AP - 002

STAGE 1 & 2 REPORTS

DATE:

Feb. 1998

GRIMES BATTERY

SOIL AND GROUNDWATER ASSESSMENT REPORT

February, 1998

Prepared For

Shell Exploration and Production Technology Company
Houston, Texas

Project 18906

Prepared By

PSC PHILIP SERVICES CORP.

PHILIP SERVICES CORPORATION
7904 Interstate 20 West
Midland, Texas 79706
(915) 563-0118

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LIST OF APPENDICES

1.0 INTRODUCTION

Philip Services Corporation (Philip) has completed a groundwater assessment of a former tank battery located west of Tasker Road, Hobbs, New Mexico on the Grimes Lease (Figure I-Site Map) (Appendix I-Aerial Photographs). This report details the installation of one (1) monitor well and one (1) temporary monitor well in the subject area. Soil and groundwater samples were collected from each of the monitor wells. The purpose of the site investigation was to delineate the vertical extent of hydrocarbon impacts to soil, and to identify if groundwater has been impacted.

2.0 SITE HISTORY

The subject site is a former tank battery location on the Grimes Lease, currently operated by Altura Energy LTD. According to Altura Energy LTD's remediation workplan submitted for this property, the site has been in use as an oilfield tank battery since 1946. The tank battery was decommissioned in 1993. In September 1997, Altura Energy LTD. submitted a workplan for the remediation of oil impacted soil at the subject site. Following removal of tanks and equipment at the battery location, Altura Energy LTD. representatives excavated soils in an area that was suspected to have been a former emergency overflow pit. Soils were excavated to a depth of approximately 14 feet below ground surface (bgs). A total of 4,259.58 cubic yards of soil were excavated and transported to Sundance Services, Inc., Parabo Disposal Facility located in Eunice, New Mexico. According to Altura Energy LTD. personnel, the soils were screened on-site for total petroleum hydrocarbon (TPH). However, no confirmation samples were submitted to an independent/outside laboratory for analysis.

According to Altura Energy LTD. personnel, the subject site was not used for disposal purposes, therefore no information concerning past disposal practices is available. Mr. Bill Weaver, a former Shell Oil Company company states in his Affidavit (**Appendix II**) that prior to the 1950's oil was transported by underground pipeline and water was placed in reserve pits. From the 1950's to the 1980's oil was transported by underground pipeline and marketed to Shell Oil Company, and water was transported by underground pipeline to an off site disposal well.

3.0 HYDROGEOLOGY

The Ogallala Formation is the principal source of groundwater in the subject area. Depth to groundwater in Lea County ranges from approximately 12 feet bgs to approximately 300 feet bgs. The Ogallala consists of predominantly coarse fluvial conglomerate and sandstone and fine-grained eolian siltstone and clay. Where present in the subject area, the Ogallala unconformably overlies Triassic red-beds. The regional groundwater gradient is to the south/southeast.

4.0 SUBSURFACE INVESTIGATION

Philip representatives were on-site December 5 and December 8, 1997, to oversee the installation of a borehole and monitor well at the former battery site (**Figure 2**). The borehole was drilled in an area that had been excavated to a depth of approximately 14 feet bgs. The borehole was

advanced to a depth of 65 feet bgs, and groundwater was encountered at a depth of 54 feet bgs. The borehole was completed as a temporary monitor well (TMW-1), developed, sampled and subsequently plugged. One monitor well (MW-1) was installed approximately 100 feet east of the temporary monitor well, (TMW-1). It was advanced to a depth of 77.30 feet bgs, and groundwater was encountered at approximately 65 bgs.

4.1 Borehole and Temporary Monitor Well Installation (TMW-1)

Following removal of tanks and equipment at the battery location, Altura Energy LTD. (the current operator of this property) representatives excavated soils in an area that was suspected to have been a former emergency overflow pit. Soils were excavated to a depth of approximately 14 feet bgs.

Philip was contracted to install a borehole in the possible former pit area to delineate the vertical extent of hydrocarbon impacts to soil. A 4-inch diameter borehole was installed in the excavation to a depth of approximately 65 feet (approximately 79 feet below un-excavated ground surface). Groundwater was encountered at a depth of 54 feet bgs (approximately 68 feet below un-excavated ground surface).

The soil lithology of the boring was recorded on field observation logs by a Philip geologist and are included in this report in **Appendix III - Boring Logs**. The lithology consists of buff, hard limestone to a depth of 15 feet bgs underlain by predominantly tan, fine-grained sandstone with minor amounts of red sandstone, chert and limestone.

Soil samples were collected in the borehole at five-foot intervals, and were screened in the field for volatile organic compounds (VOCs) by a Philip representative using a photoionization detector (PID). The samples were visually inspected for evidence of staining. Soil characteristics, evidence of staining, and PID readings are shown on the boring logs in **Appendix III**. Hydrocarbon odor was observed in the samples from surface to the termination of the borehole. Hydrocarbon staining was observed on the samples collected from 8-10 feet bgs. PID readings were observed in all of the samples and ranged from 65 deflection units to 551 deflection units.

Groundwater was encountered in the borehole at a depth of 54 feet bgs (excavated). When the augers were removed from the borehole, groundwater observed on the augers appeared to exhibit a sheen. Since the borehole had been installed in the bottom of the excavation where a potential for flooding with rainwater would exist, a decision was made to convert the borehole to a temporary monitor well (TMW-1), develop and sample the monitor well, and subsequently plug the temporary well. A second monitor well was installed approximately 100 feet east of the temporary monitor well (**Figure 2**) adjacent to the excavation. **Section 3.2** details the installation of MW-1. Mr. Wayne Price and Mr. Chris Williams of the New Mexico Oil Conservation Division, District 1, were on site and concurred with the decision to install a temporary well and subsequently plug the well and drill a second monitor well.

The borehole was completed as a 2-inch inside diameter temporary monitor well on December 8, 1997. The temporary well (TMW-1) was completed using 2-inch inside-diameter schedule 40

PVC casing. TMW-1 was constructed with fifteen (15) feet of 0.020 inch slotted PVC casing. A monitor well construction diagram is included in this report in **Appendix IV**.

No free phase hydrocarbons were measured or observed in the temporary well. The well was developed by pumping a minimum of three casing volumes of water. The purged development water was stored in a 55-gallon DOT approved drum on-site. Groundwater samples were collected from the well and submitted to Trace Analysis in Lubbock, Texas for laboratory analysis. (See **Section 5** for a discussion of laboratory analysis and results.)

Following sampling of the temporary well, the PVC casing was removed and the well was grouted to the surface with cement containing a minimum 5% bentonite.

4.2 Monitor Well Installation (MW-1)

One 4-inch inside diameter monitor well (MW-1) was installed approximately 100 feet east of the excavation. The location was selected in order to install the well adjacent to the excavation. The monitor well was drilled to a depth of 77.30 feet bgs. The monitor well construction diagram is included in **Appendix IV**.

Soil samples were collected during drilling at five-foot intervals, and were screened in the field for volatile organic compounds (VOCs) by a Philip representative using a photoionization detector (PID). The samples were visually inspected for evidence of staining. Soil characteristics, evidence of staining, and PID readings are shown on the boring logs in **Appendix III**. The lithology consists of hard, buff limestone to a depth of 45 feet bgs, and is underlain by a tan, fine-grained sandstone. No hydrocarbon odor or staining and no PID readings greater than 1 deflection unit were observed in the samples from the surface to a depth of 45 feet bgs. Hydrocarbon odor was observed in the samples from 45 feet bgs to the termination of the borehole. PID readings ranged from 1 deflection unit to 380 deflection units in the samples from 45 feet bgs to the termination of the borehole.

MW-1 was completed using 4-inch inside-diameter schedule 40 PVC casing. The well was constructed with fifteen (15) feet of 0.020 inch slotted PVC casing. The well was sand-packed with a two (2) foot bentonite plug placed immediately above the sand pack. The well was grouted above the bentonite plug with cement containing 3-5% bentonite, and completed with a four-inch locking monument sleeve cover. Photographs of drilling and completion activities are included in **Appendix IV**.

Measured depth to groundwater is 65 feet bgs. No free phase hydrocarbons were measured or observed. The well was developed by pumping a minimum of three casing volumes of water. The purged development water was stored in a 55-gallon DOT approved drum on-site. A groundwater sample was collected from the well and was submitted to Trace Analysis in Lubbock, Texas for laboratory analysis. (See **Section 5** for a discussion of laboratory analysis and results.)

Photographs of site activities are included in **Appendix V**.

5.0 ANALYTICAL RESULTS

Soil and groundwater samples were collected from each of the monitor wells and submitted for analysis to Trace Analysis in Lubbock, Texas.

5.1 Soil Samples

In each of the monitor wells drilled in the subject area, the soil sample exhibiting the highest PID reading, and the sample collected directly above groundwater was submitted to Trace Analysis in Lubbock, Texas for analysis of total petroleum hydrocarbons (TPH) using EPA method 418.1; benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA method 8020; and total chlorides using EPA method 300 as requested by NMOCD District 1. Analytical results are summarized below in **Table 1** and are included in **Appendix VI**. TPH concentrations in the soil samples range from 2,610 milligrams per kilogram (mg/kg) to 10,000 mg/kg. Total BTEX concentrations range from 6.66 mg/kg to 64.2 mg/kg. Benzene was not detected in any of the samples. Toluene was detected in two samples (TMW-1, 15 feet bgs and MW-1, 65 feet bgs at a concentration of 1.74 mg/kg and 0.792, respectively. Ethylbenzene concentrations range from 0.669 mg/kg to 9.39 mg/kg. Xylenes concentrations range from 5.99 mg/kg to 53.1 mg/kg. Chloride concentrations range from 84 mg/kg to 160 mg/kg.

Table 1
Laboratory Analysis
(Samples Collected 12/5/97-12/8/97)

Sample ID	Sample Depth	TPH	Benzene	Toluene	Ethylbenzene	Xylenes	Total BTEX	Chloride
TMW-1	15'	10,300	<0.500	1.74	9.39	53.1	64.2	160
TMW-1	50'	3,930	<0.500	<0.500	2.19	18.6	20.8	110
MW-1	55'	2,610	<0.100	<0.100	0.669	5.99	6.66	84
MW-1	65'	4,650	<0.500	0.792	2.68	19.3	22.8	88

All units in milligrams per kilograms (mg/kg)

5.2 Groundwater Sample

One groundwater sample each was collected from temporary monitor well TMW-1 and monitor well MW-1 and submitted to Trace Analysis for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX); methyl tertiary butyl ether (MTBE) using USEPA Method 8020; total metals using USEPA Methods 3015, 6010B and 7470; polycyclic aromatic hydrocarbon (PAH) using USEPA Methods 8270, 3510; volatile organics using USEPA Method 8260; polychlorinated biphenyls (PCBs) using USEPA method 8080; and pH, total dissolved solids, cyanide, phenols, fluoride, chloride nitrate-N, and sulfate as requested by NMOCD District 1. Laboratory results are shown below in Table 2 and are included in Appendix V.

Table 2
Groundwater Analytical Results

Analyte	MW-1	TMW-1	Human Health Standard#
MTBE	<0.001	0.011	NS
Benzene	.007*/.0055**	.044*/.044**	0.01
Toluene	.006*/.0061**	.033*/.044**	0.75
Ethylbenzene	.048*/.046**	.085*/.089**	0.75
Xylenes	.256*/.222**	.48*/.443**	0.62
Total BTEX	0.317	0.642	NS
Naphthalene	0.02	0.02	0.030 Combined
1-Methylnaphthalene	<0.05	<0.005	
Benzo [a] pyrene	<0.01	<0.005	0.0007
Vinyl Chloride	<0.002	<0.02	0.001
1,1-Dichloroethene	--	<10	0.005
Methylene Chloride	<0.005	0.11	0.10
1,1-Dichloroethane	<0.001	<0.01	0.025
Chloroform	<0.001	<0.01	0.10
1,2-Dichloroethane	<0.001	<0.01	0.01
1,1,1,-Trichloroethane	<0.001	<0.01	0.06
Carbon Tetrachloride	<0.001	<0.01	0.01
1,1,2-Trichloroethane	<0.001	<0.01	0.1
1,2-Dibromoethane	<0.001	<0.01	NS
1,1,2,2-Tetrachloroethane	<0.001	<0.01	0.01
As	<0.10	<0.1	0.10
Se	<0.05	<0.05	0.05
Cd	<0.01	<0.01	0.01
Cr	<0.05	<0.05	0.05
Pb	<0.05	<0.05	0.05
Ag	<0.01	<0.01	0.05
Ba	0.5	0.4	1.0
Cu	0.03	0.03	1.0
Fe	0.49	0.56	1.0
Mn	0.15	0.11	0.2
Zn	0.1	<0.02	10.0
U	<0.10	<0.10	5.0
Hg	<0.001	<0.001	0.002
pH (su)	8.1	7.2	6 - 9
Ra-226 (pci/L)	2.48	NA	30.0 Combined
Ra-228 (pci/L)	3.89	NA	
TDS	530	960	1000.0
Total PCB	<0.002	<0.002	0.001
Cyanide	<0.01	<0.01	0.20
Phenols	0.15	0.14	0.005
Fluoride	<5.0	<5.0	1.60
Chloride	120	29	250.0
Nitrate-N	<6.0	<6.0	10.0
Sulfate	80	<10	600.0

Analysis Method
* 8020
** 8260

Unless otherwise indicated, all units in milligrams per liter (mg/l).
# New Mexico Water Quality Control Commission, Title 20, Chapter 6, Part 2, Subpart I, Section 3103.A
NA = Not Analyzed NS = No Standard

6.0 CONCLUSIONS

6.1 Soil

Soils in the former emergency overflow pit area exhibit TPH concentrations. TPH concentrations in the soil samples range from 2,610 milligrams per kilogram (mg/kg) to 10,000 mg/kg. Total BTEX concentrations range from 6.66 mg/kg to 64.2 mg/kg. Benzene was not detected in any of the samples. Toluene was detected in two samples (TMW-1, 15 feet bgs and MW-1, 65 feet bgs at a concentration of 1.74 mg/kg and 0.792, respectively. Ethyl-benzene concentrations range from 0.669 mg/kg to 9.39 mg/kg. Xylenes concentrations range from 5.99 mg/kg to 53.1 mg/kg. Chloride concentrations range from 84 mg/kg to 160 mg/kg.

Based on the NMOCD's approval of Altura Energy LTD.'s workplan for the remediation of hydrocarbon impacted soils to achieve a TPH concentration of 100 mg/kg or less and a BTEX concentration of non-detect, soils with analyte concentrations in excess of these remediation levels remain at the site. However, approximately 4,260 cubic yards of hydrocarbon impacted soil has been excavated and removed from this site. Removal of these soils is likely to have removed a potential source of groundwater contamination.

6.2 Groundwater

The groundwater sample collected from temporary monitor well TMW-1 exhibited concentrations in excess of Human Health Standards for groundwater as outlined in New Mexico Water Quality Control Commission, Title 20, Chapter 6, Part 2 (20 NMAC 6.2), section 3103 for benzene (0.044 mg/L), methylene chloride (0.110 mg/L) and phenols (0.14 mg/L). The 20 NMAC 6.2 Human Health Standards for these constituents are 0.01 mg/L, 0.10 mg/L, and 0.005 mg/L, respectively. Methylene chloride is a commonly used cleaning agent for the decontamination of laboratory equipment, and may have been detected as a result of laboratory procedures.

The groundwater sample collected from monitor well MW-1 exhibited a phenols concentration of 0.15 mg/L, which is in excess of the 20 NMAC 6.2 Human Health Standard of 0.005 mg/L.

No other analytes exhibited concentrations in excess of 20 NMAC 6.2 Human Health Standards in either of the groundwater samples.

7.0 RECOMMENDATIONS

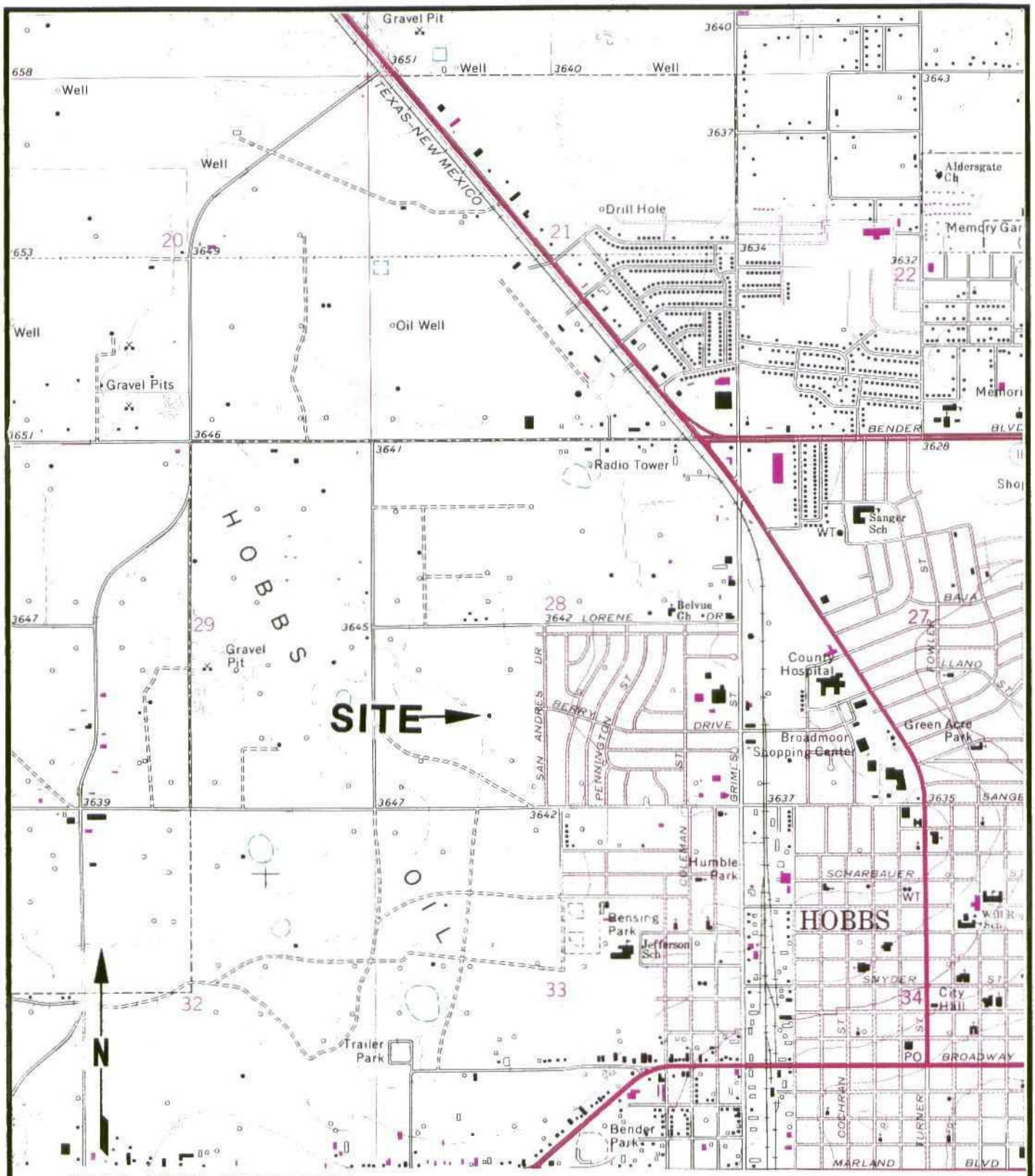
Philip recommends that Shell Exploration and Production Technology Company perform a risk assessment of this site to determine a clean-up level that is protective of human health and the environment. The risk assessment should address potential receptors and potential up-gradient sources of contamination, and should be conducted in accordance with ASTM 1739, Risk Based Closure Assessment for Petroleum Release Sites.

8.0 REFERENCES

Hydrology and Hydrochemistry of the Ogallala Aquifer, Southern High Plains, Texas Panhandle and Eastern New Mexico; Report Number 177; Bureau of Economic Geology; 1988

Hydrogeochemistry and Water Resources of the Lower Dockum Group in the Texas Panhandle and Eastern New Mexico; Report Number 161: Bureau of Economic Geology; 1986

New Mexico Water Quality Control Commission, Title 20 Chapter 6, Part 2, Subpart I



HOBBS WEST QUADRANGLE
NEW MEXICO - LEA Co
7.5 Minute Series (Topographic)
1969
Photo Revised 1979

PHILIP SERVICES CORP

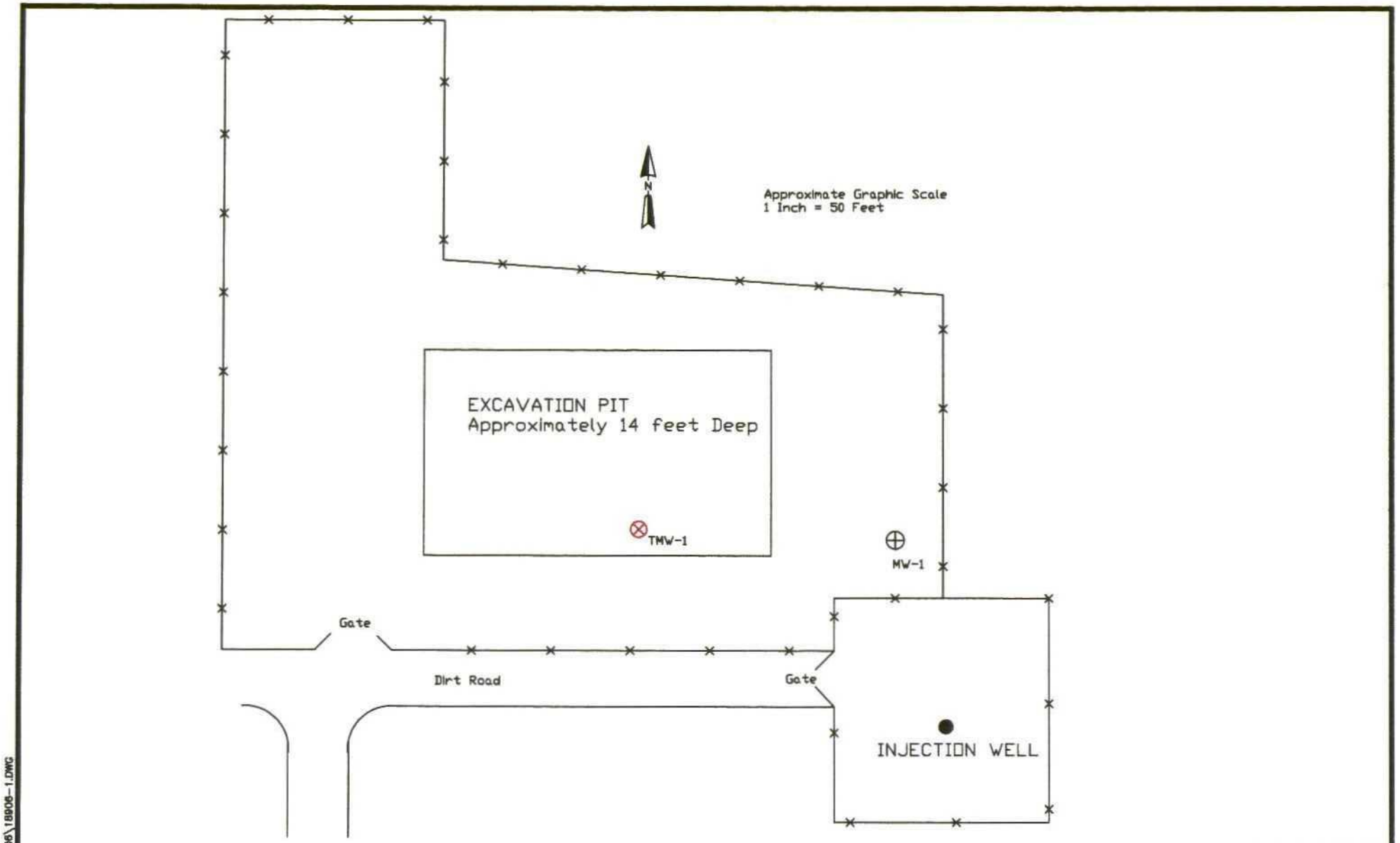
TITLE:
SHELL EXPLORATION & TECHNOLOGY COMPANY
GRIMES BATTERY
SITE LOCATION MAP

DWN:	DES.:
CHKD: seh	APPD: seh
DATE: FEB. 1998	REV.: 1

PROJECT NO.: 18906
GRIMES ASSESSMENT
Hobbs, New Mexico

FIGURE 1

C:\PROJECTS\18906\18906-7.DWG
kd



PHILIP SERVICES CORP

TITLE:

SHELL EXPLORATION & TECHNOLOGY COMPANY
GRIMES BATTERY
MONITOR WELL LOCATIONS

DWN:	DES.:
KO	JWK
CHKD:	APPD:
SEH	SEH
DATE:	REV.:
FEB. 1998	2

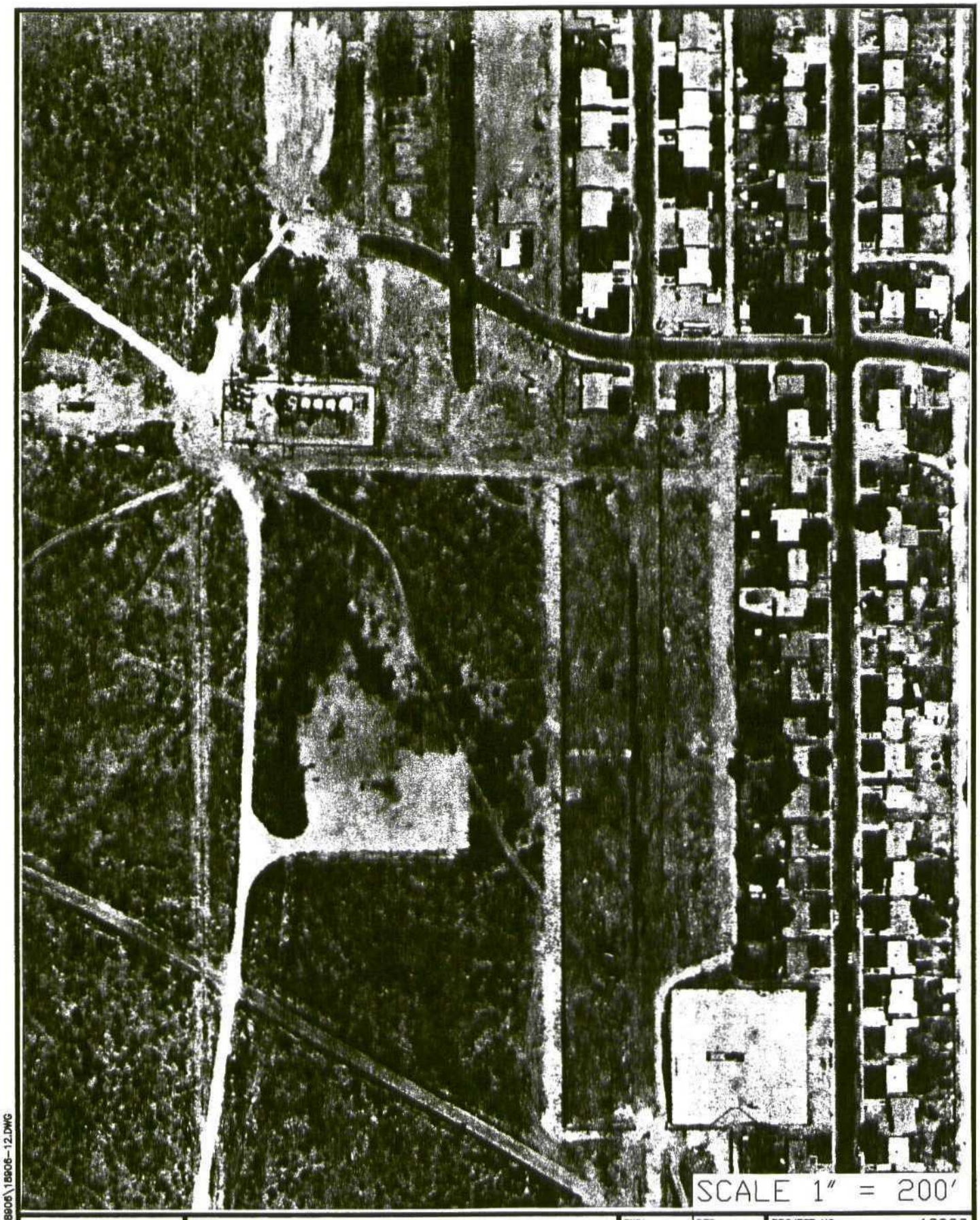
PROJECT NO.: 18906
GRIMES ASSESSMENT
Hobbs, New Mexico

FIGURE 2

C:\PROJECTS\18906\18906-1.DWG
ko

APPENDIX I

AERIAL PHOTOGRAPHS



PSC PHILIP SERVICES CORP

TITLE:
SHELL EXPLORATION & TECHNOLOGY COMPANY
AERIAL PHOTOGRAPH
1978 HOBBS, NEW MEXICO

DWN:	DES.:
CHKD: seh	APPD: seh
DATE: FEB. 1998	REV.: 1

PROJECT NO.: 18906
GRIMES ASSESSMENT
Hobbs, New Mexico

FIGURE I-A

C:\PROJECTS\18906\18906-12.DWG
ko

SCALE 1" = 200'

PSC PHILIP SERVICES CORP

TITLE:

SHELL EXPLORATION & TECHNOLOGY COMPANY

AERIAL PHOTOGRAPH

1988 HOBBS, NEW MEXICO

DWN:	DES.:
CHKD: seh	APPD: seh
DATE: FEB. 1998	REV.: 1

PROJECT NO.: 18906

GRIMES ASSESSMENT
Hobbs, New Mexico

FIGURE I-B

C:\PROJECTS\18906\18906-13.DWG

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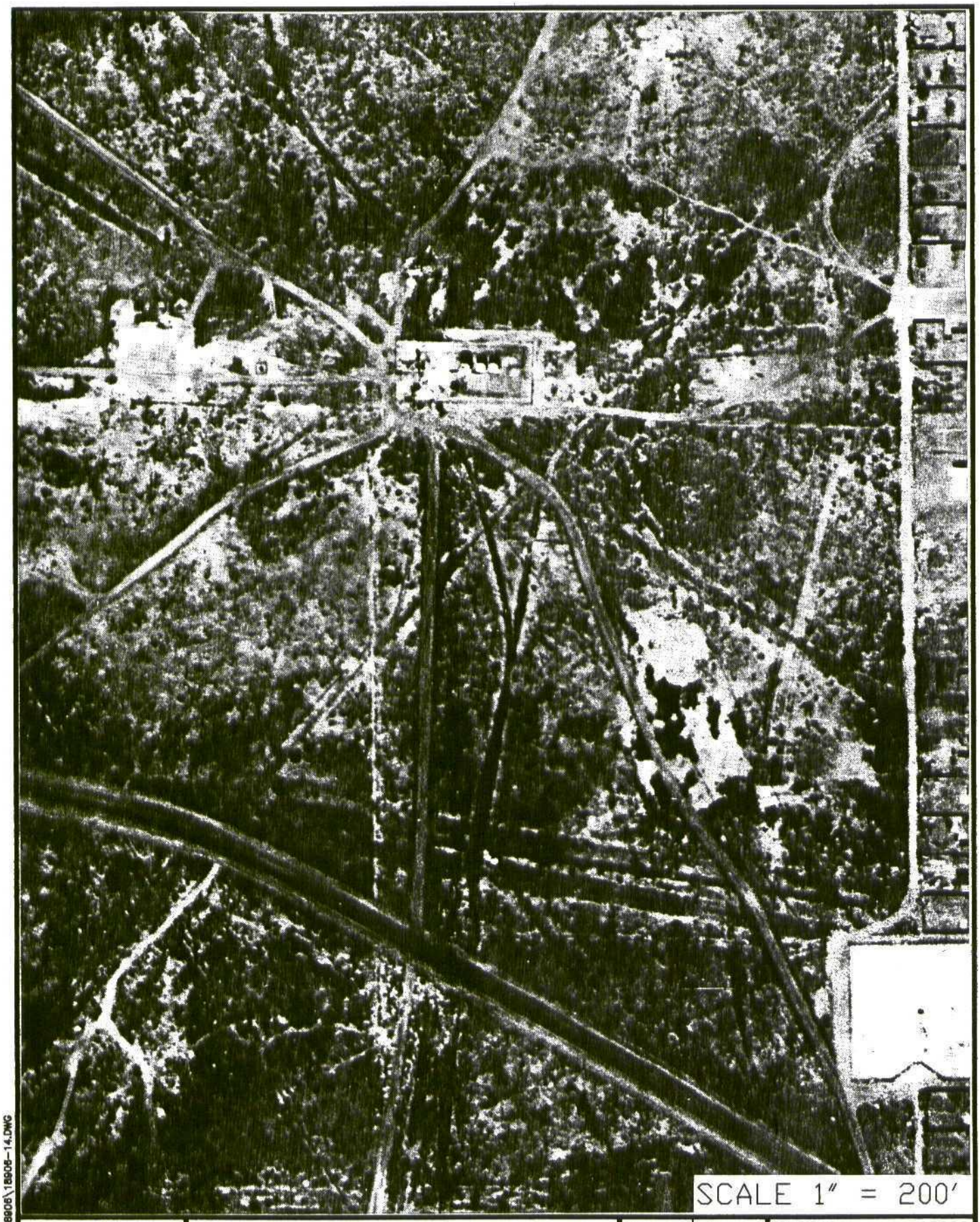

SCALE 1" = 200'

PSC PHILIP SERVICES CORP

TITLE:

SHELL EXPLORATION & TECHNOLOGY COMPANY

AERIAL PHOTOGRAPH

1964 HOBBS, NEW MEXICO

DWN:	DES.:
CHKD: seh	APPD: seh
DATE: FEB. 1998	REV.: 1

PROJECT NO.: 18906

GRIMES ASSESSMENT
Hobbs, New Mexico

FIGURE I-C

C:\PROJECTS\18906\18906-14.DWG

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APPENDIX II

AFFIDAVIT

DRAFT

AFFIDAVIT OF USE AND OCCUPANCY

Post-it™ Fax Note 7671	Date 2/3/98	# of pages ▶
To Sharon Hall	From Wayne Hamilton	
Co./Dept.	Co.	
Phone #	Phone #	
Fax # 915 563-9526	Fax #	

State of New Mexico }

County of Lea }

Bill Weaver, of lawful age, being first duly sw[illegible] upon oath, states: That he resides at 709 Avenue F, Eunice, Texas 88231. That he is well and personally acquainted with the following described lands located in Lea, County, State of New Mexico, to-wit:

Township 18 South, Range 38 East, Section 28: SW/4

That I, Bill Weaver, for a period of over 9 years worked as Lease Operator for Shell Oil Company, as to subject lands, and was employed by Shell Oil Company for more than 36 years in its oil related operations. During this 36 year period, I was kept familiar with subject lands and of which were commonly referred to as the "Grimes Lease".

Affiant states that during his 9 years as Lease Operator for the Grimes Lease, no uncommon procedures occurred on subject lands, other than that which would occur during normal operating procedures. Upon my personal site inspection and my recollection of the Grimes Lease, I can inform that one (1) central production facility was operational as to the Grimes Lease, as to subject lands. Several wells from said lease were producing, however, all of which, by virtue of flow lines, were integrated into the said Central Production Facility along with a Trunk Line co-existing with the Sanger Remote Facility.

Affiant further states that all oil was marketed to Shell Oil Company by underground pipeline and all produced water was disposed of by underground pipeline to a disposal well located off said premises. This procedure was in place from approximately 1950's to 1980's.

Affiant further states, to the best of his knowledge that prior to the 1950's, by common practice, oil was transported by underground pipeline, but water was placed in reserve pits at the battery.

Affiant further states that said leasehold estate was unitized with other lands to form the North Hobbs (Grayburg-San Andres) Unit.

Affiant further states that it has been brought to his attention that a hard pan area exist to the West of Lot 26, of Block 5A of Westgate Addition-2nd Unit, a subdivision of which is part of the original Grimes Lease.

Affiant further states that to the best of his knowledge there is no apparent reason for the existence of said hard pan area, other than that which may have occurred by normal operating conditions.

Bill Weaver

Bill Weaver, Affiant

Subscribed and sworn to be me this 23rd day of December 1997.

STATE OF New Mexico }

COUNTY OF Lea }

ACKNOWLEDGMENT FOR INDIVIDUAL
(Kans. Okla. And Colo.)

Before me, the undersigned, a Notary Public, within and for said County and State, on this 23rd day day of December, 19 97, personally appeared Bill Weaver, a married man

to me personally known to be the identical person who executed the within and foregoing instrument and acknowledged to me that he executed the same as his free and voluntary act and deed for the uses and purposes therein set forth.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal the day and year last above written.

My commission expires January 29, 1999

Janet S. Brooker

JANET S. BROOKER Notary Public

APPENDIX III

BORING LOGS

PHILIP SERVICES CORP

RECORD OF SUBSURFACE EXPLORATION

Project Name: Shell Grimes Battery
Project No. 18906
Borehole Location: Hobbs, Lea County, New Mexico
Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling
Drilling/Rig Methods: Air Rotary 8 1/4"
Date/Time Started: 12/08/97 @ 1135
Date/Time Completion(s): 12/08/97 @ 1430
Air Monitoring Type: Not Applicable
GWL Depth: 65 feet

Depth (feet)	Sample Number	Sample Interval	Sample Type	Sample Description	OVM Readings (ppm)	USCS Symbol	Comments
0-				Backfill material			
5		3-5	SS	Buff limestone (hard)	1	L	Dry No hydrocarbon odor or staining
--10		8-10	SS		1	L	
--15		13-15	SS		1	L	Dry No hydrocarbon odor or staining
--20		18-20	SS	Buff limestone (hard)	0	L	
--25		23-25	SS		0	L	
--30		28-30	SS		0	L	Dry No hydrocarbon odor or staining
--35		33-35	SS		0	L	
--40		38-40	SS	Buff limestone (hard)	1	L	

Comments:

Geologist Signature Jeffrey Kindley

PHILIP SERVICES CORP

RECORD OF SUBSURFACE EXPLORATION

Project Name: Shell Grimes Battery
Project No. 18906
Borehole Location: Hobbs, Lea County, New Mexico
Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling
Drilling/Rig Methods: Air Rotary 8 1/4"
Date/Time Started: 12/08/97 @ 1135
Date/Time Completion(s): 12/08/97 @ 1430
Air Monitoring Type: Not Applicable
GWL Depth: 65 feet

Depth (feet)	Sample Number	Sample Interval	Sample Type	Sample Description	OVM Readings (ppm)	USCS Symbol	Comments
--40-				Buff Limestone (Hard)		L	Dry No hydrocarbon odor or staining
--45		43-45	SS	Tan fine-grain siltysand	1		
--50		48-50	SS		100	SM	Dry Hydrocarbon odor with no staining
--55	MW-1	53-55	SS		120	SM	
--60	MW-1	58-60	SS	Tan fine-grain siltysand	89	SM	Moist
--65		63-65	SS		380	SM	Water on rods at 65 feet
--70		68-70	SS		NA	SM	Wet
--75		73-75	SS		NA	SM	Wet
				Boring terminated at 75 feet			
--80		78-80	SS				

Comments: Boring completed as a monitor well (MW-1). Soil samples collected from 53 to 55 feet and from 58 to 60 feet.

Geologist Signature Jeffrey Kindley

PHILIP SERVICES CORP

RECORD OF SUBSURFACE EXPLORATION

Project Name: Shell Grimes Battery
Project No. 18906
Borehole Location: Hobbs, Lea County, New Mexico
Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling
Drilling/Rig Methods: Air Rotary 8 1/4"
Date/Time Started: 12/05/97 @ 1344
Date/Time Completion(s): 12/08/97 @ 1000
Air Monitoring Type: Not Applicable
GWL Depth: 54 feet

Depth (feet)	Sample Number	Sample Interval	Sample Type	Sample Description	OVM Readings (ppm)	USCS Symbol	Comments
0-							
5		3-5	SS	Buff limestone (hard)	65	L	Dry Hydrocarbon odor with no staining
--10		8-10	SS	with gray hydrocarbon staining	439	L	Dry Hydrocarbon odor
--15	TW-1	13-15	SS	Tan fine-grain silty sand	523		Dry Hydrocarbon odor with no staining
--20		18-20	SS		504	SM	
--25		23-25	SS	with chert	465		Dry- Hydrocarbon odor with no staining
--30		28-30	SS	with brick red sandstone intermixed	5080		Dry Hydrocarbon odor- with no staining-
--35		33-35	SS		379	SM/Ss	
--40				Tan fine-grain sand with chert	395	SM	Hydrocarbon odor- with-no staining-

Comments:

Geologist Signature Jeffrey Kindley

PHILIP SERVICES CORP

RECORD OF SUBSURFACE EXPLORATION

Project Name: Shell Grimes Battery
Project No. 18906
Borehole Location: Hobbs, Lea County, New Mexico
Logged By: Jeffrey Kindley
Drilled By: Scarborough Drilling
Drilling/Rig Methods: Air Rotary 8 1/4"
Date/Time Started: 12/05/97 @ 1344
Date/Time Completion(s): 12/08/97 @ 1000
Air Monitoring Type: Not Applicable
GWL Depth: 54 feet

Depth (feet)	Sample Number	Sample Interval	Sample Type	Sample Description	OVM Readings (ppm)	USCS Symbol	Comments
--40-							
--45	43-45		SS	Tan fine-grain sand	551	SM	Dry Hydrocarbon odor with no staining
--50	48-50		SS		480	SM	Moist
--55	53-55	TW-1	SS		610	SM	Water on rods at 54 feet
--60	58-60		SS		NA	SM	Wet--
--65	63-65		SS		NA	SM	Wet
				Boring terminated at 65 feet			
--70							
--75							
--80							

Comments: Boring completed as a temporary monitor well. Samples collected at 13 to 15 feet below ground level (Bgl) and 48-50 feet Bgl.

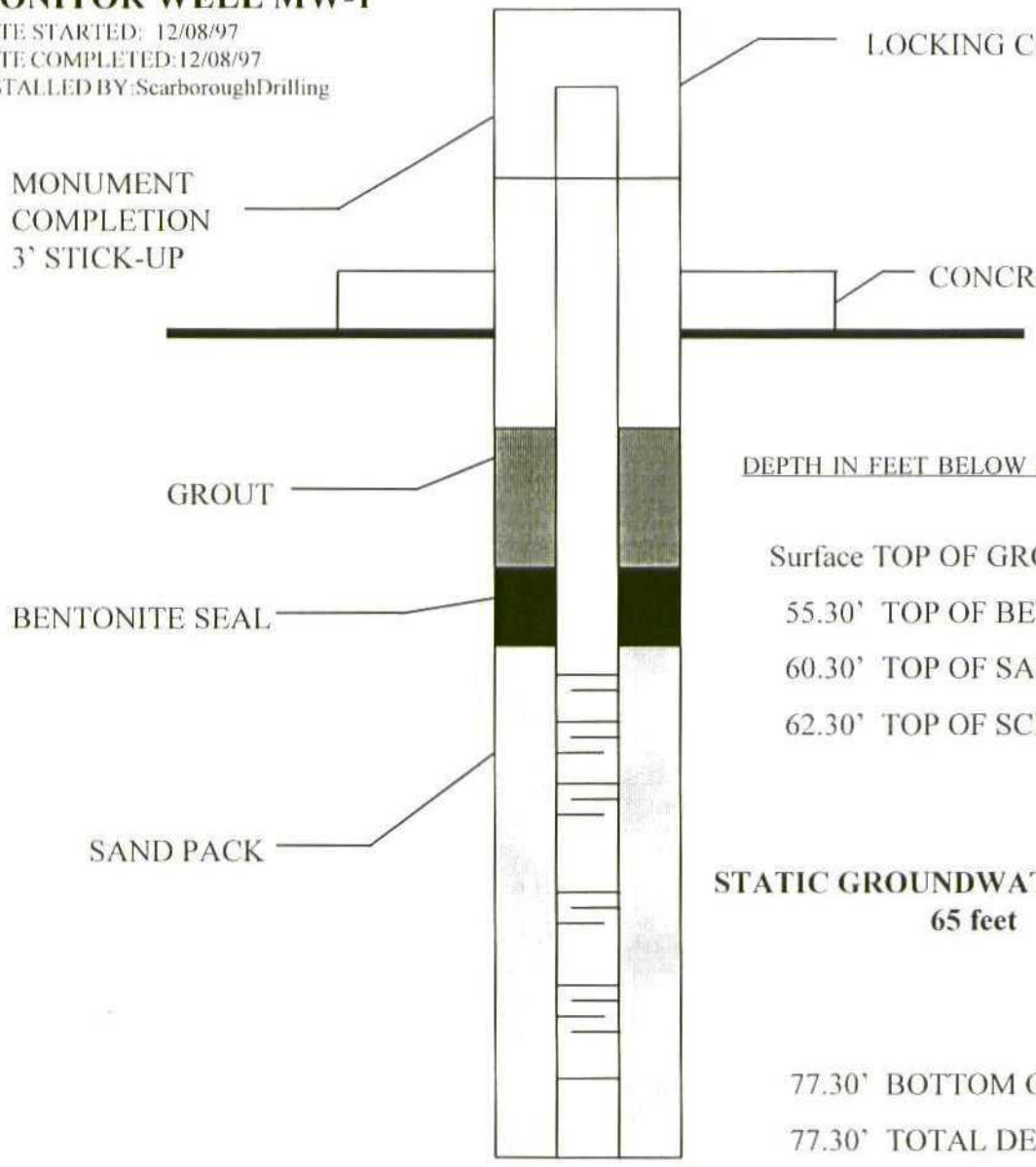
Geologist Signature Jeffrey Kindley

APPENDIX IV

MONITOR WELL COMPLETION DIAGRAMS

MONITOR WELL MW-1

DATE STARTED: 12/08/97
DATE COMPLETED:12/08/97
INSTALLED BY:ScarboroughDrilling



DEPTH IN FEET BELOW LAND SURFACE

Surface TOP OF GROUT
55.30' TOP OF BENTONITE SEAL
60.30' TOP OF SAND PACK
62.30' TOP OF SCREEN

STATIC GROUNDWATER DEPTH:
65 feet

77.30' BOTTOM OF SCREEN
77.30' TOTAL DEPTH

CASING TYPE: 4" SCH. 40 PVC
SCREEN TYPE: SCH. 40 PVC 0.020 SLOT
GRAVEL PACK: 08/16 VOLUME SILICA SAND

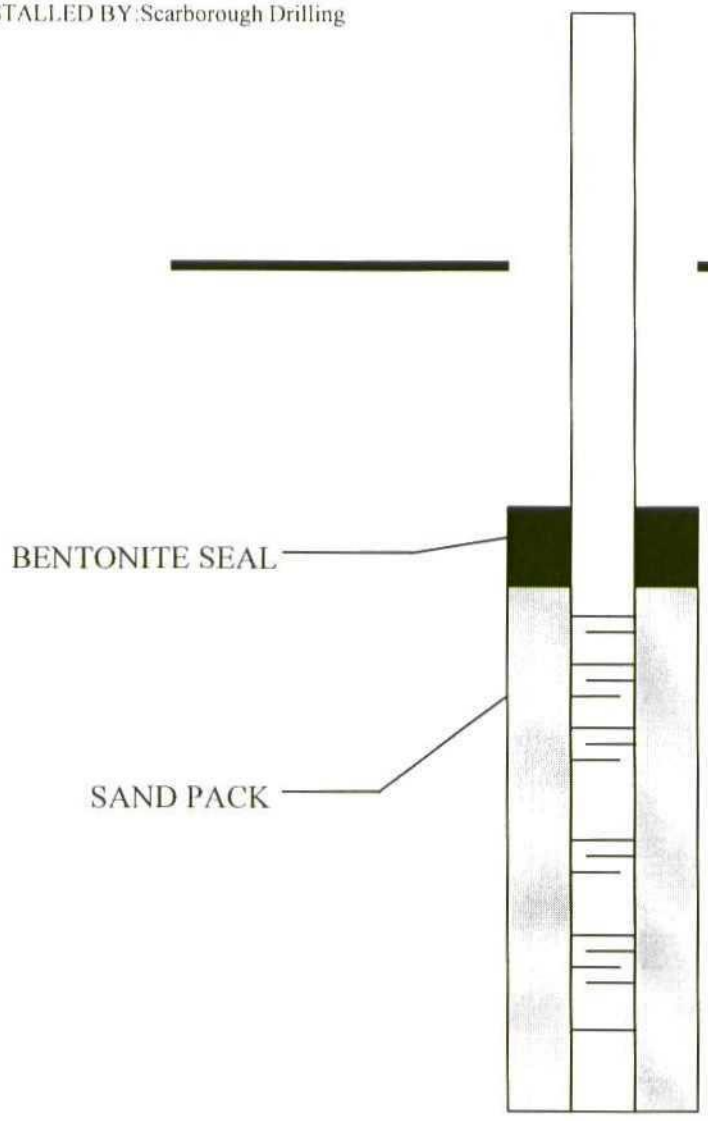
PHILIP SERVICES CORPORATION

Monitor Well Installation Diagram

SHELL GRIMES BATTERY
HOBBS, LEA COUNTY, NEW MEXICO
Project Number 18906

TEMPORARY WELL TMW-1

DATE STARTED: 12/05/97
DATE COMPLETED:12/08/97
INSTALLED BY:Scarborough Drilling



DEPTH IN FEET BELOW LAND SURFACE

NO GROUT USED

42.70' TOP OF BENTONITE SEAL

47.70' TOP OF SAND PACK

49.70' TOP OF SCREEN

STATIC GROUNDWATER DEPTH:
54 feet

64.70' BOTTOM OF SCREEN

65.00' TOTAL DEPTH

CASING TYPE: 2" SCH. 40 PVC
SCREEN TYPE: SCH. 40 PVC 0.020 SLOT
GRAVEL PACK: 08/16 VOLUME SILICA SAND

PHILIP SERVICES CORPORATION

Temporary Well Installation Diagram

SHELL GRIMES BATTERY
HOBBS, LEA COUNTY, NEW MEXICO
Project Number 18906

APPENDIX V

SITE PHOTOGRAPHS

Drilling TMW-1

Completed TMW-1

Plugged TMW-1

Drilling MW-1

Completion of MW-1

Completed MW-1

APPENDIX VI

LABORATORY ANALYSIS

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
PHILIP SERVICES CORPORATION
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

December 30, 1997
Receiving Date: 12/10/97
Sample Type: Water
Project No: 18906
Project Location: Hobbs, NM

Prep Date: 12/18/97
Analysis Date: 12/18/97
Sampling Date: 12/05,08/97
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Shell Hobbs, NM

TA#	FIELD CODE	PHENOL (mg/L)	FLUORIDE (mg/L)	CHLORIDE (mg/L)	NITRATE-N (mg/L)	SULFATE (mg/L)
T86989	MW-1	0.15	<5.0	120	<6.0	80
T86990	TMW-1	0.14	<5.0	29	<6.0	<10
QC	Quality Control	0.77	5.0	24	9.4	24
RPD		3	2	0	0	2
% Extraction Accuracy		98	99	97	93	98
% Instrument Accuracy		96	99	96	94	96
REPORTING LIMIT		0.002	5.0	20	6.0	10

METHODS: EOA 300.0, 420.2.
CHEMIST: RC
SPIKE: 5.0 mg/L FLUORIDE; 25 mg/L CHLORIDE, SULFATE; 10 mg/L NITRATE-N; 0.8 mg/L PHENOL.
QC: 4.9 mg/L FLUORIDE; 24 mg/L CHLORIDE, SULFATE; 9.3 mg/L NITRATE-N; 0.8 mg/L PHENOL.

M. Kopes
Director, Dr. Blair Leftwich

12-30-97
Date

TRACE ANALYSIS, INC.

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP SERVICES CORPORATION
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

December 30, 1997
Receiving Date: 12/16/97
Sample Type: Water
Project No: 18906
Project Location: Hobbs, NM

Prep Date: 12/22/97
Analysis Date: 12/22/97
Sampling Date: 12/15/97
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Shell Hobbs, NM

TA#	FIELD CODE	PHENOLS (mg/L)
T87406	MW-1	0.10
QC	Quality Control	0.77
REPORTING LIMIT		0.002
RPD		3
% Extraction Accuracy		98
% Instrument Accuracy		96

METHODS: EPA 420.2.
CHEMIST: RC
PHENOL SPIKE AND QC: 0.8 mg/L PHENOL.

Director, Dr. Blair Leftwich

12-30-97
DATE

TRACEANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
PHILIP SERVICES CORPORATION
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

December 22, 1997
Receiving Date: 12/10/97
Sample Type: Water
Project No: 18906
Project Location: Hobbs, NM

Prep Date: 12/10/97
Analysis Date: 12/10/97
Sampling Date: 12/05,08/97
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Shell Hobbs, NM

TA#	FIELD CODE	pH (s.u.)	TDS (mg/L)	TOTAL PCB (mg/L)	CYANIDE (mg/L)
T86989	MW-1	8.1	530	<0.002	<0.01
T86990	TMW-1	7.2	960	<0.002	<0.01
QC	Quality Control	8.0	—	0.39	0.038
RPD		0	4	19	3
% Extraction Accuracy		—	—	74	94
% Instrument Accuracy		100	102	98	96
REPORTING LIMIT		—	—	0.002	0.01

METHODS: EOA SW 846-3510, 8080; EPA 150.1, 160.1, 335.2.
CHEMIST: pH/TDS: JS TOTAL PCB: MB CYANIDE: RC
TOTAL PCB SPIKE: 0.005 mg/L TOTAL PCB.
TOTAL PCB QC: 0.5 mg/L TOTAL PCB.
CYANIDE SPIKE AND QC: 0.04 mg/L CYANIDE.

Director, Dr. Blair Leftwich

12-22-97
Date

TRACEANALYSIS, INC.

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP SERVICES CORPORATION
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

December 22, 1997
Receiving Date: 12/10/97
Sample Type: Water
Project No: 18906
Project Location: Hobbs, NM

Prep Date: 12/11/97
Analysis Date: 12/11/97
Sampling Date: 12/05/97
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Shell Hobbs, NM

TA #: T86990
FIELD CODE: TMW-1

8260 Compounds	Reporting Limit	Concentration (ug/L)	QC	RPD	%EA	%IA
Vinyl chloride	20	ND	104			104
1,1-Dichloroethene	10	ND	103	8	92	103
Methylene chloride	50	110				
1,1-Dichloroethane	10	ND				
Chloroform	10	ND	103			103
1,2-Dichloroethane	10	ND				
1,1,1-Trichloroethane	10	ND				
Carbon Tetrachloride	10	ND				
Benzene	10	44		7	112	
Toluene	10	44	108	6	110	108
1,1,2-Trichloroethane	10	ND				
1,2-Dibromoethane	10	ND				
Ethylbenzene	10	89	102			102
m & p-Xylene	10	340				
o-Xylene	10	103				
1,1,2,2-Tetrachloroethane	10	ND				

SURROGATES	% RECOVERY
Dibromofluoromethane	110
Toluene-d8	98
4-Bromofluorobenzene	98

ND = NOT DETECTED

METHODS: EPA SW 846-8260.
CHEMIST: RW

Director, Dr. Blair Leftwich

12-22-97
Date

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP SERVICES CORPORATION
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

December 22, 1997
Receiving Date: 12/10/97
Sample Type: Water
Project No: 18906
Project Location: Hobbs, NM

Prep Date: 12/11/97
Analysis Date: 12/11/97
Sampling Date: 12/08/97
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Shell Hobbs, NM

TA #: T86989
FIELD CODE: MW-1

8260 Compounds	Reporting Limit	Concentration (ug/L)	QC	RPD	%EA	%IA
Vinyl chloride	2	ND	104			104
Methylene chloride	5	ND				
trans-1,2-Dichloroethene	1	ND				
1,1-Dichloroethane	1	ND				
Chloroform	1	ND	103			103
1,2-Dichloroethane	1	ND				
1,1,1-Trichloroethane	1	ND				
Carbon Tetrachloride	1	ND				
Benzene	1	5.5		7	112	
Toluene	1	6.1	108	6	110	108
1,1,2-Trichloroethane	1	ND				
1,2-Dibromoethane	1	ND				
Ethylbenzene	1	46	102			102
m & p-Xylene	1	170				
o-Xylene	1	52				
1,1,2,2-Tetrachloroethane	1	ND				

SURROGATES	% RECOVERY
Dibromofluoromethane	109
Toluene-d8	98
4-Bromofluorobenzene	99

ND = NOT DETECTED

METHODS: EPA SW 846-8260.
CHEMIST: RW

Director, Dr. Blair Leftwich

12-22-97
Date

TRACE ANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
Philip Environmental
Attention Jeff Kindley
7904 I-20 West
Midland TX 79706

Lab Receiving # : 9712000179
Date Rec: 12/10/97
Sampling Date: 12/5/97 - 12/8/97
Sample Condition: Intact and Cool
Sample Received By: VW

Date: Dec 15, 1997
Project: 18906
Proj Name: Shell
Proj Loc: Hobbs, New Mexico

TA#	Field Code	MATRIX	MTBE (mg/L)	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL-BENZENE (mg/L)	M,P,O XYLENE (mg/L)	TOTAL BTEX (mg/L)
T86989	MW-1	Water	<0.001	0.007	0.006	0.048	0.256	0.317
T86990	TMW-1	Water	0.011	0.044	0.033	0.085	0.480	0.642
	Method Blank		<0.001	<0.001	<0.001	<0.001	<0.001	
	Reporting Limit		0.001	0.001	0.001	0.001	0.001	
	QC		0.109	0.097	0.096	0.104	0.318	
	RPD		3	2	2	2	2	
	% Extraction Accuracy		111	98	95	102	107	
	% Instrument Accuracy		109	97	96	104	106	

TEST	PREP METHOD	PREP DATE	ANALYSIS METHOD	ANALYSIS COMPLETED	CHEMIST	QC: (mg/L)	SPIKE: (mg/L)
BTEX	EPA 5030	12/10/97	EPA 8020	12/10/97	AG	0.100 ea	0.1 ea

BS
Director, Dr. Blair Leftwich

12-15-97
Date

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP SERVICES CORPORATION
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

December 22, 1997
Receiving Date: 12/10/97
Sample Type: Water
Proj. Loc.: Hobbs, NM
Sampling Date: 12/05/97
Sample Condition: I & C
Sample Received by: VW
Project Name: Shell Hobbs, NM
Extraction Date: 12/11/97
Analysis Date: 12/15/97

PAH Reporting T86990

8270 Compounds (mg/L)	Limit*	TMW-1	QC	RPD	%EA	%IA
Naphthalene	0.005	0.02	73	4	45	91
Benzo[a]pyrene	0.005	ND	78	2	73	98
1-methyl-Naphthalene	0.005	ND	---	---	---	---

ND = Not Detected

SURROGATES	% RECOVERY
Nitrobenzene-d5 SURR	55
2-Fluorobiphenyl SURR	60
Terphenyl-d14 SURR	50

*NOTE: Elevated reporting limit due to matrix effect.

METHODS: EPA SW 846-8270, 3510.
CHEMIST: RP/HW

Director, Dr. Blair Leftwich

12-22-97
DATE

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP SERVICES CORPORATION
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

December 22, 1997
Receiving Date: 12/10/97
Sample Type: Water
Proj. Loc.: Hobbs, NM
Sampling Date: 12/08/97
Sample Condition: I & C
Sample Received by: VW
Project Name: Shell Hobbs, NM
Extraction Date: 12/11/97
Analysis Date: 12/11/97

PAH **Reporting** **T86989**

8270 Compounds (mg/L)	Limit*	MW-1	QC	RPD	%EA	%IA
Naphthalene	0.01	0.02	73	4	45	91
Benzo[a]pyrene	0.01	ND	78	2	73	98
1-Methylnaphthalene	0.05	ND	---	---	---	---

ND = Not Detected

SURROGATES	% RECOVERY
Nitrobenzene-d5 SURR	80
2-Fluorobiphenyl SURR	80
Terphenyl-d14 SURR	80

*NOTE: Elevated reporting limit due to matrix effect.

METHODS: EPA SW 846-8270, 3510.
CHEMIST: RP/HW

12-22-97

Director, Dr. Blair Leftwich DATE

TRACE ANALYSIS, INC.
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ANALYTICAL RESULTS FOR
PHILIP SERVICES CORPORATION
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

December 22, 1997
Receiving Date: 12/10/97
Sample Type: Water
Project No: 18906
Project Location: Hobbs, NM

Prep Date: 12/09/97
Analysis Date: 12/11/97
Sampling Date: 12/05,08/97
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Shell Hobbs, NM

TA#	FIELD CODE	As (mg/L)	Se (mg/L)	Cd (mg/L)	Cr (mg/L)	Pb (mg/L)	Ag (mg/L)	Ba (mg/L)	Cu (mg/L)	Fe (mg/L)	Mn (mg/L)	Zn (mg/L)	U (mg/L)	Hg (mg/L)
T86989	MW-1	<0.10	<0.05	<0.01	<0.05	<0.05	<0.01	0.5	0.03	0.49	0.15	0.10	<0.10	<0.001
T86990	TMW-1	<0.10	<0.05	<0.01	<0.05	<0.05	<0.01	0.4	0.03	0.56	0.11	<0.02	<0.10	<0.001
QC	Quality Control	4.8	5.0	4.8	4.7	4.8	0.98	5.0	4.8	4.6	4.8	4.9	5.1	0.0054
REPORTING LIMIT		0.10	0.05	0.01	0.05	0.05	0.01	0.20	0.02	0.10	0.03	0.02	0.10	0.001
RPD		3	2	0	0	1	6	1	2	2	0	0	5	2
% Extraction Accuracy		93	102	98	93	92	79	99	79	92	92	92	100	105
% Instrument Accuracy		96	100	95	93	96	98	100	96	92	95	97	102	108

METHODS: EPA SW 846-3015, 6010B, 7470.
CHEMIST: As, Se, Cd, Cr, Pb, Ag, Ba, cu, Fe, Mn, Zn, U; RR Hg; HC
TOTAL METALS SPIKE: 2.0 mg/L As, Se, Cd, Cr, Pb, Ba, Cu, Fe, Mn, Zn, U; 1.0 mg/L Ag; 0.005 mg/L Hg.
TOTAL METALS QC: 5.0 mg/L As, Se, Cd, Cr, Pb, Ba, Cu, Fe, Mn, Zn, U; 1.0 mg/L Ag; 0.005 mg/L Hg.

Director, Dr. Blair Leftwich

12-22-97
Date

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ANALYTICAL RESULTS FOR
Philip Environmental
Attention Jeff Kindley
7904 I-20 West
Midland TX 79706

Lab Receiving # : 9712000178
Sampling Date: 12/5/97 - 12/8/97
Sample Condition: Intact and Cool
Sample Received By: VW

Date: Dec 11, 1997
Date Rec: 12/10/97
Project: 18906
Proj Name: Shell
Proj Loc: Hobbs, New Mexico

TA#	Field Code	MATRIX	TRPHC (mg/Kg)	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL-BENZENE (mg/Kg)	M,P,O XYLENE (mg/Kg)	TOTAL BTEX (mg/Kg)
T86985	TMW-1 (15')	Soil	10,300	<0.500	1.74	9.39	53.1	64.2
T86986	TMW-1 (50')	Soil	3,930	<0.500	<0.500	2.19	18.6	20.8
T86987	MW-1 (55')	Soil	2,610	<0.100	<0.100	0.669	5.99	6.66
T86988	MW-1 (65')	Soil	4,650	<0.500	0.792	2.68	19.3	22.8
Method Blank			<10.0	<0.050	<0.050	<0.050	<0.050	
Reporting Limit			10	0.05	0.05	0.05	0.05	
QC			102	0.109	0.106	0.105	0.329	
RPD			1	4	4	4	4	
% Extraction Accuracy			100	101	97	96	102	
% Instrument Accuracy			102	109	106	105	110	

TEST	PREP METHOD	PREP DATE	ANALYSIS METHOD	ANALYSIS COMPLETED	CHEMIST	QC: (mg/L)	SPIKE: (mg/Kg)
BTEX	EPA 5030	12/10/97	EPA 8020	12/10/97	AG	0.1 ea	5 ea
TRPHC	EPA 3550	12/10/97	EPA 418.1	12/10/97	MS	100	250

Director, Dr. Blair Leftwich

12-11-97
Date

TRACE ANALYSIS, INC.

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E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
PHILIP SERVICES CORPORATION
Attention: Jeff Kindley
7904 I-20 West
Midland, TX 79706

December 22, 1997
Receiving Date: 12/10/97
Sample Type: Soil
Project No: 18906
Project Location: Hobbs, NM

Prep Date: 12/17/97
Analysis Date: 12/17/97
Sampling Date: 12/05,08/97
Sample Condition: Intact & Cool
Sample Received by: VW
Project Name: Shell Hobbs, NM

TA#	FIELD CODE	CHLORIDE (mg/kg)
T86985	TMW-1 (15')	160
T86986	TMW-1 (50')	110
T86987	MW-1 (55')	84
T86988	MW-1 (65')	88
QC	Quality Control	25
REPORTING LIMIT		40
RPD		1
% Extraction Accuracy		101
% Instrument Accuracy		100

METHODS: EPA 300.0.
CHEMIST: RC
CHLORIDE SPIKE: 25 mg/kg CHLORIDE.
CHLORIDE QC: 25 mg/L CHLORIDE.

Director, Dr. Blair Leftwich

12-22-97
DATE

AMERICAN RADIATION SERVICES, INC.

1726 Wooddale Court • Baton Rouge, Louisiana 70806

1 (800) 401-4277 • Fax (504) 927-6822

ARS Tracking Number:	ARS-97-1152	**P.O. Number:**	N/A
Client I.D.:	87406	**ARS Sample I.D.:**	ARS-97-4184
Date Sampled:	N/A	**Date Received:**	12/17/97
Time Sampled:	N/A	**Time Received**	1530
Type of Sample:	Liquid	**Date of Report**	1/2/98

Analysis Description	Analysis Result	Analysis Error $\pm 2\sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Ra-226	2.48	0.70	1.23	pCi/L	EPA 903	12/31/97 1624	NC
Ra-228	3.89	1.32	1.68	pCi/L	EPA 904	12/26/97 1826	NC

Quality Assurance Review

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

AMERICAN RADIATION SERVICES, INC.
1726 Wooddale Court • Baton Rouge, Louisiana 70806
1 (800) 401-4277 • Fax (504) 927-6822

Notes:

Comments:

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

Method References:

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

Definitions:

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

TraceAnalysis, Inc.

6701 Aberdeen Avenue, Ste. 9 Lubbock, Texas 79424
Tel (806) 794 1296 Fax (806) 794 1298
1 (800) 378 1296

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

LAB Order ID #: _____

Company Name: Philip Services Corporation
Phone #: (915) 563-0118
Address: 7904 I H 20 West Midland, Tx 79706
Fax #: (915) 563-9526
Contact Person: Mr. Jeffrey Kindley
Invoice to: (If different from above) SAME
Project #: 18906
Project Name: Shell Hobbs
Project Location: Hobbs, New Mexico
Sampler Signature: Jeffrey W. Kindley

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	SAMPLING: DATE	TIME
87406	MW-1	2	40ml VOA	✓				✓				12/15/97	1100
	MW-1	1	1Liter	✓							✓	12/15/97	1100
	MW-1	1	1Liter	✓							✓	12/15/97	1100

ANALYSIS REQUEST
(Circle or Specify Method No.)

MTBE 8020/602	BTEX 8020/602	TPH	PAH 8270	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC/MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 8080/608	BOD, TSS, PH	Phenols	Radium			Turn Around Time if different from standard	Hold Use if needed
														✓	✓				✓

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Jeffrey Kindley	12/15/97	438			
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received at Laboratory by:	Date:	Time:
J Thomas	12/15	4:38	Vicki Wyndham	12-16-97	9:20 AM

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C.O.C.

LAB USE ONLY

Intact Y / N
Headspace Y / N
Temp 1 °C
Log-in Review ML

REMARKS:
Normal Turnaround
350AO

Carrier # Bus 155 758 818 6

30 [redacted] 0 [redacted] Page [redacted] of [redacted]

87406

TraceAnalysis, Inc.

6701 Aberdeen Avenue, Ste. 9 Lubbock, Texas 79424
Tel (806) 794 1296 Fax (806) 794 1298
1 (800) 378 1296

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

LAB Order ID # 178 / 179

Company Name: Philip Services Corporation
Phone #: (915) 563-0118
Address: 7904 IH 20 West, Midland, Tx 79707
Fax #: (915) 563-9526
Contact Person: Jeffrey Kindley
Invoice to: (If different from above) SAA
Project #: 18906
Project Name: Shell Hobbs New Mexico
Project Location: Hobbs, New Mexico
Sampler Signature: Jeffrey Kindley

ANALYSIS REQUEST
(Circle or Specify Method No.)

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	SAMPLING: DATE	TIME	MTBE 8020/602	BTEX 8020/602	TPH	PAH 8270	Total Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC/MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 8080/608	BOD, TSS, PH	Total Chlorides	See Attached List Section A+B in NM Human Health Standards	Turn Around Time if different from standard	Hold
86985	TMW-1 (15')	1			✓						✓	12/05/97	1404		✓	✓												✓			
86	TMW-1 (50')	1			✓						✓	12/05/97	1501		✓	✓												✓			
87	MW-1 (55')	1			✓						✓	12/08/97	1252		✓	✓												✓			
88	MW-1 (OWK) (65')	1			✓						✓	12/08/97	1258		✓	✓												✓			
89	MW-1	2	40ml vials	✓				✓				12/08/97	1510	✓	✓														✓			
	MW-1	1	liter	✓							✓	12/08/97	1510															✓			
	MW-1	1	1 Liter	✓				✓				12/08/97	1510																✓			
90	TMW-1	1	40ml	✓				✓				12/05/97	1438	✓	✓														✓			
	TMW-1	1	1 Liter	✓							✓	12/05/97	1438																✓			
	TMW-1	1	1 Liter	✓				✓			✓	12/05/97	1438																✓			

Relinquished by: Jeffrey Kindley Date: December 9, 1997 Time: 4:10PM
Received by: Helen Shelton Date: 12/9/97 Time: 4:10PM
Relinquished by: Helen Shelton Date: 12/9/97 Time: 5:45PM
Received by: Date: Time:
Relinquished by: Date: Time:
Received at Laboratory by: Vicki Windham Date: 12-10-97 Time: 9:50am

12-10-97

REMARKS: Notified Jeff short on samples Jeff will send sample for phenols, Radium for MW-1. Normal Turnaround (See attached)

K

LAB USE ONLY
Intact (Y) N
Headspace Y (N)
Temp 3°
Log-in Review VW

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of C.O.C. 11 samples-HS

Carrier # Greyhound $155758816 4