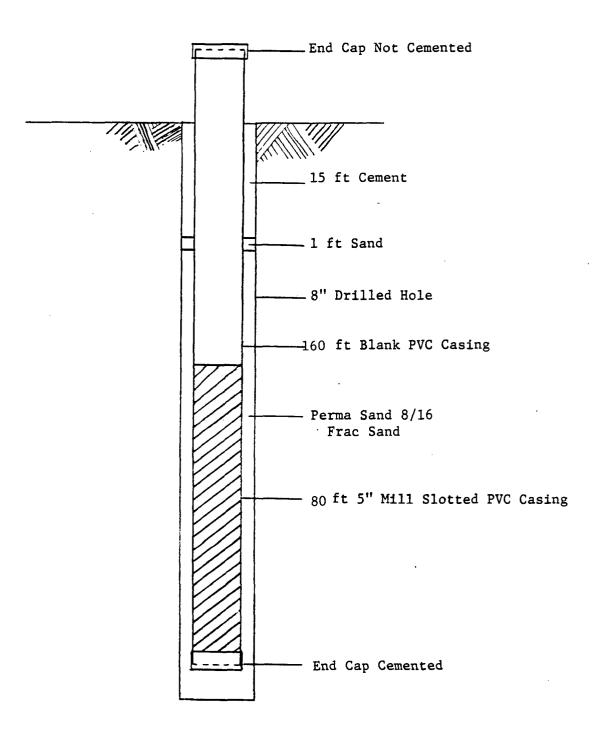
PROPOSED	USE:	Monitor	Well	#2	
----------	------	---------	------	----	--

DIAMETER: 8"

DEPTH: 250'

DEPTH FT.	DRILLER'S LOG
5	Limestone
10	*
15	
20	
25	
- 30	Limestone
	Sand
	*
50	
- 55	
60	
65	
80	
- 85	
105	
115	
120	
125	
130	
135	
140	
145	
150	
155	
160	
165	
1.70	
175	
180	
185	
190	
195	
200	
205	<u>\</u>
1-210	Sand
220	Sand & Gravel
220 2 2 5	
	Cand & Cravel
230 235	Sand & Gravel
	Red Clay & Gravel
240	Red Clay & Gravel
245	Red Clay
250	Red Clay

Lee Gasoline Plant Groundwater Sampling Well #3





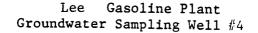
COMPANY: Phillips Petroleum Company
DATE: June 6, 1984
ORDER NO.: Verbal / Robert G. Stubbs
LOCATION: Buckeye Gasoline Plant
COUNTY: Lea
STATE: New Mexico

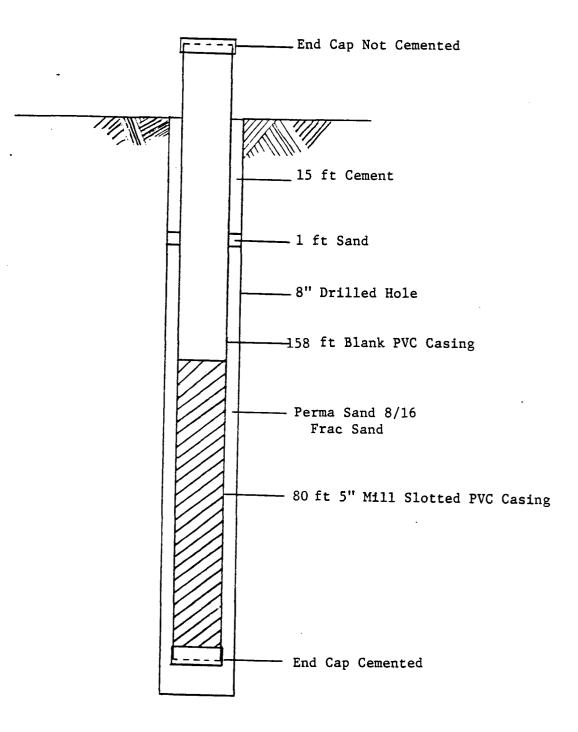
PROPOSED	USE:	Monitor	Well	#3	
----------	------	---------	------	----	--

DIAMETER: 8"

DEPTH: 250'

DEPTH FT.	DRILLER'S LOG
5	Limestone
101	<u> </u>
15	
20	
25	Limestone
30	اخبا ختلاء ونكله وتكبيها عجب بمخيري والفرقي الفتراط الجامي المرجوبي وجادات فالقوال فأور المتراج السبغ
1	Sand
40	
45	
50	
55	
60	
65	
70	
25	
80	
85	
90	
95	
100	
105	
110	
115	
120	
125	
130	
135	
140	
145	
150	
155	
160	
165	
120	
175	
180	
185	
190	
195	
200	
285	Y
210	Sand
205 210 715 220	Sand & Gravel
220	
225	
230	Sand & Gravel
235	Red Clay & Gravel
240	Red Clay & Gravel
245	Red Clay
250	Red Clay







COMPANY: Phillips Petroleum Company

DATE: June 7, 1984

ORDER NO.: Verbal / Robert G. Stubbs

LOCATION: Buckeye Gasoline Plant

COUNTY: Lea

STATE: New Mexico

PROPOSED USE: Monitor Well #4

DIAMETER: 8"

DEPTH: 250'

•••

DEPTH FT.	DRILLER'S LOG
5	Limestone
10	小
15	
20	
25	
30	Limestone
35	Sand
-	· 不
50	
55	
60	
65	
75	
80	
85	
90	
95	
100	
-195	
110	
115	
120	
196	
130	
لعتلسا	
140	
145	
150	
165	
120	
170	
175	
180	
185	1
190	
105	Sand
200	Sand & Gravel
205	Sand & Gravel
101	Sand & Gravel
5	Red Clay & Gravel
225 225 235 235 235 240	Red Clay & Gravel
225	Red Clay & Gravel
: :0	Sand & Gravel
5,51	
	Sand & Gravel
	Sand & Gravel
245	Red Clay
250	Red Clay

APPENDIX 2

- Laboratory Reports



Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services 1703 W. Industrial Avenue [915 - 683-3348] • P.O. Box 2150 • Midland, Texas 79701

File No.	<u>C-1950-W</u>
Customer No.	3355796
Report No.	35560
Report Date	6-14-84

Date Received 6-11-84

Report of tests on: Water

Client:

Phillips Petroleum Company

Identification:

Lee Plant, Formation water sampled at completion of Monitor Well No. 1

Chromium-----Less Than 0.05 mg/L

Technician: GMB

Copies 3 cc:

: Phillips Petroleum Company Attn: Mike Ford

Burc ary M.

Sw[

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

1703 W. Industrial Avenue [915 - 683-3348] • P.O. Box 2150 • Midland, Texas 79701

File No.	C-1950-W
Customer No.	3355796
Report No.	35556
	6-14 04
Report Date	6-14-84

Date Received 6-11-84

119904

Report of tests on: Water

Client:

Phillips Petroleum Company

Identification:

Lee Plant, Monitor Well No. 1, as shown

Sample Point No.

Chromium, mg/L

1	*	0.05
2	*	0.05
3	*	0.05
4	*	0.05

*designates "less than"

Technician: GMB

Copies Phillips Petroleum Company 3 cc: Attn: Mike Ford

SOUTH

Our letters and reports are for the exclusive use of the client to whom they are addressed. The use of our name must receive our prior written approval. Our letters and reports apply only to the sample tested and/or inspected, and are not necessarily indicative of the quantities of apparently identical or similar products.

Sw[

119904

A ++

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services 1703 W. Industrial Avenue [915 - 683-3348] • P.D. Box 2150 • Midland, Texas 79701

		File No Customer No.	C-1950-W
		Customer No.	3355796
		Report No	35561
		Report Date _	6-14-84
t of tests on:	Water	Date Received	6-11-84
	Philling Petroleum Company		

Client:

Report

Phillips Petroleum Company

Identification:

Lee Plant, Formation water sampled at completion of Monitor Well No. 2

Chromium-----Less Than 0.05 mg/L

Technician: GMB

Copies 3 cc: Phillips Petroleum Company Attn: Mike Ford

TODIES aryth Bur

Sw[

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services 1703 W. Industrial Avenue (915 - 683-3348) • P.O. Box 2150 • Midland, Texas 79701

			<u>C-1950-W</u>
		Customer No.	3355796
		Report No.	35557
		Report Date	6-14-84
Report of tests on:	Water	Date Received	6-11-84
Client:	Phillips Petroleum Company		

Identification: Lee Plant, Monitor Well No. 2, as shown

Sample Point No.

Chromium, mg/L

1	*	0.05
2	*	0.05
3	• 🖈	0.05
4	*	0.05

*designates "less than"

Technician: GMB

Copies 3 cc: Phillips Petroleum Company Attn: Mike Ford

TOPIES un

Sw[

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

1703 W. Industrial Avenue (915 - 683-3348) • P.O. Box 2150 • Midland, Texas 79701

File No.	C-1950-W
Customer No.	3355796
Report No.	35562

Report Date <u>6-14-84</u>

119904

Date Received 6-11-84

Report of tests on: Water

Client:

Phillips Petroleum Company

Identification:

Lee Plant, Formation water sampled at completion of Monitor Well No. 3

Chromium-----Less Than 0.05 mg/L

Technician: GMB

Copies 3

3 cc: Phillips Petroleum Company Attn: Mike Ford



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		File No.	C-1950-W
		Customer No.	3355796
		Report No.	35558
		Report Date	6-14-84
Report of tests on:	Water	Date Receive	6-11-84
Client:	Phillips Petroleum Company		

Identification: Lee Plant, Monitor Well No. 3, as shown

Sample Point No.

Chromium, mg/L

1	* 0.05
2	* 0.05
3	* 0.05
4	* 0.05

*designates "less than"

Technician: GMB

Copies 3 cc: Phillips Petroleum Company Attn: Mike Ford

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C-1950-W File No. Customer No. 3355796 Report No. 35563

Report Date 6-14-84

119904

Date Received 6-11-84

Report of tests on: Water

Client:

Phillips Petroleum Company

Identification:

Lee Plant, Formation water sampled at completion of Monitor Well No. 4

----Less Than 0.05 mg/L Chromium-----

Technician: GMB

Copies

Phillips Petroleum Company 3 cc: Attn: Mike Ford

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File No.	C-1950-W
Customer No.	3355796
Report No.	35559
Report Date	6-14-84
Date Received	6-11-84

Report of tests on: Water

Phillips Petroleum Company

Client:

Identification: Lee Plant, Monitor Well No. 4, as shown

Sample Point No.

Chromium, mg/L

1	* 0.05
2	* 0.05
3	* 0.05
4	* 0.05

*designates "less than"

Technician:	GMB		
Copies 3	cc:	Phillips Petroleum Attn: Mike Ford	Company

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File No.	C-1950-W
Customer No.	3355796
Report No.	35564
Report Date	6-14-84

Date Received 6-11-84

Report of tests on: Water

Client: Phillips Petroleum Company

Identification:

Lee Plant, Water used to drill monitor wells

Chromium-----Less Than

0.05 mg/L

Technician: GMB

Copies 3 cc:

c: Phillips Petroleum Company Attn: Mike Ford

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		File NoC-1950-X
		Customer No. 3355796
		Report No26949
		Report Date <u>6-1-84</u>
Report of tests on:	Soil	Date Received 5-16-84
Client:	Phillips Petroleum Company	

Identification: Lee Plant Pit, Quad No. 1, Sampled 5-16-84 @ 1:00 p.m. by Mike Ford

EPA Hazardous Waste Number	Contaminant	Detected, mg/L	EPA Max. Conc. Limits, mg/L
D007	Chromium	* 0.2	5.0

*designates "less than"

Sw[

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Company Attn: Mike Ford

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> File No. <u>C-1950-X</u> Customer No. 3355796 Report No. <u>26949</u>

> > Report Date <u>6-1-84</u>

Date Received 5-16-84

Report of tests on: Soil

Sw[

Phillips Petroleum Company

Identification:

Client:

Lee Plant Pit, Quad No. 1, Sampled 5-16-84 @ 1:00 p.m. by Mike Ford

Total Available Chromium----- 390 p.p.m.

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Company Attn: Mike Ford

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		File No. C-1950-X Customer No. 3355796 Report No. 26950	
		Report Da	te <u>6-1-84</u>
Report of tests on:	Soil	Date Rece	ived 5-16-84
Client:	Phillips Petroleum Company		
Identification:	Lee Plant Pit, Quad No. 2, Sampled 5-16-84 @ 1:00 p.m. by	Mike Ford	

EPA HazardousEPA Max. Conc.Waste NumberContaminantDetected, mg/LLimits, mg/LD007Chromium* 0.25.0

*designates "less than"

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Company Attn: Mike Ford

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File No. <u>C-1950-X</u> Customer No. 3355796 Report No. <u>26950</u>

Report Date <u>6-1-84</u>

Date Received 5-16-84

Report of tests on: Soil

Client: Phillips Petroleum Company

Identification: Lee Plant Pit, Quad No. 2, Sampled 5-16-84 @ 1:00 p.m. by Mike Ford

Total Available Chromium----- 140 p.p.m.

Technician: SAM, KLH, GMB

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File No.	<u>C-1950-X</u>
Customer No.	3355796
Report No.	26951
Report Date	6-1-84

Date Received _5-16-84

Report of tests on: Soil

Client: Phillips Petroleum Company

Identification: Lee Plant Pit, Quad No. 3, Sampled 5-16-84 @ 1:00 p.m. by Mike Ford

EPA Hazardous Waste Number	Contaminant	Detected, mg/L	Limits, mg/L
D007	Chromium	* 0.2	5.0

*designates "less than"

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Co. Attn: Mike Ford

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File No.	C-1950-X
Customer No.	3355796
Report No.	26951
Report Date	6-1-84

Date Received 5-16-84

119904

Report of tests on: Soil

Phillips Petroleum Company

Identification:

Client:

Lee Plant Pit, Quad No. 3, Sampled 5-16-84 @ 1:00 p.m. by Mike Ford

Total Available Chromium----- 115 p.p.m.

Technician: SAM, KLH, GMB

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File No. <u>C-1950-X</u> Customer No. 3355796 Report No. <u>26952</u>

Report Date <u>6-1-84</u>

Date Received 5-16-84

Report of tests on: Soil

Client: Phillips Petroleum Company

Identification: Lee Plant Pit, Quad No. 4, Sampled 5-16-84 @ 1:00 p.m. by Mike Ford

EPA Hazardous Waste Number	Contaminant	Detected, mg/L	EPA Max. Conc. Limits, mg/L				
D007	Chromium	* 0.2	5.0				

*designates "less than"

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Company Attn: Mike Ford

Harry M. Burch

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C-1950-X				
3355796				
26952				
6-1-84				
d <u>5-16-84</u>				

Report of tests on: Soil

Client: Phillips Petroleum Company

Identification: Lee Plant Pit, Quad No. 4, Sampled 5-16-84 @ 1:00 p.m. by Mike Ford

Total Available Chromium----- 2.4 p.p.m.

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Co. Attn: Mike Ford

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		File No	C-1950-X
		Customer No.	
		Report No.	26953
		Report Date	6-1-84
Report of tests on:	Sludge	Date Received	5-16-84
Client:	Phillips Petroleum Company		

Identification: Lee Plant Pit, Quad No. 1, Sampled 5-16-84 @ 11:00 a.m. by Mike Ford

EPA Hazardous Waste Number	Contaminant	Detected, mg/L	EPA Max. Conc. Limits, mg/L
D007	Chromium	* 0.2	5.0

*designates "less than"

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Co. Attn: Mike Ford

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File No. <u>C-1950-X</u> Customer No. 3355796 Report No. <u>26953</u>

Report Date _______

Date Received 5-16-84

Report of tests on: Sludge

Client: Phillips Petroleum Company

Identification: Lee Plant Pit, Quad No. 1, Sampled 5-16-84 @ 11:00 a.m. by Mike Ford

Total Available Chromium----- 194 p.p.m.

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Co. Attn: Mike Ford

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> File No. <u>C-1950-X</u> Customer No. <u>3355796</u> Report No. <u>26954</u>

> > Report Date <u>6-1-84</u>

Report of tests on: Sludge

Date Received 5-16-84

Client: Phillips Petroleum Company

Identification: Lee Plant Pit, Quad No. 2, Sampled 5-16-84 @ 11:00 a.m. by Mike Ford

EPA Hazardous Waste Number	Contaminant	Detected, mg/L	EPA Max. Conc. Limits, mg/L
D007	Chromium	* 0.2	5.0

*designates "less than"

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Co. Attn: Mike Ford

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File No.	C-1950-X
Customer No.	3355796
Report No.	26954
Report Date	6-1-84
Date Receive	d <u>5-16-84</u>

119904

Report of tests on: Sludge

Phillips Petroleum Company

Identification:

Client:

n: Lee Plant Pit, Quad No. 2, Sampled 5-16-84 @ 11:00 a.m. by Mike Ford

Total Available Chromium----- 6.8 p.p.m.

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Co. Attn: Mike Ford

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File No. <u>C-1950-X</u> Customer No. 3355796 Report No. <u>26955</u>

Report Date _________

119904

Report of tests on: Sludge

Date Received 5-16-84

Client:

Phillips Petroleum Company

Identification:

Lee Plant Pit, Quad No. 3 Sampled 5-16-84 @ 11:00 a.m. by Mike Ford

EPA HazardousEPA Max. Conc.Waste NumberContaminantDetected, mg/LLimits, mg/LD007Chromium* 0.25.0

*designates "less than"

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Co. Attn: Mike Ford

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File No. <u>C-1950-X</u> Customer No. 3355796 Report No. <u>26955</u>

Report Date <u>6-1-84</u>

119904

Date Received 5-16-84

Report of tests on: Sludge

Client: Phillips Petroleum Company

Identification:

Lee Plant Pit, Quad No. 3, Sampled 4-16-84 @ 11:00 a.m. by Mike Ford

Total Available Chromium----- 27.5 p.p.m.

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Co. Attn: Mike Ford

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			2-1950-X 3355796 26956
		Report Date	6-1-84
Report of tests on:	Sludge	Date Received	5-16-84

Client: Phillips Petroleum Company

Identification: Lee Plant Pit, Quad No. 4 Sampled 5-16-84 @ 11:00 a.m. by Mike Ford

EPA HazardousEPA Max. Conc.Waste NumberContaminantDetected, mg/LLimits, mg/LD007Chromium* 0.25.0

*designates "less than"

'echnician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Co. Attn: Mike Ford

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	C-1950-X
Customer No.	3355796
Report No.	26956
Report Date	6-1-84
	ed _5-16-84

Report of tests on: Sludge

Client: Phillips Petroleum Company

Identification:

Lee Plant Pit, Quad No. 4, Sampled 5-16-84 @ 11:00 a.m. by Mike Ford

Total Available Chromium------ 1.6 p.p.m.

Technician: SAM, KLH, GMB

Copies 3 cc: Phillips Petroleum Co. Attn: Mike Ford

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APPENDIX 3

- Chain of Custody Manifests

Ot receipte bempte ne	C	lectors	Sample	No.
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CHAIN OF CUSTODY RECORD

·

			-ice I
Sample Description			
Collector's Name MICHAE	• ,		
Date Sampled JUNE 9	<u>1984</u> Time Sampl	ed 9:30 -11:30 f	A.M. Hou
Field Imformation			·
SAMP	LES ARE FROM MONITOR	WE WELLS	
	-55		
Chain of Possessions:		·····	
1.	PHILLIPS PETROLEUM	•	
	Name of Organization		
Michael D. Foul.	ELVIRONMENTAL ANALYST Title	6/9/84	<u>6/11/84</u>
2.	Southwestern Laboratories P. O. Box 2150	Inclusive	
Lary M. Burch	Name of Organization Chem. Dest Magnitude Title	6-11-84	6-14-84
G ignature	Title ~	Inclusive	Dates
3	Name of Organization		
Signature	Title	Inclusive	Dates
4	······································		
·•	Name of Organization		
Signature	Title	Inclusive Date	es
5		•	
	Name of Organization		
Signature	Title	Inclusive Dat	es

Collectors Sample No.

CHAIN OF CUSTODY RECORD

Sample Description 4 COMPOSITE SOIL SAMPLES LEE PIT Collector's Name MIKE FOFO Signature Mulas Date Sampled 5/16/84 Time Sampled 1:00 P.M Ηοι Field Imformation Chain of Possessions: PHILUPS PETROLEM COMPANY Name of Organization ENIRONABUTAL ANALYST Title 5/16/24 Southwestern Laboratories P. O. Box 2150 Midland, Texas 79702 Name of Organization <u>1 5-16-84</u> 5-30-84 Inclusive Dates Name of Organization Signature Title Inclusive Dates Name of Organization Inclusive Dates Signature Title Name of Organization -+10 TO MOUSE Dates Signature

Collectors Sample No.

CHAIN OF CUSTODY RECORD

ample Description 4 COMPOSITE SCUPUE SAMPLES LEE PIT ollector's Name MIKE FORD Signature Milal ate Sampled 5/16/89 Time Sampled 11:00 A.M Ho ield Imformation hain of Possessions: PHILUPS PETROLEUM COMPANY Name of Organization 5/16 ENVIRONMENTAL ANALYST Southwestern Laboratories P. O. Box 2150 Midland, Texas 79702 Name of Organization <u>5-16-84</u> <u>5-30-8</u> Inclusive Dates Name of Organization Signature Inclusive Title Dates Name of Organization Signature Title Inclusive Dates Name or Organization

APPENDIX 4

- Lee Natural Gasoline Plant Closure and Post-Closure Plan (Updated July 27, 1984)

CLOSURE AND POST-CLOSURE PLAN FOR HAZARDOUS WASTE FACILITY

3

July 27, 1984

PHILLIPS PETROLEUM COMPANY (Phillips)

LEE NATURAL GASOLINE PLANT

WEST STAR ROUTE

LOVINGTON, NM 88260

EPA ID Number NMD 000709659

This document must be kept on file

at the above facility.

This Closure Plan addresses the general Closure and Post-Closure requirements in 40 CFR 265 Subpart G (and NM/HWMR 206.C.2) and the specific Surface Impoundment Closure and Post-Closure requirements in 40 CFR 265.228 (and NM/HWMR 206.C.6.f). This plan is submitted to effect a settlement reached with EPA. Phillips does not admit that the wastes sent to the impoundment were hazardous wastes as that term is defined by the statute nor does it admit these wastes were hazardous as that term is commonly understood. For purposes of closing the impoundment only Phillips will treat the contents of the impoundment as if it were a hazardous waste.

The New Mexico Environmental Improvement Board (EIB) Hazardous Waste Management Regulations are essentially equivalent to those promulgated by the EPA. In this document when reference is made to a federal regulation, the corresponding New Mexico EIB regulation is also cited for the convenience of the reader.

As required by 40 CFR 265.112 (and NM/HWMR 206.C.2.c(1)), a copy of this closure plan and all revisions to the plan is to be kept at the facility until closure is completed and certified in accordance with 40 CFR 265.115 (and NM/HWMR 206.C.2.f).

In connection with the closure of the Lee Plant surface impoundment, this closure plan will be submitted to the EPA Regional Administrator and the Director of The New Mexico Environmental Improvement Division in accordance with 40 CFR 265.112(c) (and NM/HWMR 206.C.2.c.(3)). This submittal will commence a series of events, delineated in 40 CFR 265.112(d) (and NM/HWMR 206.C.2.c.(4)), which will result in an approved closure plan.

A demonstration of compliance with the requirements for financial responsibility for closure and post-closure care and sudden and nonsudden occurrence liability for the Lee Plant hazardous waste management facility (as required by 40 CFR 265, Subpart H and NM/HWMR 206.C.3.) was submitted in a 3-28-84 letter to Mr. Raymond Sisneros, Director, NM Environmental Improvement Division from B. F. Ballard (Director, Phillips Petroleum Company Environment Control).

- 1 -

The facility to be closed at the Lee Plant consists of a surface impoundment which was used for treatment and disposal of chromium containing cooling tower blowdown water.

The generation of chromium containing cooling tower blowdown water at the Lee Plant has been discontinued. Phillips has decided to withdraw the Interim Status Authorization for the Lee Plant. Approval of this closure and postclosure plan will come from the New Mexico Environmental Improvement Division (NMEID). EPA Region VI will also review the plan but approval will come from the NMEID.

The following list of wastes was included in the Lee Plant Part A Application filed with the EPA. The discussion following each listed waste category indicates the only hazardous waste generation, if any, at the Lee Plant was limited to chromium.

<u>D007 Chromium</u>. On 3/31/83 a letter was sent to Mr. Allyn M. Davis, Director, U.S. EPA Air and Waste Management Division, discussing the RCRA activities at the Lee Plant. In this letter, it was requested that Interim Status be retained for the Lee Plant (a request to withdraw the Part A Application, based on the belief that there was no hazardous waste generated at the Lee Plant, had been made in a 6/16/82 letter) because it was discovered that blowdown from a cooling tower sent to the impoundment may have exceeded the EP Toxicity characteristic chromium level from time to time.

The use of chromium-containing cooling tower chemicals was discontinued at the Lee Plant on October 4, 1983.

FOOL Halogenated Solvent. This waste was originally included to cover the use of degreasing agents which were thought to contain halogenated solvents. These materials have been investigated and found to be water soluble detergents, and not halogenated solvents.

<u>D001 Ignitable</u>. This waste description was included to cover an iron sulfide-bearing material periodically removed from pipes and heat exchangers.

- 2 -

This solid waste does not exhibit the RCRA characteristic of ignitability because it does not "...when ignited, burn so vigorously and persistently that it creates a hazard."

<u>D002 Corrosive</u>. This waste description was included to accomodate occasional acid cleaning of selected lines and vessels. It has been found that during the cleaning process, the acid can be circulated, and the solution adjusted to a pH between 2.0 and 12.5. Therefore, a corrosive hazardous waste is not generated.

U013 Asbestos. Asbestos is no longer a RCRA hazardous waste.

As required by 40 CFR 265.112(a(2)) (and NM/HWMR 206.C.2.c.1(b)), an estimate of the maximum inventory of wastes in storage and in treatment at any time during the life of the facility must be made. The maximum inventory of waste in the Lee Plant surface impoundment at any one time is estimated to be less than 1688 tons (based on an average impoundment depth of 3 feet: (165 ft, length) x (110 ft, width) x 3 ft, depth) x (62 lb/ft³, density) x (1 ton/2000 lb) = 1688 tons).

It is Phillips' intention to demonstrate the closure of the Lee Plant surface impoundment as specified in 40 CFR 265.228(b) and NM/HWMR 206.C.6.f.(2). If in closing a surface impoundment the facility can demonstrate (under 40 CFR 261.3(c) and (d) and NM/HWMR 201.B.2.c) that none of the standing liquids, waste and waste residues, the liner (if any) and underlying and surrounding contaminated soil remaining at any stage of removal are hazardous wastes, the impoundment is no longer subject to the requirements of 40 CFR 265 (and of NM/HWMR 206.).

The following course of action will serve to remove the Lee Plant from the EPA's and NMEID's Hazardous Waste Program:

(1) Phillips submits this amended Lee Plant closure and post-closure plan to the EPA and the New Mexico EID.

- 3 -

- (2) Phillips obtains approval of the Lee Plant closure and post-closure plan from the NMEID.
- (3) Phillips demonstrates closure of the Lee Plant surface impoundment under 40 CFR 265.228(b) (and NM/HWMR 206.C.6.f.(2)) and 40 CFR 265 Subpart G (and NM/HWMR 206.C.2).
- (4) After the Lee Plant surface impoundment has been formally closed interim status will be withdrawn. The Notification of Hazardous Waste Activity for the Lee Plant will remain on file, whereby the EPA identification number for the Lee Plant will be retained.

The following sampling and analysis program will effectuate the demonstration of closure of the Lee Plant unlined surface impoundment (under 40 CFR 265.228(b) and NM/HWMR-2, 206.C.6.f(2)):

(1) Intent

The Lee Plant surface impoundment is no longer in use. The liquid that was in the impoundment evaporated, leaving only sludge and soil. This sampling and analysis program is designed to determine the chromium level, via the use of the EP toxicity test, of the impoundment sludge and underlying soil. The chromium concentration of the water that may be present in the uppermost water-bearing formation will also be determined.

The determination of whether the impoundment's sludge, soil or groundwater exhibits the characteristic of EP toxicity for chromium will be done in accordance with 40 CFR 261.24 (and NM/HWMR-2, 201.B.5.). The sampling program and analytical procedures will follow methods established in the publications "Test Methods for Evaluating Solid Waste" (EPA Publication SW-846, Second Edition), "Samplers and Sampling Procedures for Hazardous Waste Streams" (EPA Publication 600/2-80/018), "Characteristics of EP Toxicity" (Federal Register, Vol. 45, No. 98) and "Thin-Walled Tube Sampling of Soils" (ASTM Publication D1587-74). All sampling will be performed

by persons knowledgeable of analytical sampling techniques and all analytical work will be done by a qualified, independent laboratory. All samples will be appropriately labeled and chain of custody manifests will document the movement of all samples.

(2) Selection of Sampling Locations

A stochastic approach will be used to select impoundment sludge and soil sampling locations. The dimensions of the Lee Plant surface impoundment are 250 by 100 feet. The impoundment is divided into four quadrants, and a grid system will be conceptually overlaid on each quadrant, with each grid dimension scaled to represent a certain distance. For example, if each grid represents an area 8 by 4.5 feet, there would be 15 by 11 grid elements in each quadrant (assuming a 250 by 100 feet impoundment), or 165 grid-elements in each quadrant. Sample locations within each grid will be determined by selecting random numbers corresponding to grid locations. Samples will then be taken from each quadrant in the area corresponding to the chosen grid locations. (Attachment 1 illustrates the Lee impoundment grid system.)

(3) Impoundment Sludge Sampling

Impoundment sludge at the Lee Plant will be sampled at five randomly selected locations within each quadrant. As this impoundment has already been backfilled, an auger type bit will be used to drill through the backfill, at each location, until the impoundment's sludge layer is encountered at which time a sludge sample will be taken. The five samples from each quadrant will be combined to produce one composite sample per quadrant. The sample containers will be sealed, labeled and transported to a commercial laboratory and an Extraction Procedure Toxicity Test for chromium will be performed on the composite sludge samples in accordance with 40 CFR 261, Appendix II (and NM/HWMR-2, 201.C, Appendix II). Chain of custody manifests will document the movement of all samples.

(4) Impoundment Soil Sampling

The Lee impoundment soil will be sampled at five randomly selected locations within each quadrant at a depth of six inches. As this impoundment has already been backfilled, an auger type bit will be used, at each location, to drill through the backfill, sludge and six inches into the soil at which time a soil sample will be taken. (A depth of six inches was chosen as the majority of this pit is underlain with hard caliche and shale rock with little or no soil.) The five samples will be combined to form one composite sample per quadrant for analysis. The composite samples will be labeled and transported to a commercial laboratory and an Extraction Procedure Toxicity Test for chromium will be performed in accordance with 40 CFR 261, Appendix II (and NM/HWMR-2, 201.C, Appendix II). Chain of custody manifests will document the movement of all samples.

(5) Total Chromium Content

A portion of all composite sludge and soil samples will be ashed with nitric acid and hydrogen peroxide to dissolve all chromium which might be present. The leachate from this ashing will be analyzed by atomic absorption to determine the total chromium content.

(6) Groundwater Sampling

Four water sampling wells, one up-gradient and three down-gradient, will be drilled to determine the chromium concentrations, as per the EP toxicity test, of any groundwater that may be present in the uppermost water-bearing formation. Independent hydrogeologist Ed L. Reed and Associates have prepared the completion procedures for these sampling wells and chosen their locations. Attachment 2 is a report from Ed L. Reed detailing the reasons for choosing the well sites as well as a discussion of the drilling and well completion procedures that will be used. A schematic of a completed well (Attachment 3) and a plot plan showing the location of the monitoring wells (Attachment 4) were also prepared by Ed L. Reed and Associates.

- 6 -

During the drilling of the wells, a water sample will be taken at the point that water is first encountered. After completion of the well, the well will be bailed until clean water is present, then two casing volumes of water will be pumped from the well before further sampling.

If during the drilling of a well it is found that the well cannot be drilled with air due to poor hole conditions (sluffing of the well bore), it will be drilled with water. A sample of the water used for drilling will be taken and analyzed for chromium. A water sample will also be taken from the well immediately after it has been bailed instead of at first contact. Two casing volumes will then be pumped from the well before taking further samples.

Four samples will be taken from each well, spaced in such a manner that will allow one sample to be taken one foot from the bottom of the well and the rest at equal distances from each other further up the well. The groundwater samples will be labeled (including the well number and the depth at which sampling occurred), numbered, refrigerated and transported to a commercial laboratory and analyzed by atomic absorption for their chromium content. Chain of custody manifests will document the movement of all samples.

(7) Results of Analyses

Since the impoundment no longer receives chromium containing cooling tower blowdown water (the Lee Plant impoundment no longer receives any waste), if the laboratory results indicate that none of the matter in and around the Lee Plant surface impoundment is hazardous, the Lee Plant surface impoundment will not be subject to the requirements of 40 CFR 265 Subpart G and 40 CFR 265 Subpart K (and NM/HWMR-2, 206.C.2. and 206.C.6.). If any of the material in the impoundment is determined to be hazardous, the material will be removed and disposed of as a hazardous waste in accordance with all applicable requirements of 40 CFR 262, 263, and 265 (and EIB/HWMR-2, 204., 205., and 206.). Once any material found to be hazardous

is removed from the surface impoundment, the impoundment will be retested in accordance with the plan discussed above.

The total chromium content testing is expected to show that although EP-toxic concentrations of chromium are not present in the impoundment sludge and soil, the total chromium concentrations are considerably higher because the chromium has been stabilized in a non-leachable form. This testing will answer the question "where did the chromium go?"

The groundwater sampling is expected to show chromium levels no higher than the naturally-occurring background concentration. This testing should demonstrate that no chromium has leached from the surface impoundment into the groundwater.

(8) <u>Revert to Generator-only Status</u>

When Phillips demonstrates closure of the Lee Plant impoundment in accordance with this closure plan, it will be requested that the facility retain its EPA identification number.

As required by 40 CFR 165.112(a)(4) (and NM/HWMR 206.C.2.c.(1)(d)), an estimate of the expected year of closure and a schedule for final closure must be made. Closure is anticipated to occur in 1984. Once the closure plan submitted by Phillips is approved by the New Mexico EID, the sampling program discussed in this closure plan will have begun before the expiration of 90 days as required by 40 CFR 265.113(a) (and NM/HWMR 206.C.2.d.(1)). Initial sampling and analysis is expected to take approximately 30 days. If the results of testing indicate some of the liquid or sludge or soil from the impoundment is hazardous, it will be removed and disposed of as a hazardous waste in accordance with all applicable requirements of 40 CFR 262, 263 and 265 (and NM/HWMR 204., 205. and 206.). This activity, if it must be executed, is estimated to take approximately an additional 30 days.

The closure activities are anticipated to be completed within 180 days after the approval of the closure plan, as required by 40 CFR 265.113(b) (and NM/HWMR 206.C.2.d.(2)). If for some hitherto unknown reason closure cannot be achieved within 180 days of receiving the approved closure plan, the New Mexico EID Director and The EPA Regional Administrator will be contacted and a revised time schedule will be negotiated.

An "Activity Matrix" for the Lee Plant, outlining the events comprising the impoundment closure, is presented on the following page.

As required by 40 CFR 265.114 (and NM/HWMR 206.C.2.e.), when closure is completed, any facility equipment used in handling hazardous waste will be disposed or decontaminated by removing any hazardous waste or residues.

As required by 40 CFR 265.115 (and NM/HWMR 206.C.2.f.), after the closure is completed, Phillips will submit to the New Mexico EID certification by Phillips and an independent registered professional engineer that the facility has been closed in accordance with the specifications in the approved closure plan.

Since there will be no hazardous waste at the Lee Plant once Closure is effected, the facility should not be subject to the Post-Closure requirements of 40 CFR 265.117, 265.118, 265.110 and 265.120 (and NM/HWMR 206.C.2.g,h,i and j), and not subject to provide post-closure care under 40 CFR 265 Subpart G and Section 265.310 (and NM/HWMR 206.C.9.d.).

-9-

	LEE PLANT	
	CLOSURE ACTIVITY NATRIX	
Action by Phillips	Action by EPA	Action by NM EID
Submit amended closure plan to	Review plan for regulatory	Review closure plan; notify
EPA and NM EID.	compliance.	Phillips as to the acceptability
		of the plan.
Commence impoundment and ground-		
water sampling described in plan,		
and submit results to NMEID with		
the required certifications by		
Phillips and a registered pro-		
fessional engineer.		
		Commence formal closure and post-
		closure plan review process.
		Certify Lee Plant is closed with
		respect to the EPA and NM hazard-
		ous waste management regulations.

LER PLANT

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- 10 -

Questions concerning this closure plan should be directed to either the facility's Corporate Environmental Contact:

B. F. Ballard, Director
Environment Control
7 A4 PB
Bartlesville, OK 74004
918-661-5330

or the facility's Regional Manager:

E. E. Clark Regional Operations Manager 4001 Penbrook Odessa, TX 79762 915-367-1266

FPC:dsg-CE:421

ATTACHMENT 1

LEE PLANT EVAPORATION IMPOUNDMENT

Sludge and Soil Sampling Points

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Quad 4

Quad 3

ATTACHMENT 2

Ea L. Reed and Associates, Inc.

Consulting Hydrologists MIDLAND - CORPUS CHRISTI TEXAS

V. STEVE REED EXECUTIVE VICE PRESIDENT 708 GUARANTY PLAZA CORPUS CHRISTI. TEXAS 78475 512-883-1353

ED L. REED, P.E. CHAIRMAN OF THE BOARD A. JOSEPH REED PRESIDENT CHESTER F. SKRABACZ VICE PRESIDENT FIELD OPERATIONS 1109 N. BIG SPRING MIDLAND. TEXAS 79701 915 682-0556

April 3, 1984

Mr. J. W. Maharg Engineering Director, PBR Phillips Petroleum Company 4001 Penbrook Odessa, Texas 79762

> RE: Lee Plant Ground Water Monitoring

Dear Mr. Maharg:

Attached please find locations for 3 ground water sampling wells whose water should contain chromium from the past impoundment if infiltration has occurred. On the same map is a location which should provide a representative sample of native ground water unaffected by the impoundment. The data which we have available indicates that the hydraulic gradient in the area should be to the southeast.

These wells should be completed by drilling an 8-inch hole to the top of the Triassic red beds (expected to occur at a depth of about 250 feet). Four-inch PVC casing should be set to the top of the Triassic with the entire saturated interval of the well screened using mill slotted 4-inch PVC. We recommend 30 thousandths mill slotting with the annular space between the drilled hole and the well casing being gravel packed with Perma-sand 8/16 frac sand. The gravel should be brought to within 15 feet of the surface and the annular space between the gravel and the top of the hole filled with neat cement. We would advise about a one-foot layer of sand be placed on top of the gravel before the neat cement is placed in the annular space in order to prevent the slurry from penetrating into the gravel.

Following completion of the well, a pump should be placed in the casing and the water in the well pumped until clear water is obtained. A water sample can be collected at that time to establish the base line conditions. Samples collected subsequent to this initial sampling should be taken only after two casing volumes of water have been removed from the monitor well immediately prior to sampling.

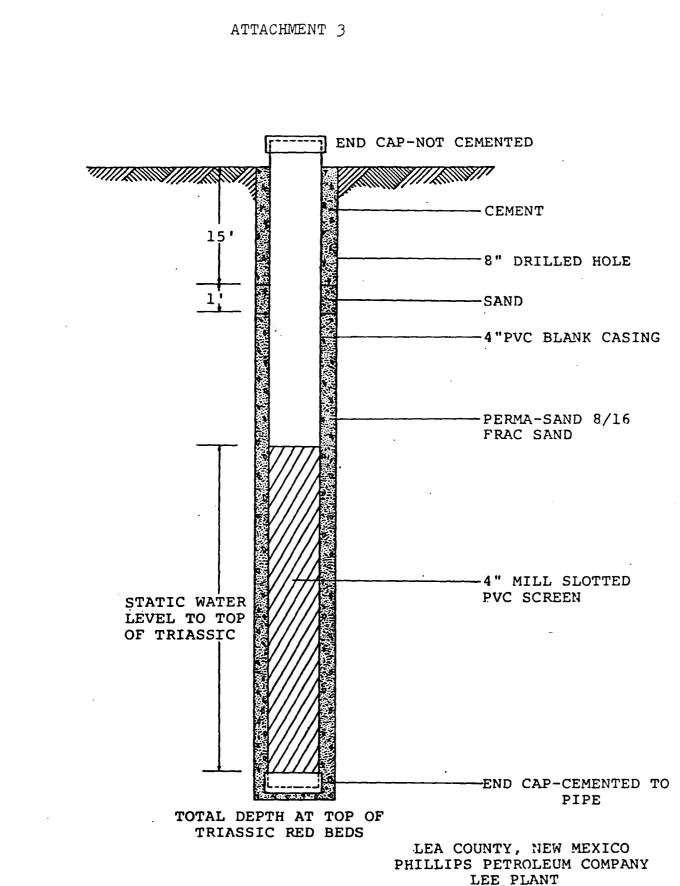
If you should have any questions regarding these recommendations please advise.

Very truly yours,

ED L. REED & ASSOCIATES, INC. G. Joseph Ruld

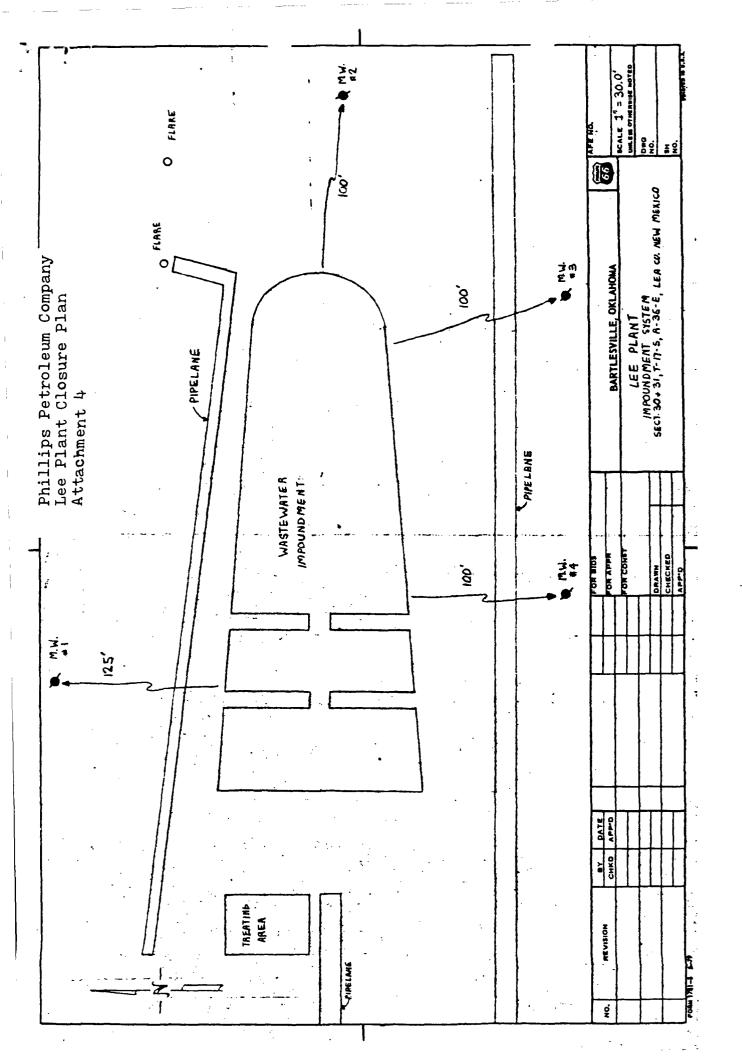
A. Joseph Reed

AJR:1b



MONITOR WELL DESIGN

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APPENDIX 5

- Copy of Mr. William H. Taylor, Jr.'s February 15, 1984 letter to Mr. Frank Collis, discussing the roles of the U.S. EPA and the New Mexico Environmental Improvement Division in reviewing and approving closure and postclosure plans.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION VI INTERFIRST TWO BUILDING. 1201 ELM STREET DALLAS, TEXAS 75270

February 15, 1984

Mr. Frank Collis Phillips Petroleum Company 7 A3 PB Bartlesville, Oklahoma 74004

Dear Mr. Collis:

Pursuant to your request, we are providing the following summary of the respective responsibilities and authorities of the Environmental Protection Agency (EPA) and the New Mexico Environmental Improvement Division (NMEID) with regard to the administration of the hazardous waste management program. We have emphasized the review and approval of closure and post-closure plans which we understand to be your particular concern.

On September 30, 1983, the State of New Mexico received Interim Authorization from the EPA to administer the hazardous waste management program under the authority of the Resource Conservation and Recovery Act (RCRA). NMEID has been granted authorization for Phase I and Phase II, Components A and B, which means NMEID has authority for primary enforcement responsibility of the federal hazardous waste program interim status standards for facilities in existence as of November 19, 1980 (Phase I), authority to issue permits for tanks and containers (Phase II A) and authority to permit hazardous waste incinerators (Phase II B).

The Phase I Authorization gives the State primary enforcement authority over the RCRA-regulated community. New Mexico's responsibilities include the identification and listing of hazardous waste, enforcement of the standards for generators and transporters of hazardous waste and enforcement of the interim status standards for owners and operators of treatment, storage, and disposal facilities.

However, EPA and NMEID have agreed that any enforcement action commenced by EPA prior to the date of the State's Interim Authorization will remain the responsibility of EPA to conclude. It was also agreed that EPA may take enforcement action based on a violation detected prior to the date of the State's Interim Authorization.

The Phillips Petroleum - Lusk Plant closure and post-closure plans were required under a compliance order issued September 9, 1983, prior to the authorization of NMEID. Therefore, under the above mentioned agreement, EPA will continue its enforcement action and it will be necessary for EPA to approve the closure and post-closure plans based on a review of their adequacy before the order can be settled and the final order issued. However, EPA has delegated the authority to approve and give public notice of closure plans for interim status closures to NMEID as part of the Phase I Interim Authorization. EPA is obligated to review the closure plan to verify compliance with the 40 CFR Part 265 regulations in order to conclude the enforcement action; at the same time NMEID has the responsibility for reviewing the closure plan for detailed and specific technical adequacy in light of the impending closure. The State must subsequently give public notice of the approved closure plan and be prepared to discuss and possibly defend the plan in the course of a public hearing.

As mentioned above, New Mexico has not yet applied for Phase II, Component C; therefore EPA retains the permitting authority for hazardous waste land disposal facilities including waste piles, surface impoundments, landfills, and land treatment units. Consequently, EPA retains permitting authority for any permits currently issued for post-closure care of such land disposal facilities. The authority to terminate interim status also rests with the permitting authority. In the case of land disposal units, such as surface impoundments, this authority rests with EPA - until such time as New Mexico receives Phase II, Component C Interim Authorization or Final Authorization.

If you have any questions or if we can be of further assistance, please contact me or Harriet Tregoning at 214/767-9727

Sincerely yours,

William H. Zaylon, Jr.

William H. Taylor, Jr., Chief Hazardous Materials Enforcement Section

cc: Raymond Sisneros New Mexico Environmental Improvement Division

TABLE 3-1

SOIL VAPOR RESULTS, LEE PLANT SEPTEMBER, 1988

Point	Location	Benzene	Toluene	Ethylbenzene	P,M-Xylene	0-Xylene
1	N700 E800	ND	13.0	48.8	14.3	10.9
2	N750 E800	ND	ND	ND	ND	ND
A	N700 E850	ND	ND	ND	ND	ND
в	N650 E800	ND	ND	ND	ND	ND
с	N700 E850	ND	0.07	ND	ND	ND
7	N400 E1100	ND	ND	ND	ND	ND
8	N100 E1000	ND	224	ND	91.0	ND
9	N100 E900	41.9	23.7	17.4	1,63	6.26
11	N100 E800	19.6	8.30	ND	ND	20.3
13	N250 E1000	ND	ND	ND	ND	ND
14	N250 E900	ND	ND	ND	ND	ND
15	N250 E800	ND	ND	179	663	ND
16	N000 E1000	ND	ND	ND	ND	ND
17	N000 E1100	ND	ND	40.1	14.7	1.80
18	N000 E900	1.14	37.4	ND	113	157
Detection Limit		0.01	0.01	0.01	0.01	0.01

Constituent Concentration (uL/L)

Points 3,4,5,6,10 and 12 could not be sampled due to probe refusal by caliche layer.

ND = Not Detected

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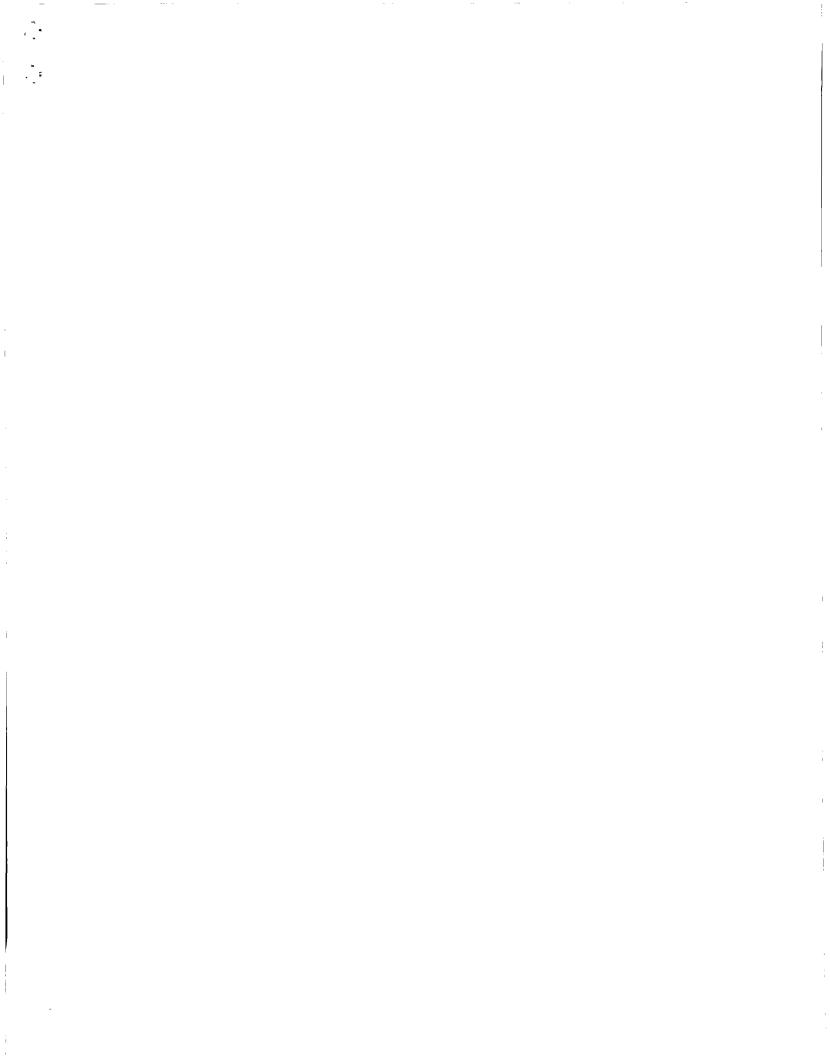
but the medium and heavier molecular weight unknowns were present in relatively higher concentrations than the low molecular weight unknowns.

Points 8 and 9 were located in the evaporation pond and point 11 was located directly to the west. The vapor sample from point 9 resulted in the highest observed concentration of benzene (41.9 uL/L) for any point analyzed; with toluene, ethylbenzene and xylene all present but at lower levels than benzene. Results from the point 8 sample showed the highest concentration of toluene (224 uL/L) for any point analyzed, while the sample from point 11 resulted in a benzene concentration of 19.6 uL/L and o-xylene of 20.3 uL/L.

Results from points 17 and 18, south of the evaporation ponds, indicate elevated levels of toluene (37.4 uL/L in 18), ethylbenzene (40.1 uL/L in 17), p-, m-xylene (113 uL/L in 18) and o-xylene (157 uL/L in 18). Chromatograms from both samples show a very similar qualitative match with respect to low and medium molecular weight unknowns.

A headspace analysis was run on water collected from MW-4. The results show that significant concentrations of toluene (21.2 uL/L), ethylbenzene (37.7 uL/L) and xylenes (32.2 uL/L) are present in the water. The water also contains low and some medium, molecular weight unknown hydrocarbons.

Quantitative analysis of BTEX was performed by daily calibrations and peak identification/integration by the Photovac 10550 computer. The qualitative analysis of the sample chromatograms were performed by matching the retention times and shape of prominent compound peaks, or group of compound peaks, to each other.



APPENDIX A EQUIPMENT SPECIFICATION

EQUIPMENT SPECIFICATION

Chromatograms were obtained using a Photovac 10S50 Portable Photoionization GC and Integrator. Portable 12V DC batteries and ultra-pure carrier air were used for field operation. Constituents in the soil vapor were separated by a 530 micron wide-bore fused silica capillary column, which gives excellent resolution of petroleum hydrocarbons at lower temperatures. An isothermal oven temperature of 30 degrees C and a column flow rate of 10 mh/min. were maintained for stable column operation. The gain and sample volumes were adjusted, depending on the concentration of the soil vapor, to give consistent on-scale peaks.

A 12V DC Air-Cadet diaphragm vacuum pump was used to evacuate the vapors from the soil at approximately 700-900 cu. in./min. (at 5 in. Hg). The pumps maximum air capacity is 1150 cu. in./min. with a maximum vacuum of 1 in. Hg.



APPENDIX B GAS CHROMATOGRAPH DATA SHEETS GC DATA SHEET

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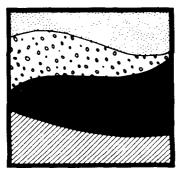
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GC DATA SHEET

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MJAN FGM	· · ·	73		3	AN	dN	<u>C</u> N	CN	CN	CH	AN	QN	AN	QN	
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Geoscience Consultants, Ltd. (GCL) is a multidisciplinary firm offering a wide range of environmental, geotechnical and engineering services to clients throughout the United States. GCL is headquartered in Albuquerque, New Mexico and has eastern regional offices in the Washington, D.C. area. The firm's professional staff has expertise in hazardous waste management, hydrogeology, environmental, chemical and civil engineering, permitting and regulatory compliance, and air quality studies.





For more information, contact: Geoscience Consultants, Ltd. 500 Copper Avenue, N.W., Suite 200, Albuquerque, New Mexico 87102, (505) 842-0001 ATTACHMENT 5

Geoscience Consultants, Ltd.

500 Copper Avenue NW, Suite 200 Albuquerque, New Mexico 87102 (505) 842-0001 FAX (505) 842-0595

1109 Spring Street, Suite 706 Silver Spring, Maryland 20910 (301) 587-2088

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September 20, 1988

Ms. Cindy Smith Process and Environment Phillips Petroleum Company Bartlesville, Oklahoma 74004

RE: RESULTS OF THE SOIL VAPOR SURVEY CONDUCTED AT PHILLIPS LEE GAS PLANT

Dear Ms. Smith:

Geoscience Consultants, Ltd. (GCL) is pleased to submit the Draft Report on the Soil Vapor Survey at Phillips Lee Gas Plant, which was conducted on September 6, 7 and 8, 1988.

Eighteen grid points (see the enclosed copy of Figure 3-1 of the draft report), one background location and water collected from MW-4 were surveyed by headspace analysis for benzene, toluene, ethylbenzene and xylenes (BTEX) with GCL's portable gas chromatograph (GC). In addition, several products that are present at the site were analyzed for comparison with the results of the soil samples. In general, the signatures of the chromatograms for the sample points could not be positively correlated because of the presence of light, medium and heavy compounds. However, the following relationships have been interpreted to occur based on the results of the survey:

- o The chromatograms from grid point 1, located in the center of the "rocket pit", and MW-4, located downgradient from the evaporation pond correlate very well (Figure 1).
- o It is possible that the chromatograms from grid points 8 and 9, located within the evaporation pond, also correlate with MW-4, but the relationship is not clearly identified because of the presence of numerous unknown compounds (Figure 2).
- o The chromatograms from grid points 1, 8 and 9 correlate well with the early peaks, but not with the late peaks (Figure 3).
- o The chromatograms for grid points 1, 17 and possibly 18 correlate with the late peaks, but not with the early peaks (Figure 4).
- o The chromatograms for grid points 15, 17 and 18 are roughly similar (Figure 5).

Ms. Cindy Smith Page 2 September 20, 1988

- o A chromatogram of a sample of "stoddard solvent" which is used at the site, and grid point 15 correlate (Figure 6); grid points 17 and 18 roughly correlated (Figure 7).
- o A sample of natural gas product collected at the site was too volatile for the sampling equipment to retain and could not be analyzed, and can probably be eliminated as comparison product.

Based on the data presented in the report, and summarized above, several general conclusions can be made. The "rocket pit", which is roughly upgradient from the evaporation pond, is a potential and probable source for the hydrocarbons found in MW-1 and MW-4 during GCL's initial ground-water investigation. Hydrocarbons identified in and around the evaporation pond, by the soil vapor survey, cannot be confirmed or eliminated as a source for the hydrocarbons which occur in ground water beneath the pond. The "stoddard solvent" found in grid points 15, 17 and 18 is probably a result of a pipe rupture which occurred and may or may not relate to the ground water problem at the site.

Upon receipt of your verbal or written comments, we will finalize the report for transmittal to the Oil Conservation Division (OCD) and the New Mexico Environmental Improvement Division (NMEID). We should continue to approach the investigation and remedial action under the jurisdiction of OCD. We recommend that a meeting be scheduled as soon as practicable with the OCD to discuss the results of the investigation, submit an amended work plan and to obtain approval to proceed with the remaining tasks of the work plan. It is GCL's experience is that OCD is very cooperative if a proactive strategy is actively pursued once a release of "raw" product has been detected. Should EID become involved, all tasks proposed would still be required but it is likely that a more complete plume definition would also be required before recovery of product could begin.

If you have any questions regarding this transmittal letter or the draft Soil Vapor Report, please contact me at (505) 842-0001. We look forward to your review of the report.

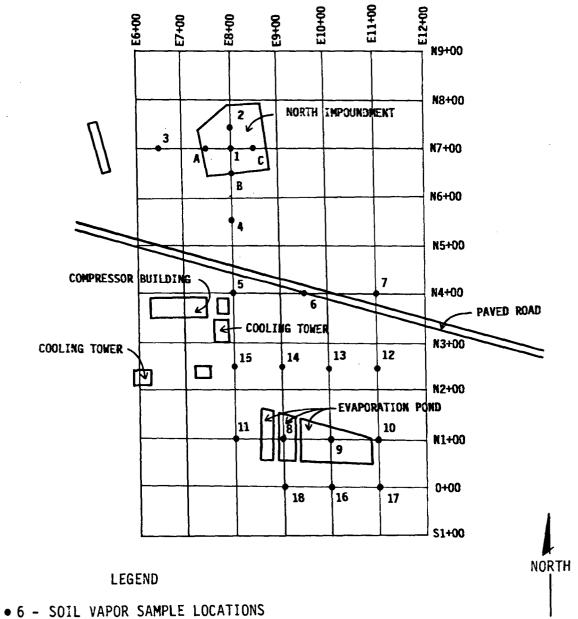
Yours very truly, GEOSCIENCE CONSULTANTS, LTD.

Carol Wilson Hodges

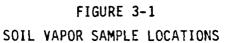
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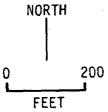
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Enclosure



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Point # 8

FIGURE 2 Chromatograms from Point #8, Point #9 and MW-4

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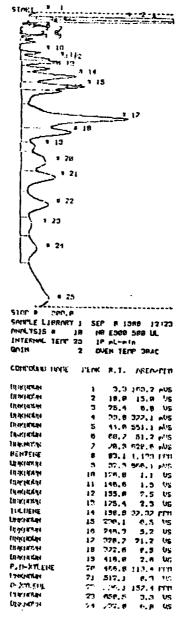
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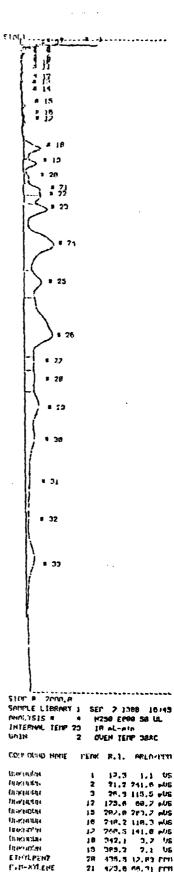
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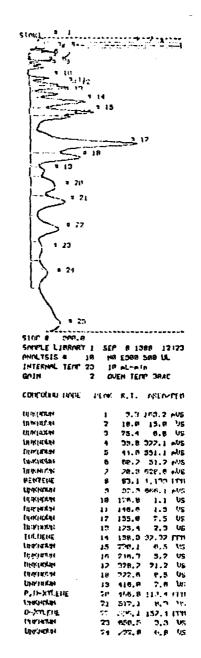
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DRAFT REPORT LIMITED SOIL VAPOR SURVEY PHILLIPS LEE GAS PLANT LEA COUNTY, NEW MEXICO

September 20, 1988

Prepared for:

Cindy Smith Process and Environment Phillips Petroleum Company Bartlesville, Oklahoma 74004

Prepared by:

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DRAFT REPORT LIMITED SOIL VAPOR SURVEY PHILLIPS LEE GAS PLANT LEA COUNTY, NEW MEXICO

SUBMITTED BY:

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Wilcon Hoday GCL Program Manager

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GCL Project Director

DATE:

9-30-88

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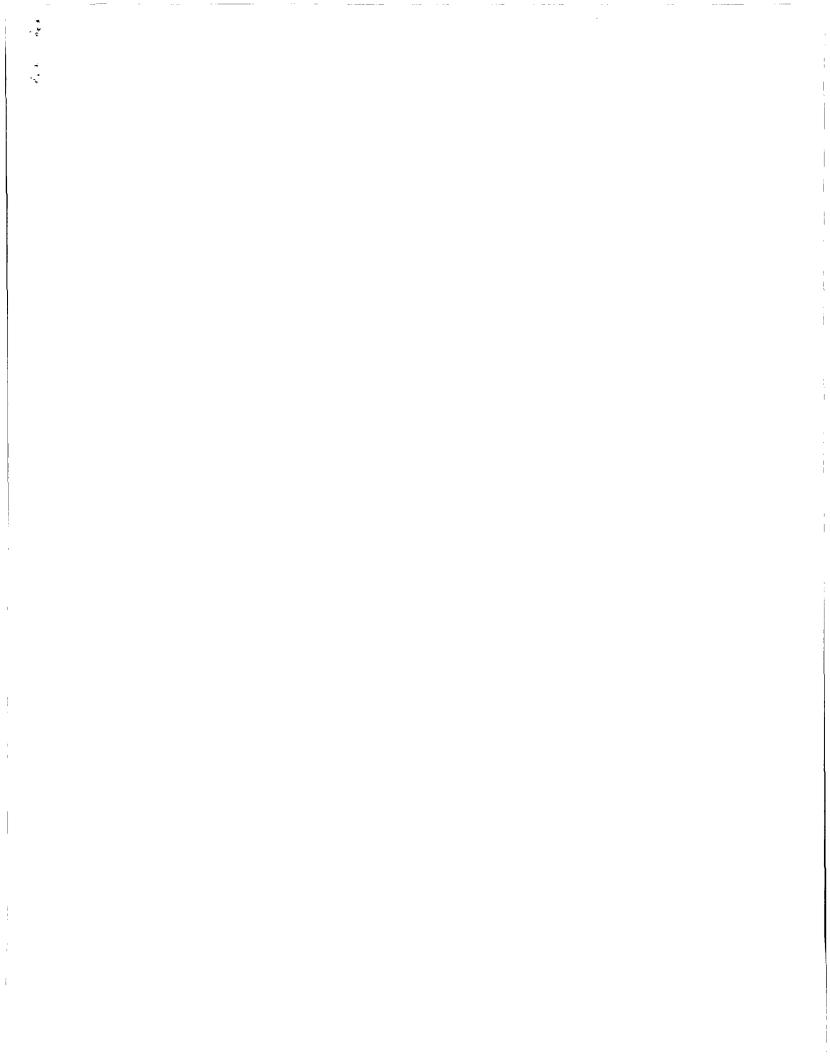


TABLE OF CONTENTS

1.0	EXECUTIVE SUMMARY	
2.0	INTRODUCTION	2
3.0	TECHNICAL APPROACH3.1FIELD INVESTIGATION3.1.1Sample Locations3.1.2Sampling and Analysis	3 • • • • • • • • • • • • • • • • • • •
	RESULTS	

LIST OF TABLES

TABLE 3-1	SOIL VAPOR RESUL	TS, LEE PLANT	 7
		LIST OF FIGURES	

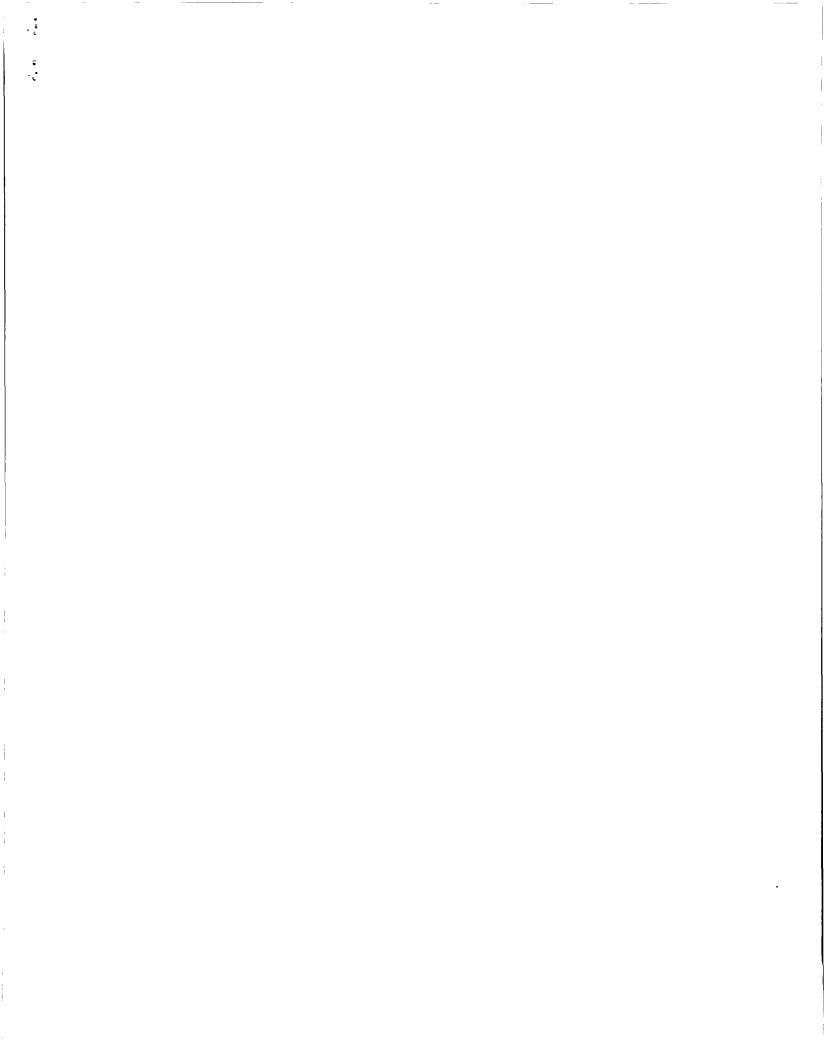
FIGURE 3-1 SOIL	VAPOR SAMPLE	LOCATIONS	•	•	•	•	•		•	•	•	٠	•	٠	•		4
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LIST OF APPENDICES

APPENDIX	Α	EOUIPMENT	SPECIFICATION
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APPENDIX B GAS CHROMATOGRAPH DATA SHEETS



1.0 EXECUTIVE SUMMARY

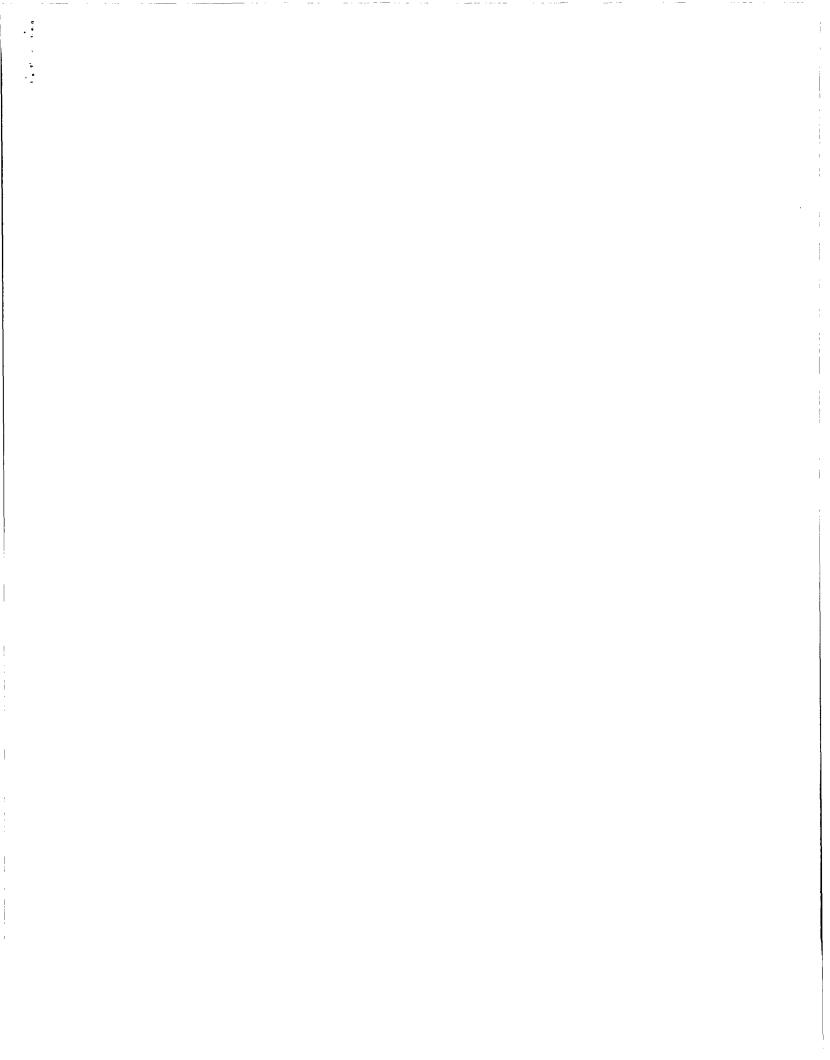
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On September 6 through September 8, 1988, Geoscience Consultants Ltd. (GCL) conducted a limited soil vapor survey at Phillips Lee Plant near Hobbs, New Mexico. The survey was requested by Phillips Petroleum Company after ground-water samples from four monitor wells installed by GCL at the plant revealed the presence of hydrocarbons. The purpose of the survey was to identify potential sources of these hydrocarbons.

The limited soil vapor survey consisted of 18 sample points located on and adjacent to two surface impoundments (one located north of the plant and referred to as the north impoundment, and one located east of the plant referred to as the evaporation pond) and one background point located off-site. Probe refusal was encountered at six points. One sample of ground water and two samples of natural gas liquids were obtained from Phillips and prepared by GCL personnel for qualitative gas chromatography comparison with shallow soil vapor samples. Chemical analyses for benzene, toluene, ethylbenzene and xylene (BTEX) were made using a Photovac Model 10S50 Portable Gas Chromatograph (GC).

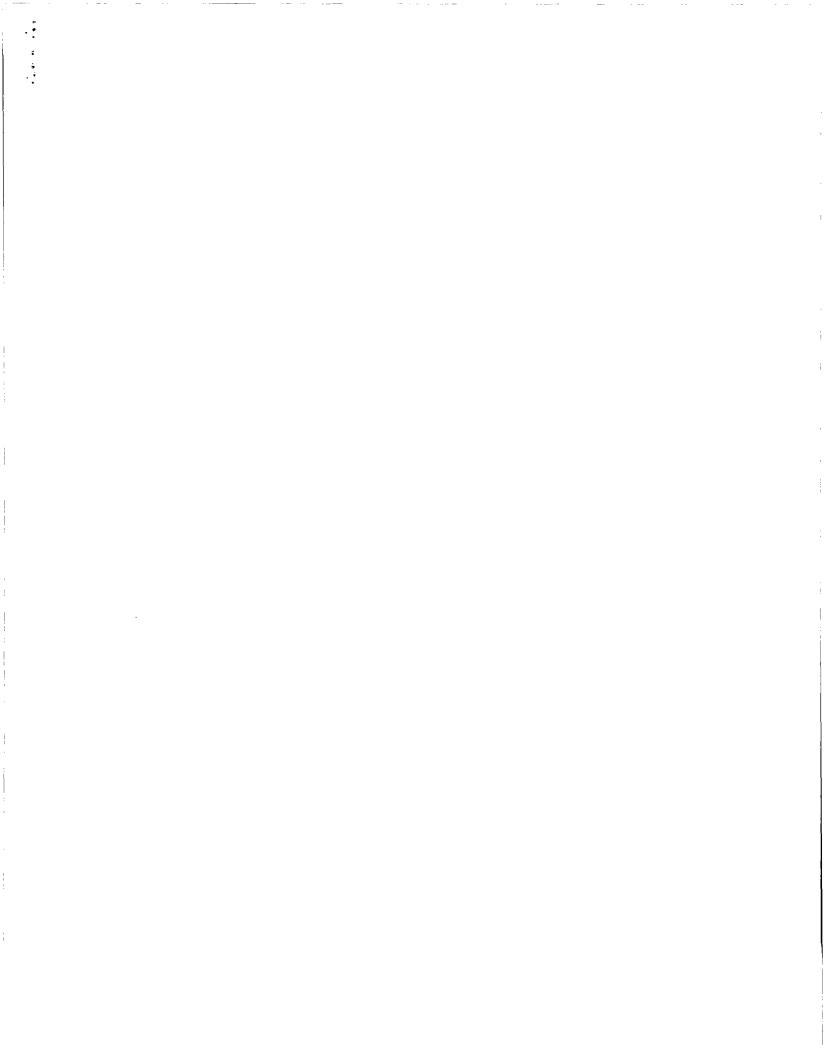
Samples analyzed from points 2, A, B and C near the north impoundment and points 7, 13, 14 and 16 near the evaporation pond indicated that nominal background levels of hydrocarbons are present in the soils at these locations. Concentrations of toluene, ethylbenzene, p-,m-xylene and o-xylene ranging from approximately 10 to 50 microliters per liter (uL/L) and unknown compounds of low to medium molecular weight (relative to BTEX) were identified in the north impoundment. The highest concentrations of benzene (41.9 uL/L) and toluene (224 uL/L) were identified in the evaporation pond. Vapor analyzed from a point northwest of the evaporation pond showed high concentrations of ethylbenzene (40.1 uL.L) and p, m-xylene (113 uL/L). Points located west and south of the evaporation pond also indicated the presence of hydrocarbons at low uL/L levels.

September 16, 1988



2.0 INTRODUCTION

Site hydrogeology, water levels, ground-water gradient and subsurface lithology was characterized at the Phillips Lee Plant when four groundwater monitoring wells were installed by GCL in April, 1988. Based upon analytical and related field data obtained from the monitor wells, it became evident that free-phase petroleum products occurred in the unconfined alluvial aquifer underlying the Lee Plant. In accordance with Section 1-203 of the New Mexico Water Quality Control Commission Regulations, Phillips Petroleum Company notified the New Mexico Oil Conservation Division (NMOCD) and authorized GCL to identify potential sources of hydrocarbons in the unsaturated and saturated zone through a limited soil vapor investigation. The soil vapor grid was developed to center on two impoundments; the north impoundment and the evaporation pond.



3.0 TECHNICAL APPROACH

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The following sections describe in detail the technical procedure GCL followed in performing the soil vapor survey at the Phillips Lee Plant.

3.1 FIELD INVESTIGATION

3.1.1 Sample Locations

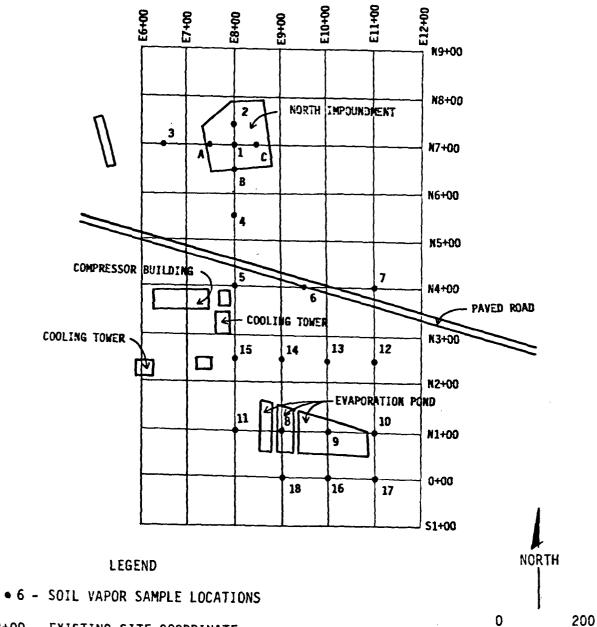
GCL utilized a grid system based on a modification of the site's existing 100-foot coordinate system to locate sample points (Figure 3-1). Sample points were centered around two former evaporation ponds. Soil vapor samples were collected at locations as near to the 100-foot centers as possible, but the presence of an impenetrable caliche horizon just below the surface necessitated that samples be taken where probe-penetration was possible. A background sample was collected from a location approximately one-quarter mile northeast of the plant. One water sample was collected from MW-4, and two natural gas liquids were obtained from Phillips and prepared by GCL personnel for qualitative gas chromatography comparison with shallow soil vapor samples.

3.1.2 Sampling and Analysis

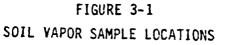
At each sampling point, a 0.75-inch diameter by seven-foot long, decontaminated steel probe was driven with a hand-operated, slide hammer to a depth of 3-4 feet. Thick layers of caliche were encountered at points 3, 4, 5, 6, 10, and 12. These points could not be sampled because the shallow probe refusal would not allow a tight enough seal between the soil and the probe to result in a depth-discrete vapor sample. Without a tight seal, air from the surface could be included in the sample via the drive-hole annulus, and distort analytical results.

A diaphragm vacuum pump was attached to the probe after it penetrated to the target depth, via an adapter tube. The probe was then raised until an in-line vacuum gauge read approximately 5-inches of mercury (Hg), to ensure that the probe had lifted off the drive-point. During evacuation, an H-Nu photoionization detector (H-Nu) was used to monitor vacuum pump

September 16, 1988



N3+00 - EXISTING SITE COORDINATE

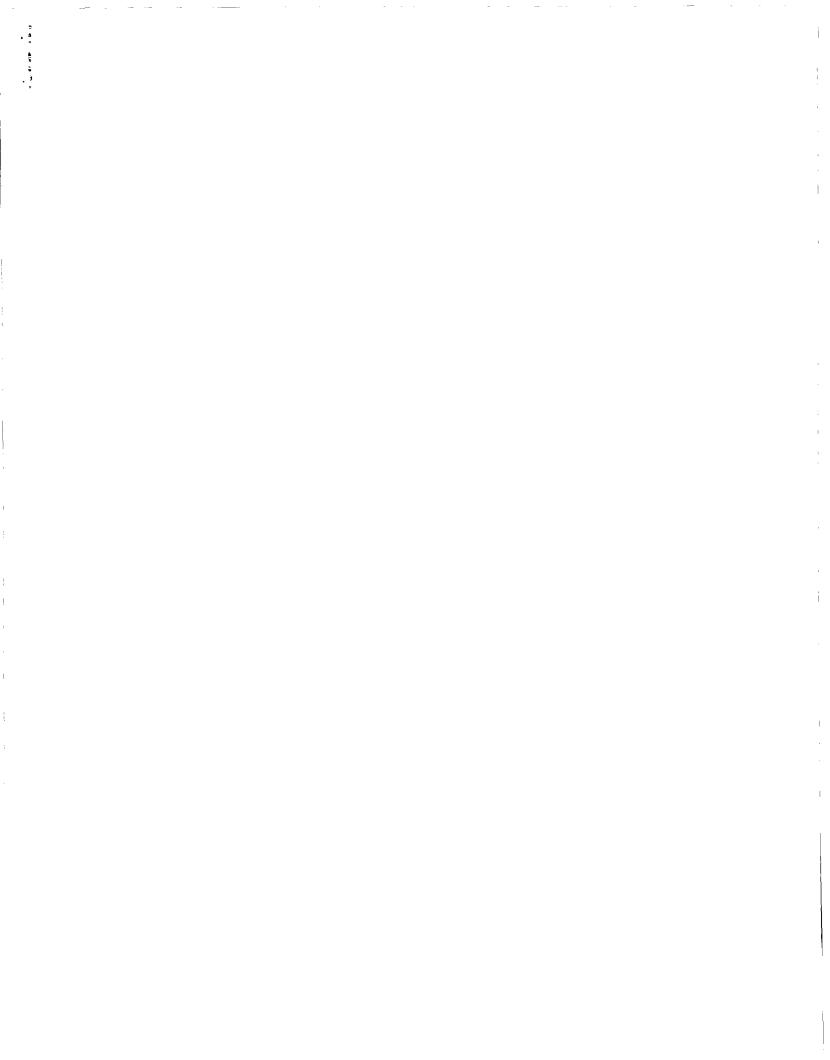


FEET

exhaust and confirm that organic vapors were being evacuated from the soil. Vapor samples were withdrawn from the probe using a clean gastight syringe after the probes were evacuated for a predetermined length of time. Based on field experience, samples with vacuum pressures of 5to 10-inches of Hg were evacuated for 30 seconds, while samples with vacuum pressures of 10- to 15-inches of Hg were evacuated for one minute.

After the sample was collected, it was injected into GCL's portable GC (Appendix A) for analysis of organic compounds and a printout of the results. Standards for benzene, toluene, ethylbenzene and xylene (BTEX) were injected at the beginning of each day for calibration of the GC. Soil vapor concentrations for BTEX were recorded on data sheets as the results were generated.

September 16, 1988



4.0 RESULTS

The data that was obtained during the survey is summarized below. Three general conditions were identified: points that could not be sampled, points that were sampled but resulted in nominal "background" values of hydrocarbons, and points that resulted in chromatograms with concentrations of hydrocarbons above background levels. Results of the survey are located in Appendix B.

After several attempts, probe refusal was encountered for points 3, 4, 5 and 6 in the area north of the plant and downgradient from the north impoundment, and points 10 and 12 located east and northeast of the evaporation pond. Consequently, the soil vapor for these sample points could not be collected and analyzed.

Samples injected from points 2, A, B and C, from immediately around the north impoundment, and points 7, 13, 14 and 16, from around the evaporation pond, all resulted in a similar flat chromatogram. These results indicate that nominal background levels of hydrocarbons are present in the soil at these points. The aromatic compounds benzene, toluene, ethylbenzene and xylene were also not detected at the above points (Table 3-1).

The sample taken from point 1, in the north impoundment, identified concentrations of toluene, ethylbenzene, p-, m-xylene and o-xylene in the range of 10 to 50 uL/L. Low to medium molecular weight unknown compounds (relative to BTEX) were also present but could be quantitatively identified.

Vapor analyzed from point 15, located northwest of the evaporation pond, shows the highest concentration of ethylbenzene (179 uL/L) and p, mxylene (663 uL/L) observed for any point analyzed. Benzene and toluene were not detected. The chromatogram identified low molecular weight unknowns, as well as medium and heavier molecular weight unknowns. Concentrations of these unknowns could not be quantitatively determined,

September 16, 1988

DCW-6-88 Page 2

TABLE I

Compositional Analyses of Lee Plant Sample

Component	<u>Weight %</u>
Component C3- i-C4 n-C4 i-C5 n-C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C19 C30 C31 C32 C33 C34	Weight % 0.00 0.02 0.26 1.74 3.43 14.35 31.67 27.74 9.22 3.33 1.26 0.72 0.56 0.47 0.48 0.43 0.41 0.43 0.41 0.43 0.41 0.38 0.35 0.25 0.26 0.23 0.25 0.26 0.23 0.23 0.15 0.19 0.18 0.15 0.12 0.08
C35 C36 C37	0.05 0.04 0.02

ATTACHMENT 7

MOBILE ANALYTICAL LABS, INC.

P.O. BOX 69210

ODESSA, TEXAS 79769-9210

3/15/90

LIQUID EXTENDED ANALYSIS

LAB # 682

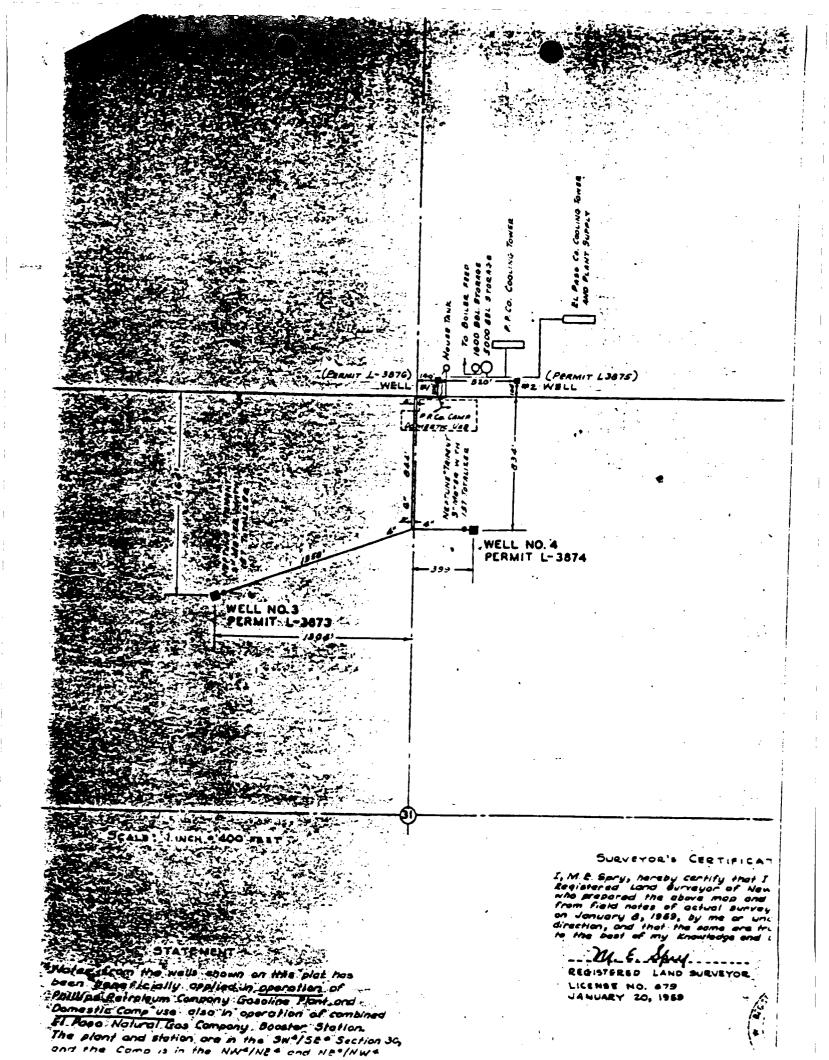
PHILLIPS 66 OIL SAMPLE-LEE PLANT SAMPLE RECEIVED 3/13/90

	MOL %	LV %	WT %
NITROGEN	0.23	0.06	0.07
METHANE	0.00	0.00	0.00
CARBON DIOXIDE	0.00	0.00	0.00
ETHANE	0.00	0.00	0.00
PROPANE	24.27	16.12	11.82
ISO-BUTANE	0.42	0.33	0.27
N-BUTANE	1.06	0.80	0.68
ISO-PENTANE	4.18	3.67	3.32
N-PENTANE	9.80	8.51	7.78
NEOPENTANE	0.00	0.00	0.00
NEOHEXANE	0.02	0.02	0.02
CYCLOPENTANE	0.34	0.29	0.32
2-METHYLPENTANE	1.45	1.45	1.38
3-METHYLPENTANE	1.13	1.10	1.07
N-HEXANE	3.03	2.99	2.87
METHYLCYCLOPENTANE	2.41	2.04	2.23
BENZENE	1.55	1.04	1.33
CYCLOHEXANE	3.97	3.24	3.68
2-METHYLHEXANE	1.84	2.04	2.02
3-METHYLHEXANE	2.03	2.23	2.23
DIMETHYLCYCLOPENTANES	3.04	3.01	3.28
N-HEPTANE	3.73	4.12	4.11
METHYLCYCLOHEXANE	6.40	6.16	6.91
TRIMETHYLCYCLOPENTANES	1.78	1.99	2.20
TOLUENE	3.91	3.14	3.96
2-METHYLHEPTANE	1.56	1.93	1.97
3-METHYLHEPTANE	0.97	1.19	1.22
DIMETHYLCYCLOHEXANES	2.25	2.47	2.77
N-OCTANE	2.26	2.77	2.84
C8 AROMATICS	0.00	0.00	0.00
C9 NAPTHENES	0.00	0.00	0.00
C9 PARAFFINS	4.26	5.77	6.02
N-NONANE	2.65	3.59	3.75
N-DECANE	2.81	4.13	4.39
UNDECANE PLUS	6.65	13.80	15.49
TOTALS	100.00	100.00	100.00

SPECIFIC GRAVITY 0.691 POUNDS/GALLON 5.757 POUNDS/GALLON C5+ 6.067 VAPOR PRESSURE 37.5 MOL. WT. C6+ 115.37 SP. GR. C6+ 0.745 MOL. WT. C7+ 124.49 SP. GR. C7+ 0.747 API GRAVITY 73.4 TNSITY -(GM/CC) 0.690

MR. DAVE ROCKEY

Remediato Sile 2 Storage Tanks - 5000 bbl. each To Plant Well #1 Standby Process Water 0 O Well #2 Temporarily Abandoned O Well #4 Plant Process Water Well #3 O Drinking Water Pressure Tank and Chlorinator To Distribution NO. REVISION DATE CHKD BY APP'D JA NO. FILE CODE FOR BIDS PHILLIPS PETROLEUM COMPANY 66 66 FOR APPR BARTLESVILLE, OKLAHOMA AFE NO. SCALE FOR CONST NONE WATER SYSTEMS DWG LEE PLANT 11-9-88 FORD NO. DRAWN CHECKED SH NO. APP'D





SCUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services 1703 W. Industrial Avenue [915-683-3348] • P.O. Box 2150 • Midland, Texas 79702

File No.	6705900					
Report No.	40567					
Report Date						
Date Received	6-30-88					
Delivered By	M.Ford					

Report of tests on: Water

Client:

Identification:

Lee Plant Water Supply Well

Phillips 66 Natural Gas Company

mg/L

,	
Arsenic	*0.05
Barium	*0.5
Cadmium	*0.01
Chromium	*0.05
Lead	*0.02
Mercury	*0.002
Selenium	*0.01
Silver	*0.05
Nitrate, as N	0.6
Endrin	*0.0002
Lindane	*0.0001
Methoxychlor	*0.0003
Toxaphene	*0.003
2,4-D	*0.005
2,4,5-TP Silvex	*0.001

North Marine ?

* Denotes "less than" EPA SW-846

Technician: LLC, LYN, GMB, CB, GM

Copies Phillips 66 Natural Gas Company ATTN: Mike Ford

BOUTHWEBTERN LABORATORIES

Burc aris M

Dur letters and reports are for the exclusive use of the client to whom they are addressed. The use of our name must receive our prior written approval. Our letters and reports apply only to the sample tested and/or inspected, and are not necessarily indicative of the quantities of apparently identical or similar products.

		,	
age 1 eceived:	age 1 RAS - eceived: 09/20/88	Austin REPORT 09/23/88 14:12:15	Work Order # 88-09-086
REPORT TO ATTEN CLIENT COMPANY	Radian Bl. 1 Austin Linde Bendele Phillips Petroleum Odessa, TX	PREPARED Radian Analutical Bervices BV 8301 Mo-pac Bl. PO Box 201088 ATTEN PHONE 512-434-4797	CERTIFIED BY CONTACT BENDELE
HORK ID TAKEN TRANS TYPE P. C. # INVOICE	BTEX, Lee MF UPS Vnder separate cover	Footnotes and Comments * Indicates a value less than 5 tim Potential error for such low values e Indicates that spike recovery for specific matrix was not within acce	t times the detection limit. Nues ranges between 30 and 100%. For this analysis on the acceptable limits indicating
SAMPLE BIS-3	SAMPLE IDENTIFICATION WS-1 Lee Well No. 1 WS-3 Lee Well No. 3 WS-4 Lee Well No. 4 WS-4 Lee Well No. 4	TEST EPA method 605 Xulenes, EPA 6	d an this report
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	Work Order # 88-09-086	NAME EPA method 602 Category	CL			US/1140 - 1000	- ppm		2 15 LIMIT POR Helmening water)
	S - Austin REPORT Results by Sample	FRACTION OIA TEST CODE EPA602 NA Date & Time Collected 09/19/88	VERIFIED	FILE # UNITS UNITS	COMPOUND RESULT DET LIMIT	Benzene 48 0.40	Toluene ND 0.40	Ethylbenzene ND 0.60	Chlorobenzene-A ND 0.60	1,4-Dichlorobenzene <u>ND</u> 0.60	1, 3-Dichlorobenzene <u>ND</u> <u>0.80</u>	1,2-Dichlorobenzene ND 0.80	SURROGATES	a, a. a-Trifluorotoluene <u>101</u> % recovery	S FOR THIS REPORT. ECTION LIMIT ed at detection limit ad times the detection limit ble brise noted.)
RADIAN	Pàge 2' Received: 09/20/88	SAMPLE ID <u>WS-1</u>		ANALYST CL INSTRMT D INJEC	CAS#	71-43-2	108-88-3	100-41-4	108-90-7	106-46-7	541-73-1	95- ¹ 50-1		98-08-8	NOTES AND DEFINITIONS FOR THIS REPORT DET LIMIT = DETECTION LIMIT ND = not detected at detection limit NA = not analyzed * = less than 5 times the detection limi N\A = not available Second column confirmation NOT performed unless otherwise noted	

	Work Order # 88-09-086	NAME <u>Xulenes, EPA 602</u> Category	сL ив/L			
· · · · · · · · · · · · · · · · · · ·	RAS - Austin REPORT Results by Sample	FRACTION OIA TEST CODE XYLENE NAME Date & Time Collected 09/19/88	INJECTD 09/22/88	IMI 440 20 20	FOR THIS REPORT. FOR THIS REPORT. TION LIMIT at detection limit imes the detection limit le firmation NOT performed e noted. ndard recovery outside interval. p-xylene co-elute. p-xylene unless	
NALUA ANDIAN	Page 4 Received: 09/20/88	SAMPLE ID <u>WS-1</u>	ANALYST CL INSTRMT D	CAS # 106-42-3 108-38-3 95-47-6	VB-08-9 NOTES AND DEFINITIONS FOR THIS REPORT. DET LIMIT = DETECTION LIMIT ND = not detected at detection limit NA = not analyzed * = less than 5 times the detection lim NA = not available Second column confirmation NOT performe unless otherwise moted. G = daily EPA standard recovery outside 95% confidence interval. Chlorobenzene and p-xylene co-elute.	

	Work Order # 88-09-086	2 <u>4602</u> NAME EPA method 602 /88 Category	VERIFIED CL	UNITS URIL	ET LIMIT	0.20	0.20	0.30	0.30	0.30	0.40	0.40		recovery		-
) :	IS - Austin REPORT Results by Sample	FRACTION <u>OZA</u> TEST CODE EPA602 Date & Time Collected <u>09/19/88</u>	VER	FILE # FILE #	COMPOUND RESULT DET LIMIT	Benzene <u>ND</u>	Toluene ND	Ethylbenzene <u>ND</u>	Chlorobenzene-A ND	1, 4-Dichlorobenzene ND	1, 3-Dichlorobenzene <u>ND</u>	1, 2-Dichlorobenzene <u>ND</u>	SURROGATES	a, a, a-Trifluorotoluene <u>98</u> % r	EPORT. ion limit etection limit NOT performed	-
	'age	SAMPLE ID <u>WS-3</u>		ANALYST CL INSTRMT D INJEC	CAS#	71-43-2	108-88-3	100-41-4	108-90-7	106-46-7	541-73-1	95-50-1		8-08-8	NOTES AND DEFINITIONS FOR THIS REPORT. DET LIMIT = DETECTION LIMIT ND = not detected at detection limit NA = not analyzed * = less than 5 times the detection lim N\A = not available N\A = not available Second column confirmation NOT performe unless otherwise noted.	

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RADIAN Corporation		
Page 7 Received: 09/20/88	RAS - Austin RePORT Work Order # 88-09-086 Results by Sample	•
SAMPLE ID <u>WS-3</u>	FRACTION O2A TEST CODE XYLENE NAME Xulenes, EPA 602 Date & Time Collected 09/19/88 Category	
ANALYST CL INSTRMT D	INJECTD 09/22/88 FILE * UNITS UNITS UNITS	
CAS # 106-42-3 108-38-3 95-47-6	COMPOUND RESULT DET LIMIT p-Xylene <u>ND.Q</u> 0.20 m-Xylene <u>ND</u> 0.20 o-Xylene <u>ND</u> 0.10	· ·
8-80-86	SURROGATES a.a.a-Trifluorotoluene <u>98</u> % recovery	
NOTES AND DEFINITIONS FOR THIS REPORT. DET LIMIT = DETECTION LIMIT DET LIMIT = DETECTION LIMIT ND = not detected at detection lim NA = not analyzed " * = less than 5 times the detection lim N/A = not available Second column confirmation NOT performe unless otherwise noted. G = daily EPA standard recovery outside 95% confidence interval. Chlorobenzene and p-xylene co-elute. Guantitated as chlorobenzene unless otherwise noted.	EFINITIONS FOR THIS REPORT. MIT = DETECTION LIMIT ot detected at detection limit ot analyzed " ss than 5 times the detection limit not available column confirmation NOT performed ss otherwise noted. ily EPA standard recovery outside ily EPA standard recovery outside confidence interval benzene and p-rylene co-elute. titated as chlorobenzene unless rwise noted.	
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REPORT ts by Sample	FRACTION 03A TEST CODE EPA602 NAME EPA method 602 Date & Time Collected 09/19/88 Category	INJECTED 09/22/88 FILE * UNITS US UNITS	COMPOUND RESULT DET LIMIT	1	Ethylbenzene ND 0.30	Chlorobenzene-A ND 0.30	1,4-Dichlorobenzene ND 0.30	1, 3-Dichlorobenzene ND 0.40	1, 2-Dichlorobenzene ND 0.40	SURROGATES	a, a. a-Trifluorotoluene <u>102</u> % recovery	ORT. n limit ection limit T performed	
RADIAN RAS 0/88	4	CL INJECTED	CAS#	71-43-2 108-88-3	100-41-4	108-90-7	106-46-7	541-73-1	95-50-1		98-08-8 a, a,		s otherwise noted.
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	Work Order # 88-09-086	E NAME Xylenes, EPA 602 Category	EDL UNITSU_/_		ery	
	RAS - Austin	FRACTION <u>O3A</u> TEST CODE <u>XYLENE</u> Date & Time Collected <u>09/19/88</u>	INJECTD 09/22/88	COMPOUND RESULT DET LIMIT p-Xylene ND, Q 0.20 m-Xylene ND 0.20 o-Xylene ND 0.10	a, a, a-Trifluorotoluene <u>102</u> % recovery	NS FOR THIS REPORT. TECTION LIMIT ted at detection limit 5 times the detection limit Confirmation NOT performed wise noted. standard recovery outside iterval. and p-xylene co-elute. as chlorobenzene unless ted.
RADIAN	Page 10 Received: 09/20/88	SAMPLE ID <u>WS-4</u>	ANAL YST CL INSTRMT D	CAS # 106-42-3 108-38-3 95-47-6	8-80-86	NOTES AND DEFINITIONS FOR THIS R DET LIMIT = DETECTION LIMIT ND = not detected at detect NA = not analyzed at detect NA = not available * = less than 5 times the d N\A = not available Second column confirmation unless otherwise noted. G = daily EPA standard reco 95% confidence interval. Chlorobenzene and p-xylene Quantitated as chlorobenz otherwise noted.

SOEN'	TIFIC LABORATOR 700 Camino de Salud Albuquerque, NM 87106	NE 01/1510.N COPY NE 01/1510.N COPY 841-2570
<u> </u>		88-185
REPORT TO:		S.L.D. No. OR
Z120 N	ALTO	DATE REC11/7/88
Hobbs	, NM 88240	PRIORITY
	· · · · · ·	PHONE(S): (505)397-52
COLLECTION CITY: Buckey	<u>е</u>	; COUNTY: LEG
		110131818110110
LOCATION CODE: (Township-Range-Set	:tion-Tracts) $[1] [S + R]$	<u> 3 56+5 3 + - (10N06E</u>
USER CODE: 159300	SUBMITTER: Charles AT	lizhenCODE:
SAMPLE TYPE: WATER XI, SOIL L	_, food [_], other:	· · · · · · · · · · · · · · · · · · ·
		RECEIV
This form accompanies <u>2</u> Septum 1	Vials, Glass Jugs, and/or	
Samples were preserved as follows:	ble stored at room temperature.	
P-Ice Sample stored in an		NOV 17
	Sodium Thiosulfate to remove	chlorine residual.
•		HOBBS O
		o indicate the type of analytical screens
required. Whenever possible list specific	-	•
PURGEABLE SCREEN		(751) Aliphatic Hydrocarbons
[2] (754) Aromatic & Halogenated Purg	-	(755) Base/Neutral Extractables
(765) Mass Spectrometer Purgeables		(758) Herbicides, Chlorophenoxy acid
(766) Trihalomethanes] (759) Herbicides, Triazines
Other Specific Compounds or	Classes] (760) Organochlorine Pesticides
		(761) Organophosphate Pesticides
Benzene.] (767) Polychlorinated Biphenyls (PCB's)] (764) Polynuclear Aromatic Hydrocarbons
] (764) Polynuclear Aromatic Hydrocarbons] (762) SDWA Pesticides & Herbicides
Remarks: * Benzene de-	facted in Hzu	· · · · · · · · · · · · · · · · · · ·
PIELD DATA:		
pH=; Conductivity=umh	o/cm atC; Chlorine R	esidual=mg/l
Dissolved Oxygen=mg/l; Alkalinit	.y=mg/l; Flow Rate	/
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I certify that the results in this block activities.(signature collector):		my field analyses, observations and Method of Shipment to the Lab:
CHAIN OF CUSTODY		
	i from	to
certify that this sample was transferre		to; and t

Image: Second		This sample was tested using the analytical scre	eening method(s)	checked below:	
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H.	Albuquerque, NM 87106 841-25	
		88-1849-C
Scibin 7	REPORT TO: ZNUNOnmental Inprovement DW.	S.L.D. No. OR
12	ZIZO NALTO	DATE REC. 11/7/88
$\left \begin{array}{c} \\ \\ \\ \end{array} \right $		
0	·	PHONE(S): (305) 397-5750
		COUNTY: Lea
	COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute)	01318181/1010151am
	LOCATION CODE: (monship-Range-Section-Tracts) 1711 75+ R13 5	E + S 3 + - (10N06E24342)
	USER CODE: 15 9 3 0 DI SUBMITTER: Charles KIIN	
		· ·
	SAMPLE TYPE: WATER 💢, SOIL 📋, FOOD 📋, OTHER:'	
	This form accompanies Z Septum Vials, Glass Jugs, and/or	
1	Samples were preserved as follows:	NOV 1 7 1988
	NP: No Preservation; Sample stored at room temperature.	- • 1500
	P-Ice Sample stored in an ice bath (Not Frozen).	HOBBS OFFICE
	\square P-Na S O Sample Preserved with Sodium Thiosulfate to remove chlorine	residual.
	ANALYCES DECONFERENCE Blass shall the second side have a indicate the indicate	to the time of analytical company
	<u>ANALYSES REQUESTED</u> : Please check the appropriate box(es) below to indica required. Whenever possible list specific compounds suspected or required.	te the type of analytical screens
		TRACTABLE SCREENS
		Aliphatic Hydrocarbons
		Base/Neutral Extractables
		Herbicides, Chlorophenoxy acid
1	(766) Trihalomethanes (759)	Herbicides, Triagines
	Other Specific Compounds or Classes [] (760)	Organochlorine Pesticides
	[] [761]	Organophosphate Pesticides
		Polychlorinated Biphenyls (PCB's)
		Polynuclear Aromatic Hydrocarbons
	(762)	SDWA Pesticides & Herbicides
		••••••••••••••••••••••••••••••••••••••
	Remarks:	· · · · · · · · · · · · · · · · · · ·
	PIELD DATA:	
	pH=; Conductivity=umho/cm atC; Chlorine Residual=	mg/l
	Dissolved Oxygen=mg/l; Alkalinity=mg/l; Flow Rate	/
1	Depth to waterft.; Depth of wellft.; Perforation Interval	- ft.: Casing:
	Sampling Location, Methods and Remarks (i.e. odors, etc.)	T
	Phillips petroleum - Buckeye yard - Conje	nence room well #3
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	I certify that the results in this block accurately reflect the results of my field activities (signature collector):	
	activities.(signature collector): Method	or surplient to the 280;
	CHAIN OF CUSTODY	
	I certify that this sample was transferred from	to
}	at (location) on/_	and that
	the statements in this block are correct. Evidentiary Seals: Not Sealed . OR	Seals Intact: Yes 🔲 No 🗍
I		

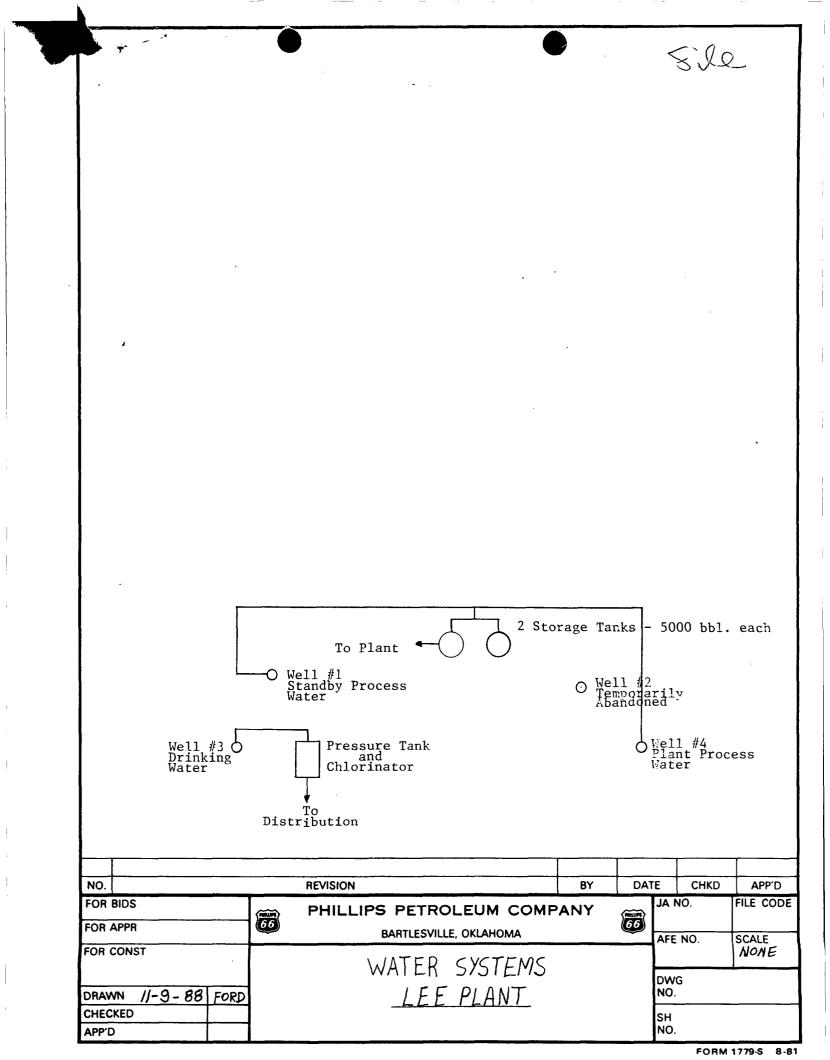
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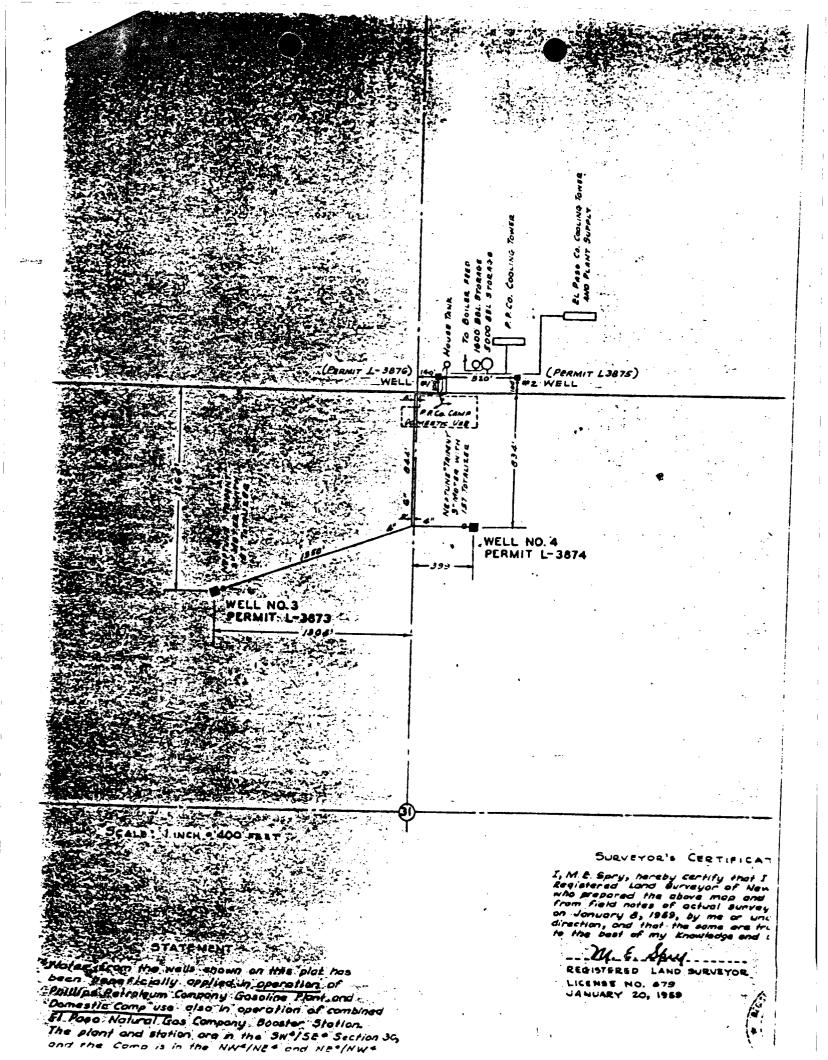
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	screening method(s)	checked below:	
· · · · ·			
PURGEABLE SCREENS		EXTRACTABLE SCREENS	
(753) Aliphatic Headspace (1-5 Carbons)		(751) Aliphatic Hydrocarbons	
(754) Aromatic & Halogenated Purgeables		(755) Base/Neutral Extractables	
(765) Mass Spectrometer Purgeables		(758) Herbicides, Chlorophenoxy acid	
(766) Trihalomethanes		(759) Herbicides, Triazines	
Other Specific Compounds or Class	les	(760) Organochlorine Pesticides	
<u></u>		(761) Organophosphate Pesticides	
	· · · · · · · · · · · · · · · · · · ·	(767) Polychlorinated Biphenyls (PCB)	
!		 (764) Polynuclear Aromatic Hydrocarb (762) SDWA Pesticides & Herbicides 	ons
	<u> </u>	(762) SDWX Pesticides & Aerolicides	
A	NALYTICA	RESULTS	Ŧ
COMPOUND (S) DETECTED	CONC.	COMPOUND (S) DETECTED	CONC.
	[PPB]	······································	[PPB]
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CERTIFIC s) Not Sealed [] Intact: Yes [] No []. rtify that I followed standard laboratory proc	CATE OF ANALYT Seal(s) broken by edures on handling	ICAL PERSONNEL : <u>mit-secled</u> date: and analysis of this sample unless otherwise no	oted and
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SCUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services 1703 W. Industrial Avenue [915-683-3348] • P.O. Box 2150 • Midland, Texas 79702

File No.	6705900
Report No	40567
Report Date	8-9-88
Date Received	6-30-88
Delivered By	M.Ford

Report of tests on: Water

Client:

Phillips 66 Natural Gas Company

Identification:

Lee Plant Water Supply Well

mg/L

Arsenic	*0.05
Barium	*0.5
Cadmium	*0.01
Chromium	*0.05
Lead	*0.02
Mercury	*0.002
Selenium	*0.01
Silver	*0.05
Nitrate, as N	0.6
Endrin	*0.0002
Lindane	*0.0001
Methoxychlor	*0.0003
Toxaphene	*0.003
2,4-D	*0.005
2,4,5-TP Silvex	*0.001

wouch well??

* Denotes "less than" EPA SW-846

Technician: LLC,LYN,GMB,CB,GM

Copies Phillips 66 Natural Gas Company ATTN: Mike Ford

BOUTHWESTERN LABORATORIES

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Our letters and reports are for the exclusive use of the client to whom they are addressed. The use of our name must receive our prior written approval. Our letters and reports apply only to the sample tested and/or inspected, and are not necessarily indicative of the quantities of apparently identical or similar products.

		-	· · ·	
age 1 Received	Page 1 RAS Received: 09/20/88	- Austin REPORT Work C 09/23/88 14:12:15	Work Order # 88-09-086	
REPORT TO	Redian 31.1 Avstin	vises		
ATTEN	i Linda Bendele	8720-1088	CERTIFIED BY	
CLIENT COMPANY COMPANY	r <u>Phillips Petroleum</u> M odesse , TX		CONTACT BENDELE	
	BIEX, Lee MF UPS	Footnotes and Comments * Indicates a value less than 5 times the Potential error for such low values ranges	detection limit.	_
P. O. # Invoice	under separate cover	icates that spike recovery for this fic matrix was not within acceptable terferent present.	on the ndicatin	
SAMPLE SAMPLE WS-1 Ja WS-4	IDENTIFICATION Lee Well No. 1 Lee Well No. 3 Lee Well No. 4	TEST CODES and NAMES used on this XYLENE XULENE: EPA 602	s report	
			`	
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Work Order # 88-09-086	NAME EPA method 602 Category			0001 - 1-1-1/SO	- ppm		s is amil row Nelvenist watch							Š
- Austin C REPORT Wo Results bu Sample	CODE EPA602 09/19/88	VERIFIEDCL	09/22/88	COMPOUND RESULT DET LIMIT Renzene 48 0.40	ND 0. 40	Ethylbenzene <u>ND</u> 0.60	Chlorobenzene-A ND 0.60	1,4-Dichlorobenzene <u>ND</u> <u>0.60</u>	1, 3-Dichlorobenzene <u>ND</u> <u>0, 80</u>	1,2-Dichlorobenzene <u>ND</u> <u>O.80</u>	SURROGATES	a, a. a-Trifluorotoluene <u>101</u> % recovery	ORT. n limit ection limit T performed	
Page 2 Received: 09/20/88	SAMPLE ID WS-1	ANALYST CL	Q	CAS# 71-43-2	108-88-3	100-41-4	108-90-7	106-46-7	541-73-1	95-150-1		, 98-08-8 a,	NOTES AND DEFINITIONS FOR THIS REPORT. DET LIMIT = DETECTION LIMIT ND = not detected at detection limit NA = not analyzed * = less than 5 times the detection limit N/A = not available Second column confirmation NOT performed unless otherwise noted.	

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	Work Order # 88-09-086	NAME <u>Xylenes, EPA 602</u> Category	ED <u>CL</u> UNITS <u>UQ/L</u>			·	
	RAS - Austin REPORT Results by Sample	FRACTION OIA TEST CODE XYLENE Date & Time Collected 09/19/88	INJECTD <u>09/22/88</u>	COMPOUND RESULT DET LIMIT P-Xylene ND,0,0,0,40 m-Xylene-A ND 0.40 o-Xylene ND 0.20	SURROGATES a.a.a-Trifluorotoluene <u>101</u> % recovery	WITIONS FOR THIS REPORT. = DETECTION LIMIT letected at detection limit nalyzed nalyzed than 5 times the detection limit available tumn configmation NOT performed available tumn configmation NOT performed therwise noted. EPA standard recovery outside tidence interval. tene and p-xylene co-elute. tene and p-xylene unless te noted.)
CORPORTION	Page 4 Received: 09/20/88	SAMPLE ID <u>WS-1</u>	ANALYST CL INSTRMT D	CAS # 106-42-3 108-38-3 95-47-6	8-80-86	NOTES AND DEFINITIONS FOR THIS REPORT. DET LIMIT = DETECTION LIMIT ND = not detected at detection limit ND = not analyzed * = less than 5 times the detection limi NA = not available Second column confirmation NOT performed unless otherwise moted. G = daily EPA standard recovery outside 95% confidence interval. Chlorobenzene and p-xylene co-elute. Guantitated as chlorobenzene unless otherwise noted.	

KA	RADIAN		
Page 5 Received: 09/20/88		RAS - Austin CREPORT Work Order # 88-09-086 Results by Sample	BB-09-086
SAMPLE ID WS-3		FRACTION <u>O2A</u> TEST CODE <u>EPA6O2</u> NAME <u>EPA method 602</u> Date & Time Collected <u>09/19/88</u> Category	, 02
		VERIFIED CL	мит - талат - т
ANALYST CL INSTRMT D	INJEC	FILE # FILE # UNITS UNITS UNITS	
	CAS#	COMPOUND RESULT DET LIMIT)
	71-43-2	Benzene ND 0.20	
	108-88-3	Toluene ND 0.20	
	100-41-4	Ethylbenzene <u>ND</u> 0.30	
,	108-90-7	Chlorobenzene-A ND 0.30	
	106-46-7	1,4-Dichlorobenzene ND 0.30	_
	541-73-1	1, 3-Dichlorobenzene <u>ND</u> 0.40	
	95-50-1	1, 2-Dichlorobenzene ND 0.40	
	· · · .	SURROGATES)
	8-08-86	a, a, a-Trifluorotoluene <u>98</u> % recovery	
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NADIAN CORPORATION		
Page 7 Received: 09/20/88	RAS - Austin REPORT W Results by Sample	Work Order # 88-09-086
SAMPLE ID <u>WS-3</u>	FRACTION <u>O2A</u> TEST CODE <u>XYLENE</u> NAME Date & Time Collected <u>09/19/88</u>	NAME Xylenes, EPA 602 Category
ANALYST CL INSTRMT D	INJECTD 09/22/88	
CAS # 106-42-3 108-38-3 95-47-6	COMPOUND RESULT DET LIMIT P-Xylene ND.G 0.20 m-Xylene ND 0.20 o-Xylene ND 0.20	
8-80-86	SURROGATES a, a, a-Trifluorotoluene <u>98</u> % recovery	- · · · ·
NOTES AND DEFINITIONS FOR THIS REPORT DET LIMIT = DETECTION LIMIT ND = not detected at detection J NA = not analyzed * detect NA = not available second column confirmation NOT p unless otherwise noted. G = daily EPA standard recovery 95% confidence interval. Chlorobenzene and p-xylene co-el Quantitated as chlorobenzene u otherwise noted.	FIONS FOR THIS REPORT. DETECTION LIMIT cected at detection limit cected at detection limit alyzed " allable in 5 times the detection limit allable in confirmation NOT performed in confirmation NOT performed rerwise noted. A standard recovery outside lence interval. A standard recovery outside lence interval. I a chlorobenzene unless noted.	

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Pàge B Received: 09/20/88		RAS - Austin Results by	REPORT ts by Sample	Work Order # 88-09-086
SAMPLE ID WS-4		FRACTION 03A Date & Time Col	FRACTION <u>03A</u> TEST CODE <u>EPA602</u> Date & Time Collected <u>09/19/88</u>	NAME EPA method 602 Category
			VERIFIED	CL
ANALYST CL INSTRMT D	INJE	FILE INJECTED 09/22/88	#	UNITS UR/L
	CAS#	COMPOUND	JND RESULT DET LIMIT	IT
	71-43-2	Benzene	ene <u>8.5</u> 0.20	oł
	108-88-3	Toluene	ане <u>ND</u> 0. 20	O
	100-41-4	Ethylbenzene	ane <u>ND</u> 0.30	Ol
	108-90-7	ChlorobenzeneA	P-4 0.30	O
	106-46-7	1,4-Dichlorobenzene	ane <u>ND</u> 0.30	O
	541-73-1	1, 3-Dichlorobenzene	ne <u>ND</u> 0.40	0
	95-50-1	1, 2-Dichlorobenzene	ne <u>ND 0.40</u>	Ģ
		SURROGATES	ES	
	9-90-86	a, a. a-Trifluorotoluene	ine <u>102</u> % recovery	71
NOTES AND DEFINITIONS F DET LIMIT = DETECT ND = not detected NA = not analyzed * = less than 5 tim N\A = not availabl Second column conf Unless otherwise	<pre>#ITIONS FOR THIS REPORT. # DETECTION LIMIT # DETECTION LIMIT # DETECTION LIMIT # DETECTION I # DETECTION LIMIT # detection # detectio</pre>	AND DEFINITIONS FOR THIS REPORT. DET LIMIT = DETECTION LIMIT ND = not detected at detection limit NA = not analyzed AA = not analyzed NA = not available N\A = not available Second column confirmation NOT performed unless otherwise noted.		

Page 10	RAS - Aus	Work Order # 88-09-086	·-, ·-
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	USER CODE: 15191310101 SUBMITTER: Challes MULLUM CODE: CODE:
	SAMPLE TYPE: WATER X, SOIL , FOOD , OTHER:
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	ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required. PURGEABLE SCREENS
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	Other Specific Compounds or Classes (760) Organochlorine Pesticides (761) Organophosphate Pesticides (767) Polychlorinated Biphenyls (PCB's) (764) Polynuclear Aromatic Hydrocarbons (762) SDWA Pesticides & Herbicides
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Date(s) of analysis: 11/7/88. Analyst's signature: 1990 C. Gellen					
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Reviewers signature: K. Meyerhein					



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI 1445 ROSS AVENUE, SUITE 1200 DALLAS, TEXAS 75202

RECEIVED

JUL 0 7 1988

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HAZARDOUS WASTE SECTION

Mr. Jack Ellvinger, Chief Hazardous Waste Bureau Environmental Improvement Division New Mexico Health and Environment Department P. O. Box 968 Santa Fe, New Mexico 87504-0968

Dear Mr. Ellvinger:

Enclosed you will find a copy of the following RCRA Facility

Assessment (RFA) report:

° Facility Name: Phillips - Lee

° EPA ID Number: NMD000709659

Additional information will be forwarded to you as it becomes

available. If you have any questions, please contact me or have your

staff contact Lydia Boada Clista at (214) 655-6790.

Sincerely yours,

P.F.

Chief Hazardous Waste Compliance Branch

Enclosure

A.T. Kearney, Inc. 222 South Riverside Plaza Chicago, Illinois 60606 312 648 0111 Management Consultants

JUN 2 4 REC'D

ATKEARNEY

June 24, 1988

Mr. Tom Clark Regional Project Officer U.S. Environmental Protection Agency Region VI 1445 Ross Avenue Dallas, Texas 75202-2733

Reference: EPA Contract No. 68-01-7374; Work Assignment No. R26-05-40; Phillips, Lee; EPA I.D. No. NMD000709659, PR/VSI Report

Dear Mr. Clark:

Enclosed is the PR/VSI report for Phillips Petroleum Company, Lee Natural Gas Plant located in Buckeye, New Mexico. The Preliminary Review (PR) and Visual Site Inspection (VSI) resulted in the identification of twenty-six Solid Waste Management Units (SWMUs).

No further action appears warranted for this facility at this time. The RCRA-regulated Surface Impoundment (SWMU #18) is currently undergoing closure with the New Mexico Environmental Improvement Department.

A Former Landfill (SWMU #24) was identified prior to the VSI from the facility's Part A application. The facility representatives had no knowledge of the unit, and its boundaries, if existent, were not discernible at the time of the VSI. No information was available on the design of the unit or the type of wastes managed, although facility representatives surmised that the area may have been a scrap metal storage area rather than a landfill. Therefore, there is insufficient evidence to compel a sampling visit or an RFI. We have suggested that further information be requested from the facility so that release potentials may be evaluated further to determine if an RFI is warranted.

HAZARDOUS WASTE COMPLIANC CAL SECTION

Mr. Tom Clark June 24, 1988 Page 2

If you have any questions, please feel free to call me or Chris Nelson, the Work Assignment Manager, who can be reached at (415) 595-4300.

Sincerely, -

nderso

Ann L. Anderson Assistant Technical Director

Enclosure

cc: W. Luthans, EPA Region VI (two copies)

L. Boada, EPA Region VI

J. Grieve

J. Levin

A. Schaffer (w/o attachment)

A. Williams (w/o attachment)

C. Nelson

B. Morson, SAIC

1207T

PR/VSI REPORT

PHILLIPS PETROLEUM COMPANY LEE NATURAL GAS PLANT BUCKEYE, NEW MEXICO EPA I.D. Number NMD000709659

Prepared for:

EPA Region VI 1445 Ross Avenue Dallas, Texas 75202–2733

Prepared by:

A. T. Kearney, Inc. Three Lagoon Drive Redwood City, California 94065

and

Science Applications International Corporation 5150 El Camino Real, Suite C-31 Los Altos, California 94022

> EPA Contract Number 68-01-7374 Work Assignment Number R26-05-40

> > June 1988

DISCLAIMER

This report was prepared for the U. S. Environmental Protection Agency, Region VI (EPA) by A. T. Kearney, Incorporated in fulfillment of Contract No. 68-01-7374, Work/Project Assignment No. R26-05-40. The opinions, findings, and conclusions expressed herein are those of the contractor and not necessarily those of the EPA or other cooperating agencies. Mention of company or product names is not to be considered an endorsement by the EPA.

This document is intended to assist EPA and State personnel in exercising the discretion conferred by regulation in developing requirements for an owner/operator to conduct the RCRA Facility Investigation (RFI) pursuant to 40 CFR 264. EPA will not necessarily limit RFI or other requirements to those that correspond with the recommendations set forth herein. EPA and State personnel must exercise their technical judgement in using the RCRA Facility Assessment report as well as other relevant information in determining what RFI or other requirements to include in a permit or an order.

TABLE OF CONTENTS

- -- -

			Page NO.
1.0	INTRO	DUCTION	1
	1.1 1.2	Purpose and Scope of the RFA Program Contents of This Report	1 2
2.0	FACIL	ITY DESCRIPTION	4
	2.1 2.2 2.3 2.4	Location Historical and Current Operations Identification of Solid Waste Management Units Summary of Wastes Handled	4 10 16
3.0	ENVIR	ONMENTAL SETTING	18
	3.1 3.2 3.3 3.4 3.5	Meteorology and Climate Topography, Floodplain and Surface Water Geology and Soils Ground Water Receptor Information	18 19 20 25 30
4.0	RELEASE PATHWAYS		32
	4.1 4.2 4.3 4.4	Air Release Pathway Surface Water Release Pathway Soil Release Pathway Ground-water Release Pathway	32 32 32 33
5.0	DESCR	IPTION OF INDIVIDUAL UNITS	34
	5.1	SWMUs #1-4 - Engine Drain Tanks (4) 5.1.1 Information Summary 5.1.2 Release Potentials	34 34 35
	5.2	SWMU #5 - Steel Collection Tank5.2.1 Information Summary5.2.2 Release Potentials	36 36 37
	5.3	SWMU #6 - Gunbarrel 5.3.1 Information Summary 5.3.2 Release Potentials	38 38 39
	5.4	SWMU #7 - Oil-Water Separator.5.4.1Information Summary.5.4.2Release Potentials.	40 40 41
	5.5	SWMUs #8-11 - Slop Oil Tanks (4) 5.5.1 Information Summary 5.5.2 Release Potentials	42 42 43

	5.6	5.6.1 Information Summary	44 44 45
	5.7	5.7.1 Information Summary	46 46 47
	5.8	5.8.1 Information Summary	48 48 49
	5.9	SWMU #19 - Precoat Slop Water Tank 5.9.1 Information Summary 5.9.2 Release Potentials	50 50 51
	5.10		52 52 52
	5.11	SWMU #23 - Sulfur Incinerator 5.11.1 Information Summary 5.11.2 Release Potentials	54 54 55
	5.12	SWMU #24 - Former Landfill 5.12.1 Information Summary 5.12.2 Release Potentials	56 56 57
	5.13	SWMU #25 - Closed Drain Separator 5.13.1 Information Summary 5.13.2 Release Potentials	58 58 59
	5.14	SWMU #26 - Cold Drain Vaporizing Tank 5.14.1 Information Summary 5.14.2 Release Potentials	60 60 61
6.0	AREAS	OF CONCERN	62
7.0	CONCLU	JSIONS	63
8.0	REFERI	ENCES	70

APPENDIX A - VSI Summary Trip Report and Photograph Log

LIST OF EXHIBITS

<u>Exhibit No.</u>	hibit No. Description	
2-1	Location Map for Phillips Lee Plant	5
2-2	Lee Gasoline Plant Process Flow	6
2-3	Solid Waste Management Units at the Phillips Eunice Plant	11
2-4	Lee Plant SWMU Location Map	12
2-5	Lee Plant Wastewater System	14
3-1	Well Logs of the Ground-Water Wells Located at the Phillips Lee Plant	24
3-2	Map Showing Altitude and Configuration of the Water Table for the High Plains Aquifer, 1978	28

1.0 INTRODUCTION

This section of the PR/VSI report covers the purpose and scope of the RFA program. The contents of the other sections of this report also are described.

1.1 Purpose and Scope of the RFA Program

-The 1984 Hazardous and Solid Waste Amendments (HSWA) provide new authority to EPA to require comprehensive corrective actions on solid waste management units (SWMUs) and other areas of concern at interim status hazardous waste management facilities, particularly those applying for RCRA permits. These corrective actions are intended to address unregulated releases of hazardous constituents to air, surface water, soil, and ground water, as well as the generation of subsurface gas.

One of the major segments of EPA's corrective action program consists of RCRA Facility Assessments (RFAs) to identify releases, potential releases, or potential releases requiring further investigation. According to EPA's RCRA Facility Assessment Guidance Document, the four purposes of an RFA are to:

- Identify and gather information on releases at RCRA-regulated facilities;
- Evaluate solid waste management units and other areas of concern for releases to all media and regulated units for releases other than ground water;

- 1 -

- 3. Make preliminary determinations regarding releases of concern and the need for further actions and interim measures at the facility; and
- 4. Screen from further investigation those SWMUs which do not pose a threat to human health and the environment.

The three basic steps of an RFA consist of a preliminary review (PR) of available information, a visual site inspection (VSI) to obtain additional information on releases and a sampling visit (SV) to fill data gaps by obtaining field and analytical data.

1.2 Contents of This Report

This report presents the results of the PR and VSI of the Phillips 66 Company Lee Natural Gas Plant (EPA I.D. No. NMD 000709659) near Buckeye, New Mexico. The principal sources of information included the facility's Part A Application, RCRA closure documents, air emissions documents, inspection reports, correspondence, contractor reports, and facility personnel interviews. These documents were obtained during a search of relevant files at the EPA Region VI Office in Dallas, Texas and the office of the New Mexico Environmental Improvement Division in Albuquerque, New Mexico. File material encompassed RCRA, CERCLA, and the Clean Air Act.

The VSI was conducted May 4, 1988. The Phillips representatives present during the VSI were Charlie Thompson and Mike Ford. The A. T. Kearney inspection team conducting the VSI was composed of Christopher Nelson and Gary Walvatne.

- 2 -

Section 2.0 of this report contains a description of the Phillips facility, including its historical and current operations. Individual SWMUs are also identified in Section 2.0 along with a summary description of the wastes managed by the facility. Section 3.0 provides an overview of the environmental setting at the facility, comprising meteorology, floodplain, surface water, geology, ground water, and receptor information. In Section 4.0, a broad assessment of release pathways is made, covering the potential for releases to soil, ground water, surface water, air, and the generation of subsurface gas. Section 5.0 contains detailed discussions of each SWMU. Section 7.0 presents conclusions and recommendations. References used in preparing this report are provided at the end of the document. The VSI photograph log is presented as Appendix A to this report.

2.0 FACILITY DESCRIPTION

2.1 Location

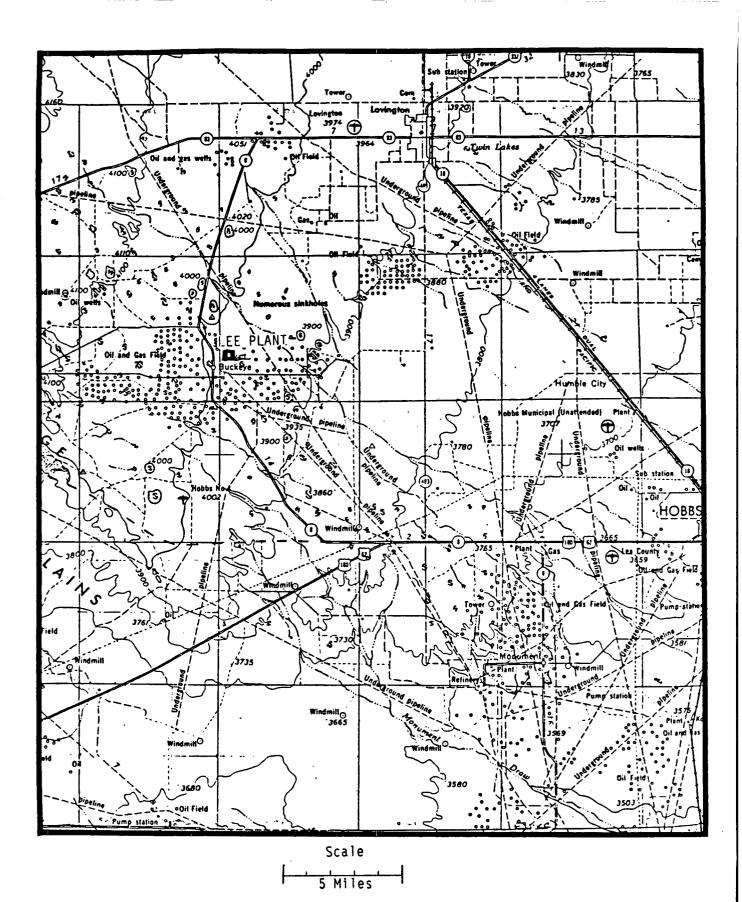
The Phillips 66 Company owns and operates a natural gas plant located at Buckeye, New Mexico, approximately one-half mile east of Highway 238 (formerly Highway 8); Buckeye is located approximately 12 miles southwest of Lovington, New Mexico (see Exhibit 2-1). The geographical coordinates of the facility are latitude 32°48'N, longitude 103°29'W. [Ref. 1]

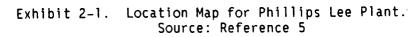
2.2 <u>Historical and Current Operations</u>

The Lee Plant processes raw natural gas from several production fields into residue gas and natural gas liquids. According to facility representatives, the Lee Plant began operations in 1937 as a booster plant. In 1941, the facility began treating natural gas using the absorption process. The facility expanded its operations in 1958 and 1963 and presently uses a cryogenic process to process natural gas. The residue gas (saleable natural gas) is sold to the El Paso Natural Gas Company, which operates a pipeline booster plant on property contiguous with the Lee Plant. [Ref. 7]

The Lee Plant's basic function is to remove the ethane and heavier hydrocarbon fractions from casinghead and gas well gas. The plant receives sour hydrocarbon gas streams from 5- and 250-psig gathering systems (see Exhibit 2-2). The gas from the 5-psig system is compressed to 250 psig in order that the gas streams from both gathering systems enter the plant's amine contactor at 250 psig. The amine contactor uses monoethanolamine to remove the hydrogen

- 4 -





SALES RESIDUE GAS COMPRESS. SIEVE DEHYDRATOR TO PIPELINE TURBO-EXPANDER PLANT MOLECULAR LIQUID PRODUCT STORAGE EUNICE AMINE SWEETENING UNIT SULFUR RECOVERY PLANT COMPRESSION HIGH PRESSURE LOW PRESSURE

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Exhibit 2-2. Lee Gasoline Plant Process Flow. Source: Reference 2.

- 6 -

sulfide and carbon dioxide from the inlet gas stream. The hydrogen sulfide and carbon dioxide removed in the sweetening process is sent to the plant's sulfur recovery unit. The sweet gas from the amine contactor is split into two streams. One stream is sent via pipeline to the Phillips Eunice Plant near Oil Center, New Mexico. The second stream is compressed from 250 to 750 psig and is then routed to a molecular sieve dehydrator where the gas is dehydrated to a water content of less than 1 ppmv. From the dehydrator the gas stream flows to a turboexpander (cryogenic) plant where it is cooled by propane refrigeration and expansion to a temperature of approximately $-140^{\circ}F$. The turboexpander plant produces two hydrocarbon streams, the first being a liquid hydrocarbon stream comprised of approximately 85 percent of the ethane and all of the propane and heavier hydrocarbons that entered the plant. The liquid hydrocarbon stream has a vapor pressure of approximately 500 psig and is sent to a stainless steel pressure vessel for temporary storage before it is delivered to a pipeline for sale. The second hydrocarbon stream produced from the turboexpander is comprised primarily of methane gas, which is compressed to 750 psig before it is sold to the El Paso Natural Gas Company. [Ref. 2]

The facility filed a Hazardous Waste Notification (dated August 15, 1980) and Part A of its RCRA permit application (dated November 19, 1980) to operate under interim status; however, the facility withdrew its RCRA Hazardous Waste Notification and Part A on June 16, 1982 stating that it incorrectly notified or applied for a RCRA permit [Ref. 4, 5, and 8]. The facility, however, operated Cooling Towers (SWMUs #15-17) that discharged chromium-containing blowdown to an unlined Surface Impoundment (SWMU #18). A compliance order was issued against the facility on September 29, 1983 for operating without

- 7 -

interim status and failure to determine that chromium-containing blowdown was a hazardous waste. [Ref. 10] EPA issued the compliance order when it learned that the blowdown may have occasionally exceeded the EP Toxicity level for chromium. The facility failed to determine that the blowdown was a characteristic hazardous waste and, since the facility withdrew its Part A, was operating without interim status. The compliance order required the facility to test all solid wastes on-site, to re-file a Part A to regain interim status, and submit closure and post-closure plans for the Surface Impoundment. A civil penalty of \$17,600 was also assessed against the facility for operating without a permit and failure to perform hazardous waste determination. [Ref. 10]

The New Mexico Environmental Improvement Division filed a Notice of Violation against the facility on June 15, 1984 for violations determined during a hazardous waste compliance inspection performed on May 8, 1984. These violations were for improper recordkeeping and operation of the Surface Impoundment (SWMU #18). [Ref. 13] Phillips responded to the NOV on July 18, 1984 [Ref. 15].

Phillips submitted closure and post-closure plans for the Surface Impoundment (SWMU #18) to EPA on June 28, 1984 [Ref. 19]. Revised plans were submitted on August 3, 1984 [Ref. 16]. Phillips submitted a certification of closure for the Surface Impoundment to the New Mexico Environmental Improvement Division in a letter dated October 29, 1984; the certification of closure was signed by an independent registered professional engineer [Ref. 18].

On August 27, 1984, EPA issued a Consent Agreement and Final Order pursuant to the Compliance Order issued on September 29, 1983. [Ref. 17]

- 8 -

Harding Lawson Associates reviewed the Closure and Post-Closure Plan for the Lee Plant and presented a summary report and a checklist of its findings; several deficiencies were noted [Ref. 19]. Jacobs Engineering Group Inc. also reviewed the Closure and Post-Closure Plan and noted deficiencies in it, which were presented in its summary report dated May 13, 1986 [Ref. 25].

On August 4, 1987, the New Mexico Health and Environment Department issued a Notice of Violation to Phillips Petroleum Company since the annual ground-water monitoring report was not submitted for the Phillips Lee Plant [Ref. 27]. Phillips responded to the NOV on August 24, 1987 requesting a meeting to discuss ground-water monitoring at the facility [Ref. 28]. In addition, Phillips submitted analyses of ground-water samples collected from the facility in August 1985; chromium was not detected in any of the monitoring wells, but organics were detected in all four monitoring wells at part per billion levels. The greatest concentrations of volatile organics were found in Monitoring Well No. 1 and are provided below. (The results for tetrahydrofuran and butanone are tentative.) [Ref. 24]

Benzene	47 ppb
m-Xylene	l ppb
o-Xylene	6 ppb
Toluene	17 ppb
Tetrahydrofuran	>500 ppb
Butanone	>500 ppb

The New Mexico Environmental Improvement Division conducted an inspection at the facility on September 15, 1987 and noted that the presence of tetrahydrofuran, which was detected in all four monitoring wells, may be from the adhesive used to install the PVC monitoring wells [Ref. 29] On October 27, 1987, the New Mexico Health and Environmental Department issued a Notice of Violation to the Phillips Lee Plant for four violations of the Hazardous Waste Management Regulations [Ref. 31]. According to a letter dated February 2, 1988, the facility satisfactorily addressed the first and second violations (inclusion of the addresses of all emergency coordinators in the contingency plan and an evacuation plan in the contingency plan, respectively). The third violation concerning the failure to perform required ground-water sampling was readdressed by the state in a second NOV issued on January 25, 1988. The fourth violation, regarding the failure to close the Surface Impoundment (SWMU #18), was not resolved. [Ref. 32] Phillips responded on February 17, 1988 to the NOV issued on January 25, 1988 for ground-water sampling; on February 26, 1988, the New Mexico Environmental Improvement Division approved Phillips' proposed schedule for compliance with the NOV [Ref. 33].

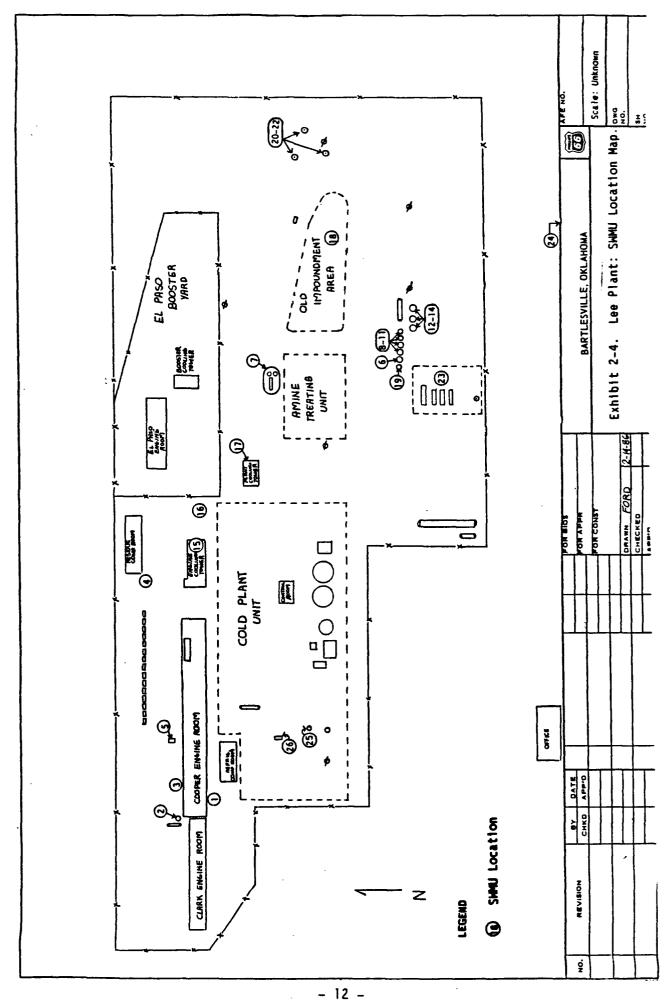
2.3 Identification of Solid Waste Management Units

The following section describes the various processes at the Phillips Lee Plant and waste streams associated with each process. The processes and associated waste streams are discussed in the general order of the overall natural gas treatment process at the Lee Plant: compression of natural gas, monoethanolamine sweeting, molecular sieve dehydration, sulfur recovery, and other general wastes. This section includes an introduction to the solid waste management units (SWMUs) identified during this assessment and their relation to the overall process flow. A total of 26 SWMUs were identified during the PR and VSI. The SWMUs are listed in Exhibit 2–3 and their locations are presented in Exhibit 2–4.

EXHIBIT 2-3

SWMU No.	Name	RCRA-Regulated
1-4	Engine Drain Tanks (4)	No
5	Steel Collection Tank	No
6	Gunbarrel (Separator)	No
7	Oil-Water Separator	No
8-11	Slop Oil Tanks (4)	No
12-14	Wastewater Tanks (3)	No
15-17	Cooling Towers (3)	No
18	Surface Impoundment	Yes
19	Precoat Slop Water Tank	No
20-22	Flares (3)	No
23	Sulfur Incinerator	No
24	Former Landfill	No
25	Closed Drain Separator	No
26	Cold Drain Vaporizing Tank	No

SOLID WASTE MANAGEMENT UNITS AT THE PHILLIPS EUNICE PLANT



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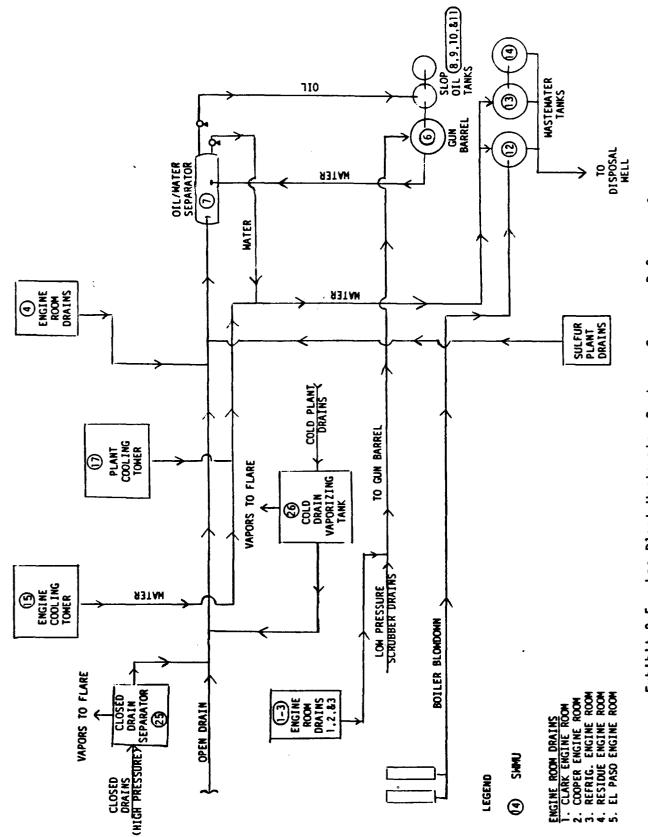
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Three Cooling Towers (SWMUs #15-17) are operated at the plant to cool engine jacket water and process cooling water. The Cooling Towers provide noncontact cooling water for the engine jacket water and process cooling water; however, a chromium-containing corrosion inhibitor was used in the noncontact cooling water until October 4, 1983 when its use ceased due to its potential to make the blowdown a characteristic hazardous waste [Ref. 16]. An aqueous mixture of an aromatic nitrogen heterocycle and sodium hydroxide has since been used as a corrosion inhibitor in the noncontact cooling water [Ref. 2]. The chromium-containing blowdown was discharged to the Surface Impoundment (SWMU #18) [Ref. 16]. The cooling tower blowdown is presently discharged to the Wastewater Tanks (SWMUS #12-14), which discharge to a pipeline in Rice Engineering's Vacuum Salt Water Disposal System (see Exhibit 2-5); Rice Engineering operates a Class II injection well offsite [Ref. 2].

Oil that leaks from the engines is collected by the Engine Drain Tanks (SWMUs #1-4). These units discharge the oil via the open drain system to the belowground Oil-Water Separator (SWMU #7), which has two discharge streams. The aqueous stream is sent to the Wastewater Tanks (SWMUs #12-14) and the oil stream is sent to the Slop Oil Tanks (SWMUs #8-11). [Ref. 2] The slop oil is trucked offsite to a heater treater in Hobbs and then delivered to the Phillips sales pipeline [Ref. 7].

The Gunbarrel (SWMU #6) collects hydrocarbon liquids separated from the inlet gas. The Gunbarrel separates the oil-water mixture and discharges the oil component to the Slop Oil Tanks (SWMUs #8-11) and the aqueous component to the Wastewater Tanks (SWMUs #12-14). [Ref. 2]

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Exhibit 2-5. Lee Plant Wastewater System. Source: Reference 2.

The monoethanolamine sweetening process employs diatomaceous earth to remove fine particulate matter that the monoethanolamine solution removes from the inlet gas. The diatomaceous earth is backwashed to the Precoat Slop Water Tank (SWMU #19) where the solids settle out. The slop water is discharged from the tank and trucked offsite to an injection well located 9 to 10 miles from the plant. The diatomaceous earth is removed from the tank and transported offsite by INW of Lubbock, Texas. [Ref. 7]

The molecular sieve dehydrators (commonly known as mole sieves) employ an alkali aluminosilicate material in pellet form to dry the sweet inlet gas. The aluminosilicate pellets act as a dessicant removing water from the natural gas. Approximately every three to four years the molecular sieve dehydrators are recharged. The spent pellets, or molecular sieve, are disposed in a caliche pit on nearby property owned by Texaco; this pit is also known as the Texaco landfill. Approximately 28,000 pounds of this material is disposed each time the beds are recharged. [Ref. 2 and 7]

The hydrogen sulfide and carbon dioxide removed from the acid inlet gas during the monoethanolamine sweetening process are piped to the sulfur recovery plant. The recovered sulfur is collected and sold off-site; all of the gases (primarily hydrogen sulfide and sulfur dioxide) produced during the sulfur recovery process are burned in the Sulfur Incinerator (SWMU #23). [Ref. 7] Approximately once every five years the catalyst in the sulfur recovery unit converter beds are recharged. The spent catalyst is disposed of in the Texaco landfill. Approximately 29,000 pounds of this material are disposed each time the beds are recharged. [Ref. 2]

- 15 -

All Class II wastes are hauled to an off-site landfill by Waste Control of New Mexico, which is based in Hobbs. The Class II wastes include paper towels, sacks, and spent air and oil filters from the engines. Large pieces of pipe and concrete are disposed in the Texaco landfill. [Ref. 2 and 7]

2.4 Summary of Wastes Handled

This section summarizes the wastes generated during the refining of acid field gas to produce sweet residue gas for sale. The waste streams are discussed in the general order of the overall natural gas treatment process at the Lee Plant: compression of natural gas, diethanolamine sweeting, molecular sieve dehydration, sulfur recovery, and other general wastes.

A chromium-containing corrosion inhibitor was used in the noncontact cooling tower water until October 4, 1983. This noncontact water (blowdown) was discharged from the Cooling Towers (SWMU #15-17) to the Surface Impoundment (SWMU #18). The blowdown may have exceeded the EP Toxicity characteristic chromium level from time to time and the Surface Impoundment is now going through closure due to the presence of chromium in the soil within the unlined unit. [Ref. 18] A closure and post-closure plan for the Surface Impoundment was submitted to the New Mexico Environmental Improvement Division and EPA Region VI. [Ref. 16]

An aqueous mixture of an aromatic nitrogen heterocycle and sodium hydroxide has been used as a corrosion inhibitor in the Cooling Tower water since October 4, 1983. When operation of the Surface Impoundment ceased, the blowdown was discharged to Rice Engineering's Vacuum system for disposal in an injection well. [Ref. 2]

- 16 -

Liquids collected by the open-drain and closed-drain systems are treated by the Gunbarrel (SWMU #6) and the Oil-Water Separator (SWMU #7). The slop oil is collected and stored in the Slop Oil Tanks (SWMUs #8-11) on-site until it is trucked to Hobbs for treatment and delivery to a sales pipeline. The aqueous portion of the treated liquid is discharged to Rice Engineering's injection well. [Ref. 2]

The monoethanolamine sweetening process generates diatomaceous earth and slop water that are sent off-site for disposal. The diatomaceous earth is disposed by INW and the slop water is disposed in an injection well. [Ref. 2 and 7]

The molecular sieve dehydrators employ alkali aluminosilicate filter pellets that are replaced every three to four years. The spent pellets, or molecular sieve, are disposed in the Texaco landfill located several miles to the west of the facility. [Ref. 2 and 7]

Gases generated during the sulfur recovery process are burned in the Sulfur Incinerator (SWMU #23). These gases are primarily hydrogen sulfide and sulfur dioxide. [Ref. 7]

Waste Control of New Mexico hauls all Class II wastes to an off-site landfill. The Class II wastes include paper towels, sacks, and spent air and oil filters from the engines. [Ref. 2 and 3]

- 17 -

3.0 ENVIRONMENTAL SETTING

3.1 Meteorology and Climate

The Phillips Lee Plant is located in central Lea County, which has a semiarid, continental climate with warm summers and cool dry winters. The primary source of rainfall is moisture from the Gulf of Mexico. The northern part of the county receives greater amounts of rain because the moist air moves upslope. Strong surface heating in the summer contributes to brief, heavy thunderstorms that are responsible for most of the yearly rainfall. Blizzards are rare and snow generally melts soon after falling. [Ref. 34]

Lea County is located in one of the warmer areas of New Mexico, with temperatures a little warmer in the southern and western parts of the county and a little cooler in the north. Summer temperatures of 90 degrees or more occur about 66 percent of the time. Temperatures reach or exceed the freezing point on about 66 days during the winter months and seldom drop below zero. [Ref. 34]

Average annual precipitation in Lea County ranges from about 16 inches in the northern part to about 12 inches in the southern part. Approximately 80 percent of the annual rainfall occurs from May through October, much of it in thunderstorms. Average annual snowfall ranges from about 4 inches in the southern part of the county to about 10 inches in the north. Nearly half the months, on the average, have no measurable snowfall. [Ref. 34]

- 18 -

Surface winds are primarily from the southwest from November through April and the southeast from May through October. The direction of the wind is determined by the general circulation around the Bermuda high pressure area and is modified by the low pressure over Arizona in summer. The average annual wind velocity is 12.2 miles per hour, with monthly averages ranging from 10.0 miles per hour in October to 15.0 miles per hour in March. The winds generally have higher velocities in the spring and lower velocities in the fall. Winds in excess of 46 miles per hour are mostly from the west and usually occur about twice a year. Tornadoes or funnel clouds occur about once or twice a year in Lea County and may be accompanied by hail storms. [Ref. 34]

Evaporation from a Class A measuring pan ranges from 105 to 110 inches a year and from a lake surface from 45 to 49 inches. Sixty-seven percent of the evaporation takes place from May through October. The average annual relative humidity of the county is 45 to 50 percent. [Ref. 34]

An average of about 75 percent of the possible sunshine may be expected during the year. The percentage is higher in June and during fall, and lower in winter. Similarly, the average cloud cover is four-tenths and is less in June and during fall and greater in winter. [Ref. 34]

3.2 Topography, Floodplain and Surface Water

The Phillips Lee Plant is located in central Lea County near the southwestern edge of the Llano Estacado, or Staked Plains, which is a remnant of the southern extension of the Southern High Plains. The Southern High Plains are remnants of a vast debris apron spread along the eastern front of the

- 19 -

mountains of Central New Mexico by streams flowing eastward and southeastward during the Tertiary period. This southeastward movement of debris is reflected in the present-day topography. With the exception of the sandy undulating areas along the eastern and northern edges of the county, the Llano Estacado in Lea County has a nearly flat surface. It has a gradient to the east and southeast of about 10 to 15 feet to the mile. Elevations on the Southern High Plains are 4,000 to 4,400 feet along the west side to 3,600 to 3,900 feet along the Texas line. [Ref. 34]

There are no perennial streams on the Southern High Plains and, hence, the Phillips Lee Plant is not located on a floodplain. Rainfall is disposed by seepage, evaporation, or incipient stream channels that fade out within a few miles or terminate in closed depressions, or playas. Other common features of the Southern High Plains are undrained depressions called "buffalo wallows." These depressions are believed to have formed by leaching of the caliche cap and the calcareous cement of the underlying sandstone of the Ogallala Formation followed by subsequent removal of the loosened material by winds. [Ref. 34]

3.3 Geology and Soils

Southern Lea County includes a part of a large subsurface structural feature known as the Permian basin, which underlies southeastern New Mexico and a large part of western Texas. Exploration for oil has revealed a highly complex subsurface geology which involves rocks ranging from Precambrain and early Paleozoic to Permian in age. The oldest rocks exposed in the area are Triassic in age. Cretaceous rocks have been uncovered in a gravel pit near

- 20 -

Eunice, but the unit is apparently of very limited extent. The only other rocks exposed at the surface are Tertiary and Quaternary in age. In general, rock exposures are poor; nowhere in the area is there a complete section of the Triassic or Cretaceous rocks and large areas are covered by drift sand. [Ref. 35]

Southern Lea County includes parts of the Delaware basin, the back-reef or shelf area, and the Central basin platform of the Permian basin. The southwestern part of the county overlies the Delaware basin and the eastern part overlies the Central basin platform; the back-reef or shelf area lies between these two areas and also extends northward to central Lea County to the area where the Phillips Lee Plant is located. These general areas are defined by different sedimentary depositional environments that existed during Permian time. The sharp boundary between the basin and shelf areas is marked by a complex of reef deposits; the boundary between the shelf area and the platform is transitional. The total thickness of the Paleozoic and younger rocks in these provinces ranges from about 8,000 feet in the Central basin platform to more than 17,000 feet in the deepest part of the basin. [Ref. 35]

The Precambrian rocks in Lea County consist primarily of granitic igneous rocks that intruded older igneous and metamorphosed sedimentary rocks over a vast area in western Texas and eastern New Mexico during middle Precambrian time. The known depth to the Precambrian basement rocks ranges in this area ranges from 7,600 feet on the east side to 16,800 feet on the west side. [Ref. 35]

- 21 -

A thick section of Paleozoic sedimentary rocks overlies the Precambrian basement rocks. The rocks of Ordovician through Pennsylvanian age consist of interbedded limestones, dolomites, cherts, and shales. The rocks of Permian age in the area were deposited on an irregular surface formed by Late Pennsylvanian folding. The basins subsided more rapidly than the Central basin platform and continued to accept sediments at times when there was little or no deposition on the platform. The Permian rocks include interbedded limestones, dolomites, conglomerates, sandstones, shales, cherts, and evaporite deposits that are divided into four series: Wolfcamp, Leonard, Guadalupe, and Ochoa. [Ref. 35]

Overlying the Rustler formation of the Ochoa series is a sequence of red beds consisting of micaceous red siltstone, shale, and sandstone that are commonly cemented with gypsum. These red beds are known by various names including the Dewey Lake, Tecovas, and Pierce Canyon formations. These rocks are classed as Permian or Triassic, undifferentiated. [Ref. 35]

The Mesozoic era is represented in the area only by Upper Triassic rocks of the Dockum group and by a small exposure of Cretaceous rocks near the eastern margin of the county. The Dockum group consists of a sequence of red beds including the Santa Rosa sandstone and the Chinle formation. The Santa Rosa is a fine- to coarse-grained sandstone with minor shale layers. The Chinle is dominantly red and green claystone with minor fine-grained sandstone and siltstone. [Ref. 35] The depth to the Triassic red beds at the Phillips Lee Plant is 230 to 240 feet, according to facility representatives [Ref. 7]

- 22 -

Rocks of Jurassic age have not been found in southern Lea County. Rocks of Cretaceous age were deposited, but have been almost entirely removed by erosion. [Ref. 35]

The Cenozoic formations include the Tertiary Ogallala formation of Pliocene age and Quaternary deposits. The Ogallala formation underlies the High Plains and is a heterogeneous complex of terrestrial sediments, which mantles an irregular erosion surface cut into the Triassic rocks. The Ogallala crops out along the face of Mescalero Ridge about six miles south of the Phillips Lee Plant. The Ogallala formation ranges in thickness from a few inches to about 300 feet. It is chiefly a calcareous, unconsolidated sand, but it contains clay, silt, and gravel. The Ogallala on the Llano Estacado is capped by a layer of dense caliche, which ranges in thickness from a few feet to as much as 60 feet. The caliche was formed after the end of Ogallala deposition and is probably late Pliocene in age. [Ref. 35]

Sediments of Quaternary age are present in Lea County in the form of alluvial deposits, probably of both Pleistocene and Recent age, and dune sands of Recent age. The alluvium was deposited in topographically low areas, such as the Querecho Plains and Laguna Valley, where the Ogallala formation was eroded away. The alluvium ranges in thickness from a few inches to more than 400 feet, but it is generally less than 100 feet thick. The dune sands, where present, overlie the older alluvium and the Ogallala formation. [Ref. 35, 37]

Well logs for the three ground-water wells located at the Phillips Lee Plant are presented in Exhibit 3-1. The logs indicate that the subsurface is comprised of interbedded sands, gravels, clays, and caliche to a depth of approximately 225 feet. These deposits overlie Triassic red beds. [Ref. 36]

- 23 -

EXHIBIT 3-1

Well Logs of the Ground-Water Wells Located at the Phillips Lee Plant (Source: Reference 36)

Lee Well No. 1:	0 – 1'	Top Soil
	1' - 24'	Caliche
SE/4 Sec. 30, T-17-S, R-35-E	24' - 55'	Firm Sand
	55' - 80'	Soft Sand
	80' - 153'	Water Sand

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Lee Wells	No. 3	No. 4	
N/2 Sec. 31, T-17-S, R-35-E	0 – 1' 1' – 8'	0 – 1' 1' – 14'	Soil Caliche
WZ Sec. 51, 1-17-5, R-55-E	8' - 16'	14' - 18'	Boulder
	16' - 25'	18' - 25'	Caliche and Sand
	10 - 23	25' - 31'	Boulder
	25' - 40'	31' - 40'	Sand
	40' - 70'	40' - 77'	Sandy Clay
	40 - 70 70' - 75'	40 - 77	Sand Rock
	75' - 88'	77' - 90'	Sand – Top of
	75 - 88	// - 50	Water
		90' - 112'	Sandy Clay
	88' - 95'	112' - 132'	Sand, Dry White
	95' - 115'	132' - 155'	Sandy Clay
	115' - 135'		Sand
	135' - 142'	162' - 178'	Sandy Gravel and
			Clay
	142' - 146'	178' - 182'	Red Clay
	146' - 165'	182' - 198'	Sandy Clay
	165' - 172'	198' - 208'	Sand
	172' - 200'	208' - 214'	Sandy Clay
	200' - 202'	200 - 214	Red Clay
	200 - 202	214' - 225'	Gravel and Sand
	202' - 212'	214 - 220	
	212' - 227'		Sandy Clay
		2251 2201	Gravel and Sand
	227' - 230'	225' - 229'	Red Bed

Note: Well Nos. 3 and 4 were installed in 1959. The completion date for Well No. 1 is not known.

Soils at the Phillips Lee Plant belong to the Kimbrough-Lea association. The soils in the plant area are gravelly and loamy overlying indurated caliche. The surface of this soil association is nearly level to gently sloping. The soils have a loam and gravelly loam surface layer over a heavy loam subsoil or indurated caliche. They formed in wind-laid and alluvial deposits over indurated caliche. [Ref. 34]

Typically, Kimbrough soils have a dark grayish-brown gravelly loam surface layer that is underlain by indurated caliche at a depth of about 6 inches. Lea soils have a dark grayish-brown to brown loam surface layer, a grayish-brown heavy loam subsoil, and indurated caliche at a depth of about 26 inches. [Ref. 34]

Kimbrough soils occur in an intricate pattern with Lea soils. They are on low broad ridges and plains while Lea soils occur in swales. [Ref. 34]

3.4 Ground Water

The High Plains aquifer in southeastern New Mexico is part of a regional aquifer system extending from South Dakota on the north through Wyoming, Colorado, Nebraska, Kansas, and Oklahoma, to Texas and New Mexico on the south. The principal aquifer, the Ogallala Formation of Tertiary age, is hydraulically connected with other unconsolidated deposits, principally of Quaternary age. Alluvium and terrace deposits hydraulically connected with the Ogallala are included in the High Plains aquifer in New Mexico. [Ref. 37]

- 25 -

The High Plains aquifer is the principal source of water in southeastern New Mexico because of its areal extent and the relatively large yields of water to wells completed in the aquifer. The aquifer commonly yields 250 to 800 gallons per minute and locally yields as much as 1,000 gallons per minute to wells. The agricultural economy that exists in the semiarid climate of southeastern New Mexico has expanded significantly because of this major source of water. [Ref. 37]

The Triassic, Jurassic, and Cretaceous rocks that directly underlie the High Plains aquifer in southeastern New Mexico are composed primarily of shale, mudstone, siltstone, and fine-grained sandstone. In addition, there are some lithologic units composed of medium- to very coarse-grained sandstone, conglomerate, limestone, and dolomite. [Ref. 37]

The High Plains aquifer consists of one or more hydraulically connected geologic units of the late Tertiary or Quaternary age. The rocks of late Tertiary age consist of the Ogallala Formation, and the Quaternary deposits consist of alluvial, dune sand, and valley-fill deposits. The thickness of the High Plains aquifer ranges from 0 to about 500 feet. The Ogallala is the principal geology unit in the High Plains aquifer. [Ref. 37]

The Ogallala Formation is mostly unconsolidated clay, silt, fine- to coarse-grained sand, and gravel. Some caliche is present near the top and locally within the formation. When the Ogallala was deposited, aggrading streams filled valleys eroded deep into pre-Ogallala rocks. Braided streams flowed eastward from the mountains in central and southern New Mexico transporting rock debris, which was deposited as a heterogenous sequence of

- 26 - 1

unconsolidated material. The upper part of the Ogallala in southern New Mexico may contain a considerable thickness of windblown sediments. [Ref. 37]

The unconsolidated Quaternary alluvial and valley-fill deposits consist of clay, silt, sand, and gravel. These rocks are primarily derived from reworked Ogallala material. [Ref. 37]

The configuration of the water table in the High Plains aquifer in the Phillips Lee Plant area is shown in Exhibit 3-2. The aquifer boundary on the map is the physical limit of the various geologic units comprising the High Plains aquifer. Water-level data for this map were obtained during the winter of 1978, when the effects of seasonal pumping for irrigation were at a minimum. [Ref. 37]

Hydraulic interconnection between geologic units that comprise the High Plains aquifer is sufficient to permit contouring a continuous water table throughout most of the area. The degree of hydraulic interconnection may vary from place to place and, locally, some water-yielding beds may have a water level representative of an artesian-pressure surface because of clay lenses within the aquifer. However, from a regional aspect, water-table conditions prevail in the aquifer. [Ref. 37]

The water-table map shows a general east-southeastward slope of the water table across the High Plains. The general direction of ground-water movement is at right angles to the water-table contours, in the down-gradient direction. Typically, the slope of the water table is between 10 and 15 feet per mile. [Ref. 37] The local hydraulic gradient at the Phillips Lee Plant,

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Source: Reference 37.

HIGH PLAINS AQUIFER, 1978

however, is in a northerly direction. This was determined from monitoring wells at the Surface Impoundment (SWMU 20). [Ref. 18]

The saturated thickness in the High Plains aquifer ranges from 0 to slightly more than 200 feet. [Ref. 37] Well logs in the area of the Phillips Lee Plant indicate that the water table occurs at a depth of approximately 85 feet. [Ref. 38]

The quantity of natural recharge to the aquifer from precipitation is less than 0.5 inch per year. Only 3 to 4 percent of the precipitation falling on the High Plains reaches the water table; the remainder is returned to the atmosphere by evapotranspiration. [Ref. 37]

Prior to large-scale development of irrigation, the High Plains ground-water system was in a state of dynamic equilibrium, with long-term recharge equal to long-term discharge. Irrigated farming on the High Plains has significantly increased the quantity of water discharged from the system. Increased discharge has resulted in a lowering of the water level as water is removed from storage in the aquifer. The removal of water from storage, or ground-water mining, is most evident in three general areas of southeastern New Mexico where irrigation wells are numerous and relatively concentrated: (1) Eastern Lea County; (2) Portales Valley; and (3) southeastern Curry County. [Ref. 37]

Water levels in eastern Lea County locally have declined more than 60 feet. Water-level declines of 20 to 60 feet are common in areas where irrigation wells are concentrated. The water level in eastern Lea County has been

- 29 -

declining as much as 2 feet per year and is declining at an average rate of 1 foot per year. [Ref. 37]

Water in the High Plains aquifer generally is suitable for domestic, municipal, and irrigation use, but the water typically has large concentrations of calcium, magnesium, and bicarbonate and in some areas may contain high concentrations of fluoride or chloride. [Ref. 37] There are no known public drinking water well in the immediate area surrounding the facility [Ref. 7]

3.5 <u>Receptor Information</u>

The area surrounding the Lee Plant is used primarily for oil production and cattle ranching. The nearest town is Buckeye, which is located approximately one-half mile west of the plant. At the time of the VSI, Buckeye appeared to consist of only one building, a grocery store. The nearest city is Lovington, which is located approximately 12 miles northeast of the facility. [Ref. 7]

Two private residences are located on property adjacent to the southwest corner of the Lee Plant. The homes are located approximately 150 feet west of the plant office. Facility representatives reported that one family lives in each home. [Ref. 7]

A CERCLA Preliminary Assessment/Site Investigation (PA/SI) was performed at the Lee Plant on September 10, 1985. The PA/SI report indicates that approximately six people lived within one-half mile of the plant, presumably in the two homes mentioned above; approximately 19 people worked within one-half mile of the plant. [Ref. 38]

- 30 -

Wildlife living in the semiarid environment surrounding the Eunice Plant includes mourning doves, scaled quail, roadrunners, jackrabbits, desert mule deer, and antelope.

4.0 RELEASE PATHWAYS

This section provides an overview of the potential for the release of hazardous constituents to the various environmental media. This potential is based on the combination of waste characteristics, facility characteristics and environmental setting.

4.1 Air Release Pathway

There are numerous compressor engines, boilers, heaters, a Sulfur Incinerator (SWMU #23), and three Flares (SWMUs #20-22) which have air release pathways at the Phillips Lee Plant permitted under Air Quality Permit No. 276 [Ref. 40].

4.2 Surface Water Release Pathway

There are no significant bodies of surface water within at least fifteen miles of the Eunice Plant. Due to this distance, the release potential to surface water is not considered to be significant.

4.3 Soil Release Pathway

Two land-based units manage or have managed wastes without using liner systems. These units include the Surface Impoundment (SWMU #18) and the Former Landfill (SWMU #24). Given the unlined construction of these units, there is a significant potential for release to soil.

4.4 Ground-water Release Pathway

Ground-water contamination from organics was reported from samples taken from monitoring wells located near the Surface Impoundment (SWMU #18) [Ref. 24]. Due to the sandy nature of the subsurface layers, wastes released to the soil may migrate to ground-water even though it is located approximately 85 feet below the surface. Since there is no information on wastes managed by the Former Landfill (SWMU #24), it is not known if it has released to ground water. Due to documented contamination in the area of the Surface Impoundment, there is a significant potential for release to ground water.

5.0 DESCRIPTION OF SOLID WASTE MANAGEMENT UNITS

5.1 <u>SWMUs #1-4 - Engine Drain Tanks (4)</u> (Photos 1-3, 6)

5.1.1 Information Summary

<u>Unit Description</u>: These units are small underground collection tanks located near the various engine rooms. Engine Drain Tanks Nos. 1,3, and 4 are steel tanks measuring 36 inches in diameter by 6 feet long and have a capacity of 300 gallons. Engine Drain Tank No. 2 is a steel tank of unknown dimensions. Engine Drain Tank No. 3 replaced Tank No. 2. These units receive oil that drips from compressor engines; the oil gravity-flows via pipelines to the tanks. [Ref. 7] The units discharge the oil via the open drain system to the belowground Oil-Water Separator (SWMU #7). [Ref. 2]

<u>Dates of Operation</u>: Engine Drain Tanks Nos. 1, 3, and 4 were installed in 1987 and are currently in service. The start-up date for Engine Drain Tank No. 2 is not known and it is no longer in service. [Ref. 7]

<u>Wastes Managed</u>: These units collect oil that drips from the compressor engines. [Ref. 2] The wastes are expected to contain 40 CFR Part 261 Appendix VIII constituents including complex hydrocarbons and heavy metals.

<u>Release Controls</u>: These units gravity-flow to the Oil-Water Separator (SWMU #7); there are no other release controls for these units.

<u>History of Releases</u>: There is no documented release history for these units. These units were not visible during the VSI due to their below-grade location.

- 34 -

5.1.2 Release Potential

- <u>Soil/Ground Water</u>: The release potential to soil and ground water is unknown due to the below grade location and unknown integrity of the units.
- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: The release potential to air is low due to the enclosed construction of the unit and the nonvolatile nature of the waste.
- <u>Subsurface Gas</u>: There is a potential for subsurface gas generation due to the unknown integrity of the tanks.

5.2 SWMU #5 - Steel Collection Tank (Photo 4)

5.2.1 Information Summary

<u>Unit Description</u>: This unit is located on a concrete pad adjacent to and east of a shed that is located north of the Cooper Engine Room. This aboveground unit is a horizontal steel tank measuring 30 inches in diameter by 5 feet long. The unit stands on short metal legs and has a capacity of 150 gallons. This unit was used to store Stoddard solvent prior to discharging it to the open drain system. [Ref. 7]

<u>Dates of Operation</u>: The start-up date of this unit was not known by facility representatives. It was taken out of service in 1987. [Ref. 7]

<u>Wastes Managed</u>: This unit collected Stoddard solvent used to wash down the floor of the Cooper Engine Room [Ref. 7]. This unit discharged the solvent via the open drain system to the belowground Oil-Water Separator (SWMU #7). [Ref. 2]

<u>Release Controls</u>: The unit is situated on a concrete pad without curbing. It discharges by gravity flow to the Oil-Water Separator (SWMU #7).

<u>History of Releases</u>: There is no documented release history for this unit. The unit appeared to be in good condition during the VSI with no visible signs of past releases.

- 36 -

5.2.2 <u>Release Potential</u>

- <u>Soil/Ground Water</u>: The potential for release to soil and ground water is low due to the observed integrity of the unit.
- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: The potential for release to air is low due to the enclosed construction of the unit and it discharges via a pipe.
- <u>Subsurface Gas</u>: There is no potential for generation of subsurface gas due to the aboveground location and observed integrity of the unit.

5.3 SWMU #6 - Gunbarrel (Photo 12)

5.3.1 Information Summary

<u>Unit Description</u>: This aboveground unit is a closed-top steel tank measuring approximately 10 feet in diameter by 20 feet high. It has a capacity of about 300 barrels. The unit is located inside an unlined containment basin constructed of native caliche; a 3-foot dike surrounds the containment basin. The Slop Oil Tanks (SWMUs #8-11) and the Precoat Slop Water Tank (SWMU #19) are also located in the containment area. This unit separates the oil and water components of the hydrocarbon liquids separated from inlet gas. [Ref. 7]

<u>Dates of Operation</u>: The start-up date for this unit is unknown; it is currently in service [Ref. 7].

<u>Wastes Managed</u>: This unit collects hydrocarbon liquids separated from the inlet gas. The Gunbarrel separates the oil-water mixture and discharges the oil component to the Slop Oil Tanks (SWMUs #8-11) and the aqueous component to the Oil-Water Separator (SWMU #7). [Ref. 2]

<u>Release Controls</u>: The unit is located inside an unlined containment basin constructed of native caliche. The dike is approximately 3 feet high. [Ref. 7]

<u>History of Releases</u>: There is no documented release history for this unit. The unit appeared to be in good condition during the VSI with no visible signs of past releases.

·- 38 -

5.3.2 <u>Release Potential</u>

- <u>Soil/Ground water</u>: The release potential to soil and ground water is low due to the observed integrity of the unit.
- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: The release potential to air is low due to the enclosed construction of the unit.
- <u>Subsurface Gas</u>: There is a low potential for subsurface gas generation due to the observed integrity and aboveground location of the tank.

5.4 SWMU #7 - Oil-Water Separator (Photo 10)

5.4.1 Information Summary

<u>Unit Description</u>: This unit is an underground steel tank measuring approximately 6 feet in diameter by 20 feet long. The tank has a capacity of 3000 gallons. This unit also includes two sumps located at the east end of the tank. Each sump is approximately 3 feet in diameter by 10 to 12 feet deep and has a 500-gallon capacity. [Ref. 7] The unit separates the oil and water components of wastewater and sends each component to the appropriate sump for delivery to storage tanks. The aqueous stream is sent to the Wastewater Tanks (SWMUs #12-14) and the oil stream is sent to the Slop Oil Tanks (SWMUs #8-11). [Ref. 2]

<u>Dates of Operation</u>: This unit was installed in 1980 or 1981 and is currently in operation. [Ref. 7]

<u>Wastes Managed</u>: This unit receives oil, via the open drain system, discharged by the Engine Drain Tanks (SWMUs #1-4), other hydrocarbon liquids separated from inlet gas, and the separated aqueous component from the Gunbarrel (SWMU #6). [Ref. 2] The wastes are expected to contain 40 CFR Part 261 Appendix VIII constituents including complex hydrocarbons and heavy metals.

<u>Release Controls</u>: There are no identified release controls to prevent overflow of this unit.

- 40 -

<u>History of Releases</u>: There is no documented release history for this unit. The unit appeared to be in good condition during the VSI with no visible signs of past releases.

5.4.2 Release Potential

- <u>Soil/Ground Water</u>: The potential for release to soil and ground water is unknown since the integrity of the underground unit could not be verified during the VSI.
- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: The potential for release to air is low due to the enclosed construction of the unit.
- <u>Subsurface Gas</u>: The potential for generation of subsurface gas is unknown since the integrity of the underground unit could not be verified during the VSI.

5.5 SWMUs #8-11 - Slop Oil Tanks (4) (Photos 12 and 15)

5.5.1 Information Summary

<u>Unit Description</u>: These aboveground units are closed-top steel tanks of two different sizes. Two of the tanks measure approximately 10 feet in diameter by 15 feet tall and have a capacity of 210 bb1. The other two tanks are about 15 feet in diameter by 15 feet tall. The tanks are located inside an unlined containment basin constructed of native caliche; a 3-foot dike surrounds the containment. These units store slop oil before it is trucked offsite for treatment and sale. The Gunbarrel (SWMU #6) and the Precoat Slop Water Tank (SWMU #19) are also located in the containment area. [Ref. 7]

<u>Dates of Operation</u>: The start-up dates for these units is unknown, but they are currently in service. [Ref. 7]

<u>Wastes Managed</u>: These tanks receive the separated oil components from the Gunbarrel (SWMU #6) and the Oil-Water Separator (SWMU #7). The oil is stored until it is trucked to the heater treater in Hobbs for treatment and then delivery to a Phillips sales pipeline. [Ref. 7] The wastes are expected to contain 40 CFR Part 261 Appendix VIII constituents including complex hydrocarbons and heavy metals.

<u>Release Controls</u>: These units are located inside an unlined containment basin constructed of native caliche. The dike is approximately 3 feet high. [Ref. 7]

- 42 -

<u>History of Releases</u>: There is no documented release history for these units. The units appeared to be in good condition during the VSI with no visible signs of past releases.

5.5.2 <u>Release Potential</u>

- <u>Soil/Ground water</u>: The release potential to soil and ground water is low due to the observed integrity of the units.
- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: The release potential to air is low due to the enclosed construction of the units.
- <u>Subsurface Gas</u>: There is a low potential for subsurface gas generation due to the observed integrity and aboveground location of the tanks.

5.6 SWMUs #12-14 - Wastewater Tanks (3) (Photos 13 and 15)

5.6.1 Information Summary

<u>Unit Description</u>: These aboveground units are closed-top steel tanks situated on individual concrete pads. Each tank measures approximately 12 feet in diameter by 20 feet high with a capacity of 750 barrels. The tanks store wastewater before it is discharged to an offsite injection well. The tanks are connected to each other by overhead and underground pipelines. The wastewater is received by Wastewater Tank No. 1, where solids settle out. The solids are pumped out of the tank by vacuum truck and transported to a disposal pit at an offsite injection well located 9 to 10 miles northeast of the plant. The aqueous component in Tank No. 1 flows by overhead pipeline to Tank No. 2, which discharges the water to the Rice Engineering Vacuum Salt Water Disposal System. The discharged wastewater is sent by pipeline to an offsite Class II injection well. Tank No. 3 is connected by underground pipeline to Tank No. 2; Tank No. 3 is only used as a back-up for Tank No. 2. [Ref. 2 and 7]

<u>Dates of Operation</u>: The start-up date for these units is unknown, but they are currently in service. [Ref. 7]

<u>Wastes Managed</u>: These units receive wastewater from the Oil-Water Separator (SWMU #7) and blowdown from the Cooling Towers (SWMUs #15-17) and boilers. [Ref. 2 and 7]

<u>Release Controls</u>: The tanks are connected by pipelines allowing them to overflow in series to the next in line. [Ref. 7]

- 44 --

<u>History of Releases</u>: There is no documented release history for these units. The units appeared to be in good condition during the VSI with no visible signs of past releases.

5.6.2 <u>Release Potential</u>

- <u>Soil/Ground Water</u>: The potential for release to soil and ground water is low due to the observed integrity of the units during the VSI and the overflow release controls.
- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: There is a low potential for release to air due to the enclosed construction of the unit.
- <u>Subsurface Gas</u>: The potential for generation of subsurface gas is low due to the observed integrity of the units during the VSI and the overflow release controls.

5.7 SWMUs #15-17 - Cooling Towers (3) (Photos 7-9)

5.7.1 Information Summary

<u>Unit Description</u>: There are three Cooling Towers at the Lee Plant. The Cooling Towers provided noncontact cooling water for the engine jacket water and process cooling water. All of the units are open recirculating cooling towers constructed over concrete containment basins and are called the Engine Cooling Tower (SWMU #15), the Refrigeration Cooling Tower (SWMU #16), and the Plant Cooling Tower (SWMU #17). The Engine Cooling Tower had a recirculation rate of 1860 gpm with an approximate raw water make-up rate of 28 gpm. The Plant Cooling Tower had a recirculation rate of 3500 gpm with an approximate raw water make-up rate of 63 gpm. The Refrigeration Cooling Tower was dismantled prior to the VSI; only the concrete containment basin remained at the time of the VSI. [Ref. 2 and 7]

<u>Dates of Operation</u>: The start-up dates for these units is unknown; these cooling towers were not active at the time of the VSI (see Photos 7-9).

<u>Wastes Managed</u>: This unit manages cooling water blowdown from the Cooling Towers. The raw water in these units is recirculated until the impurities in the water are concentrated to five times their inlet concentrations and then piped directly to the Wastewater Tanks (SWMUs #12-14), which discharge to a pipeline in Rice Engineering's Vacuum Salt Water Disposal System. Rice Engineering operates a Class II injection well offsite [Ref. 2].

- 46 -

A chromium-containing corrosion inhibitor was used in the noncontact cooling water until October 4, 1983 when its use ceased due to its potential to make the blowdown a characteristic hazardous waste. The chromium-containing blowdown was discharged to the Surface Impoundment (SWMU #18). [Ref. 16]. An aqueous mixture of an aromatic nitrogen heterocycle and sodium hydroxide has since been used as a corrosion inhibitor in the noncontact cooling water [Ref. 2].

<u>Release Controls</u>: These units are set in concrete basins [Ref. 7].

<u>History of Releases</u>: There is no documented history of releases for these units. The units appeared to be in good condition during the VSI with no visible signs of past releases.

5.7.2 Release Potential

- <u>Soil/Ground Water</u>: The release potential to soil and ground water is low due to the concrete basins associated with these units.
- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: There is a low potential for release to air due to the non-hazardous nature of the wastes.
- <u>Subsurface Gas</u>: There is no potential for the generation of subsurface gas due to the aboveground location and the observed integrity of the units.

- 47 -

5.8 SWMU #18 - Surface Impoundment (Photo 11)

5.8.1 Information Summary

<u>Unit Description</u>: This RCRA-regulated unit is located at the east end of the facility and is going through closure. The unit received chromium-containing blowdown from the Cooling Towers (SWMUs #15-17). The unit was filled with caliche in 1984 and was certified closed by an independent professional engineer; however, the New Mexico Environmental Improvement Agency has not approved the closure and post-closure plan for the unit and continues to negotiate with the facility on closure requirements. The Surface Impoundment was comprised of three interconnected and unlined pits excavated into the native caliche. [Ref. 7] The dimensions of the three pits were (from west to east) 110 feet by 30 feet, 120 feet by 30 feet, and 110 feet by 165 feet [Ref. 5]. A ground-water monitoring system was installed around the unit based on regional ground-water flow, which is to the southeast. A new system, however, was installed shortly before the VSI since water levels in the first set of wells indicated that local ground-water flow was to the north. [Ref. 18]

<u>Dates of Operation</u>: The facility representatives stated that the unit was probably built in 1953. The unit is going through closure and was filled with caliche in 1984.

<u>Wastes Managed</u>: This unit received cooling tower blowdown from the Cooling Towers, which used a chromium-containing corrosion inhibitor in its cooling water that may have occasionally exceeded EP Toxicity limits for chromium. [Ref. 16] Analyses of ground-water samples collected in August 1985 from the

- 48 -

old ground-water monitoring system for the unit indicated that chromium was not detected in any of the monitoring wells; however, volatile organics from an unconfirmed source were found in all four monitoring wells [Ref. 24].

<u>Release Controls</u>: There are no release controls for this unit.

History of Releases: There is no documented release history for this unit.

5.8.2 <u>Release Potential</u>

- <u>Soil/Ground Water</u>: The release potential to soil and ground water is high due to the unlined construction of the unit and the burial of the chromium-containing wastes in place.
- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: There is a low potential for release to air from this unit due to the covered construction of the unit.
- <u>Subsurface Gas</u>: There is a low potential for subsurface gas generation due to the reported inorganic nature of the wastes.

- 49 -

5.9 SWMU #19 - Precoat Slop Water Tank (Photo 12)

5.9.1 Information Summary

<u>Unit Description</u>: This aboveground unit is a closed-top steel tank measuring approximately 10 feet in diameter by 15 feet high. It has a capacity of about 210 barrels. The unit is located inside an unlined containment basin constructed of native caliche; a 3-foot dike surrounds the containment. The unit stores slop water generated while backwashing diatomaceous earth filters used in the monoethanolamine sweetening process. The Slop Oil Tanks (SWMUs #8-11) and the Gunbarrel (SWMU #6) are also located in the containment area. [Ref. 7]

<u>Dates of Operation</u>: The start-up date for this unit is unknown, but it is currently in service.

<u>Wastes Managed</u>: The monoethanolamine sweetening process employs diatomaceous earth to remove fine particulate matter that the monoethanolamine solution removes from the inlet gas. The diatomaceous earth is backwashed to the Precoat Slop Water Tank where the solids settle out. The slop water is discharged from the tank and trucked offsite to an injection well located 9 to 10 miles from the plant. The diatomaceous earth is removed from the tank and transported offsite by INW of Lubbock, Texas. [Ref. 7]

<u>Release Controls</u>: The unit is located inside an unlined containment basin constructed of native caliche. The dike is approximately 3 feet high. [Ref. 7] <u>History of Releases</u>: There is no documented release history for this unit. The unit appeared to be in good condition during the VSI with no visible signs of past releases.

5.9.2 Release Potential

- <u>Soil/Ground water</u>: The release potential to soil and ground water is low due to the observed integrity of the unit.
- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: There is no potential for release to air due to the enclosed construction of the unit and nonvolatile nature of the waste.
- <u>Subsurface Gas</u>: There is no potential for subsurface gas generation due to the closed construction and aboveground location of the tank.

5.10 <u>SWMUs #20-22 - Flares (3)</u> (Photo 11)

5.10.1 Information Summary

<u>Unit Description</u>: There are a total of three Flares at the facility: the Acid Gas Flare (SWMU #20), the Process Flare (SWMU #21), and the Field Gas Flare (SWMU #22). These units are located at the east end of the plant, just east of the Surface Impoundment (SWMU #18). All of the flares are at least 50 feet tall. The units are used to burn field, inlet, and process gases. [Ref. 7]

<u>Dates of Operation</u>: The start-up dates of these units is unknown, but they are currently in operation. [Ref. 7]

<u>Wastes Managed</u>: The Flares are used to burn off field gas during a plant upset, inlet gas, and process gases. The Process Flare receives gases from the Closed Drain Separator (SWMU #25) and the Cold Drain Vaporizing Tank (SWMU #26). The units discharge to the atmosphere under permit. [Ref. 7]

Release Controls: There are no release controls for these units.

<u>History of Releases</u>: There is no documented unregulated release history for these units.

5.10.2 Release Potential

o <u>Soil/Ground Water</u>: There is a low potential for release to soil and ground water since the gas is flared off to the atmosphere.

- 52 -

- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: The units discharge to the atmosphere under permit.
- <u>Subsurface Gas</u>: There is a low potential for generation of subsurface gas since the gas is flared off to the atmosphere.

5.11 SWMU #23 - Sulfur Incinerator (Photos 16-18)

5.11.1 Information Summary

<u>Unit Description</u>: This unit is located at the sulfur recovery plant, which employs a three-stage Claus sulfer recovery process. The Sulfur Incinerator burns Claus tail gas from the sulfur recovery unit and discharges 4.2 MCF/hr through its 100-foot stack to the atmosphere. The incineration temperature of the unit is 1200°F and it is fueled by sweet natural gas. [Ref. 39 and 40]

<u>Dates of Operation</u>: The unit began operation on March 21, 1981 and is currently in service [Ref. 7 and 41].

<u>Wastes Managed</u>: The unit burns waste gases from the sulfur recovery unit. The waste composition is 0.40 percent hydrogen sulfide, 0.38 percent sulfur dioxide, 0.13 percent sulfur, 28.67 percent carbon dioxide, 62.46 percent nitrogen, and 7.96 percent water. [Ref. 40] The unit operates under Air Quality Permit No. 276 [Ref. 41]

<u>Release Controls</u>: The unit is operated to minimize the formation of incomplete combustion products.

<u>History of Releases</u>: There is no documented history of nonpermitted releases from this unit.

- 54 -

5.11.2 <u>Release Potential</u>

- o <u>Soil/Ground Water</u>: There is a low potential for release to soil and ground water since the unit discharges to the atmosphere.
- o <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water and the gaseous nature of the waste.
- o <u>Air</u>: Releases to air from this unit are regulated by the New Mexico Environmental Improvement Division.
- o <u>Subsurface Gas</u>: There is a low potential for subsurface gas generation since the unit discharges to the atmosphere.

5.12 SWMU #24 - Former Landfill (Photo 14)

5.12.1 Information Summary

<u>Unit Description</u>: This unit was initially identified prior to the VSI from the facility drawing provided with the facility's Part A application [Ref. 5]. Following the VSI, the unit was also identified from the files in a Phillips plot plan for the Lee Plant, as well as in a Phillips surveyed plat of the Lee Plant. Both the plot plan and the plat indicate an area of 4.14 acres at the southeast corner of the Lee Plant as a disposal area; the dimensions of the rectangular disposal area are reported as 250 feet from north to south and 722 feet from east to west. The plat identifies the disposal area as Tract #3 of four making up the contiguous property of the Lee Plant. [Ref. 42] The Part A application facility drawing identifies the location of the unit as being smaller and a little north of the location shown in both the surveyed plat and the plot plan [Ref. 5].

The facility representatives had no knowledge of the unit and the area showed no distinguishing features at the time of the VSI. The facility representatives stated that scrap metal may have been accumulated on the ground and mistakenly identified as a landfill at the time the drawing was made in 1980. During the VSI, only an out-of-service process tank was seen in the general area of the unit (see Photo 14). [Ref. 3]

Dates of Operation: The dates of operation for this unit are unknown.

Wastes Managed: The wastes, if any, managed by this unit are unknown.

- 56 -

<u>Release Controls</u>: Release controls for this unit are unknown.

History of Releases: There is no documented history of releases for this unit.

5.12.2 Release Potential

- <u>Soil/Ground Water</u>: The release potential to soil and ground water is unknown since there is little information on the unit.
- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: The release potential to air is unknown since there is little information on the unit.
- <u>Subsurface Gas</u>: The potential for generation of subsurface gas is unknown since there is little information on the unit.

5.13 <u>SWMU #25 - Closed Drain Separator</u> (No photo)

5.13.1 Information Summary

<u>Unit Description</u>: This unit was identified following the VSI during a detailed review of information provided by Phillips during the VSI. The unit is located aboveground in the process area of the facility. It receives liquids from the closed drain system, which is associated with process units. Liquids with low specific gravities evaporate off in the separator and are discharged to the Process Flare (SWMU #21) where they are burned. Liquids that do not volatize in the separator flow into the open drain system to the Oil-Water Separator (SWMU #7). [Ref. 2]

<u>Dates of Operation</u>: The start-up date for this unit is not known; the unit is currently in use [Ref. 2].

<u>Wastes Managed</u>: This unit receives liquids from the closed drain system, which is a high-pressure drain system associated with the process units [Ref. 2].

<u>Release Controls</u>: The unit discharges by gravity flow to the Oil-Water Separator (SWMU #7) [Ref. 2].

<u>History of Releases</u>: There is no documented history of releases from this unit.

5.13.2 <u>Release Potential</u>

- <u>Soil/Ground Water</u>: The potential for release to soil and ground water is unknown since the unit was not observed during the VSI.
- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: The potential for release to air is unknown since the unit was not observed during the VSI.
- <u>Subsurface Gas</u>: The potential for generation of subsurface gas is unknown since the unit was not observed during the VSI.

5.14 <u>SWMU #26 - Cold Drain Vaporizing Tank</u> (No photo)

5.14.1 Information Summary

<u>Unit Description</u>: This unit was identified following the VSI during a detailed review of information provided by Phillips during the VSI. The unit is located aboveground in the process area of the facility. It receives liquids from the cold drain system, which is associated with process units. Drain liquids from the turboexpander (cryogenic plant) flow to the unit where they are heated. Vapors produced by heating the drain liquids are discharged from the tank to the Process Flare (SWMU #21). Liquids that do not volatize in the tank flow into the open drain system to the Oil-Water Separator (SWMU #7). [Ref. 2]

<u>Dates of Operation</u>: The start-up date for this unit is not known; the unit is currently in use [Ref. 2].

<u>Wastes Managed</u>: This unit receives liquids from the cold drain system, which is an atmospheric drain system associated with the process units [Ref. 2].

<u>Release Controls</u>: The unit discharges by gravity flow to the Oil-Water Separator (SWMU #7) [Ref. 2].

<u>History of Releases</u>: There is no documented history of releases from this unit.

5.14.2 <u>Release Potential</u>

- <u>Soil/Ground Water</u>: The potential for release to soil and ground water is unknown since the unit was not observed during the VSI.
- <u>Surface Water</u>: There is no potential for release to surface water due to the absence of nearby bodies of surface water.
- <u>Air</u>: The potential for release to air is unknown since the unit was not observed during the VSI.
- <u>Subsurface Gas</u>: The potential for generation of subsurface gas is unknown since the unit was not observed during the VSI.

There were no areas of concern observed during the VSI.

7.0 CONCLUSIONS

7.1 SWMUs #1-4 - Engine Drain Tanks (4)

Suggested Action: No further action is suggested at this time.

<u>Reasons</u>: Engine Drain Tanks Nos. 1, 3, and 4 were recently installed in 1987; Engine Drain Tank No. 2 is no longer in service. All four tanks are of closed construction, located below grade, and receive and discharge waste oil via pipelines. No evidence of release was discovered in reviewing the files during the PR or observed during the VSI.

<u>Supplemental Information</u>: Routine inspection to verify the structural integrity of the units is recommended.

7.2 SWMU #5 - Steel Collection Tank

<u>Suggested Action</u>: No further action is suggested at this time.

<u>Reasons</u>: This unit is an aboveground tank constructed of steel and is located on a concrete pad. This unit was used to store Stoddard solvent prior to discharging it to the open drain system. The tank is no longer in service and was observed to be in good condition during the VSI. No evidence of release was discovered in reviewing the files during the PR or observed during the VSI.

7.3 SWMU #6 - Gunbarrel

Suggested Action: No further action is suggested at this time.

<u>Reasons</u>: This unit is an aboveground closed-top tank constructed of steel. This unit separates the oil and water components of the hydrocarbon liquids separated from inlet gas. It was observed to be in good condition during the VSI. No evidence of release was discovered in reviewing the files during the PR or observed during the VSI.

7.4 SWMU #7 - Oil-Water Separator

Suggested Action: No further action is suggested at this time.

<u>Reasons</u>: This unit is of closed construction, located below grade, and receives and discharges oil and aqueous components of wastewater via pipelines. The unit receives wastewater from the open drain system, hydrocarbon liquids separated from inlet gas, and the separated aqueous component from the Gunbarrel (SWMU #6). No evidence of release was discovered in reviewing the files during the PR or observed during the VSI.

<u>Supplemental Information</u>: Routine inspection to verify the structural integrity of the unit is recommended.

7.5 SWMUs #8-11 - Slop Oil Tanks (4)

<u>Suggested Action</u>: No further action is suggested at this time.

<u>Reasons</u>: These units are aboveground steel tanks located in an unlined containment basin. These units store slop oil before it is trucked offsite for treatment and sale. They were observed to be in good condition during the VSI. No evidence of release was discovered in reviewing the files during the PR or observed during the VSI.

7.6 SWMUs #12-14 - Wastewater Tanks (3)

Suggested Action: No further action is suggested at this time.

<u>Reasons</u>: These units are aboveground tanks constructed of steel. These tanks store wastewater before it is discharged to an offsite injection well. They were observed to be in good condition during the VSI. No evidence of release was discovered in reviewing the files during the PR or observed during the VSI.

7.7 <u>SWMUs #15-17 - Cooling Towers (3)</u>

<u>Suggested Action</u>: No further action is suggested at this time.

<u>Reasons</u>: These units are open recirculating cooling towers constructed above concrete basins, which were observed to be in good condition during the VSI. The Cooling Towers provided noncontact cooling water for the engine jacket water and process cooling water. A chromium containing corrosion inhibitor was formerly used in the noncontact cooling water; the blowdown was discharged to the Surface Impoundment (SWMU #18). All three cooling towers are no longer in service. No evidence of release was discovered in reviewing the files during the PR or observed during the VSI.

7.8 SWMU #18 - Surface Impoundment

Suggested Action: No further action is suggested for this unit.

<u>Reasons</u>: This RCRA-regulated unit is unlined and was closed with chromium-containing wastes buried in-place. The unit was filled with caliche in 1984 and certified closed by an independent professional engineer. The unit received chromium-containing blowdown from the Cooling Towers (SWMUs #15-17). There is no documented evidence of a release from the unit. Closure of this unit is being coordinated with the New Mexico Environmental Improvement Division.

<u>Supplemental Information</u>: Future closure activities should be coordinated with the New Mexico Environmental Improvement Division.

- 66 -

7.9 SWMU #19 - Precoat Slop Water Tank

<u>Suggested Action</u>: No further action is suggested at this time.

<u>Reasons</u>: This unit is an aboveground tank constructed of steel and located in an unlined containment basin. The unit stores slop water generated while backwashing diatomaceous earth filters used in the monoethanolamine sweetening process. It was observed to be in good condition during the VSI. No evidence of release was discovered in reviewing the files during the PR or observed during the VSI.

7.10 SWMUs #20-22 - Flares (3)

<u>Suggested Action</u>: No further action is suggested at this time.

<u>Reasons</u>: These units are located aboveground and discharge to the atmosphere under permit. The units are used to burn field, inlet, and process gases. No evidence of a nonpermitted release was discovered in reviewing the files during the PR or observed during the VSI.

- 67 -

7.11 SWMU #23 - Sulfur Incinerator

Suggested Action: No further action is suggested at this time.

<u>Reasons</u>: This unit is located aboveground and discharges to the atmosphere under permit. The incineration temperature of the unit is 1200°F and it is fueled by sweet natural gas. It burns Claus tail gas from the sulfur recovery unit. No evidence of a nonpermitted release was discovered in reviewing the files during the PR or observed during the VSI.

7.12 SWMU #24 - Former Landfill

Suggested Action: No further action is suggested for this unit at this time.

Reasons: No evidence of the unit was observed during the VSI.

<u>Supplemental Information</u>: Although there is not sufficient evidence to compel a sampling visit or an RFI, the facility should provide documentation confirming the location of the unit, the construction of this unit, and the nature of the wastes managed. If the wastes are found to have contained hazardous constituents, then an RFI may be warranted. 7.13 SWMU #25 - Closed Drain Separator

Suggested Action: No further action is suggested at this time.

<u>Reasons</u>: This unit is located aboveground in the process area of the facility. It receives liquids from the closed drain system. Liquids with low specific gravities evaporate off in the separator and are discharged to the Process Flare (SWMU #21). It discharges the remaining liquids by gravity flow to the Oil-Water Separator. No evidence of release was discovered in reviewing the files during the PR.

7.14 SWMU #26 - Cold Drain Vaporizing Tank

<u>Suggested Action</u>: No further action is suggested at this time.

<u>Reasons</u>: This unit is located aboveground in the process area of the facility. The unit receives drain liquids from the turboexpander (cryogenic plant) and heats the liquids, which produce vapors that are discharged to the Process Flare (SWMU #21). It discharges the remaining liquids by gravity flow to the Oil-Water Separator [SWMU #7] and vapors to the Process Flare (SWMU #21). No evidence of release was discovered in reviewing the files during the PR.

- 69 -

- New Mexico Environmental Improvement Division, Public Notice No. 6, Notice of Intent to Terminate Interim Status, March 28, 1986.
- Phillips 66 Natural Gas Company, Facility Discharge Plan, February 20, 1986.
- Energy and Minerals Department, Oil Conservation Division, Letter of approval for Phillips Lee Plant discharge plan (February 20, 1986), May 5, 1986.
- 4. Phillips Petroleum Company, Hazardous Waste Notification, August 15, 1980.
- Phillips Petroleum Company, Part A Hazardous Waste Permit Application, November 19, 1980.
- Phillips Petroleum Company, Part A Hazardous Waste Permit Application, March 25, 1983.
- 7. Visual Site Inspection Logbook, May 4, 1988.
- 8. Phillips Petroleum Company, Letter requesting withdrawal of the Hazardous Waste Notification and Part A for the Lee Plant, June 16, 1982.
- 9. Phillips Petroleum Company, Letter notifying EPA Region VI of closure of Surface Impoundment (SWMU #18) at the Lee Plant, June 17, 1983.

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- EPA Region VI, Compliance Order and Notice of Opportunity for Hearing for Lee Plant, September 29, 1983.
- Phillips Petroleum Company, Letter to EPA Region VI submitting Answer and Request for Hearing, October 27, 1983.
- 12. Phillips Petroleum Company, Letter to EPA Region VI regarding Compliance Order for Lee Plant, December 15, 1983.
- New Mexico Environmental Improvement Division, Notice of Violation for Lee Plant, June 15, 1984.
- 14. EPA Region VI, Letter to New Mexico Environmental Improvement Division regarding May 8, 1984 inspection of Lee Plant, July 16, 1984.
- 15. Phillips Petroleum Company, Letter to New Mexico Environmental Improvement Division regarding violations found during the May 8, 1984 inspection of the Lee Plant, July 18, 1984.
- 16. Phillips Petroleum Company, Closure and Post-Closure Plan for Hazardous Waste Facility at Lee Natural Gasoline Plant, July 27, 1984.
- 17. EPA Region VI, Letter to Phillips Petroleum Company with Consent Agreement and Final Order for the Lee Plant, August 27, 1984.
- Phillips Petroleum Company, Closure and Post-Closure Plan Sampling and Analysis Report for the Lee Plant, October 29, 1984.

- 71 -

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- 20. New Mexico Environmental Improvement Division, Letter to Phillips Petroleum Company with August 27, 1985 inspection report for the Lee Plant, September 26, 1985.
- Phillips Petroleum Company, Post-Closure Plan for Surface Impoundment (SWMU #18) at the Lee Plant, no date.
- 22. Phillips Petroleum Company, Letter to EPA Region VI, November 12, 1985.
- Phillips Petroleum Company, Letter to New Mexico Environmental Improvement Division with attached supplemental sampling results, March 21, 1986.
- 24. New Mexico Environmental Improvement Division, Letter to EPA Region VI with attached sampling results, April 8, 1986.
- 25. Jacobs Engineering Group Inc., Summary Report: Closure and Post-Closure Plan Review, Lee Natural Gas Plant, May 13, 1986.
- 26.. New Mexico Environmental Improvement Division, September 24, 1986 Inspection Report for the Lee Plant, October 2, 1986.
- 27. New Mexico Environmental Improvement Division, Notice of Violation for the Lee Plant, August 4, 1987.

- 28. Phillips Petroleum Company, Letter to New Mexico Health and Environment Department regarding the August 4, 1987 Notice of Violation, August 24, 1987.
- 29. New Mexico Environmental Improvement Division, Inspection Report for the Lee Plant, September 15, 1987.
- New Mexico Environmental Improvement Division, Letter to Phillips Petroleum Company regarding September 23, 1987 meeting, October 13, 1987.
- 31. New Mexico Health and Environment Department, Notice of Violation for the Lee Plant, October 27, 1987.
- 32. New Mexico Health and Environment Department, Letter to Phillips Petroleum Company regarding October 27, 1987 and January 25, 1988 Notices of Violation, February 2, 1988.
- New Mexico Environmental Improvement Division, Letter to Phillips
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 25, 1988 Notice of Violation, February 26, 1988.
- 34. Soil Conservation Service, Soil Survey, Lea County, New Mexico, January 1974.
- 35. Alexander Nicholson, Jr. and Alfred Clebsch, Jr., Geology and Ground-Water Conditions in Southern Lea County, New Mexico, Ground-Water Report 6, New Mexico State Bureau of Mines and Mineral Resources, 1961.

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- 36. Phillips Petroleum Company, Letter to New Mexico Environmental Improvement Division, October 1, 1984.
- 37. Donald L. Hart, Jr. and Douglas P. McAda, Geohydrology of the High Plains Aquifer in Southeastern New Mexico, U. S. Geological Survey Hydrogeologic Investigations Atlas HA-679, 1985.
- 38. EPA Region VI, Letter to Phillips Petroleum Company regarding CERCLA inspection of the Lee Plant, October 31, 1985.
- 39. Phillips Petroleum Company, Letter to EPA Region VI regarding installation of an amine treater and a sulfur recovery plant at the Lee Plant, November 26, 1979.
- 40. Phillips Petroleum Company, Letter to New Mexico Environmental Improvement Division regarding installation of an amine treater and a sulfur recovery plant at the Lee Plant, November 27, 1979.
- 41. Phillips Petroleum Company, Letter to New Mexico Environmental Improvement Division regarding start-up of new equipment at the Lee Plant, March 4, 1981.
- 42. Phillips Petroleum Company, Plot plan and surveyed plat for the Lee Plant, no date.

APPENDIX A

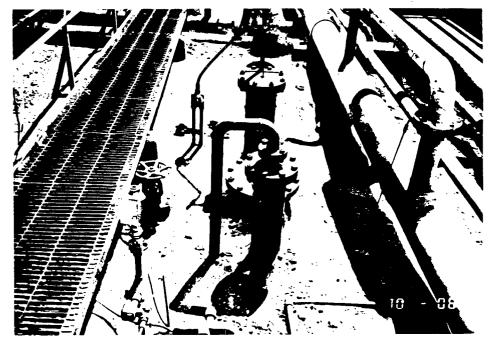
VSI SUMMARY TRIP REPORT AND PHOTOGRAPH LOG

VSI SUMMARY TRIP REPORT Lee Natural Gas Plant, Phillips Petroleum Company May 4, 1988

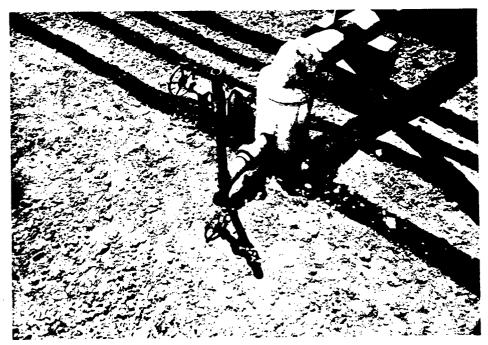
This appendix presents 18 photographs that were taken at the Phillips Petroleum Company Lee Plant near Buckeye, New Mexico. These photographs were taken during a Visual Site Inspection (VSI) conducted by A. T. Kearney on May 4, 1988.

May 4, 1988 was a partly cloudy day. The temperatures were in the lower 70s (°F) and a steady breeze blew from the south throughout the day. After a brief meeting in the office area, a tour of the facility was taken during which photographs were taken. The tour was followed by an indoor question and answer and information review session with Phillips Petroleum representatives.

The team conducting the VSI consisted of Christopher Nelson and Gary Walvatne of A. T. Kearney, Inc. Representing Phillips Petroleum were Michael T. Ford, Environmental Analyst, and Charlie Thompson, Lee Plant Superintendent.



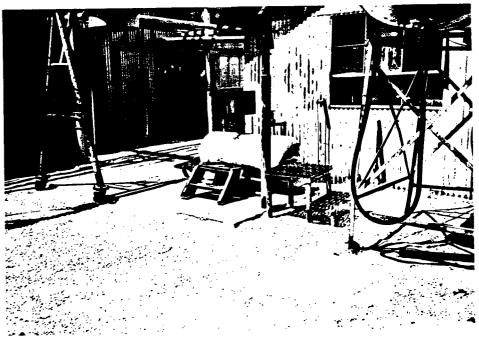
1. View of Engine Drain Tank No. 1 (SWMU #1).



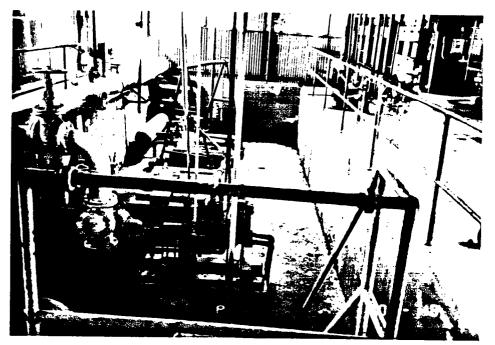
2. View of Engine Drain Tank No. 2 (SWMU #2).



3. View of Engine Drain Tank No. 3 (SWMU #3).



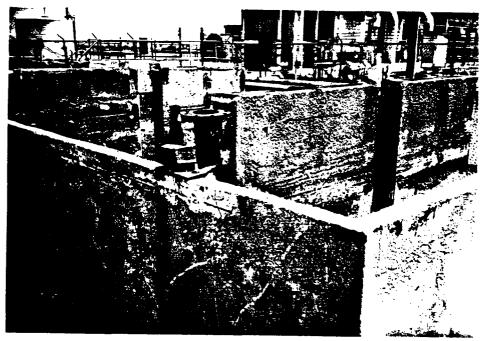
4. View of Steel Collection Tank (SWMU #5).



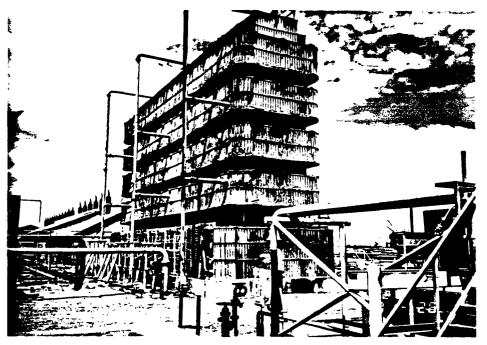
5. View of engine jacket water sump.



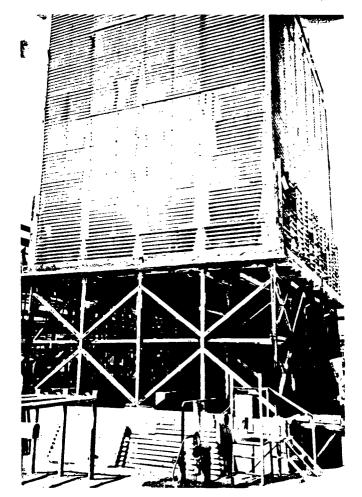
6. View of Engine Drain Tank No. 4 (SWMU #4).



7. View looking northeast of Refrigeration Cooling Tower basin (SWMU #16).



8. View looking northwest of Engine Cooling Tower (SWMU #15).



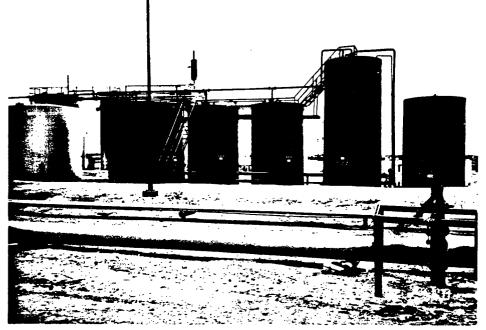
9. View looking south southeast of Plant Cooling Tower (SWMU #17).



10. View looking east of Oil-Water Separator (SWMU #7). Note the associated sumps in the upper right of the photo; the Oil Sump with pump is to the left and in back of the plant superintendent and the Water Sump is to his right.



11. View looking east of the filled Surface Impoundment (SWMU #18). Note the Flares (SWMUs #20-22) in the background.



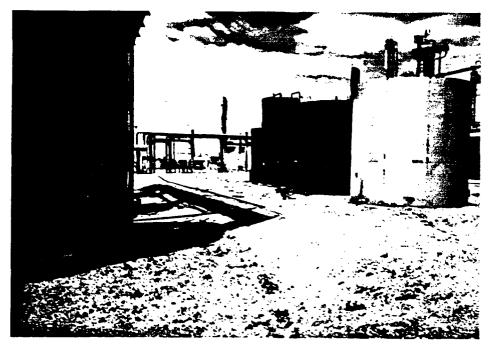
12. View looking south of (from left to right) four Slop Oil Tanks (SWMUs #8-11), the Gunbarrel (SWMU #6), and the Precoat Slop Water Tank (SWMU #19).



13. View looking northeast of the Wastewater Tanks (SWMUs #12-14). Tank No. 1 is on the left, Tank No. 2 is in the center, and Tank No. 3 is on the right.



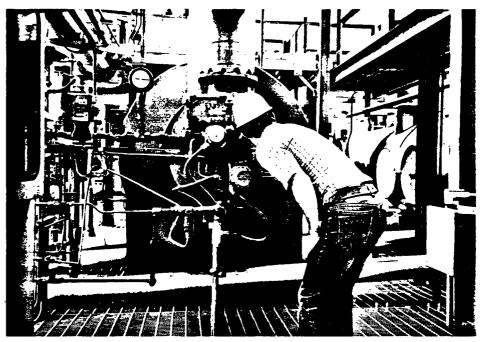
 View looking south in the general direction of the Former Landfill (SWMU #24). Note the empty process tank in the background.



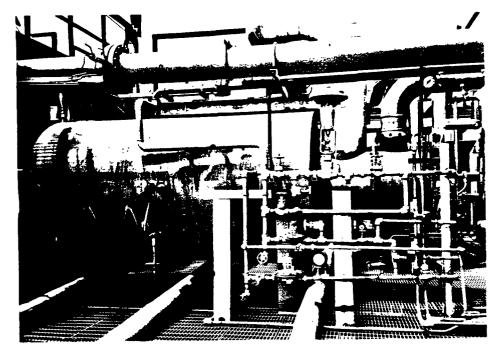
15. View looking west of the Wastewater Tanks (SWMUs 12-14) on the left and the Slop Oil Tanks (SWMUs #8-11) on the right.



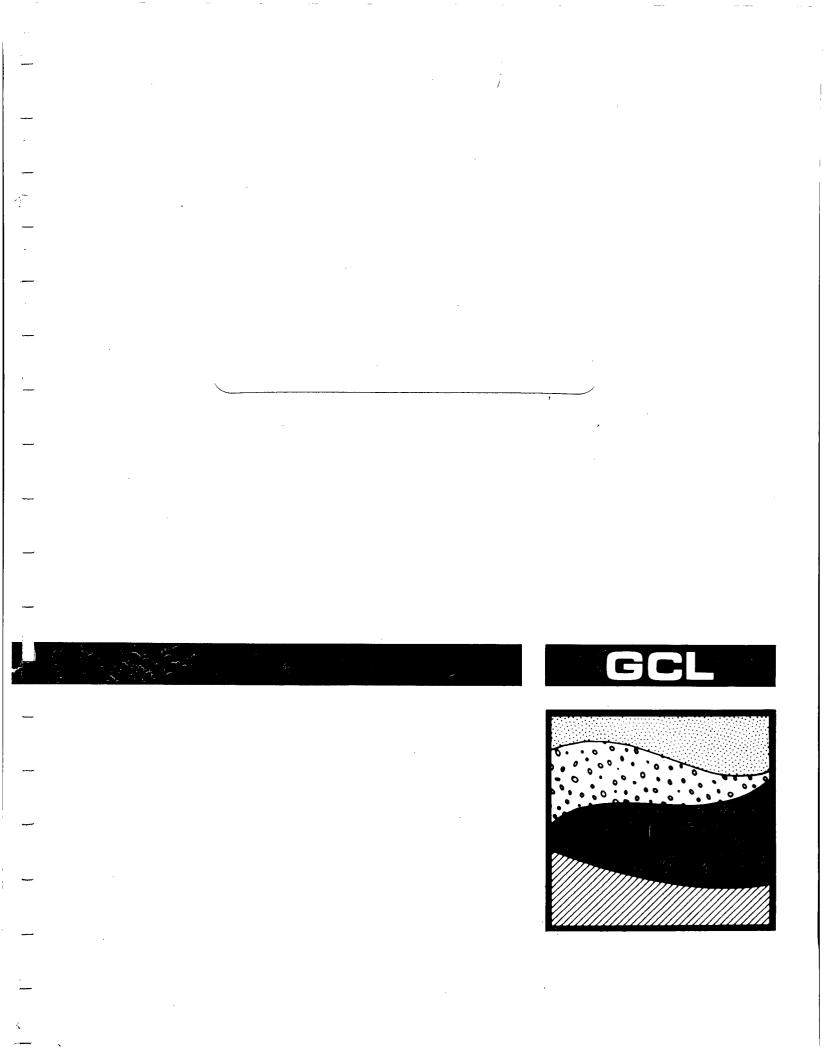
16. View looking east of the sulfur recover plant. Note the Sulfur Incinerator stack (SWMU #23) on the left.



17. View looking south of the end of the Sulfur Incinerator (SWMU #23).



18. View looking east of the side of the Sulfur Incinerator (SWMU #23).



Received June 6, 1988

COUCR letter is located in Artesia, Eurice, Lee & Lusk Enforcement Files, dated June 6, 1988.

SAMPLING AND ANALYSIS PLAN FOR PHILLIPS 66 NATURAL GAS COMPANY ARTESIA, EUNICE, LEE AND LUSK GASOLINE PLANTS

June 3, 1988

Prepared for:

Bruce G. Stearns **PHILLIPS 66 NATURAL GAS COMPANY** 12 C1 Phillips Building Bartlesville, Oklahoma 74004

Prepared by:

GEOSCIENCE CONSULTANTS, LTD.

HEADQUARTERS 500 Copper Avenue, NW Suite 200 Albuquerque, New Mexico 87102 (505) 842-0001 FAX (505) 842-0595

WEST COAST REGIONAL OFFICE 5000 Birch Street West Tower, Suite 3000 Newport Beach, CA 92660 (714) 476-3650 FAX (714) 752-2160 EASTERN REGIONAL OFFICE 1109 Spring Street Suite 706 Silver Spring, Maryland 20910 (301) 587-2088 FAX (301) 588-0605 SAMPLING AND ANALYSIS PLAN FOR PHILLIPS 66 NATURAL GAS COMPANY ARTESIA, EUNICE, LEE AND LUSK GASOLINE PLANTS

HOIL OF PROFESSIONAL SUBMITTED BY: SSIONAL GCL Program Manager le fice M

GCL Project Director

DATE:

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FORM/REPTSIGN.FRM

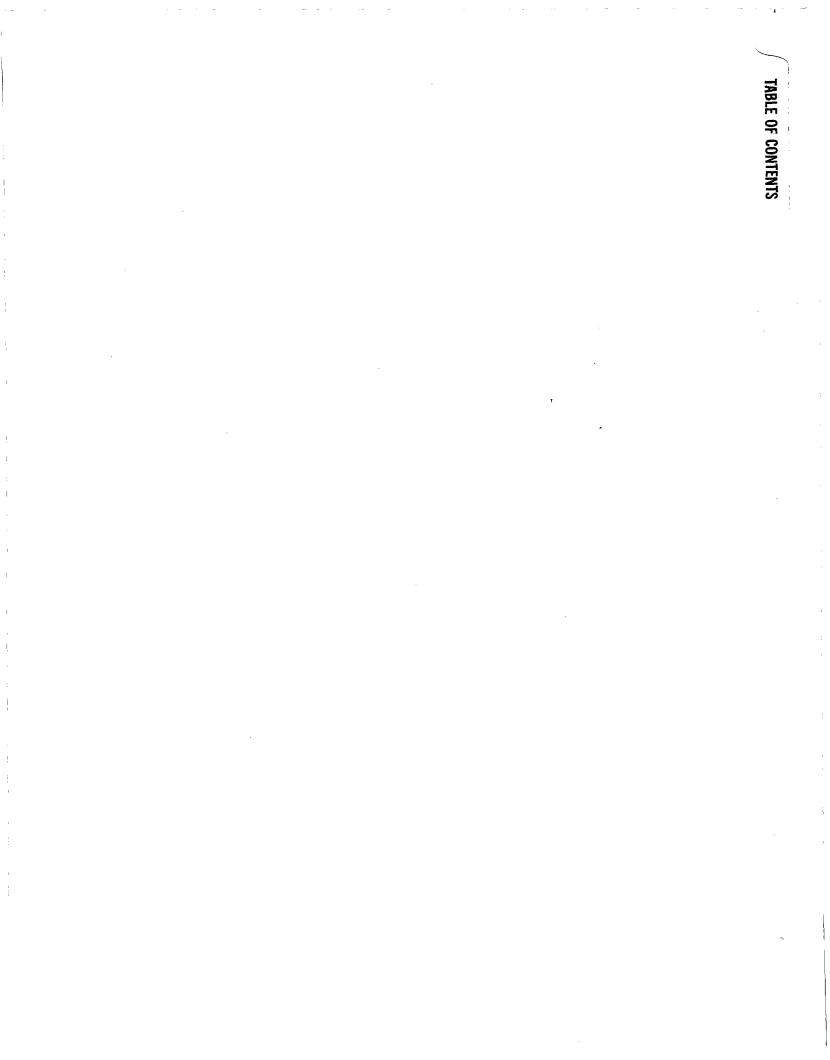


TABLE OF CONTENTS

1.0	EXECUTIVE SUMMARY	1
2.0	PURPOSE, SCOPE AND REGULATORY BACKGROUND	2 2 2
3.0	DESIGN AND MAINTENANCE OF RCRA MONITOR WELLS	4 4 4
4.0	SAMPLING EQUIPMENT AND SUPPLIES4.1BAILER4.2FIELD ANALYTICAL EQUIPMENT4.3FIELD LOGBOOK4.4OTHER EQUIPMENT AND SUPPLIES4.5EQUIPMENT CLEANING AND PREVENTION OF CONTAMINATION	5 5 5 5 6 6
5.0	SAMPLING PROCEDURES5.1SAMPLING SEQUENCE5.2WATER LEVEL MEASUREMENT5.3WELL PURGING5.4SAMPLE COLLECTION5.5FIELD ANALYSES5.6SAMPLE PRESERVATION AND STORAGE5.7QA/QC SPLITS AND BLANKS5.7.1Trip Blanks5.7.2Sample Splits	7 7 8 8 10 10 10 10
6.0	PACKING AND SHIPPING OF SAMPLES	11
7.0	CHAIN-OF-CUSTODY PROCEDURES	12
8.0	ANALYTICAL METHODS AND QA/QC	13 13 13

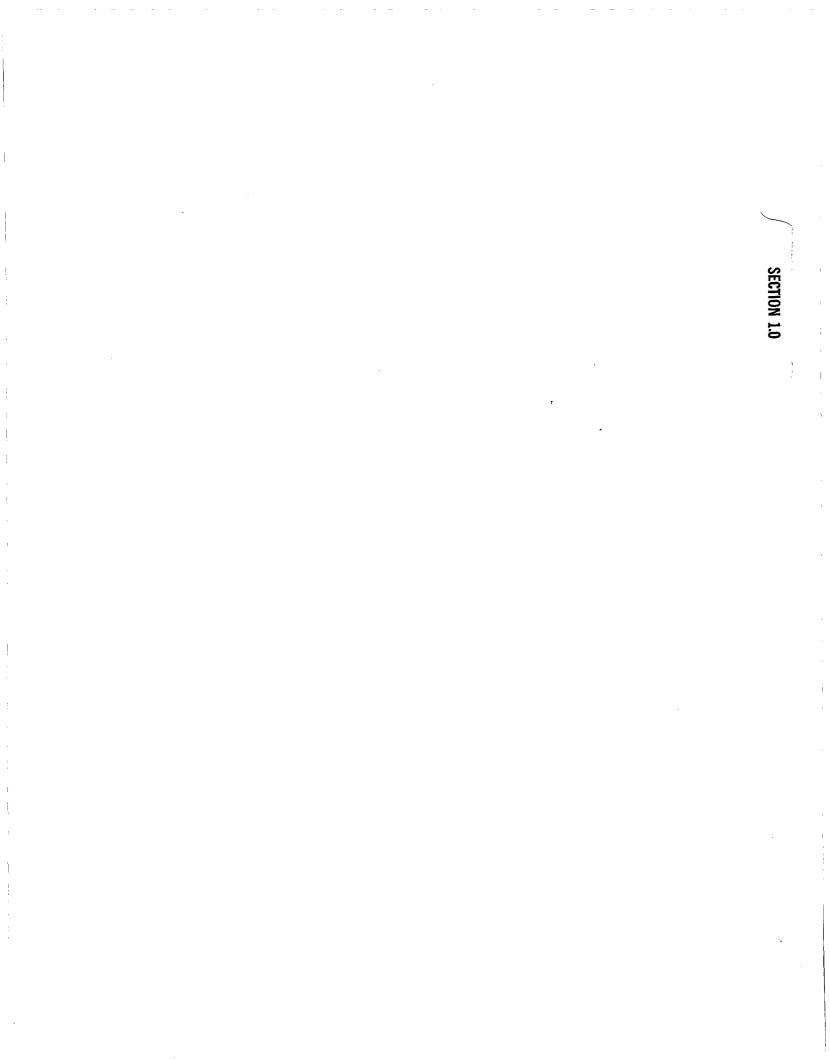
LIST OF TABLES

TABLE 5-1	SAMPLING MATERIALS	•		•		•	•	•	•		•		9
TABLE 8-1	PARAMETERS AND SAMPLING FREQUEN	CY		٠	•	•	•	•		• •		•	14
TABLE 8-2	ANALYTICAL METHODS	•	• •	•	•	•	•	•	•	•		•	15

LIST OF APPENDICES

APPENDIX A	MONITOR WELL LOCATION MAPS AND COMPLETION DIAGRAMS FOR PHILLIPS ARTESIA, EUNICE, LEA AND LUSK GASOLINE PLANTS
APPENDIX B	PROCEDURES FOR PURGING AND SAMPLING WELLS
APPENDIX C	PROCEDURES FOR DECONTAMINATION OF GROUND-WATER SAMPLING EQUIPMENT
APPENDIX D	PROCEDURES FOR STEAM CLEANING OF GROUND-WATER SAMPLING EQUIPMENT
APPENDIX E	PROCEDURES FOR WATER LEVEL MEASUREMENT IN WELLS, USING ELECTRONIC SOUNDER
APPENDIX F	PROCEDURES FOR FIELD MEASUREMENT OF TEMPERATURE, SPECIFIC CONDUCTANCE, AND pH
APPENDIX G	PROCEDURES FOR LABELING, PACKING AND SHIPPING OF WATER SAMPLES
APPENDIX H	CHAIN-OF-CUSTODY PROCEDURES
APPENDIX I	ANALYTICAL QUALITY CONTROL PROCEDURES

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1.0 EXECUTIVE SUMMARY

A program of ground water sampling and analysis, including a written Sampling and Analysis Plan, is often required by State and Federal regulatory agencies. This manual is the Ground Water Sampling and Analysis Plan for the Phillips Natural Gas Company (Phillips) Artesia, Eunice, Lea and Lusk Gasoline Plants. Adherence to the procedures described herein will ensure the collection and analysis of ground-water samples which are:

- Free of contamination from any possible borehole effects;
- Representative of the physical and chemical characteristics of ground water in the uppermost aquifer;
- Consistent with procedures for collection, preservation, handling and analyses outlined in appropriate regulations and accepted published literature; and
- Collected in an efficient and cost-effective fashion.

This manual prescribes specific procedures for use at the Phillips sites, but is flexible enough to allow alternate procedures of equal environmental soundness when required by field conditions. The Sampling and Analysis Plan may be modified if necessary due to future changes in the hydrologic or environmental conditions at the sites.

Copies of this manual will be retained at each of the four sites throughout the period during which ground-water sampling will be required. SECTION 2.0

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2.0 PURPOSE, SCOPE AND REGULATORY BACKGROUND

2.1 PURPOSE

This manual is written as a practical guide for technical personnel engaged in ground-water sampling at the four Phillips sites in southeastern New Mexico. It describes in detail the necessary equipment, operational requirements and handling procedures for collecting groundwater samples. Procedures outlined herein are consistent with those specified for use at sites subject to the requirements of the Resource Conservation and Recovery Act (RCRA), and have been adapted to meet the specific requirements of ground-water monitoring at Phillips sites.

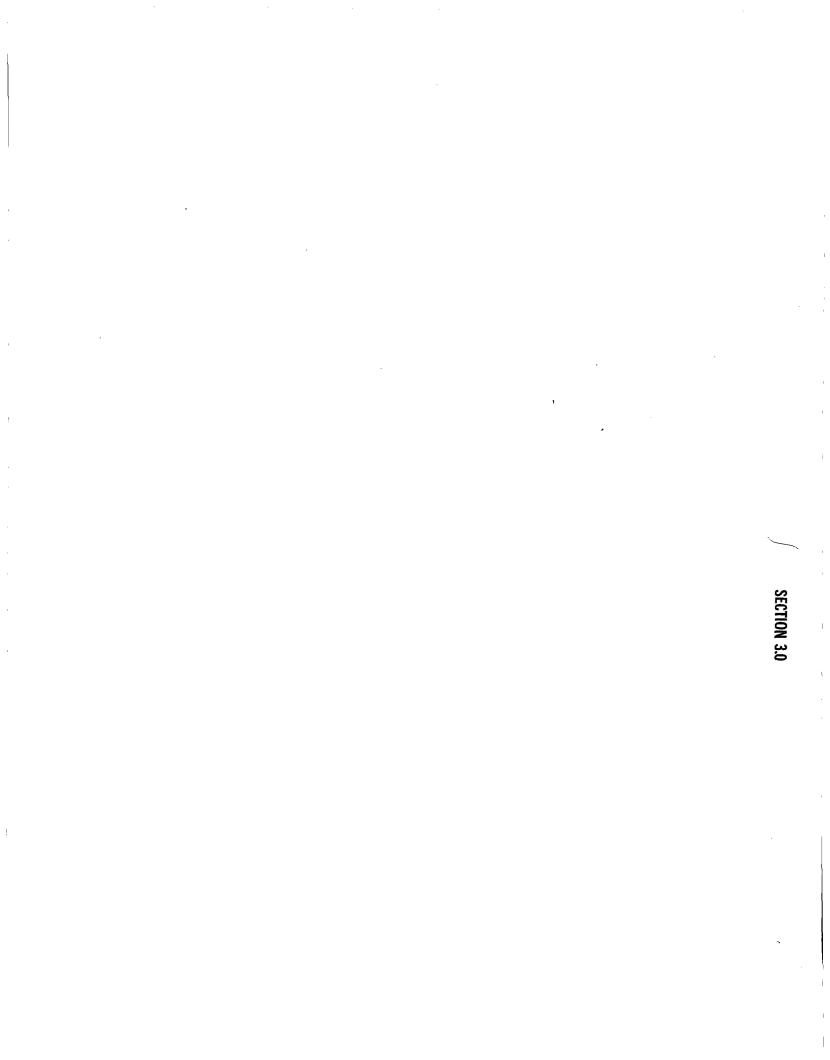
2.2 SCOPE

This manual is intended to be used both as an aid for training technical staff, and as a reference source for trained personnel. By careful adherence to the protocols described in this document, operators of the Phillips ground-water monitoring network can be assured that their water samples are uncontaminated by borehole effects and handling methods, and are representative of the ground-water quality in the uppermost aquifer.

In most circumstances, a program of ground-water monitoring and analysis is required as a condition of permit issuance. To comply with the language and intent of the regulations the ground water samples must:

- be collected according to a consistent sampling plan,
- be collected and transported in a manner which assures that no contaminants can be added to or removed from them,
- be transported to an appropriate laboratory under strict chainof-custody procedures,
- accurately represent the condition and composition of ground water in the "uppermost aquifer",
- be analyzed according to a detailed analytical plan, including quality assurance/quality control steps.

Modern analytical techniques are capable of detecting many contaminants at levels of less than 1.0 part per billion (ppb). Since any statistically significant deviation from "background" may require an extensive assessment program, it is important that samples be collected in a clean, consistent and scientifically valid manner.



3.0 DESIGN AND MAINTENANCE OF RCRA MONITOR WELLS

Geoscience Consultants, Ltd. (GCL) has installed a system of 4 monitor wells at each of the four Phillips sites. The wells are arranged so as to provide one upgradient well and three downgradient wells at each site to immediately detect any potential release of contaminants to ground water beneath the evaporation ponds. Monitor-well location maps are located in Appendix A, along with well completion diagrams for each monitor well.

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3.1 DESIGN OF THE RCRA MONITOR WELLS

The monitor wells are constructed of 2-inch diameter PVC and stainless steel casing, and are screened at and below the water table with 0.020inch slot, stainless steel screen. Construction details of the wells are shown in Appendix A.

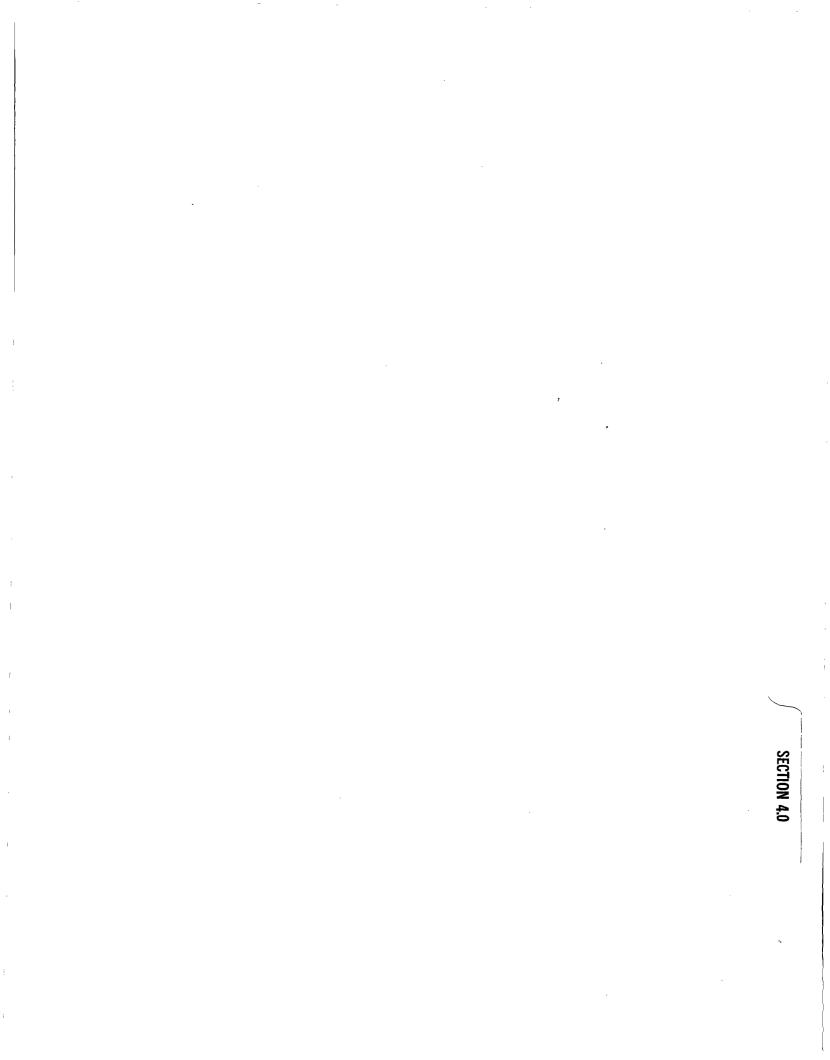
3.2 WELL MAINTENANCE

The monitor wells are designed to require a minimum of maintenance. As with any well completed in fine-grained material, however, occasional redevelopment of the wells may be necessary. Regular monitoring of total depth and recovery time after pumping, performed at the same time as sampling, will determine when or if re-development becomes necessary. Re-development will be considered if a significant portion of the well bore (> about 5 feet) becomes filled by silt, or if recovery time after pumping increases significantly (by a factor of about 2 or more) over recovery times observed during initial well development.

3.3 WELL SECURITY

The monitor wells are provided with locking caps, which must be in place and locked at all times when the well is unattended. Caps should be removed only as necessary for sampling and analysis procedures conducted in accordance with this manual. Keys are issued to sampling technicians or other personnel on an as-needed basis. A log is maintained of all well access, including the persons involved, dates, times and purpose of opening the wells.

4



4.0 SAMPLING EQUIPMENT AND SUPPLIES

Equipment needed for purging and sampling the ground-water monitor wells at the Phillips Artesia, Eunice, Lea and Lusk sites includes a bailer, pH and electrical conductance meters, a field logbook, and other miscellaneous supplies which are detailed below.

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4.1 BAILER

A bailer with removable top and bottom check valves will be used for sampling the wells. The bailer will be constructed entirely of stainless steel and/or Teflon with an outer diameter less than two inches. The bailer will be equipped with a rope or cable with a minimum length capable of reaching the bottom of the deepest well at each site. Any rope that has contacted ground water will be cut off and discarded before use in bailing another well.

An optimal bailer size for sampling 2-inch wells is 5 feet in length with an inner diameter of 1.25 inches. Because several of the 16 wells installed at the four sites are not perfectly aligned, or have constricted zones, a 5-foot long bailer may not pass unrestricted through the entire depth of the well. In wells where this is the case, a 3-foot long bailer or shorter of the same diameter, or a 5-foot long bailer with a smaller diameter may be necessary to permit water sampling.

4.2 FIELD ANALYTICAL EQUIPMENT

Equipment necessary for field analyses includes a thermometer, specific conductance meter, pH meter, and spare batteries for the meters. Standard solutions must be included for field calibration of the pH meter.

4.3 FIELD LOGBOOK

All field activities, observations and measurements will be recorded in a field logbook. Items which should be recorded in the field logbook each time sampling is conducted include:

• Identification of well

- Well depth
- Static water level depth and measurement technique
- Purge volume and pumping rate
- Time required for purging
- Sample withdrawal procedure/equipment
- Date and time of collection and purging
- Well sampling sequence
- Types of sample containers used and sample identification numbers

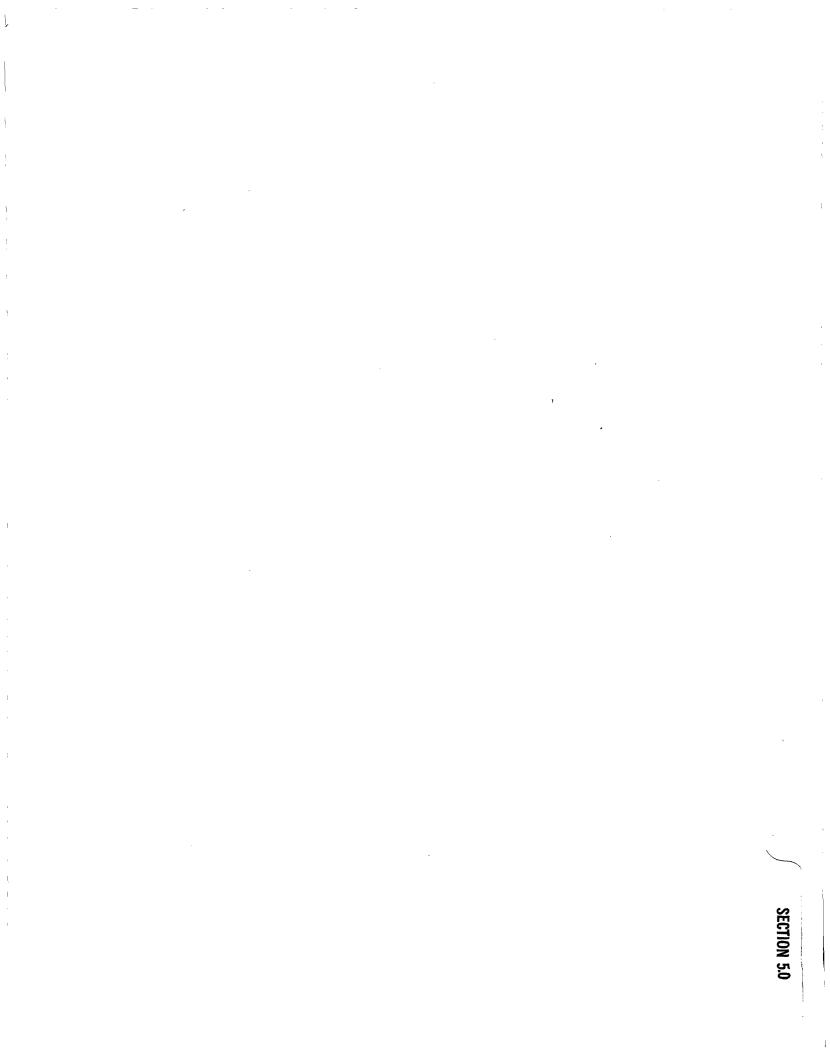
- Preservative(s) used
- Field analysis data and method(s) (i.e., temperature, pH, electrical conductance)
- Sample distribution and transporter
- Field observations on sampling event
- Name of collector
- Climatic conditions

4.4 OTHER EQUIPMENT AND SUPPLIES

A list of other equipment and supplies needed for sampling is included in Section 3.1 of the Procedures for Purging and Sampling Wells, included as Appendix B of this manual.

4.5 EQUIPMENT CLEANING AND PREVENTION OF CONTAMINATION

Equipment used for monitor well sampling shall be decontaminated using Level 2 Decontamination prior to each use (Appendix C). In some cases, it may be impractical for logistical reasons to decontaminate equipment in accordance with Appendix C. In these cases, the equipment shall be steam cleaned and rinsed as described in Appendix D. At least one equipment blank for each site where steam cleaning is the selected method for decontamination shall be taken by running distilled water over or through the steam cleaned equipment after steam cleaning is performed. and collecting the water in 40-ml septum vials, which shall then be carefully capped so that no air bubbles or headspace remain. The equipment blanks shall be labeled, assigned sample numbers, and handled identically with other samples collected during the sampling program and analyzed for BTEX. This will allow identification of any analytical irregularities that might occur due to incomplete decontamination of the equipment.



5.0 SAMPLING PROCEDURES

The complete sampling procedure includes measurement of water level and total well depth, purging and sample withdrawal from the well, field analyses for temperature, specific conductance, pH, and sample preservation and storage. These procedures are described in detail in the accompanying texts of standard operating procedures (Appendix B through H). Their specific applications at the Phillips sites are discussed in this section.

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5.1 SAMPLING SEQUENCE

The sequence in which the 4 wells at each site are sampled is not critical. However, to minimize the possibility of cross-contamination in the event of equipment failure or other contingency leading to use of some equipment at more than one well, the wells should preferably be sampled in sequence from the least to the most contaminated. If no contamination is known to exist at the site, the upgradient well should be sampled before the downgradient wells. This sequence places the wells that are most likely to show contamination last in the sampling sequence. Thus, the likelihood of inadvertently introducing significant contaminants to the ground water or to any of the samples will be minimized.

5.2 WATER LEVEL MEASUREMENT

Before purging and sampling, measure the depth to water, to the nearest 0.01 foot, using a clean electronic water-level indicator. Record this measurement in the field logbook. Depth measurements are made from the measuring point at the top, and on the north side, of each two-inch well casing. Detailed procedures for the measurements are described in Appendix E.

Since the elevations of the measuring points have been surveyed into a known datum, the elevation of the water table can be determined by subtracting the depth to water from the known elevation at the measuring point.

7

5.3 WELL PURGING

Purge the well using a stainless steel bailer or a stainless steel airejector pump operated at a speed slow enough to prevent cascading of water down the sides of the well. Bail or pump until 3 casing volumes have been purged from the well, or, if recovery is too slow to allow this, purge the well to dryness once and allow it to recover before sampling. Record the volume of water purged, rate of pumping, and any other pertinent data in the field logbook.

Detailed procedures for determining the volume to be purged and for the purging process are included in Appendix B.

5.4 SAMPLE COLLECTION

Collect the sample using the bailer described in Section 4.1 and decontamination procedures outlined in Appendices C and D. Table 5-1 lists the sample volumes, types of containers, and preservatives to be used. Sample containers and preservatives will be supplied by the independent analytical laboratory conducting the analyses.

At all times during sampling, take care to minimize agitation of the samples and limit sample contact with the atmosphere as much as possible, particularly while collecting samples for analysis of volatiles.

Record the well number, date and time of sampling, and sample number(s) in the field logbook. Measure the total depth of the well at this time. Further discussion of standard sampling procedures will be found in Appendix B.

5.5 FIELD ANALYSES

Both the first and last samples collected at each well will be reserved for field determination of temperature, specific conductance, and pH. Detailed procedures for making these field analyses are described in Appendix F.

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TABLE 5-1SAMPLING MATERIALS

Parameters	<u>Container</u>	<u>Preservative</u>						
Trace Metals, Cations	1-500 mL Plastic*	HNO3, pH<2						
Fluoride, Chloride, Sulfate,Turbidity, pH, Conductivity	1-500 mL Plastic	None						
pH, Conductivity (3 remaining of quad)	3-250 mL Plastic	None						
Nitrate, Phenols, TOC, TOX	1-500 mL Amber Glass	H ₂ SO ₄ , pH<2; no headspace or bubbles						
TOC & TOX (3 remaining of quad)	3-500 mL Amber Glass	H ₂ SO ₄ , pH<2, no headspace or bubbles						
Radiochemistry	2-1 Liter Plastic	HNO3, pH<2						
Total Coliform	1 – specimen cup	None						
BTEX	2-40 mL vials*	HC1, pH<2; no headspace or bubbles						
Pesticides & Herbicides	2-1 Liter Amber Glass	None						

* For those sets requiring an extra sample for BTEX and RCRA metals, fill an extra 500 mL plastic and 2 extra 40 mL vials. Record the results of the field analyses (2 replicates for each well) in the field logbook.

5.6 SAMPLE PRESERVATION AND STORAGE

Samples will be preserved in accordance with the methods shown in Table 5-1.

Promptly after labeling and sealing each sample container, place it on ice in a suitable closed container (ice chest) for transportation to the laboratory at the end of each day of sampling.

5.7 QA/QC SPLITS AND BLANKS

Quality Analysis/Quality Control (QA/QC) is a critical part of any ground water sampling program. The QA/QC program for each of the four sites will include trip blanks, equipment blanks as needed, and sample splits for duplicate analyses. Equipment blanks are discussed in Section 4.5. Other field QA/QC procedures are described in the following sections.

5.7.1 Trip Blanks

Before conducting each sampling event, fill four 40-ml septum vials with deionized water, or have them provided by the chemical laboratory which will be analyzing the samples. Carry these blanks to the site, assign a sample number to each in the same manner as the ground water samples, and submit them to the analytical laboratory with labels and chain-ofcustody seals identical to those used for the ground water samples. Record the sample number as "trip blank" in the field logbook, but <u>do not</u> indicate to the laboratories which samples are blanks. Request analyses for benzene, toluene, ethyl benzene and xylenes (BTEX).

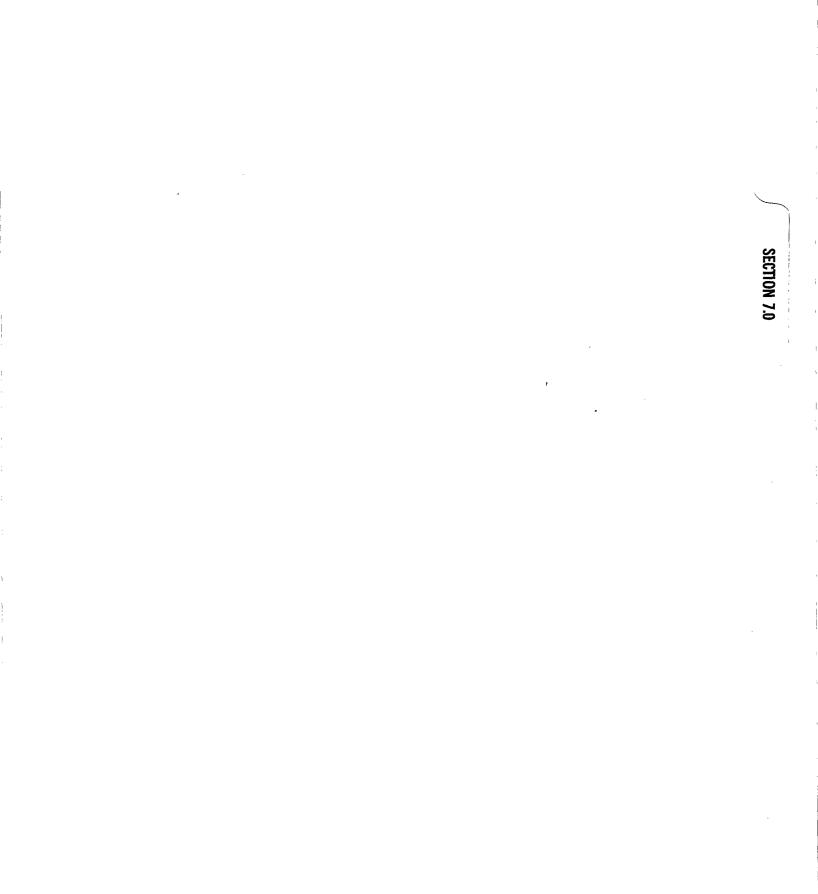
5.7.2 Sample Splits

Duplicate samples will be taken for BTEX and chromium from one monitor well at each of the four sites. The samples will be given (individual) sample numbers and be submitted with full chain-of-custody documentation to the lab for analysis. Comparison of the results of the duplicates will permit evaluation of the quality of laboratory analytical data. **SECTION 6.0**

6.0 PACKING AND SHIPPING OF SAMPLES

Store all samples on ice in appropriate containers until delivery to the analytical laboratory. Samples sent to the independent laboratory will be shipped promptly by a rapid (next-day) delivery service, or will be delivered directly to the laboratory by the sampling personnel, if feasible.

Complete procedures for labeling, packing and shipping of water samples are included in Appendix G.



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7.0 CHAIN-OF-CUSTODY PROCEDURES

1

Follow chain-of-custody procedures at all times during sample collection, transportation, and delivery to the analytical laboratory. Chain-ofcustody procedures are described in detail in Appendix H. **SECTION 8.0**

8.0 ANALYTICAL METHODS AND QA/QC

All ground-water samples will be analyzed by a qualified independent analytical laboratory. The samples will be analyzed in accordance with Section 206.C.1 of the New Mexico Hazardous Waste Management Regulations Fourth Edition (HWMR-4). Additional samples will be analyzed for BTEX.

8.1 ANALYTICAL PARAMETERS AND METHODS

Ground water samples will be analyzed for the contaminants cited above. All parameters will be determined in accordance with standard methods approved by the EPA. Sample parameters and sampling frequency are listed in Table 8-1. Analytical methods are listed in Table 8-2.

8.2 LABORATORY QA/QC PROCEDURES

Laboratory QA/QC procedures will include the use of:

- Standard samples
- Laboratory blanks
- Spiked samples
- Field blanks (as described in Sections 4.5 and 5.7.1)
- Sample splits (as described in Section 5.7.2)

The analytical laboratories will be required to maintain logbooks or similar records listing the sample preparation techniques, analytical methods, and experimental conditions applied to each sample, and the date, time, and person performing each processing step. The laboratories shall adhere to the standards and procedures set forth in Sections 1.2 through 1.5 of EPA Manual SW-846, Test Methods for Evaluating Solid Waste, which are included in this manual as Appendix I.

Units of measure shall be reported with all analytical results. Units of concentration normally will be milligrams per liter (mg/l) or micrograms per liter (ug/l). Gross alpha and beta will normally be reported in picocuries per liter (pCi/l), coliform bacteria in most probable number per 100 milliliters of sample (MPN), and turbidity in standard nephelometric units (turbidity units). Other units of measure must be justified and approved in advance by the person requesting the analyses.

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TABLE 8-1

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PARAMETERS AND SAMPLING FREQUENCY

TANANLILING AND	SAMPLING I REQUENCE		
PARAMETERS	FIRST YEAR	SUBSEQUENT YEARS	
Drinking Water Parameters			
Arsenic Barium Cadmium Chromium Fluoride Lead Mercury Nitrate (as N) Selenium Silver Endrin Lindane Methoxychlor Toxaphene 2, 4-D 2,4,5-IP Silvax Radium Gross Alpha Gross Beta Coliform Bacteria Turbidity <u>Ground-Water Quality Parameters</u>	Quarterly	Semi-annually	
Chloride	Quant and u	A.,	
Iron Manganese Phenols Sodium Sulfate	Quarterly	Annually	
Indicators of Ground-Water Contamination			
pH Specific conductance Total organic carbon Total organic halogen	*Quarterly	**Semi-annually	
Detection Parameters			
BTEX	As required	As required	
<u>Ground-Water Elevation</u>	Quarterly	Semi-annually	
* During the first year, four replicate measurements will be made on			

During the first year, four replicate measurements will be made on the samples from the upgradient wells. During subsequent years, four replicate measurements will be made on samples from all wells.

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TABLE 8-2ANALYTICAL METHODS

PARAMETER	EPA METHOD NO.
Trace Metals Cations	E200.7/E200AAS E200.7
Fluoride Chloride Sulfate Turbidity pH Conductivity	E340.2 E325.3 E375.4 E180.1 E150.1 E120.1
Nitrate Phenols TOC TOX	E353.1 E420.2 E415.1 E450.1
Radiochemistry	E900.0
Total Coliform	SM908C
BTEX	E602
Pesticides Herbicides	E608 SW 8150

APPENDIX A

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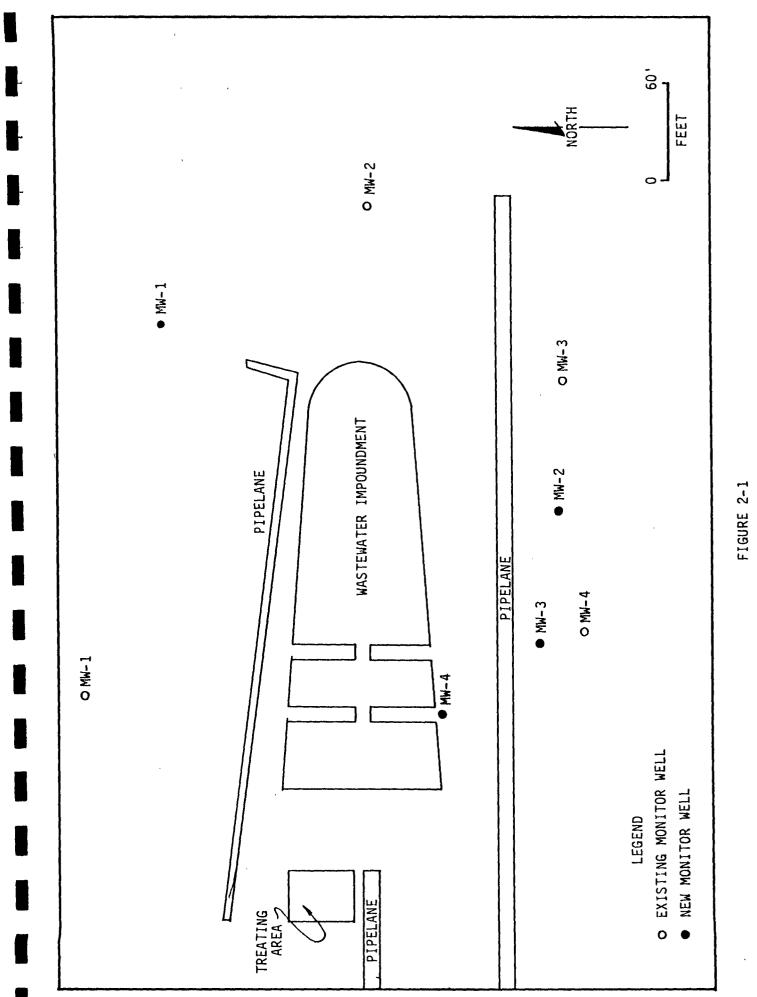
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APPENDIX A

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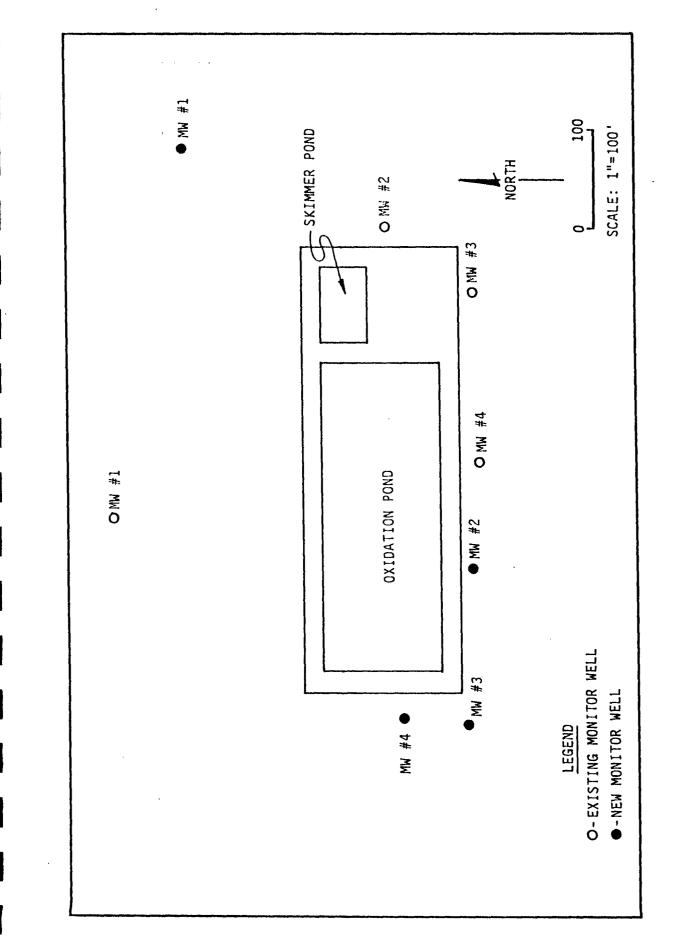
MONITOR WELL LOCATION MAPS AND COMPLETION DIAGRAMS FOR PHILLIPS ARTESIA, EUNICE, LEA AND LUSK GASOLINE PLANTS



SITE MAP SHOWING EXISTING AND NEW GROUND WATER MONITORING SYSTEMS

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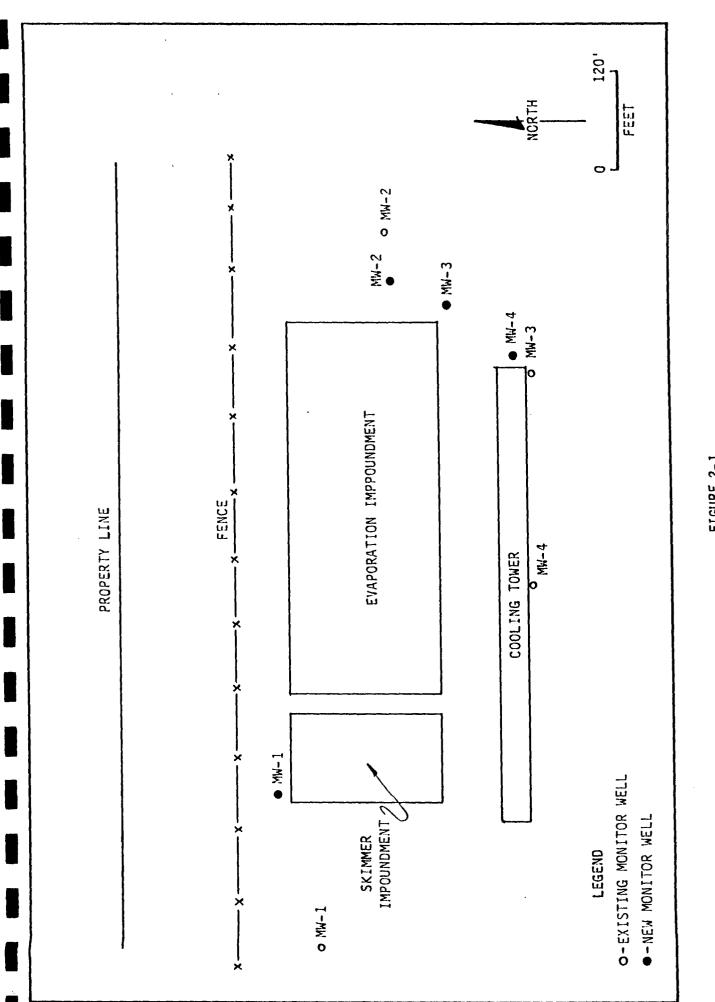
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SITE MAP SHOWING EXISTING AND NEW GROUND-WATER MONITORING SYSTEMS

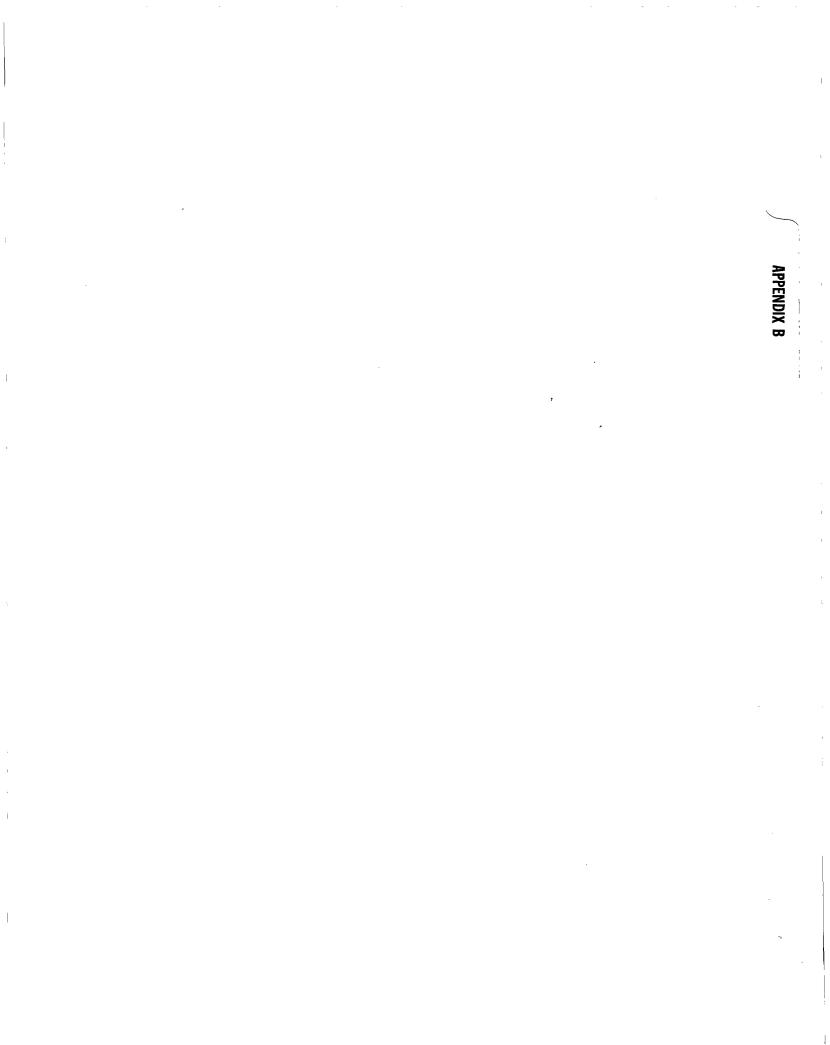
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FIGURE 2-1



SITE MAP SHOWING EXISTING AND NEW GROUND WATER MONITORING SYSTEMS

FIGURE 2-1



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APPENDIX B

PROCEDURES FOR PURGING AND SAMPLING WELLS

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MANUAL OF STANDARD OPERATING PROCEDURES

DATE: May 11, 1988

Procedures for Purging and Sampling Wells

1.0 PURPOSE To describe the Standard Operating Procedures (SOP) for purging and sampling wells.

2.0 SCOPE

This document describes procedures to be used in purging and sampling wells for determination of water quality and potential contamination. The procedures described in this document are consistent with the requirements of all Federal regulations, and are specifically designed to comply with ground-water monitoring requirements under RCRA.

3.0 PROCEDURES

3.1 PREPARATIONS FOR SAMPLING

Before proceeding to the field area, be sure that all necessary equipment and supplies are on hand. To the extent possible, all equipment and supplies should be decontaminated in the laboratory before proceeding to the field area. Equipment decontamination procedures are described in a separate SOP.

Equipment and supplies needed for collecting representative ground-water samples include:

- An electronic water-level indicator or steel tape and chalk,
- Distilled water and wash bottles,
- Brushes and laboratory soap,
- Heavy plastic bags,
- Paper towels or clean rags,
- Zip-lock plastic bags,
- Rubber gloves,
- Several 500 ml beakers,
- A submersible pump (at some sites there is a dedicated pump or bailer for each well) with appropriate attachments to enable purging and sampling the well,

- A hose to direct any pump discharge several feet away from the well, and containers to receive the discharge if it is contaminated,
- Plastic sheet film,
- A graduated bucket,
- A bottom-filling teflon or stainless steel bailer with sufficient cord and/or cable,
- All necessary sample containers with the appropriate volume of preservatives added to the containers by the laboratory,
- pH meter,
- Thermometers,
- Specific conductance meter,
- Field log book and sample forms,
- Ice and ice chest for samples,
- Strapping tape and shipping labels,
- Waterproof marking pen,
- Chain-of-Custody labels,
- Watch or stopwatch for use in determining pumping rates.

A nearby location of a steam cleaner is desirable in order to avoid long delays for cleaning of equipment, if necessary, between sampling of individual wells.

3.2 DETERMINE WATER LEVEL

Using an electronic sounder ("water level probe") or other suitable device, measure the depth to water (DTW) in the well. If approximate total depth (TD) of the well is not known, it will also be necessary to measure total depth with the sounder. If approximate total depth is known, defer the measurement until after sampling has been completed. Use of the electronic sounder is described in a separate SOP.

3.3 DETERMINE THE VOLUME OF WATER TO BE PURGED FROM THE WELL This normally is at least 3 casing volumes, determined as follows:

- Measure the true inside diameter of the casing, using a steel tape or ruler; convert to feet.
- Find the true inside radius (r) of the casing by dividing the diameter by 2.

• Determine 1 casing volume in cubic feet (V_{cf}) by calculating:

 $V_{cf} = 3.14 \times (r)^2 \times (TD - DTW).$

- Determine 1 casing volume in gallons by multiplying $V_{cf} \ge 7.48$ gals/ft³.
- Multiply by 3 to determine total volume of water to be pumped from the well.

The exception to this standard (other than program requirements) is in the case of low yield wells. When purging low yield wells, pump the well once to dryness. Samples should be collected as soon as the well recovers. When full recovery exceeds three hours, samples should be collected as soon as sufficient water volume is available.

3.4 PURGE THE WELL Currently, standards allow for several options for purging wells. They are:

- Teflon or stainless steel bailers
- Existing dedicated equipment Use of these devices must be approved by On-Site Representatives.
- Peristaltic pumps Use of these devices, suitable for shallow wells only, must be approved by the On-Site Representative.
- Positive displacement bladder pump or air lift pump, capable of being completely disassembled and cleaned before use in each well. Air must not contact ground water.

At no time during purging should the evacuation rate be high enough to cause the ground water to cascade back into the well thus causing excessive aeration and potential stripping of volatile constituents.

The actual volume of purged water can be measured by several acceptable methods.

- When bailers are used to purge, the actual volume of each bailer's contents can be measured using a calibrated bucket.
- If a pump is used for purging, the pump rate can be determined by using a bucket and stopwatch, and the duration of pumping timed until the necessary volume is purged. A totalizing flow meter may be used, if available.

Monitor the pH, temperature, and specific conductance of the water purged to ensure that these parameters have stabilized by the time three casing volumes have been withdrawn. If stabilization has not been achieved at that time, continue purging until it is achieved. Dispose of pumped water in a manner which poses no threat of contamination to any surface or ground water in the vicinity. If the water is determined to be hazardous, it must be contained and disposed of according to appropriate regulations.

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3.6 INITIAL SAMPLING FOR FIELD PARAMETERS

Begin sampling by withdrawing water from the well in accordance with the procedures of Section 3.8. Place the first water withdrawn in a 500 ml or larger flask or beaker which has been properly cleaned, then rinsed three times with the well water being recovered. Use this sample for field measurement of temperature, specific conductance, and pH. Procedures for these field measurements are described in a separate SOP document.

3.7 SAMPLE COLLECTION

3.7.1 General Considerations

The technique used to withdraw a ground-water sample from a well should be selected based on a consideration of the parameters which will be analyzed. To ensure the ground-water samples' representativeness, it is important to avoid physically altering or chemically contaminating the samples during collection, withdrawal, and containerization.

The preferred sampling device for all parameters is a double check valve stainless steel or Teflon bailer.

To the extent possible, no sampling device constructed of or containing neoprene, PVC, Tygon, silicone, polyethylene, or Viton will be used to collect ground-water samples.

In some cases, it may be necessary to use equipment already in the well to collect samples. This is particularly true of high volume, deep wells (>150 feet) where purging pumps are ineffective, and bailing is impractical. If existing equipment must be used, determine the make and model of the pump and check with the manufacturer concerning component construction materials.

General sampling procedures include the following:

- Clean sampling equipment should not be placed directly on the ground. Use a drop cloth or feed line from clean reels. If reels are used, avoid placing contaminated lines back on reels.
- Lower sampling equipment slowly into the well to avoid degassing of the water and damage to the equipment.
- If bailer cable is to be decontaminated and reused, it must be Teflon-coated or made of stainless steel. Braided polypropylene is also acceptable.
- Check the operation of bailer check valve assemblies to confirm free operation.

Bladder Pump flow rates should be adjusted to eliminate intermittent or pulsed flow. The settings should be determined during the purging operations. Flow rate should be less than 100 ml/minute when sampling for volatile organic compounds Air-lift pumps should not be used for sample (VOC's). collection.

• Samples should be collected and containerized in the order of the parameters volatilization sensitivity. Table 3-1 lists the preferred collection order for some common ground-water parameters.

3.7.2 Collection of Volatile Organics Samples (VOAs)

VOAs should be collected from the first bailer removed from the well after purging, immediately following collection of the sample for field analyses. The most effective means of controlled collection of the sample is by employing two people. One person should retrieve the bailer from the well and place the bottom over a VOA container (40-ml septum vial) held by the second person. The second person should insert the Teflon bottom-emptying device into the bailer, bring the vial to the tip of the bottom-emptying device, and tilt the vial to approximately 60 from the vertical.

Delivery of the sample from the bailer down the edge of the vial is accomplished when the person holding the bailer slowly opens the top check valve with a Teflon, glass, or stainless steel insert. As the vial is filled, the second person should return the sample vial to the vertical position.

Fill the septum vial until it is just overflowing. Cap the vial and invert. If a bubble exists, discard and repeat. Do not reopen the vial and add additional sample.

If an approved pump is used, reduce the flow to less than 100 ml per minute prior to sample collection.

3.8 CONTAINERS

Collect all samples using the standard methods described in the Sampling and Analysis Plan for the project, and preserve all samples in approved containers. The specific containers and preservatives used for each analyte may vary among laboratories. The standard methods of the laboratory selected for analysis will be followed in each project Sampling and Analysis Plan. Handle all samples in accordance with the procedures described in the SOP documents "Procedures for Packing and Shipping of Samples" and "Chain-of-Custody Procedures."

3.9 FINAL FIELD ANALYSES

Immediately after collection of all samples required in the Sampling and Analysis Plan, collect a final sample for field analyses, as described in Section 3.7 above. The purpose of these repeat analyses is to check for possible changes in water quality during the time of sampling. Samples



TABLE 3-1

PREFERRED ORDER OF SAMPLE COLLECTION

- 1. Volatile organics (VOA)
- 2. Total metals
- 3. Purgeable organic carbon (POC)
- 4. Purgeable organic halogens (POX)
- 5. Extractable organics
- 6. Dissolved metals
- 7. Total organic carbon (TOC)
- 8. Total organic halogens (TOX)
- 9. Phenols
- 10. Cyanide
- 11. Sulfate and chloride
- 12. Nitrate and ammonia
- 13. Radionuclides

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used for field analyses should be discarded in an approved and safe manner when the analyses are complete.

3.10 MEASURE TOTAL DEPTH OF WELL

After collection and preservation of all samples and completion of final field analyses, measure the depth to bottom of the well, using the electronic sounder. Use of the sounder is described in a separate SOP.

4.0 REFERENCES U.S. Code of Federal Regulations, 1983, 40 CFR 264.97.

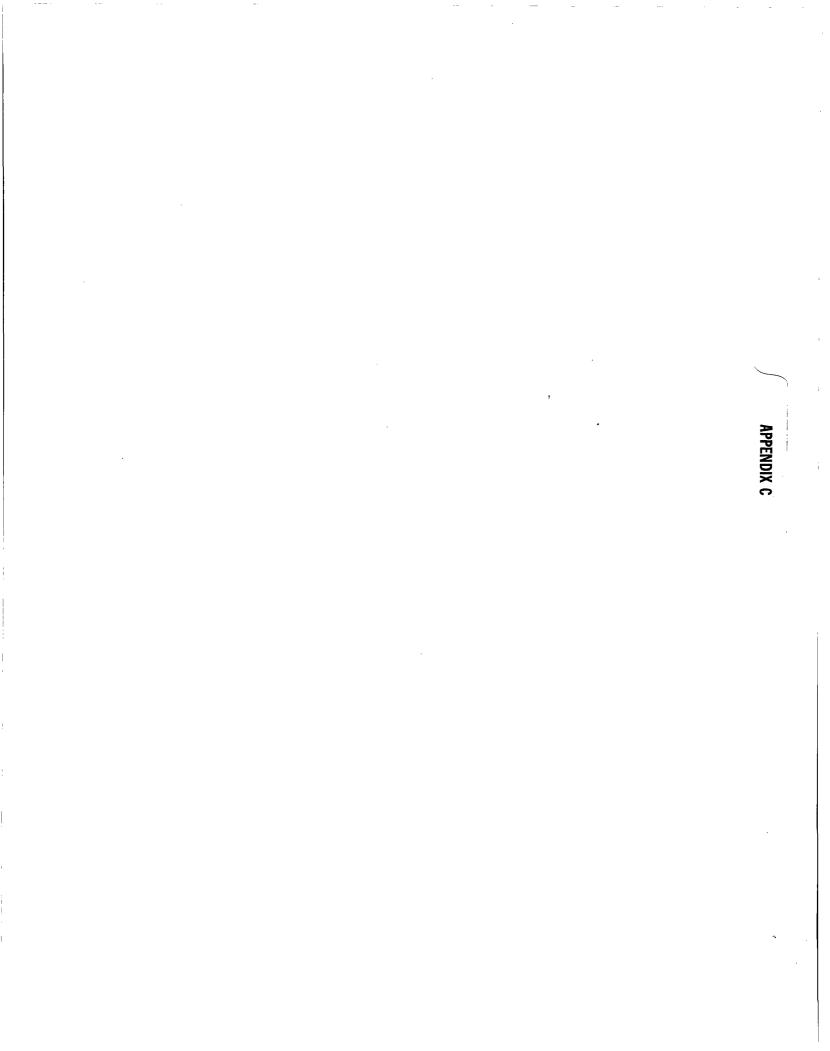
U.S. Environmental Protection Agency, 1986a, RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, p. 97-114.

U.S. Environmental Protection Agency, 1986b, Test Methods for Evaluating Solid Waste: EPA Report SW-846; Volume I: Physical/Chemical Methods.

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APPENDIX C

PROCEDURES FOR DECONTAMINATION OF GROUND-WATER SAMPLING EQUIPMENT

MANUAL OF STANDARD OPERATING PROCEDURES

DATE: May 11, 1988

Procedures for Decontamination of Sampling Equipment

1.0 PURPOSE

To describe the Standard Operating Procedures used for decontamination of ground-water sampling equipment prior to field use.

2.0 SCOPE

To prevent contamination of samples or monitor wells, all sampling equipment must be thoroughly cleaned prior to each use. This document describes the recommended procedures for cleaning of equipment and tools before a sampling program.

Sampling equipment dedicated to a particular well will be cleaned prior to installation and after any maintenance requiring its removal from the well. Other equipment will be cleaned prior to each use.

Equipment used in each of several wells or sites will be cleaned prior to use at each individual site.

These procedures are designed to comply fully with the requirements of RCRA ground-water monitoring.

3.0 PROCEDURES

3.1 EQUIPMENT PREPARATION

Any equipment, either new or previously used, should be assumed to be contaminated and should undergo the level of decontamination appropriate to its intended use and construction. The following sections detail the various decontamination procedures to be used.

3.2 GENERAL LEVELS OF DECONTAMINATION

Level 1 Laboratory Decontamination

Applicability - (1) All glassware and (2) stainless steel equipment whose construction will tolerate high temperatures of the muffle furnace and that will be used in collection and containerization of organic samples.

- 1. Thoroughly wash with nonphosphate detergent in hot water.
- 2. Rinse several times with tap water.
- 3. Rinse several times with deionized water.
- 4. Rinse once with acetone or methanol.
- 5. Rinse once with pesticide grade hexane.

- 6. Place in muffle furnace, or other equivalent furnace, at 450°C for 15 to 30 minutes.
- 7. Allow to cool, protect from dust and other contaminants by sealing or covering with aluminum foil.

Level 2 Laboratory Decontamination

Applicability (for organic samples) - All Teflon equipment and stainless equipment with components which would be damaged by high temperatures of the muffle furnace should be treated as follows. This procedure is also applicable where a muffle furnace is not available.

- 1. Thoroughly wash with nonphosphate detergent in hot water.
- 2. Rinse several times with tap water.
- 3. Rinse once with acetone or methanol.
- 4. Rinse several times with deionized water.
- 5. Air dry in a dust free environment.
- 7. Cap or cover after drying; Teflon bailers and other applicable equipment should be sealed in plastic bags.
- NOTE: Chromic acid can be used to remove persistent organic deposits.

Level 3 Laboratory or Field Decontamination

Applicability - Safety equipment such as respirators, boots, gloves, equipment susceptible to degradation by solvent rinsing.

- 1. Brush off loose dirt with soft bristle brush or cloth.
- 2. Rinse thoroughly with tap water.
- 3. Wash in nonphosphate detergent in warm water.
- 4. Rinse thoroughly with tap water.
- 5. Rinse thoroughly with deionized water.
- 6. Air dry in dust free environment; keep articles out of the sun.
- 7. Store in plastic bags.

Level 4 Laboratory or Field Decontamination

Applicability - Ancillary equipment such as ropes, extension cords, generators, hand carts.

1. Brush off loose dirt with stiff bristle brush.

2. Rinse off with high pressure water.

3. Air dry.

Once equipment has been allowed to dry, package the equipment to protect it from dust. Plastic bags are appropriate for larger items such as bailers and purging pumps; aluminum foil is preferred for glassware openings.

3.3 PROCEDURES FOR FIELD DECONTAMINATION OF SAMPLING EQUIPMENT 3.3.1 General Considerations

Field decontamination of equipment used for well purging, sample collection, and sample compositing is not to be considered a procedure of preference; rather it should be viewed as a last resort where logistical considerations and practical concerns outweigh the preferred use of dedicated equipment.

When field decontamination cannot be avoided, the following general rules should be adhered to:

- 1. Unless it is absolutely necessary, no equipment should be field decontaminated more than once between laboratory decontaminations.
- 2. Equipment used to collect hazardous waste samples prior to decontamination should not subsequently be used for collection of environmental samples. In general, any equipment to be decontaminated should then be reused to collect samples of "lower quality" than the first sample collected.
- 3. All decontamination and subsequent use of decontaminated equipment should be documented in a field logbook.
- 4. Never reuse equipment if visual signs, such as discoloration, indicate that decontamination was insufficient.

3.3.2 Decontamination of Bailers

- 1. Disassemble both top and bottom check valve assemblies.
- 2. Clean all component parts with hot, high pressure tap water.
- 3. Rinse all surfaces twice with methanol.
- 4. Rinse all surfaces three times with deionized water.
- 5. Place all components on rack or clean surface and allow to air dry.
- 6. Wearing clean cotton gloves (powderless), reassemble bailer.

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7. Use immediately or place bailer in plastic bag, seal the bag, and label the bag indicating date of decontamination.

When used equipment is to be returned to GCL for thorough decontamination, Level 4 decontamination should be performed in the field. The equipment should then be sealed in a plastic bag and segregated from unused equipment.

4.0 REFERENCES

U.S Environmental Protection Agency, 1986, RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, p. 106-107.

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APPENDIX D

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APPENDIX D

PROCEDURES FOR STEAM CLEANING OF SAMPLING EQUIPMENT

MANUAL OF STANDARD OPERATING PROCEDURES

DATE: December 23, 1987

Procedures for Steam Cleaning of Sampling Equipment

1.0 PURPOSE

To describe the Standard Operating Procedures used in steam cleaning of sampling equipment.

2.0 SCOPE

To prevent contamination of samples or monitor wells, all sampling equipment must be thoroughly cleaned prior to each use. Steam cleaning is commonly the most efficient method of accomplishing this in the field.

This document describes procedures to be used in steam cleaning sampling equipment. Sampling equipment dedicated to a particular well will be cleaned prior to installation and after any maintenance requiring removal from the well. Other equipment will be cleaned prior to each use. Equipment used in each of several wells will be cleaned prior to use at each individual well.

The procedures described in this SOP are intended to be used only when the more rigorous decontamination methods described in the SOP "Procedures for Decontamination of Sampling Equipment" are impracticable for technical or logistical reasons.

3.0 **PROCEDURES** Always wear gloves and safety glasses when operating the steam cleaner.

3.1 Disassemble any equipment, such as pumps, which cannot be thoroughly cleaned in an assembled condition.

3.2 Remove any obvious dirt or other foreign substances from all tools and equipment to be cleaned, using tap water, a brush, and soap if necessary. Arrange the tools and equipment on a clean, hard surface. Have heavy plastic bags in readiness to receive the cleaned tools and equipment.

3.3 Read the steam cleaner's operating instructions, and be certain that they are completely understood. Inspect the steam cleaner to ensure that it is properly fueled and in good working order, and that there are no solvents, detergents, or other foreign substances in the machine. Clean the steam cleaner, if necessary.

3.4 Thoroughly steam clean all equipment and tools, and rinse with distilled water. Be certain to measure and record the temperature of the steam cleaner discharge.

3.5 Using an appropriate item of equipment (e.g., a bailer or a glass sample container) take an "equipment blank" sample by running distilled,

deionized water over or through the equipment and collecting it in 2 40ml septum vials. Close the vials securely, ensuring that no air or headspace remains in the vials. Assign sample numbers and store, transport, and analyze the equipment blanks in the same manner as other samples collected in the program. An equipment blank should be taken at each steam cleaning event.

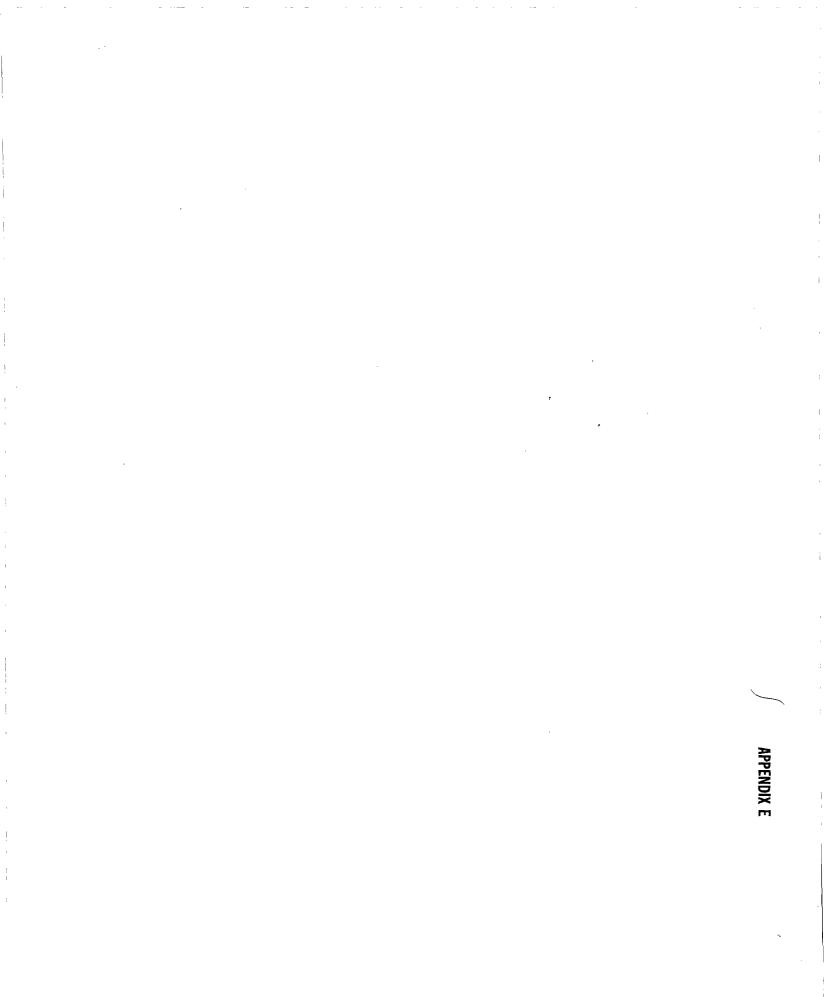
3.6 Wearing clean disposable rubber gloves, reassemble any equipment that was disassembled for cleaning. Transfer all of the cleaned tools and equipment to clean plastic bags and secure the bags.

3.7 After cleaning, handle equipment no more than is essential for conducting the sampling procedure. Always wear clean, disposable rubber or cotton gloves when handling the clean equipment.

4.0 REFERENCES

U.S. Environmental Protection Agency, 1986, RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, p. 106-107.

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APPENDIX E

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PROCEDURES FOR WATER LEVEL MEASUREMENT IN WELLS, USING AN ELECTRONIC SOUNDER

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MANUAL OF STANDARD OPERATING PROCEDURES

Procedures for Water Level Measurement in Wells, Using an Electronic Sounder

1.0 PURPOSE

To describe the Standard Operating Procedures for measurement of water level in wells, using an electronic sounder ("probe").

2.0 SCOPE

Water level measurements are required prior to pumping and sampling of monitor wells, and are commonly made under many other circumstances where data on water table or potentiometric surface elevations are needed.

This document describes procedures for water level measurement using an electronic indicator, commonly referred to as a "water level probe." The probe is designed so that, when it reaches ground water, a circuit is closed, resulting in an audible or visible response or in a strong reading on an ammeter. The depth to water from a surface reference point of known elevation is measured using a graduated tape attached to the sounder.

3.0 PROCEDURES

3.1 Prior to each measurement, clean the probe with distilled water and dry it with a clean paper towel. Place clean plastic sheeting around the well head to assure that the sounder does not become contaminated by contact with the ground during the measurement procedures.

3.2 Remove the cap (if so equipped) from the well head and set it aside. If the casing cap is unvented, allow about 10 minutes for water level in the well to equilibrate to atmospheric pressure.

3.3 Each well should have a measuring point which is accurately surveyed so that its exact elevation is known. (Commonly, this point is the top of the casing.) At RCRA sites, this point will be described in the Sampling and Analysis Plan. Be sure that the measuring point is known.

In some cases (e.g., regional ground water studies) the well being measured may not be surveyed accurately with respect to a known datum. In these cases, the depth measurement should be made from the top of the casing. Additionally, measure the "stick-up," i.e., the length of casing above the ground level, using a ruler or steel tape. Record this information to permit determination of water level based on the known ground surface elevation (from a topographic map or similar source).

3.4 Ensure that the probe is turned on. Insert the probe slowly into the well until a "beep" is heard (or a strong ammeter reading is

observed). Using the graduated tape attached to the sounder, measure the depth to water from the measuring point, to the nearest 0.01 inch, and record it in the field log book.

3.5 The total depth of the well should also be determined (after sampling). Turn the probe off and insert it slowly into the well until the probe reaches the bottom of the well, which will be observed by the sudden reduction of tension on the tape. Jostle the tape <u>slightly</u> (up and down) to be certain that the probe has reached the bottom of the well, rather than being hung up on a casing joint, pump or similar irregularity. Measure total depth from the measuring point to the nearest 0.01 inch and record it in the field log book. Prior to measuring total depth be certain that pumps, wires, tubing or other obstructions will not tangle the probe and prevent probe removal. Note that the "zero point" on most probes is at the electrical contacts, which may not be at the bottom of the probe, so total depth measurements may have to be adjusted to reflect the additional probe length below the contacts.

3.6 Remove the probe from the well and be certain that it is turned off and cleaned before storage or reuse.

3.7 Replace and lock the well cap (if so equipped).

4.0 REFERENCES

U.S. Code of Federal Regulations, 1983, 40 CFR 264.97 (f).

U.S. Environmental Protection Agency, 1986, RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, p. 99-100.

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Page 2 of 2



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APPENDIX F

PROCEDURES FOR FIELD MEASUREMENT OF TEMPERATURE, SPECIFIC CONDUCTANCE, AND pH

MANUAL OF STANDARD OPERATING PROCEDURES

DATE: December 23, 1987

Procedures for Field Measurement of Temperature, Specific Conductance, and pH

1.0 PURPOSE To describe the Standard Operating Procedures for field measurement of temperature, specific conductance, and pH of water samples.

2.0 SCOPE Water quality parameters which are physically or chemically unstable must be measured in the field immediately after collection of samples. Unstable parameters include temperature, specific conductance, and pH.

This document describes approved methods of measuring temperature, specific conductance, and pH in the field.

3.0 PROCEDURES FOR FIELD MEASUREMENTS
3.1 TEMPERATURE
3.1.1 Equipment
A mercury-filled thermometer or thermistor with accuracy to 0.1°C, should be used.

- 3.1.2 General Considerations
 - 1. When possible, temperature measurements should be taken at the source; otherwise, an intermediate container may be used. When an intermediate container is used, fill the container with sample and allow the container temperature to equilibrate with that of the sample source. Dispose of the sample and draw a new sample, transfer the sample to the equilibrated container and measure.
 - 2. Check the thermometer for separations in the mercury prior to each reading. These can be remedied by gently shaking the thermometer.
 - 3. When taking a reading, hold the thermometer away from any surface, such as the sides or bottom of a container or stream.

3.1.3 Calibration

Thermometer should be checked monthly or before each sampling period against a National Bureau of Standards (NBS) certified thermometer.

3.1.4 Procedure

- 1. Take temperature reading by immersing the thermometer in the solution to be measured to the manufacturer's indicated immersion level.
- 2. Read the temperature to the nearest 0.1°C.
- 3. Record measurement on the Field Analysis Sheet (Figure 3-1) or a field notebook.

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FIGURE 3-1 FIELD ANALYSIS SHEET

Site
Date
Time of Sample Collection
Time of Reading
Site No
In-Situ [*] Temperature (°C)
Sample Temperature (°C)
Initial Sample pH Reading
Uncorrected Conductivity Reading (UMHOS/CM)
Correction Factor
Corrected Conductivity reading (umhos/cm)

*If sample is retained for pH measurement independent of field conditions, in-situ temperature measurement must still be taken.

3.2 SPECIFIC CONDUCTANCE

The procedures described below apply to the SI Model 33 S-C-T Meter. GCL employs several different types of conductance meters. The manufacturer's instructions should be consulted to determine the specific calibration procedures required for the meter being used.

3.2.1 Equipment

- 1. Conductivity Meter
- 2. Conductivity Cell
- 3. Standard 0.01N KCl Solution
- 4. NBS Standardized Thermometer, accuracy to 0.1°C.

3.2.2 Preparation of 0.01N KCl Solution

- 1. Use anhydrous KCl crystals; desiccated for 24 hours or baked at 100°C for two hours.
- 2. Weigh out 0.744 grams of KCl and place in a 1,000-milliliter volumetric flask.
- 3. Using high grade distilled water at $25 \pm 2^{\circ}C$, bring to full volume and mix well to dissolve all KCl crystals.
- 4. Store in glass bottle(s), and label with the date prepared.
- 5. Measure the conductivity of the distilled water used to prepare the solution. If any conductivity is present, this value must be corrected to 25 C and added to the value of the solution. The base conductivity value of the prepared solution using 0.744 grams of KCl is 1408.8 umhos/cm. Label the prepared solution as to the final conductivity value at 25 C.

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3.2.3 General Considerations

A Salinity-Conductivity-Temperature Meter is the field instrument normally used for specific conductance determinations. Instructions which follow describe the use of this instrument. Other types of conductivity meters are available and commonly used. If another type of meter is used, these instructions should be modified as needed in accordance with the manufacturer's recommendations for the type of meter in use.

In general, the meter should be used in the following manner when taking all readings:

1. Adjust meter zero (if necessary) by turning the bakelite screw on the meter face so that the needle coincides with the zero on the conductivity scale. 2. Turn the <u>mode</u> control to <u>redline</u> and adjust the <u>redline</u> control knob so that the meter needle lines up with the redline painted on the meter face. If this cannot be accomplished, the batteries must be replaced. (This step may be performed without the probe plugged into the meter.)

- 3. Rinse the probe with deionized water before and after each reading.
- 4. When taking a reading, immerse the probe in the sample solution and move the probe up and down a few times to ensure proper circulation through the cell electrodes. Hold the probe steady and away from the sides and bottom of the container and read the measurement.
- 5. Read the meter needle to the nearest 1/4 of the scale graduations. Always estimate to the next higher 1/4 graduation, rather than "dropping" any value. All results are expressed in umhos/cm.
- 6. Conductance measurements should always be taken in an intermediate container, rather than a sample container.
- 7. The thermocouple in the probe does not measure temperature to the required accuracy, so an NBS standardized thermometer with an accuracy of 0.1°C is necessary for all temperature measurements.

3.2.4 Determination of Cell Constant

The cell constant is used to evaluate the proper functioning of the instrument probe. The cell constant will be calculated on a daily basis prior to any field measurements.

- 1. Measure the temperature of the 0.01N KCl standard solution to the nearest 0.1°C.
- 2. Turn the meter on to the X10 scale and measure the conductance of the standard 0.01N KC1 solution. (Multiply the observed value by 10 to obtain the final result.)
- 3. Press the cell test button. The meter needle should not deflect more than 2 percent of the observed value. If deflection is >2 percent, the probe is fouled and requires cleaning before use.

4 of 11

4. Calculate the cell constant using the following formula:

$$C = \frac{K_{\rm m}}{K_{\rm s}} \times 100$$

where

C = Cell constant

- K_m = Measured conductance of 0.01N KCl solution at measured temperature
- K_{S} = Actual conductance of 0.01N KCl solution at measured temperature

The cell constant must be between 0.95 and 1.05. If not, the cell should be cleaned and the constant rechecked before use.

The following formula can be used to calculate K_s values:

 $K_{\rm S} = 1408.8 + 26.9019 (T-25)$

T = Temperature (°C)

5. Record all data and calculation on the specific conductance calibration log (Figure 3-2).

3.2.5 Field Measurements

- 1. Measure the temperature of the sample to the nearest 0.1°C, using an NBS standardized thermometer.
- 2. Measure the specific conductance of the sample. Remember to multiply the meter scale factor (X1, X10, X100) when calculating results.
- 3. Obtain the temperature correction factor for the sample temperature measure in Step 1.
- 4. Multiply the specific conductance measured in Step 2 by the temperature correction factor to obtain the corrected specific conductance value.
- 5. Record all data and calculations on the specific conductance data sheet (Figure 3-1).

3.3 pH FIELD MEASUREMENT PROCEDURE 3.3.1 Required Equipment

- 1. pH meter and manufacturer's Manual of Operation
- 2. NBS standardized thermometer, accuracy to 0.1°C
- 3. Standard buffer solutions: 4.0, 7.0, 10.0
- 4. Saturated KCl with AgCl solution (optional)

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FIGURE 3-2 SPECIFIC CONDUCTANCE CALIBRATION LOG

SITE	
DATE	
TIME	
PERFORMED BY	

YSI Model 33 S-C-T Meter Serial No. _____

Date of 0.01N KC1 Standard Preparation _____

_____ Changed KCl solution in Calibration Jar

<u>Measurements</u>

Temperature of Standard (°C) ______ Uncorrected Reading (umhos/cm) _____ Correction Factor _____ Corrected Reading (umhos/cm) _____

<u>Calibration Verification</u>

Cell Test Deflection (umhos/cm) _____ Cell Constant _____

NOTES:

a.

Cell Constant = 1408.8 umhos/cm

- b. Cell constant must be between 0.95 and 1.05. If not, probe is fouled and requires cleaning.
- c. Cell test deflection must be 2 percent of uncorrected reading.

Procedure performed as per Minimum Standards and Guidelines of Operation, Process and Wastewater Sampling Standards, Section 1.1.2.

Initial

QA/QC

3.3.2 General Considerations

Several types of pH meters are available for use. For differences in operation between meters, consult the appropriate manufacturer's manual of operation. In general, all meters should be used in the following manner:

1. Store electrode in saturated KCl solution or in 4.0 buffer when not in use.

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- 2. Rinse the electrode with deionized water before and after each use.
- 3. When taking a reading, immerse the electrode in the solution fluid, stir gently for a few seconds. Hold the electrode steady and away from the sides and bottom of the container and read the measurement. Always record measurements to the nearest 0.1 unit.
- 4. pH readings should always be taken in an intermediate container, rather than a sample container.
- 5. Store the meter with the electrode disconnected, taking care not to soil or damage connections.

3.3.3 Operation Check Procedure

Each day prior to use, the pH meter will be checked and calibrated to ensure proper operation.

- 1. Check expiration dates on buffers. Discard and replace if expired.
- 2. Check batteries in pH meter. Replace if necessary.
- 3. Check condition of electrode solution. If solution or gel is separated, gently shake electrode to consolidate solution, in KC1-filled probes, add solution if necessary.
- 4. Measure the temperature of the buffer(s) to the nearest 1.0°C with an NBS standardized thermometer. (Note: It is assumed that all buffer temperatures are equal if stored together.)
- 5. Set the temperature compensation dial to the buffer temperature measured in Step 4. (Note: For automatic temperature compensating meters, disregard this step.)
- 6. Using Table 3-1, find the corresponding buffer values for the measured temperature in Step 5. For this comparison estimate measured temperatures to the nearest 5°C.
- 7. Measure the pH of the 7.0 buffer solution.

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		TABLE 3-1	
pН	BUFFER	TEMPERATURE	CORRECTIONS

Temperature	Buffer Values									
•C	4.0	7.0	10.0							
0	4.01	7.13	10.34							
5	3.99	7.10	10.26							
10	4.00	7.07	10.19							
15	3.99	7.05	10.12							
20	4.00	7.02	10.06							
25	4.00	7.00	10.00							
30	4.01	6.99	9.94							

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- 8. Adjust the calibration control knob until the meter reading corresponds to the appropriate value in Table 3-2.
- 9. Repeat Steps 6 and 7 using the 4.0 or 10.0 buffer solution. When the pH is measured with the 4.0 or 10.0 buffer solution, continue with the next step (No. 10). The choice of buffer solution depends on the range of pH anticipated in the material to be tested. If acidic material is expected, calibrate using 4.0 buffer; if basic material is expected, calibrate using 10.0 buffer. A 3-point calibration using all 3 buffers should be done if the approximate pH of the analyte is not known in advance.
- 10. Record all measurements on the <u>pH calibration log</u> (see Figure 3-4).
- 11. If measurements obtained are within 0.2 or the appropriate table values, the meter is functioning properly.
- 3.3.4 Sample pH Measurement Procedure
 - 1. Measure the temperature of the sample to the nearest 1.0°C. When taking a pH measurement of a sample, set the temperature compensation dial to the measured temperature.
 - 2. Take the "initial" sample reading. The purpose of this reading is to determine approximate pH of sample for calibration purposes.
 - You may need to recalibrate the pH meter to standards within 2 pH units of the "initial" sample reading following the procedures in Section 3.3.3, Operation Check Procedure Steps 3-9. Use an additional calibration form or equivalent page in a field book.
 - 4. Measure the pH of the two other buffers.
 - 5. Measure the pH of the sample.
 - 6. Recheck the meter by measuring the pH of the two buffers (4.0 and 7.0).
 - 7. Record all measurements on the <u>field data sheet</u> (see Figure 3-1) or equivalent format in field notebook.

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FIGURE 3-4 ph calibration log

Site			
Date			
Performed	by		

Time

Instrument:

Digi-Sense Model 5985-20	
Digi-Sense Model 5986-10	
Presto-Tek PA-11A	
Cole Parmer pH Wand Model N	lo. 5985-75
Nester pH pen*	

Serial Number

Changed buffers in pH kit Temperature of Buffers (C) pH of buffers at measured temperature: 7=_____4=___10=____

(See Table A3-2)

_____ Calibrated at 7.0 buffer value from Table C1-1.

Readings of other buffers: 4=____ 10=____

pH readings must be \pm 0.2 units from table values for proper operation of meter.

*Nester pH pens are not temperature compensating instruments. Sample and buffer temperatures must be equal when using these units.

Procedure performed as per Minimum Standards and Guidelines of Operation, Process and Wastewater Sampling Standards, Section 1.1.3.

Initial

QA/QC

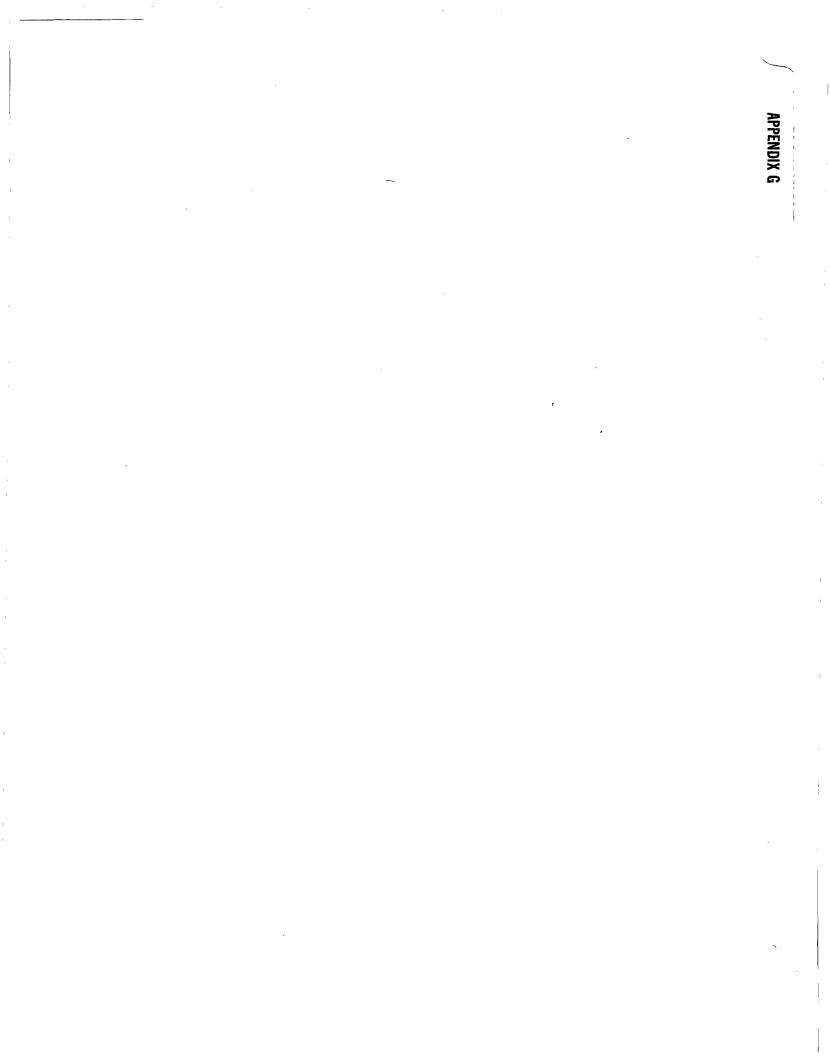
4.0 REFERENCES

U.S. Environmental Protection Agency, 1986a, RCRA Grand-Water Monitoring Technical Enforcement Guidance Document, p. 107-108.

U.S. Environmental Protection Agency, 1986b, Test Methods for Evaluating Solid Waste: EPA Report SW-k846; Volume I: Physical/Chemical Methods, Methods 9040 and 9050.

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APPENDIX G

PROCEDURES FOR LABELING, PACKING AND SHIPPING OF WATER SAMPLES

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MANUAL OF STANDARD OPERATING PROCEDURES

DATE: December 23 1987

Procedures for Labeling, Packing and Shipping of Water Samples

1.0 **PURPOSE** To describe the Standard Operating Procedures for the packing and shipping of water samples.

2.0 SCOPE Proper handling of water samples between the time of field collection and that of laboratory analysis is critical in preserving the validity of analytical data. This document describes procedures to be used in labeling, packing, shipping, and storage of water samples.

These procedures are consistent with the requirements of all state and Federal regulations, including those for ground water monitoring programs under RCRA.

3.0 **PROCEDURES**

3.1 All samples will be collected and placed in tightly sealed glass or polyethylene containers, as appropriate, and preserved in accordance with the requirements of EPA document SW-846 and the standard practices of the laboratory which is to do the analyses. The specific containers and preservation techniques required will be included in the Sampling and Analysis Plan for each project. Table 3-1 is to be utilized as guidance in the absence of specific instructions in a site-specific plan.

3.2 Immediately upon collection, label each sample container with an adhesive label clearly indicating, in waterproof ink:

- Project and site identification
- Sample number
- Sample preservation (e.g., H₂SO₄, Na₂S₂O₃)
- Date and time of sampling
- Name of sample collector

Standard practice is to assign a sample number of 10 digits, indicating the date and time of sampling, as follows:

- Year (2 digits)
- Month (2 digits)
- Day (2 digits)
- Time (24-hour clock; 4 digits)

1 of 5

TABLE 3-1 REQUIRED CONTAINEES, PRESERVATION TECHNIQUES, AND HOLDING TIMES

Name	Container	Preservat lon	Maximum holding time				
Bacterial Tests:							
Coliform, fecal and total	P, G	Cool. 4°C. 0.008% Nr. S.O.	6 hours				
Fecal streptococci	P, G	Cool, 4°C, 0.008% Na, S, 0, Cool, 4°C, 0.008% Na, S, 0,	6 hours				
Inorganic Tests:	., .						
Acidity	P, G	Cool., 4°C	14 days				
Alkalinity	P, G	Cool, 4°C	14 days				
Amonia	P, G	Cool, 4° C, 11, SO ₄ to p1K2	28 days				
Biochemical oxygen demand	P, G	Cool, 4°C	48 hours				
Bronide	P, G	None regulized	28 days				
Blochemical oxygen demand,	P, G	Cool, 4°C	48 hours				
carbonaceous	, , ,						
Chemical oxygen demand	P, G	Cool, 4°C, 11,50, to pHK2	28 days				
Chloride	P, G	None required	28 days				
Oulorine, total residual	P, G	None regulated	Analyze immediately				
Color	P, G	Cool, 4°C	48 hours				
Cyanide, total and amenable	P, G	Cool, 4°C, NaCH to pID12,	14 days				
to chlorination		0.6g ascorbic acid					
Fluoride	Р	None required	28 days				
Hardness	P, G	HNO, to pHK2, H2SO, to pHK2	6 months				
Hydrogen ion (pH)	P, G	Noné regutred 👘 🐪	Analyze immediately				
Kjeldahl and organic nitrogen	P, G	$Cool, 4^{\circ}C, 11_{2}SO_{4}$ to pHK2	28 days				
Metals:							
Chronium VI	P, G	Cool, 4°C	24 hours				
Mercury	P, G	HNO, to pHK2	28 days				
Metals, except chromium VI and mercury	P, G	HNO' to pK2	6 months				
Nltrate	P, G	Cool, 4°C *	48 hours				
Nitrate-nitrite	P, G	•	28 days				
Nitrite	P, G	Cool, 4° C, 11_{2} SO ₄ to pIK2 Cool, 4° C	48 hours				
011 and grease	G	Cool, 4°C, 11,50, to piK2	28 days				
Organic carbon	P, G	Cool, 4°C, HCI or H2504 to pHK2	28 days				
Orthophosphate	P, G	Filter immediately, cool, 4°C	48 hours				
Okygen, Dissolved Probe	G Bottle and top	None regulred	Analyze immediately				
Winkler	do	Fix on site and store in dark					
Phenols	G only	Cool, 4°C, II, SO, to plK2	28 days				
Phosphorus (elemental)	G	Cool, 4°C	48 linirs				
Hosphorus, total	P, G	Cool, 4°C, 11, 50, to pik2	28 days				
Residue, total	P, G	Cool, 4°C	7 days				
Residue, Filterable	P, G	Cool, 4°C	7 days				
Residue, Nonfilterable (TS		Cool, 4°C	7 days				
Residue, Settleable	P, G	Cool, 4°C	48 luxirs				
Residue, volatile	P, G	Cool, 4°C	7 days				
SLLICA	P	Cool, 4°C	28 days				
Specific conductance	P, G	Cool, 4°C	28 days				

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TABLE 3-1 REQUIRED CANTAINERS, PRESERVATION DECINIQUES, AND IDIDING TIMES (CANTINUED)

Name	Container	Preservation	Maximum holding time
Sulfate	P, G	Cool, 4°C	28 days
Sulfide	P, G	Cool, 4°C, and zinc acetate plus addium hydroxide to piD9	7 days
Sulfite	P, G	None regulared	Analyze immediately
Surfactants	P, G	Cool, 4°C	48 luxius
Temperature	P, G	None required	Analyze
Turbidity	P, G	0001, 4°C	48 Inxins
rganic Tests:			
Purgeable Nalocarbons	G, Teflon-lined septum	Cool, 4°C, 0.008% Na25203	14 days
Purgeable aromatic hydrocarbons	G, Teflon-Lined septim	Cool, 4° C, 0.008% $Na_2S_2O_3$, HCl to pli2	14 days
Acrolein and acrylonitrile	G, Teflon-lined septum	Cool, 4° C, 0.008% Na ₂ S ₂ O ₃ , Adjust pli to 4-5	14 days
Phenols	G, Teflon-lined cap	Cool, 4°C, 0.008% Na25203	7 days until extraction, 40 days after extraction
Benzidines	G, Teflon-lined cap	Cool, 4°C, 0.008% Na, 5,0,	7 days until extraction
Phthalate esters	G, Teflon-lined cap	Cool, 4°C 223	7 days until extraction 40 days after extraction
Nitrosamines	G, Teflon-Lined cap	Cool, 4°C, store in dark, 0.008% Na_S_0 Cool 4°C 2 203	40 days after extraction
PCBs, acrylonitrile	G, Teflon-lined cap		40 days after extraction
Nitroaromatics and Isophyrone	G, Teflon-lined cap	Cool, 4°C, 0.008% Na ₂ S ₂ O ₃ store in dark	40 days after extraction
Polynuclear aromatic hydrocarbons		Cool, 4°C, 0.008% Na ₂ S ₂ O ₃ store in dark	40 days after extraction
Haloethers	G, Teflon-lined cap	Cool, 4°C, 0.008% Na ₂ S ₂ O ₃	40 days after extraction
ChlorInsted hydrocarbons	G, Teflon-lined cap	Cool, 4°C 22J	40 days after extraction
TCD	G, Teflon-Lined cap	Cool, 4°C, 0.008% Na ₃ S ₃ O ₃	40 days after extraction
Total organic halogens Pesticides Tests:	G, Teflon-lined cap	Cool, 4°C; 112504 to 517<2	7 days
Pesticides	G, Teflon-lined cop	Cool, 4°C, pll 5-9	40 days after extraction
Radiological Tests:			-
Alpha, beta and radium	P, G	INO ₁ to pIK2	6 months

Polyethylene (P) or Glass (G)

Source:

U.S. Environmental Protection Agency, 1986, Test Methods for Evaluating Solid Waste: EPA Report SW-846; Yolume I: Physical/Chemical Methods

Page 3 of 5

Revision 0 Date September 1986 Thus, for example, a sample collected at 2:45 p.m. (14:45 on the 24-hour clock) on May 15, 1987, would be assigned the sample number: 8705151445. Other systems of identifying samples may be used for certain projects, if desired.

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Sample splits, spikes, and blanks required for QA/QC analysis will be labeled and given sample numbers according to the same scheme. All sample numbers and the source of the associated samples will be recorded in the Field Logbook.

Seal each sample container with a chain-of-custody seal, which is an adhesive seal clearly indicating, in waterproof ink:

- Sample number
- Project and site identification
- Date
- Signature and printed name of individual responsible for sampling.

These seals are not to be removed from the containers except by laboratory personnel. Complete Chain-of-Custody procedures are described in a separate SOP.

3.3 Since the great majority of analytes require preservation at low temperatures (4°C), it will be the normal policy to preserve <u>all</u> samples in ice chests at 4°C, unless specifically stated otherwise in the Sampling and Analysis Plan.

Immediately after affixing labels and chain-of-custody seals to the sample containers, place them on ice in an ice chest. During subsequent handling and shipping, ensure that enough ice remains in the chest to keep the samples at a temperature no greater than 4° C.

3.4 Ideally, samples will be directly delivered to the analytical laboratory by the person responsible for the sampling. If this is not possible, arrange for transportation by common carrier. Record each transfer of sample custody on the chain-of-custody form.

3.5 If shipping by common carrier is necessary, pack the samples securely, using clean paper, styrofoam beads, or similar clean material, so that there is no likelihood of breakage during transit. Seal each shipping container (ice chest or similar unit) with a chain-of-custody seal, and clearly label the package "FRAGILE-GLASSWARE" or with other appropriate indications of package contents. Include chain-of-custody documentation within the sealed container, as described in the chain-ofcustody SOP.

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Maintain full chain-of-custody records (as described in a separate SOP) showing all transfers of sample custody between the sampling point and the analytical laboratory.

4.0 REFERENCES

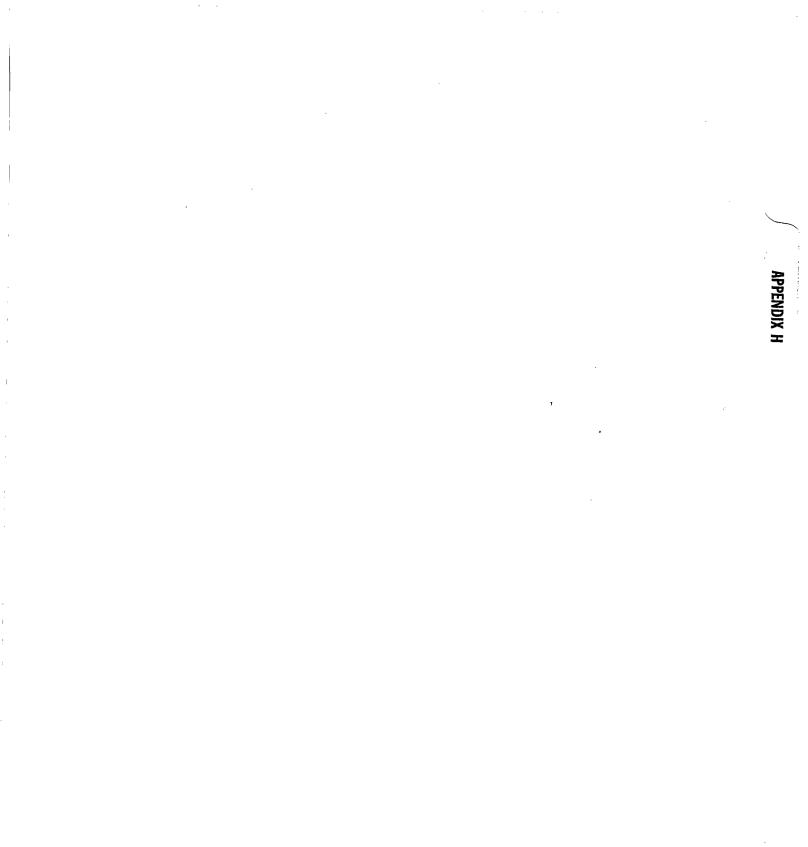
U.S. Code of Federal Regulations, 1983, 40 CFR 264.97.

U.S. Environmental Protection Agency, 1986a, RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, p. 11-117.

U.S. Environmental Protection Agency, 1986b, Test Methods for Evaluating Solid Waste: EPA Report SW-846; Volume I: Physical/Chemical Methods.

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APPENDIX H

CHAIN-OF-CUSTODY PROCEDURES

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MANUAL OF STANDARD OPERATING PROCEDURES

Chain-of-Custody Procedures

1.0 PURPOSE

To describe Standard Operating Procedures used to ensure complete chainof-custody recording for all samples.

2.0 SCOPE

Formal chain-of-custody procedures are required for documentation of sample possession from time of collection to time of analysis on most projects.

The procedures described in this document are designed to meet all legal accountability requirements, including specifically those for sample documentation under RCRA.

3.0 PROCEDURES

3.1 The chain-of-custody program allows for the tracing of possession and handling of individual samples from the time of field collection through laboratory analysis. Elements of the chain-of-custody program include:

- <u>Sample labels</u>, which prevent misidentification of samples;
- <u>Sample seals</u> to preserve the integrity of the sample from the time it is collected until it is opened in the laboratory;
- <u>Field logbook</u> to record information about each sample collection during the monitoring program;
- <u>Chain-of-custody record</u> to establish the documentation necessary to trace sample possession from the time of collection to analysis;
- <u>Sample analysis request sheets</u>, which serve as official communication to the laboratory of the particular analysis(es) required for each sample and provide further evidence that the chain of custody is complete; and
- <u>Laboratory logbook</u> and analysis notebooks, which are maintained at the laboratory and record all pertinent information about the sample.

3.2 Immediately after sample collection, label each sample container with an adhesive label containing the information needed to positively identify the sample and the treatment appropriate for it. Labels are usually supplied by the laboratory which will perform the analyses, and

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in some cases may already be affixed to the sample containers. Mark the labels with a waterproof ink.

Include on the label:

- Project and site identification
- Sample number
- Sample preservation (e.g., H₂SO₄, Na₂S₂O₃)
- Date and time of sampling
- Any other information needed for sample analysis.

Standard practice is to assign a sample number of 10 digits, indicating the date and time of sampling, as follows:

- Year (2 digits)
- Month (2 digits)
- Day (2 digits)
- Time (24-hour clock; 4 digits)

Thus, for example, a sample collected at 2:45 p.m. (14:45 on the 24-hour clock) on May 15, 1987, would be assigned the sample number: 8705151445. Other systems of identifying samples may be used for certain projects, if desired by the client.

Sample splits, spikes, and blanks required for QA/QC analysis will be labeled and given sample numbers according to the same scheme. Record all sample numbers and the source of the associated samples in the Field Logbook.

3.3 Seal each sample container with a chain-of-custody seal. The chainof-custody seal is an adhesive seal with spaces for recording the following information:

- Sample number
- Project and site identification
- Date
- Signature and printed name of individual responsible for sampling.

Record this information on the seal, using a waterproof ink, and affix the seal over the lid of the sampling container so that the container cannot be opened until the seal is broken. The seal is not to be broken except by laboratory personnel at the time the sample container is opened for analysis. A typical chain-of-custody seal is shown in Figure 3-1.

3.4 Record the sample number, date and time of sampling, and any other pertinent information in the Field Logbook.

3.5: Before delivering samples to the analytical laboratory or relinquishing possession to another person for delivery, fill out a chain-ofcustody record. The chain-of-custody record must accompany the sample to the laboratory, and must record each change in sample custody from the person collecting the sample to the receiving party at the analytical laboratory. It must be signed by every person who has custody of the sample at any time.

The chain-of-custody record should contain:

- Sample number(s)
- Signature of collector
- Date and time of collection
- Sample type (e.g., ground water, immiscible layer)
- Identification of sample site (well, spring, soil boring, etc.)
- Number of containers
- Signature of person(s) involved in the chain of possession
- Inclusive dates of possession
- Date of sample receipt by the laboratory

3.6 Before delivering samples to the analytical laboratory, fill out a Sample Analysis Request Form. A typical chain-of-custody record and Sample Analysis Form is shown in Figure 3-2. The Sample Analysis Request Form provides the analytical laboratory with information and instructions as to the types of samples received, preservation techniques used, and types of analyses to be performed.

The Sample Analysis Request Form should contain the following information:

- Company and person requesting analyses
- Sample number

GEOSCIENCE CONSULTANTS, LTD 500 Conper Ave NW Suile 200	SAMPLE NO DATE	a≺ €×	
Albuquerque, NM 87102	SIGNATURE	BROKE	
LOCATION	PRINT NAME AND TITLE (Inspector Analyst or Technicia		DATE

FIGURE 3-1

CHAIN-OF-CUSTODY SEAL

FIGURE 3-2

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	LAB NAME	ADDRESS	TELEPHONE	SAMPLERS (SIGNATURE)	SAMPL										PROJECT		PROJECT MANAGER	CHARGE CODE NO	SHIPPING ID. NO	VIA:	SPECIAL INSTRUCTIONS/COMMENTS:		

CHAIN-OF-CUSTODY RECORD/SAMPLE ANALYSIS FORM

GCL

- Date of sampling
- Project and job number or billing code
- Type of sample
- Number and type of sample containers
- Preservation methods
- Number and type of analyses requested

3.7 At time of sample delivery to the analytical laboratory, obtain signed copy of the Chain-of-Custody Record/Sample Analysis Request Form for client files and in case of any subsequent questions regarding the types of analyses requested.

3.8 If it is necessary to ship the samples to the analytical laboratory via commercial or common carrier (including truck, bus, plane, train, or other parcel delivery service), the following procedures will be followed.

Retain one copy of the chain-of-custody form, and seal the other copy or copies in a watertight pouch. Place the pouch inside the container containing the samples, and seal the entire container with a completed chain-of-custody seal and strapping tape so that it cannot be opened without breaking the seal. Record the name of the shipping company and the date, time, and place of delivery to the shipping company on the retained copy of the chain-of-custody form, signed by the person relinquishing the package to the shipping company. Instruct the receiving laboratory to verify the integrity of the package on arrival, and to certify the date, time, and place of delivery and the company making the delivery to the laboratory or to the location where the package is picked up by laboratory personnel. A copy of the chain-of-custody form containing the certification of delivery to the laboratory will be returned to GCL and retained, along with the copy certifying GCL relinquishment of the package to the shipping company.

4.0 REFERENCES U.S. Code of Federal Regulations, 1983, 40 CFR 264.97.

U.S. Environmental Protection Agency, 1986a, RCRA Ground-Water Monitoring Technical Enforcement Gyridaner Document, p. 114-117.

Prepared by: Micha andall Reviewed by: _____

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APPENDIX I

APPENDIX I

ANALYTICAL QUALITY CONTROL PROCEDURES

"TAKEN DIRECTLY FROM EPA SW-846, TEST METHODS FOR EVALUATING SOLID WASTE." WATER:

<u>Reagent</u>, <u>analyte-free</u>, or <u>laboratory pure water</u> means distilled or defonized water or Type II reagent water which is free of contaminants that may interfere with the analytical test in question.

1.2 QUALITY CONTROL

The procedures indicated below are to be performed for all analyses. Specific instructions relevant to particular analyses are given in the pertinent analytical procedures.

1.2.1 Field Quality Control

The sampling component of the Quality Assurance Project Plan (QAPP) shall include:

Reference to or incorporation of accepted sampling techniques in the sampling plan;

Procedures for documenting and justifying any field actions contrary to the QAPP;

Documentation of all pre-field activities such as equipment check-out, calibrations, and container storage and preparation;

Documentation of field measurement quality control data (quality control procedures for such measurements shall be equivalent to corresponding laboratory QC procedures);

Documentation of field activities;

Documentation of post-field activities including sample shipment and receipt, field team de-briefing and equipment check-in;

Generation of quality control samples including duplicate samples, field blanks, equipment blanks, and trip blanks; and

The use of these samples in the context of data evaluation, with details of the methods employed (including statistical methods) and of the criteria upon which the information generated will be judged.

1.2.2 Analytical Quality Control

A quality control operation or component is only useful if it can be measured or documented. The following components of analytical quality control are related to the analytical batch. The procedures described are intended to be applied to chemical analytical procedures; although the principles are applicable to radio-chemical or biological analysis, the procedures may not be directly applicable to such techniques.

ONE - 10

Revision 0 Date September 1986 All quality control data and records required by this section shall be retained by the laboratory and shall be made available to the data requestor as appropriate. The frequencies of these procedures shall be as stated below or at least once with each analytical batch.

1.2.2.1 Spikes, Blanks and Duplicates

General Requirements

These procedures shall be performed at least once with each analytical batch with a minimum of once per twenty samples.

1.2.2.1.1 Duplicate Spike

A split/spiked field sample shall be analyzed with every analytical batch or once in twenty samples, whichever is the greater frequency. Analytes stipulated by the analytical method, by applicable regulations, or by other specific requirements must be spiked into the sample. Selection of the sample to be spiked and/or split depends on the information required and the variety of conditions within a typical matrix. In some situations, requirements of the site being sampled may dictate that the sampling team select a sample to be spiked and split based on a pre-visit evaluation or the on-site inspection. This does not preclude the laboratory's spiking a sample of its own selection as well. In other situations the laboratory may select the appropriate sample. The laboratory's selection should be guided by the objective of spiking, which is to determine the extent of matrix bias or interference on analyte recovery and sample-to-sample precision. For soil/sediment samples, spiking is performed at approximately 3 ppm and, therefore, compounds in excess of this concentration in the sample may cause interferences for the determination of the spiked analytes.

1.2.2.1.2 Blanks

Each batch shall be accompanied by a <u>reagent blank</u>. The reagent blank shall be carried through the entire analytical procedure.

1.2.2.1.3 Field Samples/Surrogate Compounds

Every blank, standard, and environmental sample (including matrix spike/matrix duplicate samples) shall be spiked with surrogate compounds prior to purging or extraction. Surrogates shall be spiked into samples according to the appropriate analytical methods. Surrogate spike recoveries shall fall within the control limits set by the laboratory (in accordance with procedures specified in the method or within $\pm 20\%$) for samples falling within the quantification limits without dilution. Dilution of samples to bring the analyte concentration into the linear range of calibration may dilute the surrogates below the quantification limit; evaluation of analytical quality then will rely on the quality control embodied in the check, spiked and duplicate spiked samples.

ONE - 11

Revision 0 Date <u>September 1986</u>

1.2.2.1.4 Check Sample

Each analytical batch shall contain a <u>check sample</u>. The analytes employed shall be a representative subset of the analytes to be determined. The concentrations of these analytes shall approach the estimated quantification limit in the matrix of the check sample. In particular, <u>check</u> <u>samples for metallic analytes</u> shall be matched to field samples in phase and in general matrix composition.

1.2.2.2 Clean-Ups

Quality control procedures described here are intended for adsorbent chromatography and back extractions applied to organic extracts. All batches of adsorbents (Florisil, alumina, silica gel, etc.) prepared for use shall be checked for analyte recovery by running the elution pattern with standards as a column check. The elution pattern shall be optimized for maximum recovery of analytes and maximum rejection of contaminants.

1.2.2.2.1 Column Check Sample

The elution pattern shall be reconfirmed with a column check of standard compounds after activating or deactivating a batch of adsorbent. These compounds shall be representative of each elution fraction. Recovery as specified in the methods is considered an acceptable column check. A result lower than specified indicates that the procedure is not acceptable or has been misapplied.

1.2.2.2.2 Column Check Sample Blank

The check blank shall be run after activating or deactivating a batch of adsorbent.

1.2.2.3 Determinations

1.2.2.3.1 Instrument Adjustment: Tuning, Alignment, etc.

Requirements and procedures are instrument- and method-specific. Analytical instrumentation shall be tuned and aligned in accordance with requirements which are specific to the instrumentation procedures employed. Individual determinative procedures shall be consulted. Criteria for initial conditions and for continuing confirmation conditions for methods within this manual are found in the appropriate procedures.

1.2.2.3.2 Calibration

Analytical instrumentation shall be calibrated in accordance with requirements which are specific to the instrumentation and procedures employed. Introductory Methods 7000 and 8000 and appropriate analytical procedures shall be consulted for criteria for initial and continuing calibration.

Revision 0 Date September 1986

1.2.2.3.3 Additional QC Requirements for Inorganic Analysis

Standard curves used in the determination of inorganic analytes shall be prepared as follows:

Standard curves derived from data consisting of one reagent blank and four concentrations shall be prepared for each analyte. The response for each prepared standard shall be based upon the average of three replicate readings The standard curve shall be used with each subsequent of each standard. analysis provided that the standard curve is verified by using at least one reagent blank and one standard at a level normally encountered or expected in such samples. The response for each[®] standard shall be based upon the average of three replicate readings of the standard. If the results of the verification are not within +10% of the original curve, a new standard shall be prepared and analyzed. If the results of the second verification are not within +10% of the original standard curve, a reference standard should be employed to determine if the discrepancy is with the standard or with the instrument. New standards should also be prepared on a quarterly basis at a minimum. All data used in drawing or describing the curve shall be so indicated on the curve or its description. A record shall be made of the verification.

Standard deviations and relative standard deviations shall be calculated for the percent recovery of analytes from the spiked sample duplicates and from the check samples. These values shall be established for the twenty most recent determinations in each category.

1.2.2.3.4 Additional Quality Control Requirements for Organic Analysis

The following requirements shall be applied to the analysis of samples by gas chromatography, liquid chromatography and gas chromatography/mass spectrometry.

The calibration of each instrument shall be verified at frequencies specified in the methods. A new standard curve must be prepared as specified in the methods.

The tune of each GC/MS system used for the determination of organic analytes shall be checked with 4-bromofluorobenzene (BFB) for determinations of volatiles and with decafluorotriphenylphosphine (DFTPP) for determinations of semi-volatiles. The required ion abundance criteria shall be met before determination of any analytes. If the system does not meet the required specification for one or more of the required ions, the instrument must be retuned and rechecked before proceeding with sample analysis. The tune performance check criteria must be achieved daily or for each 12 hour operating period, whichever is more frequent.

Background subtraction should be straightforward and designed only to eliminate column bleed or instrument background ions. Background subtraction

ONE - 13

Revision <u>0</u> Date <u>September 1986</u> actions resulting in spectral distortions for the sole purpose of meeting special requirements are contrary to the objectives of Quality Assurance and are unacceptable.

For determinations by HPLC or GC, the instrument calibration shall be verified as specified in the methods.

1.2.2.3.5 Identification

Identification of all analytes must be accomplished with an authentic standard of the analyte. When authentic standards are not available, identification is tentative.

For gas chromatographic determinations of specific analytes, the relative retention time of the unknown must be compared with that of an authentic standard. For compound confirmation, a sample and standard shall be reanalyzed on a column of different selectivity to obtain a second characteristic relative retention time. Peaks must elute within daily retention time windows to be declared a tentative or confirmed identification.

For gas chromatographic/mass spectrometric determinations of specific analytes, the spectrum of the analyte should conform to a literature representation of the spectrum or to a spectrum of the authentic standard obtained after satisfactory tuning of the mass spectrometer and within the same twelve-hour working shift as the analytical spectrum. The appropriate analytical methods should be consulted for specific criteria for matching the mass spectra, relative response factors, and relative retention times to those of authentic standards.

1.2.2.3.6 Quantification

The procedures for quantification of analytes are discussed in the appropriate general procedures (7000, 8000) and the specific analytical methods.

In some situations in the course of determining <u>metal analytes</u>, matrixmatched calibration standards may be required. These standards shall be composed of the pure reagent, approximation of the matrix, and reagent addition of major interferents in the samples. This will be stipulated in the procedures.

Estimation of the concentration of an <u>organic</u> <u>compound</u> not contained within the calibration standard may be accomplished by comparing mass spectral response of the compound with that of an internal standard. The procedure is specified in the methods.

Revision 0 Date <u>September 1986</u>

1.3 DETECTION LIMIT AND QUANTIFICATION LIMIT

The detection limit and quantification limit of analytes shall be evaluated by determining the noise level of response for each sample in the batch. If analyte is present, the noise level adjacent in retention time to the analyte peak may be used. For wave-length dispersive instrumentation, multiple determinations of digestates with no detectable analyte may be used to establish the noise level. The method of standard additions should then be used to determine the calibration curve using one digestate or extracted sample in which the analyte was not detected. The slope of the calibration curve, m, should be calculated using the following relations:

m = slope of calibration line

 $S_{\rm R}$ = standard deviation of the average noise level

 $MDL = KS_{R}/m$

For K = 3; MDL = method detection limit.

For K = 5; MQL = method quantitation limit.

1.4 DATA REPORTING

The requirement of reporting analytical results on a wet-weight or a dryweight basis is dictated by factors such as: sample matrix; program or regulatory requirement; and objectives of the analysis.

Analytical results shall be reported with the percent moisture or percent solid content of the sample.

1.5 QUALITY CONTROL DOCUMENTATION

The following sections list the QC documentation which comprises the complete analytical package. This package should be obtained from the data generator upon request. These forms, or adaptations of these forms, shall be used by the data generator/reportor for inorganics (I), or for organics (O) or both (I/O) types of determinations.

1.5.1 Analytical Results (I/O: Form I)

Analyte concentration.

Sample weight.

Percent water (for non-aqueous samples when specified).

Final volume of extract or diluted sample.

Holding times (I: Form X).

Revision <u>O</u> Date September 1986 1.5.2 Calibration (I: Form II; 0: Form V, VI, VII, IX)

Calibration curve or coefficients of the linear equation which describes the calibration curve.

Correlation coefficient of the linear calibration.

Concentration/response data (or relative response data) of the calibration check standards, along with dates on which they were analytically determined.

1.5.3 Column Check (O: Form X)

Results of column chromatography check, with the chromatogram.

1.5.4 Extraction/Digestion (I/O: Form I)

Date of the extraction for each sample.

1.5.5 Surrogates (0: Form II)

Amount of surrogate spiked, and percent recovery of each surrogate.

1.5.6 Matrix/Duplicate Spikes (I: Form V, VI; O: Form III)

Amount spiked, percent recovery, and relative percent difference for each compound in the spiked samples for the analytical batch.

1.5.7 Check Sample (I: Form VII; O: Form VIII)

Amount spiked, and percent recovery of each compound spiked.

1.5.8 Blank (I: Form III; O: Form IV)

Identity and amount of each constituent.

1.5.9 Chromatograms (for organic analysis)

All chromatograms for reported results, properly labeled with:

- Sample identification

- Method identification
- Identification of retention time of analyte on the chromatograms.

Revision <u>0</u> Date September 1986 1.5.10 Quantitative Chromatogram Report (O: Forms VIII, IX, X)

Retention time of analyte.

Amount injected.

Area of appropriate calculation of detection response.

Amount of analyte found.

Date and time of injection.

1.5.11 Mass Spectrum

Spectra of standards generated from authentic standards (one for each report for each compound detected).

Spectra of analytes from actual analyses.

Spectrometer identifier.

1.5.12 Metal Interference Check Sample Results (I: Form IV)

1.5.13 Detection Limit (I: Form VII; O: Form I)

Analyte detection limits with methods of estimation.

1.5.14 Results of Standard Additions (I: Form VIII)

1.5.15 <u>Results of Serial Dilutions</u> (I: Form IX)

1.5.16 Instrument Detection Limits (I: Form XI)

1.5.17 <u>ICP Interelement Correction Factors and ICP Linear Ranges</u> (when applicable) (1: Form XII, Form XIII).

1.6 REFERENCES

1. Guidelines and Specifications for Preparing Quality Assurance Program Plans, September 20, 1980, Office of Monitoring Systems and Quality Assurance, ORD, U.S. EPA, QAMS-004/80, Washington, DC 20460.

2. Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, December 29, 1980, Office of Monitoring Systems and Quality Assurance, ORD, U.S. EPA, QAMS-005/80, Washington, DC 20460.

Revision 0 Date <u>September 1986</u>