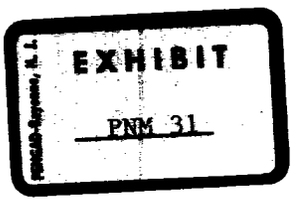
BURLINGTON RESOURCES

Burlington Resources Oil & Gas Co.
Data Summary
Hampton 4M Production Location

August 1997



BURLINGTON RESOURCES

SAN JUAN DIVISION

July 30, 1997 *Certified P 358 636 562*

Bill Olson
New Mexico Oil Conservation Division
2040 S. Pacheco
Santa Fe, NM 85704

RE: Hampton 4M - Groundwater Contamination
Unit Letter N, Section 13, Township 30N, Range 11W

Dear Mr. Olson

On December 16, 1996 PNM Gas Services (PNM) discovered contaminated groundwater at the Hampton 4M gas production location. This location is owned and operated by Burlington Resources Oil and Gas Inc. (Burlington). Since the discovery of contaminated groundwater, action has been taken to identify the source of hydrocarbon contamination.

The Hampton 4M gas production location is located approximately 3 miles East of Aztec, NM (Figure 1). Figure 2 illustrates all equipment and the orientation of that equipment on the pad surface. Burlington owns and operates the location and PNM Gas Services owns and operates two dehydrators with associated equipment on the Northern end of the location. Burlington's equipment is all situated to the South of the well head.

-Work Done To Date-

Beginning in December of 1996, actions have been taken to address the contamination at the Hampton 4M production location. Following is a chronological summary of the events at the Hampton 4M.

December 16, 1996 *Vertical Extent Drilling*	To determine the vertical extent of hydrocarbon contamination in the former dehydrator discharge pit, PNM conducted vertical extent drilling. Beneath the center of the former discharge pit, PNM encountered groundwater at approximately 28 feet. At that time monitoring Well 2, MW-2, was installed (see Figure 2 for monitoring well location). Samples from the groundwater indicated total BTEX of 20,620 ppb v/v and a benzene concentration of 3,840 ppb v/v.
January 13, 1997 *Notification*	PNM notified NMOCD in writing of groundwater contamination at the site.
January 28, 1997 *Sampling*	PNM gauged MW-2 and approximately 4 feet of free phase floating product was discovered in the well.
January 31, 1997 *MW-3 and MW-4 Installation*	PNM installed two additional monitoring wells, MW-3 and MW-4. Water level, product measurements and groundwater samples were taken in all three monitoring wells at the time of the installation. All samples were analyzed for BTEX compounds (RM 8020).
February 4, 1997 *On-site Meeting*	PNM hosted an on-site meeting with the NMOCD, and Burlington to discuss remediation options at the site.
April 9, 1997 *On-site Meeting*	On site visit with Burlington and PNM

2535 East 30th St. 87402-8801. P.O. Box 4289. Farmington. New Mexico 87499-4289. Telephone 505-326-9700. Fax 505-326-9833

April 14, 1997 ***Off-site Hydrocarbon Seep Discovered***	During a site visit Burlington discovered a surface seep of hydrocarbons to the north of the well pad. Free phase hydrocarbons were found seeping from the ground surface into a small drainage area. Burlington notified both NMOCD and PNM about the hydrocarbon seep.
April 16, 1997 ***On-site Meeting***	Burlington hosted an on-site meeting with PNM, and NMOCD to discuss the off-site hydrocarbon seep. NMOCD asked that immediate action be taken to contain the seep. The group agreed that a collection trench should be installed to slow or stop the hydrocarbons seep.
April 16, 1997 ***Archeological Clearance***	Burlington Resources obtained archeological clearance to construct an off-site collection trench to the north of the well location (Figure 2).
April 17, 1997 ***Collection Trench Construction***	Burlington constructed a collection trench to the north of the well location. The trench was situated between the hydrocarbon seep and the well location. A sandstone shelf was encountered six to eight feet below the ground surface. Black to gray saturated soil with signs of hydrocarbons were found on top of the sandstone shelf. No analytical samples were taken. P.I.D. readings were in the 1,000 ppm to 2,000 ppm range. Water and a small amount of hydrocarbons began collecting in the trench.
April 30, 1997 ***Tank Discharge Pit Excavation***	Burlington attempted to excavate the area of the former tank discharge pit. Sandstone was encountered at one foot below the bottom of the pit. The excavator could not penetrate the sandstone. A PID survey of the soil and sandstone revealed no volatile hydrocarbons. No visual signs of hydrocarbon contamination existed. To identify any hydrocarbon contaminated area, Burlington began excavating 9 to 10 test holes over the location. On the southern end of the location sandstone was encountered at 0 to 1 foot below the surface. Sandstone dipped sharply to the north to a depth of approximately 15 feet below the surface. No hydrocarbon contaminated areas were found in any of the test holes. .
June 4, 1997 ***On-site Meeting***	Burlington hosted an on-site meeting with PNM and NMOCD to discuss further investigation at the site. The group agreed to continue surveying using a soil boring rig.
June 5, 1997 ***Soil Boring***	Three holes were bored on the site just to the south of PNM's dehydrators and discharge tank. Figure 2 shows the location of each borehole and the results of groundwater and soil samples. Information gathered during the boring was soil characteristics and soil vapor analysis every five feet to groundwater. A soil sample, for laboratory analysis, was taken just above the water level and a groundwater sample will be taken. .
June 6, 1997 ***Soil Boring***	Burlington continued soil boring on the location. A total of four more points were bored. These points are shown in Figure 2.
June 10, 199 ***Meeting - Discussion of Boring Results***	Burlington and PNM met to discuss costs for other groundwater sites and to discuss the results of the soil boring at the Hampton 4M.

-Sample Results-

The results of all analytical samples taken to date at the Hampton 4M are listed in Table 1. Provided with the results of the samples is supporting information about the depth to water in feet, the depth the sample was taken in feet, and the matrix of the sample. Water samples were only analyzed for Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) compounds. Each soil sample was analyzed for BTEX compounds and Total Petroleum Hydrocarbons (TPH). Associated backup for all analytical samples is located in Appendix A.

-Monitoring Wells-

Three permanent groundwater monitoring wells were installed on location (Figure 2). Monitoring Well 2 (MW-2) was installed in the center of the former gas dehydrator discharge pit operated by PNM. MW-3 and MW-4 were installed to establish the groundwater gradient under the location. A contour map of the groundwater was developed from water level information in the monitoring wells (Figure 3). The contour surface map shows the groundwater flows northwest across the location.

Groundwater in the permanent monitoring wells has been sampled twice. Results of the sampling events are summarized in Table 1. Samples of groundwater in MW-3 and MW-4 for BTEX compounds revealed dissolved phase contamination in MW-4 but not in MW-3, indicating a contamination source upgradient of MW-4. Approximately 4 feet of a Non-Aqueous Phase Liquid (NAPL) was discovered on the top of the groundwater in MW-2.

Samples were taken of the NAPL in MW-2 and compared to samples of produced hydrocarbons stored on the location. Fingerprinting analysis revealed that the NAPL in MW-2 is similar to produced hydrocarbons from the Dakota formation stored on location. Copies of the analysis and results are provided in Appendix A - Sample Backup. Due to the NAPL, the groundwater from MW-2 well has not been analyzed for BTEX compounds.

It is thought that there are two separate sources of groundwater contamination at the Hampton 4M location. One source is the former discharge pit for the gas dehydrators operated by PNM and the second source being upgradient of MW-4 supplying a dissolved phase BTEX component. This is supported by the fact that a NAPL on the groundwater has only been found in the area directly around the dehydration equipment.

-Temporary Wells-

To identify the second contaminant source, Burlington initiated an investigation using a hollow stem auger and split spoon sampler. A total of seven Temporary Wells (TPW) were drilled at the location. While drilling each TPW, soil samples were taken every five feet and screened using a Photo Ionization Detector (PID). Results of the soil screening were recorded in drilling logs (Appendix B - Drilling Logs). Also in each well a soil sample was captured just above the groundwater interval to be analyzed, in a laboratory, for TPH and BTEX components.

In order to sample the groundwater in a TPW, screened PVC pipe was installed in the well and groundwater was allowed to flow in. Once the water level became static, a sample of the water was taken using a disposable Teflon bailer. The water sample was properly preserved and analyzed, in a a laboratory, for BTEX components.

TPW 1 through 3 were drilled in an east to west transect just to the south of PNM's gas dehydration equipment. TPW 4 was drilled midway between TPW 2 and MW-4. The remainder of the temporary wells were drilled to the south of MW-4 to locate the source of dissolved phase BTEX contamination. TPW 5 and 6 were drilled on the southern most boundary of the production location. The seventh temporary well (TPW 7) was drilled directly under the former location of the produced hydrocarbon storage tanks. Relative locations of the temporary wells can be seen in Figure 2.

-TPW Sampling Results-

Contamination to some degree was found in each groundwater sample from the temporary wells. The highest dissolved phase concentrations occurred in TPW 7 and TPW 5. This result may indicate a source that is off site, upgradient of TPW 5. A NAPL was found on top of the groundwater in TPW 2, therefore no groundwater sample was taken.

Soil screening while drilling the TPWs revealed no hydrocarbon contamination in the soil from the surface to several feet above the groundwater zone. For example, the TPW Record of Subsurface Exploration (Appendix B - Drilling Logs) shows no volatile contamination (using a PID) until just above the groundwater zone (see Air Monitoring column). Results are similar at each TPW.

Since no contamination exists until just above the saturated zone this may indicate subsurface flow of contaminants to that particular sampling location. This result may or may not indicate contamination from an off site source. The geology of the location may cause a release on the surface to channel through fractures while traveling downward through the soil. This channeling effect may not leave a direct trail of contaminants in the soil directly under the release site. Leading to the possible conclusion that the soil auger did not penetrate the contaminant channels leading to the groundwater.

-Location Geology-

Drilling logs were compiled from each Monitoring Well and Temporary Well that was drilled on the location. Copies of all the drilling logs are in Appendix B - Drilling Logs. Generally the logs show that a sandstone shelf underlies the entire site. The sandstone surfaces in the southern half of the site and dips northward to a depth of approximately 18 feet on the edge of the location. During construction, fill material was used to level the surface of the location on the northern half.

And generally groundwater was encountered just below the sandstone layer and above a green to gray clay material.

-Conclusions-

Based on the work done at the Hampton 4M, Burlington Resources firmly believes that contamination to the groundwater under the location is caused by at least two sources. Source No. 1 has been identified as PNM's unlined earthen dehydrator discharge pit. Source No. 2 is contributing dissolved BTEX to the groundwater upgradient to MW-4.

To identify Source No. 2, probable locations were investigated with the soil auger, but no on site source was identified. Groundwater contaminant levels from TPW 5 and TPW 6, on the southern most edge of the location, indicates the second source may be off site and upgradient of the well location. A survey of nearby facilities revealed a pipeline drip pot approximately 1/4 mile to the southeast of the well location.

Results of groundwater sampling over the location indicates a significant amount of NAPL on the top of the groundwater under the gas dehydration equipment operated by PNM. NAPL from the area under the dehydration equipment has migrated to the northwest and is the source of hydrocarbons surfacing in the seep.

-Plan of Action-

The most immediate concerns at the Hampton 4M are the hydrocarbon seep to the northwest and the NAPL on the groundwater in the area of the gas dehydration equipment. These two areas should be the focus of initial activities. NAPL recovery should be implemented in MW-2. Because the NAPLs found to date are located near the former dehydrator discharge pit, Burlington believes this initial action should be the responsibility of PNM Gas Services.

Burlington Resources will focus on identifying the source of groundwater contamination upgradient of MW-4. Burlington proposes constructing a small pad off site and upgradient of the well location to conduct an investigation of the groundwater. Results from the off site investigation will determine the background levels of contaminants in the groundwater flowing to the Hampton 4M location.

If through the off site investigation, Burlington discovers the influence of an off site source then Burlington will cease operations and consult with the NMOCD about other responsible parties. However, if Burlington discovers no contaminants in the groundwater flowing to the Hampton 4M location, then further investigation will be conducted on site.

The unique characteristics of the Hampton 4M location pose challenges of site characterization and remediation. All parties working together will be the most efficient means to address the contamination at the Hampton 4M site. If further clarification is needed regarding this matter, please contact me at (505) 326-9537.

Sincerely,

Craig A. Bock
Environmental Representative

Enclosures: Figure 1: Area Map
Figure 2: Hampton 4M Site Diagram
Figure 3: Groundwater Contour Map
Table 1: Sample Results
Appendix A - Sample Back up
Appendix B - Drilling Logs

cc: Denny Foust - NMOCD Aztec
Johnny Ellis - BR
Ken Raybon - BR
Keith Baker - BR
Denver Bearden - PNM Farmington
Maurene Gannon - PNM Albuquerque

TABLE 1: HAMPTON 4M

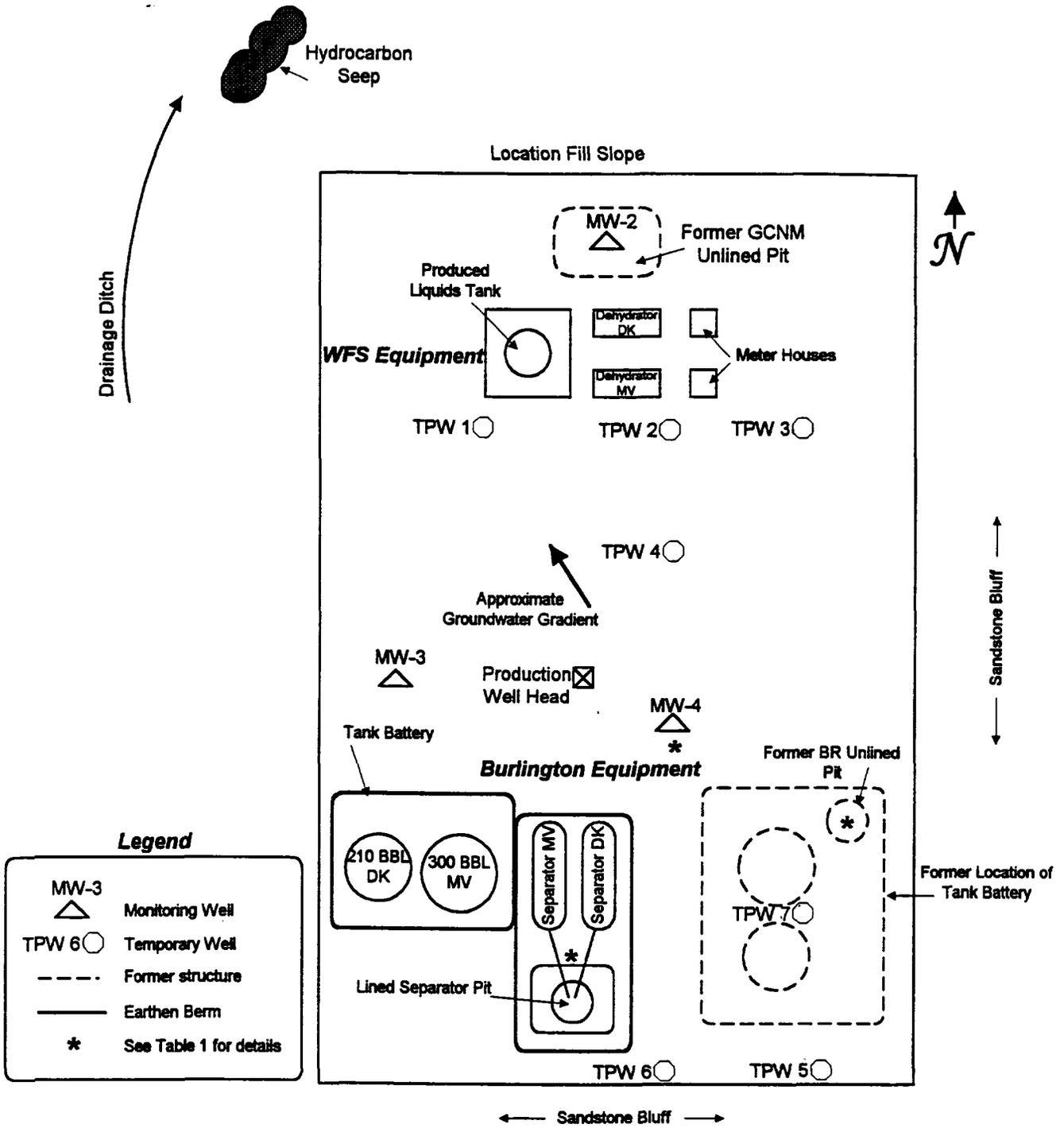
Sample Results

Location (SeeFigure 2)	*Sample Date*	*Sample Number*	*TPH (ppm)*	*BTEX (ppb)*	*Depth to Water (ft)*	*Sample Depth (ft)*	*Sample Matrix*	*Comments*
MW-2	12/16/96	TB #1	N/A	20,620	--	--	water	Taken by PNM
MW-3	1/31/97	MW-03	N/A	ND	20	N/A	water	Taken by PNM
MW-3	5/1/97	MW-03	N/A	ND	20	N/A	water	
MW-4	1/31/97	MW-04	N/A	2,651	16.4	N/A	water	Taken by PNM
MW-4	5/1/97	MW-04	N/A	3,477	16.4	N/A	water	
MW-4	5/1/97	MW-54	N/A	3,470	16.4	N/A	water	Blind Duplicate Sample
TPW 1	6/5/97	TPW-01-25-26	ND	ND	22.75	25	soil	
TPW 1	6/5/97	TPW-01	N/A	20	22.75	N/A	water	
TPW 2	6/5/97	TPW-02-25-26	600	59,600	23.38	25	soil	Free hydrocarbons on water
TPW 3	6/5/97	TPW-03-25-26	25	ND	N/A	25	soil	Groundwater not encountered.
TPW 4	6/6/97	TPW-04	N/A	5,967	19	N/A	water	
TPW 4	6/6/97	TPW-04-20-21.5	52	148	19	20	soil	
TPW 5	6/6/97	TPW-05	N/A	29,260	15	N/A	water	
TPW 5	6/6/97	TPW-05-15-16	61	46,500	15	15	soil	
TPW 6	6/6/97	TPW-06	N/A	5,738	15	N/A	water	
TPW 6	6/6/97	TPW-06-15-16.5	11	8	15	15	soil	
TPW 7	6/6/97	TPW-07	N/A	33,220	14.6	N/A	water	
TPW 7	6/6/97	TPW-07-15-16	250	271,000	14.6	15	soil	
N. of Lined Separator Pit *	4/30/97	APP-6.5-01	ND	ND	N/A	6.5	soil	
Former BR Unlined Pit *	4/30/97	OP-3-01	ND	2	N/A	3	soil	
S. of MW 4 *	4/30/97	SSMW4-2-01	274	9	N/A	2	soil	

25
2

* Refer to Figure 1: Hampton 4M Site Diagram

Figure 2: Hampton 4M Site Diagram



Groundwater Sampling Summary

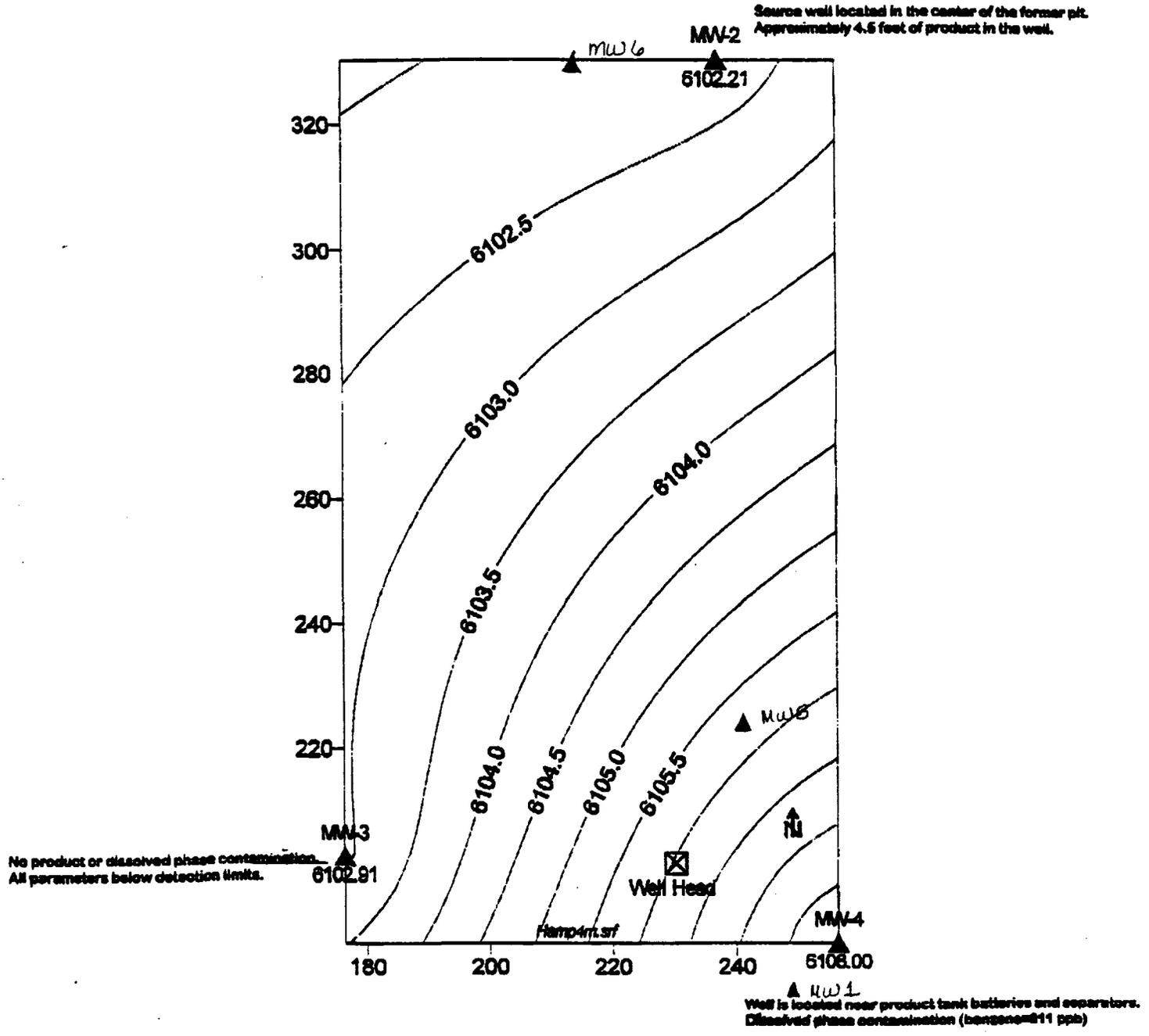
Location (See Figure 2)	Sample Date	BTEX (ppb)	Depth to Water (ft)	Sample Matrix	Comments
MW-2	12/16/96	20,620	--	water	Taken by PNM
MW-3	1/31/97	ND	20	water	Taken by PNM
MW-3	5/1/97	ND	20	water	
MW-4	1/31/97	2,651	16.4	water	Taken by PNM
MW-4	5/1/97	3,477	16.4	water	
MW-4	5/1/97	3,470	16.4	water	Blind Duplicate Sample
TPW 1	6/5/97	20	22.75	water	
TPW 4	6/6/97	5,967	19	water	
TPW 5	6/6/97	29,260	15	water	
TPW 6	6/6/97	5,738	15	water	
TPW 7	6/6/97	33,220	14.6	water	

▲ MW 7

* STANDPIPE

Figure 3: Hampton 4M Groundwater Contour Map (January 1997)

▲ MW 5



Location	*X*	*Y*	*TOC Elevation (feet)*	*GW Elevation (feet)*	*DTW 1/4/97 (feet)*	*DTP 1/4/97 (feet)*
MW-2	237.36	330.165	6124.088	*6102.208	25.28	20.75
MW-3	176.435	202.725	6122.943	6102.913	20.03	N/A
MW-4	256.437	188.695	6124.372	6103.002	16.37	N/A
Well Head	232.926	205.649	6124.241	—	—	—
Former Tank Battery	290.325	169.909	—	—	—	—

*Adjusted water level based on 4.53 feet of product and a specific gravity of 0.75.

X and Y are relative distances TOC - Top Of Casing DTW - Depth to Water

APPENDIX A

SAMPLE BACK UP

APPENDIX B

DRILLING LOGS

ENVIROTECH INC.

FIELD BORING LOG

MW-2

TEST BORING No.	MONITOR WELL No.	PROJECT No.	PROJECT NAME:	SHEET: OF:
TB #1	MW-1	93108-02	PNM GAS SERVICES	

MFG. DESIGNATION OF DRILL:	PROJECT LOCATION:
MOBIL DRILL B-61	HAMPTON #4M

TYPE OF BIT:	SURFACE ELEVATION OF TB OR MW:	TOTAL DEPTH OF HOLE:
AUGER DRILLING		45 FT.

DATE		DRILLING Co.:
STARTED:	12/16/96	ENVIROTECH INC.
COMPLETED:	12/16/96	

COMPLETION TYPE:	ENGINEER:	GROUNDWATER DEPTH	TIME
COMPLETED AS MONITOR WELL	AL CHAHARUNG	1045 — 27.8'	
	CREW: MS./Bd.	1110 — 27.75'	

SURFACE CONDITIONS: GRADED YELLOW SILTY SAND

DIST FROM SURF.	SAMPLE TYPE	SAMPLE No.	OVM READ IN PPM	BLOWS PER 6 IN.	USCS	LOG OF MATERIAL/COMMENTS
					SM	LIGHT BROW SILTY SAND, SLIGHTLY MOIST, MEDIUM-HARD, NO HYDROCARBON ODOR
1						
2						
3						
4						
					SM	SAME AS ABOVE PLUS STRONG H.C. ODOR (ASSESSMENT FROM SURFACE CUTTING, VISUAL) @ 11' DARK BROWN STREAK OF SILT TO CLAYEY SAND.
6						
7						
8						@ 16' ANOTHER STREAK (THIN LAYER) OF SILTY SAND, DARK BROWN + STRONG H.C. ODOR
9						
20					SM	STRONG H.C. ODOR, VISUAL
1						LIGHT GRAY TO GREENISH GRAY SILTY TO CLAYEY SAND, WET, HARD, STRONG H.C. ODOR (COULD BE PRODUCT SATURATED SOIL).
2						
3						
					▽	GROUND WATER TABLE (COLLECTED WATER SAMPLE FOR BTEX (8020) AND TPH (8015). N 2" PRODUCT OBSERVED IN THE BAILER
0					SM	SAME AS ABOVE
					SM	SAME AS ABOVE

BORING LOG

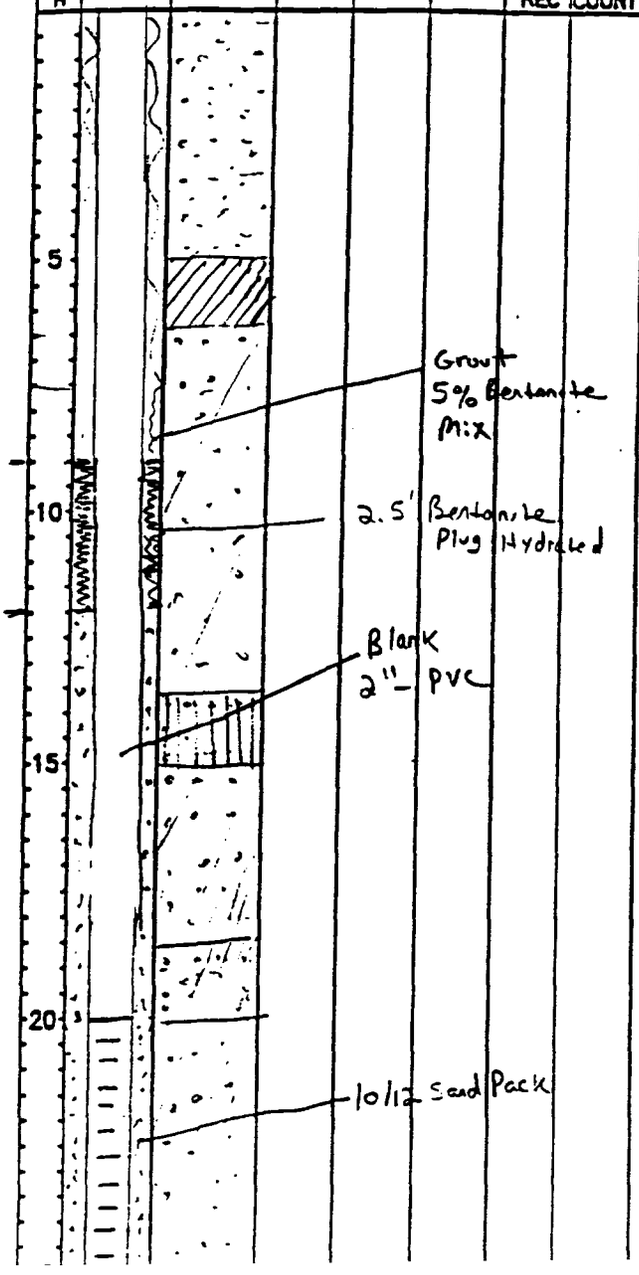
Page 1 of _

LOCATION MAP:

__1/4 __1/4 SE 1/4 SW 1/4 S 13 T 30N R 11W

SITE ID: Hampton 4M LOCATION ID: MW-3
SITE COORDINATES (ft.):
N _____ E _____
GROUND ELEVATION (ft. MSL): _____
STATE: _____ COUNTY: _____
DRILLING METHOD: Hollow Stem
DRILLING CONTR.: Envirotech
DATE STARTED: 1/31/97 DATE COMPLETED: 1/31/97
FIELD REP.: _____
COMMENTS: _____

LOCATION DESCRIPTION: _____



DEPTH	WELL CONST.	LITH.	SAMPLE USCS	FROM	TO	% REC	BLOW-COUNT	NUMBER OR PID READING	LITHOLOGIC DESCRIPTION (LITH., USCS, GRAIN SIZE PROPORTIONS, WET, COLOR, RNDG., SORT., CONSOL., DIST. FEATURES)
									0-5' Sand med-course Slightly clayey moist lt Brown
									5-6' Clay layer wet olive Brown
5								0.0 PPM	6-7' Clay dark color slightly Sand moderate sorted
									7'-13' Sand med-course SC clayey Moist Yellowish Orange
10								0.0 PPM	13' Sand med-course mod sorted moist
									14'-15' Sandstone layer Yellowish Orange Clayey moist
15								3.0 PPM? Could be Background	15'-18' Sand clayey Medium course Yellowish orange moist mod-well sorted
									18'-19' Sand clayey Dark color Dark Grey mod. sorted moist
20									19'-20 Sand clayey course Poorly sorted Orange Brown Moist
								42.0 PPM @ 24.5'	20'- Sand clay / Med-course Mod sorted Orange Brown Moist
									24.5' Sand clayey med-

BORING LOG
(Continued)

LOCATION ID: MW-3

DEPTH	WELL CONST.	LITH.	SAMPLE USCS	FROM	TO	% REC	BLOW-COUNT	NUMBER OR PID READING	LITHOLOGIC DESCRIPTION (LITH., USCS, GRAIN SIZE PROPORTIONS, WET COLOR, RNDG., SORT., CONSOL., DIST. FEATURES)
30								no Reading with PID cuttings very wet & disturbed	25'-30' Sand SC Med Grained Wet Orangeish Brown, Mod Sorted low-med Plasticity
				2" 0.01' Slotted Screen					30'-35' Sand SM SC med grained wet Slightly consolidated drilling slowed
				10/12 Sand Pack					
35				End Cap					34-35' Clay olive Brown wet Plasticity
									35' TD of Borehole
									34'-35' Clay olive grey Slight
									34-35' cuttings very wet dark water up from below looks like motor oil? No Reading with PID 0.0 PPM
40									
45									
50									
55									
60									

Hampton #4m MW #4

BORING LOG

Page 1 of ___

LOCATION MAP:

___1/4 ___1/4 SE 1/4 SW 1/4 S 13 T 30N R 11W

SITE ID: Hampton #4M LOCATION ID: MW 4
SITE COORDINATES (ft.):
N ___ E ___
GROUND ELEVATION (ft. MSL): ___
STATE: N.M COUNTY: San Juan
DRILLING METHOD: Hollow Stem
DRILLING CONTR.: Envirotech
DATE STARTED: 1-31-97 DATE COMPLETED: ___
FIELD REP.: ___
COMMENTS: ___

LOCATION DESCRIPTION: ___

DEPTH	WELL CONST.	LITH.	SAMPLE: USCS	FROM	TO	% REC	BLOW-COUNT	NUMBER OR PID READING	LITHOLOGIC DESCRIPTION (LITH., USCS, GRAIN SIZE PROPORTIONS, WET COLOR, RNDG., SORT., CONSOL., DIST. FEATURES)
1025									2' weathered sandstone
									3' sand yellowish orange
									5' sand yellowish orange some silt SM
5	grout							ø	5' 600 lbs pressure on drill hard drilling
		SM							
								ø	10' Fine consolodiated sand weathered sandstone SM yellowish orange
10	Bentonite plug								11' hard drilling to 10' after 10' pressure 150 lbs. [illegible] yellowish-orange moderately sorted sand
15		SC							13' Clay
	20' slotted screen								14' sand poorly sorted yellowish-orange slight trace of clay SC
20		sand						31.3 ppm	17' color change more of a orangish color
								1447 ppm	18' clay olive / GRY
								669	20' clay olive / GRY SC
25								477	23' clay poorly sorted [illegible]

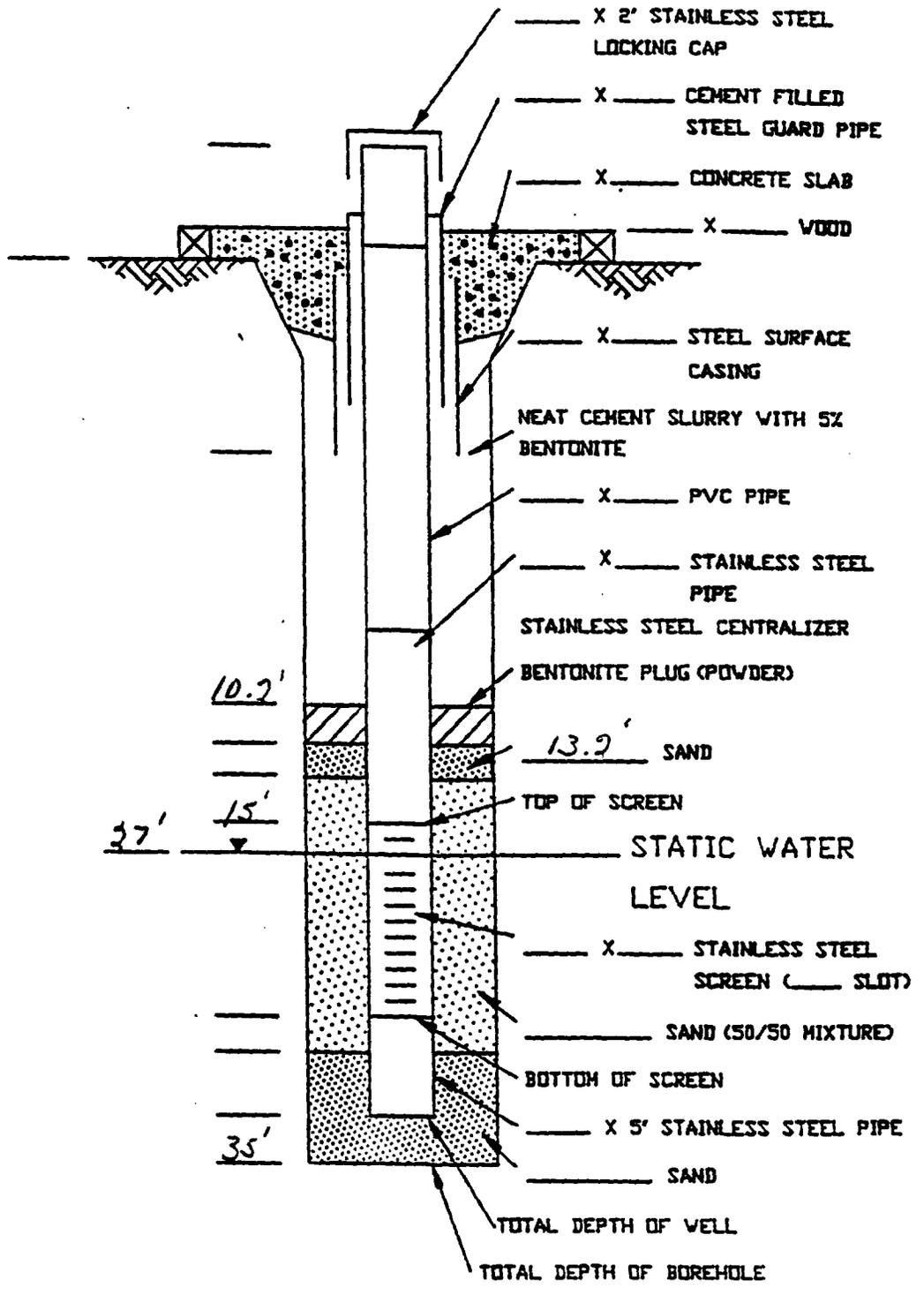
Hampton #4m MW #4

BORING LOG
(Continued)

Page 2 of ___
LOCATION ID: MW-4

DEPTH	WELL CONST.	LITH.	SAMPLE USCS	FROM	TO	% REC	BLOW-COUNT	NUMBER OR PID READING	LITHOLOGIC DESCRIPTION (LITH., USCS, GRAIN SIZE PROPORTIONS, WET COLOR, RNDG., SORT., CONSOL., DIST. FEATURES)
			OH					80.7 ppm	27' H_2O
30				slotted screen					GRY color, moist clay
				sand					28' Hard layer clay 700 lbs CH
									GRY color
									to drill thru
									29'
35									30' GRY color clay OH
									high plasticity
									Organic silts
									31' 900 lbs press.
40									hard drilling
									35' GRY Clay OH
									high plasticity
									hard drilling
45									stopped drilling
									set 20' slotted screen
50									(sand to 13.2'
									Bentnit 10.2'
									grout to surface)
55									
60									

Hampton #4m. MW #4



RECORD OF SUBSURFACE EXPLORATION

Philip Environmental Services Corp.
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # TPW-01
Well #
Page of

Project Name: Hampton 4m
Project Number: 17877 Phase 6001
Project Location: Aztec

Elevation:
Borehole Location: South West of Site
GWL Depth: 22.45
Logged By: S. Pope
Drilled By: K Padilla
Date/Time Started: 0845 6/5/97
Date/Time Completed: 1015 6/5/97

Well Logged By: S. Pope
Personnel On-Site: D. Charley
Contractors On-Site: —
Client Personnel On-Site: —
Drilling Method: HSA 4 1/4 ID
Air Monitoring Method: PID

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU BZ	BH	S	Drilling Conditions & Blow Counts
0										
5	1	5 7	24	Brown SAND, Med co grained, trace sand stone frags, soft Moist			0	0	0	Loose Fill
10	2	10 11.5	18	SAA			0	0	0	
15	3	15 17	8	Brown-Gray SAND trace clay Med Co grained Very hard some cementation Moist			0	0	0	Sandstone @ 15'
20	4	20 22	12	Brown Gray SAND trace clay, Cemented Med Co grained, Very Dense, Moist		21	0	0	0	Refusal @ 21' w/spoon
25	5	25 27	10	Greenish Gray SAND, Med-Co grained Very hard, wet @ Bottom spoon		26 ▽				Refusal @ 8" on spoon
30	6	30 32	24	Gray SAND COARSE Grained well Sorted, Hard, Saturated						Refusal @ 8"
				TOB 30'						
35										
40										

Comments: 1015 Set 2" w/10 screen in hole Pulled back 5'. WL Prior to Temp well INST 23.2 22.45 @ Sample point

MONITORING WELL INSTALLATION RECORD

Philip Environmental Services Corp.
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # TPW-01
Well # ______
Page ____ of ____

Project Name: HAMPTON 4M
Project Number: 18777 Phase: 6001
Project Location: AZTEC

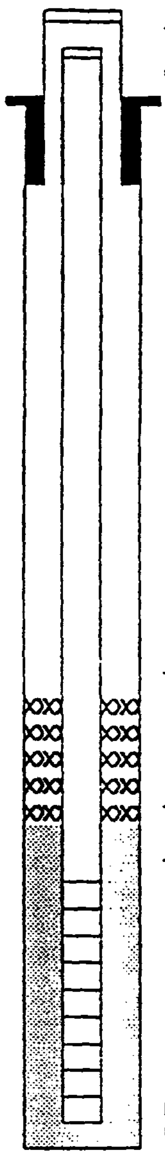
Elevation: ______
Well Location: North West Side of Site
GWL Depth: 22.45
Installed By: K. Padilla

On-Site Geologist: S. Pope
Personnel On-Site: D. Charley
Contractors On-Site: —
Client Personnel On-Site: —

Date/Time Started: 1015 6/5/97
Date/Time Completed: 1035 6/5/97

Depths in Reference to Ground Surface

Item	Material	Depth
Top of Protective Casing		—
Bottom of Protective Casing		—
Top of Permanent Borehole Casing		—
Bottom of Permanent Borehole Casing		—
Top of Concrete		—
Bottom of Concrete		—
Top of Grout		—
Bottom of Grout		—
Top of Well Riser		+.4
Bottom of Well Riser		19.1
Top of Well Screen		19.1
Bottom of Well Screen		29.5
Top of Peltonite Seal		—
Bottom of Peltonite Seal		—
Top of Gravel Pack		—
Bottom of Gravel Pack		—
Top of Natural Cave-In		—
Bottom of Natural Cave-In		—
Top of Groundwater		22.45
Total Depth of Borehole		30.0



Top of Protective Casing: —
Top of Riser: .4
Ground Surface: —
Top of Seal: N/A
Top of Gravel Pack: N/A
Top of Screen: 19.1
Bottom of Screen: 29.5
Bottom of Borehole: 30

Comments: 1015 INSTALLED 2" TEMP WELL w/ 10' SCREEN WATER CAME UP TO 22.45 Collect Sample @ 1035 w/ Clean No odor. Back Filled Boring to 10 w/ Hole Plug

Geologist Signature: [signature]

RECORD OF SUBSURFACE EXPLORATION

Borehole # TPW-02
Well # TPW-02
Page of

Philip Environmental Services Corp.
4000 Monroe Road
Farmington, New Mexico 87401
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Project Name HAMPTON 4m
Project Number 17877 Phase 6001
Project Location AZTEC

Elevation
Borehole Location Midway North Ensign Site
GWL Depth 23.95
Logged By S. Pope
Drilled By K. Padilla
Date/Time Started 1145 6/5/97
Date/Time Completed 1300 6/5/97

Well Logged By S. Pope
Personnel On-Site D. Chambers
Contractors On-Site —
Client Personnel On-Site —

Drilling Method HSA 4 1/4 ID
Air Monitoring Method PID

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU BZ	BH	S	Drilling Conditions & Blow Counts
0										
5	1	5 7	24	Brown SAND Med-CO grained, Some Clay Moist, Loose			0	0	0	Fill
10	2	10 12	12	Lt Brown SAND Med CO GRAINED Very dense possibly Cemented, Trace Moisture			0	0	0	Refusal 1"
15	3	15 17	12	SAT Lt Brown - Yellow DK Brown Clay, Very Stiff, trace Moisture, Calcium Cry Shells in voids,		15.5	0	0	13	Refusal @ 1'
20	4	20 22	12	Brown SAND, Some clay Med-CO grained, Hard, trace Moisture,		18.0	0	0	0	
25	5	25 27	20	Gray Silty Clay, Very Dense trace fine Sand, Moist	23.0	▽ 23.95	0	0	89	Refusal @ 1'
30				TOB 25		21.0	0	0	187	
35									149	Refusal @ 22" HS = 851
40										

Comments: Water Come up to 23.38 After Sitting 10 Mins Drill to 27' INSTALL TEMP WELL
WATER level Coming up Slowly will pull AUGERS and leave well IN. MOVE TO Next location

Geologist Signature

MONITORING WELL INSTALLATION RECORD

Philip Environmental Services Corp.
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Farmington, New Mexico 87401
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Borehole # ____
Well # TPW-02
Page ____ of ____

Project Name HAMPTON 4M

Project Number 17877 Phase 10001
Project Location AZTEC, NM

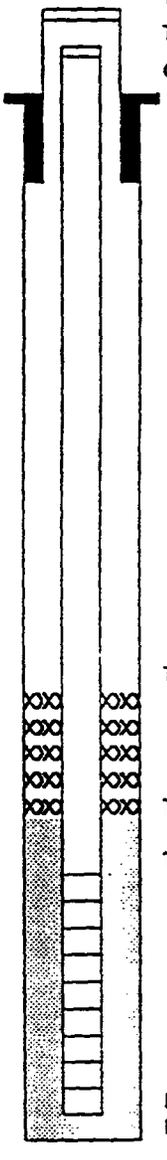
Elevation ____
Well Location MIDWAY NORTH END OF SITE
GWL Depth 23.38
Installed By K. PADILLA

Date/Time Started 1300 6/5/97
Date/Time Completed 1400 6/5/97

On-Site Geologist S. POPE
Personnel On-Site D. CHARLEY
Contractors On-Site —
Client Personnel On-Site —

Depths in Reference to Ground Surface

Item	Material	Depth
Top of Protective Casing		—
Bottom of Protective Casing		—
Top of Permanent Borehole Casing		—
Bottom of Permanent Borehole Casing		—
Top of Concrete		—
Bottom of Concrete		—
Top of Grout		—
Bottom of Grout		—
Top of Well Riser		+3.0
Bottom of Well Riser		14.6
Top of Well Screen		14.6
Bottom of Well Screen		25
Top of Peltonite Seal		—
Bottom of Peltonite Seal		—
Top of Gravel Pack		—
Bottom of Gravel Pack		—
Top of Natural Cave-In	SURFACE	14.6
Bottom of Natural Cave-In		25
Top of Groundwater		≈ 23.38
Total Depth of Borehole		25.0



Top of Protective Casing —
Top of Riser +3.0
Ground Surface —
Top of Seal —
Top of Gravel Pack —
Top of Screen 14.6
Bottom of Screen 25
Bottom of Borehole 25

Comments: PRODUCT THICKNESS @ 1555 .39 FT
6/6/97 PRODUCT THICKNESS .96 FT. 6/9/97 PRODUCT THICKNESS = 2.75 FEET

Geologist Signature

RECORD OF SUBSURFACE EXPLORATION

Borehole # TPW-03
Well #
Page of

Philip Environmental Services Corp.
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Project Name HAMPTON 4M
Project Number 17877 Phase 6001
Project Location AZTEC, NM

Elevation
Borehole Location NORTH EAST SIDE OF SITE
GWL Depth NOT ENCOUNTERED
Logged By S. POPE
Drilled By K. PADILLA
Date/Time Started 1415 6/5/97
Date/Time Completed 1530 6/5/97

Well Logged By S. POPE
Personnel On-Site D. Charley
Contractors On-Site —
Client Personnel On-Site —

Drilling Method HSA 4¼ ID
Air Monitoring Method PID

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU BZ	BH	S	Drilling Conditions & Blow Counts
0										
5	1	5 7	6	BROWN SAND MED-CO Grained Very hard, trace MOISTURE Some Cementation			0	0	0	Refusal @ 6" 1430
10	2	10 12	18	LT BROWN-Reddish BROWN SAND, Med-Co GRAINED, trace silt, Some Oxidation, trace Moisture			0	0	0	Refusal @ 18" 1437
15	3	15 17	12	GRAY SAND FINE MED GRAINED w/ Some CLAY (Shale) Very hard - Cemented trace MOISTURE		15	0	0	0	Refusal @ 12" 1450
20	4	20 21	6	SAA Very hard			0	0	0	Refusal @ 6" 1502
25	5	25 27	12"	GRAY - DK GRAY SLITY SAND STONE Cemented, trace Clay, Trace MOISTURE VERY HARD			0	0	0	REFUSAL @ 12" 1520
30				TOB - 25						
35										
40										

Comments: NO EVIDENCE OF MOISTURE @ THIS LOCATION WILL NOT DRILL DEEPER
Pull-out and Grout

Geologist Signature

RECORD OF SUBSURFACE EXPLORATION

Philip Environmental Services Corp.
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Borehole #
Well # TPW-04
Page of

Project Name HAMPTON 4M
Project Number 17877 Phase 6001
Project Location AZTEC, NM

Elevation
Borehole Location
GWL Depth 20.0/19.0 After Sitting
Logged By S. POPE
Drilled By K. PADILLA
Date/Time Started 1610 6/5/97 / 0830 6/6/97
Date/Time Completed 1645 6/5/97 / 0930 6/6/97

Well Logged By S. POPE
Personnel On-Site D. CHUNKY
Contractors On-Site
Client Personnel On-Site
Drilling Method HSA 4¼" ID
Air Monitoring Method PID

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU BZ	BH	S	Drilling Conditions & Blow Counts
0										
5	1	5 7	10	BROWN - LT BROWN SAND Med-Co grained Very hard SOME Cementation exists Trace MOISTURE.			0	0	0	REFUSAL @ 10" 1621
10	2	10 12	10	SAA trace CLAY, Mostly Coarse Grained			0	0	0	REFUSAL @ 10" 1628
15	3	15 17	12"	SAA			6	0	0	REFUSAL @ 12" 1638 - STOP FOR DAY
20	4	20 27	18	GRAY SAND W/ SOME CLAY, Med-Co grained w/ SOME CEMENTATION Gravel, WET		20	▽ 20' 0	0	15	HEADSPACE = 33 PPM REFUSAL @ 18" NO ODOR ON SAMPLE 0845
25	5	25 27	10	GRAY SILT CLAY & SAND, Fine-Very Fine grained Somewhat Cemented Very hard, Trace MOISTURE. TOB-25		25	0	0	0	REFUSAL @ 10" OUT OF WATER will PUT WELL IN AND PULL BACK TO Fine 0919
30										
35										
40										

Comments: AFTER INSTALLING WELL LET IT SIT 10-15 MIN WATER @ 22.5 WILL LET SIT AND MOVE TO NEXT LOCATION

Geologist Signature

MONITORING WELL INSTALLATION RECORD

Philip Environmental Services Corp.
4000 Monroe Road
Farmington, New Mexico 87401
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Borehole # TPW-04
Well # TPW-04
Page ___ of ___

Project Name HAMPTON 4M
Project Number 18777 Phase 6001
Project Location AZTEC, NM

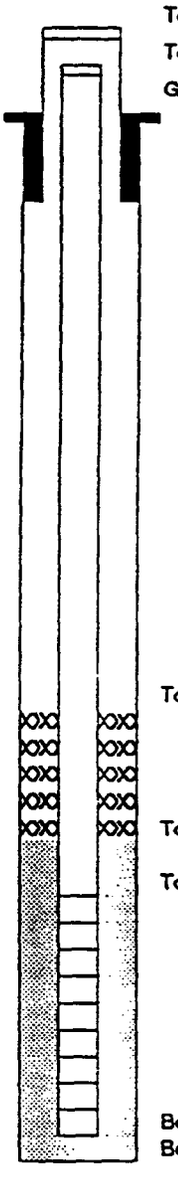
Elevation ___
Well Location Middle of SITE
GWL Depth 19
Installed By K. PRILLA

Date/Time Started 0920 6/6/97
Date/Time Completed 0945 6/6/97

On-Site Geologist S. POE
Personnel On-Site D. Charley
Contractors On-Site ___
Client Personnel On-Site ___

Depths in Reference to Ground Surface

Item	Material	Depth
Top of Protective Casing		—
Bottom of Protective Casing		—
Top of Permanent Borehole Casing		—
Bottom of Permanent Borehole Casing		—
Top of Concrete		—
Bottom of Concrete		—
Top of Grout		—
Bottom of Grout		—
Top of Well Riser		+1.0
Bottom of Well Riser		N/A
Top of Well Screen		14.6
Bottom of Well Screen		25
Top of Peltonite Seal		
Bottom of Peltonite Seal		
Top of Gravel Pack		—
Bottom of Gravel Pack		—
Top of Natural Cave-In		14.6
Bottom of Natural Cave-In		25
Top of Groundwater		~20
Total Depth of Borehole		25



Top of Protective Casing —
Top of Riser +1.0
Ground Surface —
Top of Seal —
Top of Gravel Pack —
Top of Screen 14.6
Bottom of Screen 25.0
Bottom of Borehole 25.0

Comments: WL = 19.0 FT BGS PRIOR TO SAMPLING @ 1150

Geologist Signature Scott T. Poe

RECORD OF SUBSURFACE EXPLORATION

Philip Environmental Services Corp.
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Borehole # TPW-06
Well # TPW-05
Page of

Project Name HAMPTON 4M
Project Number 17877 Phase 6001
Project Location AZTEC, NM

Elevation
Borehole Location SE. CORNER OF SITE
GWL Depth 15.0
Logged By S. POPE
Drilled By KPAD, LLA
Date/Time Started 1000 6/6/97
Date/Time Completed 1110 6/6/97

Well Logged By S POPE
Personnel On-Site D Charley
Contractors On-Site
Client Personnel On-Site

Drilling Method HSA 4¼ ID
Air Monitoring Method PID

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU BZ	BH	S	Drilling Conditions & Blow Counts
0										
5	1	5 7	10	BROWN-TAN SAND w/Trace SILT AND CLAY, Med-Co Grained, Some oxi stains, Hard, Trace Moisture			0	0	0	REFUSAL @ 10" 1025
10	2	10 12	12	SAA			0	0	20	REFUSAL @ 12" 1035 No Hydrocarbon odor
15	3	15 17	12	SAA, Trace Clay, WET No FREEWATER			0	3	470	REFUSAL @ 12" STRONG HC ODOR NO MEASURABLE WATER
20	4	20 21	24	GRAY SAND Med-Co Grained, Trace Silt Hard, SATURATED. Trace Gravel		20	0	0	3	Inhale, REFUSAL @ 20 WL 17.45 (1110)
25				GRAY, CLAY/Shale very hard, trace fine Sand visible Bedding Planes, Trace MOISTURE. TOB - 20		21.5				1210 WL 14.75 SAMPLE @ 1215 No Free phase
30										
35										
40										

Comments:

Geologist Signature

MONITORING WELL INSTALLATION RECORD

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Borehole # _____
Well # TPW-05
Page ____ of ____

Project Name HAMPTON #1 M
Project Number 17877 Phase 6001
Project Location AZTEC NM

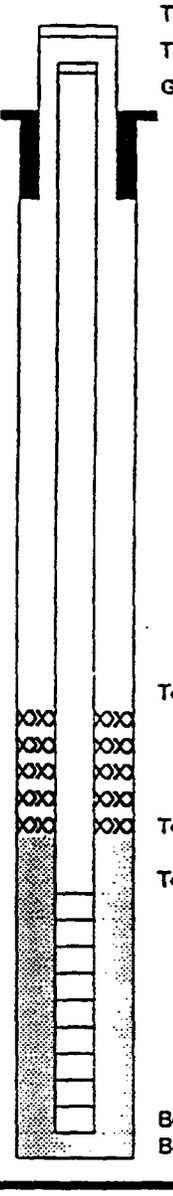
Elevation _____
Well Location S. EAST CORNER OF SITE
GWL Depth 14.75
Installed By K. PADILLA

Date/Time Started 1110 6/6/97
Date/Time Completed 1130 6/6/97

On-Site Geologist S. POPE
Personnel On-Site D. CHARLEY
Contractors On-Site —
Client Personnel On-Site —

Depths in Reference to Ground Surface

Item	Material	Depth
Top of Protective Casing		—
Bottom of Protective Casing		—
Top of Permanent Borehole Casing		—
Bottom of Permanent Borehole Casing		—
Top of Concrete		—
Bottom of Concrete		—
Top of Grout		—
Bottom of Grout		—
Top of Well Riser		+.4
Bottom of Well Riser		9.6
Top of Well Screen		~~10.6~~ 9.6
Bottom of Well Screen		20
Top of Peltonite Seal		—
Bottom of Peltonite Seal		—
Top of Gravel Pack		—
Bottom of Gravel Pack		—
Top of Natural Cave-In		14
Bottom of Natural Cave-In		20
Top of Groundwater		14.75
Total Depth of Borehole		20



Top of Protective Casing —
Top of Riser +.4
Ground Surface —

Top of Seal —

Top of Gravel Pack —

Top of Screen 9.6

Bottom of Screen 20
Bottom of Borehole 20

Comments: 14.75 WL PRIOR TO SAMPLING @ 1210. SAMPLED @ 1215

Geologist Signature Scott T. Pope

RECORD OF SUBSURFACE EXPLORATION

Philip Environmental Services Corp.
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Farmington, New Mexico 87401
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Borehole #
Well # TDW-06
Page of

Project Name HAMPTON 4M
Project Number 17877 Phase 60001
Project Location AZTEC, NM

Elevation
Borehole Location
GWL Depth 13.0 BGS
Logged By S. Pope
Drilled By R. PADILLA
Date/Time Started 1345 6/6/97
Date/Time Completed 1505 6/6/97

Well Logged By S. Pope
Personnel On-Site D. Chaney
Contractors On-Site
Client Personnel On-Site

Drilling Method HSA 4¼" ID
Air Monitoring Method PID

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU BZ	BH	S	Drilling Conditions & Blow Counts
0										
5	1	5 7	16"	BROWN SAND Med Grained, trace Clay, very hard some Cementation MOIST.			0	0	0	Refusal @ 16" 1357
10	2	10 12	15"	SAA		11.5	0	0	0	Refusal at 18"
15	3	15 17	16	GRAY SAND w/ 5% Clay, Fine - Med Grained, Moist, Very Hard Brown - Reddish Brown SAND w/ Some Clay, Med - Co SAND, HARD, Moist Wet		15.1	0	0	61	Refusal @ 14" Not Black Coloration in Bottom 4" of Soil Collected Sample No Free WATER
20	4	20 22	18	Grayish - Green Clay/Shale, Trace Fine SAND, Hard, Trace Moisture		20	0	0	0	Refusal @ 18"
25	5	25 27	10	SAA			0	0	0	Refusal @ 8" 1505
30				TOB - 25						
35										
40										

Comments: NO WATER Between 20-25 will Backfill to 20 w/ Hole plug Put screen in Pull up to 10 to see if water will Accumulate Put well in @ 1520 Full augers

Geologist Signature

MONITORING WELL INSTALLATION RECORD

Phillip Environmental Services Corp.
4000 Monroe Road
Farmington, New Mexico 87401
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Borehole # _____
Well # TPW06
Page ___ of ___

Project Name HAMPTON 4M
Project Number 17877 Phase 6001
Project Location _____

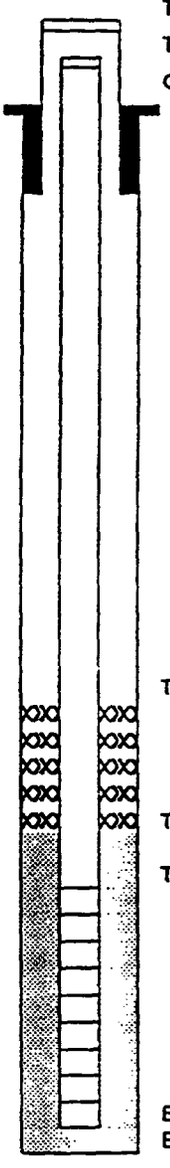
Elevation _____
Well Location _____
GWL Depth 15.0
Installed By K PADILLA

Date/Time Started 6/6/97 1505
Date/Time Completed 6/6/97 1525

On-Site Geologist S. RYAN
Personnel On-Site D. CHARLEY
Contractors On-Site —
Client Personnel On-Site —

Depths in Reference to Ground Surface

Item	Material	Depth
Top of Protective Casing		—
Bottom of Protective Casing		—
Top of Permanent Borehole Casing		—
Bottom of Permanent Borehole Casing		—
Top of Concrete		—
Bottom of Concrete		—
Top of Grout		—
Bottom of Grout		—
Top of Well Riser		.4
Bottom of Well Riser		9.6
Top of Well Screen		9.6
Bottom of Well Screen		20
Top of Peltonite Seal		—
Bottom of Peltonite Seal		—
Top of Gravel Pack		—
Bottom of Gravel Pack		—
Top of Natural Cave-In		9.6
Bottom of Natural Cave-In		20
Top of Groundwater		15
Total Depth of Borehole		25



Top of Protective Casing —
Top of Riser .4
Ground Surface —
Top of Seal —
Top of Gravel Pack —
Top of Screen 9.6
Bottom of Screen 20
Bottom of Borehole 25

Comments: WL = 15.0 @ 1710 PRIOR TO SAMPLING. HOLE PLUGGED BOREHOLE TO 20 BEFORE INSTALLING SCREEN

Geologist Signature Scott T. Ryan

RECORD OF SUBSURFACE EXPLORATION

Philip Environmental Services Corp.
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Farmington, New Mexico 87401
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Borehole #
Well # TPW-07
Page of

Project Name Hampton 4M
Project Number 17877 Phase MW 6001
Project Location Aztec,

Elevation
Borehole Location TANK AREA
GWL Depth 15.0
Logged By S. POPE
Drilled By K PADILLA
Date/Time Started 1540 6/6/97
Date/Time Completed 1620 6/6/97

Well Logged By S. POPE
Personnel On-Site D Chaney
Contractors On-Site
Client Personnel On-Site

Drilling Method HSA 4 1/4 ID
Air Monitoring Method PID

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU BZ	BH	S	Drilling Conditions & Blow Counts
0										
5	1	5 7	7"	BROWN SAND Med - Lo Grained Very Hard, Trace MOISTURE. Some Cementation.			0	0	0	Refusal @ 7" 1553
10	2	10 12	12	SAA			0	0	0	Refusal @ 12"
15	3	15 17	12	SAA trace Sand, WET		▽ 15.0'	0	13	948	REFUSAL @ 12" Head Space 1175 PPM
20	4	20 22	14	GRAY SAND COARSE Grained, trace Clay — Very hard, Saturated		20	0	0	3	Refusal @ 12"
				Gray CLAY/Shale, Trace Fine Sand and SILT Very hard, Trace Moisture		21	0	0	0	1620 Will put well into 20 - 10 screen for WATER SAMPLE
25				TOB - 20						
30										
35										
40										

Comments: 10.9D

Geologist Signature

MONITORING WELL INSTALLATION RECORD

Phillip Environmental Services Corp.
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # TPW-07
Well #
Page ___ of ___

Project Name Hammond Gas
Project Number 12577 Phase
Project Location Aztec NM

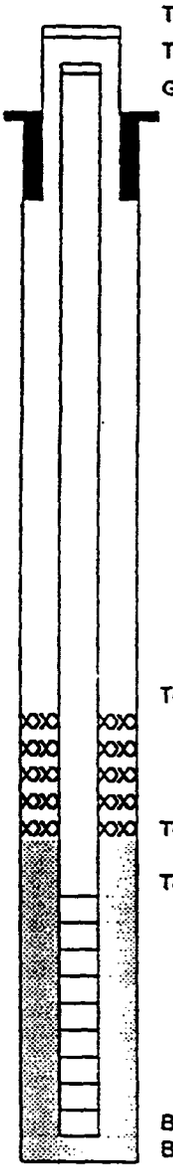
Elevation
Well Location TANK AREA
GWL Depth 14.6
Installed By K. PADILLA

Date/Time Started 1620 6/6/97
Date/Time Completed 1646 6/6/97

On-Site Geologist S. POPE
Personnel On-Site
Contractors On-Site
Client Personnel On-Site

Depths in Reference to Ground Surface

Item	Material	Depth
Top of Protective Casing		—
Bottom of Protective Casing		—
Top of Permanent Borehole Casing		—
Bottom of Permanent Borehole Casing		—
Top of Concrete		—
Bottom of Concrete		—
Top of Grout		—
Bottom of Grout		—
Top of Well Riser		+.4
Bottom of Well Riser		9.6
Top of Well Screen		9.6
Bottom of Well Screen		20
Top of Peltonite Seal		—
Bottom of Peltonite Seal		—
Top of Gravel Pack		—
Bottom of Gravel Pack		—
Top of Natural Cave-In		9.6
Bottom of Natural Cave-In		20
Top of Groundwater		14.6
Total Depth of Borehole		20



Top of Protective Casing ___
Top of Riser ___
Ground Surface ___
Top of Seal ___
Top of Gravel Pack ___
Top of Screen 9.6
Bottom of Screen 20
Bottom of Borehole 20

Comments: WL prior TO SAMPLING 14.6 @ 1738

Geologist Signature