

PRELIMINARY FIELD INVESTIGATION REPORT FORMER LIQUID WASTE DISPOSAL PIT ENRON GAS PROCESSING COMPANY, MAIN PLANT HOBBS, NEW MEXICO OCTOBER-DECEMBER 1992

Prepared for:

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1.0 Introduction_

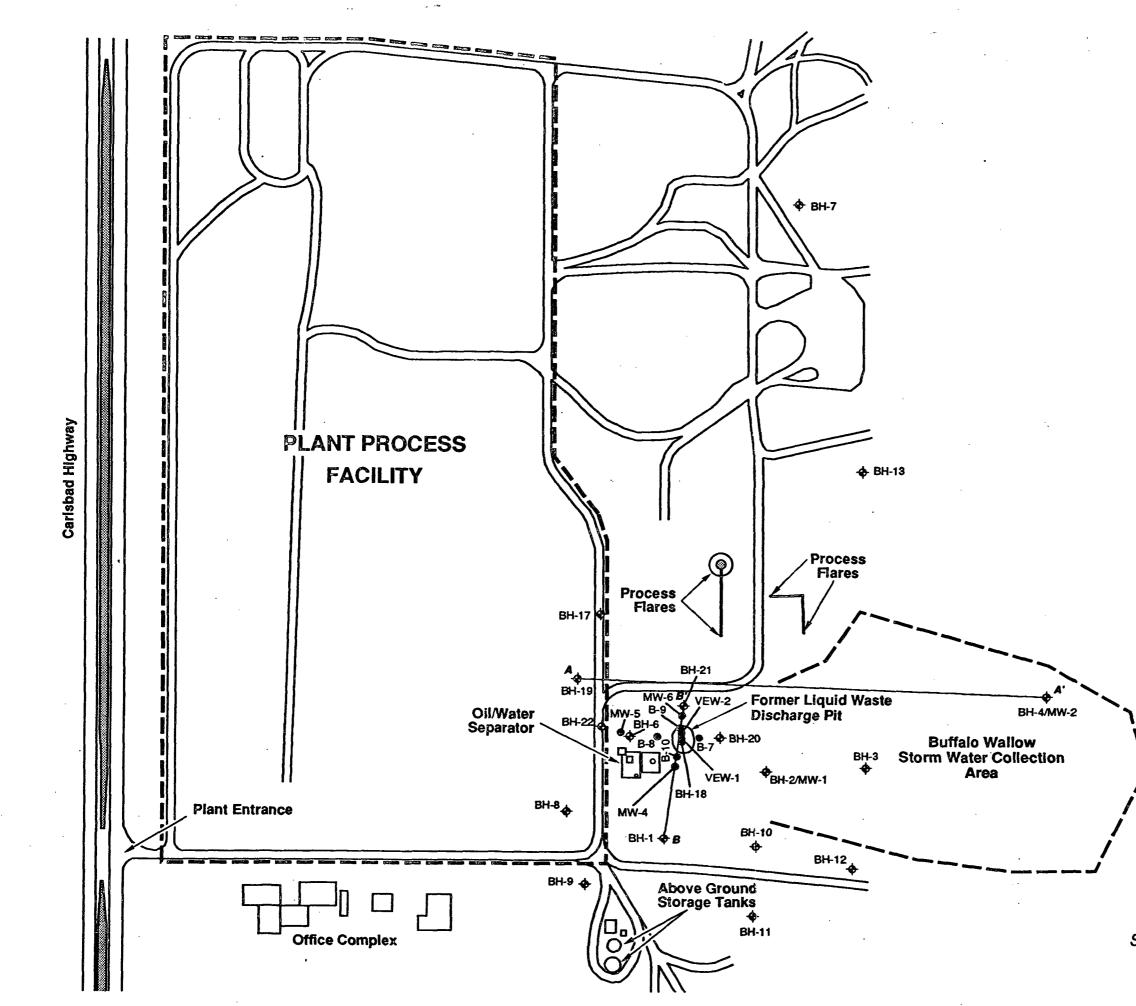
At the request of the Enron Gas Processing Company (Enron), IT Corporation (IT) conducted a preliminary field investigation to assess the extent of hydrocarbon constituents in soil and groundwater in the vicinity of a former liquid waste disposal pit at Enron's main gas processing plant (Main Plant), Hobbs, New Mexico. Additionally, equipment was installed, and information was obtained to evaluate the application of vapor extraction technology for remediation at the site. The Main Plant is located approximately 8 miles west of Hobbs, Lea County, New Mexico. The scope of work for the investigation consisted of drilling nine soil borings; installing three groundwater monitoring wells; constructing two vapor extraction wells; installing ten vapor monitoring probes at four soil boring locations; conducting slug tests in each groundwater monitoring well to estimate hydraulic conductivity of the upper portion of the aquifer; performing vapor extraction tests of the vadose zone; collecting and analyzing soil, groundwater, and soil-gas samples; logging the sediments; field screening of soil samples; interpreting the data; and presenting findings concerning site conditions.

Previous environmental work at the Main Plant was conducted by Metric Corporation (Metric) of Albuquerque, New Mexico. The results of Metric's effort are summarized in their December 1991 report entitled "Shallow Subsurface Investigation at Hobbs Gas Treating Plant, Lea County, New Mexico." IT's scope of work for this phase was partially developed from information presented in that report.

2.0 Site Description_____

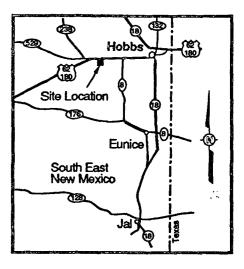
The site is located at 11525 West Carlsbad Highway, Lea County, Hobbs, New Mexico, and is shown on the Site Plan (Figure 1).

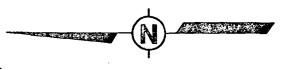
The Main Plant functions as a natural gas "sweetening" facility to remove impurities, including hydrogen sulfide, from the natural gas process stream after collection from the supply wells. After the sweetening process, the natural gas is compressed for transmission by pipeline to in-state and out-of-state customers. The sweetening process waste stream includes a clear liquid similar to white gas, which consists primarily of a mixed group of petroleum distillates (including benzene) consisting primarily of high molecular weight alkanes (C-10 to C-16), which could be considered part of the kerosene fraction. Another part of the waste stream includes a black carbon substance. Mixtures of the waste liquids were intermittently discharged into a 4- by 6-foot pit of unknown depth (probably not exceeding 6 to 8 feet). The walls of the pit were lined with concrete, but the bottom was unlined. The volume of

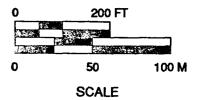


المصافحة والولاة مرمرة ويترمرهون ارتبار سراب المالية وتوريب فراكا المتاريح ورابا

⊕ BH-5/MW-3







LEGEND

- Borings/Wells Installed
 October 1992 by IT Corporation
- Borings/Wells Installed
 April 1992 by METRIC Corporation
- A____A' Cross Section Line

Figure 1

Site Plan Enron Liquid Fuels Company, Main Gas Processing Plant Hobbs, New Mexico Source: Air Photo, Koogle & Pouls Engineering, Inc. 1992

liquids discharged into the pit is unknown. In April 1992, the concrete pit was excavated and the pit filled in, with no remaining surface expression except for a concrete plug from a previously drilled soil boring (installed by Metric) and a lack of vegetation. The location of the former liquid waste disposal pit, relative to significant site features, is shown on the Site Plan (Figure 1). Several elevated flares are positioned in the vicinity of the former liquid waste disposal pit to burn gas-phase impurities from the natural gas process stream.

Topography of the site and the surrounding land is relatively flat. As shown on Figure 1, there are surface-water features positioned in the vicinity of the former liquid waste disposal pit, including an earthen storm-water holding area to the south and a process-water impoundment to the southwest.

3.0 Regional and Site Geology and Hydrology_

3.1 Regional Geology

The town of Hobbs in southeastern New Mexico is located over the unconsolidated and consolidated sand, silt, and clay units of the Pliocene Ogalalla Formation. These deposits are locally veneered with younger Pleistocene or Holocene windblown sand; stream-deposited clay; silt, sand, and gravel; or colluvial deposits. In southeastern New Mexico, the Ogalalla Formation ranges in thickness from a few inches to approximately 300 feet and commonly is capped with a hard caliche-cemented layer that may be up to 60 feet thick. The Ogalalla overlies the Triassic Dockum Group (Nicholson and Clebsch, 1961), which typically exceeds 1,100 feet in thickness in this area. The uppermost Triassic sediments in the Hobbs area consist predominantly of clay and siltstone units locally enclosing porous and permeable sandstone stringers and lenses. This upper unit is typically over 300 feet in thickness and has been correlated with the Chinle Formation of northwestern New Mexico. Underlying the upper unit is approximately 300 feet of predominantly sandstone units that are correlative to the Santa Rosa Formation in northeastern New Mexico (Nicholson and Clebsch, 1961). Beneath these sandstone units are approximately 500 feet of interbedded siltstone and clay units. All units are nearly horizontal, dipping gently toward the east.

3.2 Regional Hydrology

The town of Hobbs derives its public water supply principally from the Ogalalla Formation, which produces copious amounts of water from depths of 200 to 300 feet. A few deeper wells produce water from the sandstone units in the Dockum Group, which is the principal

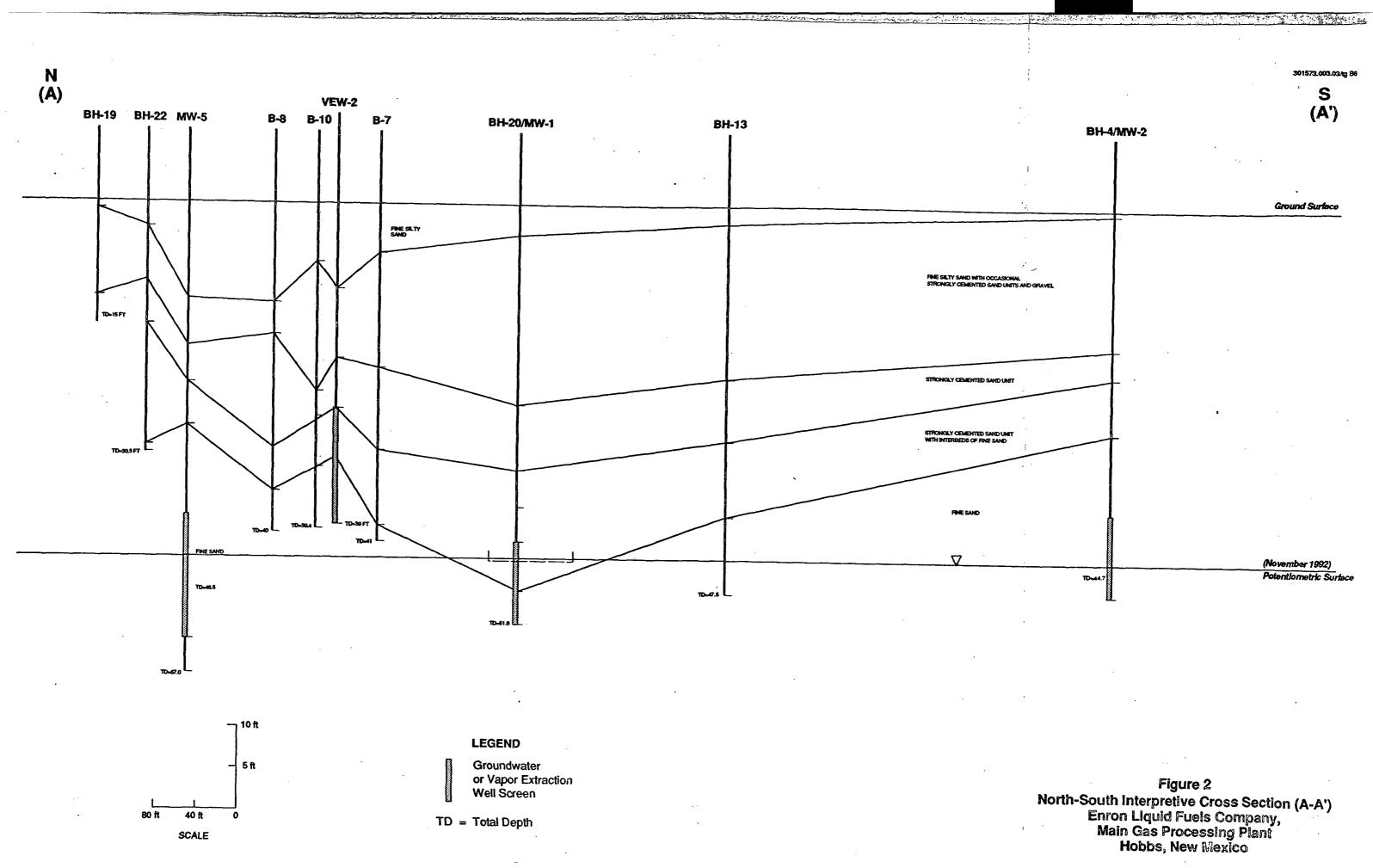
aquifer to the west of the project area. Oil Center is the only community in the area that obtains its public water supply from the Triassic rocks (Dockum Group). The Ogalalla Aquifer in this area has been designated as moderately vulnerable to contamination from surface discharges (Wilson, 1981).

3.3 Site-Specific Geology

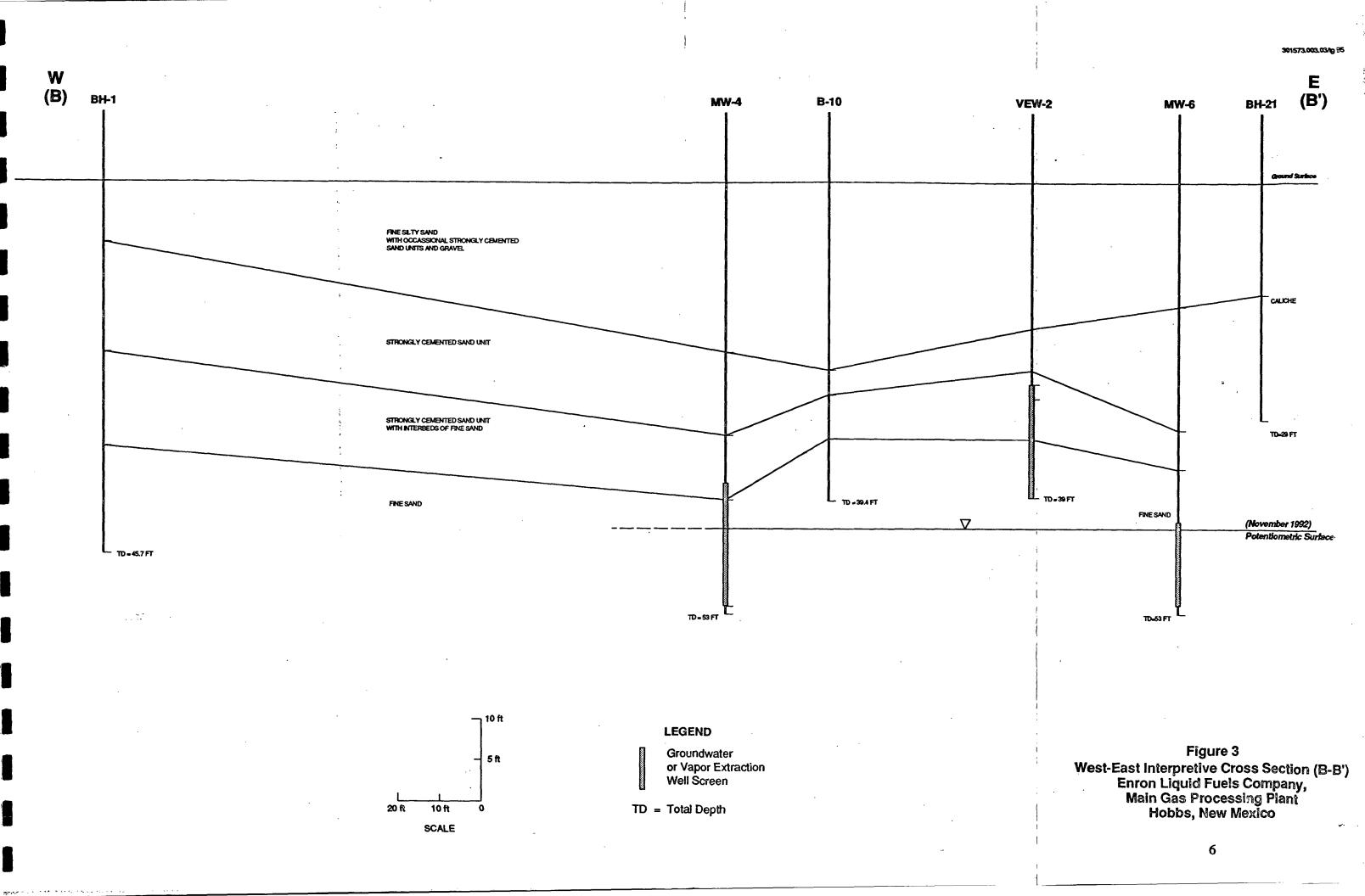
The site-specific geology consists primarily of light-brown fine-grained sand and laterally discontinuous strongly cemented sand layers up to 5 feet in thickness. The soil boring associated with MW-6 is typical of the subsurface lithology logged in the borings advanced by IT. From the land surface to approximately 15.75 feet below ground surface (bgs), a buff to white fine-grained sand was observed. Black staining and hydrocarbon vapors were noted from 15.5 to 15.75 feet. From approximately 15.75 to 20.2 feet bgs, a white strongly cemented sand was observed. Beneath the strongly cemented sand, a buff to white finegrained sand was encountered from approximately 20.2 to 21.2 feet bgs. The majority of this sand was stained black and had hydrocarbon vapors associated with it. From approximately 21.2 to 28 feet bgs, a buff- to pink fine-grained, strongly cemented sand was observed. From approximately 28 to 30.5 feet bgs, a light-brown fine-grained sand was encountered. Beneath the light-brown sand, a brown to pink fine-grained, strongly cemented sand was observed from approximately 30.5 to 35.5 feet bgs. From approximately 35.5 to 40 feet bgs, a buff to light-tan fine-grained sand was encountered, which was stained black and had hydrocarbon vapors associated with it. From approximately 40 feet bgs to the bottom of the boring (at approximately 52 feet bgs), a light-brown fine-grained sand was observed. Strongly cemented sand layers were not encountered below approximately 40 feet bgs.

The sediments from the ground surface down to the top of the strongly cemented sand unit (at a depth of approximately 15.75 feet) are probably Pleistocene or Holocene in age. The strongly cemented sand unit encountered at approximately 21.2 feet bgs probably marks the approximate top of the Pliocene Age Ogalalla Formation.

Detailed logs of the borings associated with MW-4, MW-5, MW-6, B-7, B-8, B-9, VEW-1, and VEW-2 are presented in Appendix A. A north to south interpretive cross section is presented as Figure 2. A west to east interpretive cross section is presented as Figure 3. The locations of these cross sections are presented on Figure 1. Boring logs advanced by both IT and Metric were included in development of the cross sections. Subsurface investigation by both IT and Metric indicate the presence of several strongly cemented sand units that vary in



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N. W. There are a low

thickness from less than 0.08 foot to greater than 5 feet. The strongly cemented sand units are laterally discontinuous and vary in depth below ground surface.

3.4 Site-Specific Hydrology

Groundwater was encountered at approximately 42 feet bgs. Figure 4 presents a groundwater potentiometric surface map of the upper portion of the Ogalalla Formation based on the fluid-level measurements taken on December 1, 1992, from groundwater monitoring wells MW-1, MW-5, and MW-6. The groundwater flow direction is to the southeast, with a gradient of 0.006 ft/ft.

Based on discussions with Enron personnel, liquid wastes routinely overflowed the former liquid-waste disposal pit and flowed on the ground surface to the west and south of the pit. Distribution of subsurface contaminants will be affected by the location(s) of liquid waste infiltration. In addition, the former liquid-waste disposal pit is positioned near an area of storm-water collection and storage (i.e., Buffalo Wallow) for the plant. Enron personnel indicate that the pit has been submerged by storm water during periods of excessive precipitation. The ponding of water over the infiltration source(s) will also affect the subsurface distribution of hydrocarbon constituents.

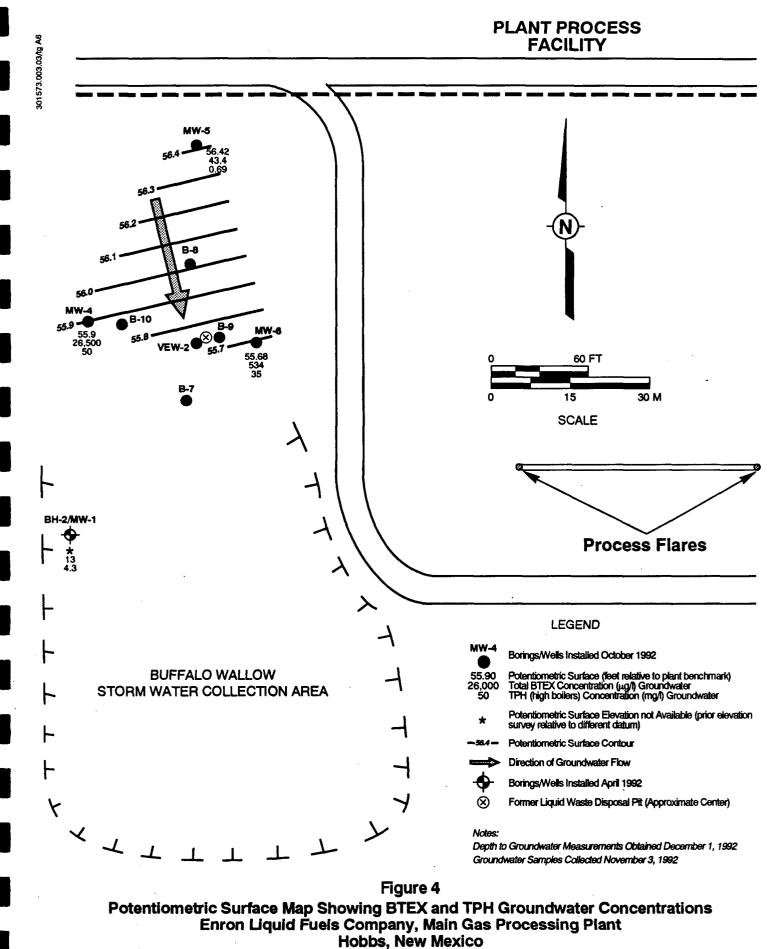
4.0 Site Assessment Activities

IT geologists performed field assessment activities at the site on October 20 and October 21, and October 26 through November 7, 1992, that included observing drilling activities, providing lithologic descriptions of the sediments encountered during drilling, collecting soil and groundwater samples for laboratory analyses, field screening soil samples for the presence of volatile organic compounds, constructing groundwater monitoring wells, constructing vapor extraction wells, installing nested vapor monitoring probes, performing aquifer slug tests, and performing vapor extraction system (VES) pilot tests.

4.1 Soil Boring Installation

4.1.1 Drilling Activities

The soil borings were drilled using an Ingersoll-Rand Model TH60 air-rotary drilling rig equipped with 6- and 10-inch-diameter drill bits. The borings extended to a depth ranging from 18 feet to 53 feet bgs. During drilling, groundwater was encountered at a depth of approximately 42 feet bgs. Black and gray hydrocarbon staining of soil and hydrocarbon



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vapors were observed by the IT geologist during drilling of the soil borings associated with MW-4, MW-6, B-8, B-9, B-10, and VEW-2. Lithologic descriptions of the sediments encountered during drilling are presented in the Soil Boring Logs included in Appendix A.

The drill rig was operated by Geo Projects International of Austin, Texas. Drilling was performed under the supervision of the IT geologist. Downhole drilling equipment was steam-cleaned between borings, and the sampling equipment was cleaned between samples to reduce the potential for cross contamination. During drilling, soil sample collection was attempted at 5-foot intervals, using 24-inch-long, split-spoon samplers equipped with cleaned brass sleeves. Samples were collected in the undisturbed sediment below the drill bit.

During sampling, a Foxboro Model 128-GC flame-ionization detector (FID) was used in conjunction with the headspace method to characterize relative levels of light-end hydrocarbons (i.e., less than C-8). FID readings are useful for indicating relative levels of hydrocarbons but did not correlate directly with levels measured by laboratory analysis. The FID responds to a range of volatile organic chemical compounds and was used to monitor for volatile hydrocarbons that may be present in the soil. Levels detected in this manner were recorded in the field and subsequently used as a basis for selecting soil samples for chemical analysis. Table 1 presents a summary of the highest and lowest headspace readings and associated sample depths. The field-screening results and procedures are presented in Appendix B.

4.1.2 Soils Analyses

The soil samples selected for chemical analyses from the borings were collected at depths ranging from 5 to 42 feet bgs. The selection of the samples for analysis was based on the results of headspace field-screening measurements.

The soil samples were analyzed for total petroleum hydrocarbon (TPH) (high boilers), using modified U.S. Environmental Protection Agency (EPA) Method 8015; and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) using EPA Method 8020. Additionally, one soil sample was analyzed by gas chromatograph/mass spectrograph (GC/MS) library search to identify and quantify other constituents present (EPA Method 8270). These analyses were conducted at the IT Analytical Services Laboratory in Austin, Texas (ITAS-Austin). Copies of the Certificates of Analysis for the soil chemical analyses are included in Appendix C, while sample collection documentation is presented in Appendix D. Detection limits for the

Summary of Headspace Readings Enron Liquid Fuels Company, Main Gas Processing Plant Hobbs, New Mexico

Soil Boring/ Well Location ^a	Highest Instrument Reading ^b (ppm) ^c	Sample Depth (feet) ^d	Lowest Instrument Reading ^b (ppm)	Sample Depth (feet) ^d
B-7	30	15	0.5	41
B-8	>1,000	All samples	>1,000	All samples
B-9	>1,000	All samples	>1,000	All samples
B-10	>1,000	All samples	>1,000	All samples
MW-4	>1,000	27	0	17
MW-5	0	All samples	0	All samples
MW-6	200	36.7	0	25
VEW-2	> 1,000	All (except 35 feet)	250	35

^aSee Figure 1 for locations. ^bFoxboro Model 128-GC flame-ionization detector. ^cppm = Parts per million ^dDepth below ground surface.

tests performed are shown on the Certificates of Analysis. Results of the soil sample analyses have been summarized in Table 2. BTEX and TPH concentrations in soil are presented next to the corresponding soil boring location shown on Figure 5.

Based on laboratory analyses of soil samples collected from six borings, hydrocarbon constituents appear to be distributed nonuniformly in the vadose zone. The lateral and vertical extent of hydrocarbon constituents relative to the former liquid waste disposal pit (FLWDP) is variable. At MW-5, positioned approximately 125 feet north (upgradient) of the FLWDP, analyses of a soil sample collected from a depth of 41 feet indicated that TPH and BTEX concentrations were below laboratory detection limits. At B-7, positioned approximately 35 feet south (downgradient) of the FLWDP, analyses of soil samples collected from depths of 16 and 41 feet indicated 71 micrograms per kilogram (µg/kg) of benzene and 31 milligrams per kilogram (mg/kg) of TPH, respectively, while the remaining constituents of interest were below laboratory detection limits. At B-9, positioned approximately 15 feet east of the FLWDP, analyses of a soil sample collected from a depth of 10.5 feet indicated 2,400 mg/kg of TPH and 352,400 µg/kg of total BTEX.

At MW-4, positioned approximately 65 feet west of the FLWDP, soil samples were collected from depths of 10.5 and 40 feet. Laboratory analysis of the sample collected at a depth of 10.5 feet indicated a xylene concentration of 160 μ g/kg, with the remaining parameters below laboratory detection limits. Laboratory analysis of the sample collected at a depth of 40 feet indicated TPH concentrations of 1,000 mg/kg and a total BTEX concentration of 484 μ g/kg, with benzene below laboratory detection limits.

At VEW-2, positioned near the center of the FLWDP, a soil sample collected from a depth of 39 feet had a TPH concentration of 7,500 mg/kg and a total BTEX concentration of 31,300 µg/kg.

Samples selected for chemical analysis were promptly sealed with aluminum foil, plastic caps, and tape. They were then labeled and placed in iced storage for transport to the analytical laboratory. Analysis Request and Chain of Custody Records (Appendix D) were initiated in the field by the IT geologist and accompanied the samples to the laboratory for the requested analyses. Cuttings generated during drilling were placed and sealed in 55-gallon drums and remain at the site for disposal by Enron.

Summary of Soil Sample Analyses Enron Liquid Fuels Company, Main Gas Processing Plant Hobbs, New Mexico October and November 1992

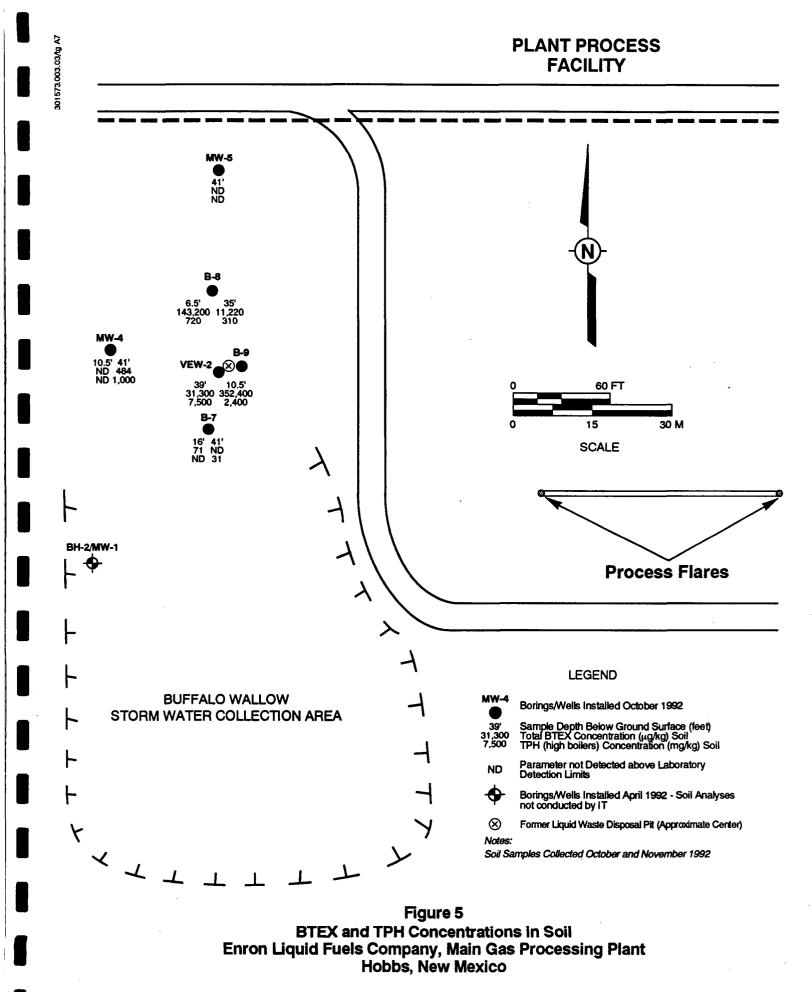
Soil Sample ID ^a	TPH ^b (mg/kg)	Benzene ^c (µg/kg)	Toluene ^c (μg/kg)	Ethylbenzene ^c (μg/kg)	Total Xylenes ^c (μg/kg)	Total BTEX (μg/kg)
B-7-16	ND (2)	71	ND (50)	ND (50)	ND (50)	71
B-7-41	31	ND (50)	ND (50)	ND (50)	ND (50)	ND
B-8-6.5	720	1,100	9,100	13,000	120,000	143,200
B-8-35	310	ND (200)	420	4,600	6,200	11,220
B-9-10.5	2,400	5,400	17,000	160,000	170,000	352,400
MW-4-10.5	ND (2)	ND (50)	ND (50)	ND (50)	160	160
MW-4-40	1000	ND (50)	84	230	170	484
MW-5-41	ND (2)	ND (50)	ND (50)	ND (50)	ND (50)	ND
VEW-2-39	7,500	3,100	2,200	13,000	13,000	31,300

^aSee Figure 1 for locations.

^bTPH = Total extractable petroleum hydrocarbons (high boilers) using modified EPA Method 8015. Units = Milligrams per kilogram (mg/kg).

^cBTEX analysis by EPA Method 8020. Units = micrograms per kilogram (µg/kg).

ND = Compound not detected above laboratory reporting limits. Reporting limit in parentheses.



4.2 Groundwater Monitoring Well Installation

4.2.1 Well Installation

Three groundwater monitoring wells were installed (MW-4, MW-5, and MW-6). At two of the well locations (MW-4 and MW-6), field screening indicated the presence of vadose zone hydrocarbon constituents that required the installation of surface casing to minimize the transport of stained and contaminated soil to the aquifer during the drilling process. The surface casing is constructed of 8-inch-diameter polyvinyl chloride (PVC) casing with the annular space grouted from the terminal depth to ground surface. Installation of the groundwater monitoring well was accomplished by drilling inside the surface casing to the required depth and constructing the smaller diameter well (4-inch-inside-diameter) inside the surface casing.

The groundwater monitoring wells were constructed using flush joint-threaded, 4-inch-insidediameter (I.D.), Schedule 40 PVC materials. No chemical cements, glues, or solvents were used in the well construction. A threaded PVC cap was screwed to the bottom length of the well screen, and each length of casing was consecutively threaded together and lowered into the borehole. Fifteen feet of 0.010-inch factory-slotted well screen was installed in each monitoring well. The well screen was positioned in the borehole to screen the upper 10 to 11 feet of the aquifer. Blank casing extended from the top of the screened interval to approximately 2.5 feet above ground surface. A filter pack, consisting of No. 8/16 (1.39 to 1.42 millimeters) Texas Mining Company silica industrial sand was installed in the annulus from the bottom of the borehole to approximately 2 feet above the top of the screened interval. A 3-foot-thick hydrated bentonite pellet seal was placed directly on top of the filter pack. The remaining annular space was filled to the ground surface with a cement/bentonite (5 percent) grout. The wellhead is protected by a steel sleeve with a hinged, locking lid and placed in a 3- by 3-foot concrete pad. Well-construction details are presented in Appendix A.

4.2.2 Groundwater Monitoring Well Development and Sampling

On November 2, 1992, the groundwater monitoring wells were developed using a 4-foot-long stainless steel bailer. Approximately 60 gallons (20 well volumes) of groundwater were purged from each well. For approximately every 5 to 10 gallons of water removed during development, pH, temperature, and specific conductance were measured. Well-development field logs are presented as Appendix E.

On November 3, 1992, the groundwater monitoring wells MW-1, MW-4, MW-5, and MW-6 were sampled to measure depth to water, presence, and thickness of any phase-separated hydrocarbons and to collect groundwater samples for laboratory analyses. Fluid-level measurements were taken to the nearest 0.01 foot with an ORS oil/water interface probe. A minimum of three casing volumes were purged from each monitoring well prior to sampling. During purging, pH, temperature, and specific conductance were measured. Groundwater samples were collected when the pH, temperature, and specific conductance readings had stabilized to within 10 percent of each other. Groundwater samples were collected using a 1- or 3-inch-diameter PVC bailer and dedicated rope. The sampling order was MW-1, MW-6, MW-5, and MW-4.

To verify the analytical results of the groundwater samples collected on November 3, 1992, groundwater monitoring wells MW-1, MW-4, MW-5, and MW-6 were resampled on December 2, 1992. The sampling procedure was the same as that performed during the November 3 sampling event except that new TeflonTM bailers and rope were dedicated to each monitoring well, and MW-4 was sampled twice. The sampling order was MW-4, MW-5, MW-6, MW-1, and MW-4. Groundwater monitoring well MW-4 was sampled twice at Enron's request to assess variations in hydrocarbon constituent concentrations. A trip blank was prepared by the laboratory and kept chilled in the cooler. A field blank was prepared using distilled water and transported to the analytical laboratory with the trip blank and the groundwater samples collected on December 2, 1992.

On November 3, 1992, the first bailer collected from groundwater monitoring well MW-4 may have had a clear nonaqueous phase liquid layer, up to 3 inches in thickness, present in it. However, this suspected layer was not present during the aquifer testing on November 6 or during the resampling activity on December 2, 1992.

4.2.3 Groundwater Analyses

Groundwater samples were collected from monitoring wells MW-1, MW-4, MW-5, and MW-6 on November 3, 1992. To obtain a representative sample of groundwater, each well was purged of approximately three well volumes of water prior to sampling. Termination of purging was based on the stabilization of temperature, pH, and specific conductance readings obtained during the purging process. Groundwater sample collection logs are presented in Appendix E.

The groundwater samples were analyzed for TPH (high boilers) using modified EPA Method 8015 and BTEX using EPA Method 8020. These analyses were conducted at ITAS-Austin. Copies of the Certificates of Analysis are included in Appendix C, while sample collection documentation is presented in Appendix D. Detection limits for the tests performed are shown on the Certificates of Analysis. Results of the groundwater sample analyses have been summarized in Table 3. BTEX and TPH concentrations are presented next to the corresponding well location on the groundwater potentiometric surface map for December 1992 (Figure 4).

Laboratory analyses of groundwater samples collected from the four monitoring wells indicate the presence of hydrocarbon constituents. TPH and total BTEX concentrations for each well sampled were above laboratory detection limits. The lowest TPH and BTEX concentrations were detected in groundwater samples collected from wells MW-1 and MW-5. The highest concentrations of TPH and BTEX were detected in the groundwater sample collected from well MW-4, with a TPH concentration of 50 mg/L, and a total BTEX concentration of 26,500 µg/L.

To verify the laboratory analytical results of the November 3, 1992, sampling event, Enron requested that IT resample groundwater monitoring wells MW-1, MW-4, MW-5, and MW-6 on December 2, 1992. The verification laboratory analyses are summarized in Table 3, which indicates similar analytical results for the groundwater monitoring wells between the November 3 and December 2 sampling events.

Samples from MW-2 and MW-3 were collected by Metric and analyzed for purgeable aromatics and purgeable hydrocarbons on October 8 and September 30, 1992. The laboratory analyses indicate that all concentrations of purgeable aromatics and hydrocarbons were found to be below the detection limit of 1.0 μ g/L. The Metric water samples were analyzed by Assagai Analytical Laboratories Inc. in Albuquerque, New Mexico. The data is presented in Metric's December 1991 report (Metric, 1991). IT did not collect samples from MW-2 and MW-3 during this investigation.

Enron Liquid Fuels Company, Main Gas Processing Plant Summary of Groundwater Sample Analyses November and December 1992 Hobbs, New Mexico

Water									Total
Sample					Ethyl	Total	Total		Dissolved
{D ^a	Sample Date	чндт	Benzene ^c	Toluene ^c	Benzene ^c	Xylenes ^c	BTEX°	pHq	Solids ^e
MW-1	November 1992	4.3	1.5	1.5	(0.1) ¹ UN	10	13	6.4	2900
MW-4	November 1992	50	16000	8000	700	1800	26,500		
MW-5 .	November 1992	0.69	3.0	3.4	3.0	34	43.4		
9-WM	November 1992	35	340	53	51	120	534		
MW-1	December 1992	5.9	1.3	1.4	(1.0) UN	6.0	8.7		

MW-1	December 1992	5.9	1.3	1.4	(0.1) ON	6.0	8.7	
MW-4	December 1992	15	17000	8200	530	1300	27,030	
MW-4A	December 1992	10	15000	6200	400	1000	22,600	
MW-5	December 1992	1.3	9.1	4.1	8.2	37	58.4	
9-WW	December 1992	10	520	20	58	120	718	
FB-1 ⁹	December 1992	NA ^h	ND (1.0)					
TB-1	December 1992	NA	ND (1.0)					

^aSee Figure 1 for locations.

^bTPH = Total extractable petroleum hydrocarbons (high boilers) using modified EPA Method 8015. Units = milligrams per liter (mg/L). ^cBTEX analysis by EPA Method 8020. Units = micrograms per liter (μg/L).

^dpH analysis by EPA Method 150.1; unitless.

^eTotal dissolved solids analysis by EPA Method 160.1 units = mg/L.

ND = Not detected at the detection limit in parentheses.

⁹FB-1 = Field Blank No. 1

^h NA = Not analyzed [†]TB-1 = Trip Blank No. 1

4.3 Vapor Extraction Wells

Two vapor extraction wells were installed adjacent to the former liquid waste disposal pit. VEW-1 was located within 5 feet to the west of the disposal pit, and VEW-2 was located within 5 feet to the east of the pit (Figure 1). The two vapor extraction wells were constructed using flush joint-threaded, 4-inch-I.D., Schedule 40 PVC materials. No chemical cements, glues, or solvents were used in the well construction. A threaded PVC cap was screwed to the bottom length of the slotted casing, and each length of casing was consecutively joined together and lowered into the borehole. The screened portion of each well consists of factory-slotted casing with 0.032-inch-wide slots. In VEW-1 the borehole is screened between depths of approximately 5 and 18 feet bgs. VEW-1 was screened above the strongly cemented sand unit that was observed from a depth of approximately 18.8 to 23.0 feet bgs. In VEW-2 the borehole is screened between depths of approximately 24 and 38.5 feet bgs. VEW-2 was screened below the strongly cemented sand unit. VEW-1 and VEW-2 were screened above and below the strongly cemented sand unit, respectively, and separate VES pilot tests were conducted to assess what effects, if any, the strongly cemented sand unit would have on vapor through the vadose zone.

Blank casing was installed above the slotted interval to approximately 0.5 feet bgs. A filter pack consisting of No. 8/16 (1.39 to 1.42 millimeters) Texas Mining Company silica industrial sand was installed from the bottom of the well to approximately 2 feet above the top of the screened interval. A 4-foot-thick bentonite clay seal was placed directly on top of the filter pack. The annular space was filled with a cement/bentonite (5 percent) grout to approximately 1 foot bgs. A traffic-rated, locking steel utility box was installed at the vapor extraction wellheads, flush with the surrounding ground surface. Additionally, an 8-inch-diameter PVC surface casing was installed at VEW-2 from ground surface to approximately 20 feet bgs and keyed into the strongly cemented sand unit. The smaller diameter vapor extraction well (VEW-2) casing was installed inside this surface casing. Well-construction details are presented in Appendix A.

4.4 Vapor Extraction Monitoring Probes

The four observation probe borings were installed 35 feet south (B-7), 50 feet north (B-8), 15 feet east (B-9), and 45 feet west (B-10) from the extraction wells and contained three observation probes each, except for B-10, which contained one observation probe. The three observation probes in B-7 were placed at depths of 10, 16, and 32 feet bgs (bgs). The three observation probes in B-8 were placed at depths of 9, 15, and 30 feet bgs. The three

observation probes in B-9 were placed at depths of 10, 16, and 27 feet bgs. The single observation probe in B-10 was placed at a depth of 31 feet bgs. The specific probe depth in each boring was selected to intersect a specific lithologic unit observed during drilling activities. Each cast-aluminum probe was attached to semirigid, 3/16-inch-I.D. polypropylene tubing. The tubing for each probe extends to above ground surface, where it is labeled and a one-way quick-connect valve is attached. Each probe was placed in an uncased borehole and positioned in the middle of an approximately 3-foot-thick layer of No. 8/16 (1.39 to 1.42 millimeters) Texas Mining Company silica industrial sand. A hydrated bentonite pellet seal was installed in between the sand layers to provide vertical isolation for each probe. A traffic-rated, locking steel utility box was installed at the surface of each soil boring, flush with the surrounding ground surface. The subsurface lithology and construction details of the observation probe borings are shown on the soil boring logs included in Appendix A.

Figure 1 presents the locations of the soil observation probe borings. The locations selected for installation of the observation probe borings were based on work done previously at the site by Metric and on IT's previous experience installing and conducting VES pilot tests. Vertical placement of the observation probes within each nest was based on the site-specific lithology. In each nest, one deeper probe was placed in unconsolidated material below the depth of the strongly cemented sand unit encountered in VEW-2 (at a depth between approximately 18.8 and 23 feet bgs). The deeper probes (ranging from approximately 27 to 32 feet bgs) were intended to measure influence from the VES pilot tests conducted in VEW-2. Two shallower probe placements were in unconsolidated material above the strongly cemented sand encountered in VEW-2. The first horizon ranges from approximately 9 to 10 feet bgs. The second horizon ranges from approximately 15 to 16 feet bgs. Only one probe was installed in boring B-10 at a depth of approximately 31 feet bgs. This boring (B-10) was initially to be converted to a groundwater monitoring well (MW-4). However, due to visual observations of soils containing hydrocarbon constituents above the strongly cemented sand unit, a surface casing was installed prior to continuing advancement of the boring below the strongly cemented sand unit. Soils containing hydrocarbon constituents were observed below the strongly cemented sand unit, and consequently, completion of this boring as a groundwater monitoring well was abandoned. The surface casing, therefore, prevented the installation of VES observation probes at shallower depths. MW-4 was relocated 20 feet west of B-10.

4.5 Vapor Extraction Tests

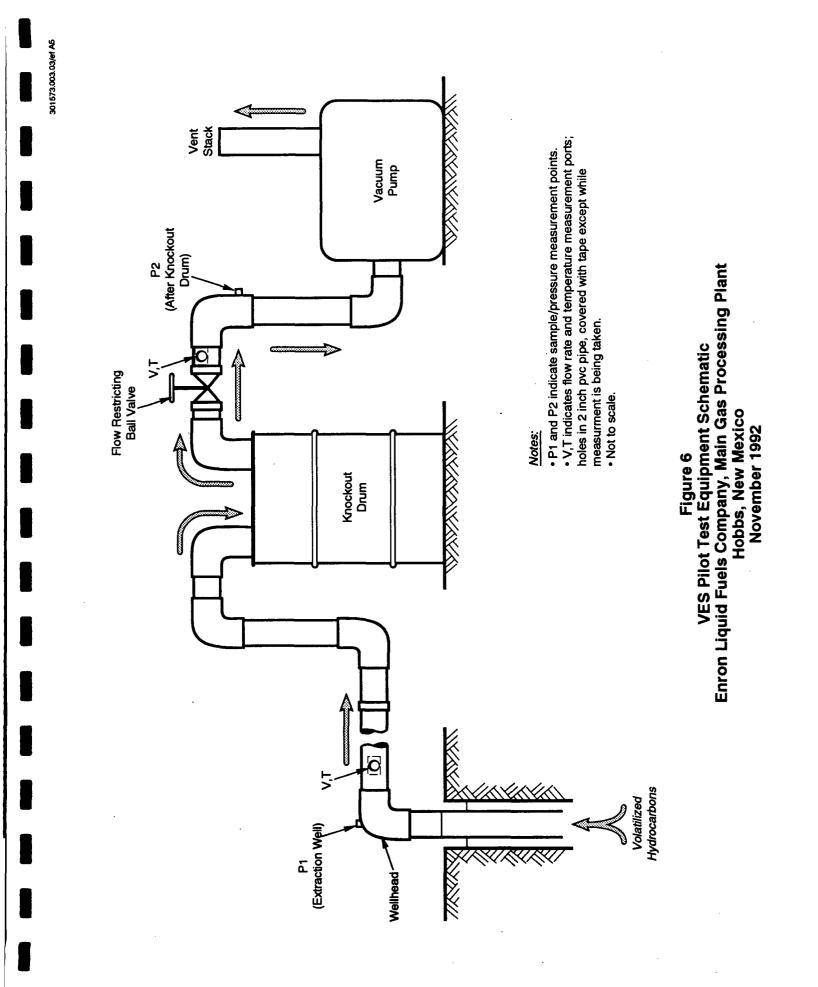
4.5.1 Pilot Tests

On November 4 and 5, 1992, soil vapor extraction system (VES) pilot tests were conducted in VEW-1 and VEW-2, respectively. The equipment used to conduct the pilot test consisted of a trailer-mounted vacuum pump, two vapor extraction wells (VEW-1 and VEW-2), and four observation probe locations, with a total of ten probes.

The VES pilot tests were conducted to assess the feasibility of moving air through the subsurface for remediation purposes. A continuous negative pressure (vacuum) was applied to the two extraction wells separately, for approximately 7 hours each. Based on IT's previous experience conducting VES pilot tests, 7 hours is an adequate duration for stabilization of the negative pressures at the observation probes and extraction well, and the extraction well flow rates and temperatures. The effects of that vacuum were measured at each of the ten observation probes.

The extraction wellhead was connected to a knockout drum on the VES pilot test equipment using PVC piping, with sampling and pressure measurement ports positioned near the wellhead. The vacuum pump used was a 5-horsepower/230-volt, alternating current motor with a Rotron blower. Electrical power for the VES motor was provided by an electrical outlet installed near the wellhead. The knockout drum served as a condensate and particulate removal point within the system. The VES pilot test equipment schematic is shown on Figure 6.

During the pilot tests, flow in the system was maintained at the highest flow rate possible to induce the greatest vacuum at the observation probes. This flow rate varied from approximately 2,000 to over 4,500 linear feet per minute, as shown in Table 4. The following parameters were recorded hourly during the pilot test: 1) percent of the lower explosive limit (LEL) for combustible cases and percent oxygen of the process stream at the extraction wellhead using a Gastech Model GX-3 explosimeter, while a Foxboro Model 128-GC FID was available to backup the explosimeter readings; 2) negative pressures (vacuum) at the extraction wellhead and each of the ten observation probes, using three Dwyer magnehelic differential pressure gauges measuring 0 to 0.25, 0 to 5, and 0 to 100 inches of water; and 3) air velocity and temperature measured with a Davis 100 UT-9110 hotwire anemometer/temperature meter at the extraction well, after the knockout drum and after



Summary of VES Pilot Test Monitoring Parameters Enron Liquid Fuels Company, Main Gas Processing Plant Hobbs, New Mexico

Date Vapor Extraction Well ID	Time	Vacuum ^a (in. H ₂ O)	Flow Rate ^b (ft/min)	Temperature ^c (°F)	% LEL ^d	FID Effluent Concentration [®] Parts Per Million
04-Nov-92	1230	54	2000	60	100	NA
VEW-2	1330	54	2700	65	100	NA
	1430	54	2300	60	100	NA
	1530	54	2300	60	100	NA
	1630	54	2200	60	100	NA
	1730	55	2600	60	100	NA
	1830	55	2500	60	100	NA
	1930	55	2700	53	100	NA
05-Nov-92	0700	30	1400 ^f	95	100	NA
VEW-1	0800	29	1800 ^f	90 ^f	100	NA
	0900	28	3000	60	100	NA
	1000	. 29	4800	60	100	NA
	1100	29	4200	60	100	NA
	1200	29	4200	65	100	NA
	1300	29	3800	65	NA	>1000
	1420	29	3800	65	NA	>1000

^aVacuum measured in inches of water.

^bAirflow velocity measured with a hot-wire anemometer in a 2-inch-inside-diameter pipe in feet per minute.

^oTemperature in degrees Fahrenheit as measured by a hot-wire anemometer.

^dLower explosive limit, percent.

^eOrganic vapor concentrations measured with an FID in parts per million by volume.

¹During the first two readings on 12-5-92, the hot-wire anemometer was out of calibration.

NA = Not analyzed.

the blower. In addition, soil-vapor samples were taken from the extraction wellheads during the pilot tests and from five of the soil-vapor monitoring probes for laboratory analyses. One soil-vapor sample was collected from VEW-2 toward the beginning of that pilot test. Two soil-vapor samples were collected from VEW-1 at the midpoint and at the end of that pilot test. Vacuum, temperature, flow-rate measurements, and volatile hydrocarbon vapor concentration field measurements or percent LEL are summarized in Table 4. The VES pilot test observation probe data are summarized in Table 5. VES pilot test field data are presented in Appendix F.

On November 4 and 5, soil vapor samples were collected from vapor extraction wells VEW-1, VEW-2, and soil vapor monitoring probes B-7-32, B-8-15, B-9-10, B-9-16, and B-9-27. Soil vapor samples were collected at the extraction well by extracting soil vapor from the process stream to an 8-liter Tedlar bag via a small diaphragm pump. The soil vapor was transferred to an evacuated 6.6-liter stainless steel cylinder via a stainless steel tube. Soil vapor samples were collected by connecting the end of each probe's 3/16-inch tubing to the evacuated stainless steel cylinder via a stainless steel cylinder via the evacuated stainless steel cylinder via a stainless steel cylinder via the stainless steel cylinder via a stainless steel cylinder via the stainless steel cylinder via a stainless steel tube. The soil vapors were drawn into the stainless steel cylinders under less than 3 millimeters of mercury vacuum.

4.5.2 Soil-Vapor Analyses

Soil-vapor samples were collected on November 4 and 5, 1992, for laboratory analyses from vapor extraction wells VEW-1 and VEW-2 and soil vapor monitoring probes B-7-32, B-8-15, B-9-10, B-9-16, and B-9-27. The soil vapor samples were collected and stored in laboratory-prepared pressure-evacuated stainless steel canisters (TO-14-style sample collection canisters) and shipped under chain-of-custody protocol by overnight delivery to the IT Analytical Services Laboratory in Cincinnati, Ohio. The samples were analyzed by Air Toxics, Ltd., under an IT Analytical Services subcontract.

Selected soil-vapor samples were analyzed for natural gas (oxygen, nitrogen, carbon monoxide, methane, carbon dioxide, and total nonmethane hydrocarbons) by ASTM Method D-3416, BTEX by EPA Method TO-3, and TPH by gas chromatograph and FID. Copies of the Certificates of Analysis are included in Appendix C, while sample collection documentation is presented in Appendix D. Detection limits for the tests performed are

Vapor Extraction System Pilot Test Soil Observation Probe Data Enron Liquid Fuels Company, Main Gas Processing Plant Hobbs, New Mexico

Date	Time	Soil Obse	Soil Observation Probe Boring B-7	be Boring I	B-7	Soli Ob	servation F	Soil Observation Probe Boring B-8	B-8	Soil Obs	Soil Observation Probe Boring B-9	be Boring	6-B	Soil Obsen Borin	Soil Observation Probe Boring B-10
Vapor Extraction Well ID		Distance From	Vacuun at	Vacuum (inches of water) at Given Depth	l water) th	Distance From	Vacuui	Vacuum (inches of water) of Given Depth	vater) of	Distance From	Vacuum	Vacuum (inches of water) Given Depth	water) at h	Distance From	Vacuum (inches of water)
		Extraction Well (feet)	10 ft	16 ft	32 ft	Extraction Welt (feet)	9 ft	15 ft	30 fi	Extraction Well (Feet)	10 ft	16 11	27 ft	Extraction Well (feet)	
04-Nov-92	1230	35	0.00	60.	21	50	0.00	0.00	0.00	15	.17	1.8	.25	45	.85
VEW-2	1330	35	0.00	÷	នុ	50	0.00	0.00	0.00	15	.17	1.7	.24	45	.10
	1430	35	0.00	.14	.30	50	0.00	.005	0.00	15	.17	ø.	.30	45	.12
•	1530	35	0.00	.12	8	50	0.00	.005	0.00	15	.18	1.7	.30	45	.12
	1630	35	0.00	.12	ક્ષ	50	.01	.01	0.00	15	.18	1.7	.20	45	11.
	1730	35	0.00	.10	ญ	20	8	.02	00'0	15	-11	1.7	.20	45	.15
·	1830	35	0.00	.10	8	50	10.	.01	00.0	15	.18	1.7	.20	45	.13
	1930	35	0.00	ŧ.	24	50	-02	-01	0.00	15	.18	1.7	50	45	.14
05-Nov-92	0020	35	0.00	.21	.25	50	.10	.12	Ŧ.	15	8	<u>9</u> 9.	1.0	45	.30
VEW-1	0800	35	0.00	.25	Ş	50	.14	.14	11.	15	8	<u>07</u> .	1.2	45	.35
.	0060	35	0.00	.25	.30	50	-10	.10	6 0 [.]	15	<u>8</u> .	<u>9</u> 9.	1.2	45	.30
	1000	35	0.00	50	.30	50	.095	.10	80.	15	8	<u>9</u> 9.	1:1	45	.30
L	1100	35	0.00	.20	.30	50	.07	90.	.05	15	%	<u>8</u> .	1.1	45	.25
	1200	35	0.00	8	.30	50	80.	-20	.05	15	<u>8</u> .	<u>9</u> .	-	45	.30
	1300	35	0.00	.20	.30	50	.11	.10	80.	15	0 6 [.]	<u>9</u> .	1.1	45	.30
	1430	35	0.00	.20	30	50	-02	80.	90.	15	0 6 [.]	<u>99</u>	.	45	.30

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shown on the Certificates of Analysis. Results of the soil vapor analyses have been summarized in Table 6. Benzene concentrations ranged from 1,900 micrograms per liter (µg/L) in VEW-2 to 3,400 µg/L in VEW-1. TPH ranged from 280,000 µg/L in VEW-1 to 380,000 µg/L in VEW-2.

4.6 Aquifer Slug Tests

On November 6, 1992, aquifer slug tests were conducted in groundwater monitoring wells MW-4, MW-5, and MW-6 to estimate the hydraulic conductivity of the aquifer material in the vicinity of each well. During the slug tests, hydraulic head changes in each well were monitored with a pressure transducer and a high-speed data recorder. To perform the test, a steel slug of known volume was rapidly removed from each well. The pressure transducer and high-speed data recorder the hydraulic head changes.

Hydraulic conductivity was calculated using the slug test data and the Bouwer and Rice (1976) method for determining hydraulic conductivity of unconfined aquifers with partially penetrating wells (which are the conditions present at the site). The equations used to determine hydraulic conductivity using this method are presented in Appendix G. The hydraulic conductivity calculated for MW-4 was 3.6 feet per day (ft/day); for MW-5, 5.5 ft/day; and for MW-6, 1.7 ft/day. These hydraulic conductivity values are summarized in Table 7 and are within the range of published hydraulic conductivity valves for a silty sand (Freeze and Cherry, 1979). The value reported by the laboratory for constant head permeability is 3.2x10⁻⁵ centimeters per second (cm/sec) (0.0921 ft/day) as determined by ASTM Method D5084. The term permeability is substituted for the term hydraulic conductivity in the ASTM D5084 Method. Laboratory results are expected to vary from actual field hydraulic conductivities, due to the randomly located short length of the screened interval of the partially penetrating well. Samples may not represent the overall hydraulic conductivity of the entire aquifer, since variations of several orders of magnitude frequently occur at different depths and locations in an aquifer due to vertical and horizontal anisotropy (Todd, 1980). Slug test data plots and calculation notes are included in Appendix G.

Enron Liquid Fuels Company, Main Gas Processing Plant Summary of Soil Vapor Sample Analyses Hobbs, New Mexico November 1992

Vanor					Carbon		Carbon	Non- Methane Hvdro-			Ethvi	Total	
Sample ID ^a	Sample Date	Sample Time	Oxygenb %	Nitrogen ^b %	Monoxide ^b %	Methane ^b %	Dioxide ^b %	carbons ^b	Benzene ^c (µg/L)	Toluene ^c (μg/L)	Benzene ^c (µg/L)	Xytenes ^c (µg/L)	1РН ^d (µ9/L)
B-7-32	11-4-92	11:15	ND [®] (0.002)	87	0.002	8.1	2.7	2.4	NA [†]	AN	AN	NA	AN
B-8-15	11-4-92	11:25	ND (0.002)	82	ND (0.002)	7.3	7.8	2.6	AN	AN	AN	AN	V
B-9-10	11-4-92	11:00	9.5	85	ND (0.002)	1.9	2.2	1.6	AN	NA	AA	AN	AN
B-9-16	11-4-92	11:05	ND (0.003)	7	(E00.0) QN	13	3.0	6.5	V	AN	AN	AN	AN
B-9-27	11-4-92	11:10	4.0	84	ND (0.002)	3.6	3.2	5.1	NA	NA	NA	NA	AN
VEW-1-1	11-5-92	10:30	7.0	77	0.001	2.5	2.8	11	2,700	850	140	250	280,000
VEW-1-2	11-5-92	14:30	6.1	11	0.001	2.1	4.3	10	3,400	1,700	400	200	340,000
VEW-2-1	11-4-92	13.45	4.0	64	ND (0.002)	13	0.047	19	1,900	400	170	250	380,000

'n. banalysis by ASTM D-3416; units = percent. banalysis by EPA Method TO-3 using purge and trap chromatography with photoionization detection; units = micrograms per liter (μg/L). canalysis by GC/FID; units = μg/L. ⁶ND = Compound not detected at method detection limit shown in parentheses.

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Summary of Aquifer Hydraulic Conductivities Enron Liquid Fuels Company, Main Gas Processing Plant Hobbs, New Mexico November 1992

Well Location ^a	Hydraulic Conductivity (feet per day) ^b	Hydraulic Conductivity (meters per day) ^b
MW-4	3.6	1.1
MW-5	5.5	1.7
MW-6	1.7	0.52

^aSee Figure 1 for locations.

^bHydraulic conductivity based on slug test data obtained November 6, 1992, using the Bouwer and Rice (1976) method of calculation.

4.7 Soil Geotechnical Samples and Analyses

Soil samples were collected for geotechnical analyses from soil borings B-8, MW-4, and MW-5 during drilling activities. The soil samples were shipped under chain-of-custody protocol by overnight delivery to the IT Environmental Technology Development Center in Oak Ridge, Tennessee.

The selected soil samples were analyzed for particle-size distribution (sieve analysis), moisture content, air permeability, constant head permeability, and porosity. Sample collection documentation is presented in Appendix D, while copies of the Certificates of Analysis are included in Appendix H. Results of the geotechnical analyses have been summarized in Table 8. The geotechnical analyses indicate that the sediments underlying the site can be characterized as a silty sand.

4.8 Surveying

Following installation of the groundwater monitoring wells, extraction wells, and soil borings, the locations, ground surface elevations, and top-of-well-casing elevations were surveyed by John W. West Engineering Company of Hobbs, New Mexico. The elevations and locations are relative to a plant datum benchmark. Horizontal locations were surveyed to the nearest tenth of a foot, and elevations were surveyed to the nearest hundredth of a foot. The soil boring locations are shown on the Site Plan (Figure 1), while elevations are presented in Table 9. A copy of the survey notes is presented in Appendix A. All survey data was determined for the north side of the boring or monitoring well.

4.9 Soil and Groundwater Storage

All drill cuttings and groundwater development/purge water were containerized in 55-gallon drums and stored on site pending the results of laboratory analysis. Disposal of the soil and water remains the responsibility of Enron.

5.0 Vapor Extraction System Pilot Test Results_

The vacuum readings from the observation probes indicate that the influence of the extraction well varies with depth and that the vacuum at depth is dependent on the depth of the extraction well (shallow or deep) in operation. The data in Table 5 indicate an increased vacuum in probes at all horizons as a result of applying a vacuum to VEW-1, the shallower extraction well. The only exception is probe B-9-16, which maintained higher vacuum readings under the influence of VEW-2 (the deeper extraction well) than VEW-1. VEW-2 is

Summary of Soil Geotechnical Analyses Enron Liquid Fuels Company, Main Gas Processing Plant Hobbs, New Mexico

Soil Sample ID ^a	Percent Moisture %	Porosity (%)	Saturated Hydraulic Permeability ^b (cm/sec)/(ft/day)	Avg. Coeff. of Permeability ^c (m ²)	Sieve Analysis ^d (Estimated Soil Type)
B-8-10.5	NA ^d	55.5	NA	NA	NA
B-8-11	NA	40.2	NA	1.54 E-13	NA
B-8-12	12.0	NA	NA	NA	Silty gravel
MW-4-45	16.8	NA	NA	NA	Silty sand
MW-4-45.5	NA	NA	3.2 E-5/0.0921	NA	NA
MW-4-46	NA	34.9	NA	NA	NA
MW-5-11.5	17.5	NA	NA	1.07 E-13	Silty Sand
MW-5-16.5	NA	40.4	NA	NA	NA

^aSee Figure 1 for soil boring and monitoring well locations. Example: B-8-10.5, where B-8 is the soil boring ID, and 10.5 is the sample depth (feet below ground surface).

^bConstant head permeability by ASTM D5084; units = centimeter per second (cm/sec).

^cAverage valve for flowing pressure of 60 pounds per square inch (psi). Average valves for 30 and 90 psi are available in Appendix G. ^dSoil classification estimated from the sieve size analysis by the laboratory. Atterberg limits test were

^oSoil classification estimated from the sieve size analysis by the laboratory. Atterberg limits test were not performed to determine clay content; therefore, soil classifications are estimated. NA = Parameter not analyzed.

Summary of Survey Information Enron Liquid Fuels Company, Main Gas Processing Plant Hobbs, New Mexico

Soil Boring/ Well Location ^a	Ground Elevation (feet)	Top-of-Well-Casing Elevation (feet)
B-7	99.34	NA
B-8	99.39	NA _
B-9	99.29	NA
B-10	98.97	NA
MW-4	98.79	101.25
MW-5	99.94	102.37
MW-6	99.33	101.89
VEW-1	98.99	NA
VEW-2	99.03	NA

Notes: Survey by John W. West Engineering Company, Hobbs, New Mexico, November 4, 1992. Survey relative to plant datum (refer to survey notes: Appendix A). NA = Not applicable.

screened from approximately 24 to 38.5 feet bgs, while VEW-1 is screened from approximately 5 to 18 feet bgs. Based on the field data (Table 5), it appears as though VEW-1 (the shallower well) is more effective in inducing higher vacuum at depth than VEW-2 (the deeper well), with the exception of the vacuum observed at probe B-9-16. The variation in vacuum efficiency may be attributed to the discontinuous and strongly cemented sand units observed in the subsurface, which may affect the lateral and vertical soil vapor flow paths.

Extraction rate calculations were performed using TPH concentrations reported by the laboratory for the soil-gas samples VEW-1-2 (84,000 parts per million by volume [ppmv], $340,000 \text{ mg/m}^3$) and VEW-2-1 (94,000 ppmv, $360,000 \text{ mg/m}^3$). The formula used for these calculations are:

$$ER = Q * C^{\text{soil-gas}} * MW * 1.581 \times 10^{-7} (EPA, 1989)$$

where,

and

$$ER = \frac{mg}{m^3} * \frac{0.001}{1mg} * \frac{0.001kg}{1g} * \frac{2.205lbs}{1kg}$$

*
$$\frac{1m^3}{35.31ft^3}$$
 * $\frac{ft^3}{\min}$ * $\frac{60\min}{hr}$ = $\frac{lbs}{hr}$ (Raugust et al., 1992)

where,

Using the flow rate of 53.1 cubic feet per minute (cfm) from pilot test VEW-2, the extraction rate was calculated to be 78.9 lb/hr using the EPA method and 75.6 lb/hr using Raugust's (1992) calculation. Using the flow rate of 87.3 cfm from the pilot test VEW-1, the extraction rate was calculated to be 115.9 lb/hour using the EPA calculation and 111.8 lb/hour using Raugust's equation.

Graphs 1 through 5, included in Appendix F, indicate an approximate linear relationship between the vacuum measured in the subsurface observation probes and the log of the distance from the extraction well(s). Interpreting the margin of the effective capture zone, where the vacuum falls to between 0.1 and 0.5 inches of water, the radius of the capture zone is approximately 20 feet, with extraction rates of 87.3 and 53.1 cfm at VEW-1 and VEW-2, respectively.

6.0 Limitations_

Evaluation of the geologic and environmental conditions at the site for the purpose of this investigation is made from a limited number of observation points. Subsurface conditions may vary from the data points available. Additional work, including further subsurface investigation, can reduce the inherent uncertainties associated with this type of investigation.

7.0 References

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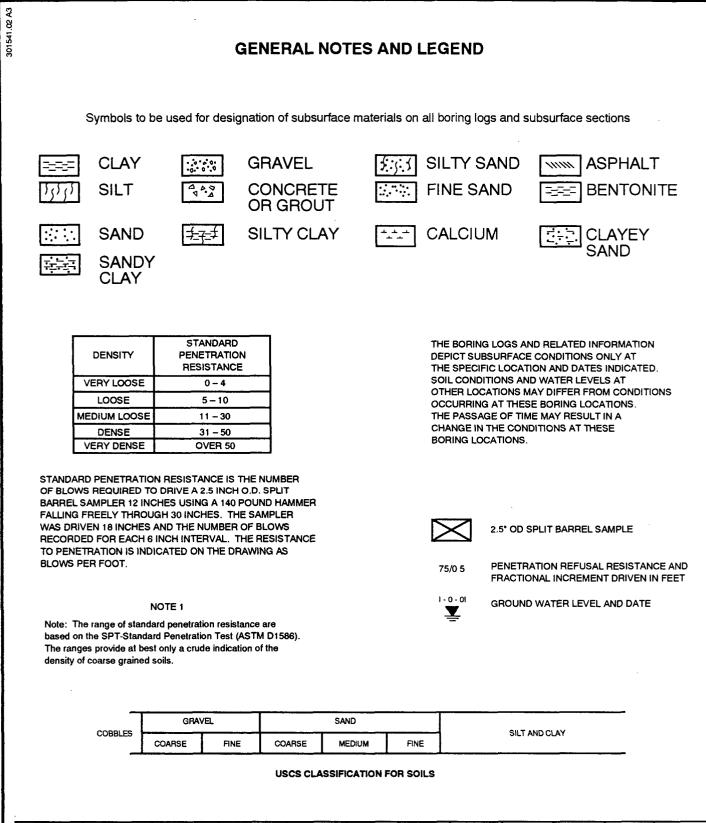
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APPENDIX A

LOGS OF SOIL BORINGS, GROUNDWATER MONITORING WELLS, VAPOR EXTRACTION WELLS, SOIL VAPOR MONITORING PROBE INSTALLATIONS, AND SURVEY NOTES



BOULDER	COBBLE	PEBBLE	GRANULE	VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY	INDIVIDUAL PARTICLES
BOULDER CONGLOMERATE	COBBLE CONGLOMERATE	PEBBLE CONGLOMERATE		VERY COARSE SANDSTONE	COARSE SANDSTONE	MEDIUM SANDSTONE	FINE SANDSTONE	VERY FINE SANDSTONE	SANDSTONE	CLAYSTONE AND SHALE	CONSOLIDATED ROCK

WENTWORTH SCALE FOR ROCK

GENERAL NOTES AND LEGEND

301541.02 A5

USCS CLASSIFICATION FOR SOILS

COARS	E-GRA	INED SOILS	FINE-GRAINI	ED/HIGI	HLY ORGANIC SOILS
CLEAN GRAVELS	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS
(GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	SILTS		WITH SLIGHT PLASTICITY INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY.
GRAVELS MTH FINES	GМ	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	AND CLAYS LIQUID LIMITS (LESS THAN 50)	CL	GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
(APPRECIABLE AMOUNT) OF FINES)	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
CLEAN SANDS	sw	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES		мн	INORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
(LITTLE OR NO FINES)	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	сн	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES		он	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
(APPRECIABLE AMOUNT) OF FINES)	SC	CLAYEY SANDS, SAND-CLAY MIXTURES	HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

U S C S UNIFIED SOIL CLASSIFICATION SYSTEM (CAPITAL LETTERS INDICATE LAB TEST CLASSIFICATION, LOWER CASE LETTERS INDICATE VISUAL FIELD CLASSIFICATION)



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VISUAL CLASSIFICATION OF SOILS

BORING NUMBER: MW-4 COORDINATES: DATE: 11-3-92 ELEVATION: UNKNOWN GWL: Depth N/A Date/Time DATE STARTED: 10-31-92 ENGINEER/GEOLOGIST: MIKE CYROCKI Depth N/A Date/Time DATE COMPLETED: 11-1-9 DRILLING METHODS: INGERSOLL-RAND MODEL TH60 AIR ROTARY PAGE: 1 OF 2 Image: Complex of the state of the	PROJE		ABER: 3	01573.0	01.02	PROJECT NAME: ENRON - HOBBS PLANT					
ENGINEER/GEOLOGIST: MIKE CYROCKI Depth N/A Date/Time DATE COMPLETED: 11:1-9 DRILLING METHODS: INGERSOLL-RAND MODEL TH60 AIR ROTARY PAGE: 1 OF 2 Image:	BORIN		BER: M	W-4		COORDINATES:	11-3-92				
DRILLING METHODS: INGERSOLL-RAND MODEL TH60 AIR ROTARY PAGE: 1 OF 2 IIII HAND IN THE ALL INFORMATION INTO ALL INFORMATION INTO ALL INFORMATION I	ELEVA	TION: L	JNKNOV	VN		GWL: Depth N/A Date/Time		DATE S	TARTED: 10-31-92		
W H O W H O W H O Stained gray and black, silty, fine sand, dry, hydrocarbon odor No MW-4-6 12 sp Stained gray and black, silty, fine sand, dry, hydrocarbon odor No MW-4-6 12 sp Stained gray and black, silty, fine sand, dry, hydrocarbon odor No MW-4-6 12 sp Stained gray and black, silty, fine sand, dry, hydrocarbon odor Stained gray and black, sandy sit with 0.08 feet thick dense caliche layer at 11.0 feet, most, hydrocarbon odor MW-4 19 ml Stained light gray and dark gray, fine sand to 16.75 feet; then white silt with no staining, dry WW-4 e Pink, fine grained strongly cemented sand in contact with viteocarbon odor WW-4 e Pink, fine grained strongly cemented sand in contact with viteocarbon odor WW-4 e Pink, fine grained strongly cemented sand in contact with viteocarbon odor WW-4 e U Distribut draws of unconsolidated fine sand, stained black and gray, hydrocarbon odor	ENGIN	EER/GE	OLOGIS	T: MIKE	CYROCKI	Depth N/A Date/Time		DATE C	OMPLETED: 11-1-92		
5 MW-46 12 sp 10 MW-4 12 sp 10 MW-4 19 ml 11.75 19 ml 15 MW-4 19 ml 15 MW-4 24 sp(ol 20 MW-4 6 Stained ight gray and black, sandy silt with 0.08 feet thick dense caliche layer at 11.0 feet, moist, hydrocarbon odor 20 MW-4 24 sp(ol 20 MW-4 6 Pink, fine grained strongly cemented sand in contact with vitreous, white silica (concholdal fracture patterns) interbedded with 0.08 feet thick layers of unconsolidated fine sand, stained black and gray, hydrocarbon odor 225 MW-4 24 sp 225 MW-4 24 sp	DRILLI	NG MET	HODS:	NGERS	OLL-RAND	MODEL TH60 AIR ROTARY		PAGE:	1 OF 2		
10 MW-4 12 Sp odor 10 MW-4 12 Sp sp odor 11 MW-4 19 mi Stained gray and black, sandy silt with 0.08 feet thick dense caliche layer at 11.0 feet, moist, hydrocarbon odor 15 MW-4 24 sp/ol Stained light gray and dark gray, fine sand to 16.75 feet; then white silt with no staining, dry 20 NW-4 6 - Pink, fine grained strongly cemented sand in contact with with recus, white silt with no staining, dry 20 NW-4 6 - Pink, fine grained strongly cemented sand in contact with vitreous, white silt acconchoidal fracture patterne) interbedded with 0.08 feet thick layers of uncostilated fine sand, stained black and gray, hydrocarbon cdor 25 MW-4 24 sp Light gray, fine sand to 25.5 feet changing to light brown	DEPTH (ft)	SAMPLE TYPE & NO.	RECOVERY (in.)	USCS SYMBOL		DESCRIPTION		CONSTRUCTION SCHEMATIC	REMARKS		
X 29 50 0		MW-4 -11.75 MW-4 -17 - MW-4 20.5	19 24	mi	odor Stained gray dense calich Stained light then white si Pink, fine gra with vitreous interbedded fine sand, str	and black, sandy silt with 0.08 feet thick e layer at 11.0 feet, moist, hydrocarbon odor gray and dark gray, fine sand to 16.75 feet; it with no staining, dry ained strongly cemented sand in contact , white silica (conchoidal fracture patterns) with 0.08 feet thick layers of unconsolidated ained black and gray, hydrocarbon odor					

NOTES:

During drilling ground water was encountered at an approximate depth of 42.0 Ft. below ground surface. Description from observations by on-site geologist

INTERNATIONAL TECHNOLOGY CORPORATION 01573.001.02/MdA1 **VISUAL CLASSIFICATION OF SOILS** PROJECT NUMBER: 301573.001.02 PROJECT NAME: ENRON - HOBBS PLANT BORING NUMBER: MW-4 COORDINATES: DATE: 11-3-92 **ELEVATION: UNKNOWN** GWL: Depth N/A Date/Time DATE STARTED: 10-31-92 ENGINEER/GEOLOGIST: MIKE CYROCKI Depth N/A Date/Time DATE COMPLETED: 11-1-92 DRILLING METHODS: INGERSOLL-RAND MODEL TH60 AIR ROTARY PAGE: 2 OF 2 CONSTRUCTION SCHEMATIC RECOVERY (in.) ISCS SYMBOI SAMPLE TYPE & NO. E DEPTH DESCRIPTION REMARKS Light brown, fine sand, moist, no staining, hydrocarbon odor to 31.2 feet, buff to pink fine grained strongly cemented MW-4 14 sand interbedded with 0.16 feet thick unconsolidated fine sp -31.2 sand at 32.0 feet and 33.5 feet MW-4 18 sp -33.5 35 Soft, black stained, strongly cemented sand from 37.0 feet to 39.0 feet, hydrocarbon odor Light gray with medium gray staining, fine sand, moist, MW-4 19 sp hydrocarbon odor -40.75 Light brown, fine sand, saturated with water, organic MW-4 24 sp chemical odor, no staining -47 50 MW-4 Same fine sand with minor dark gray mottling 24 sp -52 55 NOTES: Total depth of boring = 53.0 Ft. Description from observations by on-site geologist

PROJE	CT NUM	BER: 3	01573.0	01.02	PROJECT NAME: ENRON - HOBBS	S PLANT			
BORIN	G NUMB	ER: M	N-5		COORDINATES:	DATE: 11-	3-92		
ELEVA	TION: U	NKNOW	/N		GWL: Depth N/A Date/Time	DATE STAF	DATE STARTED: 10-27-92		
ENGIN	EER/GE	OLOGIS	T: MIKE	CYROCKI	Depth N/A Date/Time	DATE COM	DATE COMPLETED: 10-27-		
DRILLI	NG MET	HODS: I	NGERS	OLL-RAND	MODEL TH60 AIR ROTARY	PAGE: 1 O	F 2		
DEPTH (ft)	SAMPLE TYPE & NO.	RECOVERY (in.)	USCS SYMBOL		DESCRIPTION	CONSTRUCTION	REMARKS		
×	MW-5-7	24	sp	Weakly cem no staining, i	ented, light brown mottled white, fine sand, no odor, dry				
	MW-5-12	24	sp	Same with < very dense s no odor, dry	10% angular medium gravel, 0.12 feet thick, trongly cemented sand at 12.0 feet, no staining,				
	MW-5-17	24	sp	Light tan to w grained stron no odor, dry	vhite, fine sand, 0.08 feet thick, pink, fine ngly cemented sand at 17.0 feet, no staining,				
20	MW-5-22	24	sp	interbedded	tan, brown to pink strongly cemented sand with 0.08 feet to 0.16 feet thick unconsolidated, ers, no staining, no odor, dry				
25	MW-5-27	24	sp		fine sand with light tan, fine-grained ented sand, 0.16 feet thick at 25.5 feet				
 - 30				Very dense, tan to buff, fine grained strongly cemented sand					

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Description from observations by on-site geologist.

INTERNATIONAL TECHNOLOGY CORPORATION

.02/htdA2b

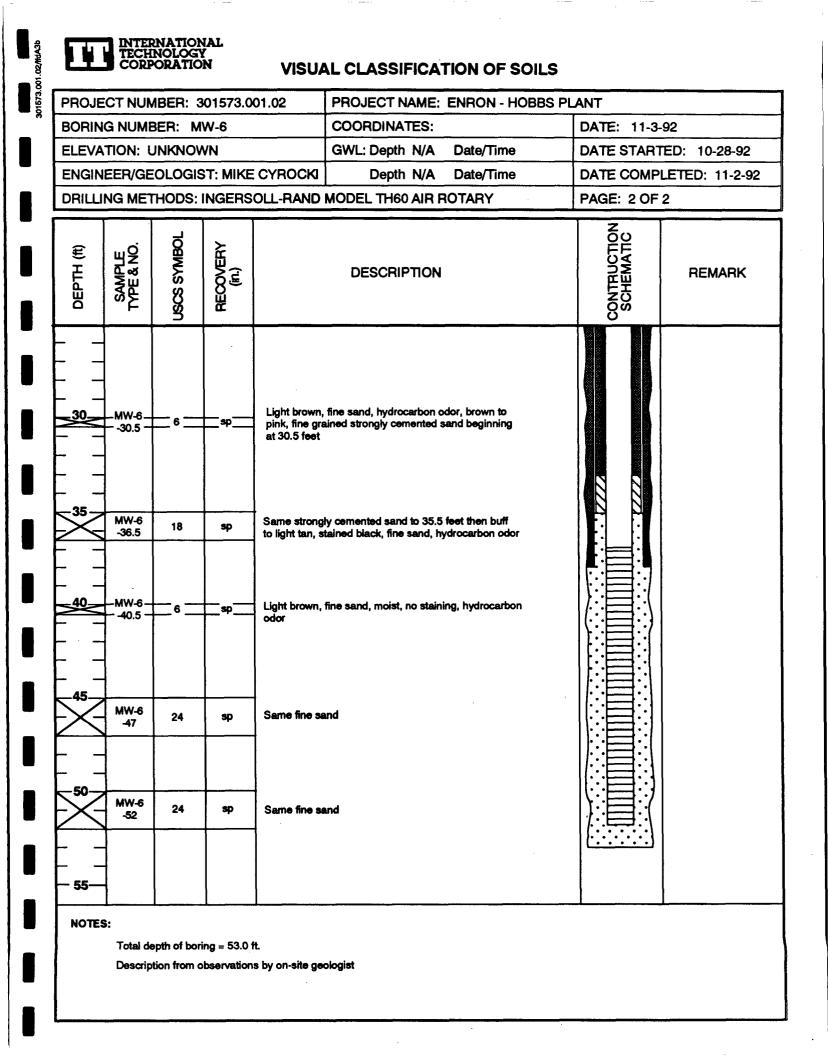
VISUAL CLASSIFICATION OF SOILS

Total depth of boring = 57.0 Ft. Description from observations by on-site geologist.

		ABER: 3		01.02	PROJECT NAME: ENRON - HOBBS		<u> </u>
		BER: M			COORDINATES:	DATE: 11-3	
		JNKNOV			GWL: Depth N/A Date/Time		TED: 10-28-92
				CYROCKI	Depth N/A Date/Time		LETED: 11-2-92
DRILLI	NG MET	HODS:	INGERS	OLL-RAND	MODEL THEO AIR ROTARY	PAGE: 1 OF	2
DEPTH (ft)	SAMPLE TYPE & NO.	RECOVERY (in)	USCS SYMBOL		DESCRIPTION	CONSTRUCTION SCHEMATIC	REMARKS
5	MW-6-7	24	sp	Buff to white with <5% su moist	with <5% grayish black staining, fine sand brounded, medium gravel, hydrocarbon odor,		
	MW-6-12	24	sp	Same fine se at 11.75 feet	and with 0.08 feet thick dense caliche		
	MW-6- 16.5	. 18	sp	at 15.5 feet,	and to 15.5 feet, 50% black staining beginning damp, hydrocarbon odor, dense buff to y cemented sand beginning at 15.75 feet		
20	MW-6- 21.5	18	sp	white with 75	ly cemented sand to 20.2 feet, then buff to % black staining, fine sand, damp, hydrocarbon pink strongly cemented sand beginning		
	MW-6-26	12	sp		fine grained strongly comented sand, with unconsolidated, fine sand		

NOTES:

During drilling ground water was encountered at an approximate depth of 42.0 Ft. below ground surface. Description from observations by on-site geologist



VISUAL CLASSIFICATION OF SOILS

PROJE		BER: 3	01573.0	02.02	PROJECT NAME	ENRON - HOBE	S PLANT	
BORIN	g nume	BER: B-	7		COORDINATES:		DATE: 11-	10-92
ELEVA	TION: L	JNKNOV	VN		GWL: Depth N/A	Date/Time	DATE STA	RTED: 11-3-92
ENGIN	EER/GE	OLOGIS	5T: J.S. F	RAUGUST	Depth N/A	Date/Time	DATE COM	PLETED: 11-3
DRILLI	NG MET	HODS:	NGERS	OLL-RAND	MODEL TH60 AIR	ROTARY	PAGE: 1 O	F 2
DEPTH (ft)	SAMPLE TYPE & NO.	RECOVERY (in.)	USCS SYMBOL		DESCRIPTION	· · · · · · · · · · · · · · · · · · ·	CONSTRUCTION SCHEMATIC	REMARK
	B-7-6	12"	sm	Dense, light angular, fine	brown, homogeneous, p , silty sand - damp	oorly graded,		
	B-7-11	18"	sp		se, red and white mottled d, angular, fine sand, mo			
	B-7-16	20"	sm	graded, angu sand fragme	ight brown (buff) hetero lar, fine silty sand and s nts up to 1.5 inches in di hard drilling beginning w	trongly cemented ameter		
20 -	B-7-21	18"	-	strongly cem	light brown and greenish ented sand, dry, slight h easier drilling at 24'	mottling, ydrocarbon odor		
 25 	B-7-26	18"	sp	angular sand layers, damp	nd light brown, hetsroge I and interbedded, thin, s , slight hydrocarbon odd hard drilling at 30'	strongly comented san		
	B-7-31	18"	sp	angular, fine	um brown, heterogeneo sand and a strongly cen " thick at top of sampler	nented sand		

PROJECT NUI	MBER: 30	01573.0	02.02	PROJECT NAME: ENRON - HOBBS	PLANT				
BORING NUM	BER: B-7	7		COORDINATES:	DATE: 11-1	DATE: 11-10-92			
ELEVATION:	JNKNOW	/N		GWL: Depth N/A Date/Time	DATE STARTED: 11-3-92				
ENGINEER/GE	OLOGIS	T: J.S. F	RAUGUST	Depth N/A Date/Time	DATE COMP	LETED:			
DRILLING ME	THODS: II	NGERS	OLL-RAND	MODEL TH60 AIR ROTARY	PAGE: 2 OF	2			
DEPTH (ff) SAMPLE TYPE & NO.	RECOVERY (in.)	USCS SYMBOL		DESCRIPTION	CONSTRUCTION	REMARKS			
 				harder drilling, interbedded unconsolidated sand cemented sand layers to 35'					
	6"	-	Very dense, sand, dry - n	light reddish brown, strongly cemented o sample collected					
 B-7-41	12"	sp	Medium den	se, gray brown, homogeneous, d angular fine sand, moist, slight odor,	-				
			<10% black	staining					

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

301573.002.02/fd A1e		INTER TECH CORE	NOLOGY PORATIO	IAL Z N	VISU		FION OF SOILS		
1573.0	PROJE		ABER: 3	01573.0	02.02	PROJECT NAME:	ENRON - HOBBS P	LANT	······································
8 	BORIN		BER: B	-8		COORDINATES:		DATE: 11-3	9-92
	ELEVA	TION: L	JNKNOV	VN		GWL: Depth N/A	Date/Time	DATE STAR	TED: 10-31-92
-	ENGIN	EER/GE	OLOGIS	ST: MIKE	CYROCKI	Depth N/A	Date/Time	DATE COMP	PLETED: 10-31-92
	DRILLI	NG MET	HODS:	INGERS	OLL-RAND	MODEL TH60 AIR P	OTARY	PAGE: 1 OF	2
	DEPTH (ft)	SAMPLE TYPE & NO.	RECOVERY (in.)	USCS SYMBOL		DESCRIPTION		CONSTRUCTION SCHEMATIC	REMARKS
	 	B-8-7	24	sm		y and black, silty, fine sand y, hydrocarbon odor	d with <10% caliche		
		B-8-12	24	sm	Same silty, fi	ine sand			
		B-8-17	24	sp	strongly cem Beginning at interbedded	y and black, fine sand with nented sand gravel, hydrod t 16.25 feet buff strongly of with 0.08 feet thick uncon ome light gray staining	carbon odor, moist. emented sand		
	20	B-8-21.5	18	•		rery fine grained strongly c in matrix of strongly cemer n odor			
		B-8-27	24	sp	cemented sa	sand with 20% medium, ro and gravel to 25.5 feet, the hydrocarbon odor present) feet	an same with <5% gravel,		
	- 30-								

NOTES:

Description from observations by on-site geologist.

INTERNATIONAL TECHNOLOGY CORPORATION

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VISUAL CLASSIFICATION OF SOILS

		NATION NOLOGY ORATIO			AL CLASSIFICA					
		IBER: 3		02.02	PROJECT NAME:	ENRON - HOBE				
L	_	BER: B-			COORDINATES:			11-3-92		
		INKNOW			GWL: Depth N/A	Date/Time		DATE STARTED: 10-31-92		
				CYROCKI	Depth N/A	Date/Time		COMPLETED: 10-31-92		
DRILLI		HODS: I	NGERS	OLL-RAND	MODEL TH60 AIR I	ROTARY	PAGE:	2 OF 2		
DEPTH (ft)	SAMPLE TYPE & NO.	RECOVERY (in.)	USCS SYMBOL		DESCRIPTION		CONSTRUCTION SCHEMATIC	REMARKS		
	B-8-31	6	sp	25% black s thick strong Light gray str strongly cem	sand, no staining, hydroc taining begining at 30.75 y cemented sand layer at aining, fine sand with 209 ented sand gravel, moist nented sand from 35.2 fe	feet, 0.08 feet 31.0 feet 6 medium, rounded hydrocarbon odor				
NOTES		epth of bor	ing = 40.0	FL	, <u>, , , , , , , , , , , , , , , , , , </u>			an 2 an		
1	Vapor	Probes pos	itioned at:	30 Ft., 15 Ft a	nd 9. Ft.					
	Descrip	otion from o	observatio	ns by on-site ge	eologist					

			·	02.02		E: ENRON - HOBB	S PLANT	
BORIN		BER: B-	9		COORDINATES		DATE: 11-	3-92
ELEVA	TION: L	INKNOV	VN		GWL: Depth N/A	Date/Time	DATE STAF	RTED: 10-30-92
ENGIN	EER/GE	OLOGIS	T: MIKE	CYROCKI	Depth N/A	Date/Time	DATE COM	PLETED: 10-30
DRILLI	NG MET	HODS:	NGERS	OLL-RAND	MODEL TH60 AIF	ROTARY	PAGE: 1 O	F 2
DEPTH (ft)	SAMPLE TYPE & NO.	RECOVERY (in.)	USCS SYMBOL		DESCRIPTION		CONSTRUCTION	REMARKS
 	B-9-5.4	3	sp		d, fine sand, hydrocarbo y cemented sand begin			
	B-9-11.3	14	sp	Gray stained strongly cem	l, fine sand, hydrocarbo ented sand beginning a	n odor, moist, with at 11.3 feet		
	B-9-17	24	sp		t gray with darker gray carbon odor present	mottling, fine sand,		
20	8-9-20.5	6	sp	Same fine sa beginning at	and with strongly cemer 20.2 feet	nted sand		
	B-9-27	24	sp	liquid, fine se	aining, moist to wet with and. 0.08 feet to 0.16 fe rented sand layers at 24	et thick, pink		
- 30-								

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INTERNATIONAL TECHNOLOGY CORPORATION
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VISUAL CLASSIFICATION OF SOILS

PROJE		IBER: 3	01573.0	02.02	PROJECT NAME:	ENRON - HOBB	S PLANT	
BORING NUMBER: B-9 COORDINATES:							DATE: 11-	3-92
ELEVA	TION: L	INKNOW	/N		GWL: Depth N/A	Date/Time	DATE STAP	RTED: 10-30-92
ENGIN	EER/GE	OLOGIS	T: MIKE	CYROCKI	Depth N/A	Date/Time	DATE COM	PLETED: 10-30-9
DRILLI	NG MET	HODS: 1	NGERS	OLL-RAND	MODEL TH60 AIR F	OTARY	PAGE: 2 O	F 2
DEPTH (ft)	SAMPLE TYPE & NO.	RECOVERY (in.)	USCS SYMBOL		DESCRIPTION		CONSTRUCTION	REMARKS
	B-9-31.2	14	sp		and with strongly cement 10.0 feet; cemented sand		955.	
 				Entire thickne	ess is cemented.			
50 								
- 55								
NOTES	Total de	epth of bor	ing = 40 fe itioned at:	et 27.0 Ft., 16.0 F	Ft. and 10.0 Ft.		<u></u>	

INTERNATIONAL TECHNOLOGY CORPORATION 573.002.02/ftc **VISUAL CLASSIFICATION OF SOILS** PROJECT NUMBER: 301573.002.02 PROJECT NAME: ENRON - HOBBS PLANT BORING NUMBER: B-10 COORDINATES: DATE: 11-3-92 **ELEVATION: UNKNOWN** GWL: Depth N/A Date/Time DATE STARTED: 10-20-92 ENGINEER/GEOLOGIST: MIKE CYROCKI Depth N/A Date/Time DATE COMPLETED: 10-30-92 DRILLING METHODS: HOLLOW-STEM AUGER AND AIR ROTARY PAGE: 1 OF 2 CONSTRUCTION SCHEMATIC RECOVERY (in.) **USCS SYMBOI** SAMPLE TYPE & NO. € DEPTH DESCRIPTION REMARKS Buff, silty sand, dry black staining, moist, hydrocarbon B-10-7 24 sm odor present 10 Plastic, white mottled green and black, silty clay, 10% coarse gravel, damp, hydrocarbon ordor present, B-10-12 24 cl very dense, gray caliche from 12.5 feet to 14.0 feet B-10-14 24 -15 Gray with minor black mottling, damp, fine sand, B-10-17 24 sp hydrocarbon odor present

Some weak cementing, white stained black, fine sand, 10% rounded medium to coarse gravel, roots present, hydrocarbon odor present

Very dense, fine-grained, pink strongly cemented sand from 23.0 feet to 26.0 feet

NOTES:

20

25

30

B-10-22

24

sp

Description from observations by on-site geologist

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

I

PROJECT	NUMBER: 3	301573.0	02.02	PROJECT NAME: ENRO	PROJECT NAME: ENRON - HOBBS PLANT				
BORING NUMBER: B-10				COORDINATES: DATE: 11-3-92					
ELEVATIO	N: UNKNOV	NN		GWL: Depth N/A Date	/Time	DATE STAR	TED: 10-20-92		
ENGINEE	R/GEOLOGIS	ST: MIKE	CYROCKI	Depth N/A Date	/Time	DATE COMP	LETED: 10-30-		
DRILLING	METHODS:	HOLLOV	V-STEM AU	GER AND AIR ROTARY		PAGE: 2 OF	2		
DEPTH (ft) SAMPI F	TYPE & NO. RECOVERY (in)	USCS SYMBOL		DESCRIPTION		CONSTRUCTION SCHEMATIC	REMARKS		
 35 B	10-32 24 10- <u>3</u> 35.4	sp sp	sandstone fro Buff, no blac some weakly progressively	d, fine sand with dense, fine grain om 31.5 to 32.0 feet. k staining, fine sand, dry, hydroca v cemented layers .25 inch thick b y more cemented at 35.4 feet l, fine sand, hydrocarbon odor pre	rbon odor, e coming				
- 55			ļ						
 - 55 NOTES:	Total depth of be Vapor probe pos	sitioned at:	31.0 Ft.			,			



VISUAL CLASSIFICATION OF SOILS

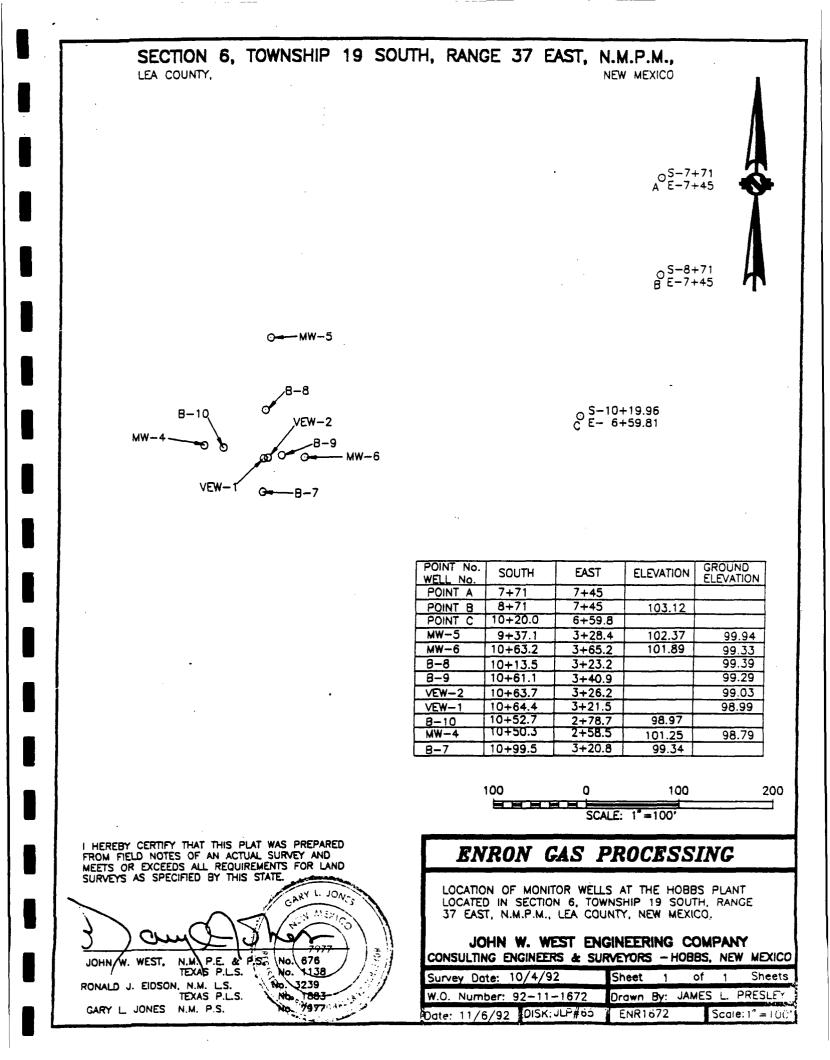
PROJECT NUMBER: 301573.002.02			02.02	PROJECT NAME: E	NRON - HOBBS PL	ANT			
BORING NUMBER: VEW-1				COORDINATES:					
ELEVATION:				· · · · · · · · · · · · · · · · · · ·	Date/Time	DATE STARTED:			
ENGINEER/GI			·	· · · · · · · · · · · · · · · · · · ·	Date/Time	DATE COMPLETED	D: 10-3	0-92	
DRILLING ME	THODS:	INGERS	OLL-RAND	MODEL TH60 AIR RO	DTARY	PAGE: 1 OF 1	·		
DEPTH (ft) SAMPLE TYPE & NO.	BLOWS ON SAMPLER/(12 in.)	RECOVERY (in)		DESCRIPTION		CONSTRUCTION SCHEMATIC	USCS SYMBOL	LTHOLOGIC	
			No Sedimer See Notes	nt Sampling					

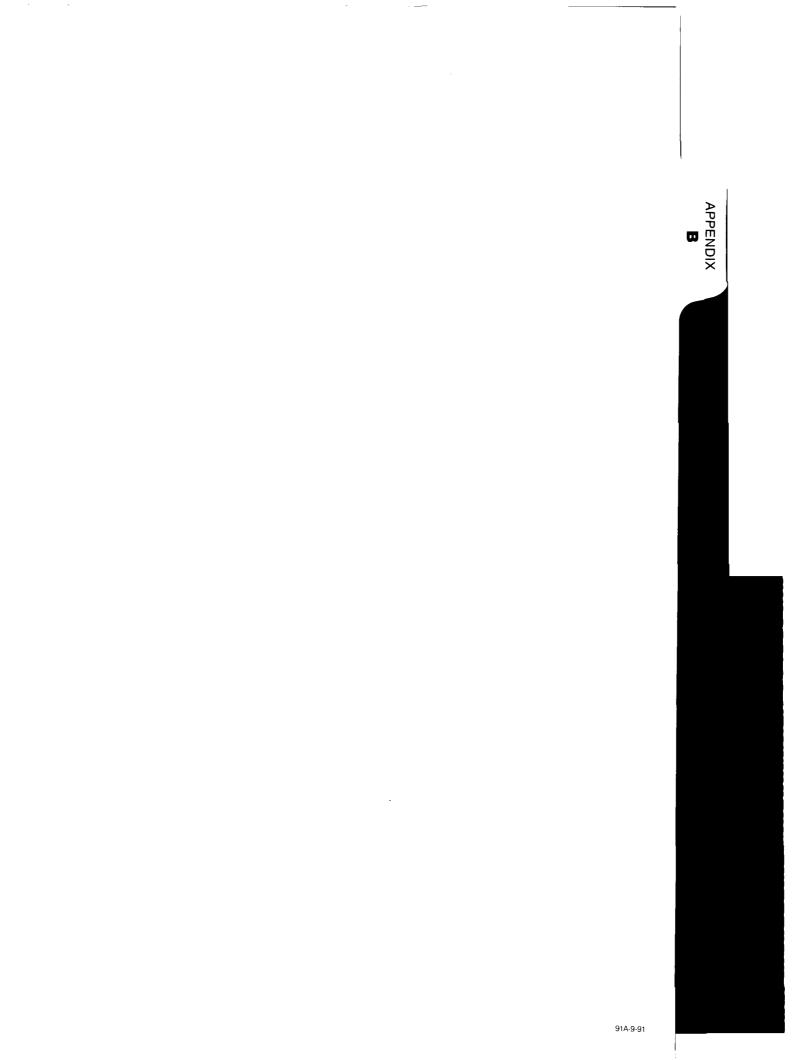
VISUAL CLASSIFICATION OF SOILS PROJECT NUMBER: 301573.002.02 PROJECT NAME: ENRON - HOBBS PLANT									
					COORDINATES: DATE: 11-3-92				
BORING NUMBER: VEW-2 ELEVATION: UNKNOWN									
					GWL: Depth N/A Date/Time			TED: 10-29-92	
				CYROCKI	Depth N/A Date/Time			PLETED: 10-30-9	
DRILL	ING MET	HODS: I	NGERS	OLL-RAND	MODEL TH60 AIR ROTARY	PAGE:	1 OF	2	
DEPTH (ft)	SAMPLE TYPE & NO.	RECOVERY (in.)	USCS SYMBOL		DESCRIPTION	CONSTRUCTION		REMARKS	
	- 	24	sm	(possible fill)	wn silty sand, 10% fine to medium gravel to 5.5 feet. From 5.5 feet black-stained, silty, erhedded with 0.04 feet thick caliche layers				
	VEW-2 -12	24	sp	hydrocarbon Buff to white, to 10.4 feet.	Buff to white, soft, fine-grained strongly cemented sand to 10.4 feet. From 10.4 feet black stained, fine sand with 0.04 feet thick caliche layers, hydrocarbon odor present Black and gray stained, fine sand with 10% medium gravel, hydrocarbon odor, moist				
- 15-	VEW-2 -17	24	sp						
— 20 — — —	-			Strongly cerr	nented sand beginning at 18.8 feet				
	<u> </u>			Strongly cen	nented sand terminates at 23.0 feet				
	VEW-2 -27	24	sp		d, fine sand with 10% medium to coarse, ngly cemented sand gravel, hydrocarbon				

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Description from observations by on-site geologist

INTERNATIONAL TECHNOLOGY CORPORATION **VISUAL CLASSIFICATION OF SOILS** PROJECT NUMBER: 301573.002.02 PROJECT NAME: ENRON - HOBBS PLANT **COORDINATES:** BORING NUMBER: VEW-2 DATE: 11-3-92 **ELEVATION: UNKNOWN** GWL: Depth N/A Date/Time DATE STARTED: 10-29-92 ENGINEER/GEOLOGIST: MIKE CYROCKI Depth N/A Date/Time DATE COMPLETED: 10-30-92 DRILLING METHODS: INGERSOLL-RAND MODEL TH60 AIR ROTARY PAGE: 2 OF 2 CONSTRUCTION SCHEMAITC **JSCS SYMBOL** SAMPLE TYPE & NO. RECOVERY (in.) DEPTH (ft) DESCRIPTION REMARKS Black stained, fine sand with 0.12 feet thick strongly VEW-2 18 sp cemented sand layer at 31.0 feet, less black staining -31.5 below 31.0 feet, moist, hydrocarbon odor 35 Light gray stained, fine sand, moist, hydrocarbon odor, VEW-2 12 sp pink strongly cemented sand beginning at 36.0 feet -36 VEW-2 12 sp Fine sand, grading to no black staining between 38.5 feet .39 to 39.0 feet, with a weakly cemented, 0.04 feet thick . caliche layer at 38.4 feet, moist 50 55 NOTES: Total depth of boring = 39.0 Ft. Description from observations by on-site geologist





APPENDIX B LOGS OF FIELD HEADSPACE READINGS



HEADSPACE TESTING FOR VOLATILES

PROJECT NAME: ENRON-HOBBS PLANT

ENGINEER/GEOLOGIST: MIKE CYROCKI

PROJECT NO.: 301573.002.02

INSTRUMENT TYPE: OVA FOXBORO FID

PHOTOIONIZATION BULB POWER (ev): NA

SERIAL NO .: A51822

DATE: 10-20-92

CALIBRATION DATE: 10-20-92

CALIBRATION GAS TYPE/CONCENTRATION: <u>97.8 ppm METHANE</u>
ROOM TEMPERATURE (°F): <u>72°</u>

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLE DEPTH (FEET)	SAMPLE MATRIX	PEAK INSTRUMENT READING (ppm)	COMMENTS
B-10-5	B-10	5.0	SOIL	>1000	
B-10-10	B-10	10.0	SOIL	>1000	
B-10-15	B-10	15.0	SOIL	>1000	
B-10-20	B-10	20.0	SOIL	>1000	



PAGE 1 OF 1

HEADSPACE TESTING FOR VOLATILES

PROJECT NAME: ENRON-HOBBS PLANT

PROJECT NO.: 301573.002.02

INSTRUMENT TYPE: OVA FOXBORO FID

SERIAL NO. A51822

PHOTOIONIZATION BULB POWER (ev): NA

ENGINEER/GEOLOGIST: MIKE CYROCKI

_____ DATE: <u>10-27-92</u>

CALIBRATION DATE: 10-27-92

CALIBRATION GAS TYPE/CONCENTRATION: <u>97.8 ppm METHANE</u>
ROOM TEMPERATURE (°F): <u>70°</u>

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLE DEPTH (FEET)	SAMPLE MATRIX	PEAK INSTRUMENT READING (ppm)	COMMENTS
MW-5-7	MW-5	7.0	SAND	0	
MW-5-12	MW-5	12.0	SAND	0	
MW-5-17	MW-5	17.0	SAND	0	
MW-5-22	MW-5	22.0	SAND	0	
MW-5-27	MW-5	27.0	SAND	0	
MW-5-36.5	MW-5	36.5	SAND	0	
MW-5-41.5	MW-5	41.5	SAND	0	
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301573.002.02/Hd AB

PAGE 1 OF 1

HEADSPACE TESTING FOR VOLATILES

PROJECT NAME: ENRON-HOBBS PLANT

PROJECT NO.: 301573.002.02

INSTRUMENT TYPE: OVA FOXBORO FID

SERIAL NO .: A51822

PHOTOIONIZATION BULB POWER (ev): NA

ENGINEER/GEOLOGIST: MIKE CYROCKI

_____ DATE: <u>10-29-92</u>

_____ CALIBRATION DATE: 10-29-92

CALIBRATION GAS TYPE/CONCENTRATION: <u>97.8 ppm METHANE</u> ROOM TEMPERATURE (°F): <u>75°</u>

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLE DEPTH (FEET)	SAMPLE MATRIX	PEAK INSTRUMENT READING (ppm)	COMMENTS
MW-6-7	MW-6	7.0	SOIL	1	
MW-6-12	MW-6	12.0	SOIL	1	
MW-6-16.3	MW-6	16.3	SOIL	1	
MW-6-21.3	MW-6	21.30	SOIL	1	
MW-6-25	MW-6	25.0	SOIL	0	
MW-6-36.7	MW-6	36.7	SOIL	200	
MW-6-30	MW-6	30	SOIL	10	
VEW-2-7	VEW-2	7	SOIL	>1000	
VEW-2-12	VEW-2	12	SOIL	>1000	
VEW-2-17	VEW-2	17	SOIL	>1000	



HEADSPACE TESTING FOR VOLATILES

PROJECT NAME: ENRON-HOBBS PLANT

PROJECT NO.: 301573.002.02

INSTRUMENT TYPE: OVA FOXBORO FID

SERIAL NO.: A51822

PHOTOIONIZATION BULB POWER (ev): NA

ENGINEER/GEOLOGIST: MIKE CYROCKI

DATE: 10-30-92

CALIBRATION DATE: 10-30-92

CALIBRATION GAS TYPE/CONCENTRATION: <u>97.8 ppm METHANE</u> ROOM TEMPERATURE (°F): <u>72°</u>

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLE DEPTH (FEET)	SAMPLE MATRIX	PEAK INSTRUMENT READING (ppm)	COMMENTS
VEW-2-27	VEW-2	27.0	SOIL	>1000	
VFW-2-31.2	VEW-2	31.2	SOIL	>1000	
VEW-2-35	VEW-2	35	SOIL	250	
VEW-2-39	VEW-2	39	SOIL	>1000	
B-9-5.4	8-9	5.4	SOIL	>1000	
B-9-11.4	B-9	11.4	SOIL	>1000	
B- 9- 17	B-9	17	SOIL	>1000	
B-9-20.2	. B-9	20.2	SOIL	>1000	
B-9-27	B-9	27	SOIL	>1000	
B-9-30	B-9	30	SOIL	>1000	
B-10-32	B-10	32	SOIL	>1000	
B-10-35.4	B-10	35.4	SOIL	>1000	
B-10-39.4	B-10	39.4	SOIL	>1000	
	-				

PAGE 1 OF 1



301573.002.02/Hd A10

HEADSPACE TESTING FOR VOLATILES

PROJECT NAME: ENRON-HOBBS PLANT

PROJECT NO.: 301573.002.02

INSTRUMENT TYPE: OVA FOXBORO FID CALIBRATION DATE: 10-31-92

SERIAL NO.: A51822

ENGINEER/GEOLOGIST: MIKE CYROCKI

DATE: 10-31-92

CALIBRATION GAS TYPE/CONCENTRATION: 97.8 ppm METHANE PHOTOIONIZATION BULB POWER (ev): NA ROOM TEMPERATURE (°F): 72°

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLE DEPTH (FEET)	SAMPLE MATRIX	PEAK INSTRUMENT READING (ppm)	COMMENTS
B-8-7	B-8	7	SOIL	>1000	
B-8-12	B-8	12	SOIL	>1000	
B-8-17	B-8	17	SOIL	>1000	
8-8-21	B-8	21	SOIL	>1000	
B-8-27	B-8	27	SOIL	>1000	
B-8-31	B-8	31	SOIL	>1000	
B-8-35.2	B-8	35.2	SOIL	>1000	
MW-4-7	MW-4	7	SOIL	0	
MW-4-11.4	MW-4	11.5	SOIL	4	
MW-4-17	MW-4	17	SOIL	o	
MW-4-20.6	MW-4	20.6	SOIL	1	
MW-4-27	MW-4	27	SOIL	>1000	
MW-4-31.2	MW-4	31.2	SOIL	10	
MW-4-40.6	MW-4	40.6	SOIL	800	



HEADSPACE TESTING FOR VOLATILES

PROJECT NAME: ENRON-HOBBS PLANT ENGINEER/GEOLOGIST: MIKE CYROCKI

PROJECT NO.: 301573.002.02

INSTRUMENT TYPE: OVA FOXBORO FID CALIBRATION DATE: 11-01-92

PHOTOIONIZATION BULB POWER (ev):___NA

_____ DATE: <u>11-01-92</u>

SERIAL NO.: A51822 CALIBRATION GAS TYPE/CONCENTRATION: 97.8 ppm METHANE _ ROOM TEMPERATURE (°F): _72°_

SAMPLE NUMBER	SAMPLING LOCATION	Sample Depth (Feet)	SAMPLE MATRIX	PEAK INSTRUMENT READING (ppm)	COMMENTS
MW-6-40.2	MW-6	40.2	SOIL	40	
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301573.002.02/Hd A11



HEADSPACE TESTING FOR VOLATILES

PROJECT NAME: ENRON-HOBBS PLANT

PROJECT NO.: _301573.002.02____

INSTRUMENT TYPE: FOXBORO MODEL 128-GC FID CALIBRATION DATE: 11-2-92

SERIAL NO.: A51822

PHOTOIONIZATION BULB POWER (ev): NA _____ ROOM TEMPERATURE (°F): 50°

____ ENGINEER/GEOLOGIST: _J. S. RAUGUST_

_____ DATE: ____11-2-92

CALIBRATION GAS TYPE/CONCENTRATION: METHANE 97.8

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLE DEPTH (FEET)	SAMPLE MATRIX	PEAK INSTRUMENT READING (ppm)	COMMENTS
B-7-6	B-7	5'	SOIL	0	
B-7-11	B-7	10'	SOIL	0	
B-7-16	B-7	15'	SOIL	30	
B-7-21	B-7	20'	SOIL	26	
B-7-26	B-7	25'	SOIL	2	
B-7-31	B-7	30'	SOIL	1	
NO SAMPLE	B-7	35'	SOIL		Poor recovery
B-7-41	B-7	40'	SOIL	.5	
					-

PAGE 1 OF 1

STANDARD OPERATING PROCEDURE 09

FIELD SCREENING OF VOLATILE ORGANIC COMPOUNDS

1.0 PURPOSE

To define a method that ensures acceptable, consistent soil vapor screening for onsite assessment of organic vapor contamination of soils. Included is the use of a photoionization detector (PID), a flame-ionization detector (FID), and use of a direct extraction/colorimetric method for the analysis of soils potentially contaminated with heavy hydrocarbons (e.g., diesel).

2.0 DISCUSSION

The PID and FID are useful tools as general survey instruments at hazardous waste sites. Both the PID and FID are capable of detecting and measuring real-time concentrations of many organic and inorganic vapors in the air. A PID is similar to an FID in application. The PID has somewhat broader capabilities because it can detect certain inorganic vapors. Conversely, the PID is unable to respond to certain low molecular weight hydrocarbons (like methane and ethane) that are readily detected by FID instruments.

Soil vapor screening may be used as a reconnaissance tool to delineate the extent of volatile organic contamination resulting from ground water and vadose-zone contamination. The "headspace" method involves collecting a sample of soil in a jar, allowing vapors to accumulate, then analyzing the concentration of vapors above the soil with a PID or FID.

For soils potentially contaminated with heavy hydrocarbons such as diesel, kerosene, or JP-4 jet fuel, the headspace method is not acceptable. Heavy hydrocarbon contamination may be assessed in the field using a direct extraction technique, such as the HNU-Hanby® Method. This method involves the collection of a small soil sample (usually 10 grams) which is reacted with a solvent. The extracted hydrocarbon and solvent solution is decanted and further reacted with a catalyst. The catalyst causes a colorimetric response upon reaction with hydrocarbons, and the resulting color is compared with known concentrations of the contaminant on a color chart. The direct extraction method is normally corroborated with a laboratory sample from the terminal depth of a boring.

3.0 **DEFINITIONS**

None

SOP 9

4.0 **PROCEDURES**

4.1 Headspace Field Method

4.1.1 Preparation

4.1.1.1 Office

- A. Coordinate schedules/actions with the field and installation staff.
- B. Obtain appropriate permission for property access.
- C. Assemble the equipment and supplies listed in Appendix 6.1. Ensure the proper operation of the instrument(s) and perform the proper procedures for calibrating/adjusting the instrument(s).

4.1.1.2 Documentation

- A. Obtain and start a Daily Field Activity Log, Daily Job Log, or logbook.
- B. Record results of the equipment check in the log.
- C. Obtain a sufficient number of the appropriate data collection forms (i.e., Sample Collection Logs, Analysis Request and Chain of Custody Record forms, etc.).
- D. Record the calibration data on the appropriate form.

4.1.1.3 Field

- A. Follow the start-up procedure, operational check, and calibration check for the appropriate instrument being used. If using a PID or FID, follow procedures described is SOP 3, Health and Safety Monitoring of Organic Vapors.
- B. Set the function switch to the appropriate range. If the concentrations of gases or vapors is unknown, set the function switch to the 0 to 20 ppm range; adjust the range if necessary.
- C. With the exception of the probe's inlet and exhaust, wrap the PID or FID in clear plastic to prevent it from becoming contaminated and to prevent water from getting inside the instrument in the event of precipitation.

4.1.2 Operation

A. Fill a clean 0.5 liter (16 ounce) or larger jar half full of soil sample.

B. Seal the top of the jar with clean aluminum foil.

AL/11-92/WP/SOP:SOP-09

- C. Ensure sample is at 15° to 20°C (approximately 60° to 80°F). A warm water bath or vehicle heater should be used before testing if necessary.
- D. Aromatic hydrocarbon concentrations must be allowed to develop in the headspace of the sample jar for 5 minutes. During this headspace development period, the sample should be shaken vigorously for a total of 1 minute (care should be taken not the puncture the aluminum foil).
- E. Immediately pierce the aluminum foil seal with the probe of either a PID or FID, and read the highest (peak) measurement.

Note: If significant moisture is present in the soil, water vapor may affect the response of either instrument, especially the PID. A typical water vapor response differs from an organic vapor response in that the former will produce a slow increase in apparent concentration and may never show a distinct peak. The organic vapor response is normally a sharp rise to a peak, followed by a gradual decline.

4.1.3 Post Operation

4.1.3.1 Field

- A. When the activity is completed, or at the end of the day, carefully clean the outside of the PID/FID with a damp disposable towel to remove any visible dirt. Return the instrument to a secure area and place on charge. Glass jars used for headspace screening are usually disposed of; however, it is not uncommon for the jars in which a sample yielded a non-detect response to be decontaminated and reused.
- B. Ensure that all equipment is accounted for, and decontaminated (see SOP 24, Field Decontamination).
- C. Make sure all survey or sampling locations are properly staked and the location ID is readily visible on the location stake.

4.1.3.2 Documentation

- A. Record any uncompleted work (like site restoration or long-term additional monitoring) in the Daily Log or logbook.
- B. Complete daily log entries, verify the accuracy of entries, and sign/initial all pages.
- C. Review data collection forms for completeness.

4.1.3.3 Office

- A. Deliver original forms and daily logs to the site manager for technical review. He/she will review, sign forms, and transmit to the document control officer (copies to the files) for eventual delivery to the Department of Energy.
- B. Inventory equipment and supplies. Repair or replace all broken or damaged equipment. Replace expendable items and recharge the batteries. Return equipment to the equipment manager and report incidents of malfunction or damage.

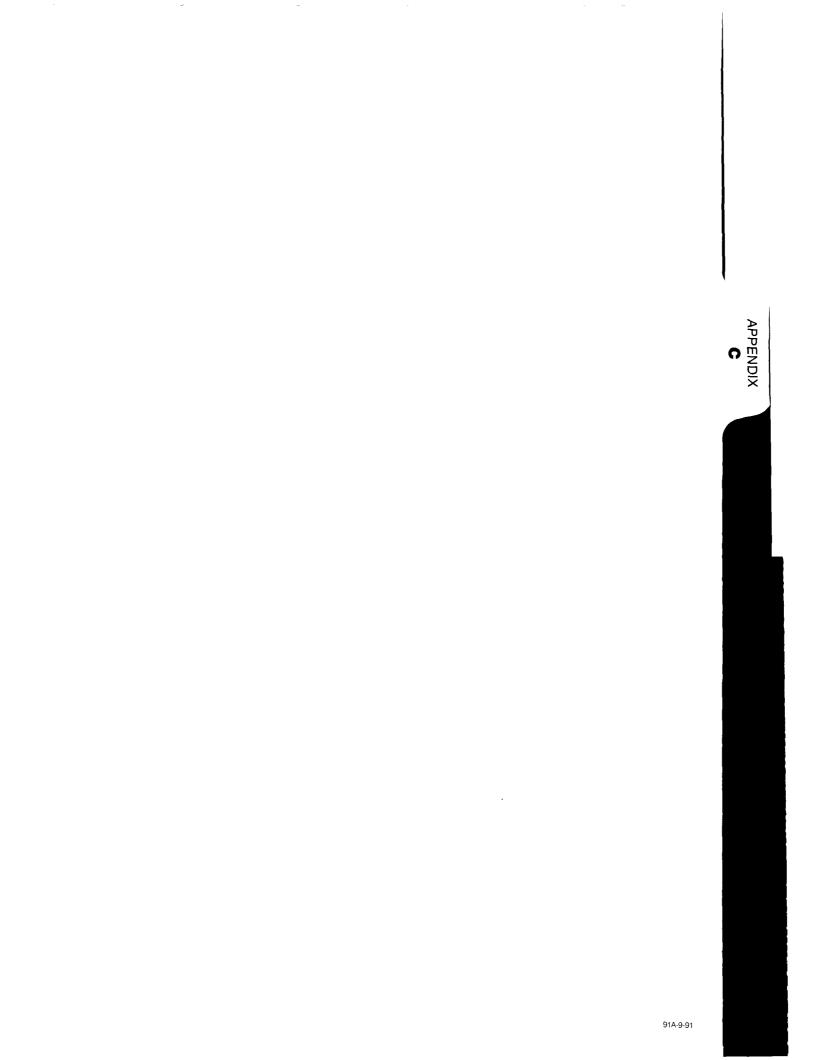
5.0 REFERENCES

Foxboro Analytical (A Division of the Foxboro Company), 1985, "Instruction and Service Manual, Century Systems Portable Organic Vapor Analyzer, Model OVA-128," New Haven, Connecticut.

HNU Systems, Inc, 1986, "Instruction Manual for the Trace Gas Analyzer Model PI-101," Newton, Massachusetts.

New Mexico Environment Department (NMED), 1990, "Underground Storage Tank Regulations," Underground Storage Tank Bureau Regulations, Section XII, Appendix C: Soil Testing for Petroleum Releases, Environmental Improvement Board, Santa Fe, New Mexico.

U.S. Environmental Protection Agency (EPA), 1987, "A Compendium of Superfund Field Operations Methods," EPA-500/P-87/001, U.S. Government Printing Office, Washington, D.C.



APPENDIX C CERTIFICATES OF ANALYSIS



ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT ALBUQUERQUE						
5301 CENTRAL	AVE.		N.E.			
SUITE 700						
ALBUQUERQUE,	NM	87	108			
STEVE RAUGUST	•					

Work	Order:	B2-11-	-030
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P.O. Number: 93-066

Date: 11/16/92

This is the Certificate of Analysis for the following samples:

Client Work ID: ENRON-HOBBS/BTEX/TPH SOILS 301573-002-06 Date Received: 11/03/92 Number of Samples: 6 Sample Type: SOIL

I. Introduction

Samples were labeled as follows:

 SAMPLE IDENTIFICATION
 LABORATORY #

 VEW-2-39
 B2-11-030-01

 B-9-10.5
 B2-11-030-02

 B-8-6.5
 B2-11-030-03

 B-8-35
 B2-11-030-04

 MW-4-40
 B2-11-030-05

 MW-4-10.5
 B2-11-030-06

Jon Barcell Laboratory Director

American Council of Independent Laboratories International Association of Environmental Testing Laboratories American Association for Laboratory Accreditation

Page: 2 of 15

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH SOILS

IT ANALYTICAL SERVICES AUSTIN, TX

682-1-89

301573-002-06 Work Order: B2-11-030

II. QA/QC

4

The results presented in this report meet the statement of work requirements in accordance with Quality Control and Quality Assurance protocol except as noted in Section IV or in an optional sample narrative at the end of Section III.

In the presented analytical data, 'ND' or '<' indicates that the compound is not detected at the specified limit.

III. Analytical Data

The following page(s) supply results for requested analyses performed on the samples listed above.

The test results relate to tested items only. ITAS-Austin reserves the right to control report production except in whole.

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IT ANALYTICAL SERVICES AUSTIN, TX

Company:IT ALBUQUERQUEAUDate:11/16/92Client Work ID:ENRON-HOBBS/BTEX/TPH SOILS301573-002-06

73-002-06 Work Order: B2-11-030

SAMPLE ID: VEW-2-39 SAMPLE DATE: 10/30/92 SAMPLE MATRIX: SOIL

	Note		Reporting		Date	Method
Test Name	Ref	<u>Result</u>	<u>Limit</u>	<u>Units</u>	<u>Analyzed</u>	Reference
TPH by GC (mod EPA 8015	i)	7500	89	mg/kg	11/11/92	CALIFORNIA

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IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH SOILS 34

301573-002-06

Work Order: B2-11-030

Reporting

TEST NAME: **BTEX - Purge and Trap** METHOD REFERENCE: **BPA8020**

SAMPLE ID: VEW-2-39 SAMPLE DATE: 10/30/92 SAMPLE MATRIX: SOIL ANALYSIS DATE: 11/05/92 DILUTION FACTOR: 200 UNITS: ug/kg

	Result	Limit
Benzene	3100	200
Ethylbenzene	13000	200
Toluene	2200	200
Xylenes (total)	13000	200

Total BTEX concentration:	31300	ug/kg

Surrogates	8	Recovery
4-Bromofluorobenzene		135*

Referenced notes for these results:

* High surrogate recovery due to coeluting peaks.

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IT ANALYTICAL SERVICES AUSTIN, TX

8. ×

Company:IT ALBUQUERQUEAUSTIN, TXDate:11/16/92Client Work ID:ENRON-HOBBS/BTEX/TPH SOILS301573-002-06Work Order: B2-11-030

SAMPLE ID: **B-9-10.5** SAMPLE DATE: **10/30/92** SAMPLE MATRIX: **SOIL**

		Note		Reporting		Date	Method
<u>Test Name</u>		Ref	Result	<u>Limit</u>	<u>Units</u>	Analyze	d <u>Reference</u>
TPH by GC	(mod EPA 8015)		2400	96	mg/kg	11/11/9	2 CALIFORNIA

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IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH SOILS

301573-002-06

Work Order: B2-11-030

Reporting

TEST NAME: **BTEX - Purge and Trap** METHOD REFERENCE: **EPA8020**

SAMPLE ID: B-9-10.5 SAMPLE DATE: 10/30/92 SAMPLE MATRIX: SOIL ANALYSIS DATE: 11/07/92 FIRST ANALYSIS: 11/05/92 DILUTION FACTOR: 1000 UNITS: ug/kg

	Result	Limit
Benzene	5400	1000
Ethylbenzene	160000	1000
Toluene	17000	1000
Xylenes (total)	170000	1000

Total BTEX concentration:	352400	ug/kg
---------------------------	--------	-------

Surrogates	8	Recovery
4-Bromofluorobenzene		176*

Referenced notes for these results:

* High surrogate recovery due to coeluting peaks.

682-1-89

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IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92

Client Work ID: ENRON-HOBBS/BTEX/TPH SOILS 301573-002-06 Work Order: B2-11-030

SAMPLE ID: **B-8-6.5** SAMPLE DATE: **10/30/92** SAMPLE MATRIX: **SOIL**

		Note		Reporting		Date	Method
<u>Test Name</u>		<u>Ref</u>	<u>Result</u>	<u>Limit</u>	Units	<u>Analyzed</u>	Reference
TPH by GC	(mod EPA 8015)		720	100	mg.kg	11/11/92	CALIFORNIA

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IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH SOILS

301573-002-06

Work Order: B2-11-030

Reporting

TEST NAME: **BTEX - Purge and Trap** METHOD REFERENCE: **BPA8020**

SAMPLE ID: B-8-6.5 SAMPLE DATE: 10/30/92 SAMPLE MATRIX: SOIL ANALYSIS DATE: 11/07/92 FIRST ANALYSIS: 11/05/92 DILUTION FACTOR: 1000 UNITS: ug/kg

Result	Limit
1100	1000
13000	1000
9100	1000
120000	1000
	1100 13000 9100

	Total	BTEX	concentration:	143200	ug/kg
--	-------	------	----------------	--------	-------

Surrogates	8	Recovery
4-Bromofluorobenzene		200*

<u>Referenced notes for these results:</u>

* High surrogate recovery due to coeluting peaks.

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IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92

Client Work ID:	ENRON-HOBBS/BTEX/TPH SOILS	301573-002-06	Work Order: B2-11-030
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SAMPLE ID: **B-8-35** SAMPLE DATE: **10/30/92** SAMPLE MATRIX: **SOIL**

	Note		Reporting		Date	Method
Test_Name	<u>Ref</u>	<u>Result</u>	<u>Limit</u>	<u>Units</u>	 Analyzed	<u>Reference</u>
TPH by GC (mod EPA 8015)		310	9	mg/kg	11/11/92	CALIFORNIA

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IT ANALYTICAL SERVICES AUSTIN, TX

Reporting

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH SOILS

301573-002-06

Work Order: B2-11-030

TEST NAME: BTEX - Purge and Trap METHOD REFERENCE: **EPA8020**

SAMPLE ID: B-8-35 SAMPLE DATE: 10/30/92 SAMPLE MATRIX: SOIL ANALYSIS DATE: 11/06/92 DILUTION FACTOR: 200 UNITS: ug/kg

	Result	Limit
Benzene	ND	200
Ethylbenzene	4600	200
Toluene	420	200
Xylenes (total)	6200	200

Total BTEX	concentration:	11220	ug/kg

Surrogates	<pre>% Recovery</pre>
4-Bromofluorobenzene	147*

<u>Referenced notes for these results:</u>

4

* High surrogate recovery due to coeluting peaks.

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IT ANALYTICAL SERVICES AUSTIN, TX

Company:IT ALBUQUERQUEAUSTIN, TXDate:11/16/92Client Work ID:ENRON-HOBBS/BTEX/TPH SOILS301573-002-06Work Order:B2-11-030

SAMPLE ID: **NW-4-40** SAMPLE DATE: **10/31/92** SAMPLE MATRIX: **SOIL**

		Note		Reporting		Date	Method
<u>Test Name</u>		Ref	<u>Result</u>	<u>Limit</u>	Units	<u>Analyzed</u>	Reference
TPH by GC	(mod EPA 8015)		1000	9	mg/kg	11/11/92	CALIFORNIA

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IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH SOILS 301

301573-002-06

Work Order: B2-11-030

Reporting

TEST NAME: **BTEX - Purge and Trap** METHOD REFERENCE: **EPA8020**

SAMPLE ID: NW-4-40 SAMPLE DATE: 10/31/92 SAMPLE MATRIX: SOIL ANALYSIS DATE: 11/06/92 DILUTION FACTOR: 50 UNITS: ug/kg

	Result	Limit
Benzene	ND	50
Ethylbenzene	230	50
Toluene	84	50
Xylenes (total)	170	50

Total BTEX concentration:	484	ug/kg

Surrogates	% Recovery
4-Bromofluorobenzene	101

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IT ANALYTICAL SERVICES AUSTIN, TX

Company:IT ALBUQUERQUEAUSTIN, TXDate:11/16/92Client Work ID:ENRON-HOBBS/BTEX/TPH SOILS301573-002-06Work Order: B2-11-030

SAMPLE ID: **MW-4-10.5** SAMPLE DATE: **10/31/92** SAMPLE MATRIX: **SOIL**

	N	ote		Reporting	,	Date	Method
<u>Test Name</u>		Ref	<u>Result</u>	Limit	<u>Units</u>	Analyzed	<u>Reference</u>
TPH by GC	(mod EPA 8015)		ND	2	mg/kg	11/11/92	CALIFORNIA

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IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH SOILS 301573-002-06

Work Order: B2-11-030

TEST NAME: BTEX - Purge and Trap METHOD REFERENCE: BPA8020

SAMPLE ID: NW-4-10.5 SAMPLE DATE: 10/31/92 SAMPLE MATRIX: SOIL ANALYSIS DATE: 11/06/92 DILUTION FACTOR: 50 UNITS: ug/kg

g/kg	Result	Reporting Limit
Benzene	ND	50
Ethylbenzene	ND	50
Toluene	ND	50
Xylenes (total)	160	50

Total BTEX concentration:	. 160	ug/kg
	-	

Surrogates	% Recovery
4-Bromofluorobenzene	107

Page: 15 of 15

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH SOILS IT ANALYTICAL SERVICES AUSTIN, TX

682-1-89

301573-002-06 Work Order: B2-11-030

IV. Methodology

BTEX

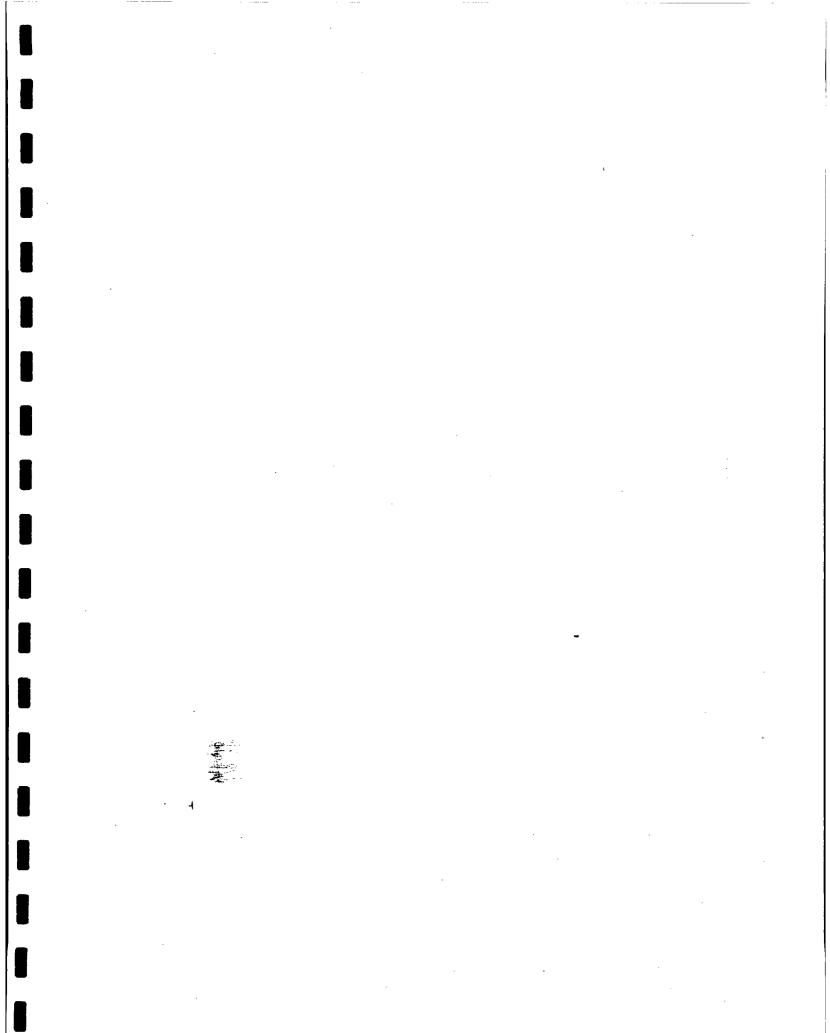
Requested analyses were performed according to the following methods.

TEST NAME BTEX - Purge and Trap TEST CODE BTEX

Method 8020, SW-846, Test Methods for Evaluating Solid Wastes, Third Edition. This technique uses a purge and trap with gas chromatography (GC) and photo ionization detection (PID) with a five point curve. This method exceeds the requirement of Method 602. Prep method is 5030.

TEST NAME TPH by GC (mod EPA 8015) TEST CODE TPH GC

TPH-Extractable Petroleum Hydrocarbons EPA Methods 3510/3520/3550/3580 for extraction of samples and modified EPA Method 8015 for GC/FID analysis of extracts run against a diesel standard.





ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT ALBUQUERQUE 5301 CENTRAL AVE., N.E. SUITE 700 ALBUQUERQUE, NM 87108 STEVE RANGUST

Work Order:	B2-11-009
-------------	-----------

P.O. Number: 93-066

Date: 11/23/92

This is the Certificate of Analysis for the following samples:

Client Work ID:ENRON-HOBBS EXT SRCH301573-002-06Date Received:10/31/92Number of Samples:1Sample Type:SOIL

I. Introduction
Revised report. Previously reported on 11/23/92.
First Reported on 11/18/92.

Samples were labeled as follows:

SAMPLE IDENTIFICATIONLABORATORY #VEW-2-15.5B2-11-009-01

Reviewed and Approved: Jon Bartell Laboratory Director

> American Council of Independent Laboratories International Association of Environmental Testing Laboratories American Association for Laboratory Accreditation

Page: 2 of 4

Company: IT ALBUQUERQUE Date: 11/23/92 Client Work ID: ENRON-HOBBS EXT SRCH

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

301573-002-06 Work Order: B2-11-009

II. QA/QC

The results presented in this report meet the statement of work requirements in accordance with Quality Control and Quality Assurance protocol except as noted in Section IV or in an optional sample narrative at the end of Section III.

In the presented analytical data, 'ND' or '<' indicates that the compound is not detected at the specified limit.

III. Analytical Data

The following page(s) supply results for requested analyses performed on the samples listed above.

The test results relate to tested items only. ITAS-Austin reserves the right to control report production except in whole.

Page: 3 of 4

Company: IT ALBUQUERQUE Date: 11/23/92 Client Work ID: ENRON-HOBBS EXT SRCH

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

301573-002-06

Work Order: B2-11-009

TEST NAME: GCMS Library Search - BNA METHOD REFERENCE: EPA8270

SAMPLE ID: VEW-2-15.5 SAMPLE DATE: 10/29/92 SAMPLE MATRIX: SOIL ANALYSIS DATE: 11/09/92 UNITS: ug/L

Compound Name	Retention Time	Estimated Concentration
Naphthalene	12.12	3.6
2-Methylnaphthalene	13.88	8.8
Unknown Compound	5.03	580
C2-Benzene	6.29	17
C2-Benzene	6.44	34
C10-Alkane	7.66	14
C10-Alkane	7.80	15
Unknown Compound	8.07	17
C3-Benzene	8.20	35
C10-Alkane	8.35	19
C10-Alkane	8.91	47
C11-Alkane	9.32	29
C11-Alkane	10.67	40
C12-Alkane	12.28	22
Cl3-Alkane	12.52	- 20
Unknown Compound	12.80	37
C14-Alkane	13.44	31
C14-Alkane	14.11	16
Unknown Cyclic Hydrocarbon	14.52	18
C15-Alkane	14.97	31
Unknown Compound	15.98	21
C16-Alkane	16.15	25
Unknown Compound	18.42	27
Unknown Compound	21.30	21

Page: 4 of 4

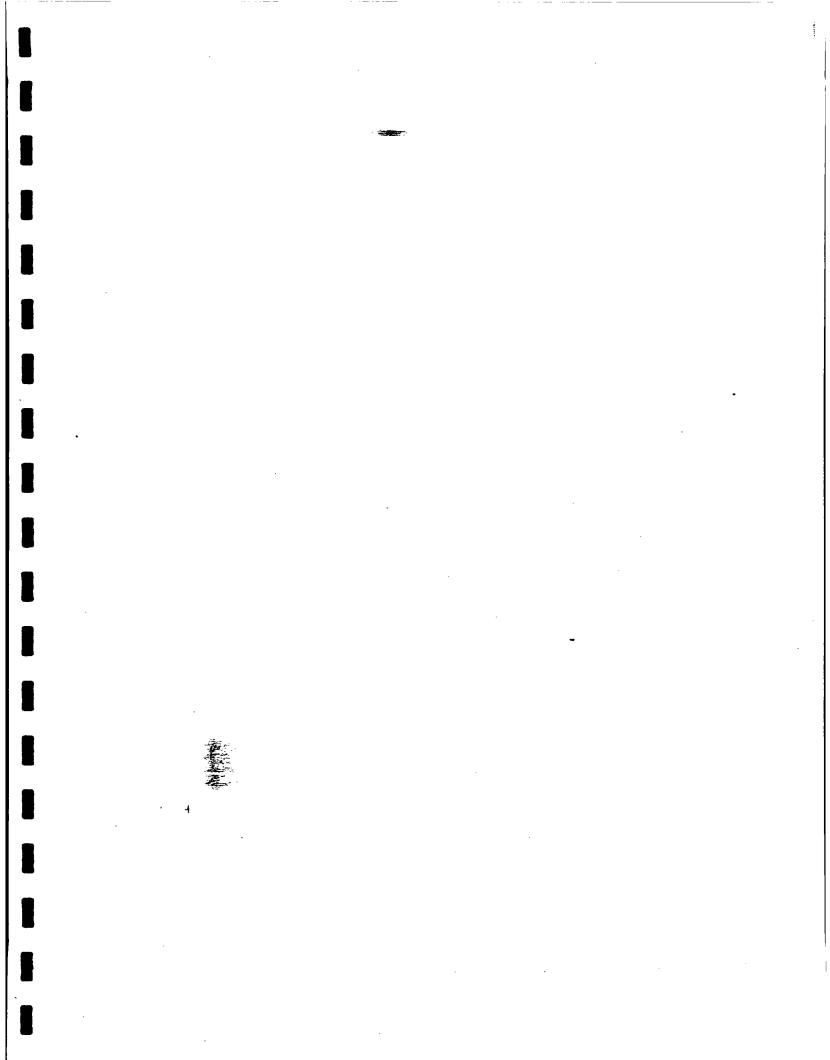
Company: IT ALBUQUERQUE Date: 11/23/92 Client Work ID: ENRON-HOBBS EXT SRCH

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

301573-002-06 Work Order: B2-11-009

IV. Methodology

Requested analyses were performed according to the following methods.





ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT ALBUQUERQUE 5301 CENTRAL AVE., N.E. SUITE 700 ALBUQUERQUE, NM 87108 STEVE RAUGUST

Work Order: B2-11-073

P.O. Number: 93-066

Date: 11/16/92

This is the Certificate of Analysis for the following samples:

Client Work ID: ENRON-HOBBS/BTEX/TPH/SOILS 301573-002-06 Date Received: 11/05/92 Number of Samples: 2 Sample Type: SOIL

I. Introduction

Samples were labeled as follows:

SAMPLE IDENTIFICATION B-7-16 B-7-41 LABORATORY # B2-11-073-01 B2-11-073-02

Reviewed and A Jon Bartell Laboratory Director

American Council of Independent Laboratories International Association of Environmental Testing Laboratories American Association for Laboratory Accreditation

Page: 2 of 7

IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH/SOILS

301573-002-06 Work Order: B2-11-073

II. QA/QC

The results presented in this report meet the statement of work requirements in accordance with Quality Control and Quality Assurance protocol except as noted in Section IV or in an optional sample narrative at the end of Section III.

In the presented analytical data, 'ND' or '<' indicates that the compound is not detected at the specified limit.

III. Analytical Data

The following page(s) supply results for requested analyses performed on the samples listed above.

The test results relate to tested items only. ITAS-Austin reserves the right to control report production except in whole.

Page: 3 of 7

IT ANALYTICAL SERVICES AUSTIN, TX

Company:IT ALBUQUERQUEAUSTIN, TXDate:11/16/92Client Work ID:ENRON-HOBBS/BTEX/TPH/SOILS301573-002-06Work Order:B2-11-073

SAMPLE ID: **B-7-16** SAMPLE DATE: **11/02/92** SAMPLE MATRIX: **SOIL**

		Note		Reporting		Date	Method
<u>Test Name</u>		Ref	<u>Result</u>	<u>Limit</u>	<u>Units</u>	Analyzed	Reference
TPH by GC	(mod EPA 8015)		ND	2	mg/kg	11/11/92	CALIFORNIA

Page: 4 of 7

IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH/SOILS 301573-002-06

Work Order: B2-11-073

TEST NAME: BTEX - Purge and Trap METHOD REFERENCE: EPA8020

SAMPLE ID: B-7-16 SAMPLE DATE: 11/02/92 SAMPLE MATRIX: SOIL ANALYSIS DATE: 11/06/92 DILUTION FACTOR: 50 UNITS: ug/kg

g/kg	Reporting		
	Result	Limit	
Benzene	71	50	
Ethylbenzene	ND	50	
Toluene	ND	50	
Xylenes (total)	ND	50	

Total	BTEX	concentration:	7	1	ug/kg

Surrogates	<pre>% Recovery</pre>
4-Bromofluorobenzene	102

Page: 5 of 7

IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92

4

Client Work ID: ENRON-HOBBS/BTEX/TPH/SOILS 301573-002-06 Work Order: B2-11-073

SAMPLE ID: B-7-41 SAMPLE DATE: 11/02/92 SAMPLE MATRIX: SOIL

	Note		Reporting		Date	Method
Test Name	Ref	Result	<u>Limit</u>	Units	<u>Analyzed</u>	Reference
TPH by GC (mod EPA 8015)		31	2	mg/kg	11/12/92	CALIFORNIA

Page: 6 of 7

IT ANALYTICAL SERVICES AUSTIN, TX

Reporting

Company: IT ALBUQUERQUE AUSTIN, T Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH/SOILS 301573-002-06 Work O

Work Order: B2-11-073

TEST NAME: **BTBI - Purge and Trap** METHOD REFERENCE: **BPA8020**

SAMPLE ID: **B-7-41** SAMPLE DATE: **11/02/92** SAMPLE MATRIX: **SOIL** ANALYSIS DATE: **11/06/92** DILUTION FACTOR: **50** UNITS: ug/kg

	Result	Limit
Benzene	ND	50
Ethylbenzene	ND	50
Toluene	ND	50
Xylenes (total)	ND	50

Total BTE	X concentration:	Not	Detected
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Surrogates	% Recovery
4-Bromofluorobenzene	101

Page: 7 of 7

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH/SOILS

IT ANALYTICAL SERVICES AUSTIN, TX

301573-002-06 Work Order: B2-11-073

IV. Methodology

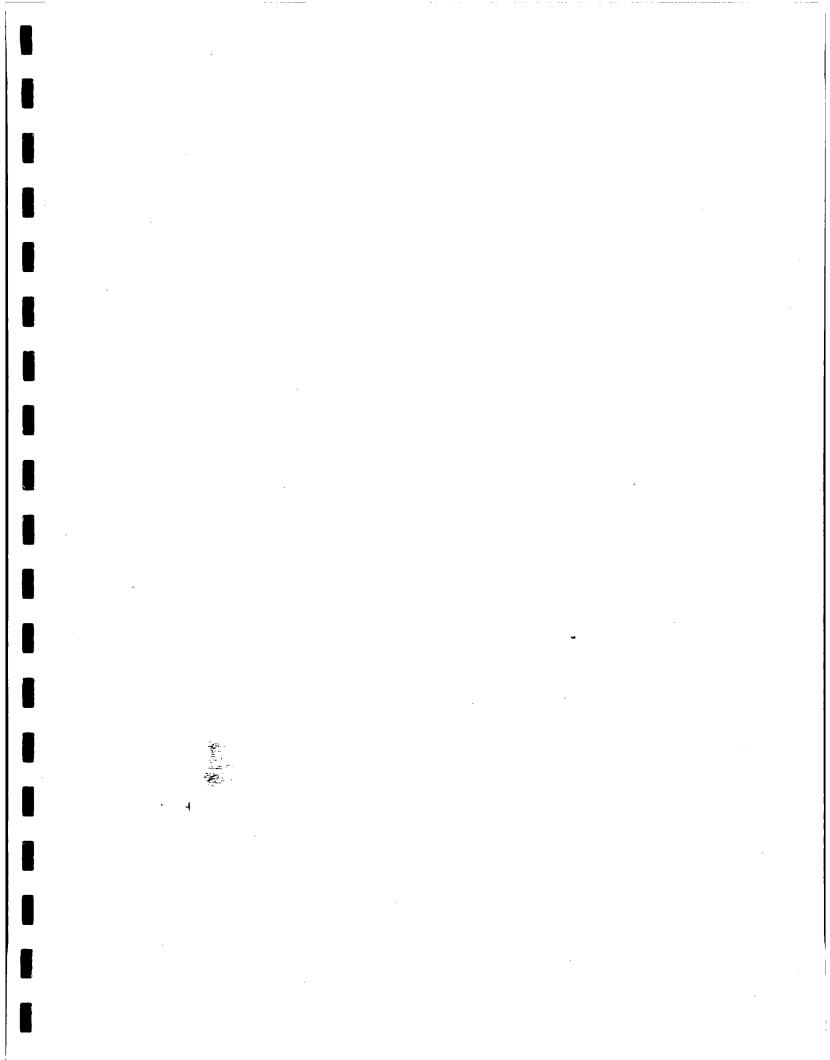
Requested analyses were performed according to the following methods.

TEST NAME BTEX - Purge and Trap TEST CODE BTEX

BTEX Method 8020, SW-846, Test Methods for Evaluating Solid Wastes, Third Edition. This technique uses a purge and trap with gas chromatography (GC) and photo ionization detection (PID) with a five point curve. This method exceeds the requirement of Method 602. Prep method is 5030.

TEST NAME TPH by GC (mod EPA 8015) TEST CODE TPH_GC

TPH-ExtractableEPA Methods 3510/3520/3550/3580 for extraction ofPetroleumsamples and modified EPA Method 8015 for GC/FIDHydrocarbonsanalysis of extracts run against a diesel standard.





ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT ALBUQUERQUE	Date: 11/16/92
5301 CENTRAL AVE., N.E.	
SUITE 700	
ALBUQUERQUE, NM 87108	
STEVE RAUGUST	
STEVE RAUGUST	
Work Order: B2-11-010	P.O. Number: 93-066
This is the Certificate of Ana	alysis for the following samples:
Client Work ID: ENRON-H	HOBBS/BTEX/TPHD/SOIL 301573-002-06
Date Received: 10/31/92	
	.
Number of Samples: 1	
Sample Type: SOIL	
I. Introduction	
Samples were labeled as follow	₩S:
SAMPLE IDENTIFICATION	LABORATORY #
MW-5-41	B2-11-010-01
13M - J - 4T	82-11-010-01
Λ	
Reviewed and Approved:	
Reviewed and Approved:	
- V lan Janen MA	-
Jon Bardell	• · · · · · · · · · · · · · · · · · · ·
Laboratory Director	
/	
	,
•	

American Council of Independent Laboratories International Association of Environmental Testing Laboratories American Association for Laboratory Accreditation

Page: 2 of 5

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPHD/SOIL

IT ANALYTICAL SERVICES AUSTIN, TX

301573-002-06 Work Order: B2-11-010

II. QA/QC

The results presented in this report meet the statement of work requirements in accordance with Quality Control and Quality Assurance protocol except as noted in Section IV or in an optional sample narrative at the end of Section III.

In the presented analytical data, 'ND' or '<' indicates that the compound is not detected at the specified limit.

III. Analytical Data

The following page(s) supply results for requested analyses performed on the samples listed above.

The test results relate to tested items only. ITAS-Austin reserves the right to control report production except in whole.

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IT ANALYTICAL SERVICES AUSTIN, TX

Company:IT ALBUQUERQUEDate:11/16/92Client Work ID:ENRON-HOBBS/BTEX/TPHD/SOIL301573-002-06

301573-002-06 Work Order: B2-11-010

SAMPLE ID: **MW-5-41** SAMPLE DATE: **10/27/92** SAMPLE MATRIX: **SOIL**

	Note		Reporting		Date	Method
Test Name	Ref	Result	Limit	Units	Analyzed	<u>Reference</u>
TPH by GC (mod EPA 8015)		ND	2	mg/kg	11/11/92	CALIFORNIA

Page: 4 of 5

IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPHD/SOIL 301573-002-06

Work Order: B2-11-010

TEST NAME: BTEX - Purge and Trap METHOD REFERENCE: BPA8020

SAMPLE ID: NW-5-41 SAMPLE DATE: 10/27/92 SAMPLE MATRIX: SOIL ANALYSIS DATE: 11/03/92 DILUTION FACTOR: 50 UNITS: ug/kg

4

g/kg		Reporting
	Result	Limit
Benzene	ND	50
Ethylbenzene	ND	50
Toluene	ND	50
Xylenes (total)	ND	50

Total	BTEX	concentration	1: No	ot	Detected	
						-

Surrogates 4-Bromofluorobenzene % Recovery 100 Page: 5 of 5

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPHD/SOIL IT ANALYTICAL SERVICES AUSTIN, TX

301573-002-06 Work Order: B2-11-010

IV. Methodology

4

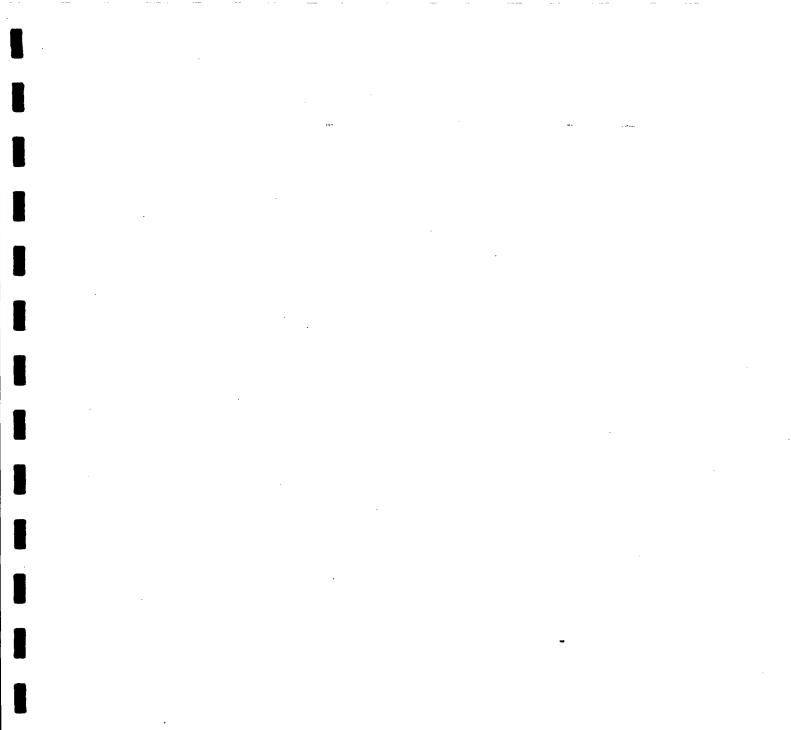
Requested analyses were performed according to the following methods.

TEST NAME BTEX - Purge and Trap TEST CODE BTEX

BTEX Method 8020, SW-846, Test Methods for Evaluating Solid Wastes, Third Edition. This technique uses a purge and trap with gas chromatography (GC) and photo ionization detection (PID) with a five point curve. This method exceeds the requirement of Method 602. Prep method is 5030.

TEST NAME TPH by GC (mod EPA 8015) TEST CODE TPH GC

TPH-ExtractableEPA Methods 3510/3520/3550/3580 for extraction ofPetroleumsamples and modified EPA Method 8015 for GC/FIDHydrocarbonsanalysis of extracts run against a diesel standard.



4

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ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT ALBUQUERQU	JE		
5301 CENTRAL	AVE.	,	N.E.
SUITE 700			
ALBUQUERQUE,	NM	87	108
STEVE RAUGUST			

Work	Order:	B2-11-	-074
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P.O. Number: 93-066

Date: 11/16/92

This is the Certificate of Analysis for the following samples:

Client Work ID: ENRON-HOBBS/BTEX/TPH/WATERS 301573-002-06 Date Received: 11/05/92 Number of Samples: 4 Sample Type: WATER

I. Introduction

Samples were labeled as follows:

SAMPLE	IDENTIFICATION	LABORATORY #
MW-1	-	B2-11-074-01
MW-6		B2-11-074-02
MW-5		B2-11-074-03
MW-4		B2-11-074-04

Reviewed and/ Jon Bartell Laboratory Director

American Council of Independent Laboratories International Association of Environmental Testing Laboratories American Association for Laboratory Accreditation

681-1-89

Page: 2 of 11

IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH/WATERS 301573-002-06 Work Order: B2-11-074

II. QA/QC

The results presented in this report meet the statement of work requirements in accordance with Quality Control and Quality Assurance protocol except as noted in Section IV or in an optional sample narrative at the end of Section III.

In the presented analytical data, 'ND' or '<' indicates that the compound is not detected at the specified limit.

III. Analytical Data

The following page(s) supply results for requested analyses performed on the samples listed above.

The test results relate to tested items only. ITAS-Austin reserves the right to control report production except in whole.

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IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH/WATERS 301573-002-06

Work Order: B2-11-074

SAMPLE ID: MW-1 SAMPLE DATE: 11/03/92 SAMPLE MATRIX: WATER

	Note		Reporting		Date	Method
<u>Test Name</u>	Ref	<u>Result</u>	Limit	<u>Units</u>	<u>Analyzed</u>	Reference
рн	1	6.4		none	11/05/92	EPA150 1
Total Dissolved Solids		2900	5	mg/L	11/05/92	EPA160 1
TPH by GC (mod EPA 8015)		4.3	0.05	mg/L	11/12/92	CALIFORNIA

<u>Referenced notes for these results:</u>

1 Sample received for pH 2 days past the holding time.

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IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH/WATERS 301573-002-06

Work Order: B2-11-074

TEST NAME: BTEX - Purge and Trap METHOD REFERENCE: EPA8020

SAMPLE ID: MW-1 SAMPLE DATE: 11/03/92 SAMPLE MATRIX: WATER ANALYSIS DATE: 11/07/92 FIRST ANALYSIS: 11/06/92 DILUTION FACTOR: 1.0 UNITS: ug/L

	Result	Limit
Benzene	1.5	1.0
Ethylbenzene	ND	1.0
Toluene	1.5	1.0
Iylenes (total)	10	1.0

Total BTEX concentration:

13

Reporting

ug/L

Surrogates 4-Bromofluorobenzene % Recovery 107

Page: 5 of 11

Company: IT ALBUQUERQUE AUSTIN, TX Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH/WATERS 301573-002-06 Work Order: B2-11-074

IT ANALYTICAL SERVICES

SAMPLE ID: **NW-6** SAMPLE DATE: **11/03/92** SAMPLE MATRIX: **WATER**

		Note		Reporting		Date	Method
Test Name		Ref	<u>Result</u>	<u>Limit</u>	<u>Units</u>	 Analyzed	Reference
TPH by GC	(mod EPA 8015)		35	0.5	mg/L	11/12/92	CALIFORNIA

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IT ANALYTICAL SERVICES AUSTIN, TX

Reporting

Company: IT ALBUQUERQUE AUSTIN, TX Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH/WATERS 301573-002-06 Work Order: B2-11-074

TEST NAME: **BTEX - Purge and Trap** METHOD REFERENCE: **BPA8020**

SAMPLE ID: MW-6 SAMPLE DATE: 11/03/92 SAMPLE MATRIX: WATER ANALYSIS DATE: 11/06/92 DILUTION FACTOR: 5.0 UNITS: ug/L

	Result	Limit
Benzene	340	5.0
Ethylbenzene	51	5.0
Toluene	23	5.0
Iylenes (total)	120	5.0

Total BTEX concentration:	534	ug/L
	•	

Surrogates	8	Recovery
4-Bromofluorobenzene		99

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IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92

Client Work ID: ENRON-HOBBS/BTEX/TPH/WATERS 301573-002-06 Work Order: B2-11-074

SAMPLE ID: MW-5 SAMPLE DATE: 11/03/92 SAMPLE MATRIX: WATER

	Note		Reporting		Date	Method
<u>Test Name</u>	_ <u>Ref</u>	Result	Limit	Units	Analyzed	Reference
TPH by GC (mod EPA 8015)		0.69	0.05	mg/L	11/12/92	CALIFORNIA

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IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92 Client Work ID: ENRON-HOBBS/BTEX/TPH/WATERS 301573-002-06

Work Order: B2-11-074

TEST NAME: BTEX - Purge and Trap METHOD REFERENCE: BPA8020

SAMPLE ID: **MW-5** SAMPLE DATE: **11/03/92** SAMPLE MATRIX: **WATER** ANALYSIS DATE: **11/06/92** DILUTION FACTOR: **1.0** UNITS: ug/L

4

	Result	Limit
Benzene	3.0	1.0
Ethylbenzene	3.0	1.0
Toluene	3.4	1.0
Xylenes (total)	34	1.0

Total	BTEX	concentrati	on:
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ug/L

43.4

Reporting

Surrogates% Recovery4-Bromofluorobenzene101

Page: 9 of 11

IT ANALYTICAL SERVICES AUSTIN, TX

Company: IT ALBUQUERQUE Date: 11/16/92

Client Work ID: ENRON-HOBBS/BTEX/TPH/WATERS 301573-002-06 Work Order: B2-11-074

SAMPLE ID: **NW-4** SAMPLE DATE: **11/03/92** SAMPLE MATRIX: **WATER**

	Note		Reporting		Date	Method
Test Name	<u>Ref</u>	<u>Result</u>	<u>Limit</u>	Units	Analyzed	<u>Reference</u>
TPH by GC (mod EPA 8015)	50	0.5	mg/L	11/12/92	CALIFORNIA

Page: 10 of 11

IT ANALYTICAL SERVICES AUSTIN, TX

Reporting

Company:IT ALBUQUERQUEAUSIIN, IDate:11/16/92Client Work ID:ENRON-HOBBS/BTEX/TPH/WATERS301573-002-06Work 0

Work Order: B2-11-074

TEST NAME: **BTEX - Purge and Trap** METHOD REFERENCE: **BPA8020**

SAMPLE ID: NW-4 SAMPLE DATE: 11/03/92 SAMPLE MATRIX: WATER ANALYSIS DATE: 11/06/92 DILUTION FACTOR: 200 UNITS: ug/L

	Result	Limit
Benzene	16000	200
Ethylbenzene	700	200
Toluene	8000	200
Xylenes (total)	1800	200

Tota	1 BTEX	concentration:	26500	ug/L

Surrogates	% Recovery
4-Bromofluorobenzene	102

Page: 11 of 11

IT ANALYTICAL SERVICES AUSTIN, TX

Company:IT ALBUQUERQUEAUSTIN, TXDate:11/16/92Client Work ID:ENRON-HOBBS/BTEX/TPH/WATERS301573-002-06Work Order:B2-11-074

IV. Methodology

Requested analyses were performed according to the following methods.

TEST NAME BTEX - Purge and Trap TEST CODE BTEX

BTEX Method 8020, SW-846, Test Methods for Evaluating Solid Wastes, Third Edition. This technique uses a purge and trap with gas chromatography (GC) and photo ionization detection (PID) with a five point curve. This method exceeds the requirement of Method 602. Prep method is 5030.

TEST NAME **ph**

TEST CODE PH

pН

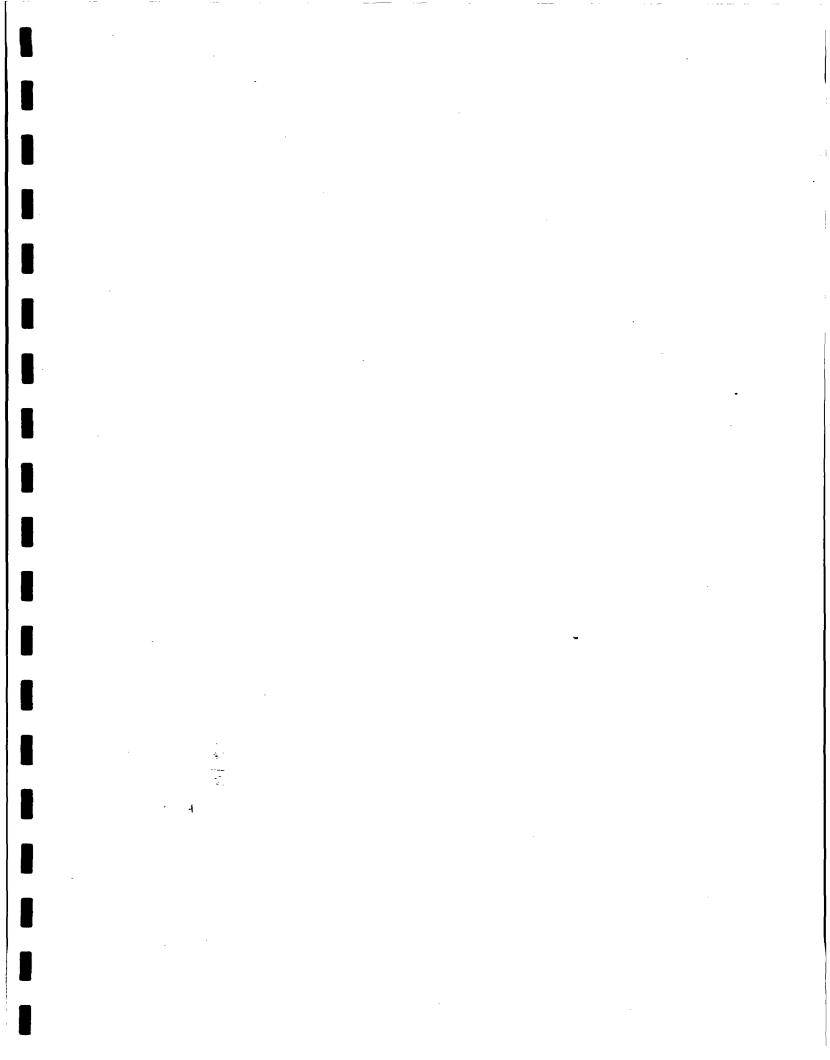
Method 150.1-Chemical Analysis of Water and Wastewater, USEPA, 1983. Potentiometric analysis. Method 9045-SW 846, Third Edition. Electrometric analysis.

TEST NAME Total Dissolved Solids TEST CODE TDS

Total DissolvedMethod 160.1-Chemical Analysis of Water and Wastewater,SolidsUSEPA, 1983. Gravimetric analysis.

TEST NAME TPH by GC (mod EPA 8015) TEST CODE TPH GC

TPH-Extractable	EPA Methods	3510/3520/3550/3580	for extraction of
Petroleum	samples and	modified EPA Method	8015 for GC/FID
Hydrocarbons	analysis of	extracts run agains	t a diesel standard.





ANALYTICAL SERVICES

DEC 14 1992

RECEIVED

CERTIFICATE OF ANALYSIS

IT ALBUQUERQUE 5301 CENTRAL AVE., N.E. SUITE 700 ALBUQUERQUE, NM 87108 STEVE RAUGUST

Date: 12/11	./92
-------------	------

Work Order: B2-12-028

P.O. Number: 93073

This is the Certificate of Analysis for the following samples:

Client Work ID: ENRON HOBBS Date Received: 12/03/92 Number of Samples: 7 Sample Type: LIQUID 301573-001-03

I. Introduction

Samples were labeled as follows:

SAMPLE IDENTIFICATION	LABORATORY #
MW-4	B2-12-028-01
MW-5	B2-12-028-02
MW-6	B2-12-028-03
MW-1	B2-12-028-04
MW-4A	B2-12-028-05
FB-1	B2-12-028-06
TB-1	B2-12-028-07

Reviewed and Jon Bart 11 Laboratory Director

American Council of Independent Laboratories International Association of Environmental Testing Laboratories American Association for Laboratory Accreditation

Page: 2 of 15

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

301573-001-03 Work Order: B2-12-028

II. QA/QC

The results presented in this report meet the statement of work requirements in accordance with Quality Control and Quality Assurance protocol except as noted in Section IV or in an optional sample narrative at the end of Section III.

In the presented analytical data, 'ND' or '<' indicates that the compound is not detected at the specified limit.

III. Analytical Data

The following page(s) supply results for requested analyses performed on the samples listed above.

The test results relate to tested items only. ITAS-Austin reserves the right to control report production except in whole.

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IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

1

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS

301573-001-03 Work Order: B2-12-028

SAMPLE ID: MW-4 SAMPLE DATE: 12/02/92 SAMPLE MATRIX: LIQUID

		Note		Reporting		Date	Method
<u>Test Name</u>	·	Ref	Result	Limit	<u>Units</u>	Analyzed	Reference
TPH by GC (mod EPA 8015)		15	0.50	mg/L	12/09/92	CALIFORNIA

Page: 4 of 15

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

301573-001-03 Work Order: B2-12-028

Reporting

ug/L

TEST NAME: BTEX - Purge and Trap METHOD REFERENCE: EPA8020

SAMPLE ID: MW-4 SAMPLE DATE: 12/02/92 SAMPLE MATRIX: LIQUID ANALYSIS DATE: 12/05/92 DILUTION FACTOR: 200 UNITS: ug/L

	Result	Limit
Benzene	17000	200
Ethylbenzene	530	200
Toluene	8200	200
Xylenes (total)	1300	200

27030

Surrogates 4-Bromofluorobenzene % Recovery
100

Page: 5 of 15

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

12

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS

301573-001-03 Work Order: B2-12-028

SAMPLE ID: MW-5 SAMPLE DATE: 12/02/92 SAMPLE MATRIX: LIQUID

	Note		Reporting		Date	Method
Test Name	Ref	Result	<u>Limit</u>	<u>Units</u>	Analyzed	Reference
TPH by GC (mod EPA 8015)		1.3	0.050	mg/L	12/08/92	CALIFORNIA

Page: 6 of 15

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

301573-001-03 Work Order: B2-12-028

Reporting

TEST NAME: **BTEX - Purge and Trap METHOD REFERENCE: EPA8020**

SAMPLE ID: MW-5 SAMPLE DATE: 12/02/92 SAMPLE MATRIX: LIQUID ANALYSIS DATE: 12/05/92 DILUTION FACTOR: 1.0 UNITS: ug/L

	Result	Limit
Benzene	9.1	1.0
Ethylbenzene	8.2	1.0
Toluene	4.1	1.0
Iylenes (total)	37	1.0

Total BTEX concentration:	58.4	ug/L
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Surrogates% Recovery4-Bromofluorobenzene99

Page: 7 of 15

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

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301573-001-03 Work Order: B2-12-028

SAMPLE ID: MW-6 SAMPLE DATE: 12/02/92 SAMPLE MATRIX: LIQUID

	Note		Reporting		Date	Method
Test Name	Ref	Result	<u> Limit</u>	Units	Analyzed	<u>Reference</u>
TPH by GC (mod EPA 8015)		10	0.50	mg/L	12/09/92	CALIFORNIA

Page: 8 of 15

4

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

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301573-001-03 Work Order: B2-12-028

Reporting

TEST NAME: **BTEX - Purge and Trap** METHOD REFERENCE: **EPA8020**

SAMPLE ID: MW-6 SAMPLE DATE: 12/02/92 SAMPLE MATRIX: LIQUID ANALYSIS DATE: 12/05/92 DILUTION FACTOR: 5.0 UNITS: ug/L

	Result	Limit
Benzene	520	5.0
Ethylbenzene	58	5.0
Toluene	20	5.0
Xylenes (total)	120	5.0

Total BTEX concentration:

ug/L

718

Surrogates% Recovery4-Bromofluorobenzene101

Page: 9 of 15

4

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS

> SAMPLE ID: MW-1 SAMPLE DATE: 12/02/92 SAMPLE MATRIX: LIQUID

	Note	1	Reporting	Date Method	
Test Name	<u>Ref</u>	Result	Limit Units	Analyzed Reference	_
TPH by GC (mod EPA 8015)		5.9	0.050 mg/L	12/08/92 CALIFORNIA	

BS 301573-001-03

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

Work Order: B2-12-028

682 1-89

Page: 10 of 15

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

301573-001-03 Work Order: B2-12-028

Reporting

TEST NAME: **BTEX - Purge and Trap** METHOD REFERENCE: **BPA8020**

SAMPLE ID: MW-1 SAMPLE DATE: 12/02/92 SAMPLE MATRIX: LIQUID ANALYSIS DATE: 12/05/92 DILUTION FACTOR: 1.0 UNITS: ug/L

4

J/ -	Result	Limit
Benzene	1.3	1.0
Ethylbenzene	ND	1.0
Toluene	1.4	1.0
Xylenes (total)	6.0	1.0

Total BTEX concent	ration:	8.7	ug/L
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Surrogates% Recovery4-Bromofluorobenzene105

Page: 11 of 15

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

301573-001-03 Work Order: B2-12-028

SAMPLE ID: MW-4A SAMPLE DATE: 12/02/92 SAMPLE MATRIX: LIQUID

		Note		Reporting		Date	Method
Test Name		Ref	Result	<u>Limit</u>	Units	Analyzed	<u>Reference</u>
TPH by GC	(mod EPA 8015)		10	0.25	mg/L	12/09/92	CALIFORNIA

Page: 12 of 15

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

301573-001-03 Work Order

Work Order: B2-12-028

TEST NAME: **BTEX - Purge and Trap** METHOD REFERENCE: **EPA8020**

SAMPLE ID: MW-4A SAMPLE DATE: 12/02/92 SAMPLE MATRIX: LIQUID ANALYSIS DATE: 12/07/92 DILUTION FACTOR: 100 UNITS: ug/L

4

	Limit
15000	200
400	100
6200	100
1000	100
	400 6200

Total BTEX concentration:

22600

ug/L

Reporting

Surrogates 4-Bromofluorobenzene % Recovery 99 Page: 13 of 15

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

301573-001-03 Work Order: B2-12-028

Reporting

TEST NAME: **BTEX - Purge and Trap** METHOD REFERENCE: **EPA8020**

SAMPLE ID: **FB-1** SAMPLE DATE: **12/02/92** SAMPLE MATRIX: **LIQUID** ANALYSIS DATE: **12/04/92** DILUTION FACTOR: **1.0** UNITS: ug/L

4

	Result	Limit
Benzene	ND	1.0
Ethylbenzene	ND	1.0
Toluene	ND	1.0
Xylenes (total)	ND	1.0

Total	BTEX	concentration:	Not	Detected
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Surrogates 4-Bromofluorobenzene % Recovery
100

Page: 14 of 15

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS

IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

301573-001-03 Work Order: B2-12-028

Reporting

TEST NAME: BTEX - Purge and Trap METHOD REFERENCE: EPA8020

SAMPLE ID: **TB-1** SAMPLE DATE: **11/24/92** SAMPLE MATRIX: **LIQUID** ANALYSIS DATE: **12/04/92** DILUTION FACTOR: **1.0** UNITS: ug/L

	Result	Limit
Benzene	ND	1.0
Ethylbenzene	ND	1.0
Toluene	ND	1.0
Xylenes (total)	ND	1.0

Total BTEX concentration: Not 1	Detected
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Surrogates% Recovery4-Bromofluorobenzene101

Page: 15 of 15

Company: IT ALBUQUERQUE Date: 12/11/92 Client Work ID: ENRON HOBBS IT ANALYTICAL SERVICES AUSTIN, TX (512) 892-6684

301573-001-03 Work Order: B2-12-028

IV. Methodology

Requested analyses were performed according to the following methods.

TEST NAME BTEX - Purge and Trap TEST CODE BTEX

BTEX Method 8020, SW-846, Test Methods for Evaluating Solid Wastes, Third Edition. This technique uses a purge and trap with gas chromatography (GC) and photo ionization detection (PID) with a five point curve. This method exceeds the requirement of Method 602. Prep method-is 5030.

TEST NAME TPH by GC (mod EPA 8015) TEST CODE TPH GC

TPH-ExtractableEPA Methods 3510/3520/3550/3580 for extraction ofPetroleumsamples and modified EPA Method 8015 for GC/FIDHydrocarbonsanalysis of extracts run against a diesel standard.



ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation 5301 Central Ave., NE, Ste 700 ALbuquerque, NM 87108 Date: December 11, 1992

Attn: Mr. Steve Raugust

Job Number 21830

P.O. Number 93-068

This is the Certificate of Analysis for the following samples:

Client Project ID:Enron Liquid FuelsDate Received:November 6, 1992Work Order:X2-11-059Number of Samples:8Sample Type:Air

I. Introduction

Eight air samples arrived at ITAS Cincinnati on November 6, 1992. The samples were labeled as follows:

Canister 🖸 VEW-2-1	Canister # B-7-32	Canister 🖸 VEW-1-1
Canister 🖸 B-9-16	Canister 🖸 B-8-15	Canister 🖸 VEW-1-2
Canister 🖸 B-9-27	Canister 🖸 B-9-10	

II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. The data will include sample identification information, the analytical results, and the appropriate detection limits.

The analyses requested were Natural Gas by GC/TCD/FID; ASTM D-3416 and Benzene, Toluene, Ethyl Benzene, and Total Xylenes by Purge and Trap Gas Chromatography with Photo-ionization Detection; EPA Method TO-3 and Total Petroleum Hydrocarbons by GC/FID.

III. Comments

These samples were analyzed at Air Toxics, Ltd. under an ITAS subcontract.

Reviewed and Approved by:

Sowar Tim Soward Project Manager 211059

American Council of Independent Laboratories International Association of Environmental Testing Laboratories American Association for Laboratory Accreditation

IT Analytical Services • 11499 Chester Road • Cincinnati, OH 45246 • 513-782-4600

IT Enron Client: Work Order: X2-11-059 21105901

IT ANALYTICAL SERVICES CINCINNATI, OH

Analytical Results, %

Canister # VEW-2-1

Client Sample ID

01

Lab No.

Date Analyzed:	11/18/92	
Analyte		Detection Limit
$\neg \neg \neg \circ \circ = = = = = = = = = = = = = = = $		
Oxygen	4.0	0.002
Nitrogen	64	0.002
Carbon Monoxide	ND	0.002
Methane	13	0.002
Carbon Dioxide	0.047	0.002
Total Non-Methane Hydrocarbons *	19	0.002
	100 Total (%)	

Client Sample ID

Lab No.

02

Canister 🖸 B-9-16

Date Analyzed:	11/18/92		
Analyte			Detection Limit
و و و و و و و و و و و و			
Oxygen	ND		0.003
Nitrogen	77	-	0.003
Carbon Monoxide	ND		0.003
Methane	13		0.003
Carbon Dioxide	3.0		0.003
Total Non-Methane Hydrocarbons *	6.5		0.003
	100 Total (%)		

ND = Not detected at or above the reported detection limit

IT ANALYTICAL SERVICES CINCINNATI, OH

	Analytical Results, %	
Client Sample ID	Canister # B-9-27	
Lab No.	03	
Date Analyzed:	11/18/92	
Analyte		Detection Limit
 Dxygen	4.0	0.002
Nitrogen	84	0.002
Carbon Monoxide	ND	0.002
lethane	3.6	0.002
arbon Dioxide	3.2	0.002
otal Non-Methane Hydrocarbons *	5.1	0.002
	100 Total (%)	
lient Sample ID	Canister # 8-7-32	
Lab No.	04	
Date Analyzed:	11/18/92	
Analyte		Detection Limit
Dxygen	ND	. 0.002
litrogen	87	0.002
arbon Monoxide	0.002	0.002
lethane	8.1	0.002
Carbon Dioxide	2.7	0.002
Total Non-Methane Hydrocarbons *	2.4	0.002
	100 Total (%)	

ND = Not detected at or above the reported detection limit

IT ANALYTICAL SERVICES CINCINNATI, OH

Analytical Results, %

Client Sample ID

Canister # 8-8-15

11/18/92

Lab No.

Date Analyzed:

Analyte		Detection Limit
نې نه نه ک په نه ک چ ن نه ک چ ن ت تو چ خ بې تو ه نه		
Oxygen	ND	0.002
Nitrogen	82	0.002
Carbon Monoxide	ND	0.002
Methane	7.3	0.002
Carbon Dioxide	7.8	0.002
Total Non-Methane Hydrocarbons *	2.6	0.002
	100 Total (%)	

Client Sample ID

Canister 🖸 B-9-10

Lab No.

06

Date Analyzed:	11/18/92	
Analyte		Detection Limit
	• # • • • • • • • • • •	
Oxygen	9.5	0.002
Nitrogen	85 -	0.002
Carbon Monoxide	ND	0.002
Methane	1.9	0.002
Carbon Dioxide	2.2	0.002
Total Non-Methane Hydrocarbons *	1.6	0.002
	100 Total (%)	

ND = Not detected at or above the reported detection limit

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IT ANALYTICAL SERVICES CINCINNATI, OH

	Analytical Results, %	
Client Sample ID	Canister # VEW-1-1	,
Lab No.	07	
Date Analyzed:	11/18/92	
Analyte		Detection Limit
Oxygen	7.0	0.002
Nitrogen	77	0.002
Carbon Monoxide	0.001	0.002
Methane	2.5	0.002
Carbon Dioxide	2.8	0.002
Total Non-Methane Hydrocarbons *	11	0.002
•	100 Total (%)	· · ·

Client Sample ID

Canister **#** VEW-1-2

Lab No.

08

Date Analyzed:	11/18/92		
Analyte			Detection Limit
و و و و و و و و و و و و و و و و و و			
Oxygen	6.1		0.002
Nitrogen	77	-	0.002
Carbon Monoxide	0.001		0.002
Methane	2.1		0.002
Carbon Dioxide	4.3		0.002
Total Non-Methane Hydrocarbons *	10		0.002
	100 Total (%)		

ND = Not detected at or above the reported detection limit

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IT ANALYTICAL SERVICES CINCINNATI, OH

Analytical Results, %

Client Sample ID

Method Blank

Lab No.

Date Analyzed:	11/18/92	
Analyte		Detection Limit
Oxygen	ND	0.001
Nitrogen	100	0.001
Carbon Monoxide	ND	0.001
Methane	ND	0.001
Carbon Dioxide	ND	0.001
Total Non-Methane Hydrocarbons *	ND	0.001
- - 3-4	100 Total (%)	

ND = Not detected at or above the reported detection limit

Client: Work Order: X2-11-059 21105910

IT Enron

IT ANALYTICAL SERVICES CINCINNATI, OH

Analytical Results, %

Client Sample ID

Canister **#** VEW-1-1 07

Lab No.

Date Analyzed:	11/:	18/92	Detection Limit	Detection Limit
Analyte	ppmv	ug/L	ppmv	ug/L
		****	*****	
Benzene	860	2700	3.8	12
Toluene	230	850	3.8	24
Ethyl Benzene	33	140	3.8	16
Total Xylenes	59	250	3.8	16
TPH *	70000	280000	38	150

Client	Sample	ID
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Canister # VEW-1-2

Lab No.

80

Date Analyzed:	11/:	18/92	Detection Limit	Detection Limit
Analyte	ppmv	ug/L	ppmv	ug/L
Benzene	1100	3400	3.9	12
Toluene	450	1700	3.9	14
Ethyl Benzene	96	400	Э.9	17
Total Xylenes	170	700	3.9	17
TPH *	84000	340000	39	160

* TPH (Total Petroleum Hydrocarbon) referenced to Gasoline

ND = Not detected at or above the reported detection limit

Client: IT Enron Work Order: X2-11-059 21105912

IT ANALYTICAL SERVICES CINCINNATI, OH

Analytical Results, %

Client Sample ID Canister **#** VEW-2-1

Lab No.

01

Date Analyzed:	11/2	18/92	Detection Limit	Detection Limit
Analyte	ppmv	ug/L	ppmv	ug/L
Benzene	600	1900	0.76	2.4
Toluene	110	400	0.76	2.8
Ethyl Benzene	39	170	0.76	3.2 .
Total Xylenes	59	250	0.76	3.2
TPH *	94000	380000	38	150

* TPH (Total Petroleum Hydrocarbon) referenced to Gasoline

ND = Not detected at or above the reported detection limit

IT Enron Client: Work Order: X2-11-059 21105911

IT ANALYTICAL SERVICES CINCINNATI, OH

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Analytical Results, %

Client Sample ID

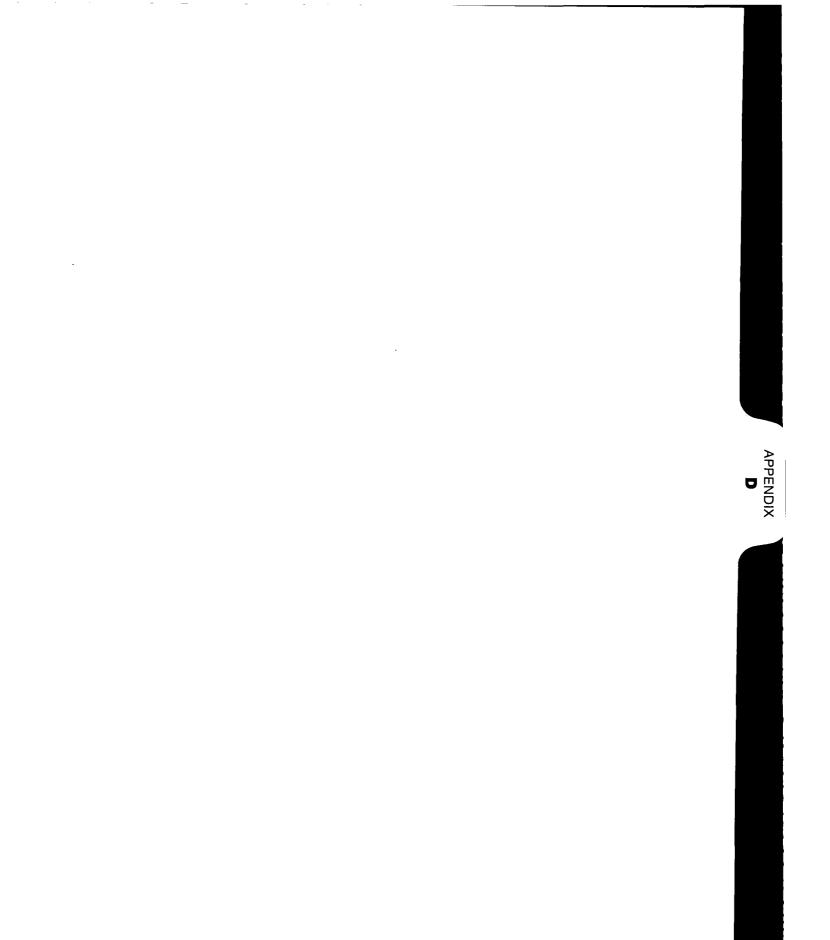
Method Blank

Lab No.

Date Analyzed:	11/18	3/92	Detection Limit	Detection Limit
Analyte	ppmv	ug/L	ppmv	ug/L
Benzene	ND	ND	0.001	0.003
Toluene	ND	ND	0.001	0.004
Ethyl Benzene	ND	ND	0.001	0.004
Total Xylenes	ND	ND	0.001	0.004
TPH *	ND	ND	0.01	0.04

* TPH (Total Petroleum Hydrocarbon) referenced to Gasoline

ND = Not detected at or above the reported detection limit



APPENDIX D

CHAIN-OF-CUSTODY DOCUMENTATION AND FIELD SAMPLING LOGS

INTERNATIONAL TECHNOLOGY CODEODATION		- T		SIS REQUEST AND F CUSTODY RECORD	EST A	· · · · · · · · · · · · · · · · · · ·	Reference Document No. 31881 Page 1 of	cument	No. 31881(
Project Name/	× 2.	2		It Date 7	NCO	26	1 3	CORP OVERQUE	14
Sample Team Members ² MIKE Profit Center No. ³ 35/	Na 3 35/5	×.	Lab Dest Lab C	Destination 8.	ALA PRLA	BUTLER			
Project Manager ⁴	JHY DAWS	Proj	Project Contact/Phone	219	STEVE	2 8800 Report	Report to: ¹⁰ 575 4		~ 5 J
Purchase Order No. ⁶ Required Report Date ¹¹ o	No. 6 75 - 06 6		Carrier/Waybill No.	aybill No. ¹³	2905	- X 280636		2000000	רי גע
Sample ¹⁴ Number	Bample ¹⁵ Description/Tyne	Date/Time ¹⁶ Collected			Pre- ¹⁹ servative	Testing am	20 Condition on Reseipt	on 21	Disposal ²² Record No.
VEW-2-39	7105	23/22/01	5	0/2	J	BTEX 8020 TPH/NIGH BOILERS	lears trop	anna a	
8-9-10.5	7105	10/20/21		2	100 10	PH(H6H POLERS	Ray - 21/2	アイデ	
8-8-6.5	2012	26/30/01	BRASS	6	1.0	PH(NIGHBOILERS) BOIS	() sois ZUX	200	1/3/2
	So/L	26/02/01	62455 TUBE	4	いい	TPH (HIGH BOILE	Bolicer C Bay 5		11
hu-4-40	201 6	10/31/52	BRASS TUBE	6	1 , 2a	TTEX BODO TPH/HIGH BOILEI	BOLLES) BOY 5 W	1× 8 %	4. 6 . 8
MW-4-10.5	7105	25/12/01	Benss Jubi	4	2	BTEN BOLO TPN/HIGH BULER	BULERS SOIST 1		
								8 F.K	2 · · · · · ·
Special Instructions: 23 CALL	305: 23 CALL STELE	it PAuguss	ust Fea	-	ADDI TTO JAL	L GUIDANCE	E SOS	5-262	2-8800
Possible Hazard Identification: Non-hazard _ Flammable	l Identification: ²⁴ Flammable W Skin Irritant M		Poison B	Unknown	<u>۳</u> ۳	Sample Disposal: ²⁵ Return to Client [Disposal by Lab	Archive	(mos.)
Turnarpund Time Required	e Required: ²⁶			Level: ²⁷ ' . II. L		Project Specific (specify).	v): A LL		
1. Relinquished by $\mathcal{M}_{\mathcal{L}}^{8}$	Bill Cruch	Date: Time:	10/11	1000	. Receivi gnature/Affil	at by 28 Mm An	hour IT	Time:	11/3/92
2. Relinquished by (Signature/Affiliation)		Date: Time:		<u>0 3</u>	2. Received by (Signature/Affiliation)	ed by ^{ation})		Date: Time:	
3. Relinquished by (Signature/Affiliation)		Date: Time:		0 0 2	3. Received by (Signature/Affiliation)	ed by ^{stion}]		Date: Time:	
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									MCA 3/15/9

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	Requested Testing Program	TPH + GC/HS LIBEARY SEARCH	UAL GUIDANCE	Sample Disposal: ²⁵ Return to Client []	Project Specifiq (spebily)	red by 28 MUM	ed by litation)	ed by Mation)	
SIS REQUEST AND F CUSTODY RECORD * ipment Date 7 30 CCT 9 Destination 8 TTA5 / AUS Lab Contact 9 CARLA 84 Lab Contact 9 CARLA 84 tract./Phone 125CS 36 2 8 /Waybill No. 5 CCS 36 2 8	18 Pre-19 servative	Jak	ADDITIONAL		27 _	2 1. Received by (Signeture/Affiliation)	2. Received by (Signature/Affiliation)	3. Received by [Signature/Affiliation]	
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Project Name/No. 130/5 Project Name/No. 130/5 Profit Center No. 3 35/ Profit Center No. 3 35/ Profit Center No. 6 93 Purchase Order No. 6 93 Required Report Date 11 2 3	Bample ¹⁴ Number	VEW-2-15.5	Special Instructio	Possible Hazard Identification: ²⁴ Non-hazard L Flammable L Ski	Turnaround Time Required: 26	1. Relinduished by (Signature/Affiliation)	2. Relinquished by (Signature/Affiliation)	3. Relinquished by (Signature/Affiliation)	Comments: ²⁹

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INTERNATIONAL TECHNOLOGY CORPORATION	TONAL OGY TION F 100 / 1/ 200 0/ 0		ANALYSI	s Real Ustod	'SIS REQUEST AND F CUSTODY RECORD *	1 7.0	Reference Document No. 3188 Page 1 of <u>/</u>	t No. 318814
Project Name/ 3ample Team Memb	באאלא - איארא - Project Name/No. <u>130/573, 202</u> . 206 Sample Team Members 2 ////22/202/575.002 . (Auquer Lab	2.06 Sam	کی Samples Shipment Date 7 همسرسال Lab Destination ⁸	pment Date ⁷ Destination ⁸	8 ITAS Autin		Bill to 5 IT CORP ALBUQUERON	Paue, NH
Profit Center No. ³ Project Manager ⁴	No. 3 3515 ager ⁴ JIM DAWSON	150 ~ Proje	ect Contact	Lab Contact ⁹ tact/Phone ¹	Carla B STEU	120036	10 STEVE RAU	cus T
Purchase Order No. ⁶	No. 6. 93-06 6 _		Carrier/Waybill No. ¹³	aybill No.	13 Fed E	۵,	S TT- ALBUQUEROU	guerout
Required Report C	Required Report Date ¹¹ CI Dec 92		ONE 0	CONTAINER	VINER	PER LINE		
Sample ¹⁴ Number	Bample ¹⁵ Description/Type	Date/Time ¹⁶ Container ¹⁷ Sample ¹⁸ Collected Type Volume	Container ¹⁷ Type		Pre- 19 servative	Requested Testing ²⁰ Program	Condition on ²¹ Repeiptyor	Disposal ²² Record No.
R-7-16	Soil	20-C-11	Dry'y L'	500 11	0N V	61 EX 84 8030 TPH (Hint & Silean) 8- 5015	ARCA (TIP	
1H-C-8	->	14-2-93 62-6-11	7	7	>	6TEX 0y sodo TPH CHigh Boilers 184 5015	1161921	
Special Instructions: 23	ons: 23 Petroloun Product	ruduct						
Possible Hazard Identification: 24	dentification: ²⁴ Elammable Skin In		r Poison B	Inknown		Sample Disposal: ²⁵ Beturn to Client I	Disnosal hv I ah 🔪 🖉 Archiva	(acual
	1 6		╹┝━━━	QC Level: 27		lener		:
	28 Alargur I	Inel Date: Time:			1. Received by (Signature/Affiliation)	ied by Contraction and the second	UMAR Date:	15/22 15/27
2. Relinquished by (Signature/Affiliation)		Date: Time:		•	2. Received by (Signature/Affiliation)		Date: Time:	
3. Relinquished by (Signature/Affiliation)		Date: Time:		-	 Beceived by (Signature/Affiliation) 	ed by Mation)	Date: Time:	
Comments: ²⁹								
								MCA 3/15/91

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ebradie Reference Document No. 31881. Page 1 of <u>L</u> Bill to: ⁵ <u>TT CORP</u> MA MA MA BU QUEROUE, NM MA BU QUEROUE, NM	n ²¹ Disposal ²² Record No.	3396			Archive [mos.]		Date: Time:	1015-6101	Date: /0/30/?こ _Time: 0800	131/92 10/2	MCA 3/15/9
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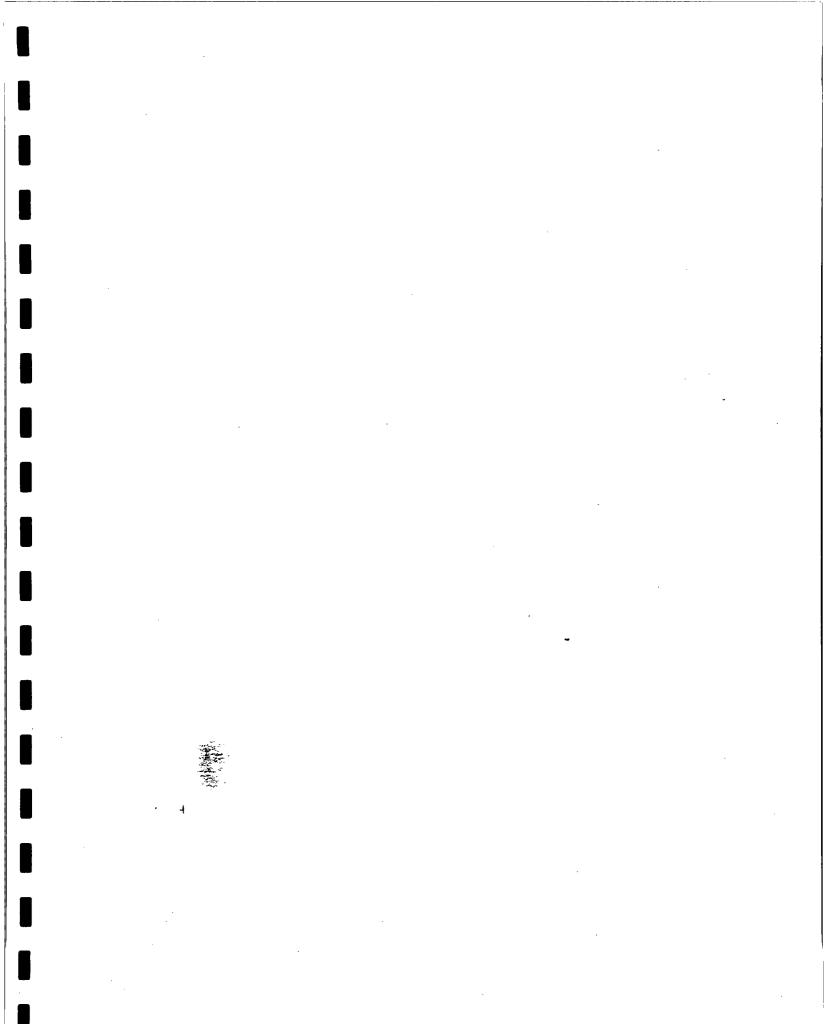
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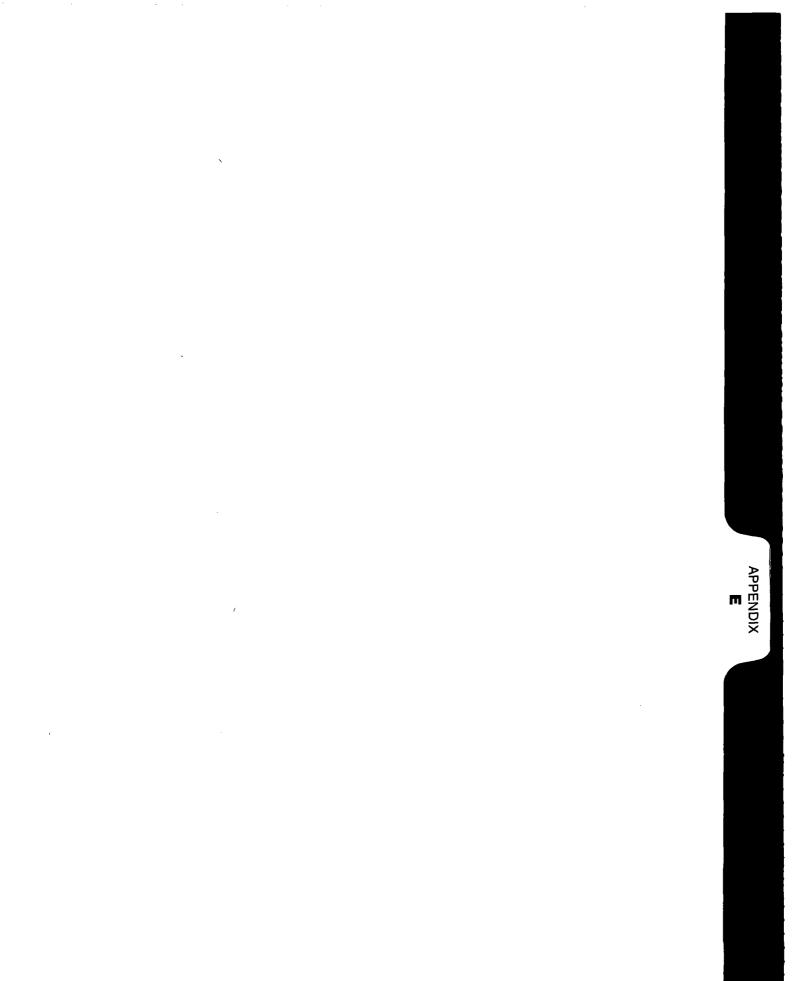
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APPENDIX E

WELL DEVELOPMENT AND GROUNDWATER SAMPLE COLLECTION LOGS

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1 OF 1						APL, ETC.)		Odor						
PAGE 1 OF 1			CMT			COMMENTS (ODOR, CHEMICALS USED, NAPL, ETC.)	Micromho/	cm Conductivity	2,520	2,480	2,520	2,520	2,560	
·		FEET				CHEM		£	7.1	7.1	7.1	7.1	7.1	
		22	NT FOR	Interview Interview Interview Interview		(ODOR,	ç	Temp	20.6	20.7	19.9	19.9	19.5	
		WELL DEPTH=	REFERENCE POINT FOR	TPC = TOP OF PROTECTIVE COVER TWC = TOP OF WELL CASING GS = GROUND SURFACE			WATER	VISUAL						
-	,	-			EB	VERY		TIME						
IT RECORD					FINAL WATER	LEVEL (FOR RECOVERY	RATE)	DEPTH (FEET)						
DEVELOPMENT RECORD	MW-4				NOL	TOTAL	VOLUME	(GALLONS)					55.0	
WELL D	MELL				EVACUATIC			METHOD	Bailer	Bailer	Bailer	Bailer	Bailer	
								STARTING TIME	1340	1345	1355	1400	1405	
		bs Plant	1.02	~			SURGING	EQUIP/ METHOD	Bailer	Bailer	Bailer	Bailer	Bailer	
		Enron-Hobbs Plant	301573.001.02	Hobbs, NM		INITIAL	WATER	DEPTH (FEET)						
		ü	BER:					DATE	11/2/92	11/2/92	11/2/92	11/2/92	11/2/92	
		PROJECT NAME:	PROJECT NUMBER:	LOCATION:				DEVELOPERS	JB	_				

PAGE 1 OF 1 FEET **REFERENCE POINT FOR** 22 WELL DEPTH= WELL DEVELOPMENT RECORD WELL MW-5 Enron-Hobbs Plant 301573.001.02 **PROJECT NUMBER: PROJECT NAME:**

TWC

TPC = TOP OF PROTECTIVE COVER

Hobbs, NM

LOCATION:

DEPTH MEASUREMENTS

TWC = TOP OF WELL CASING

GS = GROUND SURFACE

(ODOR, CHEMICALS USED, NAPL, ETC.) Odor COMMENTS Conductivity Micromho/ 4,320 4,140 4,280 4,280 4,260 4,280 4,300 E 7.1 7.0 0.7 7.1 7.0 7.1 7.1 五 Temp 16.5 18.8 18.8 19.1 19.4 19.1 19.3 <u>0</u> APPEARANCE VISUAL WATER TIME (FOR RECOVERY FINAL WATER RATE) LEVEL DEPTH (FEET) (GALLONS) REMOVED VOLUME TOTAL 55.0 EVACUATION METHOD Bailer Bailer Bailer Bailer Bailer Bailer Bailer STARTING TIME 1030 1045 1050 1240 1250 1300 1310 EQUIP./ SURGING METHOD Bailer Bailer Bailer Bailer Bailer Bailer Bailer DEPTH INITIAL WATER (FEET) 11/2/92 11/2/92 11/2/92 11/2/92 11/2/92 11/2/92 11/2/92 DATE DEVELOPERS INITIALS В

WELL DEVELOPMENT RECORD

PAGE 1 OF 1

WELL MW-6

 PROJECT NAME:
 Enron-Hobbs Plant

 PROJECT NUMBER:
 301573.001.02

LOCATION: Hobbs, NM

WELL DEPTH= 52 FEET

 REFERENCE POINT FOR
 TWC

 DEPTH MEASUREMENTS
 TWC

 TPC = TOP OF PROTECTIVE COVER
 TWC

 TWC = TOP OF WELL CASING
 GS = GROUND SURFACE

					EVACUATIO	ION	FINAL WATER	TER					
		INITIAL				TOTAL	(FOR RECOVERY	VERY		(ODOR	CHEM	COMMENTS (ODOR, CHEMICALS USED, NAPL, ETC.)	APL, ETC.)
		WATER	SURGING	CTADTING			RATE)		WATER	C. Temp	Ŧ	Micromho/	Odor
UEVELUPERS INITIALS	DATE	(FEET)	METHOD	TIME	METHOD	(GALLONS)	(FEET)	TIME	APPEARANCE		ŝ	Conductivity	5
JB	11/2/92		Bailer	0830	Bailer					16.6	7.5		
	11/2/92		Bailer	0850	Bailer					17.1	7.6		
	11/2/92		Bailer	0060	Bailer					17.5	7.7		
	11/2/92		Bailer	0630	Bailer					17.8	7.6	2,042	
	11/2/92		Bailer	0935	Bailer					17.8	7.6	2,094	
	11/2/92		Bailer	0940	Bailer					17.8	7.6	2,092	
	11/2/92		Bailer	0945	Bailer	60.0				17.4	7.5	2,084	
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Page 1of 2

GROUND WATER SAMPLE COLLECTION LOG

Project Name:	Enron		Samp	ole Number:	-	<u>MW-1</u>
Project No.:	301573.001.0)3	Samp	ole Location or We	II I.D.	MW-1
Request-for-Analysis	Control No.:	418966	(att	ach map if necess	ary)	
Chain-of-Custody Co	ontrol No.:	418966	Date	and Time Collecte	d:	1021
						11/3/92
			Samp	ble Collected By:	Boyd, Raugus	st
Weather:						
EQUIPMENT						
Purge Method/Equip	ment:	2" PVC Bailer				
Sampling Equipment	t:	1" PVC Bailer				
Filtering Equipment:						
					::	
	Equipment (Calibration				-
EQUIPMENT MODEL	SERIAL NO	DATE/TIME C	ALIBRATED	TEMP		pH
Orion pH/Temp	6431	11/3/92 0900		(°C)	STD	STD
Cole-Parmer E.C.	890607	11/3/92 0900				4.4
			i	7.5	7.0	4.0
Other Calibration (e.	g, D.O., eH):					
	3 , , .			CONDUCT	IIVITY (micron	nhos/cm)
				TEMP	STAND	
				(°C)	READI	the second s
					0 Distilled H2	o
Equipment Decont	amination:			9.6	0.046	
FIELD PARAMETERS	2					
Water Sample Tem	_	16.4	Sample Depth (Fe	at).		45
Air Temperature (*	• • •	40	initial Depth to W	•	-	42.48
pH:	r).	6.75	Reference Point:		-	42.40
Conductance (umb		1.890		reated to 25°C (V/N	N.	
	108/CIII).	1.090	Conductance con	rected to 25°C (Y/N		
SAMPLE PACKAGIN	G					
		Filtered				
Container(s) Type	and Volume	(Y/N)	Preservatives		Parameters	
1 Amber Glass Liter		<u> </u>	HCL 4°C	TPH	(high boilers) b	/ 8015
2 40 ml VOA Clear		<u>N</u>	HCL 4°C		BTEX by 802	0
500 ml Plastic		<u> </u>	4°C		TDS and pH	
		_				
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Page 2 of 2

6.75

Project Name: Project Number:	Enron 301573.001.03	<u></u>			Sample	Number:	MW-1	
PURGING INFORMATIC	N							
Casing I.D. (a)(in.) Depth of Well (c):(Ft.)	2 ~54.0			ising Volun to Water (d		0.165	(Gal/Ln. Ft	.)
Length of Static Water		g (e)=(c)-(d)	-	54.0	_ (-)	42.48	(=)	11.52
Casing Water Volume (f)=(b)x(e):	11.52	_ (x) _	0.165	(=)	1.9	(Gal)	
Casing Volumes:	3	(x) (f) =	6.0	(Gal)				
		2,000 Scale						
Volume Purged		Conducta		Temp.	Wat	er Descripti	n	
(Gallon)	Time	(umhos/a	cm)	(°C)	(Color,T	urbidity, Od	or, Oil)	pH
0.5	0955	1.975	5	17.1	Cloudy			6.8
1.0	0958	1.875	5	12.0	Light Brown	1		6.6
2.5	1005	1.885	5	17,4	Light Brow	<u>n</u>		6.61
3.0	1007	1.870)	17.1	Light Brown	1		6.74
5.0	1010	1.870	2	16.5	Brown			6.6
6.0	1015	1.865	5	17.5	Brown			6.63
	· · · ·							

Total Volume Purged:	6.5	(gal)	Time:	1021	Purged Dry (Y/N):	N
Total Totaline Langeat		(9-7			·	

16.4

Brown

CASING VOLUME

6.5

1021

1.890

1

Casing I.D.	Unit Casing	Volume
(ln.)	(Gal/Lin.Ft)	
1.0	0.04	0.15
1.5	0.09	0.34
2.0	0.16	0.61
2.2	0.20	0.76
3.0	0.37	1.4
4.0	0.65	2.5
4.3	0.75	2.8
5.0	1.0	3.8
6.0	1.5	5.7
7.0	2.0	7.6
8.0	2.6	9.8

Additional Remarks:

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GROUND WATER SAMPLE COLLECTION LOG

- -----

Project Name:	Enron			e Number:		MW-4
Project No.:	<u>301573.001.0</u>			e Location or We		<u>MW-4</u>
Request-for-Analysis Co Chain-of-Custody Contr		418966	·	ch map if necess nd Time Collecte	•	1450
Chain-on-Custody Contr	01 NO.:	418966		nd Time Collecte	G:	11/3/92
			Sampl	e Collected By:	Boyd, Rau	
Weather:			Sampi	e conected by:	BUYU, HAU	gusi
EQUIPMENT						
Purge Method/Equipme	nt:	3" PVC BAiler				
Sampling Equipment:		3" PVC Bailer				
Filtering Equipment:		N/A				
	Equipment C	alibration				
EQUIPMENT MODEL	SERIAL NO		ALIBRATED	TEMP	pH	pH
Orion pH/Temp	6431	11/3/92 0900		(C)	S1	
Cole-Parmer E.C.	890607	11/3/92 0900		7.5	7.0	4.4
					<u> </u>	
Other Calibration (e.g. I).O., eH):	1				
Equipment Decontam	ination:			CONDUCT TEMP (C) 9.6		idard Ding H2O
FIELD PARAMETERS				L	_L	
Water Sample Temp.	(`C):	18.5	Sample Depth (Fee	nt):		47
Air Temperature ('F):		40	Initial Depth to Wa			44.25
pH:		6.52	Reference Point:			
Conductance (umhos	/cm):	0.182	Conductance corre	ected to 25°C (Y/N	l):	. <u> </u>
SAMPLE PACKAGING						
		Filtered				
Container(s) Type and 1 Amber Glass Liter	volume	(¥/N) N	Preservatives HCI, 4°C	трн	Paramete (high boilers	
2 Amber 40 ml VOA		N	HCI, 4°C		BTEX by 8	
2 Amber Glass Liters	······	N	4°C		Bioassess	
1 40 ml VOA Clear		N	HNO3, 4°C		Bioassess	
' L	····		<u> </u>			_

Page 2 of 2

Project Name: Project Number:	Enron 301573.001.03				Sampl	e Number:	<u>MW-4</u>	
PURGING INFORMATIO	N						·	
Casing I.D. (a)(in.)	4		Unit Ca	asing Volun	ne (b):	0.652	(Gal/Ln. F	it.)
Depth of Well (c):(Ft.)	53.53		•	to Water (d): (Ft):	44.25		
Length of Static Water		g (e)=(c)-(d)	: .	53.53	_ (-)	44.25	(=)	9.28
Casing Water Volume (f)=(b)x(e):	9.28	_ (x) _	0.652	_ (=)	6.05	_(Gal)	
Casing Volumes:	3	(x) (f) =	18.2	(Gal)				
		20,000 Scal	e		. 	···-	· · · · · · · · · · · · · · · · · · ·	
Volume Purged (Gallon)	Time	Conducta (umhos/		Temp. (°C)		ater Descriptio Turbidity, Od		ь
3	1420	0.18		18.4	1	own, sheen, od		6.89
8	1430	0.18	7	18.8		own, sheen, od		6.90
13	1435	0.184	4	18.5	Yellow-br	own, sheen, od	lor	6.89
18	1440	0.18	2	18.5	Yellow-br	own, shee <u>n, od</u>	lor	6.91
	-					····		
19	1450	0.18	2	18.5	Yellow-br	own, sheen, oc	lor	6.92

Total Volume Purged:

(gal) Time:

19

Purged Dry (Y/N):

N

CASING VOLUME

Casing I.D.	Unit Casing	Volume
(ln.)	(Gal/Lin.Ft)	(LLAB)
1.0	0.04	0.15
1.5	0.09	0.34
2.0	0.16	0.61
2.2	0.20	0.76
3.0	0.37	1.4
4.0	0.65	2.5
4.3	0.75	2.8
5.0	1.0	3.8
6.0	1.5	5.7
7.0	2.0	7.6
8.0	2.6	9.8

Additional Remarks:

Noticeable odor from well while taking initial reading.

1450

Approximate 3-inch thick separated hydrocarbon liquid (clear) inside initial bailer.

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GROUND WATER SAMPLE COLLECTION LOG

Project Name:	Enron		Sample Nun	nber:		MW-5
Project No.:	301573.001.0)3	Sample Loc	ation or We	ll I.D.	MW-5
Request-for-Analysis C	ontrol No.:	418966	(attach ma	p if necess	ary)	
Chain-of-Custody Contr	rol No.:	418966	Date and Tir	ne Collecte	d:	1350
						11/3/92
			Sample Coli	ected By:	Boyd, Raugi	ust
Weather:						
EQUIPMENT						
Purge Method/Equipme	nt:	3" PVC Bailer				
Sampling Equipment:		3" PVC Bailer				
Filtering Equipment:						
	Equipment C	Calibration				
EQUIPMENT MODEL	SERIAL NO		ALIBRATED	TEMP	pH	pH
Orion pH/Temp	6431	11/3/92 0900		(°C)	STD	a second a s
Cole-Parmer E.C.	890607	11/3/92 0900		7.5	7.0	4.4 4.0
	-			7.5		4.0
	1					
Other Calibration (e.g. I	D.O., eH):			Babdidaebbda		
Equipment Decontam	nination:			TEMP ('C) 9.6	TVITY (micro STANC READ 0 Distilled H 0.046	ARD ING
FIELD PARAMETERS Water Sample Temp.	• •	17.9	Sample Depth (Feet):			47
Air Temperature (*F):		45	initial Depth to Water (Fe	et):		44.98
pH:		7.03	Reference Point:		_	
Conductance (umhos	/cm):	1.163	Conductance corrected	to 25°C (Y/N):	
SAMPLE PACKAGING						
Container(s) Type and	Volume	Filtered (Y/N)	Preservatives		Parameters	
1 Amber Glass Liter		N	HCI, 4°C	TPH	(high boilers) l	المتحدث البريان والمتحدث والمتحدث والمتحدث والمحادث
2 Amber 40 ml VOA		N	HCI, 4°C		BTEX by 80	
					. <u>.</u>	
				ļ		
·				<u> </u>		
				I		

Page 2 of 2

Project Name: Project Number:	Enron 301573.001.03	<u> </u>			Sample	e Number:	<u>MW-5</u>	
PURGING INFORMATIO	<u>NC</u>				·			
Casing I.D. (a)(in.)	4		Unit C	asing Volum	ne (b):	0.652	(Gal/Ln. F	t.)
Depth of Well (c):(Ft.)	55.06		Depth	to Water (d)	: (Ft):	44.98		
Length of Static Water	Column in Casing	g (e)=(c)-(d)	:	55.06	_ (-)	44.98	(=)	10.08
Casing Water Volume		0.652	(x)	10.08	(=)	6.57	(Gal)	
Casing Volumes:	3	(x) (f) =	19.7	(Gal)				
		2,000 Scale		_				
Volume Purged (Gallon)	Time	Conducta (umhos/e		Temp. ('C)		ter Descriptio Turbidity, Ode		ЪН
3	1330	1.160		19.2	Brown	i Gutilaricheshid & Ghudhat		7.05
6	1333	1.170)	19.1	Brown	·····		7.00
12	1337	1.160)	19.1	Brown			6.99
15	1340	1.160		19.0	Brown			7.01
20	1343	1.168	3	19.2	Brown			7.00
			<u> </u>					
21	1350	1.163	3	17.9	Brown			7.03

Total Volume Purged: ______ (gal) Time: ______ 1350 Purged Dry (Y/N): _____ N

CASING VOLUME

Casing I.D.	Unit Casing	Volume
(In.)	(Gal/Lin.Ft.)	(L/Lin.Fl.)
1.0	0.04	0.15
1.5	0.09	0.34
2.0	0.16	0.61
2.2	0.20	0.76
3.0	0.37	1.4
4.0	0.65	2.5
4.3	0.75	2.8
5.0	. 1.0	3.8
6.0	1.5	5.7
7.0	2.0	7.6
8.0	2.6	9.8

Additional Remarks:

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GROUND WATER SAMPLE COLLECTION LOG

Project Name:	Enron		Sample N	lumber:		MW-6
Project No.:	301573.001.	03		ocation or We	II I.D.	MW-6
Request-for-Analysis	Control No.:	418966	(attach	map if necess	ary)	
Chain-of-Custody Co	ontrol No.:	418966	Date and	Time Collecte	d:	1250
			1			11/3/92
Weather:			Sample C	Collected By:	Boyd, Rau	gust
EQUIPMENT						
Purge Method/Equip	ment:	3" PVC Bailer				
Sampling Equipment	t:	1" PVC Bailer				
Filtering Equipment:						
		······································		· · · · · · · · · · · · · · · · · · ·		
	Equipment	Calibration	·····			
EQUIPMENT MODEL			ALIBRATED	TEMP	pH	pH
Orion pH/Temp	6431	11/3/92 0900		(°C)	S1	
Cole-Parmer E.C.	890607	11/3/92 0900			7.0	4.4
				7.5	/	.0 4.0
Other Calibration (e.	g. D.O., eH):					
					TVITY (mici	
				TEMP	·	IDARD
				(°C)	0 Distilled	DING
Equipment Decont	amination			9.6	0.04	
				3.0	0.0	+0
						·
FIELD PARAMETERS	2					
Water Sample Tem	ıр. (°С):	18	Sample Depth (Feet):			50
Air Temperature (*	F):	40	Initial Depth to Water	(Feet):		45.10
pH:		7.14	Reference Point:			
Conductance (umh	nos/cm):	0.980	Conductance correct	ed to 25°C (Y/N	l):	
	_					
SAMPLE PACKAGIN	<u>G</u>					
		Filtered				
Container(s) Type a	ind Volume	(Y/N)	Preservatives		Paramete	-
1 Amber Glass Liter		N	HCI 4°C	ТРН	(high boilers	
2 Amber 40 ml VOA		N	HCI 4°C		BTEX by 8	
2 Amber Glass Liters		N	4°C		Bioassess	
1 40 ml VOA Clear		N	HNO3 4°C		Bioassess	
					·····	
· · · · · · · · · · · · · · · · · · ·			##	•		

Page 2 of 2

Project Name: Enron Sample Number: MW-6 **Project Number:** 301573.001.03 PURGING INFORMATION Casing I.D. (a)(in.) Unit Casing Volume (b): 0.652 4 (Gal/Ln. Ft.) 53.50 Depth of Well (c):(Ft.) Depth to Water (d): (Ft): 45.10 Length of Static Water Column in Casing (e)=(c)-(d): 53.50 (-) 45.10 (=) 8.4 Casing Water Volume (f)=(b)x(e): 8.4 5.5 (Gal) 0.652 (=) (X) **Casing Volumes:** 3 (x)(f) = 16.4(Gal) 2,000 Scale Volume Purged Water Description Conductance Temp. pН (Gallon) Time (umhos/cm) (°C) (Color, Turbidity, Odor, Oil) 3 1230 1.010 18.2 Brown, slight odor 7.1 6 Brown, slight odor 7.1 1235 1.010 18.3 9 7.11 1237 0.980 18.1 Brown, slight odor 12 0.980 Brown, slight odor 7.17 1240 18.2 15 1243 0.920 18.1 Brown, slight odor 7.18 16.5 1250 0.980 18.0 Brown, slight odor 7.14

Total Volume Purged: 16.5 (gal) Time: 1243 Purged Dry (Y/N): N

<u>CASING VOLUME</u>

Cas	sing I.D.	Unit Casing	Volume
	(In.)	(Gal/Lin.Ft.)	(L/Lin.Fi.)
	1.0	0.04	0.15
	1.5	0.09	0.34
	2.0	0.16	0.61
	2.2	0.20	0.76
	3.0	0.37	1.4
	4.0	0.65	2.5
	4.3	0.75	2.8
	5.0	1.0	3.8
	6.0	1.5	5.7
	7.0	2.0	7.6
	8.0	2.6	9.8

Additional Remarks:

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GROUND WATER SAMPLE COLLECTION LOG

Project Name:	Enron		Sample N	lumber:		<u>MW-1</u>
Project No.:	301573.001.	03	Sample L	ocation or We	əll I.D.	MW-1
Request-for-Analysis Control No.:		417772	417772 (attac		ch map if necessary)	
Chain-of-Custody Con	trol No.:	417772	Date and	Date and Time Collected:		
-						12/2/92
			Sample C	collected By:	Boyd	
Weather:						
EQUIPMENT						
Purge Method/Equipm	ent:	3" PVC Bailer				
Sampling Equipment:	<u></u>	1" Teflon Bailer				······
Filtering Equipment:		NA				
	STREET, STREET	Calibration		800800000000	68 886999868986	
EQUIPMENT MODEL	SERIAL N		ALIBRATED	TEMP	pH .	pH
Orion pH Meter	6431	12/2/92		(°C)		TD STI
Cole-Parmer Cond.	890607	12/2/92			6.99	4.0 7.0 4.1
				L		7.0
Other Calibration (e.g.				CONDUC TEMP ('C)	STA RE	romhos/cm) NDARD ADING
Equipment Decontal Alconox wash, DI rinse	mination:			25'		999
FIELD PARAMETERS						
Water Sample Temp	. (`C):	18.2	Sample Depth (Feet):			
Air Temperature ('F)):	~60*	Initial Depth to Water	(Feet):		43.70
pH:		7.07	Reference Point:			
Conductance (umho	s/cm):	0.313	Conductance correct	ed to 25°C (Y/I	N):	<u> </u>
SAMPLE PACKAGING						
Container(s) Type an	dValuma	Filtered (Y/N)	Preservatives		Paramet	
500 ml Amber Glass		N	HCI 4°C	TDL	l (high boiler	فيصفعون والمتكم فستستبيب فينها المتبدين فستعين
2 x 40 ml VOAs			HCI4°C		BTEX by	
					UILA UY	
	····		······································			
					· · · · · · · · · · · · · · · · · · ·	

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Project Name: Enron Sample Number: **MW-1 Project Number:** 301573.001.03 PURGING INFORMATION Casing I.D. (a)(in.) Unit Casing Volume (b): 2 0.16 (Gal/Ln. Ft.) Depth of Well (c):(Ft.) 53.93 Depth to Water (d): (Ft): 43.70 Length of Static Water Column in Casing (e)=(c)-(d): 53.93 43.70 (=) 10.23 (-) Casing Water Volume (f)=(b)x(e): 1.60 0.16 (=) (Gal) 10.23 (X) **Casing Volumes:** 3 5 (Gal) (x)(f) =20,000 Scale Volume Purged Conductance Temp. Water Description (Gallon) (umhos/cm) (°C) (Color, Turbidity, Odor, Oil) рН Time 1 1227 19.4 No odor, It. brown 6.99 0.337 2 7.03 1230 0.338 18.4 No odor, dark brown 3 1235 0.316 18.9 No odor, dark brown 7.02 4 18.4 No odor, dark brown 7.03 1240 0.312 5 1250 0.308 18.7 7.03 ÷. • 6.5 1305 0.313 18.2 7.07

Total Volume Purged: 6.5 (gal) Time: 1305 Purged Dry (Y/N): N

CASING VOLUME

Casing I.D.	Unit Casing Volume					
(in.)	(Gal/Lin.Ft.)	(L/Lin.Fl.)				
1.0	0.04	0.15				
1.5	0.09	0.34				
2.0	0.16	0.61				
2.2	0.20	0.76				
3.0	0.37	1.4				
4.0	0.65	2.5				
4.3	0.75	2.8				
5.0	1.0	3.8				
6.0	1.5	5.7				
7.0	2.0	7.6				
8.0	2.6	9.8				

Additional Remarks:

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GROUND WATER SAMPLE COLLECTION LOG

Project Name:	Enron		Sample Nu	m ber:	MW-4
Project No.: 301573.001.03 Request-for-Analysis Control No.: 417772		Sample Loc	Sample Location or Weil I.D.		
		417772	(attach m	(attach map if necessary)	
Chain-of-Custody Co	ntrol No.:	417772	Date and Ti	me Collected:	0810
					12/2/92
			Sample Col	llected By: Boyd	
Weather:					
EQUIPMENT					
Purge Method/Equip	ment:	3" PVC Bailer			
Sampling Equipment	t:	1" Teflon Bailer			
Filtering Equipment:		NA			
EQUIRMENT MODEL	Equipment SERIAL N			TEMP pH	
Orion pH Meter	6431	0. DATE/TIME C/ 12/2/92	LIDNAI EU		pH STD S1
Cole-Parmer Cond.	890607	12/2/92		6.99	4.0
					7.0 4.0
Other Calibration (e.				-	
Equipment Decont Alconox wash, DI rinse				1	ADING 000 999
FIELD PARAMETERS	2				
Water Sample Tem	ар. (*С):	19.3	Sample Depth (Feet):		
Air Temperature (*	F):	~60*	Initial Depth to Water (F	eet):	45.35
pH:		7.13	Reference Point:		
Conductance (umh	nos/cm):	0.320	Conductance corrected	to 25°C (Y/N):	
SAMPLE PACKAGIN	G				
		Filtered			
Container(s) Type a	ind Volume	(Y/N)	Preservatives .	Paramet	ers
500 ml Amber Glass		N	HCI 4°C	TPH (high boile	rs) by 8015
2 x 40 ml VOAs		N	HCI 4°C	BTEX by	8020
		I I			

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Project Name: Project Number:	Enron 301573.001.03	•			Sample	e Number:	<u>MW-4</u>	
PURGING INFORMATIC	<u>N</u>							
Casing I.D. (a)(in.)	4	-	Unit Ca	asing Volur	ne (b):	0.65	(Gal/Ln. F	t.)
Depth of Well (c):(Ft.)	53.53		Depth	to Water (d): (Ft):	45.35		
Length of Static Water	Column in Casir	ig (e)=(c)-(d)	: .	53.53	_ (-)	45.35	(=)	8.18
Casing Water Volume (f)=(b)x(e):	8.18	_ (x) .	0.65	(=)	5.317	_(Gal)	
Casing Volumes:	3	(x) (f) =	<u>16</u>	(Gal)				
		20,000 Scal	e					
Volume Purged (Gallon)	Time	Conducta (umhos/e		Temp. (°C)		ter Descriptio Turbidity, Ode		Hq
3	0747	0.293		18.3	Lt. brown,			7.27
6	0752	0.284		18.7	Lt. brown,			7.20
9	0755	0.332	2	19.0	Cloudy, It.			7.13
12	0800	0.304	4	18.3	Cloudy, It.	brown		7.18
15	0805	0.32	3	18.8	Cloudy, It.	brown		7.19
16	0806	0.308	3	20.0	Cloudy, It.	brown		7.20
18.0	0830	0.320	<u> </u>	19.3				7.13

Total Volume Purged: 18.0 (gal) Time: 0830 Purged Dry (Y/N): N

<u>CASING VOLUME</u>

Casing I.D.	Unit Casing	Volume
(in.)	(Gal/Lin.Rt.)	(L/Linifi)
1.0	0.04	0.15
1.5	0.09	0.34
2.0	0.16	0.61
2.2	0.20	0.76
3.0	0.37	1.4
4.0	0.65	2.5
4.3	0.75	2.8
5.0	1.0	3.8
6.0	1.5	5.7
7.0	2.0	7.6
8.0	2.6	9.8

Additional Remarks:

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GROUND WATER SAMPLE COLLECTION LOG

Project Name:	Enron		Sample Number:	MW-4-A	
Project No.: 301573.001.03 Request-for-Analysis Control No.: 417		03	Sample Location or Well I.D.		
		417772	(attach map if necessary)		
Chain-of-Custody Co	ntrol No.:	417772	Date and Time Collected:	1355	
				12/2/92	
			Sample Collected By: Boyd		
Weather:					
EQUIPMENT					
Purge Method/Equip	ment:	3" PVC Bailer			
Sampling Equipment	:	1" Teflon Bailer			
Filtering Equipment:		NA			
	Equipment	Calibration			
EQUIPMENT MODEL			ATED TEMP PH	pH	
Orion pH Meter	6431	12/2/92		STD S	
Cole-Parmer Cond.	890607	12/2/92	6.99	4.0	
				7.0 4.	
Equipment Decont Alconox wash, DI rinse			(°C)	1000 999	
FIELD PARAMETERS	2				
Water Sample Tem	р. (°С):	<u>21.6</u> Sa	mple Depth (Feet):		
Air Temperature ('I	F):	<u>~60* ini</u>	itial Depth to Water (Feet):	45.31	
pH:		7.32 Re	eference Point:	- <u></u>	
Conductance (umh	iós/cm):	<u>0.311</u> Co	onductance corrected to 25'C (Y/N):		
SAMPLE PACKAGIN	G				
		Fitered			
Container(s) Type a	ind Volume		reservatives Param		
500 ml Amber Glass			CI 4°C TPH (high boil		
2 x 40 ml VOAs			DI 4°C BTEX I	by 8020	
<u></u>	·				
<u> </u>					
			· · · · · · · · · · · · · · · · · · ·		
		1 1			

N

Project Name: Project Number:	Enron 301573.001.03				Sample	Number:	<u>MW-4-A</u>	
PURGING INFORMATIC	<u>N</u>							
Casing I.D. (a)(in.)	4		Unit Ca	asing Volur	ne (b):	0.65	(Gal/Ln. Ft.))
Depth of Well (c):(Ft.)	53.53		Depth	to Water (d): (Ft):	45.31		
Length of Static Water	Column in Casing	g (e)=(c)-(d):		53.53	_ (-)	45.31	(=)	8.22
Casing Water Volume (f)=(b)x(e):	8.22	(x)	0.65	(=)	5.3	_(Gal)	
Casing Volumes:	3	(x) (f) =	16	(Gai)				
Volume Purged (Gallon)	Time	20,000 Scale Conducta (umhos/c	nce	Temp. (°C)		er Descriptio urbidity, Odo		ha
3	1333	0.271		18.9	Cloudy, fue		<u></u>	7.31
6	1336	0.336		19.3	Cloudy, fue			7.27
9	1340	0.277		18.4	Cloudy, fue	l odor, sheen		7.3
12	1343	0.301		18.7	Cloudy, fue	l odor, sheen		7.31
15	1346	0.311		18.7	Slightly clou	udy, fuel odor		7.31
16	1349	0.309		18.6	Slightly clou	udy, fuel odor		7.29
18.0	1400	0.311		21.6				7.32

Total Volume Purged: 18.0 (gal) Time: 1400 Purged Dry (Y/N):

CASING VOLUME

Casing I.D.	Unit Casing Volume				
(in.)	(Gal/Lin.Fl.)	(L/L(n.Ft.)			
1.0	0.04	0.15			
1.5	0.09	0.34			
2.0	0.16	0.61			
2.2	0.20	0.76			
3.0	0.37	1.4			
4.0	0.65	2.5			
4.3	0.75	2.8			
5.0	1.0	3.8			
6.0	1.5	5.7			
7.0	2.0	7.6			
8.0	2.6	9.8			

Additional Remarks:

Page 1of 2

GROUND WATER SAMPLE COLLECTION LOG

Project Name:	Enron		Sample N	lumber:		MW-5
Project No.:	301573.001.03		Sample L	ocation or We	II I.D.	<u>MW-5</u>
Request-for-Analysis Co	ntrol No.:	417772	(attach map if necessary)			
Chain-of-Custody Contro	ol No.:	417772	Date and	Time Collecter	d:	0935
						12/2/92
			Sample C	Collected By:	Boyd	
Weather:						
EQUIPMENT						
Purge Method/Equipmer	nt:	3" PVC Bailer				
Sampling Equipment:		1" Teflon Bailer				
Filtering Equipment:		NA				
	Equipment Ca	libration				
EQUIPMENT MODEL	SERIAL NO.		ALIBRATED	TEMP	pH	pH
Orion pH Meter	6431	12/2/92		(°C)	ST	D STD
Cole-Parmer Cond.	890607	12/2/92			6.99	4.0
	 				7.	0 4.0
	<u> </u>					
Equipment Decontam Alconox wash, DI rinse	ination:			CONDUCT TEMP (C)	IVITY (micro STAN REAL 100 99	DARD DING 0
FIELD PARAMETERS	•••	10 F				
Water Sample Temp. (Air Temperature ('F):	·C):	<u>18.5</u> ~45*	Sample Depth (Feet):			45.95
pH:		7.16	Initial Depth to Water Reference Point:	(reet):		45.95
Conductance (umhos/	cm).	1.506	Conductance correct	ad to 25°C (V/N	N •	
SAMPLE PACKAGING	ciiij.	1.500		BU 10 23 C (1/14	· / ·	

Container(s) Type and	Volume	Filtered (Y/N)	Preservatives		Parameter	\$
500 ml Amber Glass	<u></u>	N	HCI 4°C	ТРН	(high boilers)	
2 x 40 ml VOAs		N	HCI 4°C		BTEX by 8	
· · · · · · · · · · · · · · · · · · ·			·····			

Page 2 of 2

Project Name: Enron Sample Number: **MW-5 Project Number:** 301573.001.03 **PURGING INFORMATION** Casing I.D. (a)(in.) Unit Casing Volume (b): 0.65 (Gal/Ln. Ft.) 4 Depth of Well (c):(Ft.) 55.94 Depth to Water (d): (Ft): 45.95 Length of Static Water Column in Casing (e)=(c)-(d): 55.94 45.95 9.99 (-) (=) Casing Water Volume (f)=(b)x(e): 9.99 6.50 (Gal) 0.65 (X) (=) **Casing Volumes:** 3 (x)(f) =19.5 (Gal) 2,000 Scale Volume Purged Water Description Conductance Temp. (Gallon) (umhos/cm) (°C) (Color, Turbidity, Odor, Oil) Time pH 7.07 3 0913 1.403 18.7 Cloudy, no odor 6 0916 1.426 18.4 Cloudy, no odor 7.09 9 1.446 18.5 7.11 0920 Cloudy, no odor 7.14 12 0923 1.311 18.4 Clear, no odor 7.13 15 0927 1.322 18.6 18 7.14 1.330 19.0 0931 19.5 0933 1.328 18.9 7.13 7.16 21 0945 1.506 18.5

Total Volume Purged:

Time:

0945

21.0

(gal)

Purged Dry (Y/N):

N

CASING VOLUME

Casing I.D.	Unit Casing	Volume
(in.)	(Gal/Lin.Ft.)	(L/Lin.Fl.)
1.0	0.04	0.15
1.5	0.09	0.34
2.0	0.16	0.61
2.2	0.20	0.76
3.0	0.37	1.4
4.0	0.65	2.5
4.3	0.75	2.8
5.0	1.0	3.8
6.0	1.5	5.7
7.0	2.0	7.6
8.0	2.6	9.8

Additional Remarks:

Page 1of 2

GROUND WATER SAMPLE COLLECTION LOG

Project Name:	Enron		Sample Nu	mber:	<u>MW-6</u>	
Project No.:	301573.001.0	03	Sample Lo	cation or Well I.D.	<u>MW-6</u>	
Request-for-Analysis	s Control No.:	417772	(attach m			
Chain-of-Custody Co	ontrol No.:	417772	Date and T	Date and Time Collected:		
					12/2/92	
Weather:		. <u></u>	Sample Co	llected By: Boyd		
EQUIPMENT						
Purge Method/Equip	ment:	3" PVC Bailer				
Sampling Equipmen	t:	1" Teflon Bailer				
Filtering Equipment:		NA				
	Equipment (Calibration	······································			
EQUIPMENT MODEL			ALIBRATED	TEMP pH	pH	
Orion pH Meter	6431	12/2/92			STD STD	
Cole-Parmer Cond.	890607	12/2/92		6.99	4.0	
					7.0 4.0	
Other Calibration (e.	a. D.O., eH):					
Equipment Decon	amination			(°C) RE	cromhos/cm) NDARD ADING 000 999	
Alconox wash, DI rins				L	<u> </u>	
FIELD PARAMETERS Water Sample Ten Air Temperature (*	np. (*C):	<u> </u>	Sample Depth (Feet): Initial Depth to Water (F	Feet).	46.21	
pH:	• /•	7.34	Reference Point:	66().		
Conductance (um)	os/cm).	1.265	Conductance corrected	to 25°C (Y/N):		
SAMPLE PACKAGIN	·					
Container(s) Type (and Volume	Filtered (Y/N)	Preservatives	Paramet	ers	
500 ml Amber Glass		N	HCI 4°C	TPH (high boile		
2 x 40 ml VOAs		N	HCI 4°C	BTEX by	8020	

Page 2 of 2

Project Name: Enron Sample Number: MW-6 **Project Number:** 301573.001.03 **PURGING INFORMATION** Unit Casing Volume (b): Casing I.D. (a)(in.) 4 0.65 (Gal/Ln. Ft.) Depth of Well (c):(Ft.) 54.41 Depth to Water (d): (Ft): 46.21 Length of Static Water Column in Casing (e)=(c)-(d): 46.21 54.41 8.2 (-) (=) Casing Water Volume (f)=(b)x(e): 5.33 (Gal) 0.65 (X) 8.2 (=) **Casing Volumes:** 3 (Gal) (x)(f) = 162,000 Scale Volume Purged Water Description Conductance Temp. (Gallon) Time (umhos/cm) (°C) (Color, Turbidity, Odor, Oil) pН 3 1030 1.445 18.2 Muddy, slight odor 7.12 6 18.2 7.24 1037 1.413 Muddy, slight odor 7.26 9 1040 1.343 18.6 Cloudy, It. brown 12 1043 1.345 18.4 Cloudy, It. brown 7.35 7.31 15 1046 1.301 18.5 16 7.32 1047 16.9 1.310 7.34 18 1105 1.265 18.7

Total Volume Purged: 18.0 (gal) Time: 1105 Purged Dry (Y/N): N

CASING VOLUME

Casing I.D.	Unit Casing Volume					
(in,)	(Gal/Lin.Ft.)	(L/Lin.Fi.)				
1.0	0.04	0.15				
1.5	0.09	0.34				
2.0	0.16	0.61				
2.2	0.20	0.76				
3.0	0.37	1.4				
4.0	0.65	2.5				
4.3	0.75	2.8				
5.0	1.0	3.8				
6.0	1.5	5.7				
7.0	2.0	7.6				
8.0	2.6	9.8				

Additional Remarks:



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91A-9-91

APPENDIX F

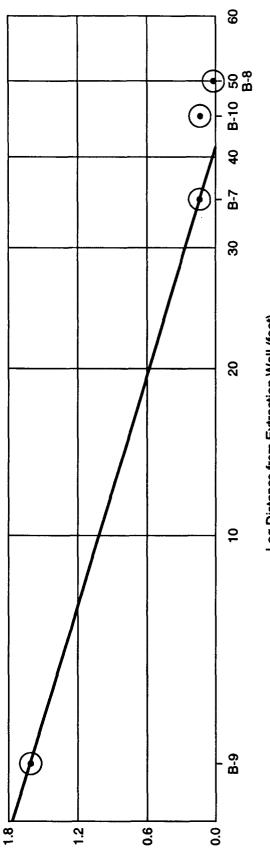
VAPOR EXTRACTION SYSTEM PILOT TEST FIELD DATA AND ANALYSIS CALCULATIONS

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											0	0	MW-6	



Average Vacuum for 7 Hr. Test (inches of water)

301573.001.06/zc A7

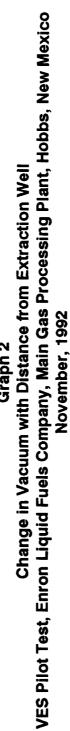


Extraction rate = 53.1 CFM at VEW-2.

Soil vapor probes positioned 15 to 16 feet below ground surface. (•) = Vacuum reading from indicated soil probe.

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VES Pilot Test, Enron Liquid Fuels Company, Main Gas Processing Plant, Hobbs, New Mexico Change in Vacuum with Distance from Extraction Well November, 1992 Graph 1



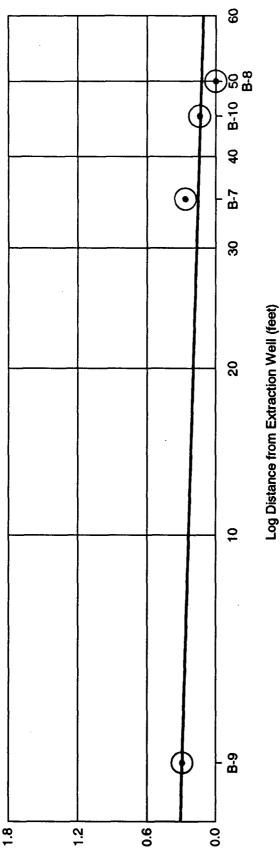
Graph 2

Soil vapor probes positioned 27 to 32 feet below ground surface.

Extraction rate = 53.1 CFM at VEW-2.

Vacuum reading from indicated soil probe.

6-8



Average Vacuum for 7 Hr. Test (inches of water)

301573.001.05/zc A10

VES Pilot Test, Enron Liquid Fuels Company, Main Gas Processing Plant, Hobbs, New Mexico Change in Vacuum with Distance from Extraction Well November, 1992 I

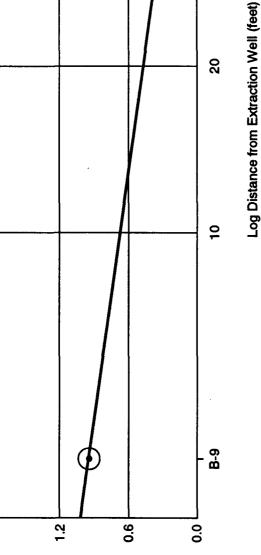
Graph 3

6-В

 (\bullet) = Vacuum reading from indicated soil probe.

Soil vapor probes positioned 9 to 10 feet below ground surface.

Extraction rate = 87.3 CFM at VEW-1.



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В 50 8

B-10

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Average Vacuum for Σ Hr. Test (inches of water)

6.

301573.001.05/zc A9

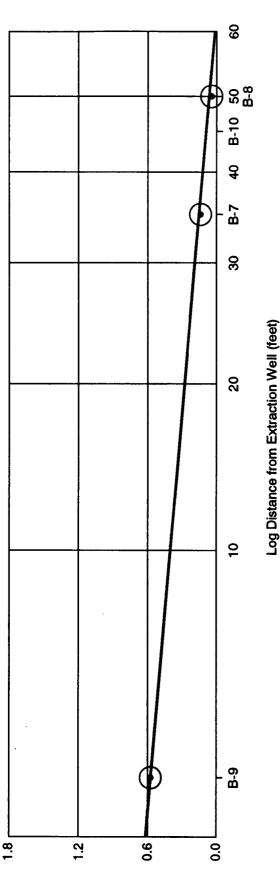
VES Pilot Test, Enron Liquid Fuels Company, Main Gas Processing Plant, Hobbs, New Mexico Change in Vacuum with Distance from Extraction Well November, 1992 Graph 4



Soil vapor probes positioned 15 to 16 feet

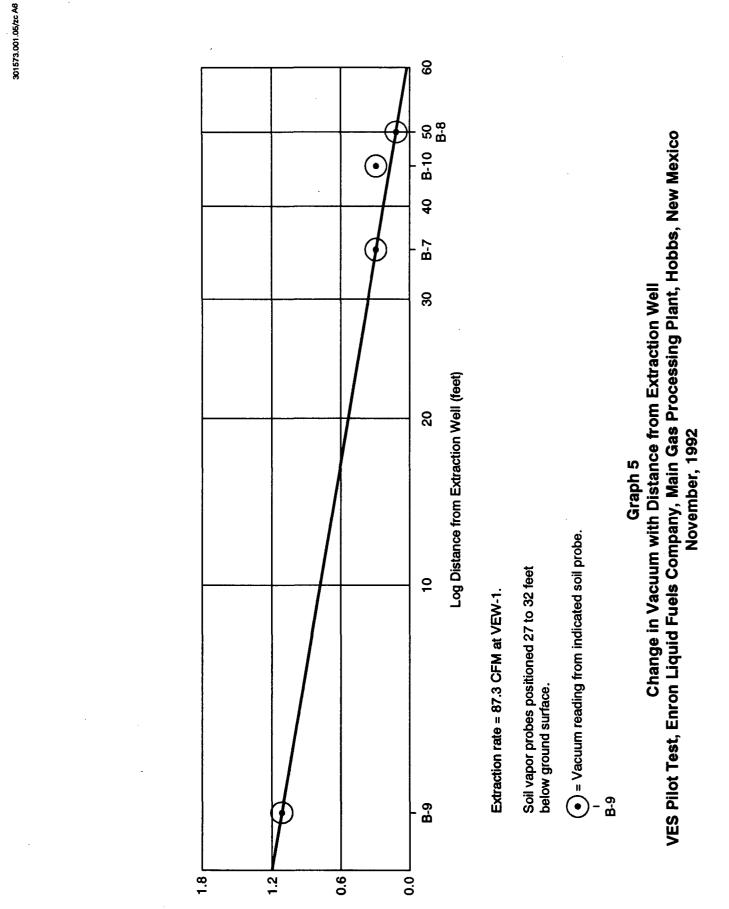
below ground surface.

Extraction rate = 87.3 CFM at VEW-1.



Average Vacuum for 7 Hr. Test (inches of water)

301573.001.06/zc A8



Average Vacuum for 7 Hr. Test (inches of water)

-

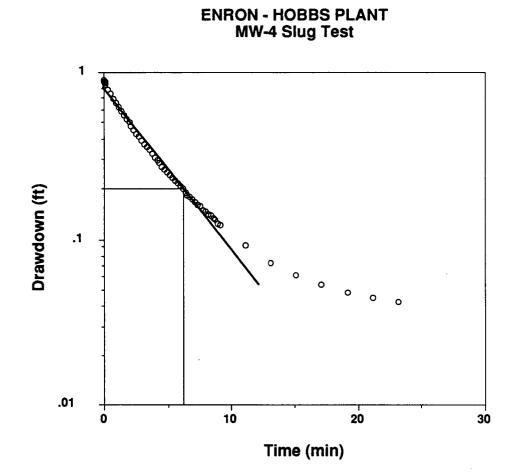
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APPENDIX G

APPENDIX G AQUIFER SLUG TEST DATA AND ANALYSIS CALCULATIONS

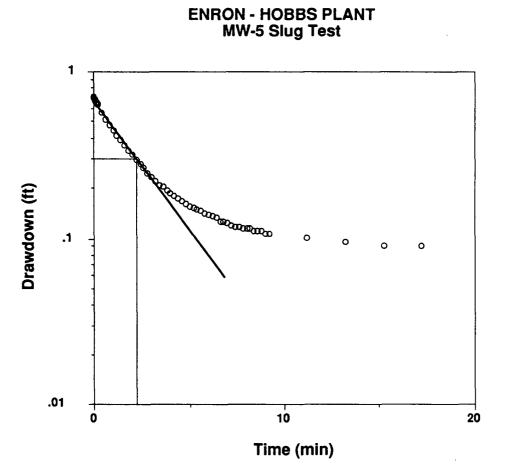
ENRON - HOBBS PLANT MW-4 Slug Test

INITIAL DRAWDOWN/BUILDUP, Y0 (ft)	0.9
DRAWDOWN/BUILDUP AT TIME T, YT (ft)	0.2
TIME, T (min)	6.15
SCREEN LENGTH, L (ft)	7.824
ESTIMATED INITIAL SATURATED THICKNESS, D (ft)	300
DISTANCE FROM BOTTOM OF SCREEN TO WATER TABLE, H (ft)	7.824
WELL RADIUS (INCLUDING GRAVEL PACK), RW (ft)	0.3333
CASING RADIUS, RC (ft)	0.1667
GRAVEL PACK POROSITY (0 IF SIMILAR TO FORMATION), N	0.35
NEW RC BASED ON GRAVEL PACK POROSITY (ft)	0.23862919
COEFFICIENT A	2.2
COEFFICIENT B	0.4
LN((D-H)/RW)	6.77606865
IF LN((D-H)/RW)>6 THEN SET IT EQUAL TO 6 HERE OTHERWISE COPY IT	6
LN(RE/RW)	2.79592044
ESTIMATE OF HYDRAULIC CONDUCTIVITY, K (ft/min)	0.00248833
ESTIMATE OF HYDRAULIC CONDUCTIVITY, K (ft/day)	3.58319682



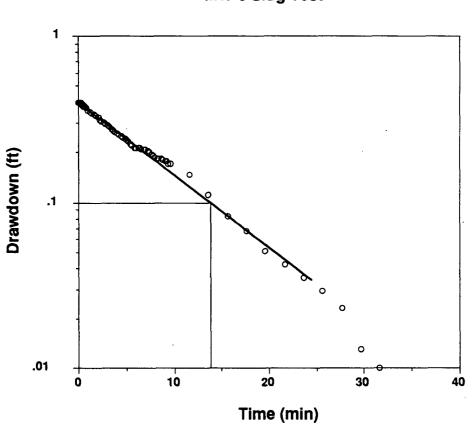
ENRON - HOBBS PLANT MW-5 Slug Test

INITIAL DRAWDOWN/BUILDUP, Y0 (ft)	0.7
DRAWDOWN/BUILDUP AT TIME T, YT (ft)	0.3
TIME, T (min)	2.2
SCREEN LENGTH, L (ft)	8.146
ESTIMATED INITIAL SATURATED THICKNESS, D (ft)	300
DISTANCE FROM BOTTOM OF SCREEN TO WATER TABLE, H (ft)	8.146
WELL RADIUS (INCLUDING GRAVEL PACK), RW (ft)	0.3333
CASING RADIUS, RC (ft)	0.1667
GRAVEL PACK POROSITY (0 IF SIMILAR TO FORMATION), N	0.35
NEW RC BASED ON GRAVEL PACK POROSITY (ft)	0.23862919
COEFFICIENT A	2.2
COEFFICIENT B	0.4
LN((D-H)/RW)	6.77496597
IF LN((D-H)/RW)>6 THEN SET IT EQUAL TO 6 HERE OTHERWISE COPY IT	
IF LIV((D-H)/RW)>0 THEIN SETTI EQUAL TO 6 HERE OTHERWISE COFT IT	6
LN(RE/RW)	2.85781241
ESTIMATE OF HYDRAULIC CONDUCTIVITY, K (ft/min)	0.00384698
ESTIMATE OF HYDRAULIC CONDUCTIVITY, K (ft/day)	5.53965054



ENRON - HOBBS PLANT MW-6 Slug Test

INITIAL DRAWDOWN/BUILDUP, Y0 (ft)	0.4
DRAWDOWN/BUILDUP AT TIME T, YT (ft)	0.1
TIME, T (min)	14
SCREEN LENGTH, L (ft)	6.934
ESTIMATED INITIAL SATURATED THICKNESS, D (ft)	300
DISTANCE FROM BOTTOM OF SCREEN TO WATER TABLE, H (ft)	6.934
WELL RADIUS (INCLUDING GRAVEL PACK), RW (ft)	0.3333
CASING RADIUS, RC (ft)	0.1667
GRAVEL PACK POROSITY (0 IF SIMILAR TO FORMATION), N	0.35
NEW RC BASED ON GRAVEL PACK POROSITY (ft)	0.23862919
COEFFICIENT A	2.15
COEFFICIENT B	0.3
LN((D-H)/RW)	6.77911013
IF LN((D-H)/RW)>6 THEN SET IT EQUAL TO 6 HERE OTHERWISE COPY IT	6
LN(RE/RW)	2.84436775
ESTIMATE OF HYDRAULIC CONDUCTIVITY, K (ft/min)	0.0011565
ESTIMATE OF HYDRAULIC CONDUCTIVITY, K (ft/day)	1.66536318



ENRON - HOBBS PLANT MW-6 Siug Test

.

APPENDIX H SOIL GEOTECHNICAL ANALYSES



ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

December 23, 1992

Steve Raugust IT Corporation 5301 Central Avenue N.E. Suite 700 Alburquerque, New Mexico 87108

ETDC Project Number: 483500.056.01 P.O. Number: 93-069 Job Number: 301573.001.06

This is the Certificate of Analysis for the following samples:

Client Project ID: Date Received by Lab: Number of Samples: Sample Type: Enron-Hobbs Plant November 2 & 3, 1992 Nine (9) Soil

I. Introduction/Case Narrative

Nine soil samples were received by IT/ETDC on November 2 and 3, 1992 for analysis of particle size distribution, moisture content, air permeability, constant head permeability, and porosity. Not all samples required all test parameters.

Please see Appendix A, the Sample Number Cross Reference List; Appendix B, the Analysis Results; and Appendix C, the Chain of Custody and Request for Analysis Records.

Reviewed and Approved:

Beverly L. Leamon Project Manager, Geotechnical Services

American Council of Independent Laboratories International Association of Environmental Testing Laboratories American Association for Laboratory Accreditation

681-11-91

Page 2 of 16 Steve Raugust IT Corporation December 23, 1992 Client Project ID: Enron-Hobbs Plant ETDC Project No.: 483500.056.01

IT ANALYTICAL SERVICES KINGSTON, TN (615) 482-6497

II. Analytical Results/Methodology

REFERENCES: Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, Soil and Rock; Dimension Stone; Geosynthetics. Army Corps of Engineers Laboratory Soils Testing, EM1110-2-1906.

Particle Size DistributionASTM D 422Moisture ContentASTM D 2216Permeability of Rocks by Flowing AirASTM D 4525Constant Head PermeabilityASTM D 5084PorosityEM1110-2-1906,Appendix II

III. Quality Control

Quality control checks such as duplicates and spikes (QC samples), are not normally applicable to geotechnical testing. This is due to the inability of obtaining samples with known characteristics, the heterogenous nature of the samples, and Quality Control procedures built-in to the analytical method.

QC measures to ensure accuracy and precision of test results include the following:

- 100% verification on all numerical results all raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified. Most data calculations are performed by computer programs.
- Data validation through test reasonableness summaries of all test results for individual reports are reviewed to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.
- Quality control procedures are built into most standardized geotechnical procedures. For example, many
 analyses routinely call for a re-analysis, specifying an acceptance criteria.
- Routine instrument calibration all instruments, gauges and equipment used in testing is calibrated on a routine basis. All instrument calibration follows ASTM or manufacturer guidelines.

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- Maintenance of all past calibration records records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the Quality Control Coordinators Quality/Operations files.
- Use of trained personnel for conducting tests all technicians are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented by IT.

IV. Data Qualification

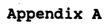
The referenced ASTM method (ASTM D 4525) was written for determination of permeability through rock core samples or wellindurated soils. Laboratory precision cannot be verified because the samples tested were composed of non-cohesive soil material.

Standard constant head permeability equipment was used with air as the permeant medium for the air permeability test. The flowing air pressure values which are given in the test data are gauge pressure readings. Barometric pressure readings were employed to determine entrance and exit pressure values which were used to calculate the coefficient of permeability values.

Specific gravities used to determine particle size/hydrometer results were assumed from specific gravities of sample material from the same location or station number, but not from the same sample numbers. Please see Particle Size/Moisture Content Analysis Results for reference.

ETDC-3113 contained sample material which was inadequate to perform a representative density measurement on. The given porosity value for ETDC-3113 was determined from measurements taken by remolding the sample material. For this reason, accuracy of the porosity value can not be related to an actual in-place field soil porosity for this sample.

A porosity value was determined on ETDC-3114 since an accurate porosity value could not be determined from ETDC-3113. Although the two samples were taken from different depths, according to the COC/RFA Record, ETDC-3114 represents material from the same location as ETDC-3113.



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CROSS-REFERENCE LIST

ETDC SAMPLE NO.

4

CLIENT SAMPLE NO.

ETDC-3097	MW-5-11.5
ETDC-3098	MW-5-16.5
ETDC-3113	.B-8-10.5
ETDC-3114	.B-8-11.0
ETDC-3115	.B-8-12.0
ETDC-3116	MW-4-45.0
ETDC-3117	MW-4-45.5
ETDC-3118	MW-4-46.0
ETDC-3119	MW-4-46.5

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Appendix B

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PARTICLE SIZE/MOISTURE CONTENT ANALYSIS RESULTS

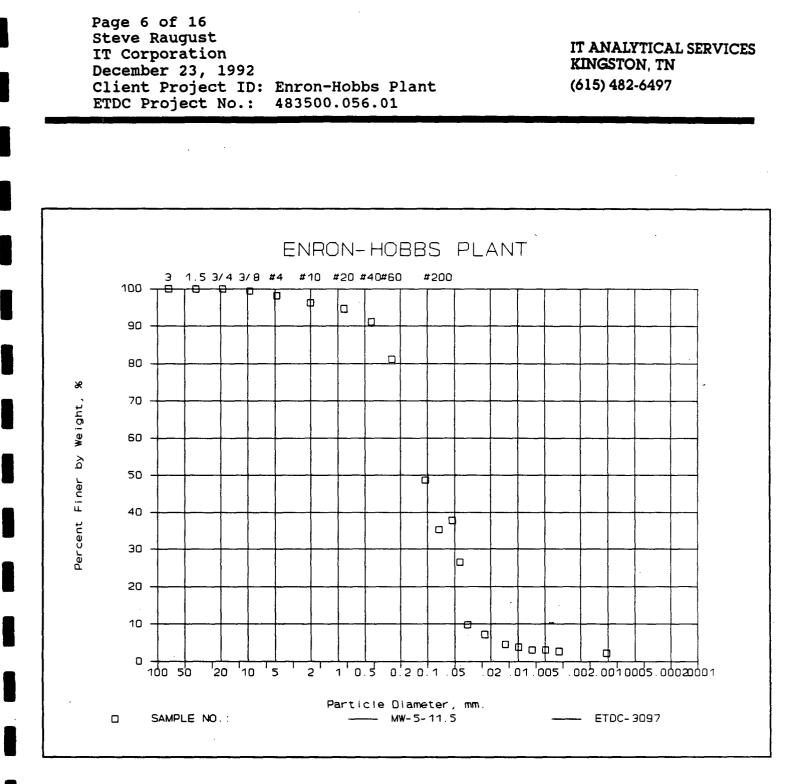
PROJECT NAME:ENRON-HOBBS PLANTUSCS SYMBOL:NOT REQUESTEDPROJECT NO.:483500.056.01WATER CONTENT, %:17.5CUST. SAMPLE NO.:MW-5-11.5LIQUID LIMIT:NOT REQUESTEDETDC SAMPLE NO.:ETDC-3097PLASTICITY INDEX:NOT REQUESTEDSPECIFIC GRAVITY:2.6703 (ASSUMED)***

SIEVE NO.	DIAMETER	PERCENT FINER
	(mm)	(%)
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
3.0 in	75.000	100.0
1.5 in	37.500	100.0
0.75 in	19.000	100.0
0.375 in	9.500	99.5
NO. 4	4.750	98.2
NO. 10	2.000	96.3
NO. 20	0.850	94.6
NO. 40	0.425	91.1
NO. 60	0.250	81.2
NO. 140	0.106	48.7
NO. 200	0.075	35.4

DIAMETER (mm)	PERCENT FINER (%)
0.0535	37.8
0.0436	26.5
0.0361	9.8
0.0233	7.2
0.0138	4.5
0.0098	3.8
0.0069	3.0
0.0049	3.0
0.0035	2.6
0.0010	2.3

*SPECIFIC GRAVITY ASSUMED FROM VALUE CALCULATED FROM TEST PERFORMED ON ETDC-3098.

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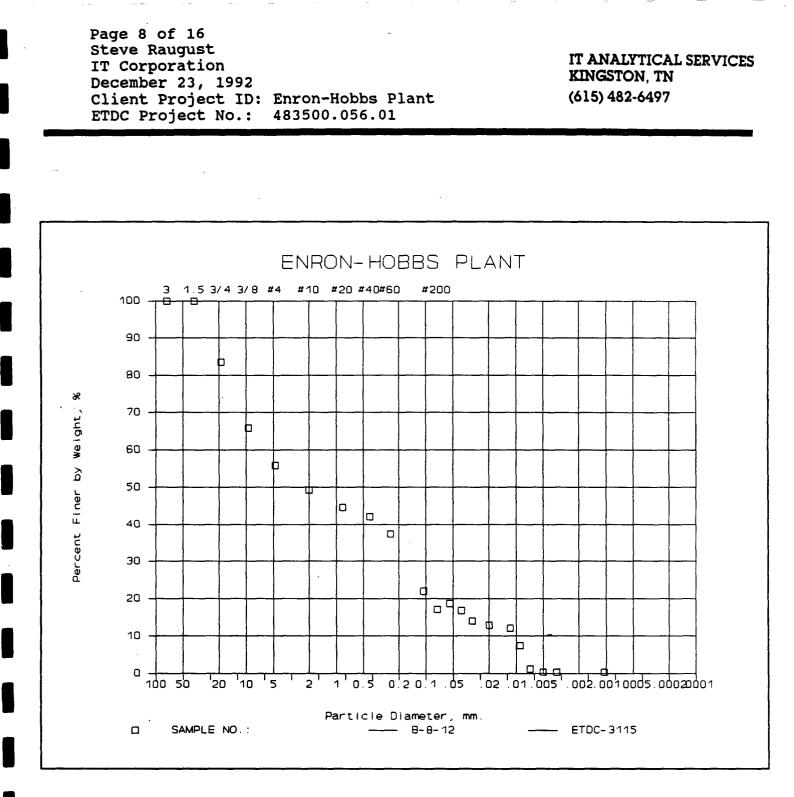
IT ANALYTICAL SERVICES KINGSTON, TN (615) 482-6497

#### PARTICLE SIZE/MOISTURE CONTENT ANALYSIS RESULTS

PROJECT NO.: CUST. SAMPLE NO.: ETDC SAMPLE NO.: SPECIFIC GRAVITY:	ETDC-3115 2.6871 (ASSUMED)*		: 12.0 NOT REQUESTED : NOT REQUESTED
_			
S	SIEVE NO.	DIAMETER (mm)	PERCENT FINER (%)
-			
3	.0 in	75.000	100.0
1	.5 in	37.500	100.0
0	).75 in	19.000	83.5
0	0.375 in	9.500	65.8
N	io. 4	4.750	55.9
N	10. 10	2.000	49.2
N	IO. 20	0.850	44.6
N	10. 40	0.425	42.1
N	IO. 60	0.250	37.4
Ň	10. 140	0.106	22.0
N	IO. 200	0.075	17.1
=	فوود و و و و و و و و و و و و و و	=HYDROMETER ANALYSIS===	
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DIAMETER	PERCENT FINER
(mm)	(%)
$\Rightarrow \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet$	
0.0545	18.7
0.0405	16.8
0.0307	14.0
0.0199	12.9
0.0116	12.1
0.0090	7.4
0.0070	1.2
0.0050	0.4
0.0035	0.4
0.0011	0.4

*SPECIFIC GRAVITY ASSUMED FROM VALUE CALCULATED FROM TEST PERFORMED ON ETDC-3114.



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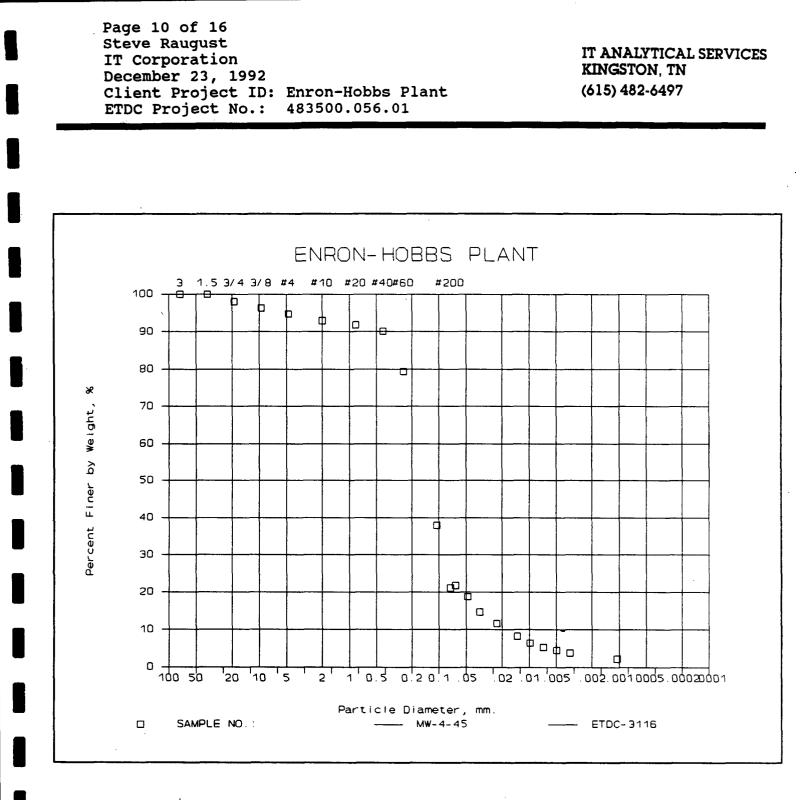
#### PARTICLE SIZE/MOISTURE CONTENT ANALYSIS RESULTS

PROJECT NAME:ENRON-HOBBS PLANTUSCS SYMBOL:NOT REQUESTEDPROJECT NO.:483500.056.01WATER CONTENT, %:16.8CUST. SAMPLE NO.:MW-4-45LIQUID LIMIT:NOT REQUESTEDETDC SAMPLE NO.:ETDC-3116PLASTICITY INDEX:NOT REQUESTEDSPECIFIC GRAVITY:2.6483 (ASSUMED)NOT REQUESTEDNOT REQUESTED

SIEVE NO.	DIAMETER (mm)	PERCENT FINER (%)
	75 000	100 0
3.0 in	75.000	100.0
1.5 in	37.500	100.0
0.75 in	19.000	98.0
0.375 in	9.500	96.3
NO. 4	4.750	94.7
NO. 10	2.000	93.0
NO. 20	0.850	91.9
NO. 40	0.425	90.1
NO. 60	0.250	79.4
NO. 140	0.106	38.0
NO. 200	0.075	21.1

DIAMETER (mm)	PERCENT FINER (%)
	******
0.0657	21.8
0.0480	18.8
0.0352	14.6
0.0229	11.6
0.0136	8.3
0.0097	6.4
0.0069	5.3
0.0049	4.5
0.0035	3.8
0.0011	2.3

*SPECIFIC GRAVITY ASSUMED FROM VALUE CALCULATED FROM TEST PERFORMED ON ETDC-3118.



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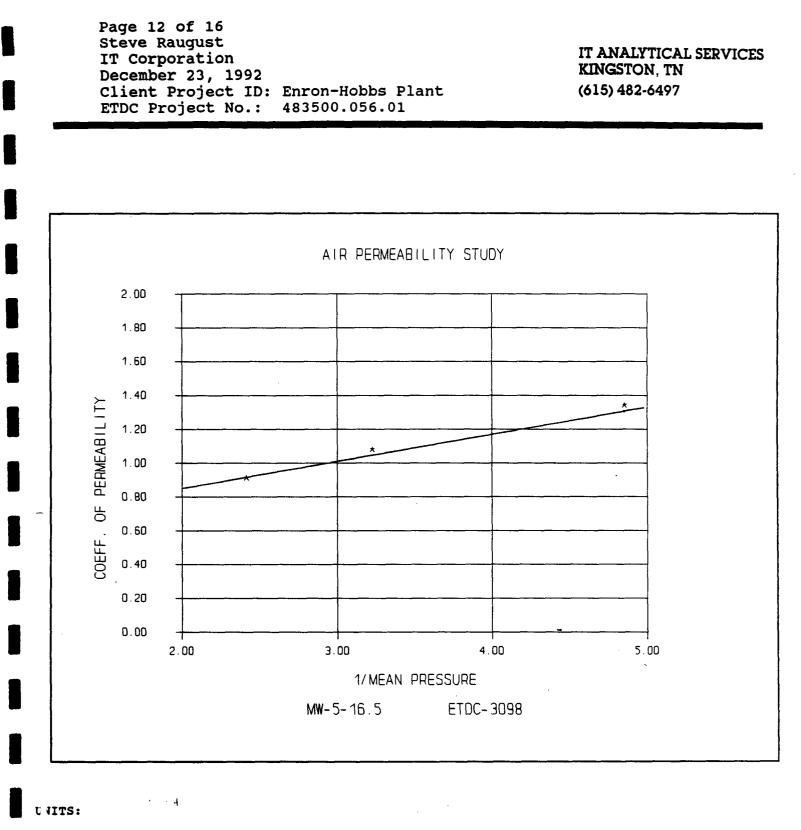
#### AIR PERMEABILITY ANALYSIS RESULTS

PROJECT NAME:	Enron-Hobbs Plant	SAMPLE LENGTH:	4.30 in.
PROJECT NUMBER:	483500.056.01	SAMPLE DIAMETER:	2.42 in.
CUSTOMER NUMBER:	MW-5-11.5		
ETDC SAMPLE NUMBER:	ETDC-3098		

EQUATION OF LINE: y = 1.7 E - 8(x) + 4.9 E - 14

FLOWING PRESSURE (psi)	AVG. RECIPROCAL OF MEAN PRESSURE (pa ⁻¹ )*	AVG. FLOW - QE (m ³ /sec)	AVG. COEFF. OF PERMEABILITY (m ² )
90.0	2.42 E-6	3.37 E-4	0.90 E-13
60.0	3.23 E-6	2.01 E-4	1.07 E-13
30.0	4.86 E-6	0.82 E-4	1.33 E-13

*Pascals⁻¹



FIRMEABILITY: E-13 M² 1'MEAN PRESSURE: E-6 PA⁻¹

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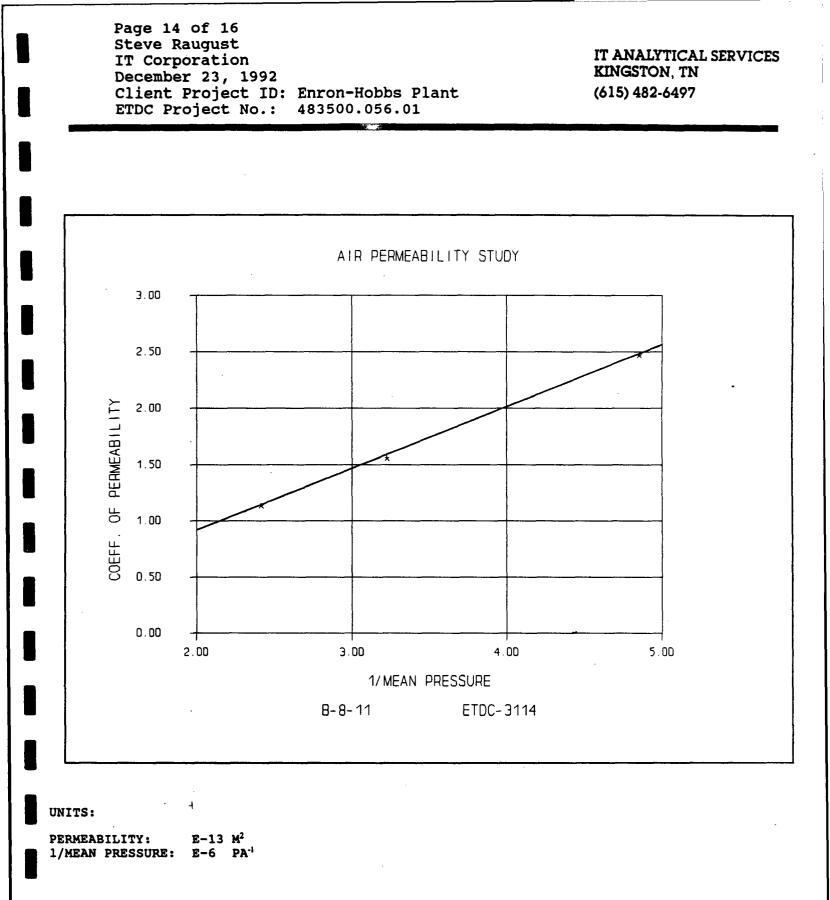
#### AIR PERMEABILITY ANALYSIS RESULTS

PROJECT NAME:Enron-Hobbs PlantSAMPLE LENGTH:2.78 in.PROJECT NUMBER:483500.056.01SAMPLE DIAMETER:2.38 in.CUSTOMER NUMBER:B-8-11ETDC SAMPLE NUMBER:ETDC-3114

EQUATION OF LINE: y = 5.5 E - 8(x) - 2.1 E - 14

	FLOWING PRESSURE (psi)	AVG. RECIPROCAL OF MEAN PRESSURE (pa ⁻¹ )*	AVG. FLOW - QE (m ³ /sec)	AVG. COEFF. OF PERMEABILITY (m ² )
	90.0	2.42 E-6	6.26 E-4	1.12 E-13
	60.0	3.23 E-6	4.29 E-4	1.54 E-13
' [	30.0	4.86 E-6	2.26 E-4	2.45 E-13

*Pascals⁻¹



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#### CONSTANT HEAD PERMEABILITY ANALYSIS RESULTS

CLIENT NUMBER	ETDC SAMPLE NUMBER	PERMEABILITY (cm/sec)
MW-4-45.5	ETDC-3117	3.2 E-5

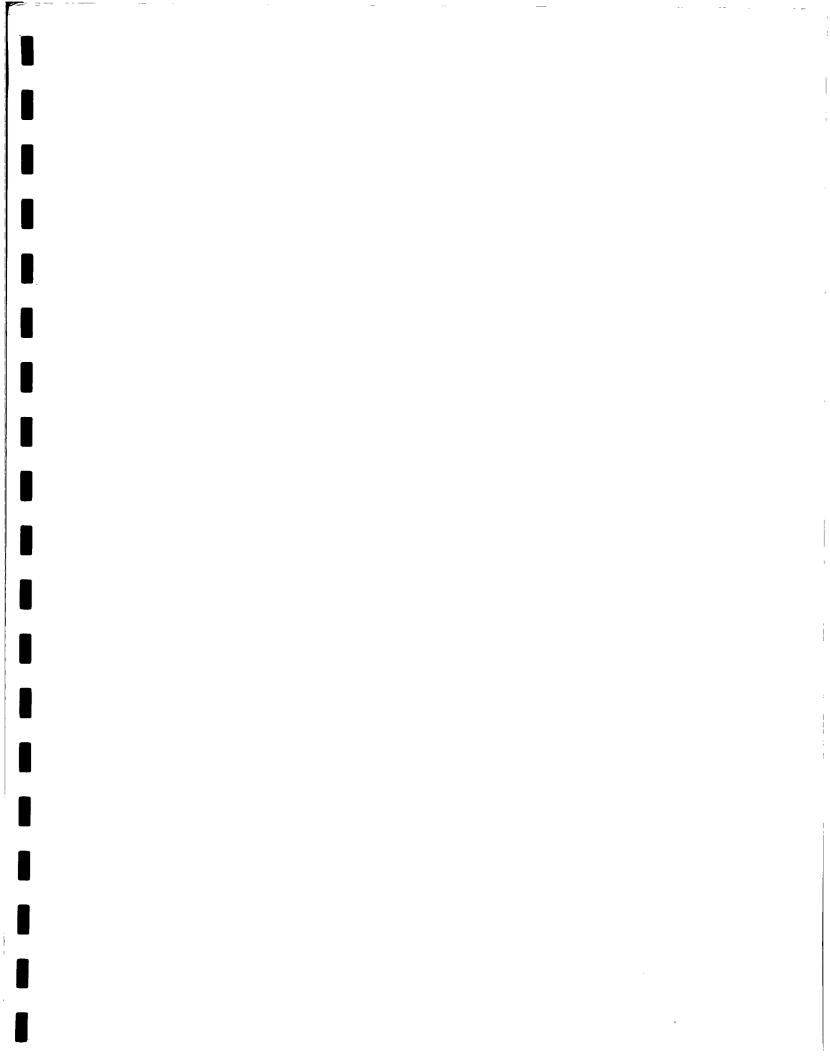
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#### POROSITY ANALYSIS RESULTS

CLIENT NUMBER	ETDC SAMPLE NUMBER	POROSITY, %
MW-5-16.5	ETDC-3098	40.4
B-8-10.5	ETDC-3113	55.5
B-8-11.0	ETDC-3114	40.2
MW-4-46.0	ETDC-3118	34.9





ENVIRONMENTAL SCIENTISTS AND ENGINEERS

# SUPPLEMENTAL ENVIRONMENTAL INVESTIGATION ENRON-HOBBS NATURAL GAS PROCESSING PLANT

Prepared for ENRON Operations Corp. Houston, Texas

February 14, 1994

6020 ACADEMY NE • SUITE 100 • ALBUQUERQUE, NM 87109 • (505) 822-9400



ENVIRONMENTAL SCIENTISTS AND ENGINEERS

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#### **EXECUTIVE SUMMARY**

Daniel B. Stephens & Associates, Inc. was retained by ENRON Corporation to conduct a supplemental environmental investigation of soils and ground water at the ENRON-Hobbs Natural Gas Processing Plant, located in southeastern New Mexico. This environmental investigation supplements the previous investigations performed by IT Corporation in 1993 and Metric Corporation in 1991. The objective of this investigation was to characterize the distribution of volatile organic compounds in subsurface soils and ground water near the oil/water separator. A total of 19 borings were advanced to determine the areal extent of soil and ground-water contamination. Of these borings, 7 were used to determine the extent of impacted soils, 11 were drilled to delineate the extent of ground-water impacts, and 1 was used to determine the background-water quality.

Soils containing detectable concentrations of petroleum hydrocarbons are limited to a circular area with a radius of approximately 100 feet. Near the source area, soils are vertically impacted from approximately the land surface to the ground-water table, which is roughly 45 feet below land surface. The vertical extent of the remaining impacted soils varies from approximately 5 to 15 feet in thickness away from the source areas and is generally contained within the upper 30 feet of the soil column.

To delineate the extent of ground-water impacts, 1 monitor well and 10 temporary wells were installed. The temporary wells identified the areal extent of petroleum hydrocarbons in ground water. The actionable extent of benzene is limited to an elliptical plume extending approximately 420 feet southeast from the vicinity of the oil/water separator.



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#### 1. INTRODUCTION

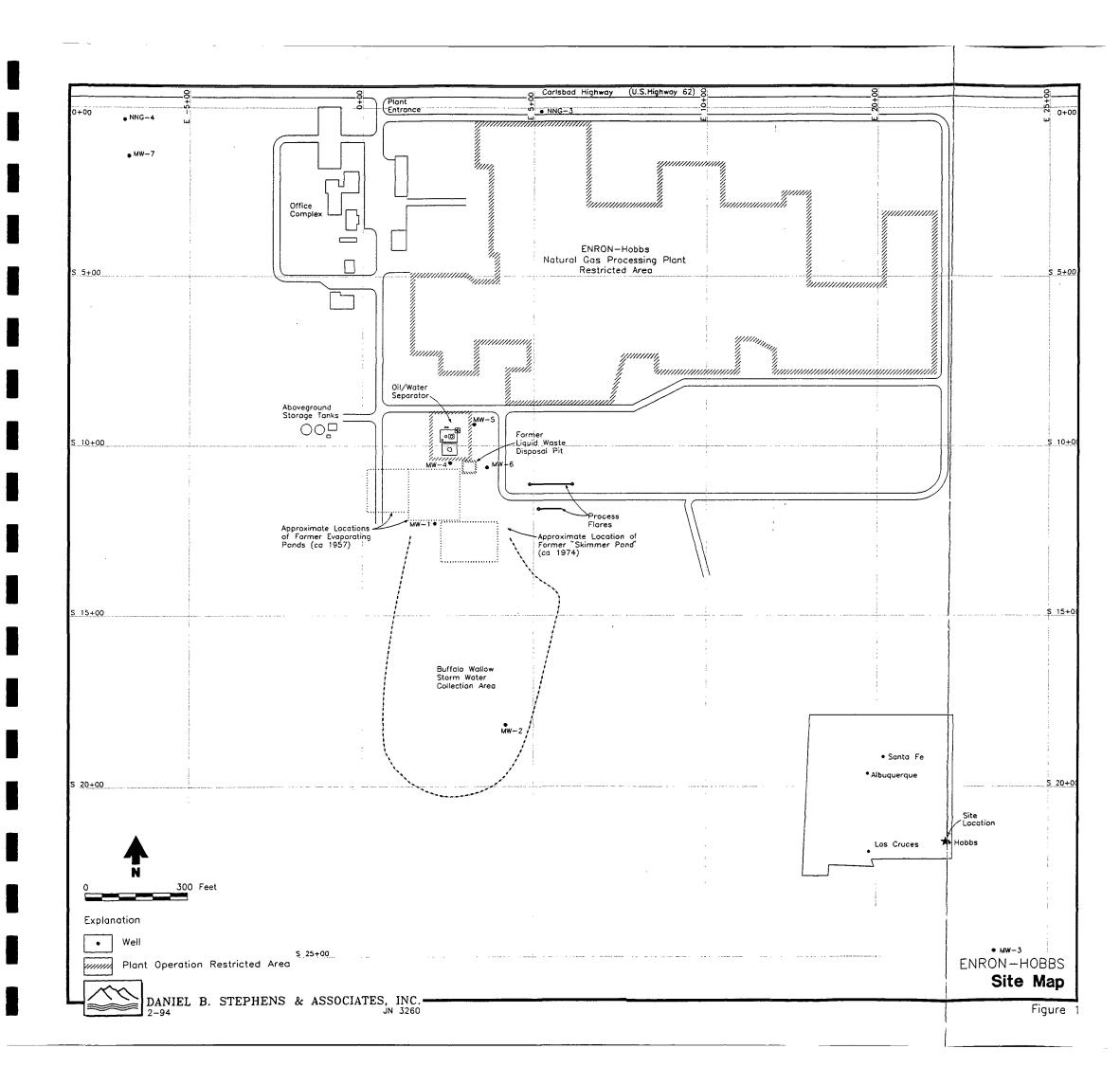
ENRON Corporation retained Daniel B. Stephens & Associates, Inc. (DBS&A) to conduct a supplemental environmental investigation (SEI) of the soils and ground water at the ENRON-Hobbs Natural Gas Processing Plant (Plant). The plant is located approximately 8 miles west of Hobbs, New Mexico along State Highway 62 (Figure 1). The objective of this investigation was to determine the subsurface distribution of volatile organic compounds (VOCs) near the oil/water separator and former liquid waste disposal pit.

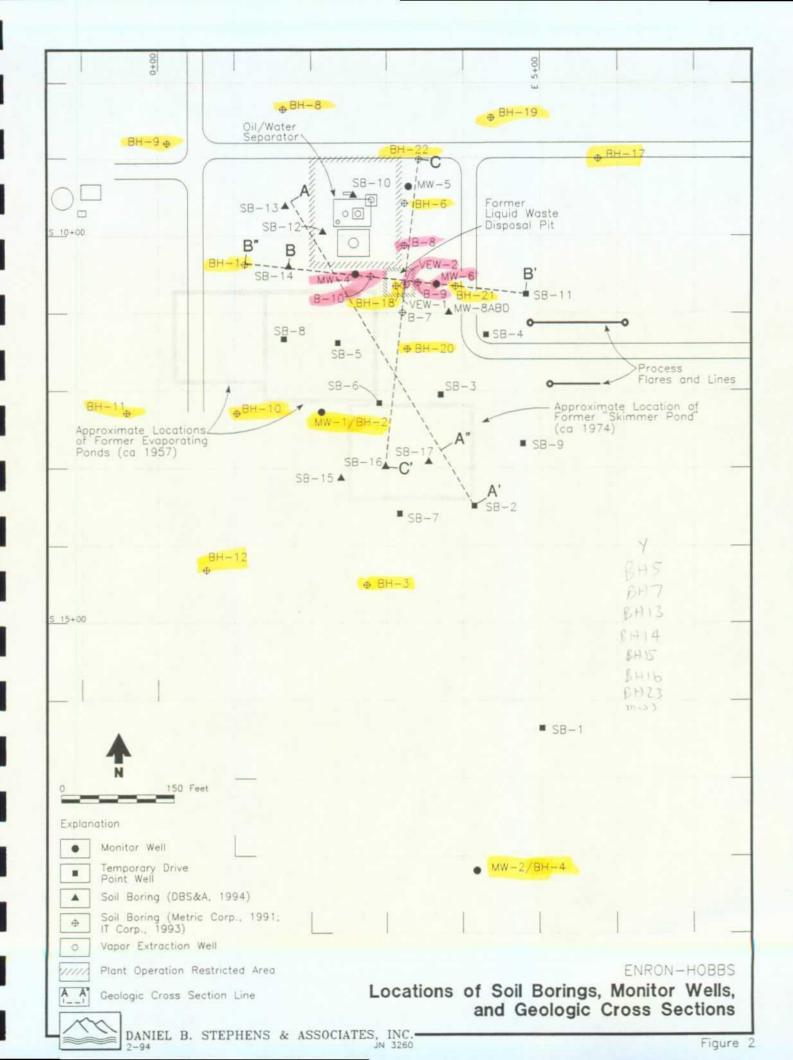
In the past, the plant waste water was discharged to the former liquid waste disposal pit depicted on the site map (Figure 1). Historical aerial photographs indicate that excess waste water was stored at two evaporation ponds next to the former liquid waste disposal pit. A "skimmer pond," directly south of the evaporation ponds was used to remove the petroleum hydrocarbons. Apparently, these operations resulted in the release of VOCs to the subsurface.

Currently, the discharged waste water is routed to the oil/water separator located near the southwestern edge of the gas processing area. The hydrocarbons separated from the waste water are contained in aboveground tanks for proper disposal while the remaining water is piped to a permitted injection well. The bermed area directly south of the oil/water separator (referred to as the Buffalo Wallow on Figure 1) continues to retain surface-water run-off from the plant.

Previous hydrogeologic investigations identified impacts to soil and ground water underlying the former waste pit and oil/water separator area (Metric Corporation, 1991; IT Corporation, 1993). As discussed in these previous investigation reports, the plant is underlain by unconsolidated and consolidated sand, silt, and clay deposits which regionally comprise the Ogallala Formation of Pliocene Age. The Ogallala Formation is the major fresh-water bearing formation in southeastern New Mexico.

The first hydrogeologic investigation was performed by Metric Corporation in 1991. Metric advanced a total of 23 borings (BH-1 through BH-23) and installed 3 monitor wells (MW-1 through MW-3) to investigate subsurface conditions throughout the Plant area. Approximately 16 of their borings were located in the area surrounding the former waste pit (Figure 2). Soil samples







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collected during drilling were analyzed for total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylene (BTEX). Regulatory standards set by the New Mexico Oil Conservation Division (OCD, 1993) for these compounds were exceeded only in BH-18, which is located at the approximate center of the former pit. Metric also analyzed soils and ground-water samples collected from monitor wells MW-1, MW-2, and MW-3 for purgeable halocarbons and the O-, F-, and M- series of the toxic characteristic leaching procedure (TCLP). For each sample, these analyses indicated that purgeable halocarbons were below detectable concentrations and that the TCLPs for organic and inorganic constituents yielded concentrations that were below regulatory standards.

In 1992 IT Corporation conducted an investigation of the area immediately surrounding the former disposal pit (IT Corporation, 1993). They found stained soils and hydrocarbon vapors in borings MW-4, MW-6, B-8, B-9, B-10, and VEW-2. TPH and BTEX results for soils and ground water indicated that the area close to the former pit contained organic concentrations above regulatory standards for soil. In addition to their drilling program, IT conducted two pilot soil vapor extraction (SVE) tests and performed hydraulic tests to determine the hydraulic properties of the upper portion of the aquifer.

Although the two previous investigations identified soil and ground-water impacts near the former pit, the extent of the actual impact remained to be defined. DBS&A conducted an SEI to determine the actionable soil and ground-water contamination resulting from prior releases within the former pit and the oil/water separator area. The DBS&A investigation included the following tasks:

- Sample five existing monitor wells and one plant supply well.
- Drill and install ten temporary drive point wells for acquisition of ground-water samples.
- Drill seven soil borings to determine the extent of impacted soils.
- Install and sample one upgradient monitor well to establish background water quality.



ENVIRONMENTAL SCIENTISTS AND ENGINEERS

• Survey the location of new borings and establish the current ground-water flow direction.

This report provides a comprehensive accounting of the subsurface hydrocarbon distributions near the oil/water separator and former pit based on all available data. Section 2 describes the site investigation and local hydrogeology, and Section 3 discusses the distribution of subsurface contaminants. Finally, Section 4 summarizes the conclusions of the SEI.



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#### 2. OIL/WATER SEPARATOR AREA INVESTIGATION

DBS&A completed the SEI of the oil/water separator area in January 1994. In order to characterize the soil and identify the area(s) of contamination, seven soil borings were advanced to approximately 40 feet below ground surface (bgs), and soil samples were collected for chemical analysis. To characterize the extent of impacted ground water, 10 temporary wells were installed in the upper portion of the aquifer, and ground-water samples were collected for chemical analysis.

The locations of all soil borings and monitor wells installed during this and previous investigations of the oil/water separator area are shown on Figure 2. The locations of each boring advanced during this investigation and all monitor wells were surveyed in reference to the plant grid by John W. West Engineering Company, Hobbs, New Mexico (Table 1).

The following sections provide a discussion of the field activities undertaken to complete this SEI. Sections 2.1 through 2.4 provide general information regarding drilling and sampling activities. The data collected during the SEI is then incorporated into a discussion of the local hydrogeologic framework in Section 2.5.

#### 2.1 Supplemental Soil Investigation

The supplemental soil investigation was undertaken to determine if the oil/water separator and former skimmer pond are actionable source areas. Drilling services were provided by Harrison Drilling Company (Harrison) and Eades Drilling Company (Eades), both of Hobbs, New Mexico, using hollow-stem auger and air rotary methods respectively. Drilling performed by Harrison using a Mobile Drill B-61 auger rig proved to be extremely slow due to the presence of well-cemented (calichified) layers at approximately 18 feet bgs. Consequently, auger drilling was terminated after attempting two soil borings (SB-10 and SB-12). The remaining five borings were drilled by Eades using a Midway-10 air rotary rig.

During drilling, soil samples were collected at 5-foot intervals by driving a split-spoon sampler into the undisturbed soil ahead of the borehole. Samples were used for lithologic descriptions and



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checked for the presence of VOCs. Appendix A contains lithologic logs produced for each soil and ground-water sampling boring advanced during the SEI. All sampling equipment was decontaminated prior to each use by washing with Liquinox[®] detergent followed by a deionized water rinse. Drilling equipment was steam-cleaned and inspected by DBS&A personnel before drilling each boring.

Soil samples were analyzed in the field for volatile organic vapors using an organic vapor meter equipped with a photoionization detector (PID). The sample yielding the highest PID reading above background measurements and/or the sample from the bottom of each boring was retained for laboratory analysis for BTEX (by EPA method 8020) and TPH ( $C_s$ - $C_{16}$  range by EPA method 8015 modified). Soil samples were placed in clean soil jars with Teflon caps, packed on ice, and delivered to Analytical Technologies, Inc. (ATI) in Albuquerque, New Mexico, for analysis. All samples delivered to ATI were accompanied by chain-of-custody forms. Field measurable vapor concentrations were not detected in several borings from the ground surface to the total drilled depth; therefore, no soil samples from these borings were sent to ATI for analysis. Table 2 provides a summary of the TPH and BTEX concentrations measured in soils sampled by DBS&A and previous investigators. Appendix B contains the ATI analytical chemistry report for the SEI.

All drill cuttings were field tested for volatile organics using the PID. Those with concentrations above the 100 ppm limits set forth in the *Unlined Surface Impoundment Closure Guidelines* (OCD, 1993) were containerized for appropriate disposal. Cuttings below the applicable regulatory guidelines were spread around the boring. Each boring was filled with a cement-bentonite slurry.

#### 2.2 Ground-Water Plume Delineation

During the plume delineation, Eades installed ten borings using a Midway-10 air-rotary drill rig. Drill cuttings were collected at 5-foot intervals for geologic descriptions (Appendix A). Additionally, as described in Section 2.1, drill duttings were field tested with a PID and were properly contained when field screening detected VOCs above the 100-ppm regulatory guideline set by OCD.

Each boring was advanced to the water table, whereupon a temporary drive point well was installed to collect a ground-water sample from the upper 3 to 5 feet of the aquifer. The locations



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of the temporary wells are shown on Figure 2. The first three borings (SB-1, SB-2, and SB-3) were drilled along a line extending directly downgradient from the former waste pit. The direction of ground-water flow was determined from depth to water measurements in monitor wells in the vicinity of the oil/water separator (Table 1). The lateral extent of organic constituents was further explored along several east-west lines.

The ground-water sampling device used to delineate subsurface impacts consisted of a 2-inchdiameter galvanized steel pipe attached to a drive point. The drive point was constructed of stainless steel wire-wrapped screen. Approximately 45 feet of 2-inch-diameter galvanized steel casing was attached to the drive point for hydraulically pushing the drive point and allowing access to the screened interval for collection of ground-water samples.

After the sampling device was installed, the drill rig moved off-hole and proceeded with decontamination prior to setting up at the next drilling location. A second drive point was used in the next boring. Each sampling device was thoroughly decontaminated using a steam cleaner prior to entry into another borehole. One field equipment blank was collected by running deionized water through the screened portion of the sampling device and collecting a sample of the run-off. The field blank was included with the other ground-water samples for BTEX and TPH analyses to verify that the sampling device was decontaminated between borings.

Prior to sample collection, each drive point was purged of at least three casing volumes to ensure that samples were representative of aquifer water. Electrical conductivity, temperature, and pH were measured every half casing volume to evaluate the effectiveness of the purging process. After purging, ground-water samples were collected by hand using dedicated, disposable polyethylene bailers. The ground-water samples were shipped to ATI in Albuquerque on Mesa Airlines and analyzed immediately for BTEX and TPH ( $C_6$ - $C_{16}$ ) by EPA methods 8020 and modified 8015 respectively. ATI provided DBS&A with facsimile copies of the analytical results within 24 hours of sample collection. The analytical results were used to determine the locations of subsequent boreholes.



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#### 2.3 Monitor Well Construction

One monitor well (MW-7) was installed in the northwest corner of the plant to serve as an indicator of background water quality (Figure 1). The monitor well was constructed using 25 feet of 2-inch 0.010-slot polyvinyl chloride (PVC) screen, 35 feet of flush-threaded 2-inch PVC blank casing, 12-20 silica sand filter pack, and a cement-bentonite grout seal from the top of the filter pack to ground surface. Additional construction details are provided in Appendix A. Following well completion, the well was developed by the surge and bail method until the field parameters (pH, temperature, and electrical conductivity) stabilized and the well yielded relatively sediment-free ground water.

#### 2.4 Sampling of Monitor Wells

Ground-water samples were collected from all monitor wells installed by previous investigators with the exception of MW-3, the newly installed upgradient monitor well (MW-7), and one upgradient water supply well (NNG-4). MW-3 is located outside the area investigated during the SEI. Samples were analyzed for BTEX (EPA method 8020) and TPH (EPA method 8015 modified). In addition, monitor wells MW-4 and MW-6 were analyzed for halogenated organic compounds and the full TPH range by EPA methods 8010 and 8015 ( $C_6$ - $C_{36}$  range) respectively. Samples for inorganic analysis were collected from MW-4, MW-7, and NNG-4 and analyzed for major ions, total dissolved solids (TDS), and the 8-RCRA metals. All samples were analyzed by ATI.

Prior to sampling, each monitor well was purged using a dedicated disposable bailer, and the water supply well was pumped for approximately 45 minutes at 16 gallons per minute to ensure that samples were representative of aquifer water. During purging, field parameters were measured and recorded every half casing volume; samples were collected after field parameters stabilized. A program of trip blanks, field equipment blanks, and sample replicates was implemented to ensure intralaboratory precision during the entire investigation. The field equipment blank was collected as described in Section 2.2.



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Tables 3 and 4 provide summaries of the analytical results from the ground-water samples collected during this SEI and during the previous two investigations (Metric Corporation, 1991; IT Corporation, 1993). Appendix B contains the ATI report with the supporting quality assurance and chain of custody documents.

#### 2.5 Local Hydrogeology

The site is underlain by unconsolidated and consolidated sand, silt, and clay deposits, which regionally comprise the Ogallala Formation. On-site, the base of the Ogallala Formation is approximately 170 feet bgs based on the available driller's logs for the site water supply wells. The depth to ground-water near the oil/water separator is approximately 44 feet bgs based on January 1994 measurements by DBS&A. Therefore, the saturated thickness of the Ogallala aquifer is approximately 125 feet at the site.

The Ogallala Formation near Hobbs, New Mexico is often capped by a layer of well hardened caliche which grades into underlying fine-grained sands (Nicholson and Clebsch, 1961). IT Corporation (1993) suggested that the strongly cemented sand units encountered at approximately 20 feet beneath the site mark the transition from alluvium into the Ogallala Formation. Nicholson and Clebsch (1961) have described the Ogallala Formation as chiefly a calcareous, unconsolidated sand that contains some clay, silt, gravel, and beds of well-consolidated sandstone.

The information gathered from the soil borings advanced by DBS&A (Appendix A) was consistent with the above lithologic description. As determined by the SEI, the lithology under the site is as follows:

• From the ground surface to a depth of approximately 15 to 25 feet bgs, a white to pale brown calcareous sandy silt with highly calcareous clayey lenses was encountered. The sandy silt grades into pink to light brown silty sand and fine sands that contain numerous strongly cemented layers of sandstone.



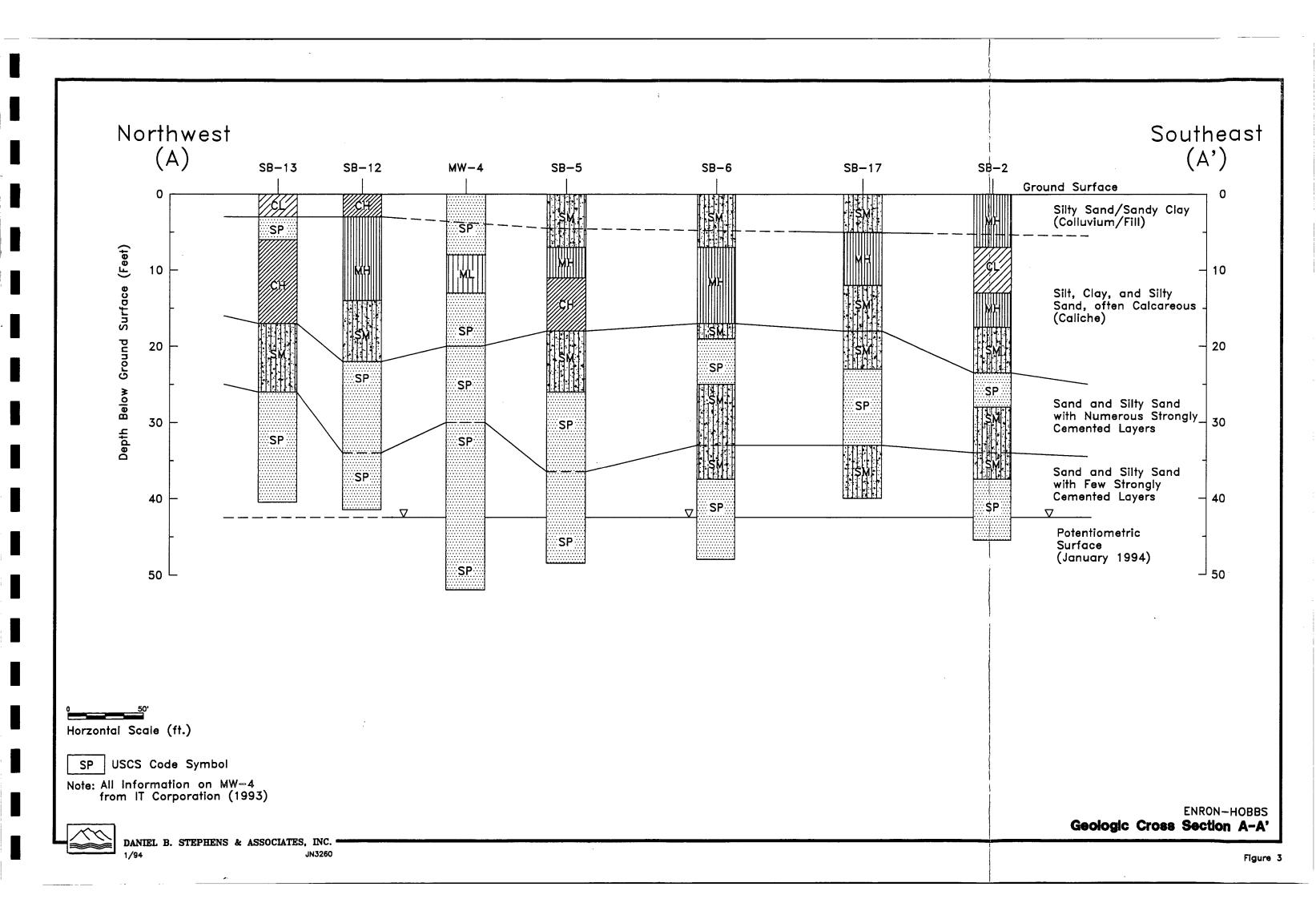
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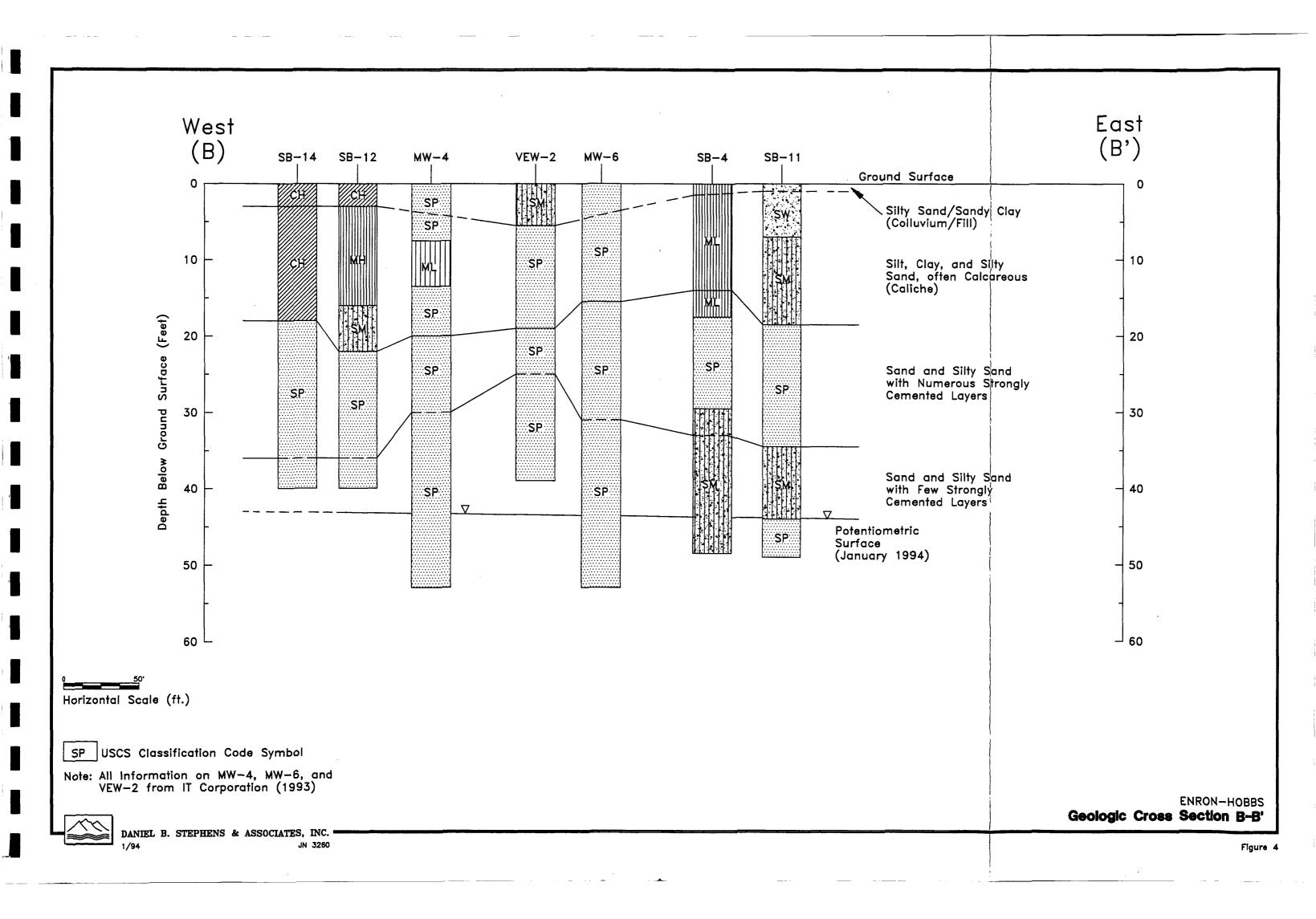
- At depths of approximately 25 to 35 feet bgs, a light brown to reddish-brown, clean, mostly unconsolidated, well-sorted sand with fewer and thinner cemented layers is present.
- From approximately 35 to 45 feet bgs, a light brown to reddish-brown, clean, unconsolidated, well-sorted sand with infrequent cemented layers is present.

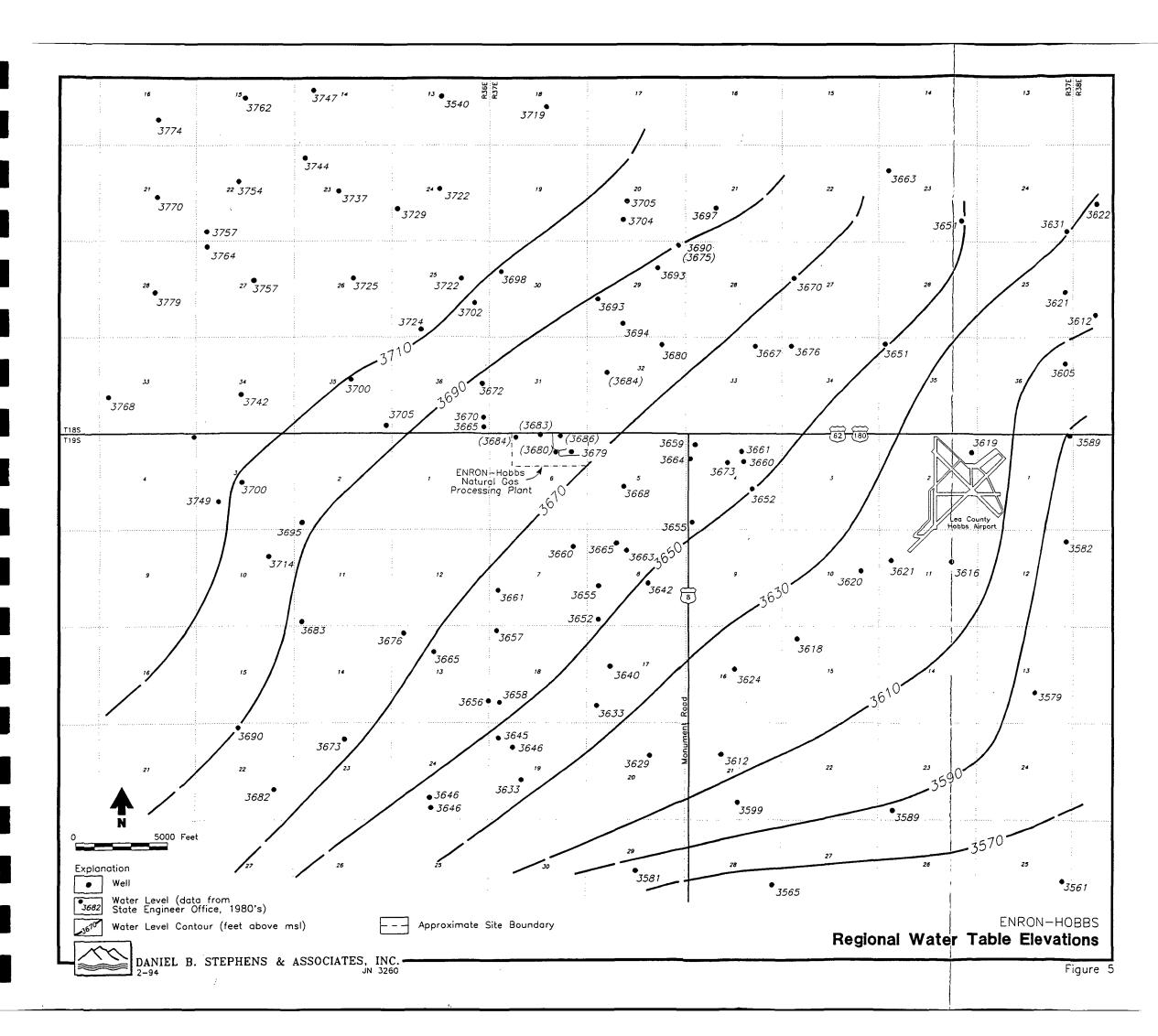
Two geologic cross sections were developed using DBS&A and IT lithologic descriptions (Figures 3 and 4); Figure 2 shows the cross section locations. The soil types found in each boring were defined using the Unified Soil Classification System (USCS), symbols for which are defined in Appendix A.

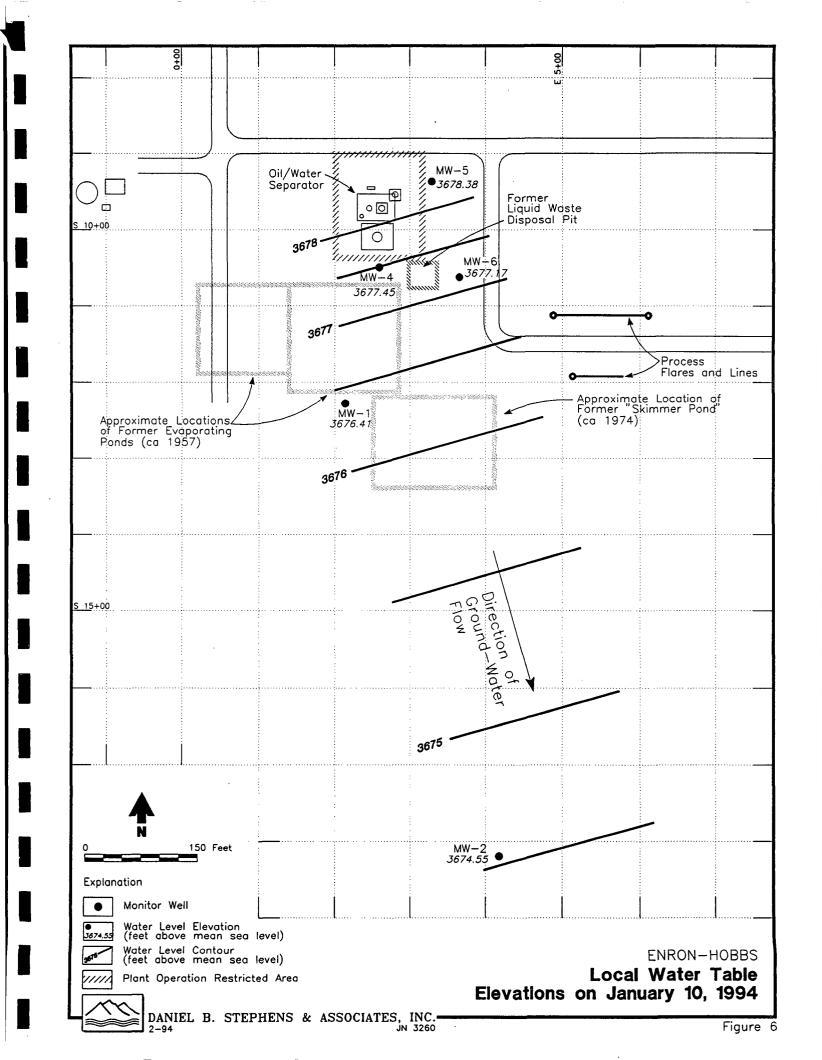
In 1989, DBS&A compiled the available water level data for wells within a 5-mile radius of the plant and determined that regional ground-water flow is toward the southeast (DBS&A, 1989). A map of regional water table elevations is provided in Figure 5. Water levels measured in the monitor wells during the SEI confirm that the ground-water flow is toward the southeast (Figure 6); however, the on-site direction of ground-water flow appears to be approximately 25 degrees south of the regional flow direction. The discrepancy in flow direction may result from the scale of the investigation area and local heterogeneities in geology that affect flow direction, and/or possibly from an insufficient number of on-site monitor wells for determination of hydraulic gradient.

The local ground-water gradient decreases in the direction of flow from approximately 0.008 ft/ft near the oil/water separator to 0.003 ft/ft beneath the Buffalo Wallow (Figure 6). The change in gradient may be the result of an increase in hydraulic conductivity. Hydraulic testing conducted by IT Corporation (1993) indicated that the upper Ogallala Aquifer is moderately permeable with hydraulic conductivity values on the order of 10⁻³ cm/sec. This value is consistent with published values for fine sands (Freeze and Cherry, 1979).











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#### 3. DISTRIBUTION OF SUBSURFACE IMPACTS

The primary contaminants of concern are the BTEX and TPH released to the subsurface near the oil/water separator. High molecular weight organic compounds such as chlorinated solvents and greater than  $C_{20}$  hydrocarbons have not been detected in the ground-water samples analyzed during the present and past investigations.

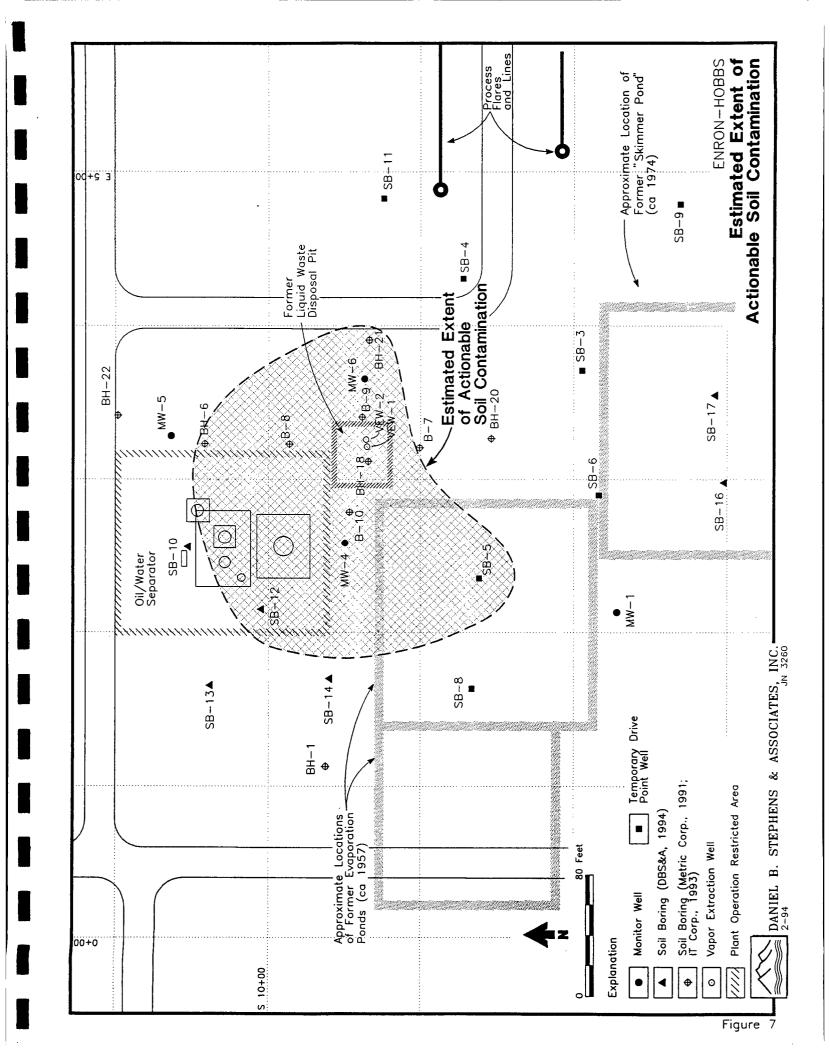
OCD has set regulatory guidelines for the actionable concentrations of TPH and BTEX compounds in soil and ground water. Actionable concentration is defined as any concentration that exceeds New Mexico Water Quality Control Commission (NMWQCC) standards and OCD guidelines. For soil, the regulatory criteria for TPH is 100 ppm and for total BTEX, 50 ppm. Field PID measurements of 100 ppm or greater can also be used to determine actionable soils (New Mexico OCD, 1993). The NMWQCC ground-water standards for BTEX are listed on Table 3. OCD has not provided guidelines for the maximum allowable concentration of TPH in ground water.

The following sections provide an accounting of the distribution of hydrocarbons in the subsurface soils and ground water. In addition, a discussion of secondary inorganic standards that are exceeded is provided.

#### 3.1 Soil Impacts

Based on the field observations and analytical chemistry results from the borings drilled during the three investigations, it appears that actionable hydrocarbon impacts are limited to a circular area centered between the current oil/water separator and the former waste pit. Based on the data obtained from borings SB-15 through SB-17, the former skimmer pond does not appear to contain any actionable hydrocarbon contamination as defined according to the above criteria for field screening. Figure 7 depicts in plan view the estimated extent of actionable soil contamination based on the OCD regulatory guideline of 100 mg/kg for TPH.

Near the former waste pit and the oil/water separator, soils are vertically impacted from approximately land surface to the ground-water table. The vertical extent of impacts in soil decreases non-uniformly as one moves away from the original hydrocarbon source area. Due





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to local heterogeneities, it appears that hydrocarbons have spread out laterally along preferential pathways. Cross-sectional profiles of actionable soils are given in Figure 8, and Figure 2 shows the locations of the cross sections. The distribution of actionable soils shown in Figure 8 is based on organic vapor meter readings and TPH concentrations in analyzed soils.

#### 3.2 Ground-Water Impacts

The estimated extent of actionable BTEX in ground water is shown in Figure 9. Benzene, which has the lowest regulatory standard (10  $\mu$ g/L) of the BTEX constituents, has been used to determine the extent of actionable ground water. Actionable benzene is limited to a plume about 200 feet wide extending from the vicinity of the oil/water separator about 420 feet to the southeast. The discrepancy between the plume orientation and the measured ground-flow direction may be a local phenomenon caused by the low hydraulic gradient. Alternatively, the orientation of the benzene plume may be controlled by the distribution of impacted soils that are releasing benzene to ground water. Benzene was also detected in the upgradient water supply well (NNG-4) but was below the regulatory action level.

The estimated extent of detectable TPH in ground water is shown in Figure 10. The TPH plume is bisected by a region defined by SB-2 and SB-3, which is free of hydrocarbons. The lack of petroleum hydrocarbons in this region may be because of the nonuniform distribution of hydrocarbons in the vadose zone and/or permeable channels in the Ogallala Formation.

The results from inorganic chemical analyses indicate that chloride and TDS in well MW-4 exceed NMWQCC standards (Table 4). The high concentration of TDS detected in MW-4 (Table 4) are attributed to elevated concentrations of chloride and bicarbonate. The elevated anion concentrations may have resulted from local recharge of waste and storm water near the oil/water separator and former evaporation ponds.

Metal concentrations in ground water appear to be below all regulatory standards set by the NMWQCC. Analysis for metals was performed on samples collected from MW-4 and MW-7. Metal concentrations in MW-4 do not appear to be elevated compared to background concentrations as represented by MW-7 (Table 4).

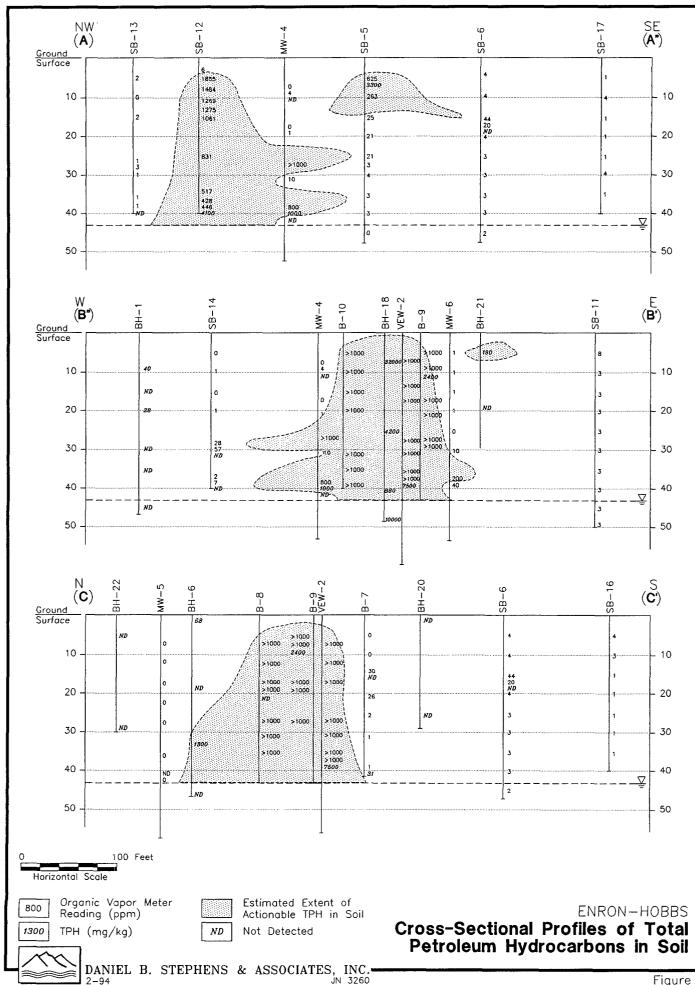
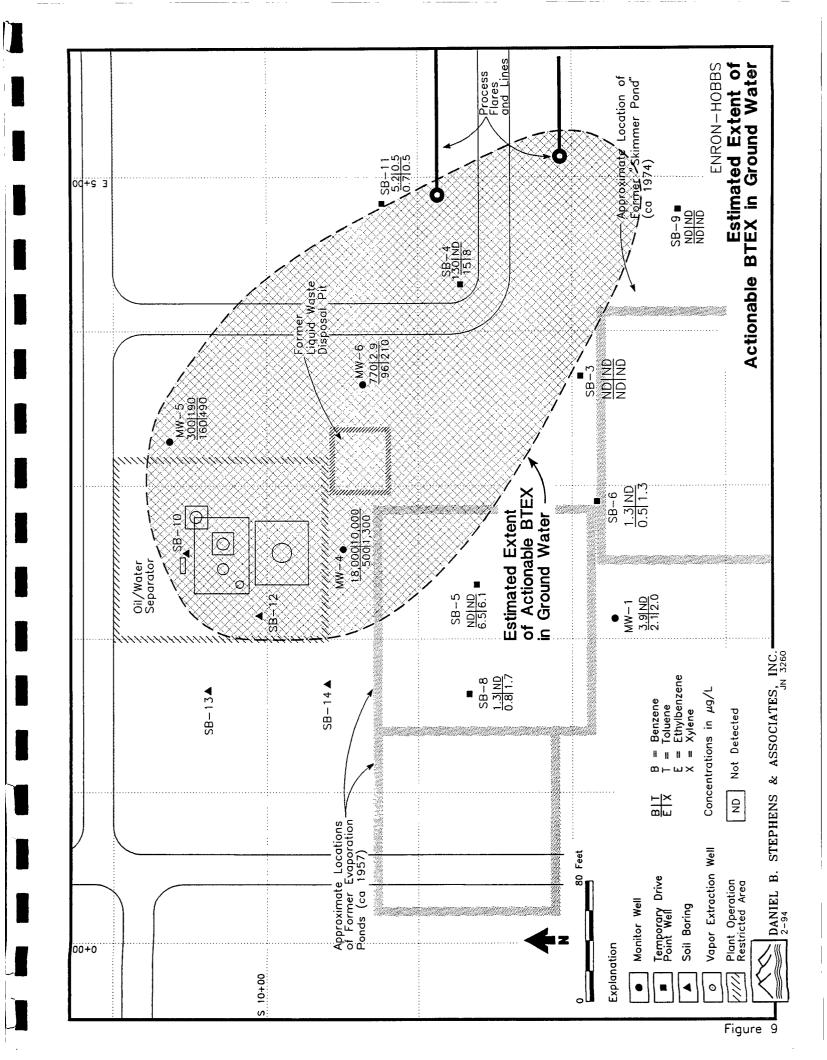
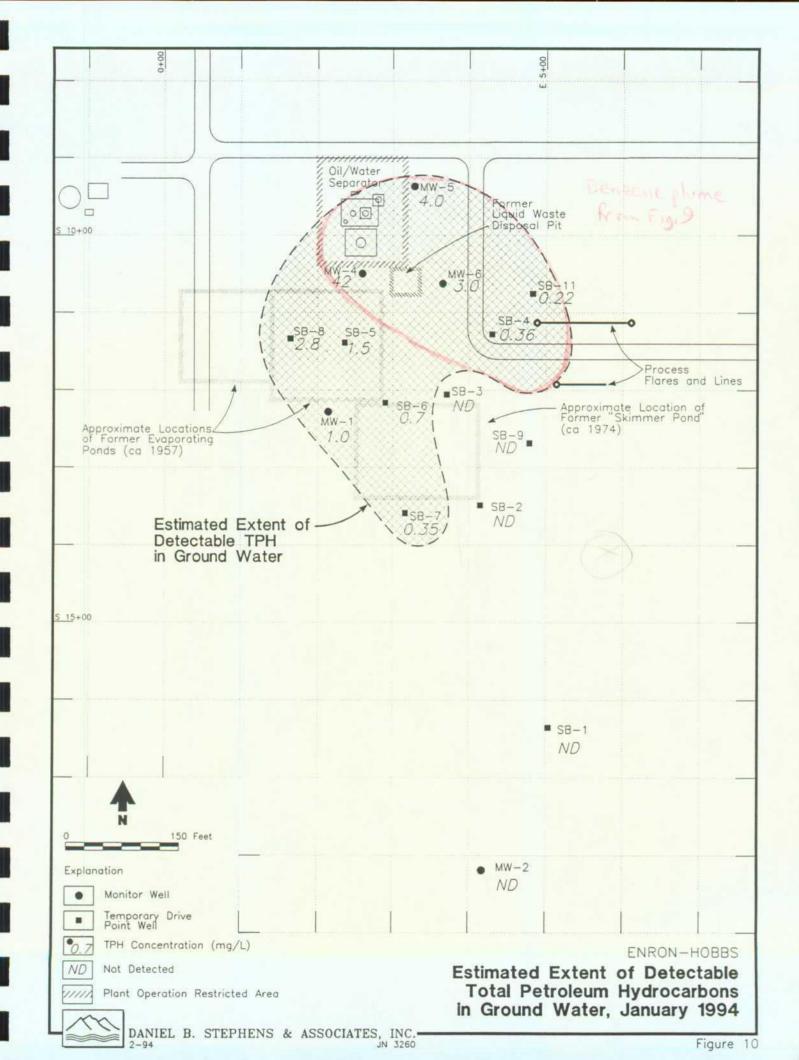


Figure 8







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#### 4. SUMMARY AND CONCLUSIONS

The supplemental environmental investigation completed by DBS&A in January 1994 in combination with previous investigations by Metric Corporation in 1991 and IT Corporation in 1993 have determined the extent of TPH, BTEX, and inorganic impacts near the former liquid waste disposal pit and the oil/water separator area. Specifically, the investigatory drilling programs performed around the waste water disposal areas have revealed the following:

- The area of impacted soils extends to the west and south of the former water disposal pit investigated by Metric (1991) and IT (1993) Corporations. Actionable levels of TPH (100 ppm and above) determined from soil analyses and PID readings indicate that impacted soils encompass an area approximately 200 feet by 200 feet. BTEX concentrations were above OCD actionable levels in soil samples from borings BH-18, B-8, B-9, and SB-12.
- The vertical extent of actionable soils varies from a thickness of approximately 45 feet near the center of hydrocarbon mass to approximately 5 feet near the perimeter of the impacted area.
- The former skimmer pond area does not appear to be an actionable source area based on PID readings collected during the DBS&A supplemental environmental investigation.
- Inorganic chemical analyses of soil samples collected by Metric Corporation (1991) indicated that no regulatory standards were exceeded.
- High molecular weight chlorinated solvents and hydrocarbons (C₂₀ and greater) were not present in any of the ground-water samples.
- BTEX concentrations above the applicable regulatory standards are present in ground water beneath the site. The plume is elliptical in shape and trends from northwest near the oil/water separator to the southeast toward the process flares. The longitudinal axis of the plume is approximately 420 feet and the transverse axis is approximately 200 feet.



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- TPH was detected within the BTEX ground-water plume and southeast of the former evaporation ponds. The downgradient extent of TPH in ground water is estimated to be 400 feet below the oil/water separator.
- Inorganic chemical analysis of major ions, TDS, and metals indicate that only TDS and chloride exceed NMWQCC standards in well MW-4.

In summary, the recharge of plant waste water has resulted in impacts to the soils directly underlying the source area and ground water south and southeast of the area in which recharge occurred.



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- Nicholson, A., Jr., A. and A. Clebsch, Jr. 1961. Geology and Ground Water Conditions in Southern Lea County, New Mexico. U.S. Geological Survey Ground-Water Report 6. New Mexico Bureau of Mines & Mineral Resources, Socorro, New Mexico, 123 p.

### TABLES



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Well/Boring ¹	South ² (feet)	East ² (feet)	Measuring Point ³ Elevation (feet above msl)	Depth to Water from Measuring Point ³ (feet)	Water Table Elevation (feet above msl)
MW-1	1227.92	213.26	3720.18	43.77	3676.41
MW-2	1819.27	418.07	3717.24	42.69	3674.55
MW-3	2482.66	1842.27	3717.70	46.24	3671.46
MW-4	1049.74	258.40	3722.45	45.00	3677.45
MW-5	936.63	328.47	3723.60	45.22	3678.38
MW-6	1062.66	365.27	3723.08	45.91	3677.17
MW-7	144.45	-676.61	3730.84	54.34	3676.50
SB-1	1635.45	503.39	3714.68	NA	NA
SB-2	1348.47	414.84	3717.31	NA	NA
SB-3	1205.46	370.79	3719.60	NA	NA
SB-4	1127.92	429.99	3719.78	NA	NA
SB-5	1138.49	235.13	3719.05	NA	NA
SB-6	1216.35	289.73	ND	NA	NA
SB-7	1358.47	316.51	3716.82	NA	NA
SB-8	1133.49	163.83	3718.71	NA	NA
SB-9	1268.78	478.64	3719.42	NA	NA
SB-10	947.94	255.75	3721.21	NA	NA
SB-11	1075.65	482.60	3720.68	NA	NA
SB-12	995.38	215.02	3720.24	NA	NA
SB-13	962.32	165.78	3720.15	NA	NA
SB-14	1039.97	170.28	3719.75	NA	NA
SB-15	1312.97	239.27	3717.60	NA	NA
SB-16	1298.30	297.96	3717.79	NA	NA
SB-17	1292.29	354.89	3717.83	NA	NA
MW-8ABD	1099.35	381.51	3728.73	NA	NA

## Table 1. Monitor Well and Soil Boring Locations andWater Table Elevation Data, January 1994

Notes: Survey conducted by John W. West Engineering, Hobbs, NM. Survey base elevation datum  $\pm$  0.5 feet.

NA = Not applicable

ND = No data available

¹ Refer to Figure 2 for locations

² South and east coordinates relative to plant survey grid

³ Measuring point is top of PVC casing

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## Table 2. Soll Chemistry Results ENRON - Hobbs Page 1 of 4

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								Conce (m	Concentration (mg/kg)			
Sample ID ¹	Sample Depth (ft)	Date (M/D/Y)	Source ²	Lab ³	TPH ⁴	Hydro- carbon Range	DL	Benzene ⁴	Toluene ⁴	Ethyl- benzene ⁴	Total Xylenes ⁴	Ы
BH-1	8.8-9.2	8/91	Metric	AAL	40	ğ	5.0	NA	AN	AN	NA	0.1
	15.0-15.5	8/91	Metric	AAL	QN	Ŋ	5.0	QN	QN	QN	QN	0.1
	19.9-20.2	8/91	Metric	AAL	28	ğ	5.0	QN	QN	QN	QN	0.1
	30.0-30.3	8/91	Metric	AAL	QN	Ø	5.0	QN	QN	QN	QN	0.1
-	36.5-36.7	8/91	Metric	AAL	QN	ğ	5.0	QN	QN	QN	QN	0.1
	45.2-45.5	8/91	Metric	AAL	QN	ğ	5.0	QN	QN	ND	ND	0.1
BH-2	0.0-1.0	8/91	Metric	AAL	QN	Ŋ	5.0	QN	QN	QN	DN	0.1
	15.0-15.3	8/91	Metric	AAL	QN	Ŋ	5.0	QN	QN	QN	QN	0.1
	30.0-30.3	8/91	Metric	AAL	Q	ğ	5.0	QN	QN	ND	QN	0.1
	40.1-40.4	8/91	Metric	AAL	Q	ğ	5.0	QN	QN	QN	QN	0.1
	51.2-51.4	8/91	Metric	AAL	Q	Ŋ	5.0	QN	QN	QN	QN	0.1
BH-3	2.0-2.5	8/22/91	Metric	AAL	QN	Ŋ	5.0	QN	QN	QN	QN	0.1
	10.5-10.7	8/22/91	Metric	AAL	24	Ŋ	5.0	QN	QN	QN	QN	0.1
	30.0-30.3	8/22/91	Metric	AAL	36	Ŋ	5.0	QN	QN	QN	QN	0.1
	45.0-45.3	8/22/91	Metric	AAL	20	Ŋ	5.0	QN	QN	ND	ŊŊ	0.1
BH-4	29.0-29.3	8/23/91	Metric	AAL	28	Ŋ	5.0	QN	QN	QN	ΟN	0.1
	37.9-38.2	8/23/91	Metric	AAL	20	Na	5.0	QN	Q	DN	QN	0.1
¹ Refer to Figure 2 for sample locations ² Metric = Metric Corporation, 1991 1T = 1T Corporation, 1993 DBS&A = Daniel B. Stephens & Ass	Figure 2 for sample locations = Metric Corporation, 1991 = IT Corporation, 1993 = Daniel B. Stephens & Associates, Inc.,	tions 991 Associates, I	nc., 1994	AAL ITAS ATI ATI TPH =	<ul> <li>Assaigai /</li> <li>IT Analyti</li> <li>Analytical</li> <li>Analytical</li> <li>Analytical</li> <li>100 mo/kc</li> </ul>	<ul> <li>Assaigai Analytical Laboratories</li> <li>IT Analytical Services</li> <li>Analytical Technologies, Inc.</li> <li>Mexico Oil Conservation Division s</li> <li>100 morkg and for total BTEX =</li> </ul>	aboratories es, Inc. Division s al BTEX =	AAL = Assaigai Analytical Laboratories ITAS = IT Analytical Services ATI = Analytical Technologies, Inc. New Mexico Oil Conservation Division soil standards for TPH = 100 mofkg and for total BTEX = 50 mofkg		TPH = Total p DL = Detect NQ = Not qu NA = Not an ND = Not an	<ul> <li>Total petroleum hydrocarbons</li> <li>Detection limit</li> <li>Not quantified</li> <li>Not analyzed</li> <li>Not detected</li> </ul>	ocarbons

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New Mexico Oil Conservation Division soil standards for TPH = 100 mg/kg and for total BTEX = 50 mg/kg

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Table 2. Soll Chemistry Results **ENRON - Hobbs** Page 2 of 4

								Conce (m	Concentration (mg/kg)			
	Sample Depth	Date	Courses	الم ا	Tout	Hydro- carbon Bango	Z	Benzene4	Toluene ⁴	Ethyl- heozene4	Total Xvlanes ⁴	Ē
	(11)		ADIDOO	Lau		LIGING	3			011071100		
BH-6	0.0-2.0	8/29/91	Metric	AAL	68	Ő	5.0	Q	QN	QN	QN	0.1
	18.9-19.5	8/27/91	Metric	AAL	Q	Ŋ	5.0	QN	QN	QN	QN	0.1
	33.0-33.5	8/27/91	Metric	AAL	1,300	Ŋ	5.0	Q	DN	QN	QN	0.1
	46.0-46.3	8/27/91	Metric	AAL	QN	NQ	5.0	ND	ND	DN	ND	0.1
BH-8	21.4-21.7	8/28/91	Metric	AAL	QN	NQ	5.0	ND	ND	DN	QN	0.1
BH-9	22.7-23.4	9/91	Metric	AAL	8	Ø	5.0	QN	DN	QN	QN	0.1
	44.2-44.5	16/6	Metric	AAL	QN	NQ	5.0	ND	DN	QN	DN	0.1
BH-10	19.6-19.9	9/91	Metric	AAL	QN	NQ	5.0	ND	QN	QN	DN	0.1
BH-11	45.2-45.4	9/91	Metric	AAL	QN	NQ	5.0	ND	DN	DN	DN	0.1
BH-12	44.2-44.4	9/91	Metric	AAL	QN	ŊŊ	5.0	ND	DN	DN .	QN	0.1
BH-18	6.1-6.3	9/19/91	Metric	AAL	32,000	Ŋ	5.0	61	160	130	370	2.5
	24.6-24.8	9/19/91	Metric	AAL	4,200	Ŋ	5.0	0.65	5.5	15	36	0.1
	35.3-35.5	9/19/91	Metric	AAL	880	Ŋ	5.0	QN	QN	0.19	0.67	0.1
	48.0-48.2	9/19/91	Metric	AAL	10,000	NQ	5.0	0.69	1.6	=	35	0.1
BH-20	1.0-1.3	10/01	Metric	AAL	QN	Ŋ	5.0	QN	QN	QN	QN	0.1
	26.2-26.5	10/91	Metric	AAL	QN	ğ	5.0	DN	QN	QN	QN	0.1

¹ Refer to Figure 2 for sample locations

² Metric

Metric = Metric Corporation, 1991 IT = IT Corporation, 1993 DBS&A = Daniel B. Stephens & Associates, Inc., 1994

* New Mexico Oil Conservation Division soil standards for TPH = 100 mg/kg and for total BTEX = 50 mg/kg

AAL = Assaigai Analytical Laboratories
 ITAS = IT Analytical Services
 ATI = Analytical Technologies, Inc.

TPH = Total petroleum hydrocarbons DL = Detection limit NQ = Not quantified NA = Not analyzed ND = Not detected

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## Table 2. Soil Chemistry Results ENRON - Hobbs Page 3 of 4

								Conce (m	Concentration (mg/kg)			
Sample ID'	Sample Depth (ft)	Date (M/D/Y)	Source ²	Lab ³	TPH ⁴	Hydro- carbon Range	DL	Benzene ⁴	Toluene ⁴	Ethyl- benzene ⁴	Total Xylenes ⁴	DL
BH-21	3.8-4.3	10/91	Metric	AAL	190	Ŋ	5.0	QN	QN	DN	QN	0.1
	18.6-19.0	10/91	Metric	AAL	QN	NQ	5.0	QN	QN	QN	ND	0.1
BH-22	3.9-4.3	10/91	Metric	AAL	QN	Ŋ	5.0	QN	QN	QN	QN	0.1
	29.2-29.6	10/91	Metric	AAL	QN	Ŋ	5.0	QN	Q	QN	DN	0.1
B-7-16	16	11/02/92	Ŀ	ITAS	QN	ğ	2	0.071	Q.	QN	QN	0.050
B-7-41	41	11/02/92	11	ITAS	31	Ŋ	2	QN	QN	QN	QN	0.050
B-8-6.5	6.5	10/30/92	Ц	ITAS	720	ğ	100	1.1	9.1	13	120	1.0
B-8-35	35	10/30/92	Ш	ITAS	310	NQ	6	ΠN	0.42	4.6	6.2	0.20
B-9-10.5	10.5	10/30/92	Ц	ITAS	2,400	NQ	96	5.4	17	160	170	1.0
MW-4-10.5	10.5	10/31/92	П	ITAS	DN	NQ	2	QN	QN	ΠN	0.16	0.050
MW-4-40	40	10/31/92	11	ITAS	1,000	NQ	6	QN	0.084	0.23	0.17	0.050
MW-5-41	41	10/27/92	Ш	ITAS	ND	NQ	2	QN	DN	QN	ND	0.050
VEW-2-39	39	10/30/92	11	ITAS	7,500	Ŋ	89	3.1	2.2	13	13	0.20
SB-5 @ 6.5'	6.5	1/18/94	DBS&A	ATI	3,300	C6-C16	10	QN	QN	18	ND	0.5
SB-6 @ 18.5'	18.5	1/13/94	DBS&A	ATI	ND	C6-C16	5.0	QN	DN	DN	ND	0.025
SB-7 @ 16'	16	1/13/94	DBS&A	ATI	29	C9-C16	5.0	QN	QN	DN	DN	0.025

¹ Refer to Figure 2 for sample locations

² Metric

Metric = Metric Corporation, 1991 IT = IT Corporation, 1993 DBS&A = Daniel B. Stephens & Associates, Inc., 1994

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TPH = Total petroleum hydrocarbons DL = Detection limit NQ = Not quantified NA = Not analyzed ND = Not detected

* New Mexico Oil Conservation Division soil standards for TPH = 100 mg/kg and for total BTEX = 50 mg/kg

^a AAL = Assaigai Analytical Laboratories ITAS = IT Analytical Services = Analytical Technologies, Inc.

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Table 2. Soli Chemistry Results **ENRON - Hobbs** Page 4 of 4

								Conce (m	Concentration (mg/kg)			
Sample ID ¹	Sample Depth (ft)	Date (M/D/Y)	Source ²	Lab ³	TPH ⁴	Hydro- carbon Range	Ъ	Benzene ⁴	Toluene ⁴	Ethyl- benzene ⁴	Total Xylenes⁴	סר
SB-10 @ 10'	10	1/14/94	DBS&A	ATI	QN	C6-C16	5.0	QN	DN	QN	QN	0.025
SB-10 @ 40'	40	1/15/94	DBS&A	ATI	DN	C6-C16	5.0	DN	ND	QN	QN	0.025
SB-12 @ 5'	5	1/14/94	DBS&A	ATI	3,100	C6-C16	250	QN	4.6	21	82	1.2
SB-12 @ 40'	40	1/14/94	DBS&A	ATI	4,100	C6-C16	250	9.4	60	18	58	1.2
SB-13 @ 40'	40	1/15/94	DBS&A	ATI	DN	C6-C16	5.0	QN	DN	QN	QN	0.025
SB-14 @ 30'	30	1/15/94	DBS&A	ATI	QN	C6-C16	5.0	ΠN	QN	ΟN	QN	0.025
SB-14 @ 40'	40	1/15/94	DBS&A	ATI	QN	C6-C16	5.0	QN	QN	QN	QN	0.025

¹ Refer to Figure 2 for sample locations

² Metric

Metric = Metric Corporation, 1991 IT = IT Corporation, 1993 DBS&A = Daniel B. Stephens & Associates, Inc., 1994

⁴ New Mexico Oil Conservation Division soil standards for TPH = 100 mg/kg and for total BTEX = 50 mg/kg

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# Table 3. Water Chemistry Results **ENRON - Hobbs** Page 1 of 2

				S	Concentration (mg/L)			ŏ	Concentration (µg/L)		
	Ĺ				Hydro-				C+6.4	Totol	
Sample ID	Uate (M/D/Y)	Source ¹	Lab ²	ТРН	caroon Range	DL	Benzene ³	Toluene ^a	benzene ³	Xylenes ³	Ы
MW-1	9/91	Metric	AAL	NA	NA	NA	5.3	6.7	1.0	NA	NA
	11/92	F	ITAS	4.3	NQ	0.05	1.5	1.5	QN	10	1.0
	12/92	Ħ	ITAS	5.9	Ŋ	0.05	1.3	1.4	QN	6.0	1.0
	1/12/93	DBS&A	ATI	1.0	C6-C16	0.050	3.9	QN	2.1	2.0	0.5
MW-2	9/91	Metric	AAL	NA	NA	AN	QN	QN	QN	<b>VN</b>	NA
_	1/12/94	DBS&A	ATI	QN	C6-C16	0.050	QN	QN	QN	DN	0.5
MW-4	11/92	F	ITAS	50	Ø	0.5	16,000	8,000	200	1,800	200
	12/92	Ħ	ITAS	15	ğ	0.5	17,000	8,200	530	1,300	200
	1/10/94	DBS&A	ATI	42	C6-C18	0.050	18,000	10,000	500	1,300	250
MW-4A	12/92	Е	ITAS	10	Ø	0.25	15,000	6,200	400	1,000	100
MW-5	11/92	н	ITAS	0.69	Ŋ	0.05	3.0	3.4	3.0	34	1.0
	12/92	Ħ	ITAS	1.3	ŐN	0.05	9.1	4.1	8.2	37	1.0
	1/16/94	DBS&A	ATI	4.0	C6-C14	0.250	300	190	160	490	2.5
9-MM	11/92	T	ITAS	35	ØN	0.5	340	23	51	120	5.0
	12/92	F	ITAS	10	Ŋ	0.5	520	20	58	120	5.0
	1/10/94	DBS&A	ATI	3	C6-C20	0.050	770 ⁰	2.9	96	210	2.5
^р Detection limit is 250 на/L	250 µg/L			² AAL	= Assaigai A	Assaigai Analytical Laboratories	nboratories			TPH = Total petroleum	petroleum
	- 0-1			TAS		IT Applical Services				huder	hudrocarhone

3260\SUPP-INV.294\WATRCHEM.294

Not quantified
Not analyzed
Not detected

N N N N

³ New Mexico Water Quality Control Commission standards (μg/L):

² AAL = Assaigai Analytical Laboratories ITAS = IT Analytical Services

= Analytical Technologies, Inc.

ATI

Metric = Metric Corporation, 1991 IT = IT Corporation, 1993 DBS&A = Daniel B. Stephens & Associates, Inc., 1994

' Metric

Ethylbenzene = 750 Xylene = 620

Benzene = 10 Toluene = 750

= Detection limit hydrocarbons

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## Water Chemistry Results **ENRON - Hobbs** Page 2 of 2 Table 3.

		_			_			_					-
	סר	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Total Xylenes³	ND	ND	0.6	QN	8.0	6.1	1.3	ND	17	0.5	0.5	QN
Concentration (µg/L)	Ethyl- benzene³	QN	DN	DN	DN	15	6.5	0.5	0.6	0.8	QN	0.7	QN
Co	Toluene ³	QN	DN	QN	QN	QN	DN	DN	ND	QN	DN	DN	ND
	Benzene ³	QN	QN	QN	QN	130	DN	1.3	DN	1.3	QN	5.2	2.6
	סר	0.050	0.050	0.050	0.050	0.050	0.050	0:050	0:050	0.050	0.050	0:050	0.050
Concentration (mg/L)	Hydro- carbon Range	C6-C16	C6-C16	C6-C16	C6-C16	C6-C14	C6-C16						
Ö	ТРН	QN	QN	QN	QN	0.36	1.5	0.70	0.35	2.8	QN	0.22	QN
	Lab ²	ATI	АТІ	АТІ	АТІ	АТІ	АТІ						
	Source ¹	DBS&A											
	Date (M/D/Y)	1/16/94	1/11/94	1/11/94	1/12/94	1/12/94	1/12/94	1/13/94	1/13/94	1/13/94	1/14/94	1/14/94	1/17/94
	Sample ID	7-WM	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	SB-7	SB-8	6-8S	SB-11	NNG-4

 $^{\text{D}}$  Detection limit is 250  $\mu\text{g/L}$ 

= Metric Corporation, 1991 ¹ Metric

 IT Corporation, 1993
 Daniel B. Stephens & Associates, Inc., 1994 IT DBS&A

3260/SUPP-INV.294/WATRCHEM.294

 New Mexico Water Quality Control Commission standards (µg/L): Benzene = 10 Ethylbenzene = 750 Toluene = 750 Xylene = 620 Analytical Technologies, Inc. ² AAL = Assaigai Analytical Lat ITAS = IT Analytical Services

Assaigai Analytical Laboratories

ЧЦ

Not quantified
Not analyzed
Not detected = Detection limit

TPH = Total petroleum

NA NC

hydrocarbons



ENVIRONMENTAL SCIENTISTS AND ENGINEERS

			Concei (mę				NMWQCC Standard
Parameter	MW-1	MW-2	MW-3	MW-4	MW-7	NNG-4	(mg/L)
Date sampled	09/23/91	09/91	09/23/91	01/10/94	01/10/94	01/10/94	
Source ¹	Metric	Metric	Metric	DBS&A	DBS&A	DBS&A	
Major ions							
Calcium	310	76	160	104	112	75.3	None
Potassium	90	13	3.2	21.5	4.7	2.4	None
Magnesium	66	6.5	12	70	11.5	10.0	None
Sodium	410	13	11	553	145	52.6	None
Bicarbonate (CaCO ₃ )	NA	NA	NA	706	262	184	None
Total alkalinity (as CaCO ₃ )	NA	NA	NA	706	262	184	None
Chloride	NA	NA	NA	770	120	66	250
NO ₂ /NO ₃ -N, total	NA	NA	NA	<0.06	2.7	2.6	10.0
Sulfate	NA	NA	NA	0.4	140	51	600
Total dissolved solids	NA	NA	NA	1,900	720	410	1,000
Metals							
Silver	NA	NA	NA	<0.010	<0.010	NA	0.05
Arsenic	NA	NA	NA	0.077	<0.005	NA	0.1
Barium	ND	ND	ND	0.667	0.059	NA	1.0
Cadmium	NA	NA	NA	<0.0005	<0.0005	NA	0.01
Chromium	NA	NA	NA	<0.010	<0.010	NA	0.05
Mercury	NA	NA	NA	<0.0002	<0.0002	NA	0.002
Lead	ND	ND	ND	<0.002	<0.002	NA	0.05
Selenium	NA	NA	NA	<0.005	<0.005	NA	0.05

### Table 4. Inorganic Analysis of Ground Water **ENRON - Hobbs**

¹ Metric = Metric Corporation, 1991

DBS&A = Daniel B. Stephens & Associates, Inc., 1994

NMWQCC = New Mexico Water Quality Control Commission

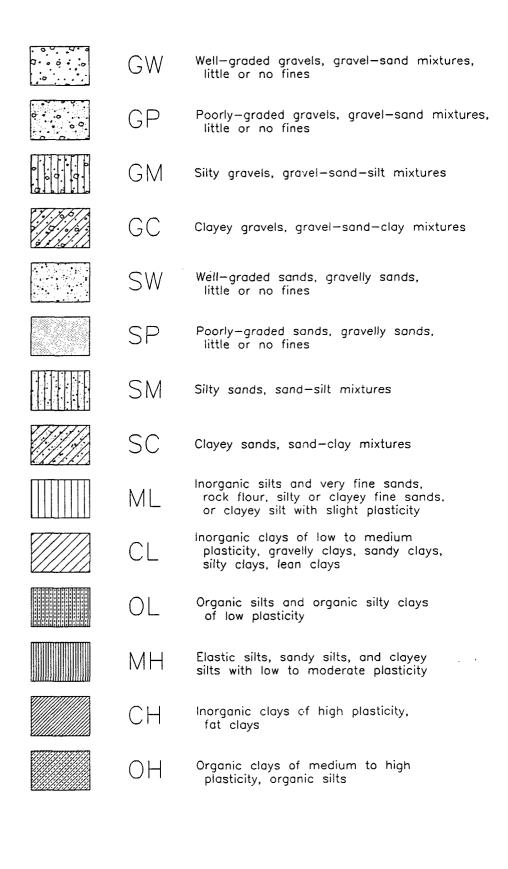
= Not analyzed NA ND

= Not detected

### **APPENDIX A**

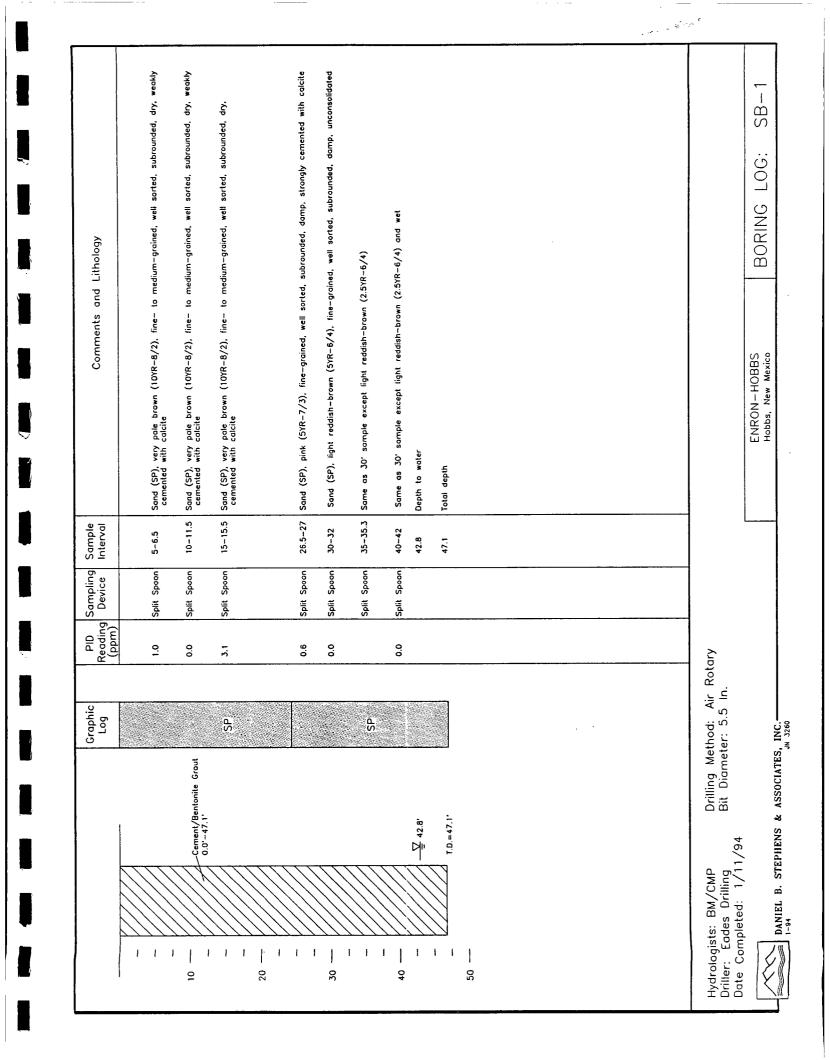
### BORING LOGS AND COMPLETION DIAGRAMS

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JN 3260

ENRON-HOBBS Unified Soil Classification System Graphic Symbols and General Descriptions for Soil Boring Logs



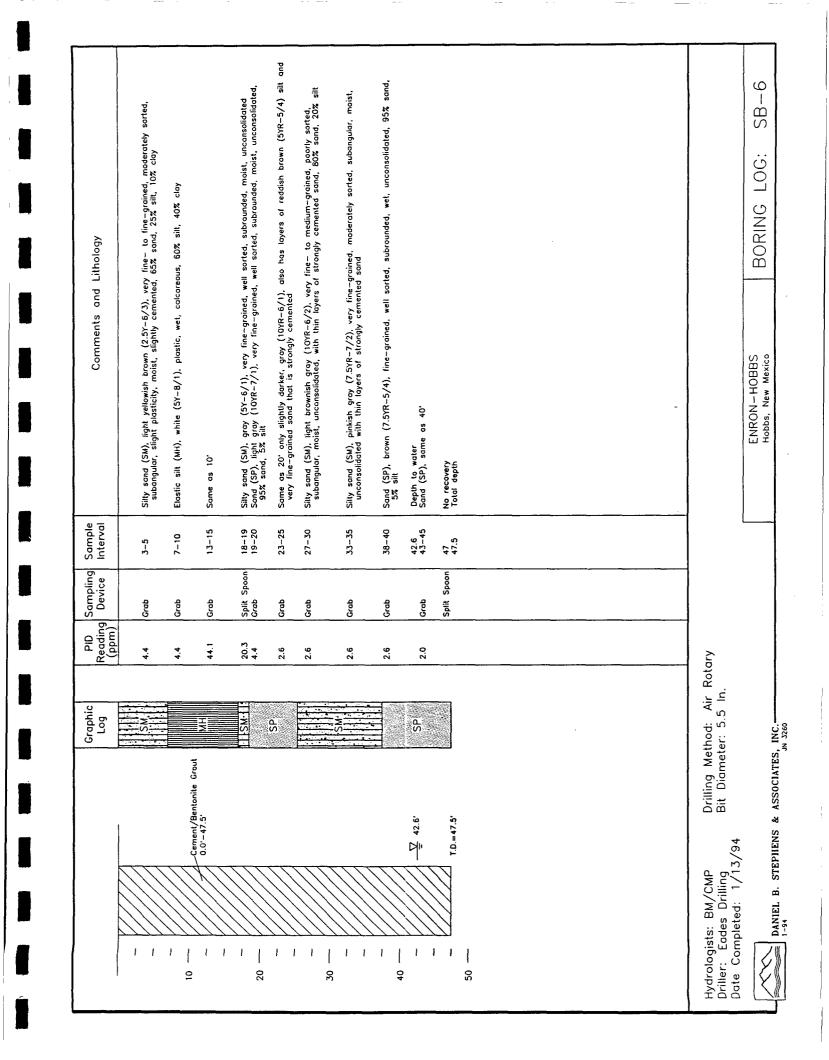
Graphic Log     PID Reading     Sampling       Ambine     Craphic Copming     3-5       Mitting     0.6     Crab     3-5       Mitting     0.6     Crab     8-10       Mitting     0.6     Crab     8-10       Spin     0.0     Crab     13-15       Mitting     0.0     Crab     13-15       Mitting     0.0     Crab     23-25       Spin     0.0     Crab     23-25       Spin     0.0     Crab     33-35       Spin     0.0     Crab     33-425       Spin     0.0     Spin Spoon     45,345.5       Drilling Method:     Air Rotary	and Lithology	. damp to moist, calcareous, 70% silt, 30% clay	moist. calcareous, 60% clay, 40% silt	Elastic silt with gravel (MH). very pale brown (10YR-8/2), moist, calcareous, 50% silt, 30% clay. 5% sand, 15% gravel	.). fine- to medium-grained. maderately sorted. X sand, 15X silt, 5X clay	Sand (SP), light brown (7.5YR-6/3), fine-grained, well sorted, subrounded, moist, unconsolidated, 95% sand, 5% silt	ed. poorly sorted, angular to subrounded, dry, strangly	ed. poorly sorted, angular, damp, slightly cemented,	medium-grained, well sorted, subrounded, maist,			BORING LOG. SR-2
Graphic Log     PID Reading (ppm)     Sampling Device (rab       MHH MHH     0.6     Grab       0.6     Grab     Crab       0.6     Grab     Crab       1.1     0.6     Grab       1.1     0.6     Grab       1.1     0.0     Grab <td></td> <td>Elastic silt (MH), very pale brown (10YR-8/2).</td> <td>Lean clay (CL), very pale brawn (10YR-B/2), moist.</td> <td>Elastic silt with gravel (MH), very pale brown ( 5% sand, 15% grovel</td> <td>Sand with silt (SW-SM), light gray (10YR-7/2), fine- ta medium-grained, maderately subangular, moist, moderately cemented, 80% sand, 15% silt, 5% clay</td> <td>Sand (SP), light brown (7.5YR-6/3), fine-grai 95% sand, 5% silt</td> <td>Silty sand (SM), pink (7.5YR-7/3), fine-grained, poorly sorted, angular cemented, 60% sond, 30% silt, 10% clay</td> <td>Silty sand (SM), pink (7.5YR-7/3), fine-grained, poorly sorted, angular, damp, 80% sand, 20% silt</td> <td>Sand (SP), light brown (7.5YR-6/4), medium- unconsolidated, 95% sand, 5% silt Sand (SP), same as 40' hut wet Daoth to where</td> <td>Sand (SP), same as 40' but saturated Total depth</td> <td></td> <td>ENRON-HOBBS</td>		Elastic silt (MH), very pale brown (10YR-8/2).	Lean clay (CL), very pale brawn (10YR-B/2), moist.	Elastic silt with gravel (MH), very pale brown ( 5% sand, 15% grovel	Sand with silt (SW-SM), light gray (10YR-7/2), fine- ta medium-grained, maderately subangular, moist, moderately cemented, 80% sand, 15% silt, 5% clay	Sand (SP), light brown (7.5YR-6/3), fine-grai 95% sand, 5% silt	Silty sand (SM), pink (7.5YR-7/3), fine-grained, poorly sorted, angular cemented, 60% sond, 30% silt, 10% clay	Silty sand (SM), pink (7.5YR-7/3), fine-grained, poorly sorted, angular, damp, 80% sand, 20% silt	Sand (SP), light brown (7.5YR-6/4), medium- unconsolidated, 95% sand, 5% silt Sand (SP), same as 40' hut wet Daoth to where	Sand (SP), same as 40' but saturated Total depth		ENRON-HOBBS
Graphic Log     PID Reading (ppm)     Sampling Device (rab       MHH MHH     0.6     Grab       0.6     Grab     Crab       0.6     Grab     Crab       1.1     0.6     Grab       1.1     0.6     Grab       1.1     0.0     Grab <td>Sample Interval</td> <td>3-5</td> <td>8-10</td> <td>13-15</td> <td>18-20</td> <td>23-25</td> <td>2830</td> <td>33-35</td> <td>38-40 41.5-42.5</td> <td>44-45.5 45.3</td> <td></td> <td>L</td>	Sample Interval	3-5	8-10	13-15	18-20	23-25	2830	33-35	38-40 41.5-42.5	44-45.5 45.3		L
Graphic Log Log MHH MHH CL C C C C C C C C C C C C C C C C C	Sampling Device	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Spoon		-	
Graphi Log SP SP SP SP	PID Reading (ppm)	0.6									ary	
	Graphic Log					SP	بمعتمت معمر	×	SP SP	÷	 <u> </u>	

	Graphic PID Log Reading (ppm)	D Sampling ding Device m)	ing Sample ie Interval	Comments and Lithology	ythology
	1.6	Grab	3-5	Silt with sand (MH), pink (7.5YR-8/3), very fine-grained sand, dry. slightly cemented, 20% very fine sand	ed sand, dry, slightly cemented, $80\%$ slit,
10 - 1	1.0	Grab	8-10	. Same as above, except damp	
- Cement/Bentomite Grout	1.6	Grab	13-15	Silt with sand (MH), pinkish white (7.5YR-8/3), very fine-grained, damp, slightly to strongly cemented	ne-grained, damp, slightly to strongly cemer
	1.0	Grab	18-20	Sand (SP), pink (7.5YR-7/3), very fine-grained, well sorted, subrounded, domp	orted, subrounded, domp
1 1	SP 1.6	Grab	23-25	Sand (SP), light reddish-brown (5YR-6/4), line- to me unconsolidated	to medium-grained, well sorted, subrounded, damp,
	0.1	Grab	28-30	Same as 25' sample except strongly cemented layers (0.2 to 1.0' thick), calcareous cement	(0.2 to 1.0' thick), calcareous cement
1 1	0	Grab	33-35	Silty sand (SM), light brown (7.5YR–6/4), very fine- to medium-grained, poorly sorted, subrounded, moist, slightly cemented with strongly cemented layers, 80% sand, 20% silt	o medium-grained, poorly sorted, subrounde s, 80% sand, 20% silt
	1.0	Grab	38-40	Some as 35' but with fewer strongly cemented layers and mare reddish in color, light reddish-brown (5YR-6/4)	and more reddish in color, light reddish⊸bro
	0.5	Grab	43-45	Some as 35' but with fewer strongly cemented layers and more reddish in color, light reddish-brown (5YR-6/4) Death to water	and more reddish in color, light reddish-brc
- ///// 1.0.=47.6'		Split Spoon		Same as 35' but unconsolidated and saturated, darker in color, reddish-brown (5YR-4/4) Total depth	in color, reddish-brown (5YR-4/4)
		• • • • • • • • • • • • • • • • •			
			,,,		
Hydrologists: BM Drilling Method: Driller: Eades Drilling Bit Diameter: 5	t thod: Air Rotary er: 5.5 In.	-	_		
			L	ENRON-HOBBS	RORING LOC: SR_

	-     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -     -       -     -     -     -     -     -       -     - <th></th> <th>Graphic Log</th> <th>PID Reading (ppm)</th> <th>Sampling Device</th> <th>Sample Interval</th> <th>Comments and Lithology</th> <th>Ŋ</th>		Graphic Log	PID Reading (ppm)	Sampling Device	Sample Interval	Comments and Lithology	Ŋ
			<u></u>	625	Grab	3-5	Sitty sand with gravel (SM), gray (7.5YR-5/1), very fine to coadry, unconsolidated	arse-grained sand, poarly sorted. angular
24.5     0.00-146.4       21.0     0.00       21.0     0.00       21.0     0.00       21.0     0.00       21.0     0.00       21.0     0.00       21.0     0.00       21.0     0.00       21.0     0.00       21.0     0.00       21.1     0.00       21.2     0.00       21.2     0.00       21.2     0.00       21.2     0.00       21.2     0.00       21.2     0.00       21.2     0.00       21.2     0.00       21.2     0.00       21.2     0.00       21.2     0.00       21.2     0.00       21.2     0.00       21.2     0.00       21.4     0.00       21.4     0.00       21.4     0.00       21.4     0.00       21.4     0.00       21.4     0.00       21.4     0.00       21.4     0.00       21.4     0.00       21.4     0.00       21.4     0.00       21.4     0.00       21.4     0.00       21.4     0.00 <td></td> <td>   </td> <td></td> <td>263</td> <td>Grab</td> <td>8-10</td> <td>Elastic silt (MH), while (2.57–8/1). moist, plastic, minor gravel, calcareous, 60% silt, 40% clay</td> <td>gray</td>				263	Grab	8-10	Elastic silt (MH), while (2.57–8/1). moist, plastic, minor gravel, calcareous, 60% silt, 40% clay	gray
$\frac{1}{10^{-10}} = \frac{1}{10^{-10}} = \frac{1}$				24.5	Grab	13-15	Fat clay (CH), pale yellow (2.5Y-8/2), minor sand, damp. plast clay, 40% sitt	tic, calcareous, slightly consolidated, 60 <b>3</b>
		20		21.0	Grab	18-20	Silty sand (SM). light gray (10YR-7/1), very fine- to fine-grai damp, unconsolidated, gray staining (possible organics), 75% :	ired, poorly sorted, angular to subangular sond, 25% silt
$ \begin{array}{c cccc} & & & & & & & & & & & & & & & & & $	1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1 <td>+ 1</td> <td></td> <td>21.2 3.0</td> <td>Grab Grab</td> <td>23-25 26-27</td> <td>Same as 20' but with thin layers of highly comented pink silts Sand (SP), groy (2.5-5.1), fine- to medium-grained, well so bubble scratch scratch or scratch scratch of scratch</td> <td>i and sonds orted, subrounded, moist, unconsolidated,</td>	+ 1		21.2 3.0	Grab Grab	23-25 26-27	Same as 20' but with thin layers of highly comented pink silts Sand (SP), groy (2.5-5.1), fine- to medium-grained, well so bubble scratch scratch or scratch scratch of scratch	i and sonds orted, subrounded, moist, unconsolidated,
		· I		4.0	Grab	28-30	block grains (possible organic staiming), 3.74 sound, 3.8 and CSP), pinkish gray (7.5YR-7/2), tine-grained, well sorted, amount of tine black grains (possible organic staiming), thin lead $5\pi$ still	. rounded, moist, unconsolidated, minor layers of strongly cemented sand, 95%
$\frac{1}{10^{-1644}} = \frac{1}{2} \frac{42}{10^{-1644}}$ $\frac{1}{10^{-1644}} = \frac{1}{10^{-1644}}$ $\frac{1}{10^{-1644}} = $	$\frac{1}{12} = \frac{1}{12} $		S	3.2	Grab	33-35	Sand (SP). same as 30'	
-     -     42.5     Same to and the operation of the operatio	$\begin{array}{c cccc} - & & & & & & & & & & & & & & & & & & $	0		3.0	Grob	38-40	Sand (SP). brown (7.5YR-5/4), same as 30° but fewer black g	grains
gists: BM/CMP Drilling Method: Air Rotary Eades Drilling Bit Diameter: 5.5 In. ompleted: 1/12/94 Bit Diameter: 5.5 In. Hobbs, New Mexico BORING LOG: SB-	gists: BM/CMP Drilling Method: Air Rotary Eades Drilling Bit Diameter: 5.5 In. ompleted: 1/12/94 ENRON-HOBBS DaNIEL B. STEPHIENS & ASSOCIATES, INC.			0 0	<del>ଟ୍</del> ଟି <del>ପ</del> ଓ ଓ		sont (SP), reddish-brown (SYR-5/4), same as 30° but with fe Same as 45° but saturated otal depth	ewer black grains and wet
Completed: 1/12/34 ENRON-HOBBS BORING LOG: SB-	Daniel B. Stepliens & ASSOCIATES, INC. 1-94 Daniel B. Stepliens & ASSOCIATES, INC. Magnetice	gists: BM/CMP Eades Drilling	u)	Rotary				
	DANIEL B. STEPHENS & ASSOCIATES, INC.					L		LOG: SB-

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ROPING LOC. SB-7	ENRON-HOBBS			ary	Drilling Method: Air Rotary Bit Diameter: 5.5 In.	Hydrologists: CMP/BM Driller: Eades Drilling Date Completed: 1/13/94
					. *	
	No recovery Total depth	47 47.6	Split Spoon		J.6 [,]	- V///// 1.0.=47.6'
	Depth to water Sand (SP), same as 40'	42.0 43-45	Grab	2.0	42.0 [.]	
Sand (SP), light brawn (7.5YR-6/4), fine-grained, well sorted, subrounded, wet, unconsolidated, 95% sand, 5% silt	Sand (SP), light brawn (7.5YR-6/4), fine-grc sand, 5% silt	38-40	Grab	2.0	3	
Sand with silt (SP-SM), light brown (7.5YR-6/3), fine-grained, well sorted, subrounded, moist, unconsolidated, 90% sand, 10% silt	Sand with silt (SP–SM), light brown (7.5YR–6 unconsolidated, 90% sand, 10% silt	33-35	Grab	2.0		
Silty sand (SM), pinkish gray (7.5YR-7/2), very fine- to medium-grained, poorly sorted, subangular, damp, unconsolidated but with numeraus strongly cemented layers of very fine sands and slits, 85% sand, 15% silt	Silty sand (SM), pinkish gray (7.5YR-7/2), ve damp, unconsoildated but with numerous stro sand, 15% silt	28-30	Grab	2.6		
Sand (SP), light gray (10YR-7/2), fine- to medium-grained, well sorted, subrounded, moist, unconsolidated, 95% sand, 5% silt	Sand (SP), light gray (107R-7/2), fine- to unconsolidated, 95% sand, 5% silt	23-25	Grab	2.0	A S	
Silty sand (SM), light brawnish gray (2.57-6/2), fine-grained, moderately sorted, subangular, maist, mottled dark gray to black (possible organics), unconsolidated, 85% sand, 10% silt, 5% clay Silty sand (SM), pale yellow (2.57-8/2), very fine- to fine-grained, poorly sorted, subangular, moist, unconsolidated, 80% sand, 20% silt	Silty sand (SM), light brownish gray (2.5Y-6/ mattled dark gray to black (possible organi Silty sand (SM), pale yellow (2.5Y-8/2), very unconsolidated, 80% sand, 20% silt	16–17 18–20	Split Spoon Grab	25 21		
Sandy lean clay (CL), very dark grayish brown (10YR-3/2), moderate plasticity, sand is fine- to medium-grained, moist, dark color is possibly due to organics, 60% clay, 20% silt, 20% sand	Sandy lean clay (CL), very dark grayish browi medium-grained, moist, dark color is possi	13-15	Grab	4.0	0.0'-47.6' CL	0.0
Silty sand (SM). dark yellowish brown (10YR-4/6). very fine- to medium-grained, poorty sorted, subrounded, damp, unconsolidated, 85% sond, 15% silt	Silty sand (SM), dark yellowish brown (10YR- subrounded, damp, unconsolidated, 85% son	8-10	Grab	2.6		Cemen
Silty sand (SM), grayish brawn (2.5V–5/2), very fine- to fine-grained, maderately sorted, subrounded, moist, very slight plasticity, unconsolidated, 80% sand, 15% silt, 5% clay	Silly sand (SM), grayish brawn (2.5Y-5/2), v moist, very slight plasticity, unconsolidated,	ζ-Γ	Grab	2.0		
s and Lithology	Comments	Sample Interval	Sampling Device	PID Reading (ppm)	Graphic Log	V / / / / /

	Graphic Log	PID Reading (ppm)	Sampling Device	Sample Interval	Comments and Lithology	
1 1	<u> </u>	2.3	Grab	3-5	Sand with silt (SW–SM), light brownish gray (2.5Y–6/2), very fine- to very coarse-grained, poorly sorted. subangular, damp, unconsolidated. 80% sand, 10% silt, 5% clay, 5% gravel	:oarse-grained, poorly sorted
- 01		2.6	Grab	8-10	Fat clay (CH). light gray (2.5Y-7/2), plastic, wet, organics, 80% clay, 20% sitt	ĸ
- 0.0'-46.3'	HO HO	2.6	Grab	13-15	Fat clay (CH). pale yellow (2.5Y-8/2), plastic, damp, organics, 60% clay. 35% silt, 5% very fine sand	% silt, 5% very fine sand
	SW:	2.6	Grab	18-20	Sand with silt (SW-SM), light olive gray (SY-6/2), very fine- to fine-grained, poorly sorted, subangular, moist, unconsolidated, 90% sand, 10% silt	i, poorly sorted, subangular,
	N N N N	0.8	Grab	23–25	Sand with silt (SW-SM), pale yellow (2.5Y-7/3), fine-grained, well sorted, s consolidated, strongly cemented layers of fine sand and silt that vary in c	well sorted, subangular, damp, mostly that vary in color to pale red
20 1 - 1	G.	0.8	Grab	28-30	Sand (SP), brown (7.5YR-5/4), fine- to medium-grained, well sorted, subrounded, moist, unconsolidated, 95% sand, 5% silt	unded, moist,
1 1		2.6	Grob	33–35	Sand with silt (SW-SM), light brown (7.5YR-6/4), very fine- to fine-grained, moderately sorted, subangular, moist, unconsolidated, with thin fayers of cemented sands, 90% sand, 10% silt	moderately sorted. sand, 10% silt
-	Ň	2.6	Grab	38-40	Sand with silt (SW-SM), same as 35	
= -		0.8	Grab	41.9 43-45 46.3	Depth to water Sand with silt (SW-SM), same as 35' only wet Tatai depth	
				- <u></u>		
Hydrologists: CMP/BM Drilling Me Driller: Eades Drilling Bit Diame	Drilling Method: Air Rotary Bit Diameter: 5.5 In.	ltary				
				L	ENRON-HOBBS BORING	1 0G. SR~8

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	Graphic Log	PID Reading (ppm)	Sampling Device	Sample Interval	Comments and Lithology	
		2.9	Grab Grab	3-5 6 7-10	Silty sand (SM), dark grayish brown (10YR-4/2), very fine- to fine-grained, poorly sorted, subrounded. dry, slightly conscidated, 75% sand, 20% silt, 5% cloy Contact with underlying silty sand Silty sand (SM), very piel brown (10YR-B/2), very fine- to medium-grained, poorly sorted, subangular, damp, moderately consolidated, 60% sand, 35% silt, 5% cloy	to fine-grained, poorly sorted, subrounded, medium-grained, poorly sorted, subangular, y
10	N N N N N N N N N N N N N N N N N N N	2.9	Grab	13-15	Silty sand (SM), pinkish gray (7.5YR-7/2), very fine- to medium-grained, poorly sorted, subangular, damp, some thin layers of moderately consolidated sands, B0% sand, 20% silt	n-grained, poorly sorted, subangular, 6 sond, 20% silt
20		2.9	Grab	18-20	Silty sand (SM). light brown (7.5YR-6/4), very fine- to medium-grained, poorty sorted, subangular, moist, unconsolidated, with loyers of strongly cemented sands and silts, 85% sand, 15% silt	-grained, poorly sorted, subangular, and silts, 85% sand, 15% silt
		2.9	Grab	23-25	Sand (SP), light brown (7.5YR-6/4), fine-grained, well sorted, subrounded, moist, mostly unconsolidated but with thin strongly cemented layers, 95% sand, 5% silt	ubrounded, moist, mostly nd, 5% silt
30	SP	2.9	Grab	28-30	Sand (SP), light gray (10YR-7/2), fine- to medium-grained well sorted, subraunded, damp. unconsolidated with thin strongly cemented layers, 95% sand, 5% silt	l sorted, subrounded, damp. 5% silt
		2.9	Grab	33–35	Sand with silt (SW-SM), light brown (7.5 YR-6/4). very fine to medium-grained, moderately sorted, subangular, moist, unconsolidated, with thin layers of strongly cemented fine sands and silts, 90% sand. 10% silt	medium-grained, moderately sorted, cemented fine sonds and silts, 90%
-	Σ Ω	2.9	Grab	38-40	Sand (SW-SM), same as 35'	
50 - 7.0.=46.9 ⁴	as .	٥. N	ê S	4 4 4 1 4 6 1 4 0 1	Sand (SP), brown (7.5YR-5/4), fine- to medium-grained, well sorted, subrounded wet, unconsolidated. Beplin to water Total depth	sorted, subrounded, wet, unconsolidated.
Hydrologists: BM/CMP Drilling Method: Driller: Eades Drilling Bit Diameter: 5. Date Completed: 1/14/94	Air 5 In.	Rotary				
				L	ENRON-HOBBS BORING	ING LOG SB-9

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	-2 Fat clay (CH), dark brown to gray. 10% fine-grained sand, moderately sorted, plastic, maist, no odor
	5-5.5 Same as above to 4.9'; below 4.9', silt, light brown, moderately well sorted, calcareous, damp -8 Silty sand (SM), white, very fine-grained, well sorted, damp, 40% silt
12.0     Split Spoon     15-15.4       1     12.0     Split Spoon     23-20.4       1     13.1     4.8     Split Spoon     23-52.4       1     10.400     26.5-27     24-25     25-27       1     2.9     Split Spoon     25-27       1     2.9     Split Spoon     26-27       1     2.0     Split Spoon     27-26	3-11.5 Silt (ML). white, well sorted, dry: at 12' hard layer, ~0.4' thick
-     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     - <td>5-15.4 Same as 10' sample, except hydrocarbon odor</td>	5-15.4 Same as 10' sample, except hydrocarbon odor
T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.D.=40.0° T.T.T.T.T.T.T.T.T.T.T.T.T.T.T.T.T.T.T.	Hard layer, well cemented (~1' thick) Auger refusal, go back and finish drilling with air rotary 3-20.4 Silt with sand (ML), white, very fine-grained sand, maist to wet, hydrocorbon odor
T T T T T D T D T D T D T D T D T T T T T T T T T T T T T	1-25 Silty sand (SM), light gray 5.5-27 Sand (SW), pinkish gray. fine- to medium-grained, moderately sorted, unconsolidated, moist
T.D.=40.0' T.D.=40.0' T.D.=40.0' T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' to T.D.=40.0' T.D.=40.0' T.D.=40.0' T.D.=40.0' T.D.=40.0' T.D.=40.0' T.D.=40.0' T.D.=40.0' T.D.=40	1.5-29.7 Sond (SW). pinkish gray. fine- to medium-grained. moderately sorted. unconsolidated. damp. many strongly cemented layers of pink fine-grained to silty sands
t.D.=40.0 t.D.=40.0 40 40 40 40 40 40 40 40 40 4	5-35.4 Sand (SP), gray. fine-grained, well sorted, unconsolidated, moist (possible hydrocarbon staining)
gists: BM	) Sand (SP), same as 35', except fine- to medium-grained
gists: BM	
	r Rotarv
Driller: Harrison/Eades Urilling Bit Diameter: 7.23 In./3.3 In. Date Completed: 1/14/94	
$\overline{\mathbf{Z}}$	ENRON-HOBBS BORING LOG: SB-10 Hobbs, New Mexico
DANIEL B. STEPHENS & ASSOCIATES, INC.	

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	Graphic Log	PID Reading (ppm)	Sampling Device	Sample Interval	Comments and Lithology	
-	SW	7.6	Grab	3-5	Sand with gravel (SW), light gray (10YR-7/2), very fine- to very coarse-grained, poorly sorted, angular, unconsolidated, dry, 85% sand, 10% gravel, 5% silt	grained, poorly sorted, angular,
		2.9	Grab	7-10	Sand with silt (SW-SM), very pale brown (10YR-7/3), very fine to coarse-grained, poorly sorted, angular, slightly consolidated, damp, with strongly cemented layers of fine sands and silts, 90% 10% silt	-grained, poorly sorted, s sands and silts, 90% sand,
- 0.0'-48.7'		2.9	Grab	13-15	Sand with silt (SW-SM), same as 10'	
20		2.9	Grab	17-20	Sand (SP), light brown (7.5YR-6/3), fine- to medium-grained, well sorted, subrounded, damp, unconsolidated with thin layers of strongly cemented very fine-grained sand, 95% sand, 5% slit	, subrounded, damp. ind, 95% sond, 5% silt
	(	2.9	Grab	23~25	Sand (SP), light brown (7.5YR-6/4), fine- to medium-grained, well sorted, rounded, moist, unconsolidated, with strongly cemented layers of fine sand and silt, 95% sand, 5% silt	, rounded, moist, sand, 5% silt
30	<u>ት</u>	2.9	Grab	28-30	Sand (SP), pink (7.5YR-7/4), fine- to medium-grained, well sorted, subrounded, moist, unconsolidated, with thin layers of strongly cemented sonds and sills, 95% sand, 5% slit	unded, moist, unconsolidated,
		2.9	Grab	33-35	Sand with silt (SW–SM), pinkish gray (7.5YR–7/2), very fine– to medium–grained, moderately sorted, subrounded, damp, unconsolidated with numerous strongly cemented layers of fine sands and silts, 90% sand, 10% silt	grained, moderately sorted, s of fine sands and silts,
40		2.9	Grab	38-40	Sand with silt (SW–SM), pink (7.5YR–7/3), very fine— to medium—grained, moderately sorted, subrounded, unconsolidated, with thin layers of strongly cemented fine-grained sands and sills, 90% sand, 10% silt	moderately sorted. ained sands and silts, 90%
		2.9	Grab	43-45 44 7	Sand with silt (SW-SM), light brown (7.5YR-6/4), same as 40' but wet a Jacht to water	nd fewer cemented layers
50 - 1.0.=48.7'		ດ. N	đe	47 - 49 7 - 7 9	Sond (SP), light brown (7.5YR-6./4), fine- to medium-grained, well sorted, subangular, wet, Total depth depth and SX sand, SX sill	, subangular, wet,
Hydrologists: CMP Driller: Eades Drilling Bit Date Completed: 1/14/94	Drilling Method: Air Rotary Bit Diameter: 5.5 In.	otary				
					ENRON-HOBBS BORING	LOG: SB-11

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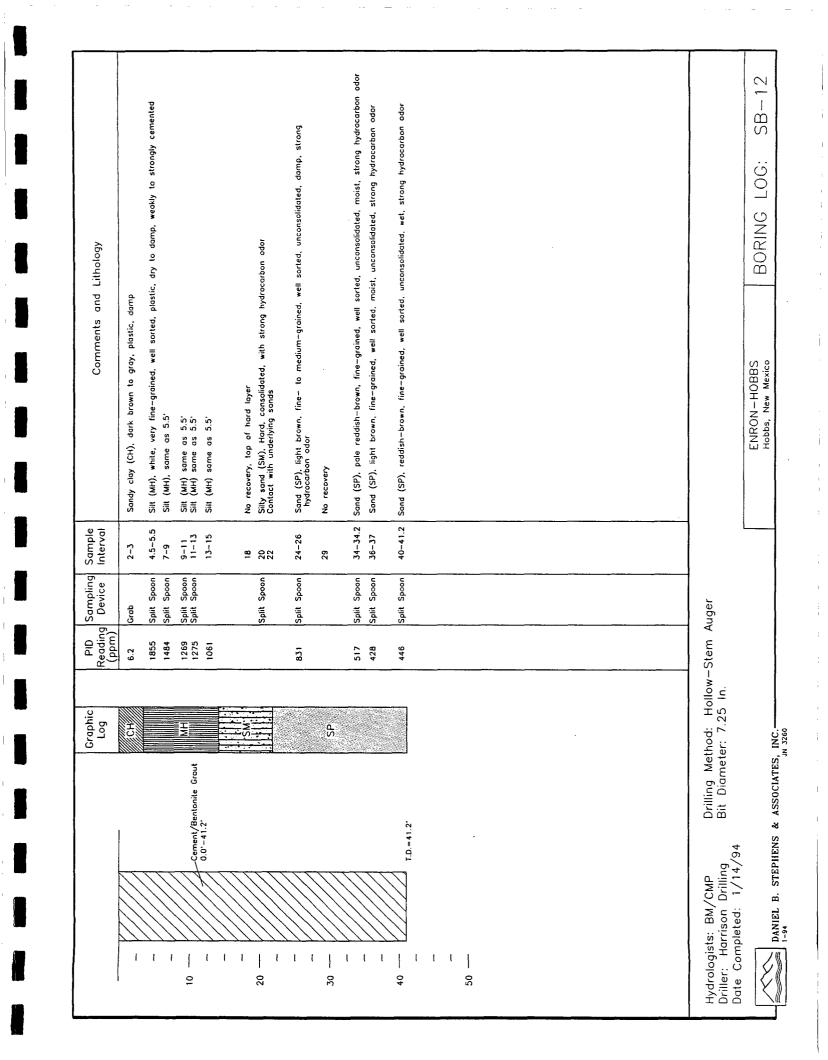
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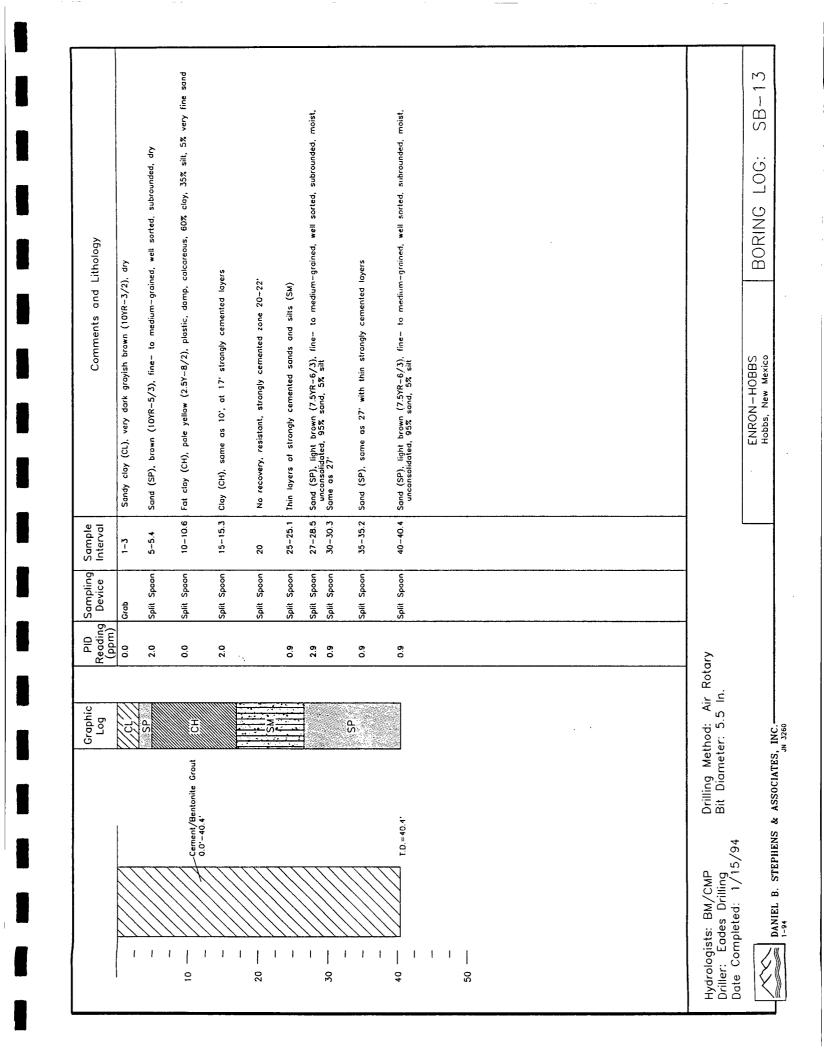
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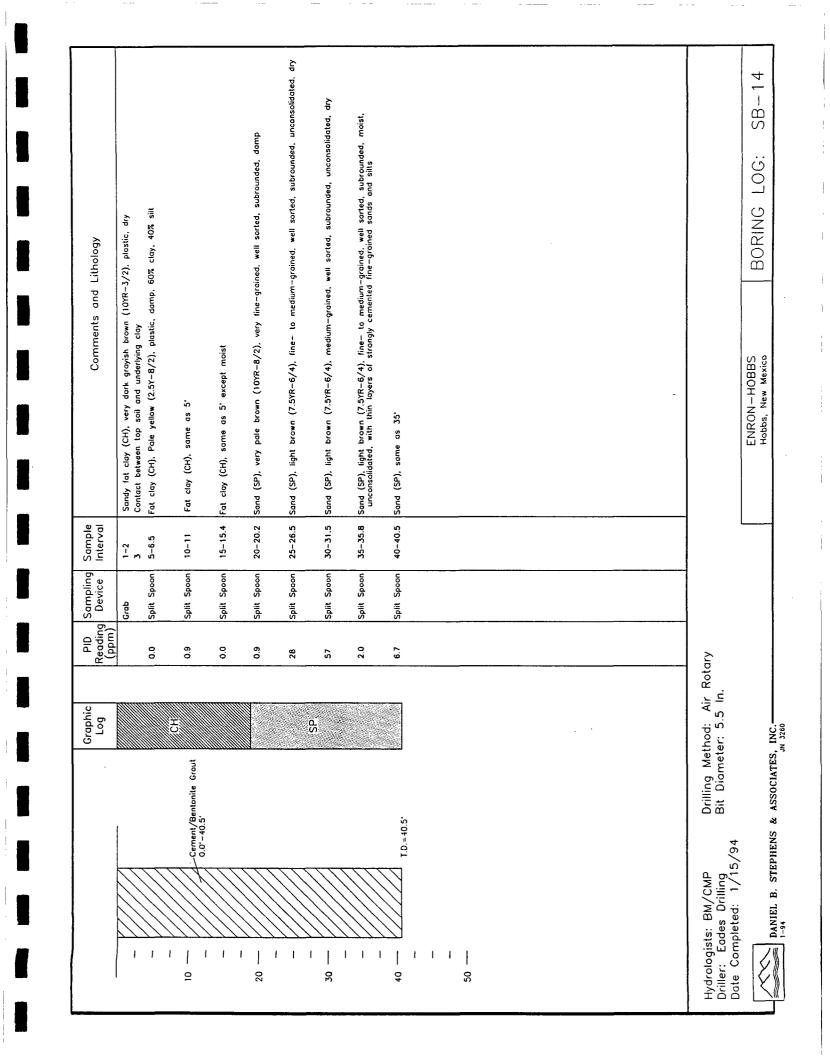
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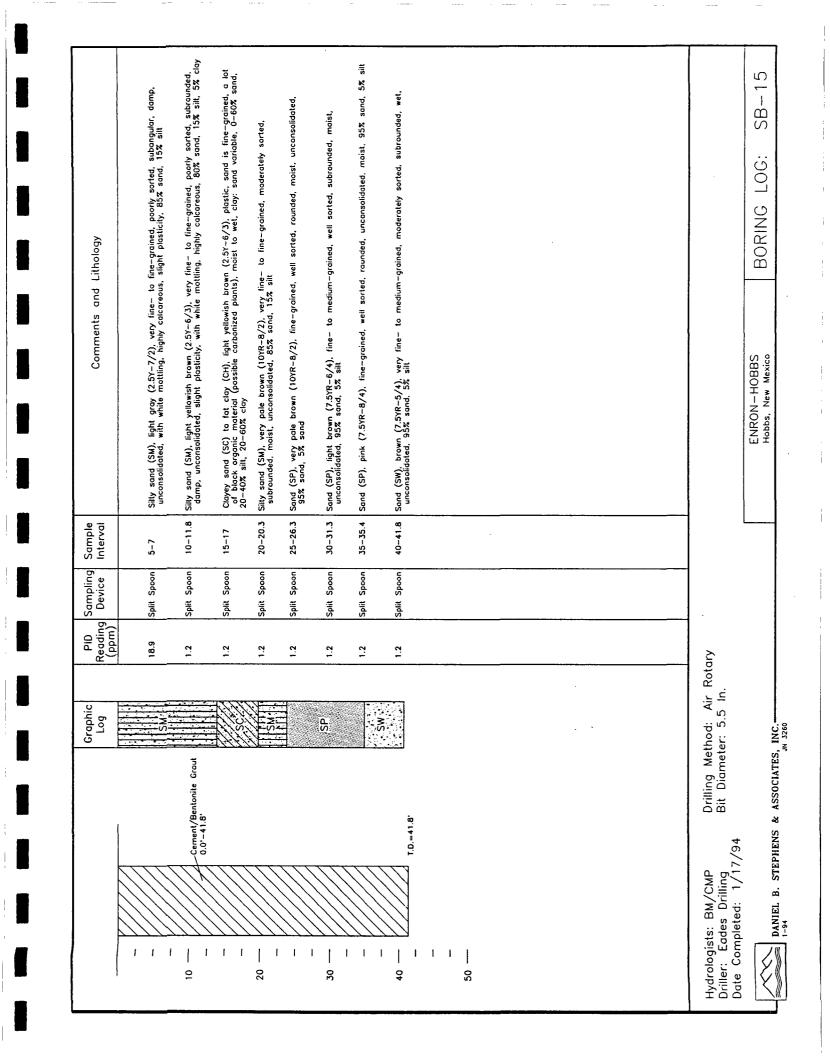
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	Grab 1–3	3.7 Split Spoon 5-7	3.0 Split Spoon 10-12	MH MH 1.2 Split Spoon 15-16.8 Elastic silt with sand (MH), whi	1.2 Split Spoon 20-21 Sond with clay (SW-SC), light of plastic, unconsolidated, catcar	1.2 Split Spoon 25-27	1.2 Split Spoon 30-30.8	1.2 Split Spoon 35-35.3	Split Spoon 40-40.4 Sand (SW), light brown (7.5YR-				Drilling Method: Air Rotary Bit Diameter: 5.5 In.	ENRON-HOBBS
Comments and Lithology	Silty sand (SM), very dark gray (5Y-3/1), very fine- to medium-grained, poorly sorted, subangular, dry, unconsolidated, 60% sand, 30% silt, 10% clay	Clayey sand (SC), light gray (2.5Y-7/2), very fine- to fine-grained, poorly sorted, subangular, moist, moderate plasticity, calcareous, 50% sand, 35% clay, 15% silt	Clay with sand (CH), light brownish gray (2.5Y-6/2), highly plastic, maist, unconsolidated, white mottling of highly calcareous material	Elastic silt with sand (MH), while (2.5Y-8/1), highly plastic, moist, unconsolidated, 50% silt, 40% clay, 10% sand	Sand with clay (SW-SC), light gray (SY-7/1), very fine-grained, poorly sorted, subangular, moderately plastic, unconsolidated, calcareous, 50% sand, 30% clay, 20% silt	Sand (SP), light gray (2.57–7/2), medium-grained, well sorted, rounded, moist, unconsolidated, with few strongly cemented layers, 95% sand, 5% sitt	Sand (SP), light gray (10YR-7/2), fine-grained, well sorted, subrounded, unconsolidated, moist, several strongly cemented layers that are pinkish in color and very fine-grained, 95% sand, 5% silt	Sand with silt (SW-SM), light gray (10YR-7/2), very fing- to fing-grained, moderately sorted, moist, unconsolidated, with few strongly cemented (with calcite) layers, 90% sand, 10% silt	Sand (SW), light brown (7.5YR-6/4), very fine- to fine-grained, moderately sorted, subrounded to rounded, moist, unconsolidated, with few strangly cemented layers, 95% sand. 5% sitt					BBS POLINICIA 1 CC

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	Graphic Log	PID Reading (ppm)	Sampling Device	Sample Interval	Comments and Lithology	
- ////			Split Spoon	0.5-1.5	Silty sand (SM), very dark grayish brown (2.5Y-3/2), very fine- to medium subrounded, dry, unconsolidated	to medium-grained, poorly sorted,
		1.2	Split Spoon	5-7.0	Elastic silt (MH), pole yellow (2.5Y-8/2). moderate plasticity, unconsolidated, moist, highly calcareous, 60% silt, 35% clay, 5% sand	maist, highly calcareous.
10 - Cement/Bentonite Grout		3.7	Split Spoon	10-11.0	Elastic silt (MH), very pale brown (10YR-8/2), moderate plasticity, moist, unconsolidated, 60% silt, 35% clay, 5% sand	iconsolidated, calcareous,
	S S	1.2	Split Spoon	15-16.8	Silty sand (SM), light gray (10YR-7/2), very fine- to fine-grained, poorly sorted, unconsolidated, calcareous, 65% sand, 25% silt, 10% clay	orted, subangular, maist,
20		1.2	Split Spoon	20-20.5	Sitty sand (SM), very pale brown (107R–8/2), very fine- to medium-grained, poorly sorted, subangular, unconsolicated, with numerous strongly cemented layers of reddish-brown fine-grained sand, 80% sand, 20% sitt	J, poorly sorted, subangular, fine∼grained sand, 80%
	Ģ.	1.0	Split Spoon	25-27	Sand (SP), reddish-yellow (7.5YR-6/6), fine- to medium-grained, well sorted, rounded, unconsolidated, 95% sand, 5% silt	ed, rounded, moist,
29 – 1 – 1		3.7	Split Spoon	30-30.5	Sond (SP), light brown (7.5YR-6/4), fine- to medium-grained, well sarted, rounded, unconsolidated, moist, with layers of strongly cemented fine-grained sand	rounded, unconsolidated,
	SW SW	1.2	Split Spoon	35-35.5	Sand with silt (SW–SM). light brown (7.5YR–6/4), very fine– to fine–grained, maderately sorted, subrounded, moist, unconsolidated, calcareous, 90% sand, 10% silt	t, moderately sorted,
40 — [////] I.D.=40.8'			Split Spoon	40-40.8	Sand with silt (SW-SM), same as 35	
1     8						
Hydrologists: CMP/BM Drilling Method: Driller: Eades Drilling Bit Diameter: 5. Date Completed: 1/18/94	lethod: Air Rotary eter: 5.5 In.	2				
-				L	ENRON-HOBBS RURING	

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ng Sample e Interval Comments and Lithology	3-5 Silty sand (SM), very pale brown (10YR-7/3), very fine- to coarse-grained, poorly sorted, subrounded, dry, unconsolidated, 80% sand, 15% silt, 5% gravel	8-10 Silty sand (SM), same as 5'	13–15 Silly sand (SM), light brown (7.5YR-6/4), very line- to medium-grained, poorly sorted, subangular, damp, with thin loyers of strongly cemented fine sands and silts, 80% sand, 20% silt	18-20 Sitty sand (SM), pinkish white (7.5YR-8/2), very fine- to medium-grained, poorly sorted, subangular, damp, with thin layers of strongly cemented fine sands and silts, 80% sand, 20% silt	23-25 Silty sand (SM), same as 20	28–30 Sand (SP), pink (7.5YR-7/3), fine- to medium-grained, well sorted, subrounded, moist, unconsolidated, with thin strongly cemented layers, 93% sond, 5% sitt	33-35 Sand with silt (SP-SM), pink (7.5YR-7/3), fine-grained, well sorted, subrounded, with minor thin layers of strongly cemented sands and silts, 90% sand, 10%	38-40 Sand (SP), light brown (7.5YR-6/4), fine-grained, well sorted, subrounded, moist, unconsolidated, with minor strongly cemented layers. 95% sand, 5% silt	43-45 Sand (SP), same as 40'	48–50 Sand (SP), light brown (7.5YR–6/4), fine- to medium-grained, well sorted, subrounded, unconsolidated, wet, 95% sond, 5% silt 53–55 Sand, some as 50	52.1 Depth to water	58-60 Sand (SP), light brown (7.5YR-6/4), fine- to medium-grained, well sorted, subrounded, unconsolidated. solurated, 95% sand, 5% silt 60.5 Total depth		
PID Sampling Reading Device	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab		 
Log			S.			ß				SP			. •	
Expansion Cap Concrete Pad		Neat Cement Grout	(47 Bentonite) 1.0'-30.5'	2" Threaded SCH 40 PVC		Bentonite	20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20.50 20							

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# **APPENDIX B**

# ANALYTICAL LABORATORY REPORT



#### ATI I.D. 401324

February 10, 1994

Daniel B. Stephens & Associates 6020 Academy, NE - Suite 100 Albuquerque, NM 87106

Project Name/Number: ENRON-HOBBS 3260

Attention: Bob Marley

From 01/10/94 through 01/19/94, Analytical Technologies, Inc., (ADHS License No. AZ0015), received a request to analyze aqueous and non-aqueous samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

High surrogate recovery for EPA Method 8020/8015 for sample SB-5 @ 6.5' was confirmed by re-analysis at a dilution. The diluted results are reported. The acceptable recoveries for bromofluorobenzene for EPA Method 8020/8015 for non-aqueous samples are 64 to 116 percent.

The 8 RCRA metals by total digestion was requested for samples MW-4 and MW-7. The sample container for MW-7 was marked as To confirm, turbidity was measured and found to be <1 filtered. NTU. Per ATI protocol, the State of Arizona Health Services, and USEPA, it is not necessary to digest such samples. Per Standard Methods for the Examination of Water and Wastes, 17 ed., "...Colorless, transparent samples (primarily drinking water) containing a turbidity of <1 NTU...may be analyzed directly by atomic absorption spectroscopy or inductively coupled plasma spectroscopy for total metals without digestion ... "

EPA Method 8015, 8020 and 8010/8020 analyses were performed by Analytical Technologies, Inc., Albuquerque, NM.

All other analyses were performed by Analytical Technologies, Inc., 9830 S. 51st Street, Suite B-113, Phoenix, AZ.

This report is being reissued in part to include clarification for the above notes and to correct the EPA method number for sulfate. The method number was originally reported as EPA 375.2 instead of 300.0.

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141



Daniel B. Stephens & Associates February 10, 1994 Page Two

If you have any questions or comments, please do not hesitate to contact us at (505) 344-3777.

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Letitia Krakowski, Ph.D. Project Manager

MR:jd

Enclosure



CLIENT ROJECT PROJECT		D.B STEPHENS AND ASSOCIAT 3260 ENRON-HOBBS	THROU	ED: 01/10/94 GH: 01/19/94 : 01/27/94
		ATI I.D.:	401324	
ATI #	CLIE	NT DESCRIPTION	MATRIX	DATE COLLECTED
01	MW-4		AQUEOUS	01/10/94
02	TRIP	BLANK	AQUEOUS	01/05/94
03	MW-6		AQUEOUS	01/10/94
04	SB-1		AQUEOUS	01/11/94
05		BLANK	AQUEOUS	01/05/94
06	MW-4		AQUEOUS	01/10/94
07	SB-2		AQUEOUS	01/11/94
<b>0</b> 8		BLANK	AQUEOUS	01/05/94
09	SB-3		AQUEOUS	01/12/94
10	MW-1		AQUEOUS	01/12/94
<b>1</b> 1		BLANK	AQUEOUS	01/05/94
12	SB-4		AQUEOUS	01/12/94
13	MW-2		AQUEOUS	01/12/94
14	SB-5		AQUEOUS	01/12/94
15	SB-6		AQUEOUS	01/13/94
16		BLANK	AQUEOUS	01/05/94
17	-	PMENT BLANK 1	AQUEOUS	01/13/94
<b>1</b> 8	SB-7		AQUEOUS	01/13/94
19	SB-8		AQUEOUS	01/13/94
20 21	SB-9		AQUEOUS	01/14/94
22		BLANK	AQUEOUS	01/05/94
22	SB-1	0 @ 10'	AQUEOUS	01/14/94
23		0 6 40'	NON-AQ	01/14/94
24 25		2 @ 5.0'	NON-AQ	01/15/94
<b>2</b> 5		2 @ 40'	NON-AQ	01/14/94
27		3 @ 40'	NON-AQ	01/14/94
28			NON-AQ	01/15/94
		4 @ 30' 4 @ 40'	NON-AQ	01/15/94
29 30	56-1 MW-5		NON-AQ	01/15/94
31	MW-5 MW-7		AQUEOUS	01/16/94
32		BLANK	AQUEOUS	01/16/94
■ 33	NNG-		AQUEOUS AQUEOUS	01/05/94
34		ABLE PIT	AQUEOUS	01/17/94 01/17/94
35		ICATE I	AQUEOUS	NA
<b></b> 36		ICATE II	AQUEOUS	NA
37		0 18.5'	NON-AQ	01/13/94
38		@ 16.0'	NON-AQ	01/13/94
39		e 6.5′	NON-AQ	01/18/94
-				



#### ----TOTALS----

MATRIX # SAMPLES AQUEOUS 29 NON-AQUEOUS 10

### ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

### D.B. STEPHENS AND ASSOCIATES ENRON-HOBBS ATI LAB NO. 401324

### ATI'S DETECTION LIMITS FOR GENERAL CHEMISTRY - AQUEOUS

COMPOUND	DETECTION	LIMIT	(MG/L)
NITRATE/NITRITE - EPA METHOD 353.	. 2	0.06	
ALKALINITY - EPA METHOD 310.1		1	
CHLORIDE - EPA METHOD 325.2		0.5	
SULFATE - EPA METHOD 300.0		0.3	
TOTAL DISSOLVED SOLIDS		10	

ATI'S DETECTION LIMITS FOR METALS ANALYSES - AQUEOUS

COMPOUND	DETECTION LIMIT (MG/L)
CALCIUM - EPA METHOD 6010	0.1
POTASSIUM - EPA METHOD 6010	1.0
MAGNESIUM - EPA METHOD 6010	0.1
SODIUM - EPA METHOD 6010	0.1
SILVER - EPA METHOD 6010	0.010
ARSENIC - EPA METHOD 7060	0.005
BARIUM - EPA METHOD 6010	0.010
CADMIUM - EPA METHOD 6010	0.0005
CHROMIUM - EPA METHOD 6010	0.010
MERCURY - EPA METHOD 7470	0.0002
LEAD - EPA METHOD 7421	0.020
SELENIUM - EPA METHOD 7740	0.005

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### D.B. STEPHENS AND ASSOCIATES ENRON-HOBBS METHOD NUMBER AND DETECTION LIMITS ATI LAB NO. 401324

Water	EPA 8015 MODIFIED, ANALYZED AT 1X, UG/L:	
	PARAMETER DETECTION	LIMIT
	FUEL HYDROCARBONS 50	
	EPA 8015 MODIFIED, ANALYZED AT 5X, UG/L:	
	PARAMETER DETECTION	LIMIT
	FUEL HYDROCARBONS 250	
Soils	EPA 8015 MODIFIED, ANALYZED AT 1X, MG/KG:	
	PARAMETER DETECTION	LIMIT
	FUEL HYDROCARBONS 5	
	EPA 8015 MODIFIED, ANALYZED AT 20X, MG/KG:	
	PARAMETER DETECTION	LIMIT
	FUEL HYDROCARBONS 100	
	EPA 8015 MODIFIED, ANALYZED AT 50X, MG/KG:	
	PARAMETER DETECTION	LIMIT
	FUEL HYDROCARBONS 250	
	EPA 8015 MODIFIED, ANALYZED AT 1X, MG/L:	
	PARAMETER DETECTION	LIMIT

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FUEL HYDROCARBONS

### D.B. STEPHENS AND ASSOCIATES ENRON-HOBBS METHOD NUMBER AND DETECTION LIMITS ATI LAB NO. 401324

Water -----

# EPA 8020, ANALYZED AT 1X, UG/L:

PARAMETER	DETECTION LIMIT
BENZENE	0.5
TOLUENE	0.5
ETHYLBENZENE	0.5
TOTAL XYLENES	0.5

# EPA 8020, ANALYZED AT 5X, UG/L:

PARAMETER	DETECTION LIMIT
BENZENE	2.5
TOLUENE	2.5
ETHYLBENZENE	2.5
TOTAL XYLENES	2.5

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### D.B. STEPHENS AND ASSOCIATES ENRON-HOBBS METHOD NUMBER AND DETECTION LIMITS ATI LAB NO. 401324

- Soils -

### EPA 8020, ANALYZED AT 1X, MG/KG:

PARAMETER	DETECTION LIMIT			
BENZENE	0.025			
TOLUENE	0.025			
ETHYLBENZENE	0.025			
TOTAL XYLENES	0.025			

### EPA 8020, ANALYZED AT 20X, MG/KG:

PARAMETER	DETECTION LIMIT
BENZENE	0.5
TOLUENE	0.5
ETHYLBENZENE	0.5
TOTAL XYLENES	0.5

### EPA 8020, ANALYZED AT 50X, MG/KG:

PARAMETER	DETECTION LIMIT
BENZENE	1.25
TOLUENE	1.25
ETHYLBENZENE	1.25
TOTAL XYLENES	1.25

D.B. STEPHENS AND ASSOCIATES ENRON-HOBBS METHOD NUMBER AND DETECTION LIMITS ATI LAB NO. 401324

# - Water -

EPA 8010/8020, ANALYZED AT 1X, UG/L:

DETECTION LIMIT PARAMETER BENZENE <0.5 BROMODICHLOROMETHANE <0.2 <0.5 BROMOFORM <0.5 BROMOMETHANE CARBON TETRACHLORIDE <0.2 <0.5 CHLOROBENZENE CHLOROETHANE <0.2 CHLOROFORM <0.2 CHLOROMETHANE <0.5 DIBROMOCHLOROMETHANE <0.2 1,2-DIBROMOETHANE (EDB) <0.5 1,2-DICHLOROBENZENE <0.5 1,3-DICHLOROBENZENE <0.5 1,4-DICHLOROBENZENE <0.5 1,1-DICHLOROETHANE <0.2 1,2-DICHLOROETHANE (EDC) <0.2 1,1-DICHLOROETHENE <0.2 <0.2 CIS-1,2-DICHLOROETHENE TRANS-1, 2-DICHLOROETHENE <0.2 1,2-DICHLOROPROPANE <0.2 CIS-1, 3-DICHLOROPROPENE <0.5 TRANS-1, 3-DICHLOROPROPENE <0.2 **ETHYLBENZENE** <0.5 METHYL-t-BUTYL ETHER <2.5 METHYLENE CHLORIDE <2.0 <0.2 1,1,2,2-TETRACHLOROETHANE **TETRACHLOROETHENE** <0.2 TOLUENE <0.5 1,1,1-TRICHLOROETHANE <0.2 1,1,2-TRICHLOROETHANE <0.2 <0.2 TRICHLOROETHENE TRICHLOROFLUOROMETHANE <0.2 VINYL CHLORIDE <0.5 TOTAL XYLENES <0.5

D.B. STEPHENS AND ASSOCIATES ENRON-HOBBS METHOD NUMBER AND DETECTION LIMITS ATI LAB NO. 401324

# - Water -

### EPA 8010/8020, ANALYZED AT 5X, UG/L:

PARAMETER

DETECTION LIMIT

BENZENE	<2.5
BROMODICHLOROMETHANE	<1.0
BROMOFORM	<2.5
BROMOMETHANE	<2.5
CARBON TETRACHLORIDE	<1.0
CHLOROBENZENE	<2.5
CHLOROETHANE	<1.0
CHLOROFORM	<1.0
CHLOROMETHANE	<2.5
DIBROMOCHLOROMETHANE	<1.0
1,2-DIBROMOETHANE (EDB)	<2.5
1,2-DICHLOROBENZENE	<2.5
1,3-DICHLOROBENZENE	<2.5
1,4-DICHLOROBENZENE	<2.5
1,1-DICHLOROETHANE	<1.0
1,2-DICHLOROETHANE (EDC)	<1.0
1,1-DICHLOROETHENE	<1.0
CIS-1,2-DICHLOROETHENE	<1.0
TRANS-1, 2-DICHLOROETHENE	<1.0
1,2-DICHLOROPROPANE	<1.0
CIS-1,3-DICHLOROPROPENE	<2.5
TRANS-1, 3-DICHLOROPROPENE	<1.0
ETHYLBENZENE	<2.5
METHYL-t-BUTYL ETHER	<12
METHYLENE CHLORIDE	<10
1,1,2,2-TETRACHLOROETHANE	<1.0
TETRACHLOROETHENE	<1.0
TOLUENE	<2.5
1,1,1-TRICHLOROETHANE	<1.0
1,1,2-TRICHLOROETHANE	<1.0
TRICHLOROETHENE	<1.0
TRICHLOROFLUOROMETHANE	<1.0
VINYL CHLORIDE	<2.5
TOTAL XYLENES	<2.5
IOIND AIDDADO	12.5

### D.B. STEPHENS AND ASSOCIATES ENRON-HOBBS METHOD NUMBER AND DETECTION LIMITS ATI LAB NO. 401324

# - Water -

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EPA 8010/8020, ANALYZED AT 500X, UG/L:

PARAMETER

DETECTION LIMIT

BENZENE	<250
BROMODICHLOROMETHANE	<100
BROMOFORM	<250
BROMOMETHANE	<250
CARBON TETRACHLORIDE	<100
CHLOROBENZENE	<250
CHLOROETHANE	<100
CHLOROFORM	<100
CHLOROMETHANE	<250
DIBROMOCHLOROMETHANE	<100
1,2-DIBROMOETHANE (EDB)	<250
1,2-DICHLOROBENZENE	<250
1,3-DICHLOROBENZENE	<250
1,4-DICHLOROBENZENE	<250
1,1-DICHLOROETHANE	<100
1,2-DICHLOROETHANE (EDC)	<100
1,1-DICHLOROETHENE	<100
CIS-1,2-DICHLOROETHENE	<100
TRANS-1, 2-DICHLOROETHENE	<100
1,2-DICHLOROPROPANE	<100
CIS-1,3-DICHLOROPROPENE	<250
TRANS-1,3-DICHLOROPROPENE	<100
ETHYLBENZENE	<250
METHYL-t-BUTYL ETHER	<1200
METHYLENE CHLORIDE	<1000
1,1,2,2-TETRACHLOROETHANE	<100
TETRACHLOROETHENE	<100
TOLUENE	<250
1,1,1-TRICHLOROETHANE	<100
1,1,2-TRICHLOROETHANE	<100
TRICHLOROETHENE	<100
TRICHLOROFLUOROMETHANE	<100
VINYL CHLORIDE	<250
TOTAL XYLENES	<250

# GENERAL CHEMISTRY RESULTS

					ATI I.D. : 401324		
CLIENT : D.B. STEPHENS PROJECT # : 3260 PROJECT NAME : ENRON-HOBBS				: 01/10/94 : 01/27/94			
PARAMETER	UNITS	06	31	33	36		
HYDROXIDE (CACO3) TOTAL ALKALINITY (AS CACO3) CHLORIDE (EPA 325.2) NO2/NO3-N, TOTAL (353.2)	MG/L MG/L MG/L MG/L	<1 706 770 <0.06	262 <1 262 120 2.7	<1	<1 187 <1 187 64 2.6 51 410		

# GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : D.B. STEPHENS & ASSOCIATES PROJECT # : 3260 PROJECT NAME : ENRON-HOBBS

ATI I.D. : 401324

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CARBONATE BICARBONATE HYDROXIDE TOTAL ALKALINITY CARBONATE	MG/L MG/L MG/L MG/L MG/L	40165812	<1 330 <1 330	<1 330 <1 330	NA O NA O	NA NA NA NA	NA NA NA NA	NA NA NA NA
BICARBONATE HYDROXIDE TOTAL ALKALINITY	MG/L MG/L MG/L	40175001	<1 87 <1 87	<1 89 <1 89	NA 2 NA 2	NA NA NA NA	NA NA NA NA	NA NA NA NA
CHLORIDE NITRITE/NITRATE-N (TOT NITRITE/NITRATE-N (TOT SULFATE	MG/L MG/L MG/L MG/L	40132431 40166702 40132431 40132406	120 4.0 2.7 0.4	120 4.0 2.7 0.4	0 0 0	260 24 6.5 5.2	125 20 4.0 5.0	112 100 95 96
SULFATE TOTAL DISSOLVED SOLIDS TOTAL DISSOLVED SOLIDS	MG/L MG/L MG/L	40132431 40165801 40187605	140 2500 2000	140 2500 2000	0 0 0	290 NA NA	150 NA NA	100 NA NA

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) ------ X 100

Average Result



# METALS RESULTS

# ATI I.D. : 401324

CLIENT : D.B. STEPHENS PROJECT # : 3260 PROJECT NAME : ENRON-HOBBS	& ASSOCI	ATES		DATE REC REPORT I		: 01/10/94 : 01/27/94
PARAMETER	UNITS	06	31	33	36	
MERCURY (ÈPA 245.1/7470) POTASSIUM (EPA 200.7/6010)	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	0.077 0.667 104 <0.0005 <0.010 <0.0002 21.5 70 553	0.059 112 <0.0005 <0.010 <0.0002 4.7 11.5 145	- 75.3 - 2.4 10.0 52.6	- 75.7 - 2.6 10.0 52.5	

# METALS - QUALITY CONTROL

CLIENT PROJECT # PROJECT NAME	:	AT
4		

ATI I.D. : 401324

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE		% REC
SILVER	MG/L	40167001		<0.010	NA	0.442	0.500	88
SILVER		40132431		<0.010	NA	0.968	1.000	97
ARSENIC		40167001		<0.005	NA	0.051	0.050	102
ARSENIC	-	40187601		<0.005	NA	0.049	0.050	98
BARIUM	MG/L ·	40165801		0.026		0.976	1.00	95
EARIUM		40132431	0.059	0.057	3	0.989	1.000	93
CALCIUM		40132406	104 -	103	1	157	50.0	106
CALCIUM	MG/L	40132431	112	103 106	6	156	500	88
CADMIUM	MG/L	40166701	0.0026	0.0026	0		0.0050	
CADMIUM CADMIUM	MG/L	40187001		0.0014	0		0.0050	38
CHROMIUM	MG/L	40167001		<0.010	NA	0.961	1.00	9€
CHROMIUM	MG/L	40132431		<0.010	NA	1.00	1.00	1()-
CHROMIUM MERCURY MERCURY		40167004				0.0051		102
MERCURY	MG/L	40180404	<0.0002		NA	0.0048	0.0050	<b>9</b> 6
POTASSIUM	MG/L	40132406	21.5		0.9	69.2	50.0	95
POTASSIUM MAGNESIUM	MG/L	40132431	4.7		4	56.1	50.0	103
MAGNESIUM	MG/L	40132406		68	3 5	323	250	101
MAGNESIUM	MG/L	40132431		10.9	5	36.1	25.0	98
SODIUM	MG/L	40132406		542	2 5	1050	500	99
SODIUM	MG/L	40132431		138	5	185	50.0	80
LEAD	MG/L	40168101		<0.002	NA	0.050	0.050	100
LEAD	MG/L	40187701		0.003	NA	0.049	0.050	98
SELENIUM	MG/L	40167001			NA	0.034	0.050	68
SELENIUM	MG/L	40186801	<0.0005	<0.0005	NA	0.035	0.050	70

% Recovery = (Spike Sample Result - Sample Result) ______ X 100 Spike Concentration RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) ______ X 100 Average Result

### GAS CHROMATOGRAPHY RESULTS

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TEST CLIENT PROJECT PROJECT	: # :	D.B STEP	MODIFIED ( HENS AND AS BBS	•	ATI I.D.: 401324			
SAMPLE I.D. #	CLIEN	T I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	
23 24 25	SB-10	@ 10' @ 40' @ 5.0'	NON-AQ NON-AQ NON-AQ	01/14/94 01/15/94 01/14/94	01/18/94	01/19/94 01/19/94 01/20/94		
PARAMETI	ER			UNITS	23	24	25	
FUEL HYD HYDROCAF HYDROCAF	RBON RA		D USING	MG/KG	<5 - -	<5 - -	3100 C6-C16 GASOLINE	
BROMOFLU	JOROBEN	ZENE (%)			90	95	121*	

*SURROGATE OUTSIDE ATI ACCEPTANCE CRITERIA DUE TO MATRIX INTERFERENCE

#### GAS CHROMATOGRAPHY RESULTS

TEST: EPA 8015 MODIFIED (C6-C16)CLIENT: D.B STEPHENS AND ASSOCIATESPROJECT #: 3260 ATI I.D.: 401324 PROJECT NAME: ENRON-HOBBS SAMPLE DATE DATE DATE DIL. I.D. # CLIENT I.D. MATRIX SAMPLED EXTRACTED ANALYZED FACTOR ------------------SB-12@ 40'NON-AQ01/14/9401/18/9401/20/9450SB-13@ 40'NON-AQ01/15/9401/18/9401/19/941SB-14@ 30'NON-AQ01/15/9401/18/9401/19/941 26 27 28 -----------------PARAMETER UNITS 26 27 28 _____ _____ -----FUEL HYDROCARBONS MG/KG 4100 <5 <5 C6-C16 HYDROCARBON RANGE -HYDROCARBONS QUANTITATED USING GASOLINE 74 91 BROMOFLUOROBENZENE (%) 92

#### GAS CHROMATOGRAPHY RESULTS

TEST: EPA 8015 MODIFIED (C6-C16)CLIENT: D.B STEPHENS AND ASSOCIATES ATI I.D.: 401324 PROJECT # : 3260 PROJECT NAME: ENRON-HOBBS _____ DATE DATE DATE DIL. SAMPLE I.D. # CLIENT I.D. MATRIX SAMPLED EXTRACTED ANALYZED FACTOR -----____ 29SB-14 @ 40'NON-AQ01/15/9401/18/9401/19/9437SB-6 @ 18.5'NON-AQ01/13/9401/21/9401/24/94 1 1 NON-AQ 01/13/94 01/21/94 01/24/94 38 SB-7 @ 16.0' 1 _____ PARAMETER UNITS 29 37 38 _______ _____ -------------____ FUEL HYDROCARBONS MG/KG <5 <5 29 HYDROCARBON RANGE C9-C16 -HYDROCARBONS QUANTITATED USING GASOLINE 87 80 80 BROMOFLUOROBENZENE (%)

TEST:EPA 8015 MODIFIECLIENT:D.B STEPHENS ANDPROJECT #:3260PROJECT NAME:ENRON-HOBBS	•	• •				
SAMPLE I.D. # CLIENT I.D. MATRI	DATE X SAMPLED	DATE EXTRACTED	DATE ANALYZEI	DIL. D FACTOR		
39 SB-5 @ 6.5' NON-A	Q 01/18/9	4 01/21/94	01/24/94	4 20		
PARAMETER	UNITS	39				
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED USING	MG/KG	3300 C6-C16 GASOLINE				
BROMOFLUOROBENZENE (%) *SURROGATE RECOVERY OUTSIDE ATI	ACCEPTANCE	486* CRITERA DUE T	O MATRIX :	INTERFERENCE.		

# GAS CHROMATOGRAPHY RESULTS

# REAGENT BLANK

	BLANK I.D. :	D.B STEPHENS AND 3260			ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOR	:	401324 01/18/94 01/19/94 1
	PARAMETER		UNITS				
	FUEL HYDROCAF HYDROCARBON F HYDROCARBONS		MG/KG	<5 - -			
_	BROMOFLUOROBE	ENZENE (%)		98			

# GAS CHROMATOGRAPHY RESULTS

# REAGENT BLANK

BLANK I.D.				ATI I.D. : DATE EXTRACTED : DATE ANALYZED : DILUTION FACTOR:	401324 01/21/94 01/24/94 1
PARAMETER		UNITS			
FUEL HYDROCA HYDROCARBON HYDROCARBONS		MG/KG	<5 - -		
BROMOFLUOROB	ENZENE (%)		77		

### GAS CHROMATOGRAPHY RESULTS

TEST CLIENT PROJECT # PROJECT NAM	: D. : 32	TEX (EPA 8 B STEPHEN 260 IRON-HOBBS	S AND ASSO	OCIATES	ATI	[ I.D.: 40	1324	
SAMPLE I.D. # CL	IENT	I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	
<b>2</b> 4 SB	-10 @ -10 @ -12 @	40′	NON-AQ NON-AQ NON-AQ	01/14/94 01/15/94 01/14/94	01/18/94 01/18/94 01/18/94	01/19/94 01/19/94 01/20/94	1 1 50	
PARAMETER			UNITS	23	24	25		
BENZENE TOLUENE ETHYLBENZEN TOTAL XYLEN			MG/KG MG/KG MG/KG MG/KG		<0.025 <0.025			
BROMOFLUORO	BENZEI	NE (%)		90	95	121*		

*SURROGATE RECOVERY OUTSIDE ATI ACCEPTANCE CRITERIA DUE TO MATRIX INTERFERENCE.

# GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8 CLIENT : D.B STEPHEN PROJECT # : 3260 PROJECT NAME: ENRON-HOBBS				HENS AND ASS	OCIATES	ATI I.D.: 401324			
SAMPLE I.D. #	CLIENT		I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	
26	SB-12	e	401	NON-AQ	01/14/94		01/20/94	50	
27 28	SB-13 SB-14			NON-AQ NON-AQ	01/15/94 01/15/94	• •	01/19/94 01/19/94	1 1	
PARAMETI	ER			UNITS	26	27	28		
BENZENE				MG/KG	9.4	<0.025	<0.025		
TOLUENE				MG/KG	60	<0.025	<0.025		
ETHYLBEN	NZENE			MG/KG	18	<0.025	<0.025	, ,	
TOTAL XY	LENES			MG/KG	58	<0.025	<0.025		

BROMOFLUOROBENZENE (%)

74

91

92

#### GAS CHROMATOGRAPHY RESULTS

TEST CLIENT PROJECT PROJECT	# : 3260	HENS AND ASSO	DCIATES	A'	ATI I.D.: 401324				
SAMPLE I.D. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR			
39	SB-5 @ 6.5'	NON-AQ	01/18/94	01/21/94	01/24/94	20			
PARAMETE	R	UNITS	39						
BENZENE TOLUENE ETHYLBEN TOTAL XY		MG/KG MG/KG MG/KG MG/KG	<0.5 <0.5 18 <0.5						

BROMOFLUOROBENZENE (%)

486*

*SURROGATE RECOVERY OUTSIDE ATI ACCEPTANCE CRITERIA DUE TO MATRIX INTERFERENCE.



# GAS CHROMATOGRAPHY RESULTS

REAGENT BLANK

BLANK I.D. : CLIENT : PROJECT # :	BTEX (EPA 8020) 011893 D.B STEPHENS AND ASSOCI 3260 ENRON-HOBBS	ATES	ATI I.D. : DATE EXTRACTED : DATE ANALYZED : DILUTION FACTOR:	401324 01/18/94 01/19/94 1	
PARAMETER	UNITS				-
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENES	MG/KG MG/KG MG/KG MG/KG	<0.025 <0.025 <0.025 <0.025 <0.025			- <b>-</b>

BROMOFLUOROBENZENE (%)

98

# GAS CHROMATOGRAPHY RESULTS

# REAGENT BLANK

TEST : BLANK I.D. : CLIENT : PROJECT # : PROJECT NAME:	012194 D.B STEPHENS 3260	·	<b>IATES</b>	ATI I.D. : DATE EXTRACTED : DATE ANALYZED : DILUTION FACTOR:	401324 01/21/94 01/24/94 1	-
PARAMETER		UNITS	, <b></b>			
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENES		MG/KG MG/KG MG/KG MG/KG	<0.025 <0.025 <0.025 <0.025 <0.025			
BROMOFLUOROBE	NZENE (%)		77			•

### GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : MSMSD # : CLIENT : PROJECT # : PROJECT NAME:	BTEX (EPA 8020), 40132423 D.B STEPHENS ANI 3260 ENRON-HOBBS	·	ATI I DATE I 5 DATE I	EXTRACT ANALYZE E MATRI	ED: 01 D: 01 X: NO : 40	1324 /18/94 /19/94 N-AQ 132423 /KG	
PARAMETERS	SAMPI RESUI		SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE TOLUENE ETHYL BENZENE TOTAL XYLENES	<0.0 <0.0 <0.0 <0.0	025 1.0 025 1.0	0.88 0.85 0.88 2.7	88 85 88 90	0.91 0.86 0.88 2.7	91 86 88 90	3 1 0 0

% Recovery = (Spike Sample Result - Sample Result) % Recovery = X 100 Spike Concentration

(Sample Result - Duplicate Result) RPD (Relative Percent Difference) = ------- X 100 Average Result

··· · ____

### GAS CHROMATOGRAPHY - QUALITY CONTROL

#### MSMSD

TEST : MSMSD # : CLIENT : PROJECT # : PROJECT NAME:	BTEX (EPA 8020)/801 40132437 D.B STEPHENS AND AS 3260 ENRON-HOBBS	, ,	ATI I DATE I DATE A	EXTRACI ANALYZI E MATRI	YED:       01         YED:       01         YED:       01         YED:       01         YED:       NON	L324 /21/94 /24/94 N-AQ L32437 /KG	
PARAMETERS	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE TOLUENE ETHYL BENZENE TOTAL XYLENES	<0.025 <0.025 <0.025 <0.025 <0.025	1.0 1.0 1.0 3.0	0.97 0.92 0.94 2.9	97 92 94 97	0.97 0.92 0.94 2.9	97 92 94 97	0 0 0 0

(Spike Sample Result - Sample Result)
% Recovery = ----- X 100
Spike Concentration

(Sample Result - Duplicate Result) RPD (Relative Percent Difference) = ------ X 100 Average Result

CLIENT : D.E PROJECT # : 326	A 8015 MODIFIED (0 3 STEPHENS AND ASS 50 RON-HOBBS	-	ATI I.I			
SAMPLE I.D. # CLIENT I.	D. MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	
04 SB-1 07 SB-2 08 TRIP BLAN	AQUEOUS AQUEOUS VK AQUEOUS	01/11/94 01/11/94 01/05/94	NA NA NA	01/12/94 01/12/94 01/12/94	1 1 1	
PARAMETER		UNITS	04	07	08	
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANT	TITATED USING	UG/L	<50 - -	<50 . - -	<50 - -	·
BROMOFLUOROBENZEN	E (%)		100	110	101	

TEST CLIENT PROJECT ; PROJECT 1	LIENT : D.B STEPHENS AND ASSOCIATES					ATI I.D.: 401324			
SAMPLE I.D. #	CLIEN	ſ I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	·	
09 10 11	SB-3 MW-1 TRIP H	BLANK	AQUEOUS AQUEOUS AQUEOUS	01/12/94 01/12/94 01/05/94	NA NA NA	01/12/94 01/13/94 01/12/94	1 1 1		
PARAMETE	R			UNITS	09	10	11		
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED USING			UG/L	<50 - - -	1000 C6-C16 GASOLINE	<50 - -	·		
BROMOFLU	OROBEN	ZENE (%)			101	99	100		

CLIENT :	EPA 8015 M D.B STEPHE 3260 ENRON-HOBB	NS AND ASS	•	ATI I.D.: 401324			
SAMPLE I.D. # CLIENT	S I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	
12 SB-4 13 MW-2 14 SB-5		AQUEOUS AQUEOUS AQUEOUS	01/12/94 01/12/94 01/12/94	NA NA NA	01/12/94 01/14/94 01/14/94	1 1 1	
PARAMETER			UNITS	12	13	14	
FUEL HYDROÇARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED USING			UG/L	360 C6-C14 GASOLINE	<50 - -	1500 C6-C16 GASOLINE	
BROMOFLUOROBENZ	ZENE (%)			109	101	94	

TEST : EPA 8015 CLIENT : D.B STEPH PROJECT # : 3260 PROJECT NAME: ENRON-HOB		ATI I.D.: 401324				
SAMPLE I.D. # CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	
15 SB-6 16 TRIP BLANK 17 EQUIPMENT BLANK	AQUEOUS	01/13/94 01/05/94 01/13/94	NA	01/14/94 01/14/94 01/14/94	1 1 1	_
PARAMETER		UNITS	15	16	17	
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED	UG/L	700 C6-C16 GASOLINE	<50 - -	<50 - -		
BROMOFLUOROBENZENE (%)			102	102	100	

TEST : EPA 8015 MODIFIED (C6-C16) CLIENT : D.B STEPHENS AND ASSOCIATE PROJECT # : 3260 PROJECT NAME: ENRON-HOBBS				ATI I.D			
SAMPLE I.D. # 0	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	
19 5	5B-7 5B-8 5B-9	AQUEOUS AQUEOUS AQUEOUS	01/13/94 01/13/94 01/14/94	NA NA NA NA	01/14/94 01/14/94 01/14/94	1 1 1	
PARAMETER			UNITS	18	19	20	
FUEL HYDRO HYDROCARBO HYDROCARBO		ED USING	UG/L	350 C6-C16 GASOLINE	2800 C6-C16 GASOLINE	<50 - -	
BROMOFLUOR	ROBENZENE (%)			101	91	98	

					ATI I.D.: 401324			
SAMPLE I.D. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR		
21 22 30	TRIP BLANK SB-11 MW-5	AQUEOUS AQUEOUS AQUEOUS	01/05/94 01/14/94 01/16/94	NA NA NA	01/14/94 01/14/94 01/19/94	1 1 5		
PARAMETI	ER		UNITS	21	22	30		
HYDROCAL	DROCARBONS RBON RANGE RBONS QUANTITATED	USING	UG/L	<50 - -	220 C6-C16 GASOLINE	4000 C6-C14 GASOLINE		
BROMOFLU	JOROBENZENE (%)			99	109	117		

TEST CLIENT PROJECT PROJECT	: D.B STEPH # : 3260	MODIFIED (0 ENS AND AS: BS	•	ATI I.I	D.: 401324		• •
SAMPLE I.D. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	
31 32 33	MW-7 TRIP BLANK NNG-4	AQUEOUS AQUEOUS AQUEOUS	01/16/94 01/05/94 01/17/94	NA NA NA	01/19/94 01/19/94 01/19/94	1 1 1	
PARAMETE	ER		UNITS	31	32	33	
_HYDROCAP	DROCARBONS RBON RANGE RBONS QUANTITATED	) USING	UG/L	<50 - -	<50 - -	<50 -	
BROMOFLU	JOROBENZENE (%)			105	102	105	

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TEST CLIENT PROJECT PROJECT		ENS AND AS	•	ATI I.D	.: 401324	
SAMPLE I.D. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
34	PORTABLE PIT	AQUEOUS	01/17/94	NA	01/17/94	1
PARAMET	ER		UNITS	34		
HYDROCA	DROCARBONS RBON RANGE RBONS QUANTITATED	USING	UG/L	72 C6-C16 GASOLINE		
BROMOFL	UOROBENZENE (%)			102		

### GAS CHROMATOGRAPHY RESULTS

TEST : BLANK I.D. : CLIENT : PROJECT # : PROJECT NAME:	D.B STEPHENS AND 3260			ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOR MATRIX	
PARAMETER		UNITS			 
FUEL HYDROCAR HYDROCARBON R HYDROCARBONS		UG/L	<50 - -		
BROMOFLUOROBE	NZENE (%)		102		

# GAS CHROMATOGRAPHY RESULTS

FEST BLANK I.D. CLIENT PROJECT # PROJECT NAM	: : : : : : E :	EPA 8015 MODIFIE 011394 D.B STEPHENS AND 3260 ENRON-HOBBS	, ,		ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOF MATRIX	:	401324 NA 01/13/94 1 AQUEOUS
PARAMETER			UNITS				
FUEL HYDROC. HYDROCARBON HYDROCARBON	RA		UG/L	<50 - -			
BROMOFLUORO	BEN	ZENE (%)		101			

# GAS CHROMATOGRAPHY RESULTS

	BLANK I.D. : CLIENT : PROJECT # :	EPA 8015 MODIFIE 011494 D.B STEPHENS AND 3260 ENRON-HOBBS	• •		ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOF MATRIX	:	401324 NA 01/14/94 1 AQUEOUS	
	PARAMETER	· · · · · · · · · · · · · · · · · · ·	UNITS					_
	FUEL HYDROCARB HYDROCARBON RA HYDROCARBONS Q		UG/L	<50 - -				
_	BROMOFLUOROBEN	ZENE (%)		101				

# GAS CHROMATOGRAPHY RESULTS

CLIENT	EPA 8015 MODIFIN 011494 D.B STEPHENS ANN 3260 ENRON-HOBBS			: 1 : ( : 2	401324 NA 01/14/94 1 AQUEOUS
PARAMETER		UNITS		 	
FUEL HYDROCA HYDROCARBON HYDROCARBONS		UG/L	<50 - -	 	
BROMOFLUOROB	ENZENE (%)		102		

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### GAS CHROMATOGRAPHY RESULTS

· · · · · · · · · · · · · · · · · · ·	: EPA 8015 MODIFIE : 011794 : D.B STEPHENS AND : 3260 : ENRON-HOBBS			ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOF MATRIX	:	401324 NA 01/17/94 1 AQUEOUS
PARAMETER		UNITS				
FUEL HYDROCA HYDROCARBON HYDROCARBONS		UG/L	<50 - -			
BROMOFLUOROE	BENZENE (%)		102			

# GAS CHROMATOGRAPHY RESULTS

TEST BLANK I.D. CLIENT PROJECT # PROJECT NAME	EPA 8015 MODIFIE 011894 D.B STEPHENS AND 3260 ENRON-HOBBS			ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOP MATRIX	: : : : :	401324 NA 01/18/94 1 AQUEOUS
PARAMETER		UNITS				
FUEL HYDROCAP HYDROCARBON F HYDROCARBONS		UG/L	<50 - -			
BROMOFLUOROBE	ENZENE (%)		106			

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# GAS CHROMATOGRAPHY RESULTS

BLANK I.D. : CLIENT : PROJECT # :	EPA 8015 MODIFIED 011994 D.B STEPHENS AND 3260 ENRON-HOBBS			ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOR MATRIX	•	401324 NA 01/19/94 1 AQUEOUS
PARAMETER		UNITS				
FUEL HYDROCARBO HYDROCARBON RAI HYDROCARBONS Q		UG/L	<50 - -			
BROMOFLUOROBEN	ZENE (%)		101			

TEST CLIENT PROJECT PROJECT	# : 3260	ENS AND ASS	OCIATES	A	FI I.D.: 40	01324	
SAMPLE I.D. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	
04 07 08	SB-1 SB-2 TRIP BLANK	AQUEOUS AQUEOUS AQUEOUS	01/11/94 01/11/94 01/05/94	NA NA NA	01/12/94 01/12/94 01/12/94	1 1 1	
PARAMETE	:R	UNITS	04	07	08		
BENZENE TOLUENE ETHYLBEN TOTAL XY		UG/L UG/L UG/L UG/L	<0.5 <0.5 <0.5 <0.5 <0.5	<0.5 <0.5 <0.5 0.6	<0.5 <0.5 <0.5 <0.5 <0.5		
BROMOFLU	OROBENZENE (%)		100	110	101		

# GAS CHROMATOGRAPHY RESULTS

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TEST : CLIENT : PROJECT # : PROJECT NAME:	D.B STEPH	IENS AND ASS	OCIATES	A	FI I.D.: 40	01324	
SAMPLE I.D. # CLIE	NT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	· · ·
09 SB-3 10 MW-1 11 TRIP	BLANK	AQUEOUS AQUEOUS AQUEOUS	01/12/94 01/12/94 01/05/94	NA NA NA	01/12/94 01/13/94 01/12/94	1 1 1	
PARAMETER		UNITS	09	10	11		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENES		UG/L UG/L UG/L UG/L	<0.5 <0.5 <0.5 <0.5 <0.5	3.9 <0.5 2.1 2.0	<0.5 <0.5 <0.5 <0.5 <0.5		· <b></b>
BROMOFLUOROBE	NZENE (%)		101	99	100		

CLIENT : D PROJECT # : 3		NS AND ASS	OCIATES	<b>A</b> :	FI I.D.: 40	01324	
SAMPLE I.D. # CLIENT	I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	
12 SB-4 13 MW-2 14 SB-5		AQUEOUS AQUEOUS AQUEOUS	01/12/94 01/12/94 01/12/94	NA NA NA	01/12/94 01/14/94 01/14/94	1 1 1	
PARAMETER		UNITS	12	13	14		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENES		UG/L UG/L UG/L UG/L UG/L	130 <0.5 15 8.0	<0.5 <0.5 <0.5 <0.5 <0.5	<0.5 <0.5 6.5 6.1		
BROMOFLUOROBENZE	INE (%)		109	101	94		

CLIENT : I	BTEX (EPA 8 D.B STEPHEN B260 ENRON-HOBBS	S AND ASSO	CIATES	ATI	I.D.: 401	1324
SAMPLE I.D. # CLIENT	I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
15 SB-6 16 TRIP BL2 17 EQUIPMEN			01/13/94 01/05/94 01/13/94	NA NA NA	01/14/94 01/14/94 01/14/94	1 1 1
PARAMETER		UNITS	15	16	17	
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENES		UG/L UG/L UG/L UG/L UG/L	1.3 <0.5 0.5 1.3	<0.5 <0.5 <0.5 <0.5	<0.5 0.5 <0.5 <0.5	
BROMOFLUOROBENZI	ENE (%)		102	102	100	

TEST : CLIENT : PROJECT # : PROJECT NAME:	3260	ENS AND ASS	OCIATES	A	FI I.D.: 40	01324	
SAMPLE I.D. # CLIEN	T I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	
18 SB-7 19 SB-8 20 SB-9		AQUEOUS AQUEOUS AQUEOUS	01/13/94 01/13/94 01/14/94	NA NA NA	01/14/94 01/14/94 01/14/94	1 1 1	
PARAMETER		UNITS	18	19	20		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENES		UG/L UG/L UG/L UG/L UG/L	<0.5 <0.5 0.6 <0.5	1.3 <0.5 0.8 17	-0.5 <0.5 <0.5 0.5		
BROMOFLUOROBEN	ZENE (%)		101	91	98		

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### GAS CHROMATOGRAPHY RESULTS

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TEST CLIENT PROJECT # PROJECT N	<b># :</b> 3260	INS AND ASS	OCIATES	A7	FI I.D.: 40	01324	
SAMPLE I.D. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	· <b></b>
21 22 30	TRIP BLANK SB-11 MW-5	AQUEOUS AQUEOUS AQUEOUS	01/05/94 01/14/94 01/16/94	NA NA NA	01/14/94 01/14/94 01/19/94	1 1 5	
PARAMETER	R	UNITS	21	22	30		
BENZENE TOLUENE ETHYLBEN2 TOTAL XYI		UG/L UG/L UG/L UG/L	<0.5 <0.5 <0.5 <0.5 <0.5	5.2 <0.5 0.7 0.5	300 190 160 490		
BROMOFLUC	OROBENZENE (%)		99	109	117		

TEST CLIENT PROJECT # PROJECT NAME	: BTEX (EPA 8 : D.B STEPHEN : 3260 E: ENRON-HOBBS	IS AND ASSO	DCIATES	AT	I I.D.: 40	1324
6AMPLE I.D. # CLI	IENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
31 MW- 32 TRI 33 NNC	IP BLANK	AQUEOUS AQUEOUS AQUEOUS	01/16/94 01/05/94 01/17/94	NA NA NA	01/19/94 01/19/94 01/19/94	1 1 1
PARAMETER		UNITS	31	32	33	
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE		UG/L UG/L UG/L UG/L	<0.5 <0.5 <0.5 <0.5 <0.5	<0.5	2.6 <0.5 <0.5 <0.5 <0.5	
BROMOFLUOROE	BENZENE (%)		105	102	105	

#### GAS CHROMATOGRAPHY RESULTS

TEST CLIENT PROJECT PROJECT	: BTEX (EPA : D.B STEPH # : 3260 NAME: ENRON-HOE	IENS AND ASS	OCIATES	A	FI I.D.: 40	01324
SAMPLE I.D. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
34	PORTABLE PIT	AQUEOUS	01/17/94	NA	01/17/94	1
PARAMET	ER	UNITS	34			_ ~
BENZENE TOLUENE ETHYLBE TOTAL X	NZENE	UG/L UG/L UG/L UG/L	<0.5 <0.5 0.5 <0.5			

BROMOFLUOROBENZENE (%)

# GAS CHROMATOGRAPHY RESULTS

# REAGENT BLANK

TEST : BLANK I.D. : CLIENT : PROJECT # : PROJECT NAME:	BTEX (EPA 8020) 011294 D.B STEPHENS AND ASSOC 3260 ENRON-HOBBS	IATES	ATI I.D. : DATE EXTRACTED : DATE ANALYZED : DILUTION FACTOR: MATRIX :	401324 NA 01/12/94 1 AQUEOUS
PARAMETER	UNITS	~		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENES	UG/L UG/L UG/L UG/L UG/L	<0.5 <0.5 <0.5 <0.5 <0.5	· · · · · · · · · · · · · · · · · · ·	

BROMOFLUOROBENZENE (%)



#### GAS CHROMATOGRAPHY RESULTS

# REAGENT BLANK

TEST : BLANK I.D. : CLIENT : PROJECT # : PROJECT NAME:	BTEX (EPA 8020) 011394 D.B STEPHENS AND ASSOCI 3260 ENRON-HOBBS	LATES	ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOR MATRIX	: 01/13/94
PARAMETER	UNITS			~~~~~~~~~~
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENES	UG/L UG/L UG/L UG/L	<0.5 <0.5 <0.5 <0.5 <0.5		

BROMOFLUOROBENZENE (%)

# GAS CHROMATOGRAPHY RESULTS

#### REAGENT BLANK

TEST : BLANK I.D. : CLIENT : PROJECT # : PROJECT NAME:	BTEX (EPA 8020) 011494 D.B STEPHENS AND ASSOC 3260 ENRON-HOBBS	TATES	ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOR MATRIX	:	401324 NA 01/14/94 1 AQUEOUS
PARAMETER	UNITS				
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENES	UG/L UG/L UG/L UG/L UG/L	<0.5 <0.5 <0.5 <0.5 <0.5			

BROMOFLUOROBENZENE (%)

#### GAS CHROMATOGRAPHY RESULTS

#### REAGENT BLANK

TEST : BLANK I.D. : CLIENT : PROJECT # : PROJECT NAME:	BTEX (EPA 8020) 011494 D.B STEPHENS AND ASSOC 3260 ENRON-HOBBS	IATES	ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOR MATRIX	: 01/14/94
PARAMETER	UNITS			
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENES	UG/L UG/L UG/L UG/L UG/L	<0.5 <0.5 <0.5 <0.5		

BROMOFLUOROBENZENE (%)



# GAS CHROMATOGRAPHY RESULTS

TEST BLANK I.D. CLIENT PROJECT # PROJECT NAME		BTEX (EPA 80 011794 D.B STEPHEN 3260 ENRON-HOBBS	·	TATES	ATI I.D. : DATE EXTRACTED : DATE ANALYZED : DILUTION FACTOR: MATRIX :	401324 NA 01/17/94 1 AQUEOUS	
PARAMETER			UNITS				
BENZENE TOLUENE ETHYLBENZENI TOTAL XYLENI			UG/L UG/L UG/L UG/L UG/L	<0.5 <0.5 <0.5 <0.5 <0.5			
BROMOFLUORO	BEN	ZENE (%)		102			



# GAS CHROMATOGRAPHY RESULTS

### REAGENT BLANK

TEST : BLANK I.D. : CLIENT : PROJECT # : PROJECT NAME:	BTEX (EPA 8020) 011894 D.B STEPHENS AND ASSOC 3260 ENRON-HOBBS	IATES	DATE EXTRACTED DATE ANALYZED DILUTION FACTOR	: 401324 : NA : 01/18/94 : 1 : AQUEOUS
PARAMETER	UNITS			
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENES	UG/L UG/L UG/L UG/L	<0.5 <0.5 <0.5 <0.5		
				· .

BROMOFLUOROBENZENE (%)

#### GAS CHROMATOGRAPHY RESULTS

#### REAGENT BLANK

ROJECT # :	BTEX (EPA 8020) 011994 D.B STEPHENS AND ASSOCI 3260 ENRON-HOBBS	ATES	ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOR MATRIX		401324 NA 01/19/94 1 AQUEOUS
PARAMETER	UNITS	- ~ - ~ - ~			
BENZENE TOLUENE THYLBENZENE TOTAL XYLENES	UG/L UG/L UG/L UG/L	<0.5 <0.5 <0.5 <0.5 <0.5		,,	

BROMOFLUOROBENZENE (%)

#### GAS CHROMATOGRAPHY - QUALITY CONTROL

#### MSMSD

MSMSD # :	BTEX (EPA 8020)/3 40132404 D.B STEPHENS AND 3260 ENRON-HOBBS		ATI I DATE DATE	EXTRACI ANALYZI E MATRI I.D.	TED: NA ED : 01, IX : AQU	1324 /12/94 JEOUS 132404 /L	
PARAMETERS	SAMPL RESUL		SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE TOLUENE ETHYL BENZENE TOTAL XYLENES	<0.5 <0.5 <0.5 <0.5 <0.5	10	10 9.5 9.5 29	100 95 95 97	10 9.3 9.2 28	100 93 92 93	0 2 3 4

(Spike Sample Result - Sample Result) Recovery = ----- X 100 Spike Concentration

(Sample Result - Duplicate Result) RPD (Relative Percent Difference) = ------ X 100 Average Result



#### GAS CHROMATOGRAPHY - QUALITY CONTROL

#### MSMSD

TEST : MSMSD # : CLIENT : PROJECT # : PROJECT NAME:	BTEX (EPA 8 40132410 D.B STEPHEN 3260 ENRON-HOBBS	IS AND	015, MOD (C	ATI I DATE DATE	EXTRACT ANALYZE LE MATRI I.D.	ED: NA D: 01/ X: AQU	L324 /13/94 JEOUS L32410 /L	
PARAMETERS		SAMPLE RESULT		SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE TOLUENE ETHYL BENZENE TOTAL XYLENES		3.9 <0.5 2.1 2.0	10 10 10 30	14 8.0 11 31	101 80 89 97	14 8.4 11 32	101 84 89 100	0 5 0 3

(Spike Sample Result - Sample Result) % Recovery = ----- X 100 Spike Concentration

(Sample Result - Duplicate Result) RPD (Relative Percent Difference) = ------ X 100 Average Result

#### GAS CHROMATOGRAPHY - QUALITY CONTROL

#### MSMSD

TEST : MSMSD # : CLIENT : PROJECT # : PROJECT NAME:	BTEX (EPA 8020)/3 40132413 D.B STEPHENS AND 3260 ENRON-HOBBS		ATI I DATE 5 DATE	EXTRACI ANALYZI E MATRI I.D.	TED: NA ED: 01/ IX: AQU	.324 14/94 JEOUS .32413 L	
PARAMETERS	SAMPL RESUL		SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE TOLUENE ETHYL BENZENE FOTAL XYLENES	<0.5 <0.5 <0.5 <0.5 <0.5	10 10	11 9.9 9.8 30	110 99 98 100	10 9.7 9.4 29	100 97 94 97	10 2 4 3

(Spike Sample Result - Sample Result) Recovery = ------ X 100 Spike Concentration

(Sample Result - Duplicate Result) RPD (Relative Percent Difference) = ------ X 100

#### GAS CHROMATOGRAPHY - QUALITY CONTROL

#### MSMSD

TEST : MSMSD # : CLIENT : PROJECT # : PROJECT NAME:	BTEX (EPA 8020)/ 40133403 D.B STEPHENS AND 3260 ENRON-HOBBS	·	ATI I DATE DATE	EXTRACI ANALYZI E MATRI I.D.	TED: NA ED : 01, IX : AQU	L324 /19/94 JEOUS L33403 /L	
PARAMETERS	SAMPL RESUL		SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	).PD
BENZENE TOLUENE ETHYL BENZENE TOTAL XYLENES	<0.5 <0.5 <0.5 <0.5	10 10	10 9.4 9.4 29	100 94 94 97	11 9.8 9.7 30	110 98 97 100	10 4 3 3

(Spike Sample Result - Sample Result) % Recovery = ----- X 100 Spike Concentration

(Sample Result - Duplicate Result) RPD (Relative Percent Difference) = ------ X 100

Average Result



## GAS CHROMATOGRAPHY - QUALITY CONTROL

#### MSMSD

TEST :	BTEX (EPA	8020)/801	15, MOD (	C6-C16) ATI I	. D .	: 401	1324	
MSMSD # : CLIENT : PROJECT # : PROJECT NAME:	40133403 D.B STEPHE 3260 ENRON-HOBB		SSOCIATES	DATE DATE	EXTRACTANALYZI E MATRI	TED: NA ED: 01, IX: AQU	/17/94 JEOUS 133403	
PARAMETERS		SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE TOLUENE ETHYL BENZENE TOTAL XYLENES		<0.5 0.6 <0.5 <0.5	10 10 10 30	9.2 8.9 8.4 26	92 83 84 87	10 10 10 31	100 94 100 103	8 12 17 18

(Spike Sample Result - Sample Result) % Recovery = ----- X 100 Spike Concentration

TEST : EPA 8015 M CLIENT : D.B STEPHE PROJECT # : 3260 PROJECT NAME: ENRON-HOBE	INS AND ASS	SOCIATES	ATI I.I	D.: 401324		
SAMPLE I.D. # CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR	
01 MW-4 03 MW-6	AQUEOUS AQUEOUS	01/10/94 01/10/94	01/10/94 01/11/94		1 1	
PARAMETER		UNITS	01	03		
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED	USING	MG/L	42 C6-C18 GASOLINE	3 C6-C20 GASOLINE		
O-TERPHENYL (%)			103	98		



# GAS CHROMATOGRAPHY RESULTS

BLANK I.D.	D.B STEPHENS AND 3260	-		ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOR	:	401324 01/10/94 01/10/94 1
PARAMETER		UNITS				
FUEL HYDROCARB HYDROCARBON RA HYDROCARBONS Q		MG/L	<1 - -			
O-TERPHENYL (%	)		102			



# GAS CHROMATOGRAPHY RESULTS

BLANK I.D. : CLIENT : PROJECT # :		-		ATI I.D. DATE EXTRACTED DATE ANALYZED DILUTION FACTOF	:	401324 01/11/94 01/11/94 1	
PARAMETER		UNITS				*****	-
FUEL HYDROCARB HYDROCARBON RA HYDROCARBONS Q		MG/L	<1 - -				-
O-TERPHENYL (%	)		97				

### GAS CHROMATOGRAPHY - QUALITY CONTROL

#### MSMSD

TEST : MSMSD # : CLIENT : PROJECT # : PROJECT NAME:	EPA 8015 MOI 011094 D.B STEPHENS 3260 ENRON-HOBBS		OCIATES	D7 D7 S7 R1	TE ANA	TRACTED: ALYZED : MATRIX :	401324 01/10/ 01/10/ AQUEOU 011094 MG/L	94 94 S
PARAMETERS		SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
FUEL HYDROCARB	ONS	<1	36	35	97	34	94	3

#### GAS CHROMATOGRAPHY - QUALITY CONTROL

#### MSMSD

TEST MSMSD # CLIENT PROJECT # PROJECT NAME	•	EPA 8015 MOI 011194 D.B STEPHENS 3260 ENRON-HOBBS	S AND AS	SOCIATES	D2 D2 S2 R1	ATE ANA	TRACTED: ALYZED : MATRIX :	401324 01/11/ 01/11/ AQUEOU 011194 MG/L	94 94 JS
PARAMETERS			SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
FUEL HYDROCA	RB	ONS	<1	36	34	94	35	97	3

# Analytical Technologies, Inc. GAS CHROMATOGRAPHY RESULTS

FEST:PURGEABLE HACLIENT:D.BSTEPHENSPROJECT #:STEPHENSPROJECT NAME:ENRON-HOBBS			(EPA 8010 ATI I	• •	01324	
SAMPLE I.D. # CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTEI		ATE LYZED	DIL. FACTOR
01 MW-4 02 TRIP BLANK 03 MW-6	AQUEOUS AQUEOUS AQUEOUS	01/10/94 01/05/94 01/10/94	NA NA NA	01/	10/94 10/94 13/94	500 1 5
PARAMETER	UNITS		01	02	03	
BENZENE BROMODICHLOROMETHANE BROMOFORM BROMOMETHANE CARBON TETRACHLORIDE CHLOROBENZENE CHLOROETHANE CHLOROFORM CHLOROMETHANE DIBROMOCHLOROMETHANE 1,2-DICHLOROBENZENE 1,3-DICHLOROBENZENE 1,3-DICHLOROETHANE (EDC) 1,2-DICHLOROETHANE (EDC) 1,2-DICHLOROETHANE (EDC) 1,2-DICHLOROETHANE (EDC) 1,2-DICHLOROETHENE TRANS-1,2-DICHLOROETHENE TRANS-1,2-DICHLOROETHENE TRANS-1,3-DICHLOROPROPENE TRANS-1,3-DICHLOROPROPENE TRANS-1,3-DICHLOROPROPENE TRANS-1,3-DICHLOROPROPENE THYLBENZENE METHYL-t-BUTYL ETHER METHYLENE CHLORIDE 1,1,2,2-TETRACHLOROETHANE 1,1,2-TRICHLOROETHANE 1,1,2-TRICHLOROETHANE 1,1,2-TRICHLOROETHANE TRICHLOROFLUOROMETHANE VINYL CHLORIDE TOTAL XYLENES	UG/L UG/L UG/L UG/L UG/L UG/L UG/L UG/L		000       100         100       250         250       250         100       250         100       250         100       250         250       250         250       250         250       250         100       250         250       250         100       250         100       100         100       250         100       250         100       250         100       250         100       250         100       200         100       200         100       100         100       100         100       250         200       200         200       200         100       200         100       200         100       200         100       200         100       200         100       250	<pre>&lt;0.5 &lt;0.5 &lt;0.2 &lt;0.5 &lt;0.2 &lt;0.5 &lt;0.2 &lt;0.5 &lt;0.2 &lt;0.5 &lt;0.2 &lt;0.5 &lt;0.5 &lt;0.5 &lt;0.5 &lt;0.2 &lt;0.5 &lt;0.2 &lt;0.2 &lt;0.2 &lt;0.2 &lt;0.2 &lt;0.2 &lt;0.2 &lt;0.2</pre>	770 D <1.0 <2.5 <2.5 <1.0 <2.5 <1.0 <2.5 <1.0 <2.5 <2.5 <2.5 <2.5 <2.5 <2.5 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	(100)
SURROGATES: BROMOCHLOROMETHANE (%) TRIFLUOROTOLUENE (%)			103 104	108 105	103 90	

# Analytical Technologies, Inc. GAS CHROMATOGRAPHY RESULTS

TEST : PURGEABLE HA CLIENT : D.B STEPHENS PROJECT # : 3260 PROJECT NAME: ENRON-HOBBS				3020) : 401324	
SAMPLE I.D. # CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
05 TRIP BLANK	AQUEOUS	01/05/94	NA	01/13/94	1
PARAMETER	UNITS		05		· · · · · · · · ·
BENZENE BROMODICHLOROMETHANE BROMOFORM BROMOMETHANE CARBON TETRACHLORIDE CHLOROBENZENE CHLOROETHANE CHLOROFORM CHLOROMETHANE DIBROMOCHLOROMETHANE 1,2-DIBROMOETHANE (EDB) 1,2-DICHLOROBENZENE 1,3-DICHLOROBENZENE 1,4-DICHLOROETHANE 1,2-DICHLOROETHANE 1,2-DICHLOROETHANE 1,2-DICHLOROETHANE 1,2-DICHLOROETHENE 1,2-DICHLOROETHENE 1,2-DICHLOROETHENE 1,2-DICHLOROETHENE 1,2-DICHLOROPROPENE TRANS-1,2-DICHLOROPROPENE TRANS-1,3-DICHLOROPROPENE ETHYLBENZENE METHYL-t-BUTYL ETHER	UG/L UG/L UG/L UG/L UG/L UG/L UG/L UG/L	< < < < < < < < < < < < < < < < < < <	0.5 0.2 0.5 0.5 0.2 0.5 0.2 0.2 0.2 0.5 0.5 0.5 0.5 0.5 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	·	
METHYLENE CHLORIDE 1,1,2,2-TETRACHLOROETHANE TETRACHLOROETHENE TOLUENE	UG/L UG/L UG/L UG/L	< < <	2.0 0.2 0.2 0.5		
1,1,1-TRICHLOROETHANE 1,1,2-TRICHLOROETHANE TRICHLOROETHENE TRICHLOROFLUOROMETHANE VINYL CHLORIDE TOTAL XYLENES	UG/L UG/L UG/L UG/L UG/L UG/L	< < < <	0.2 0.2 0.2 0.2 0.5 0.5		
SURROGATES: BROMOCHLOROMETHANE (%) TRIFLUOROTOLUENE (%)			102 98		



# GAS CHROMATOGRAPHY - QUALITY CONTROL

#### REAGENT BLANK PURGEABLE HALOCARBONS/AROMATICS

TEST : EPA 8010/802 BLANK I.D. : 011094 CLIENT : D.B STEPHENS PROJECT # : 3260 PROJECT NAME: ENRON-HOBBS		ATI I.D. : DATE EXTRACTED: DATE ANALYZED : DIL. FACTOR :	
PARAMETER	UNITS		
PARAMETER BENZENE BROMODICHLOROMETHANE BROMOFORM BROMOMETHANE CARBON TETRACHLORIDE CHLOROBENZENE CHLOROETHANE CHLOROFORM CHLOROFORM CHLOROMETHANE DIBROMOCHLOROMETHANE 1,2-DICHLOROBENZENE 1,3-DICHLOROBENZENE 1,4-DICHLOROBENZENE 1,1-DICHLOROETHANE 1,2-DICHLOROETHANE 1,2-DICHLOROETHANE (EDC) 1,1-DICHLOROETHANE (EDC) 1,1-DICHLOROETHANE (EDC) 1,1-DICHLOROETHANE (EDC) 1,2-DICHLOROETHENE TRANS-1,2-DICHLOROETHENE 1,2-DICHLOROPROPANE CIS-1,3-DICHLOROPROPENE TRANS-1,3-DICHLOROPROPENE TTANS-1,3-DICHLOROPROPENE TTANS-1,3-DICHLOROPROPENE ETHYLBENZENE METHYL-t-BUTYL ETHER METHYLENE CHLORIDE 1,1,2-TETRACHLOROETHANE TETRACHLOROETHENE TOLUENE 1,1,1-TRICHLOROETHANE 1,1,2-TRICHLOROETHANE TRICHLOROFLUOROMETHANE VINYL CHLORIDE	UNITS UG/L <0.5 UG/L <0.2 UG/L <0.5 UG/L <0.2 UG/L <0.2 UG/L <0.2 UG/L <0.2 UG/L <0.2 UG/L <0.2 UG/L <0.2 UG/L <0.5 UG/L <0.5 UG/L <0.5 UG/L <0.5 UG/L <0.5 UG/L <0.2 UG/L <0.5 UG/L <0.2 UG/L <0.5 UG/L		
TOTAL XYLENES SURROGATES: BROMOCHLOROMETHANE (%) TRIFLUOROTOLUENE (%)	UG/L <0.5 102 106		



## GAS CHROMATOGRAPHY - QUALITY CONTROL

## REAGENT BLANK PURGEABLE HALOCARBONS/AROMATICS

PEST : EPA 8010/802 BLANK I.D. : 011394 CLIENT : D.B STEPHENS PROJECT # : 3260 PROJECT NAME: ENRON-HOBBS		IATES	ATI I.D. : DATE EXTRACTED: DATE ANALYZED : DIL. FACTOR :	401324 NA 01/13/94 1
PARAMETER	UNITS			************
BENZENE	UG/L	<0.5		) in a
BROMODICHLOROMETHANE	UG/L	<0.2		
BROMOFORM	UG/L	<0.5		
BROMOMETHANE	UG/L	<0.5		
_CARBON TETRACHLORIDE	UG/L	<0.2		
CHLOROBENZENE	UG/L	<0.5		
CHLOROETHANE	UG/L	<0.2		
CHLOROFORM	UG/L	<0.2		
CHLOROMETHANE	UG/L	<0.5		
DIBROMOCHLOROMETHANE	UG/L	<0.2		
1,2-DIBROMOETHANE (EDB)	UG'L	<0.5		
1,2-DICHLOROBENZENE	UG/L	<0.5		
,3-DICHLOROBENZENE	UG/L	<0.5		
4-DICHLOROBENZENE	UG/L	<0.5		
1,1-DICHLOROETHANE	UG/L	<0.2		
2-DICHLOROETHANE (EDC)	UG/L	<0.2	~	
1-DICHLOROETHENE	UG/L	<0.2		
CIS-1,2-DICHLOROETHENE	UG/L	<0.2		
TRANS-1, 2-DICHLOROETHENE	UG/L	<0.2		
L, 2-DICHLOROPROPANE	UG/L	<0.2		
CIS-1,3-DICHLOROPROPENE	UG/L	<0.5		
TRANS-1, 3-DICHLOROPROPENE	UG/L	<0.2		
ETHYLBENZENE	UG/L	<0.5	<u>.</u> .	
METHYL-t-BUTYL ETHER	UG/L	<2.5		
METHYLENE CHLORIDE	UG/L	<2.0		
1,2,2-TETRACHLOROETHANE	UG/L	<0.2		
TETRACHLOROETHENE	UG/L	<0.2		
TOLUENE	UG/L	<0.5		
1,1,1-TRICHLOROETHANE	UG/L	<0.2		
L, 1, 2-TRICHLOROETHANE	UG/L	<0.2		
TRICHLOROETHENE	UG/L	<0.2		
TRICHLOROFLUOROMETHANE	UG/L	<0.2		
VINYL CHLORIDE	UG/L	<0.5		
TOTAL XYLENES	UG/L	<0.5		
SURROGATES:				
BROMOCHLOROMETHANE (%)		103		
TRIFLUOROTOLUENE (%)		98		
8				

Analytical **Technologies**, Inc.

## GAS CHROMATOGRAPHY - QUALITY CONTROL

CLIENT : D PROJECT # : 3 PROJECT NAME: E	URGEABLE HALO .B STEPHENS A 260 NRON-HOBBS 0131906	•		DATE	I.D. ANALYZED LE MATRIX		13/94 EOUS	
COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKE SAMPLE	DUP. % REC.	RPD.	
BENZENE CHLOROBENZENE 1,1-DICHLOROETHE TOLUENE TRICHLOROETHENE	<0.5 <0.5 NE <0.2 <0.5 <0.5 <0.2	10 10 10 10 10	11 10 13 11 11	110 100 130 110 110	11 11 12 10 11	110 110 120 100 110	0 10 8 10 0	<b></b>

(Spike Sample Result - Sample Result) % Recovery = ----- X 100 Spike Concentration

(Sample Result - Duplicate Result) RPD (Relative Percent Difference) = ------ X 100 Average Result

		RCRA Metals by TCLP (1151) RUMBER OF CONTAINERS	4									÷				ີ ເຕັ ເ	0 Holl	1/w/gcy	Analytical Technologies, inc.	ATOR
		notzegið latoT va slateM AROR											Time:	Date:			Time: D'D.	ie:	togies	DISTRIBUTION: White, Canary - ATI • Pink - ORIGINATOR
<u></u>		The 13 Priority Pollutant Metals						·				RELINQUISHED BY:	Ē	ő		RECEIVED BY:(LAB)	alla alla	。书	schno	- H
101321			<b> </b>									SHE				BY:	ð	O	cal Ti	l - L
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Shenhana & Assec-<br>ADDRESS: Gooze Academy Not Suita 100<br>Albus, NM 87109<br>PHONE: 822 9400<br>FAX: 822 8077 | BILL TO:<br>Company:<br>Address:<br>Sample ID<br>Date Time Matrix Lab ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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