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### MONITORING REPORTS

**DATE:** / 995



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July 25, 1995

0814-4230-95

### RECEIVED

### AUG 1 1 1995

Mr. George Robinson ENRON Operations Corp. Environmental Affairs Department 1400 Smith St., Suite 3AC-3142 Houston, Texas 77002

Environmental Bureau Oil Conservation Division

Dear George:

Enclosed please find a conceptual corrective action plan for the dehydration area at WT-1 Compressor Station. An associated cost estimate for system implementation is also included.

Please review the plan at your convenience and feel free to contact me with any questions at (505) 822-9400.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.

Bol Marley

Bob Marley Project Manager

BM/et Enclosure

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### CONCEPTUAL CORRECTIVE ACTION PLAN FOR SOIL REMEDIATION WT-1 COMPRESSOR STATION, DEHYDRATION AREA CARLSBAD, NEW MEXICO

### INTRODUCTION

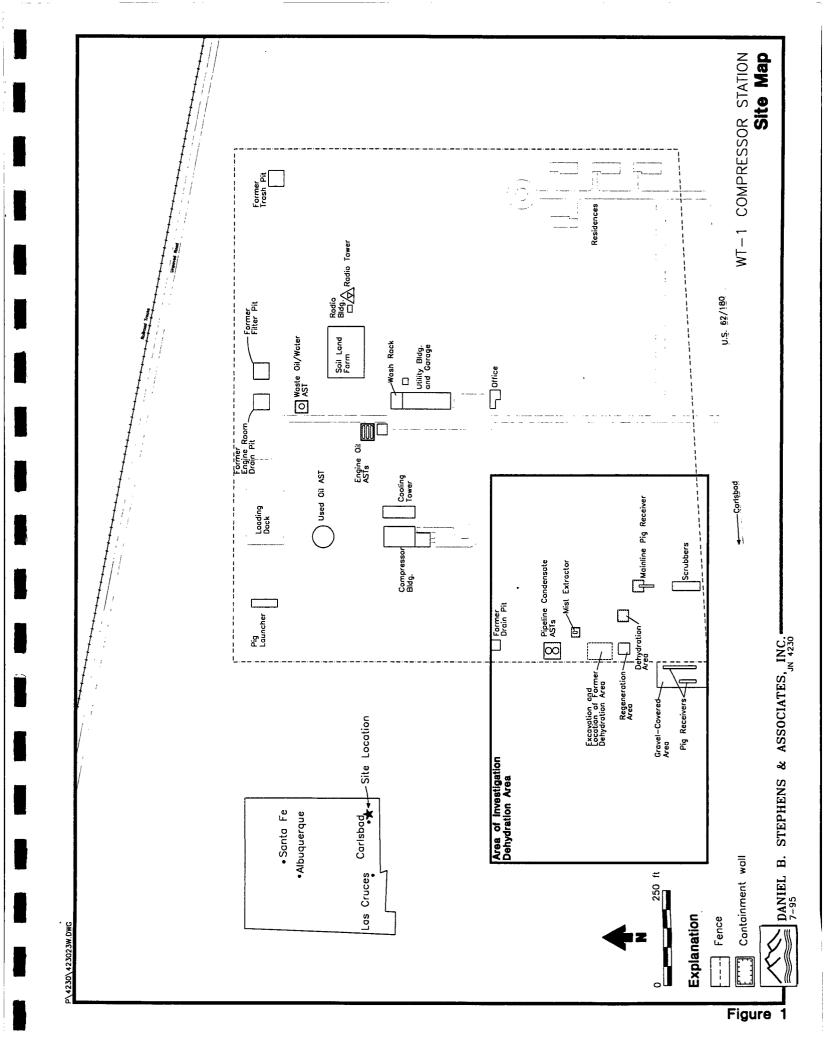
Daniel B. Stephens & Associates, Inc. (DBS&A) has been retained by ENRON Operations Corp. (EOC) to prepare a conceptual reclamation design for the remediation of contaminated soils at the Transwestern Pipeline Company's (TPC) WT-1 Compressor Station. The facility is located approximately 30 miles east of Carlsbad, New Mexico, along U.S. Highway 62.

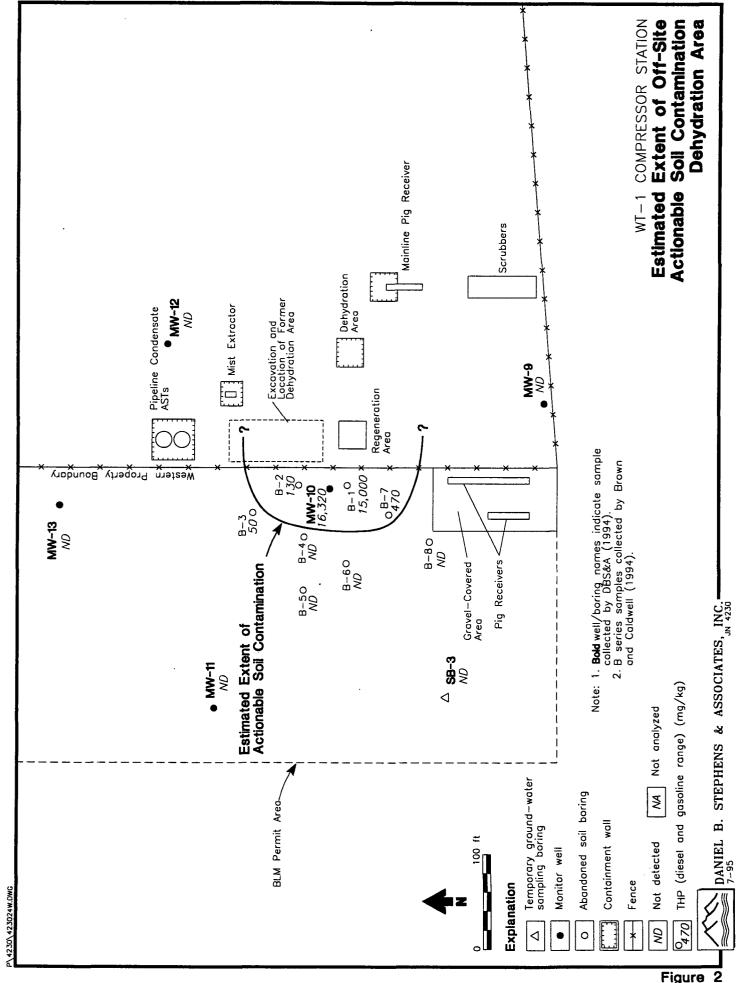
The area of contamination addressed by this reclamation design is located in the southwest corner of the WT-1 Compressor Station site (Figure 1). In this area (referred to as the dehydration area on Figure 1) pipeline liquids, consisting primarily of water with limited quantities of petroleum distillates, are removed from the gas stream by dehydration. The soil contamination beneath the dehydration units resulted from the release to the subsurface of wastewaters generated by this process.

### **PROJECT BACKGROUND**

Two previous hydrogeologic investigation were conducted to delineate the extent of soil and ground-water impacts in the dehydration area (Brown & Caldwell, 1993; DBS&A, 1995). Once the extent of subsurface impacts were determined, Cypress Engineering Services, Inc (CES) implemented a work plan to excavate and treat near-surface soils underlying the dehydration area. A brief summary of these activities is provided below.

The first investigation was performed by Brown & Caldwell in November 1993. They advanced a total of eight soil borings (B-1 through B-8 on Figure 2) to the water table and collected soil and ground-water samples for analysis of total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylene (BTEX). Soil samples from B-1, B-2, and B-7 were impacted above the New Mexico Oil Conservation Division (NMOCD) guidelines for TPH and BTEX. Ground-





Figure



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water samples collected from each open boring exceeded the New Mexico Water Quality Control Commission (NMWQCC) regulation standards for BTEX.

In November 1994, DBS&A drilled five monitor wells and a temporary ground-water sampling boring, conducted two bail-recovery tests to determine local hydraulic conductivity, and conducted a soil vapor extraction (SVE) pilot test. The investigation defined the off-site extent of soil and ground-water impacts originating from the dehydration units. In addition, the results of the SVE pilot test indicated that SVE was a feasible remedial technology for the site.

The site hydrogeology and extent of subsurface contamination, based on the data gathered to date, are described below:

- Perched ground water is present within the Santa Rosa sandstone at depths of approximately 45 to 55 feet below ground surface. The saturated thickness of the perched system ranges from approximately 0 to 10 feet; locally, ground water flows toward the northwest. There are no known uses for the perched water.
- Results of bail-down/recovery tests indicated that the average hydraulic conductivity is on the order of 10<sup>-2</sup> feet per day. As evidenced by two borings that did not encounter ground water, the perched system appears to be of limited extent west of the site.
- Field headspace and laboratory analyses indicated that actionable soil contamination, based on NMOCD (1993) guidelines of 100 mg/kg TPH, extends approximately 60 feet beyond the western property line (Figure 2).
- Phase-separated hydrocarbons (PSH) are present near the western fence line, as evidenced by the 1 foot of PSH measured in monitor well MW-10.
- Concentrations of benzene, toluene, xylene, and total naphthalene exceed NMWQCC standards in the vicinity of monitor well MW-10. TPH in ground water was identified as primarily gasoline-range constituents.



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• The majority of the contaminant mass appears to be present in the sorbed and vapor phase within the soil and as PSH in contact with the perched water.

In December 1994, CES implemented a work plan to remediate near-surface soils below the dehydration area. This remediation program included the excavation of approximately 3,300 cubic yards of soil underneath the dehydration area and the subsequent augmentation of the excavated soil with a nutrient solution to enhance biodegradation of hydrocarbons. The treated soils were placed back into the excavated area.

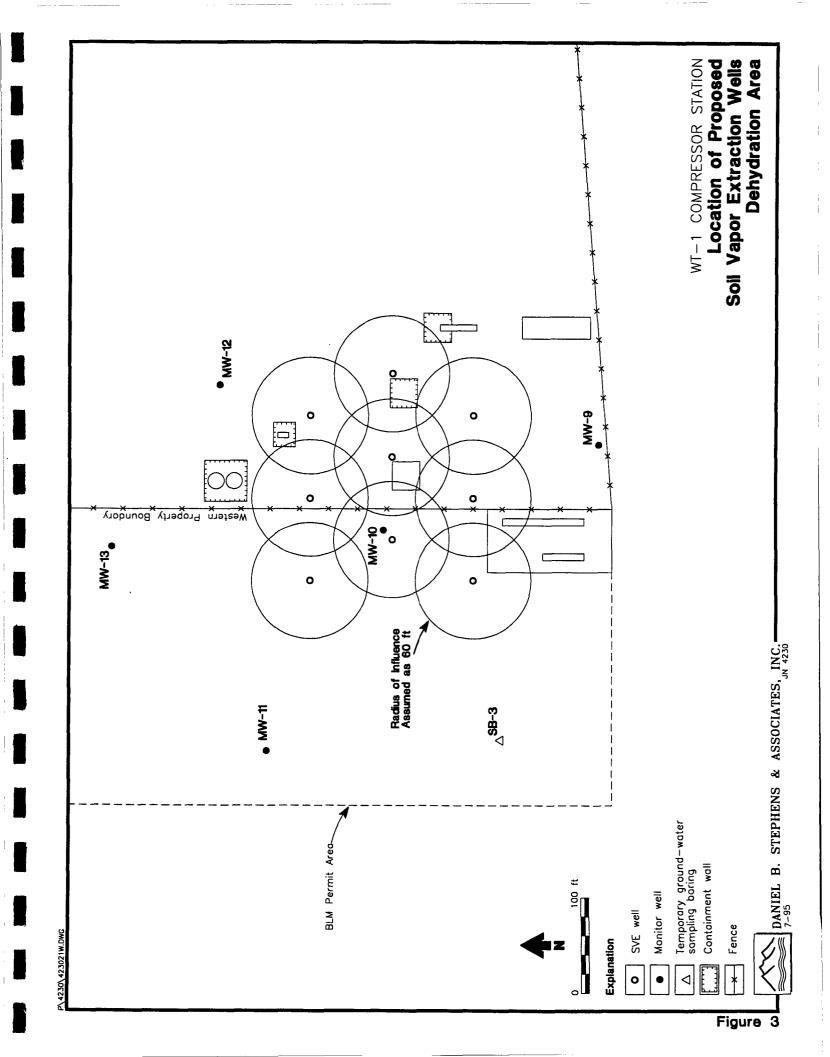
### PROPOSED CORRECTIVE ACTION SYSTEM

The proposed corrective action technology for removal of subsurface contaminants beneath the dehydration area is soil vapor extraction. This process will recover sorbed-phase, vapor-phase, and PSH contamination. Because the dissolved-phase contamination is a small fraction of the total contaminant mass, no action is proposed to address the dissolved-phase contamination present within the limited perched system. Following cleanup of soil contamination and PSH, ground-water contamination will naturally attenuate.

### **Soil Vapor Extraction System**

Soil vapor extraction is a proven technology for the removal of volatile organic compounds (VOCs) from soils with moderate to high air permeability. In addition to removing VOCs, the process enhances aerobic microbial degradation of residual sorbed soil contaminants by increasing the oxygen concentration in the subsurface. Based on the results of the SVE pilot test (DBS&A, 1995), it appears that SVE will be highly effective in removing the low-molecular-weight hydrocarbon distillates at the site. SVE can also be highly effective in removing PSH.

In order to achieve closure in a reasonably short time frame, the SVE system will consist of nine SVE wells, three independent soil vapor conveyance circuits, and a 200-standard cubic feet per minute (scfm) thermal catalytic oxidizer. Figure 3 depicts the locations of proposed SVE wells. The SVE pilot test indicated that a flow rate of approximately 1 to 2 scfm per linear foot of screen could be obtained from 2-inch-diameter SVE wells. The radius of influence was estimated as





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60 feet. The proposed design assumes 2 scfm per linear foot of screen and 20 feet of screened interval per well for a total flow rate of 40 scfm per well. The SVE wells will be screened from approximately 35 to 55 feet bgs. The nine SVE wells will be divided into three soil vapor conveyance circuits.

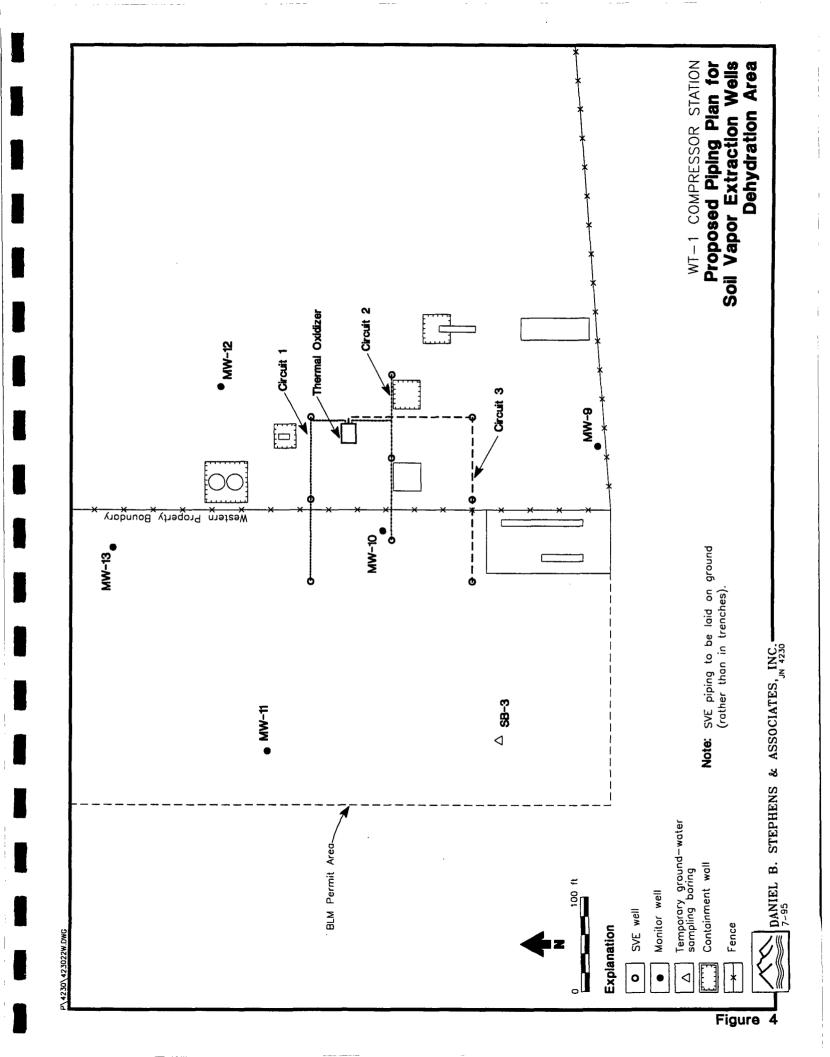
Based on the estimated flow rate requirements of the SVE well field and the contaminant mass removal rates, emission control will be required for full-scale operation of the SVE system. TPC will obtain the necessary air quality permit from the New Mexico Environment Department Air Quality Bureau.

Vapor conveyance piping will consist of high-density polyethylene (HDPE) pipe in various diameters according to head loss calculations along the three circuits. The proposed piping and SVE circuit configurations are shown in Figure 4. Due to the remoteness of the location and the short-term nature of the project, it is proposed that the piping be laid on the ground surface rather than in trenches. HDPE piping is better suited to this application than PVC because it is more flexible and less likely to be damaged by ultraviolet radiation or vehicular traffic.

### Equipment

The proposed treatment system for the extracted soil vapors is a thermal catalytic oxidizer manufactured by Baker Furnace, Inc. (Attachment 1). The 200-scfm oxidizer will extract soil vapors using a 7.5-hp positive displacement pump. Extracted vapors are passed through a moisture separator and then into a combustion chamber where the operating temperature is maintained at or above 1400°F. After destruction of the VOCs, the air stream is vented to the atmosphere.

To ensure that the combustion temperature is maintained within the required operating range, the oxidizer is equipped to use natural gas as a supplemental fuel. The 7.5-hp positive displacement pump will require a 3-phase, 220-volt electrical hookup. These required utilities will be hooked up at the equipment compound.





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When emission control is no longer required, the turnkey thermal oxidizer will be replaced with a low flow rate regenerative blower. The blower will be used to circulate air in the subsurface, thereby continuing to enhance the in-situ biodegradation of contaminants by maintaining adequate oxygen levels in the subsurface.

### **Corrective Action Activities and Performance Milestones**

The following tasks will be required to implement the proposed corrective action.

- File air quality permit application
- Finalize SVE system design and prepare construction plans; solicit contractor bid quotations and select construction contractors
- Construct SVE well field and order equipment
- Construct SVE conveyance system and equipment compound; install equipment

In addition, the following tasks will be required following system startup:

- Operate and maintain system
- Collect confirmation soil samples
- Achieve OCD soil standards and terminate SVE

### **Performance Reporting**

During the first year of operation, TPC will prepare semiannual reports detailing the operation and maintenance (O&M) of the system. These reports will summarize quarterly activities, which will include sampling of monitor wells near the dehydration area for BTEX and emissions from the SVE well field for TPH. After the first year of operation, TPC proposes to submit annual reports on O&M activities. Performance reporting will continue until site closure is obtained.



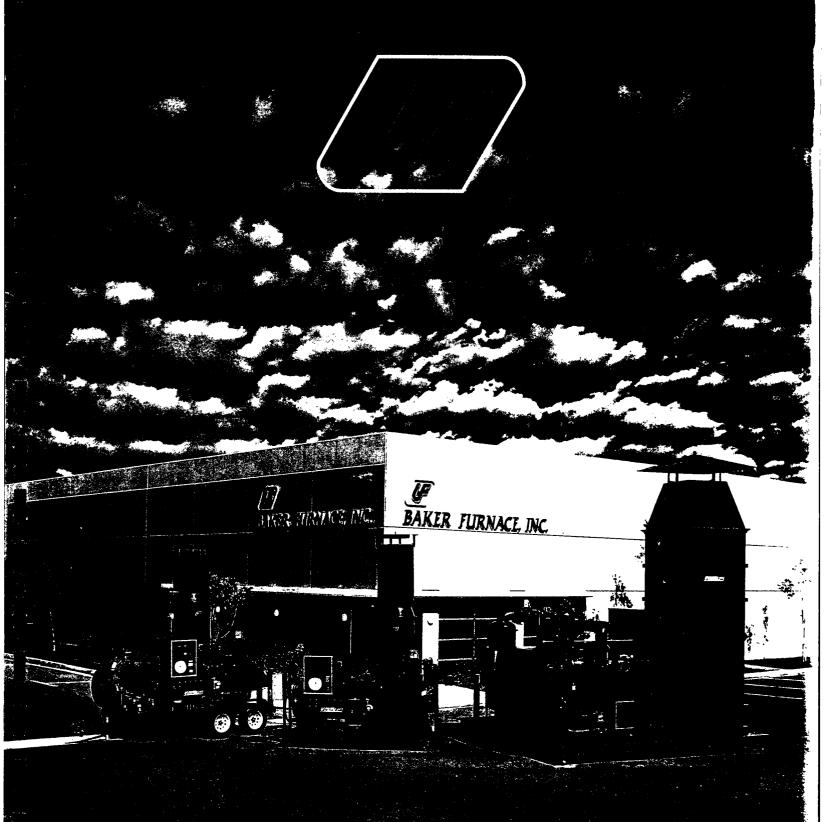
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### REFERENCES

- Brown & Caldwell. 1994. Subsurface Investigation, Transwestern WT-1 Compressor Station, Lea County, New Mexico. April 1994.
- Daniel B. Stephens & Associates, Inc. (DBS&A). 1995. Supplemental Environmental Investigation, WT-1 Compressor Station, Dehydration Area. Prepared for ENRON Operations Corp., Environmental Affairs Department, Houston, Texas. March 28, 1995.

### Attachment 1

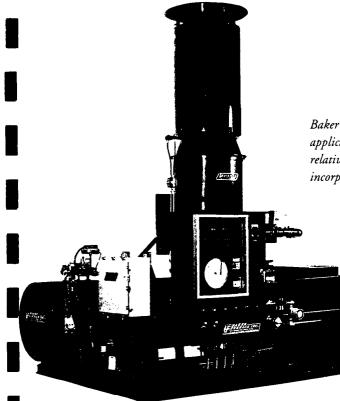
### **Description of Thermal Oxidizer**



### Committed to improving our environment

- Five separate safety interlocks
- AGA (American Gas Association) engineering report on Baker Oxidizers
- Automatic and proportional dilution air control as a function of LEL
- SCAQMD general permit
- Convertible from thermal mode (1450°F) to catalytic mode (700°F)
- Highly efficient combustion system proportionately modulates air and gas
- Highly insulating refractory lining on interior of oxidizer
- Silence package for vapor extraction blower
- Complete ready to operate with vapor extraction, electronics, and combustion system
- Fully automatic- starts and operates with turn of key switch
- LEL combustibles sensor/transmitter with alarm circuit
- On board telemetry system which monitors processes and faxes information back to management staff
- Three pen (expandable to 4 pen) chart recorder 6 hrs. to 31 days per revolution
- Moisture knockout tank with integral filter and optional automatic pump with level switches

Baker manufactures a standard line of Trailer mounted Oxidizers up to 500 cfm flow rate in 100 cfm increments. Each unit incorporates a vapor extraction system consisting of a positive displacement or regenerative blower, a U.L. classified electronics panel, a moisture knock-out tank, a complete combustion burner system and 5 safety interlocks with a Factory Mutual (FM) supplemental fuel train. The trailered (and skid mounted) units have been engineered to fit in a minimum of space while still retaining a full compliment of equipment. The trailered units also have electric brakes and meet DOT (Department of Transportation) specifications.



Baker Skid mounted Oxidizers are designed for those remediation applications where the Thermal Oxidizer is going to be stationary for a relatively prolonged period of time. Skid and trailer mounted units both incorporate the same design features.

GEONACE INC.

In addition to Thermal Oxidizers, Baker Furnace also manufactures Carbon Systems (either skid or trailer mounted). These systems are complete, ready to operate with Vapor Extraction Blower, LEL combustibles sensor, Electronic Control Panel and Carbon canisters.



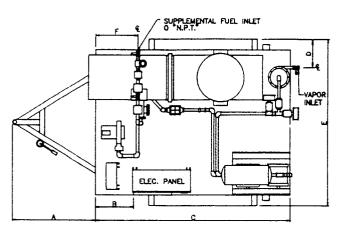
Baker Furnace maintains a complete fabrication/assembly shop and constructs each Oxidizer from the ground up. We do not utilize sub-contractors and as such have tight quality and production controls. Baker Oxidizers are subjected to rigorous tests before shipment and every component group (Electronics, Combustion and Vapor Extraction) is assembled on our premises.

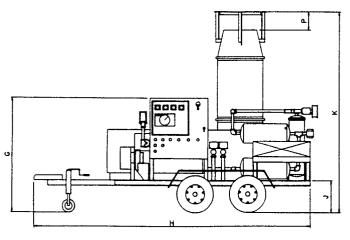
### TRAILER MOUNTED THERMAL OXIDIZERS dimensions in inches

OXIDIZER	А	В	С	D	E	F	G	Н	J	К	L	М	N	0	P	Q
100 CFM	51	20	120	20	91	18	82.5	171	19.5	162	56	60.5	2	1	8	75
200 CFM	51	20	120	20	91	18	82.5	171	19.5	162	56	60.5	2.5	1	8	75
300 CFM	60	20	144	20	97	18	87	204	24	162	56	60.5	3	1	8	81
400 CFM	60	20	168	20	97	18	87	204	24	162	<u>0</u>	75.5	4	1.5	8	81
500 CFM	60	20	168	20	97	18	87	228	24	162	-0	75.5	5	1.5	8	81

### SKID MOUNTED THERMAL OXIDIZERS dimensions in inches

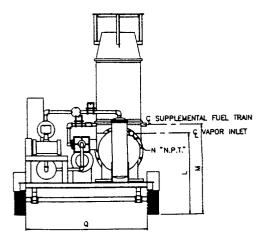
OXIDIZER	A	В	C	D	E	F	G	н	 I	 K	 T	м	N	 ()	Р	
100 CFM		20	120	 18	 N/A	18	69	N/A	 6	162	39	39	2	1	· . · . 8	84
200 CFM	N/A	20	120	18	N/A	18	69	N/A	6	162	39	39	2.5	1	8	84
300 CFM	N/A	20	132	18	N/A	18	69	N/A	6	162	39	42	3	1	8	84
400 CFM	 N/A	20	168		 N/A	18	69	N/A	6	162	53	45	4	1.5	8	96
500 CFM	N/A	20	168	18	N/A	18	69	N/A	6	162	53	50	5	1.5	8	96



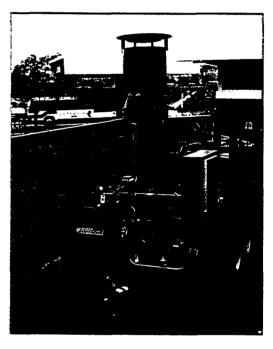


### OXIDIZER Weights in lbs. (approximate)

TYPE	100 CFM	200 CFM	300 CFM	400 CFM	500 CFM
Skid	4600	4800	5100	5700	5900
Trailer	5800	5900	6500	6800	7100



One day pilot study performed at active retail service station. 200 cfm trailer mounted units are available for short or long term rental periods. Factory trained personnel are available to operate equipment on pilot studies, perform onsite field service, or provide technical assistance over the telephone.



Trailer mounted 200 cfm oxidizer remediating gasoline storage tank leak at active retail service station.

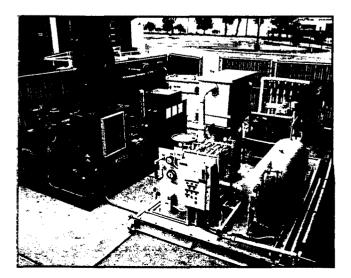
Applications for Baker Oxidation systems include:

- Underground storage tank remediation
- Paint spray booths and drying ovens
- Lithographic printing

- Bakeries (ethyl alcohol)
- Other industrial processes which emit volatile organic compounds

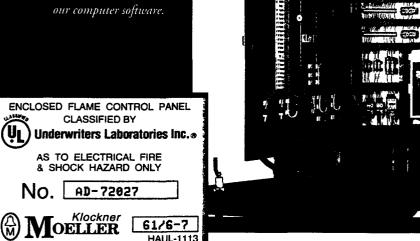


Skid mounted 400 cfm Baker Oxidizer being utilized to remediate hydrocarbon contaminated soil concurrently with water filtration system. Soil contaminant's include gasoline and diesel fuel.



Baker Furnace Thermal Oxidizers are equipped with a U.L. (Underwriters Laboratory) classified control panel. A U.L. Classification sticker is applied after a thorough diagnostics check via our computer software.

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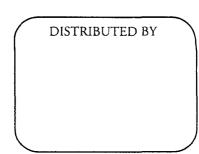




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1015 E. Discovery Lane, Anaheim, CA 92801 • (714) 491-9293 Fax (714) 491-8221 • 800-237-5675 (Outside CA)



### **Baker Thermal Oxidizer Specifications**

100 through 500 CFM Units (600 through 10,000 CFM quoted on request) Baker Thermal Oxidizers are designed for vapor extraction based soil remediation projects and other VOC destruction applications where burning the volatiles has been specified as the most cost effective method. Baker Oxidizers feature fully automatic operation, and use either natural gas or propane as supplemental fuel. The VOC destruction rates achieved by our Direct Fired and Catalytic units are excellent. (Please refer to the section on destruction rates for actual quantified rates.) The units are equipped with 6 separate safety interlocks and feature U.L. (Underwriters Laboratory), F.M. (Factory Mutual) and C.S.A. (Canadian Standards) approved components where applicable. Our 100 - 500 CFM units have been approved by A.G.A. (American Gas Association) Laboratories. Selected units have been granted general approval by the South Coast Air Quality Management District (responsible for greater Los Angeles area.) Baker Furnace was the first oxidizer manufacturer to secure this type of approval. Each unit is carefully sized for the correct volume of air and correct residence time for the vapors being oxidized. We size our Thermal Oxidizers for 1 full second of residence time to ensure a thorough destruction of the vapors being introduced into the Oxidizer.

### Dimensions

For specific dimensions on the #100 through #500 CFM Thermal Oxidizers (either skid or trailer mounted), please refer to our general arrangement drawing #101212 enclosed with these specifications.

### Oxidizer Weights in lbs.

TYPE	100CFM	200CFM	300CFM	400CFM	500CFM
Skid	3400	3600	4100	4300	4300
Trailer	4200	4300	4900	5100	5100

### Vapor Extraction Blower

A positive displacement blower with a 208/230/460 volt three phase (or 220 volt single phase) sixty (60) HZ. motor to deliver a correct volume of air at 4" of Hg. will be provided. Higher vacuums are available on request in the 10 to 12" Hg. range. The blower is belt driven and is equipped with an O.S.H.A. approved guard over the belts and sheaves. The blower also is fitted with inlet and outlet silencers and a "Kunkle" vacuum relief valve. Baker Furnace can provide a regenerative blower in lieu of the positive displacement blower if so desired.

### Blower Horsepower and Amperage Ratings at 4" HG Vacuumidizer100CFM200CFM300CFM400CFM500CFM

Oxidizer	100CFM	200CFM	300CFM	400CFM	500CFM
Horsepower	2	3	5	5	7.5
Amperage 230 V. 1 Ph.	12	17	28	28	40
208 V. 3 Ph.	7.8	11	17.5	17.5	25.3
230 V. 3 Ph.	6.8	9.6	15.2	15.2	22
460 V. 3 Ph.	3.4	4.8	7.6	7.6	11

### **Knock** Out Pot

A 12" or 16" diameter knock out pot with a manual drain is an integral part of the vapor extraction train. The pot is equipped with a sight glass and a brass ball cock for draining off liquid. An automatic pump with level switches can be fitted to the knock out pot on request. (See also high level knockout drain/shutoff in options section).

### Air Filters

Replaceable air filters are furnished with the unit and are located in the knock out pot and on the two dilution air inlets. The knock out pot filter can be readily changed by removing the top of the knock out pot. The air dilution filters are external and can also be readily changed. Baker Furnace maintains a supply of replacement filters in stock at all times.

### Three Way Valving with Automatic Air Dilution

Motor actuated three-way values are installed to supply clean air to purge the combustion system prior to ignition of the pilot and to restrict VOC laden air from entering the Thermal Oxidizer until it reaches its operating temperature. The values automatically switch over at a preset temperature which is configured into the process temperature controller. Two of the values are proportionally modulated and are linked to oxygen and L.E.L. sensors. The sensors are connected to digital microprocessor based P.I.D. controllers which proportionately modulate the butterfly values around a setpoint which has been selected. L.E.L. and oxygen levels are simply set on the P.I.D. controllers and then maintained automatically by the amount of dilution air which enters the Oxidizer.

### Supplemental Fuel and Vapor Inlet Pipe Sizes

Please refer to our general arrangement drawing #101212 included with these specifications for specific pipe sizes for the #100 through #500 Thermal Oxidizers.

### Air Flow Measurement

Post dilution process air flow to the combustion chamber is measured via a pitot tube and electronic air flow transmitter. An averaging pitot tube measures differential pressure, which is translated into an electronic signal by the transmitter, and sent to the chart recorder. Air flow is one of the three process variables monitored and recorded continuously by our Honeywell 3-pen chart recorder.

### **Combustion System**

An Eclipse MVTA (medium velocity tempered air) combustion burner will be supplied with the Thermal Oxidizer utilizing a combustion blower, modulating gas butterfly valve, spark ignition, piloting and FM approved flame safety relays. The combustion burner is also equipped with a FM approved gas fuel train. The burner will fire on propane or natural gas. Inlet gas pressure should be 2-5 PSI at the regulator on the fuel train. Please refer to the fuel usage charts provided with these specifications for data regarding the use of supplemental fuel versus VOC concentrations at the influent to the Oxidizer. The charts are available for both Catalytic and Direct fired operation.

### Control Panel

A complete, U.L. Approved Three Phase control panel is included with a choice of 208/ 230/460 volts (or 220 volt Single Phase if required) and would consist of the following component parts:

- 1. Honeywell 3 pen chart recorder (4 pen available)
- 2. Honeywell digital microprocessor based process controller
- 3. Honeywell high limit temperature controller
- 4. Honeywell L.E.L. controller with alarm setpoint -4-20 output
- 5. Honeywell  $O_2$  controller -4-20 milliamp output
- 6. Totalizing hour meter up to 9999 hours
- 7. Nema four panel with 3 Phase or 1 Phase disconnect
- 8. Step down transformer for 120 V. circuitry (3 ph. panels)
- 9. Alarm contacts in process and high limit controllers
- 10. FM approved flame safety relays
- 11. Combustion purge timer
- 12. All necessary fuses, terminal strips, wiring
- 13. Complete wiring schematic
- 14. Locking glass enclosure over instruments

### **Refractory Lining**

A 5" thick 2300° F. ceramic fiber lining is installed in the Thermal Oxidizer to keep the exterior surface at a safe temperature. The ceramic fiber material has a very low K value which means it is an excellent insulator (does not store or transfer heat readily). A ceramic throat is fitted within the Oxidizer at a specific location and is sized for velocity of 15 ft/sec. The combustion chamber is sized for 10 ft/sec.

### **Steel Construction**

All components are manufactured from heavy grades of hot rolled A-36 steel plate. Weldments are accomplished under an argon  $CO_2$  purge to assure gas free homogeneous bonding of components. The Oxidizer is to be of a cylindrical design with flanged connections for maintenance purposes in the future. All components will be skid mounted on a heavy channel base with slots for forklift access.

### **Operating Temperatures**

Direct fired Oxidizers are designed to operate at  $1450^{\circ}$  F. (AQMD requires minimum  $1400^{\circ}$  F.) while the Catalytic units are designed to operate at 700° F. (at the entry to the Catalyst).

### **Residence Time for Vapors**

Our Oxidizers are designed for 1 full second of residence time. Los Angeles AQMD requires 0.7 seconds for Thermal Oxidizers.

### **Destruction Efficiencies**

Direct fired units have destruction efficiencies above 99% while the Catalytic units are advertised to have rates above 97%. We generally see higher than 97% destruction efficiency for Catalytic operation and we are still exceeding the criteria set forth by AQMD at 97% destruction.

### **Options:**

### Catalytic "Plug In" Module

Baker Furnace has developed a "plug in" Catalytic Module which can be installed in our existing direct fired Oxidizer with a minimum of effort. The catalyst inside the module is a monolithic material which significantly reduces the pressure drop across it and provides maximum surface area for the gasses which are to be catalyzed.

Each module is designed to fit down inside the Thermal Oxidizer chamber and bolt in place between the cone and stack section. Please refer to our enclosed drawing which shows the relationship of the Catalytic Module to the Thermal Oxidizer.

Once the Module is bolted in place, the only remaining task is to reduce the temperature setting on the process temperature and high limit controllers. The entire process to install the Catalytic Module should only take 1-2 hours.

The use of the Catalytic Module Option will greatly reduce supplemental fuel usage when the concentrations of VOC's are at low levels because the temperature requirement for a catalyst based system is approximately one-half that of a direct fired unit. The incoming vapors need only be heated to 700° prior to the catalyst versus 1450° in the direct fired unit. The delta T (change in temperature) is reduced by almost one-half, which results in a significant reduction in supplemental fuel usage.

Our Thermal Oxidation unit is configured with a "High Limit" temperature controller, as standard equipment, which will protect the catalyst in the event the catalytic process becomes overly exothermic and the temperature attempts to run away.

Baker Furnace can provide installation (on site) of the Catalytic Module at a nominal cost. Please refer to the charts provided with these specifications for supplemental fuel usage at various VOC concentrations for both Catalytic and Direct Fired Oxidizers to project the savings you might achieve by using the Catalytic Module.

### Trailer

We can mount the Oxidizer on a tandem axle trailer with a steel deck. Each oxidizer component is mounted securely with bolts, which allows the component to be removed for maintenance if required. The trailer is equipped with electric brakes and all lights necessary for licensing the unit for the road. Please refer to our general arrangement drawing #101212 for specific overall dimensions on the trailer. The trailer, as well as the Thermal Oxidizer, is painted with federal safety blue enamel.

### Telemetry "Remote Monitoring" Fax System

The Oxidizer can be equipped with a remote monitoring and reporting system which interfaces with the control instrumentation on the unit. This information can be faxed to a maximum of three locations. The IBM compatible operating software is extremely user friendly and allows you to select the destination of the fax reports, the number of reports you wish to receive each day, and the time of day at which you receive them. The fax reports are typically configured to show process combustion temperature, process air flow to the combustion chamber, and the percent of L.E.L. in the process vapor stream. In addition to the "routine" faxes, the system will also send an alarm fax in the event the unit shuts down for any reason. This report will specify which one of four failure conditions caused the unit to shut down. The addition of the telemetry system requires a dedicated phone line at the site and a fax machine at the receiving end.

### Silence package

If you anticipate installing the Oxidizer in an area where noise levels are a critical issue, i.e. residential area etc., the unit can be configured with a quiet design blower package. The blower inlet and exhaust silencers, as well as the blower itself are enclosed with a soundproofed material.

### Vacuum Upgrade

Our standard unit will generate a maximum of 4" hg vacuum. Per your specifications we can provide up to 10" hg vacuum in 2" increments. Proper vacuum sizing is very important to ensure that your unit can operate at the engineered flow rate.

### High Water Level Shutoff/Pump

If you believe that water will be a problem at the site(s) where you install the Oxidizer, we can install a shutoff switch in the knockout tank which will shut the Oxidizer down if the knockout tank fills up with water. In addition, we can also install a pump which will automatically drain the knockout tank if it fills up with water. Assuming appropriate secondary storage was in place, this process would only require your attention when the secondary holding tank filled up.

### Safety Interlocks and Safety Devices on Baker Thermal Oxidizers

### Air Proving Switch

Two U.L., FM and CSA approved air proving switches are provided to ascertain that the positive displacement vapor extraction blower and combustion blower are operational. In the event that either blower fails, the air proving switch will "open" the limits circuit thereby causing the unit to shut down the supplemental fuel line and to close the vapor line to the Oxidizer.

### High/Low Gas Pressure Switch

A U.L., FM and CSA approved gas pressure switch is provided in the supplemental fuel train which will also "open" the limits circuit in the event an unusually high or low gas pressure condition exists.

### High Temperature Limit Controller

A U.L. and FM approved high temperature limit controller has been engineered into the limits circuit to shut down the Oxidizer in the event a high temperature condition exists. The limit controller must be manually reset (per FM requirement) before the Oxidizer can be rendered operational. While in the high limit condition, the Oxidizer will not utilize supplemental fuel nor will vapors be allowed to enter the Oxidizer until the controller is manually reset.

### FM Approved Flame Safety Device

Our Thermal Oxidizers utilize a FM approved and U.L. recognized flame safety device which lights the combustion burner on the Thermal Oxidizer after a 60 second purge (5 air changes) of the combustion chamber. The burner has a 15 second ignition trial which lights pilot <u>only</u>. In the event the pilot does not light, the flame safety device locks out the supplemental fuel train thereby reducing the potential for an explosion. The main gas valve in the supplemental fuel train cannot open unless the pilot has been established. Flame monitoring is accomplished via a 3/16" diameter inconel flame rod.

### L.E.L. Combustibles Sensor and Controller

A catalytic bead L.E.L. sensor and controller have been integrated into the limits circuit. In the event that the alarm set point for L.E.L. has been exceeded, the L.E.L. controller "opens" the limits circuit which subsequently closes the vapor butterfly valve and temporarily shuts down the combustion burner until the L.E.L. returns to a safe level below the alarm setpoint.

### Flame Arrester

A U.L. approved flame arrester has been piped into the vapor extraction discharge line in close proximity to the Thermal Oxidizer. The flame arrester prevents propagation of flame back to the source.

### FM Approved Supplemental Fuel Train

A FM supplemental fuel train is provided with the Oxidizer and is fitted with an approved safety shut off valve for the main gas. The shut off valve will close in 0.3 seconds in the event of flame failure. The main gas valve is held shut with a 150 lb. force to assure a tight closure.

### **Oxygen Sensor and Proportional Dilution Valve**

A  $O_2$  sensor and P.I.D. controller is provided to monitor oxygen content in the vapor stream. We require 18% oxygen (minimum) in the stream for sufficient combustion of volatiles. In the event the oxygen content of the vapor stream drops off significantly the  $O_2$  controller opens a proportionally modulated butterfly valve and lets in dilution air to bring the oxygen content up to a satisfactory level.

### Alarm Card in Process Temperature Controller

We have integrated an alarm card into the process temperature controller to restrict the entry of volatiles into the Oxidizer until it reaches its correct operating temperature (1400° F.). This is accomplished by setting an alarm value equal to 1400 in the controller. When this value (in temperature) is reached, the process controller sends a signal to a butterfly valve drive motor which opens the valve and allows the vapor stream to enter the Oxidizer. Vapors cannot enter the Oxidizer at any temperature below which the alarm value has been set. This prevents the incomplete burning of hydrocarbons which occurs at lower operating temperatures.

**Catalytic Oxidizer** 

# Air Temperature of Influent Vapor Stream from 100° F. to 700° F. at Various PPM VOC Concentrations BTU's/hr of Supplemental Fuel Required to Raise

Mdd	%			AIR FLOW SCFM		
VOC'S	LEL	100	200	300	400	500
0	0	79,000	158,000	237,000	316,000	395,000
250	1.8	72,500	145,000	217,500	290,000	362,500
500	3.6	65,000	130,000	195,000	260,000	325,000
750	5.4	57,500	115,000	172,500	230,000	287,500
1000	7.3	52,500	105,000	157,500	210,000	262,500
1500	10.9	39,000	78,000	117,000	156,000	195,000
2000	14.5	25,000	50,000	75,000	100,000	125,000
2500	18.1	12,500	25,000	37,500	50,000	62,500
3000	21.7	0	0	0	0	0

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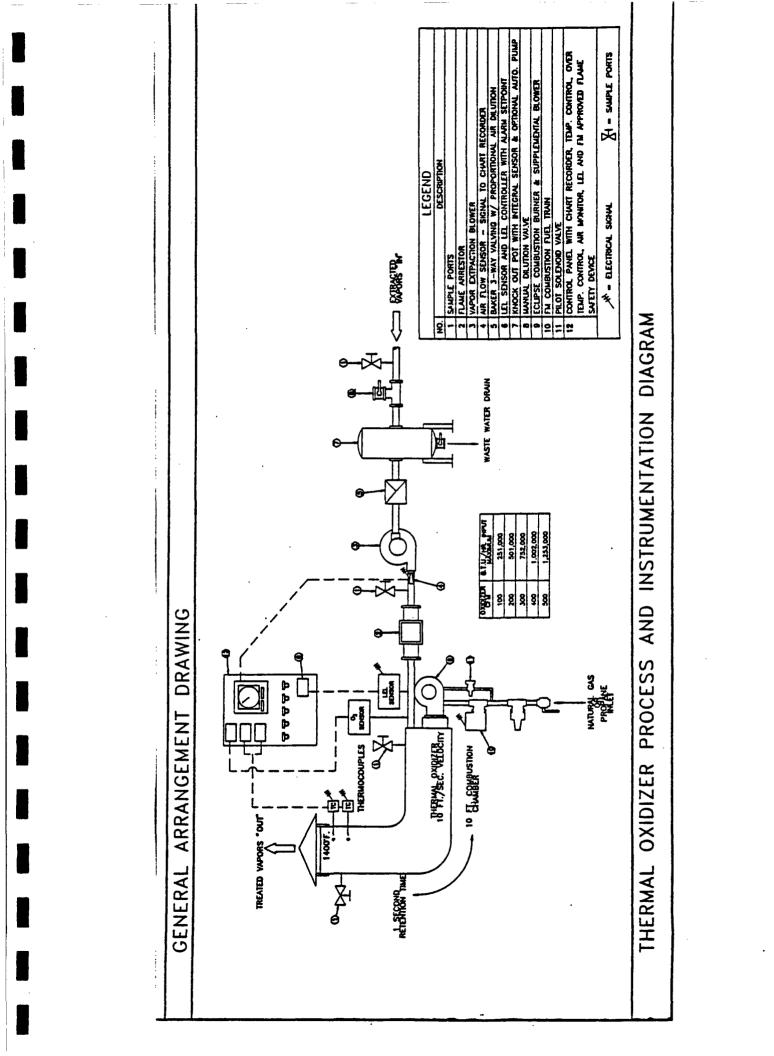
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**Direct Fired Oxidizer** 

## from 100° F. to 1400° F. at Various PPM VOC Concentrations **BTU's/hr of Supplemental Fuel Required to Raise** Air Temperature of Influent Vapor Stream

370,000 440,000

Mdd	%		300,000	<b>AIR FLOW SCFM</b>		
VOC'S	LEL	100	200	300	400	500
500	3.6	134,000	268,000	402,000	536,000	670,000
1000	7.3	120,000	240,000	360,000	480,000	600,000
1500	10.9	108,000	216,000	324,000	432,000	540,000
2000	14.5	92,500	185,000	277,500	370,000	462,500
2500	18.1	80,000	160,000	240,000	320,000	400,000
3000	21.7	67,500	135,000	202,500	270,000	337,500
3500	25.4	57,500	115,000	172,500	230,000	287,500
4000	29.0	40,000	80,000	120,000	160,000	200,000
4500	32.6	26,000	52,000	78,000	104,000	130,000
5000	36.2	14,000	28,000	42,000	56,000	70,000
5500	39.9	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
6000	43.5	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -



### Cost Estimate

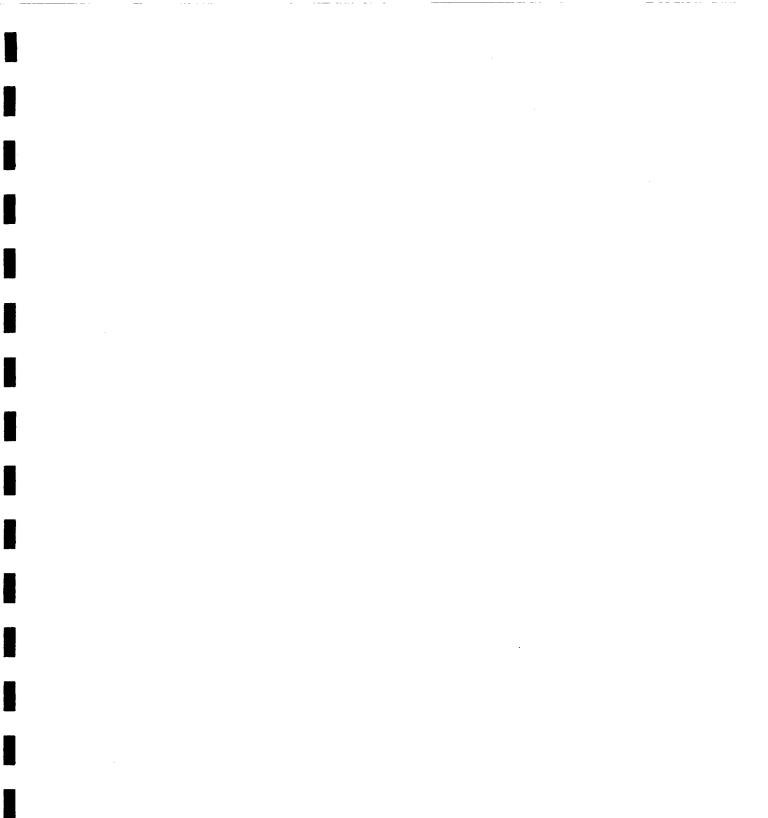


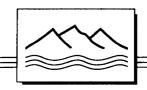
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### Cost Summary for Implementation of Corrective Action Plan WT-1 Compressor Station, Dehydration Area

Task Description		Cost
File air permit		
Professional services	\$	3,000
Expenses		1,300
Subcontractors		0
Subtotal	\$	4,300
Prepare system design and specifications and select subcontractors		
Professional services	\$	3,950
Expenses		150
Subcontractors		0
Subtotal	\$	4,100
Construct SVE wells		
Professional services	\$	5,200
Expenses*		1,100
Subcontractors*		13,500
Subtotal	\$	19,800
Construct conveyance system and install equipment		
Professional services	\$	7,000
Expenses (includes Baker Furnace <sup>1</sup> )*		56,000
Subcontractors*		12,000
Subtotal	\$	75,000
Total direct cost	\$	103,200
* Markup on third party services @ 10%	_	3,460
Project total	\$	106,660
New Mexico gross receipts tax	_	6,200
GRAND TOTAL	\$	112,860

<sup>1</sup>Assumes Baker Furnace will be purchased by ENRON Corp.





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### SUPPLEMENTAL ENVIRONMENTAL INVESTIGATION WT-1 COMPRESSOR STATION DEHYDRADATION AREA

Prepared for ENRON Operations Corp. Environmental Affairs Department Houston, Texas

March 28, 1995

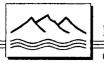
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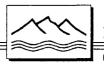


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- A Soil Boring Logs and Well Completion Forms
- B Analytical Laboratory Reports for Soil and Ground-Water Analyses
- C Results of Hydraulic Testing
- D Soil Excavation and Treatment
- E Soil Vapor Extraction Pilot Test



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### **EXECUTIVE SUMMARY**

Daniel B. Stephens & Associates, Inc. (DBS&A) was retained by ENRON Operations Corp. to conduct a supplemental environmental investigation at Transwestern Pipeline Company's (TPC) WT-1 Compressor Station, located in southeastern New Mexico. The compressor station boosts the pressure of the natural gas stream originating from two lateral pipelines and one primary pipeline heading to the northwest. This environmental investigation supplements the previous work performed by Brown and Caldwell (1994).

The objective of this investigation was to characterize the distribution of organic and inorganic constituents in underlying soils and ground water detected during the previous investigation of a dehydration area at the compressor station. The scope of work included a background data review, completion of five ground-water monitor wells and one temporary ground-water sampling boring, soil and ground-water quality sampling, in-situ tests of hydraulic properties, and summarizing interim corrective actions performed by TPC to date.

The site is underlain by the Quaternary Mescalero caliche and Gatuña Formation and the Triassic Santa Rosa sandstone. Perched ground water is present within the Santa Rosa sandstone at depths of approximately 45 to 55 feet below ground surface. The saturated thickness of the perched system ranges from approximately 0 to 10 feet; locally, ground-water flows toward the northwest. Bail-recovery tests indicate that the perched aquifer is of low permeability with an average hydraulic conductivity of  $5.0 \times 10^{-2}$  feet per day. The average ground-water flow velocity is approximately 5 feet per year based on the in-situ hydraulic tests. The perched system is underlain by approximately 350 to 550 feet of very fine-grained sandstones, siltstones, and shales of the Permian Dewey Lake Red Beds. In general, potable ground water is not present in the region.

Hydrocarbon-impacted soils extend from the dehydration area approximately 60 feet beyond the western TPC property boundary. Ground-water impacts are primarily concentrated immediately west of the dehydration area. The perched ground-water system appears to be of limited extent west of the site as evidenced by two borings that did not encounter ground water. New Mexico Water Quality Control Commission (NMWQCC) standards for benzene, toluene, total xylene, and



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total naphthalene were exceeded in ground-water samples collected from monitor well MW-10, installed near the western property boundary. Subsequent fluid-level measurements determined that monitor well MW-10 contained approximately 1.0 feet of phase-separated hydrocarbons. In addition, benzene concentrations slightly exceeded the NMWQCC standard near the southwestern property corner.

During this investigation, DBS&A conducted four short-term soil vapor extraction (SVE) pilot tests in order to assess hydrocarbon removal by vapor means. The single well tests indicated that approximately 1 to 2 cubic feet per minute per linear foot of screen can be obtained with applied vacuums ranging from 45 to 233 inches of water. The pilot tests indicated that an SVE system will be an effective remediation method in the dehydration area, where soils are impacted primarily by low-molecular-weight pipeline distillates.

In addition to the SVE pilot tests conducted by DBS&A, TPC implemented a work plan to remediate near-surface soils below the dehydration area. Remediation of near-surface soils included the excavation of approximately 3,300 cubic yards of soil underneath the former dehydration area and the subsequent augmentation of the soil with a nutrient solution to enhance biodegradation of hydrocarbons. The treated soils were placed back into the excavated area.



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#### **1. INTRODUCTION**

ENRON Operations Corp. (EOC) retained Daniel B. Stephens & Associates, Inc. (DBS&A) to conduct a supplemental environmental investigation (SEI) of soils and ground water underlying Transwestern Pipeline Company's (TPC) WT-1 Compressor Station. The site is located approximately 30 miles east of Carlsbad, New Mexico along U.S. Highway 62. The general site layout, showing the location of buildings, liquid storage areas, and the current area of investigation, is provided in Figure 1.

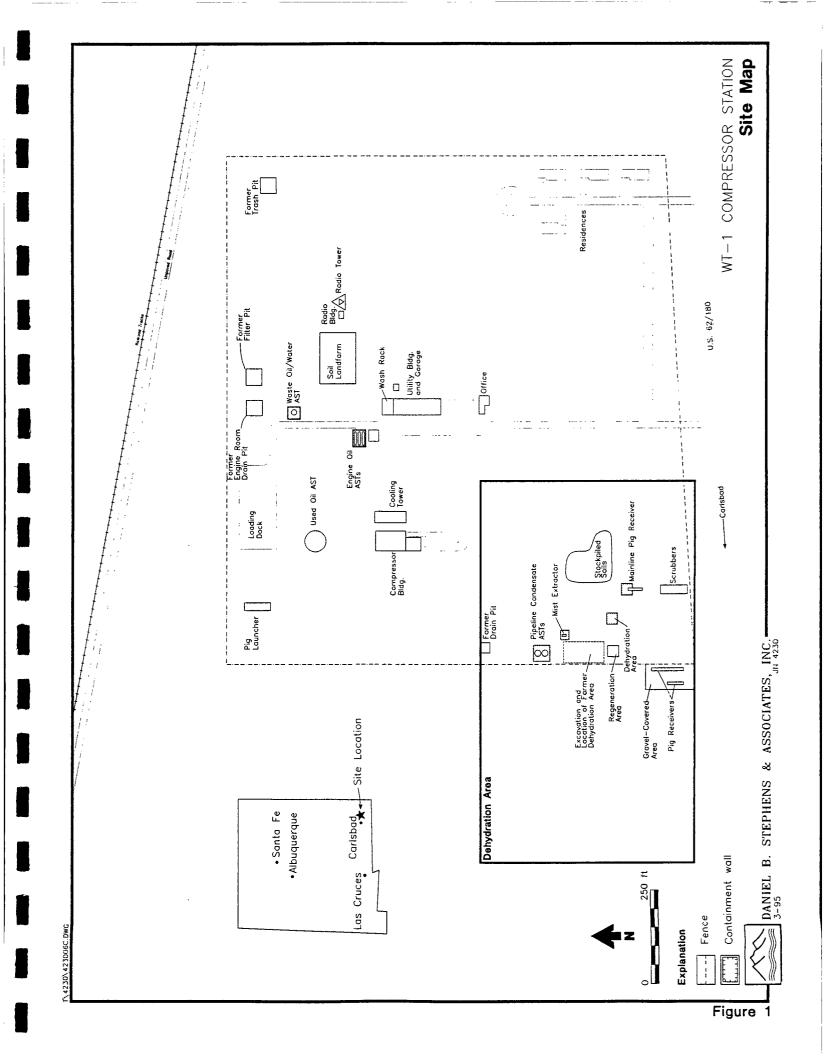
The compressor station boosts the pressure of the natural gas stream originating from two lateral pipelines and one primary pipeline heading toward Roswell, New Mexico. In the past, pipeline liquids consisting primarily of water were removed from the gas stream by dehydration units near the southwest corner of the site and routed to temporary storage tanks. Wastewaters generated by the dehydration process contained petroleum hydrocarbon distillates. Soil and ground-water impacts resulting from the release of wastewater from the dehydration area are the subject of this report.

A previous hydrogeologic investigation at the site had identified impacts to soil and perched ground water near the former dehydration units (Brown and Caldwell, 1994). The objectives of the SEI were to evaluate (1) the extent of subsurface impacts identified along the western fence line by Brown and Caldwell (1994), (2) the vertical extent and the hydraulic characteristics of the perched ground-water system, and (3) soil vapor extraction (SVE) parameters for future remedial design.

The SEI was conducted during the period of November 15 through December 1, 1994. In order to evaluate areas of potential hydrocarbon releases, DBS&A analyzed soils for volatile organic compounds (VOCs) using field and laboratory techniques. In addition, ground-water samples were submitted for analyses of organic and inorganic constituents to determine if water quality standards set by the New Mexico Water Quality Control Commission (NMWQCC) were exceeded. Specifically, the DBS&A investigation near the dehydration area included the following work:

• Five monitor wells and one temporary ground-water sampling boring were installed.

3





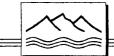
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- Soil samples were collected from each boring for field and laboratory analyses.
- Ground-water samples were collected from the newly installed monitor wells for laboratory analyses.
- Five hydraulic tests were conducted.
- Four SVE pilot tests were performed.
- The locations of all monitor wells were surveyed.

This report presents the methods and results of the investigation. Section 2 provides background information on the compressor station, including a summary of previously completed environmental work at the dehydration area. Section 3 describes the field procedures used during the investigation and the findings of the subsurface investigation. Section 4 provides a summary of the interim corrective actions completed by TPC and the SVE pilot tests conducted by DBS&A. Finally, Section 5 provides a summary of and the conclusions derived from the investigation.

Concurrently with the investigation of the dehydration area, DBS&A investigated another area at the compressor station, the engine room drain and filter pit area along the northern fence line. Investigation activities conducted by DBS&A in this area are described in a separate report (DBS&A, 1995).

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#### 2. SITE BACKGROUND

This section provides background information relevant to DBS&A's investigation. Section 2.1 describes the site in greater detail. Section 2.2 describes the regional hydrogeologic setting. Section 2.3 provides a summary of previous environmental investigations undertaken at the site.

#### 2.1 Site Description

The compressor station is situated on approximately 40 acres of land within Township 20 S, Range 32 E, Section 31 of Lea County, New Mexico. The site is located within the Pecos Valley section of the Great Plains physiographic province. The surrounding area is characterized by an irregular (hummocky) erosional surface containing numerous internally drained flat-bottomed playas. The interior drainages have formed in response to dissolution of underlying salt deposits and the subsequent collapse of overlying sedimentary beds. The ground at the compressor station gently slopes northward toward a collapse feature, and directly south of U.S. Highway 62, the ground surface slopes toward the southwest into another collapse feature known as Nash Draw. The station elevation is about 3550 feet above mean sea level; the mean annual precipitation is about 9 inches. Vegetative cover mostly consists of native grasses adapted to the arid environment.

#### 2.2 Regional Hydrogeologic Framework

The stratigraphic units of importance regarding the regional hydrogeologic framework are, in ascending order, (1) the Permian Dewey Red Beds, (2) Triassic Santa Rosa sandstone, and (3) the Quaternary Gatuña Formation and Mescalero caliche. In general, potable ground water is not present below the Permian-Triassic unconformity marked by the contact between the Dewey Lake Red Beds and the Santa Rosa sandstone (Nicholson and Clebsch, 1961). Because of the limited occurrence of water, the compressor station receives its water from a pipeline that supplies local ranchers and industry. Sections 2.2.1 through 2.2.3 describe in detail the stratigraphic units present.



#### 2.2.1 Dewey Lake Red Beds

The Dewey Lake Red Beds consist of alternating thinly bedded sequences of reddish brown siltstones, shales, and very fine- to fine-grained sandstones. The sediments are frequently gypsiferous and are mottled by greenish-gray reduction spots (Lucas and Anderson, 1993). Lithologically, the sediments are well sorted, well rounded quartzarenites to slightly micaceous quartzarenites. In the vicinity of the site, the formation ranges in thickness from approximately 350 to 550 feet, thinning toward the west (Mercer, 1983). The formation impedes the interchange of perched water within the overlying Santa Rosa sandstone with the underlying evaporite-bearing rocks of Permian age.

#### 2.2.2 Santa Rosa Sandstone

An erosional unconformity marks the contact between the Permian Dewey Lake Red Beds and the overlying Santa Rosa sandstone of Late Triassic age. The Santa Rosa sandstone consists of fine- to coarse-grained, poorly to moderately sorted, subangular to subrounded micaceous sandstones and conglomerate with interbeds of siltstone and mudstone (Mercer, 1983). In comparison to the Dewey Lake Red Beds, the formation is a relatively immature litharenite that does not contain gypsum.

The Santa Rosa sandstone is the lowest member of the Dockum group. The upper member of the Dockum group, the Chinle Formation, is absent in the area. The Santa Rosa sandstone is approximately 75 feet thick near the site and thickens rapidly to the east (Bachman, 1987).

The recharge area for the Santa Rosa sandstone is along north-trending outcrops located just west of the site and possibly along the Mescalero Ridge located approximately 15 miles to the north. Ground-water maps produced by Nicholson and Clebsch (1961) indicate a regional flow direction generally coincident with the south and east dip of the Triassic beds. However, on a more local scale, Wright (1990) presented monitor well water level data that indicated a northwesterly flow direction toward Laguna Totson. At the compressor station, ground-water elevations measured by DBS&A are consistent with a northwesterly flow direction or toward the internally drained basins (Section 3.2).



Regional studies differ over the location of the Permian-Triassic boundary, the presence of internally drained regions, and perched ground-water lenses. This lack of consensus makes regional correlations extremely difficult with respect to formational contacts and flow directions. One area of agreement amongst previous investigators is that the Santa Rosa sandstone provides low yields to wells due to low formation permeability. Nicholson and Clebsch (1961) estimated the porosity of the formation to be on the order of 13 percent.

#### 2.2.3 Gatuña Formation and Mescalero Caliche

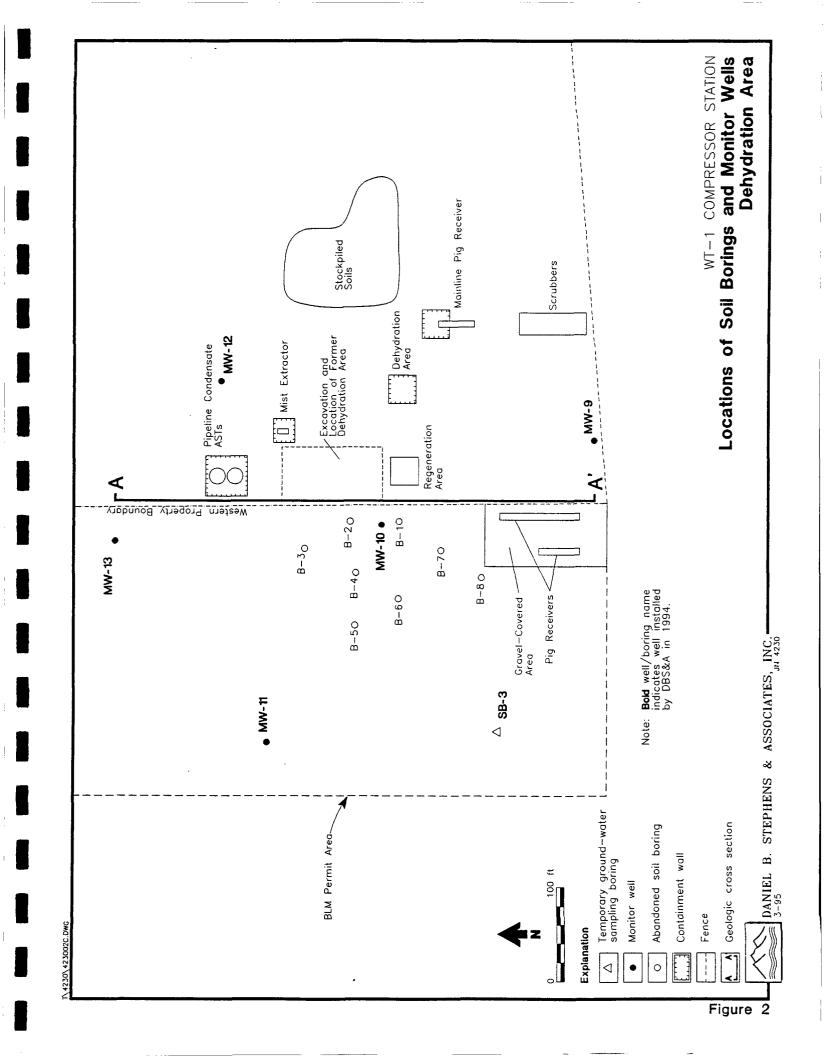
The Quaternary Gatuña Formation is distributed intermittently over a broad area in the Pecos drainage system. It consists of generally poorly consolidated pale reddish brown to yellowish sand, sandy clay, lenticular beds of gravel, and caliche that can be gypsiferous. The unit was deposited primarily in channels and depressions probably related to the dissolution of underlying Permian Formations. The Gatuña Formation ranges from 0 to 100 feet thick in the region and thins to the east as it laps onto topographically high areas. This unit may be present in the most northern extent of the site (DBS&A, 1995). Ground water, if present, is restricted to discontinuous perched zones (Mercer, 1983).

The Gatuña Formation, and the Santa Rosa sandstone where the Gatuña Formation is not present, are covered with a caliche horizon of middle Pleistocene age that is informally referred to as the Mescalero caliche. The caliche was thought to be formed by calcium carbonate from migrating sands leaching into underlying soil horizons (Bachman, 1987).

#### 2.3 **Previous Hydrogeologic Investigations**

In November 1993, Brown and Caldwell investigated the subsurface near the dehydration area located in the southwestern corner of the site (Figure 1). In order to drill off-site, TPC acquired access from the U.S. Bureau of Land Management for an area extending 300 feet west of the site fence line. The general layout of this investigation area, including the locations of soil borings and monitor wells installed by Brown and Caldwell (1994) and DBS&A, is shown in Figure 2.

Eight soil borings (B-1 through B-8) were advanced to the water table by Brown and Caldwell, and soil and ground-water samples were collected for total petroleum hydrocarbons (TPH) and





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benzene, toluene, ethylbenzene, and xylene (BTEX) analyses. Soil samples collected from B-1, B-2, and B-7 were impacted by TPH and BTEX concentrations above New Mexico Oil Conservation Division (OCD, 1993) guidelines, which are 100 mg/kg and 50 mg/kg, respectively. Ground-water samples collected from each open soil boring also exceeded the NMWQCC standards for BTEX. Benzene concentrations ranged from 720 μg/L to 5,800 μg/L.



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#### 3. SUBSURFACE INVESTIGATIONS

The following sections describe the subsurface investigation conducted by DBS&A in order to evaluate the extent of impacts identified by Brown and Caldwell (1994). The general field procedures followed during this investigation are outlined in Section 3.1. Sections 3.2 and 3.3 describe the results of the site characterization and investigation. All field work was conducted in accordance with DBS&A standard operating procedures and a site-specific health and safety plan developed for the field program.

#### 3.1 Drilling and Sampling Procedures

During the investigation, DBS&A installed five monitor wells and one temporary ground-water sampling boring to establish the distribution of soil and ground-water impacts, the direction of ground-water flow, ground-water hydraulics, and SVE design parameters. Drilling at the site was completed by Eades Drilling Company of Hobbs, New Mexico, using an Ingersoll Rand TH-75W air-rotary drilling rig. Drilling equipment and sampling devices were steam cleaned and inspected by DBS&A personnel prior to beginning each boring. In addition, all sampling equipment was decontaminated prior to each use by washing with Liquinox<sup>®</sup> detergent followed by a deionized water rinse.

#### 3.1.1 Soil Sampling

As each borehole was advanced, core-barrel samples were collected at 5-foot intervals for geologic logging. In addition, drill cuttings were inspected to aid in logging. Appendix A contains the lithologic logs produced for each boring and, where applicable, the corresponding well construction diagrams.

Soil samples collected during drilling were tested for the presence of VOCs with an OVM equipped with a photoionization detector (PID). Field PID measurements were used to determine the presence of contaminated soils above guidelines (those with PID readings greater than 100 parts per million volume [ppmv]) as described by OCD (1993). Drill cuttings generated during the



investigation were stockpiled on clean plastic; one composite sample was collected from each investigation area to determine proper disposal.

In general, the soil sample yielding the highest PID reading above background measurements and the soil sample collected from immediately above the water table were retained for laboratory analysis of TPH (EPA method 8015 modified) and BTEX (EPA method 8020). All samples were collected in 250-ml glass jars and placed in an ice-filled cooler for shipment to Hall Environmental Analysis Laboratory (HEAL) in Albuquerque, New Mexico.

#### 3.1.2 Well Installation

Monitor well borings were drilled to approximately 10 feet below the water table, or the bottom of the perched ground-water zone, whereupon a 2-inch-diameter monitor well was constructed in order to evaluate ground-water quality. Monitor wells were constructed with 15 feet of 2-inch, 0.010-inch machine-slotted polyvinyl chloride (PVC) screen, approximately 45 feet of flush-threaded 2-inch PVC blank casing, and 17 feet of 12-20 silica sand filter pack. Bentonite seals were emplaced on top of the filter packs, followed by a cement-bentonite grout to the ground surface. Surface completions consisted of 12-inch-diameter flush-grade vaults set within concrete.

The temporary ground-water sampling boring was drilled to a depth of approximately 10 feet below the projected water table, whereupon a 2-inch-diameter galvanized steel pipe attached to a well screen was lowered into the open borehole. After determining that ground water was not present, the temporary well was removed from the open boring, and the hole was abandoned with cement-bentonite grout poured from the surface.

Following well installation, John W. West Engineering Co. of Hobbs, New Mexico surveyed all borings and monitor wells installed by DBS&A relative to the northeast property corner (for horizontal control) and to mean sea level. Additionally, monitor wells installed by previous investigators were surveyed to the same reference so that accurate determination of ground-water flow directions could be made. A summary of monitor well completion information is provided in Table 1.

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# Table 1. Monitor Well/Soil Boring Locations and November 1994 Water Table Elevation Data **Dehydration Area**

	Loci	Location		Massuring Doint <sup>3</sup>	Depth to	Motor Toblo	Totol	Corocad	T <sub>on</sub> of
Well/Boring <sup>1</sup>	South <sup>2</sup> (feet)	West <sup>2</sup> (feet)	Date of Completion	(feet above msl)	Measuring Point <sup>3</sup> (feet)	Valer rable Elevation (feet above msl)	Boring Depth (feet bgs)	ocreened Interval (feet bgs)	I up u Silica Sand (feet bgs)
6-WW	1209.4	1254.2	11/18/94	3557.31	55.14	3502.17	60.5	44.0-59.0	40.5
MW-10	986.6	1342.1	11/17/94	3553.45	52.63 <sup>4</sup>	3500.82	62.5	47.5-62.5	43.5
MW-11	864.7	1562.5	11/21/94	3547.84	Dry	Dry	65.0	45.0-60.0	38.5
MW-12	818.4	1192.9	11/16/94	3551.19	49.31	3501.88	60.0	45.0-60.0	42.3
MW-13	708.9	1359.2	11/16/94	3547.78	49.70	3498.08	58.0	43.0-58.0	39.5
SB-3	1108.6	1557.8	11/29/94	3551.76 <sup>5</sup>	Dry	Dry	59.0	NA	NA

Survey conducted by John W. West Engineering, Hobbs, NM; all measurements were made in November 1994.

<sup>1</sup> Refer to Figure 2 for locations
 <sup>2</sup> South and west coordinates relative to northeast property comer
 <sup>3</sup> Measuring point is top of PVC casing
 <sup>4</sup> Corrected for PSH (assuming a specific gravity of 0.8)
 <sup>5</sup> Measuring point is top of cement plug

msl = Mean sea level bgs = Below ground surface PSH = Phase-separated hydrocarbons NA = Not applicable

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#### 3.1.3 Ground-Water Sampling

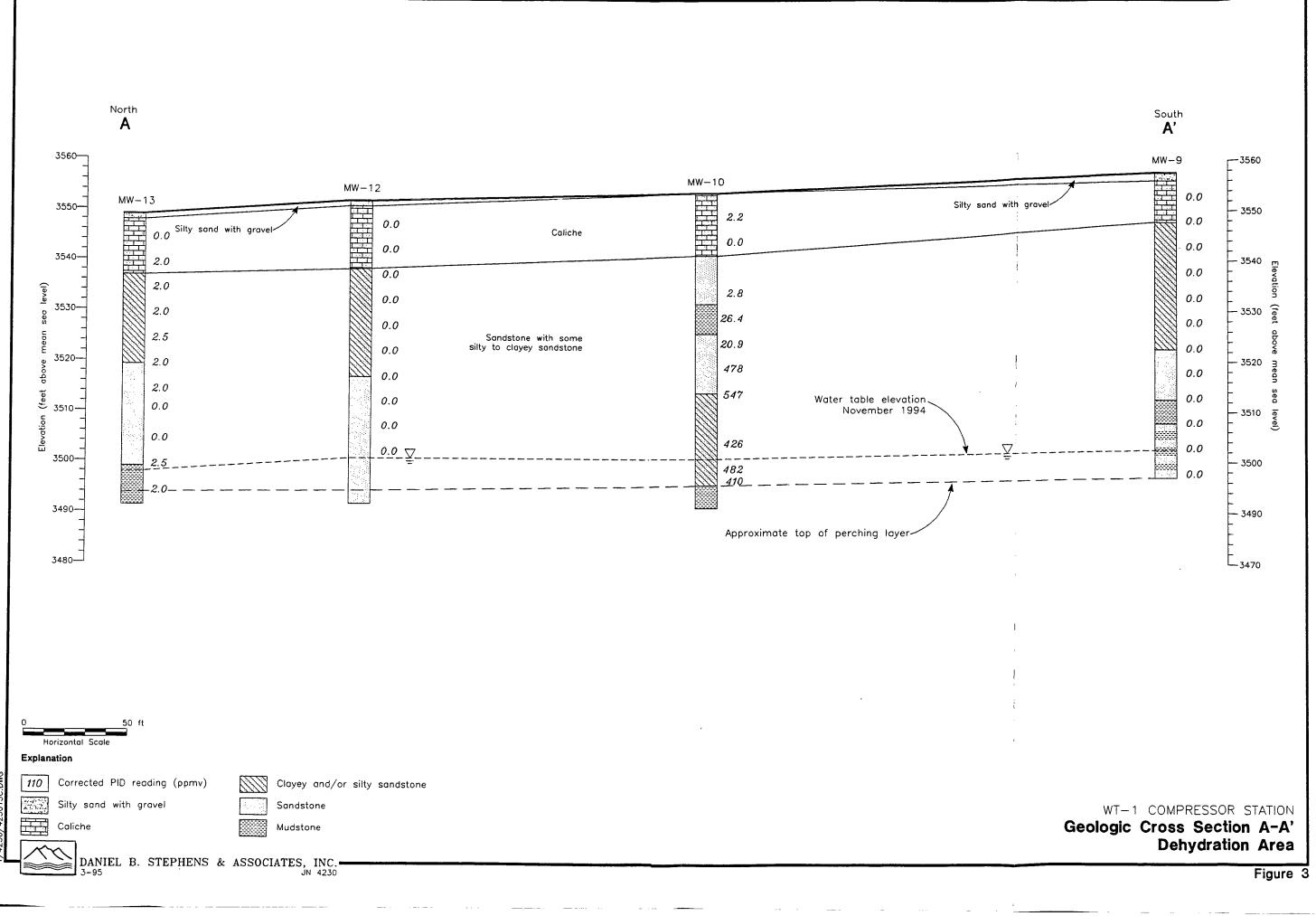
During the investigation, ground-water samples were collected from each monitor well at the dehydration area. Prior to sampling, the depth to water was measured. The presence or absence of PSH was checked with product-finding paste and a fiberglass tape. The well was then bailed until approximately three casing volumes were purged or until the well was dry. During purging, field parameters (pH, temperature, and electrical conductivity) were measured and recorded every half casing volume. Purged ground water was contained in 55-gallon drums to be disposed by TPC upon receipt of analytical results. Ground-water samples were collected using dedicated, disposable polyethylene bailers.

Ground-water samples were analyzed for halogenated and aromatic VOCs (EPA method 8010/8020), TPH (EPA method 8015 modified), polynuclear aromatic hydrocarbons (PAHs) (EPA method 8100), major ions, total dissolved solids (TDS), and metals regulated by the NMWQCC. Samples were shipped in ice-filled chests to HEAL for organic analyses and to Analytical Technologies, Inc. (ATI) for inorganic analyses. Both laboratories are located in Albuquerque, New Mexico.

In order to check intralaboratory precision, quality assurance/quality control samples, consisting of trip blanks and sample replicates, comprised approximately 5 percent of the water samples collected. Appendix B contains the HEAL and ATI reports with the supporting quality assurance and chain-of-custody documents for all soil and water samples submitted for analysis.

#### 3.2 Site Hydrogeology

A hydrogeologic cross section developed from lithologic descriptions is provided as Figure 3. The location of the cross section is shown on Figure 2. Borings advanced during the investigation intersected sediments of the Mescalero caliche and alternating sandstones, siltstones, and mudstones of the underlying Santa Rosa sandstone. In general, the lithology of the sediments directly underlying the site consist of the following:







- From ground surface to approximately 1.5 feet below ground surface (bgs), a brown to reddish gray gravelly sand to silty sand was encountered. The unit is poorly sorted, angular to rounded, unconsolidated, calcareous, and dry.
- From 1.5 to approximately 15 feet bgs, a pinkish gray to reddish orange, poorly to strongly consolidated sandy caliche (locally referred to as the Mescalero caliche) was encountered. The sand within the caliche is fine- to medium-grained, well sorted, subrounded to rounded, and dry. The unit grades downward into a calcareous silty sandstone.
- From approximately 15 to 25 feet bgs, a light brown to reddish orange calcareous silty sandstone to sandstone is present. The unit is very fine- to medium-grained, poorly sorted, subangular to rounded, poorly to moderately consolidated, sometimes gypsiferous, and dry. This unit represents a transitional zone between overlying caliche and underlying Santa Rosa sandstone. The presence of gypsum at the northern part of the study area suggests that this unit may correspond to the Quaternary Gatuña Formation (DBS&A, 1995).
- From approximately 25 to 55 feet bgs, a moderate reddish brown sandstone and silty sandstone is present. The unit is very fine- to medium-grained with minor coarse-grained zones and some siltstone and mudstone layers that become more abundant with depth. The unit is often micaceous and is poorly to well sorted, subangular to rounded, and moderately to strongly consolidated with carbonate and noncarbonate cements. The sediments are often moist to wet where interbedded with mudstone.
- From approximately 55 to 80 feet bgs, a light brown to moderate reddish brown sandstone to clayey sandstone is present, based on a separate investigation by DBS&A (1995). The sandstone is generally silty or very fine-grained with interbeds of clay, mudstone, and siltstone. The interval is poorly to strongly consolidated. Moisture content ranges from dry to saturated.

Ground water beneath the site is unconfined and occurs approximately 45 to 55 feet bgs based on November to December 1994 measurements (Table 1; DBS&A, 1995). The depth to water



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measurements listed in Table 1 represent the highest water table elevation recorded during the entire period of the field program. Following well completion, multiple measurements indicated that the water level recovery to static conditions required several hours to days as a result of the low permeability of the bedrock.

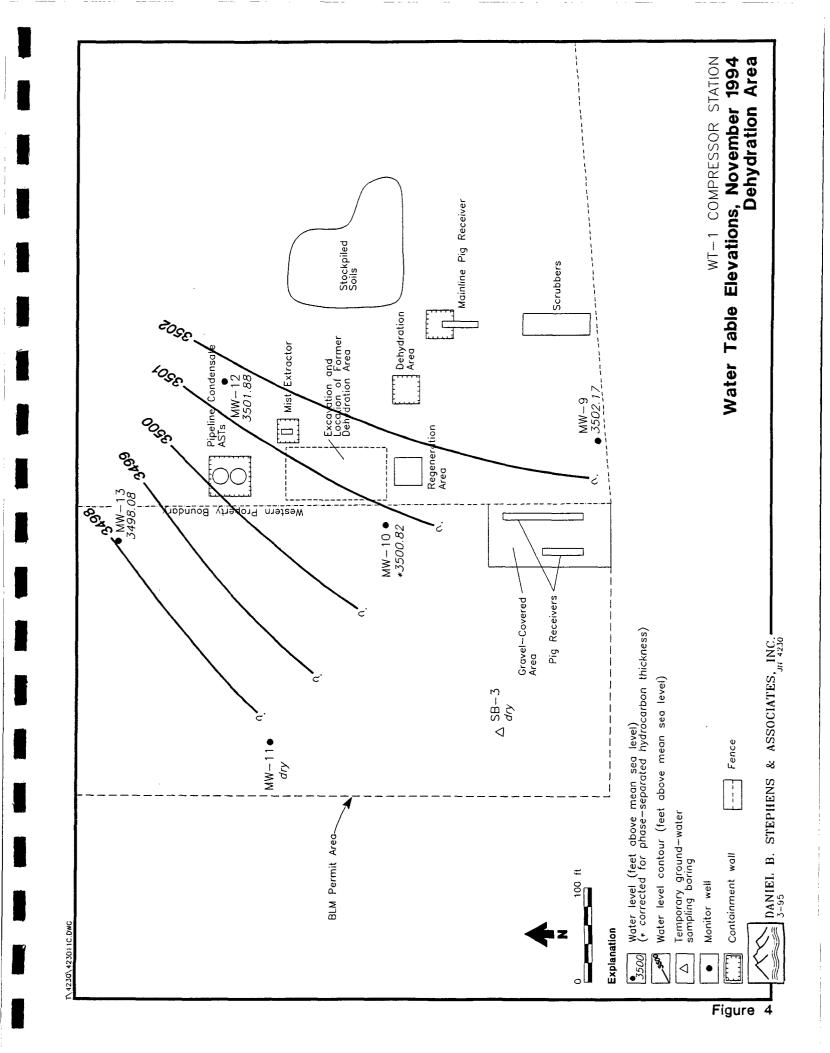
Ground water in the Santa Rosa sandstone is perched upon clays and mudstone present at approximately 60 feet bgs across the site. The perching layer is at least 20 feet thick based on lithologic descriptions from monitor well MW-4 (DBS&A, 1995). The saturated thickness of the perched zone appears to be controlled by the presence of local recharge and the textural composition of the underlying perching layer. Based on field observation, the saturated thickness of perched ground water appears to be less than or equal to 10 feet.

Water table elevations generated from November 1994 depth to water measurements are shown in Figure 4. The map indicates that ground water generally flows toward the northwest, a finding that agrees with the flow direction determined by Wright (1990). The hydraulic gradient in the perched system averages 0.015 ft/ft.

#### 3.2.1 Hydraulic Testing and Data Analysis

Following well completion, DBS&A conducted bail-recovery tests on monitor wells MW-9 and MW-12 at the dehydration area, as well as three other wells (MW-4, MW-5, and MW-8) at the compressor station (DBS&A, 1995), to evaluate the in-situ hydraulic conductivity of the perched ground-water system. The five tests provided an expedient means of estimating local hydraulic conductivity (K). The test procedure consisted of bailing each monitor well dry and monitoring the recovery of the water level to the initial static level if practicable. The water level recovery was recorded at frequent intervals using a electronic water level indicator.

The bail-recovery test data were analyzed using an equation developed for recovery from constant rate pumping (Cooper and Jacob, 1946). The solution is a modification of the Theis equation for ground-water flow toward a pumping well. The solution can be applied to late-time data by treating the bail-down tests as short-term pumping tests. Late-time data are used to avoid well bore storage effects, which can significantly distort the early recovery data.





The procedure requires a graphical plot of residual head or recovery (arithmetic scale) versus t/t' (logarithmic scale). The value of t/t' equals the total time since bailing initially began divided by the time since bailing stopped. The total recovery over one log cycle and the average bailing rate are used to estimate transmissivity. The calculated transmissivity is then divided by the saturated thickness to estimate the average hydraulic conductivity for the test zone. Data plots resulting from the bail-recovery test analyses are included in Appendix C.

The estimated values of K for the five tests ranged from 2.5 x  $10^{-3}$  ft/day to 2.0 x  $10^{-1}$  ft/day with a geometric mean of 5.0 x  $10^{-2}$  ft/day (Table 2). Estimates of specific yield (S<sub>y</sub>) cannot be obtained by this method, but based on the observed grain size distributions and cementation, S<sub>y</sub> values are probably on the order of 0.04 to 0.08 for the perched system.

Monitor Well	Hydraulic Conductivity <sup>1</sup> (ft/day
MW-4	2.0 x 10 <sup>-1</sup>
MW-5	2.5 x 10 <sup>-3</sup>
MW-8	7.4 x 10 <sup>-2</sup>
MW-9	6.1 x 10 <sup>-2</sup>
MW-12	1.4 x 10 <sup>-1</sup>
Geometric mean	5.0 x 10 <sup>-2</sup>

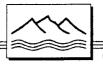
#### Table 2. Results of Hydraulic TestsWT-1 Compressor Station

<sup>1</sup> Calculated using Jacob-Cooper (1946) method

#### 3.2.2 Rate of Ground-Water Movement

Average ground-water flow velocities can be estimated by Darcy's Law, using the following equation:

$$v = \frac{Ki}{n_e}$$



where v = average pore velocity

- K = hydraulic conductivity
- i = hydraulic gradient
- n<sub>e</sub> = effective porosity

Assuming an effective porosity of 0.06 (estimated as 50% of total porosity), an average hydraulic gradient of 0.015, and a geometric mean hydraulic conductivity of 5.0 x  $10^{-2}$  ft/day (1.8 x  $10^{-5}$  cm/sec), the average ground-water velocity at the compressor station is approximately 5 ft/yr. This equation provides a relatively high estimate of contaminant transport rates since it does not take into account retardation effects that inhibit contaminant migration.

#### 3.3 Delineation of Subsurface Impacts

As described in Section 3.1, soil and ground-water samples were collected from each monitor well at the dehydration area and analyzed for organic and inorganic constituents. Appendix A contains the results of the headspace analysis for each boring, and analytical chemistry results are provided in Appendix B. The extent of soil and ground-water impacts near the dehydration area is discussed in Sections 3.3.1 and 3.3.2, respectively.

#### 3.3.1 Soil Impacts

Headspace analysis and analytical chemistry results for samples collected during the SEI indicate that soil impacts are limited primarily to the area previously identified by Brown and Caldwell (1994). With the exception of soil encountered while drilling monitor well MW-10, all PID readings were below the 100-ppmv OCD guideline. During the advancement of monitor well MW-10, PID readings exceeded 100 ppmv from approximately 35 feet bgs to the total depth of the boring. Soil samples collected for laboratory chemical analyses in the dehydration area contained no detectable TPH or BTEX with the exception of those from monitor well MW-10 (Table 3). The TPH analyses indicated that the organic compounds were primarily low-molecular-weight (gasoline range) compounds.

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# Table 3. Summary of Soils Analyses for Organic Constituents **Dehydration Area**

					5 <u>(</u> )	Sample No. (Sample Date)	(			
	Dataction	9-WM ۳	MW-9 ۵ בבי	MW-10	MW-10	MW-11 @ 40'	MW-11 @ 55'	MW-12	MW-13	SB-3 © cc'
Constituent	Limit	(11/19/94)	(11/19/94)	(11/17/94)	(11/17/94) (11/17/94)	4	4)	@ 47.0 (11/16/94)	(11/16/94)	(11/28/94)
Total petroleum hydrocarbons by EPA	carbons by		method 8015 modified (mg/kg)	dified (mg/	'kg)					
Gasoline range (C <sub>e</sub> -C <sub>16</sub> )	5.0	DN	ΠN	7,300 <sup>a</sup>	16,000 <sup>b</sup>	QN	QN	ND°	ND°	QN
Diesel range (C <sub>16</sub> -C <sub>36</sub> )	5.0	DN	ΟN	380 <sup>d</sup>	320 <sup>d</sup>	DN	DN	ND	ND	ND
Aromatic VOCs by EPA method 8020 (I	A method 8	1020 (mg/kg)	()							
Benzene	0.05	ND	ND	5.1°	18°	ND	ND	ND	ND	ND
Toluene	0.05	ND	ΟN	71°	260°	ND	QN	DN	ND	ND
Ethylbenzene	0.05	ND	DN	5.1 <sup>e</sup>	27°	ND	ND	ND	ND	QN
Total xylenes	0.05	QN	QN	140 <sup>ª</sup>	400°	QN	ΟN	ND	DN	DN

Notes: All analyses performed by Hall Environmental Analysis Laboratory, Albuquerque, NM

NMWQCC = New Mexico Water Quality Control Commission ND = Not detected

ND VOCS

= Volatile organic compounds= Not analyzed

Sample analyzed at 50x dilution; detection limit = 500 mg/kg
 Sample analyzed at 100x dilution; detection limit = 1,000 mg/kg
 Detection limit = 10 mg/kg

range hydrocarbons, peak pattern was not characteristic of only diesel fuel; therefore, only that which was in diesel range (>C\_{18}^{-}C\_{26}^{-}) was Sample analyzed at 10x dilution. Due to matrix interference from gasoline quantitated.

Sample analyzed at 50x dilution

J:\4230\HYDROINV.395\SORG-DA.395

 $\sum_{i=1}^{n} \left| \sum_{i=1}^{n} \left| \sum_{j=1}^{n} \left| \sum_{i=1}^{n} \left| \sum_{j=1}^{n} \left| \sum_{j=1}^{n} \left| \sum_{j=1}^{n} \left| \sum_{j=1}^{n} \sum_{j=1}$ 



Figure 5 shows in plan view the estimated extent of off-site actionable soil contamination, based on the OCD guideline of 100 mg/kg for TPH, originating from the dehydration area. Soil impacts extend approximately 60 feet beyond the western fence line. The on-site extent of soil impacts has been characterized by TPC, who has implemented interim corrective measures to clean up near-surface soils near the dehydration area. Section 4.1 describes these excavation and remedial measures in detail.

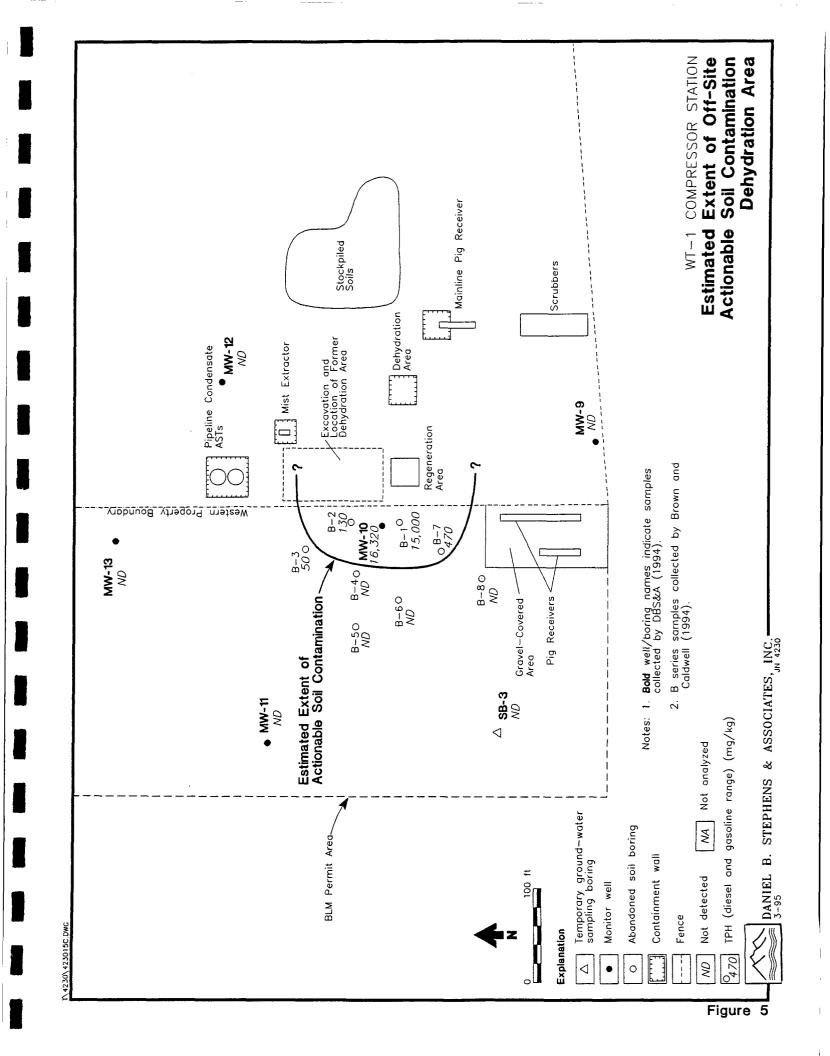
#### 3.3.2 Ground-Water Impacts

Tables 4 and 5 summarize the constituents detected in the ground water near the dehydration area. Based on analyses of aromatic and halogenated VOCs and PAHs, compounds that exceeded the NMWQCC standards were benzene, toluene, xylenes, and total naphthalene (naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene). As shown on Table 4, monitor well MW-10 exceeded NMWQCC standards for all the above compounds, and monitor well MW-9 exceeded the NMWQCC standard for benzene.

Halogenated VOCs detected in ground-water samples from MW-9 and MW-12 are trihalomethane compounds, which are typical drinking water disinfection byproducts that result from chlorination. The source of these compounds is most likely a result of the operation of electrical ground bed wells used for corrosion control. Ground bed wells produce low concentrations of chlorine gas, which can migrate up the wellbore to shallow ground water and result in the production of trihalomethane compounds. There are two ground bed wells located at the WT-1 compressor station. One ground bed well is located approximately 50 feet east of MW-9, and the other is located approximately 50 feet west of MW-9.

Fluid-level measurements revealed that monitor well MW-10 contains approximately 1 foot of PSH. Monitor wells MW-11 and SB-3 were not sampled since they were dry.

TPH analyses indicated that ground water in the source area contained mostly hydrocarbon distillates of low molecular weight. The relatively higher ratio of BTEX to TPH in ground water as opposed to soil possibly results from the higher solubility of BTEX in ground water when





#### Table 4. Summary of Ground-Water Analyses for Organic Constituents Dehydration Area

				ring No. e Date)		
Constituent	Detection Limit	MW-9 (11/21/94)	MW-10 (11/18/94)	MW-12 (11/17/94)	MW-13 (12/01/94)	NMWQCC Standard
Total petroleum hydrod	carbons by	EPA metho	od 8015 mod	dified (mg/L	)	
Gasoline range (C6-C16)	0.05	ND	69 <sup>a</sup>	ND	ND	None
Diesel range (C16-C36)	1.0	ND	10 <sup>b</sup>	ND	ND	None
Aromatic VOCs by EP	A method &	3020 (µg/L)				
Benzene	0.5	12	9,000°	ND	ND	10
Toluene	0.5	ND	16,000°	1.9	ND	750
Ethylbenzene	0.5	ND	620°	ND	ND	750
Total xylenes	0.5	ND	8,500°	3.1	ND	620
Halogenated VOCs by	EPA metho	od 8010 (µg	/L)			
Bromodichloromethane	0.2	1.4	ND°	3.5	ND	None
Chloroform	0.2	27	ND°	26	ND	100
Polynuclear aromatic I	ydrocarbo	ns by EPA	method 810	0 (µg/L)		
Naphthalene	0.5	ND	850 <sup>d</sup>	ND°	ND	
1-Methylnaphthalene	0.5	0.7	200 <sup>d</sup>	ND°	ND'	30 <sup>g</sup>
2-Methylnaphthalene	0.5	ND	220 <sup>d</sup>	ND®	ND	
Acenaphthene	0.5	ND	14 <sup>d</sup>	ND°	ND'	None

Notes: All analyses performed by Hall Environmental Analysis Laboratory, Albuquerque, NM Bold values indicate concentration exceeds NMWQCC ground-water standard

NMWQCC = New Mexico Water Quality Control Commission

- ND = Not detected
- VOCs = Volatile organic compounds
- \* Sample analyzed at 50x dilution
- <sup>b</sup> Detection limit = 5.0 mg/L
- ° Sample analyzed at 25x dilution
- <sup>d</sup> Detection limit = 10 µg/L
- \* Sampled on 11/18/94
- ' Sampled on 11/30/94
- <sup>9</sup> NMWQCC standard is for total naphthalene, which includes naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene



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#### Table 5. Summary of Ground-Water Analyses for Inorganic Constituents **Dehydration Area**

	<u></u>			No. e Date)		
Constituent	Detection Limit	MW-9 (11/21/94)	MW-10 (11/18/94)	MW-12 (11/18/94)	MW-13 (12/01/94)	NMWQCC Standard
Major ions (mg/L)						
Calcium	0.1	452	348	506	491	None
Potassium	1.0	9.6	5.6	12.6	9.3	None
Magnesium	0.1	222	201	244	184	None
Sodium	0.1	295	165	247	116	None
Total alkalinity (as CaCO <sub>3</sub> )	1.0	326	804	228	273	None
Chloride	0.5	860	650	980	340	250
NO <sub>2</sub> /NO <sub>3</sub> - N, total	0.06	8.4	ND	17	NA	10.0
Sulfate	5	850	12	1,100	1,400	600
Total dissolved solids	10	2,800	2,500	3,300	2,900	1,000
Metals (mg/L)						
Silver	0.010	ND	ND	ND	ND	0.05
Arsenic	0.005	ND	0.019	ND	0.006	0.1
Barium	0.01	0.043	0.580	0.049	0.048	1.0
Cadmium	0.0005	ND	ND	ND	ND	0.01
Chromium	0.010	ND	ND	ND	ND	0.05
Copper	0.010	ND	ND	0.012	ND	1.0
Iron	0.050	ND	1.87	1.22	ND	1.0
Mercury	0.0002	ND	ND	ND	ND	0.002
Manganese	0.010	0.229	2.41	0.352	ND	0.2
Lead	0.002	ND	ND	ND	ND	0.05
Selenium	0.005	0.009	ND	0.016	0.009	0.05
Zinc	0.050	0.092	0.057	0.082	ND	10

Notes: All analyses performed by Analytical Technologies, Inc., Albuquerque, NM Bold values indicate concentration exceeds NMWQCC ground-water standard. Metals samples were field filtered and acidified.

NMWQCC = New Mexico Water Quality Control Commission

ND = Not detected NA

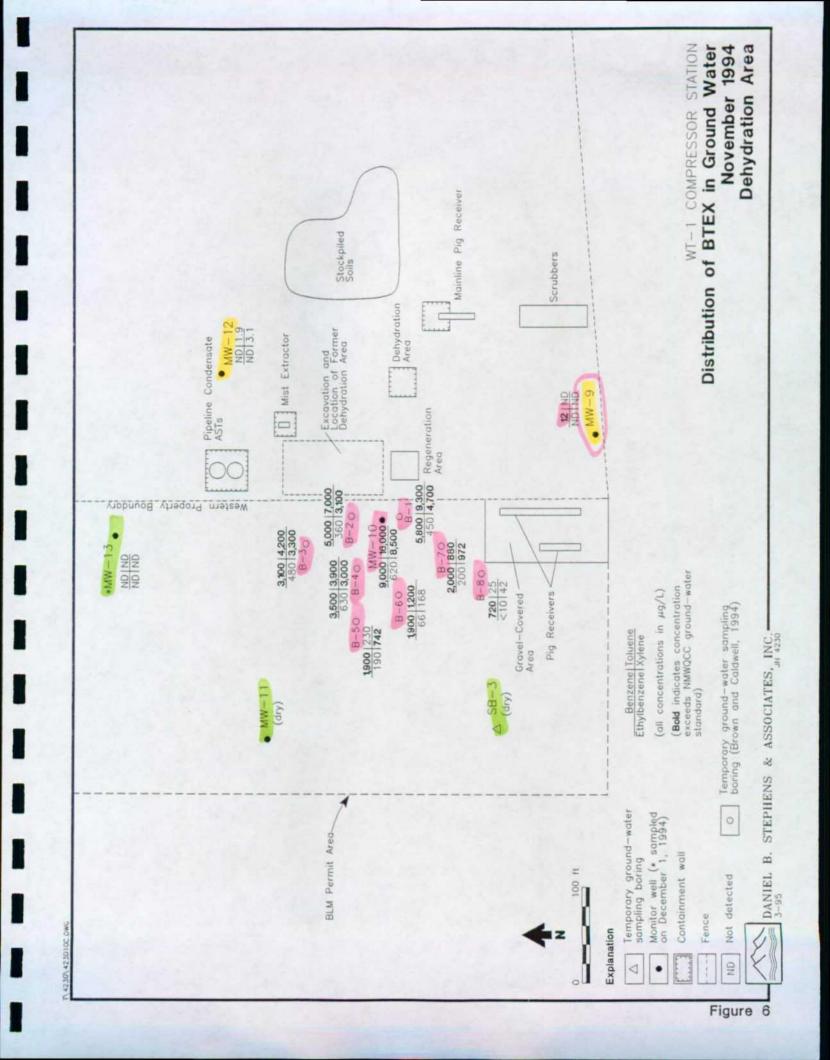
= Not analyzed



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compared to other hydrocarbons. Figure 6 depicts the distribution of BTEX within the perched ground-water system.

Each monitor well near the dehydration area exceeds the NMWQCC standards for TDS and chloride (Table 5). Several samples also exceeded NMWQCC standards for manganese, iron, and/or sulfate.





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#### 4. CORRECTIVE ACTIONS

In order to prevent continued hydrocarbon releases to the subsurface, TPC has (1) constructed secondary concrete containment walls around each aboveground storage tank, (2) excavated soils near the former dehydration units, and (3) treated the excavated soils to promote biodegradation. This section provides information concerning the interim corrective measures taken to remediate the contaminants identified by the SEI (Section 3). Section 4.1 provides a summary of the excavation and treatment of near-surface soils underlying the dehydration area. Section 4.2 describes the SVE pilot test conducted on several of the wells present at the site.

#### 4.1 Soil Excavation and Treatment

This section provides a summary of the excavation and treatment of near-surface soils underlying the former dehydration area and several other minor source areas. The analytical data, the TPC treatment and disposal work plan, and the OCD work plan approval are contained in Appendix D.

In mid-1992, TPC moved the location of the dehydration units and excavated approximately 2,300 cubic yards of hydrocarbon-contaminated soils from beneath the location of the former dehydration area (Figure 7). Actionable soils were removed from the excavation to a depth of approximately 12 feet bgs, at which point the trackhoe in use could no longer operate effectively in the partially to well cemented Mescalero caliche. In addition, the excavation was constricted to the west by the site boundary and to the east by high pressure gas lines. Excavated soils were stockpiled on plastic sheeting near the dehydration units until a treatment plan was in place.

In October 1994, Cypress Engineering Services, Inc. (CES) of Houston, Texas collected five soil samples from around the perimeter of the excavation, from the stockpiled soils, and from a soil landfarm located near the radio towers (Figure 1). The soil landfarm is used for the treatment of hydrocarbon-contaminated soils removed from near the compressor building. All samples were analyzed for TPH (EPA method 418.1) and BTEX. TPH concentrations ranged from 240 to 4,500 mg/kg for samples collected from the perimeter of the excavation, and BTEX concentrations were below detection with the exception of one sample (Table 6).



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			Co	onstituent (mg/k	(g)	
Sample No.1	Date	TPH	Benzene	Toluene	Ethyl- benzene	Xylene
EN-1	10/05/94	4300	ND	ND	ND	ND
EE-1	10/05/94	3700	ND	ND	ND	ND
EW-1	10/05/94	4500	0.105	0.288	0.053	0.414
ES-1	10/05/94	240	ND	ND	ND	ND
ES-2	10/05/94	ND	ND	ND	ND	ND
EE-1-S	12/11/94	970	ND	ND	ND	ND
EE-2-N	12/11/94	ND	ND	ND	ND	ND
EN-1-E	12/11/94	ND	ND	ND	ND	.026
EN-2-W	12/11/94	15	ND	ND	ND	ND
EB-1-E	12/11/94	2600	ND	ND	4.0	63
EB-2-N	12/11/94	1400	ND	ND	ND	.29

### Table 6. Summary of TPH and BTEX Analyses of Excavated SoilsDehydration Area

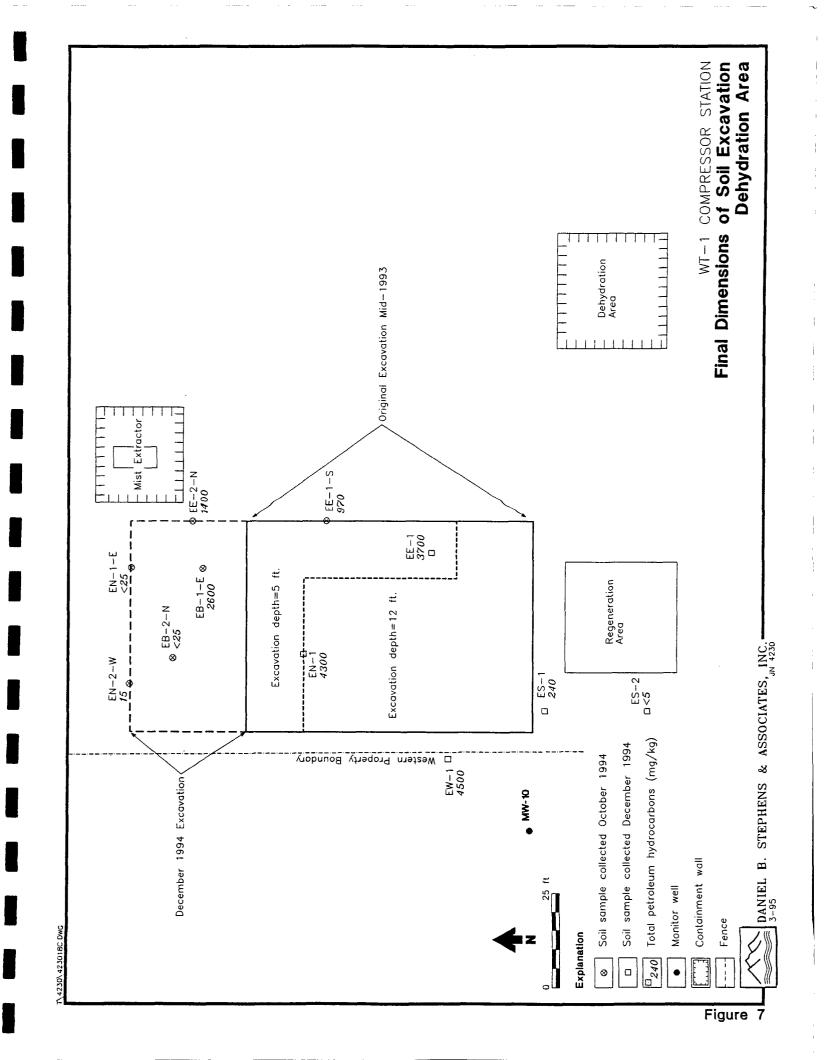
TPH analyzed using EPA method 418.1 BTEX analyzed using EPA method 8020

<sup>1</sup> Refer to Figure 7 for locations of samples

ND = Not detected

In November 1994, DBS&A collected two composite samples, one from the dehydration area excavation soils and one from the soils from off-site sources, and delivered the samples to ATI for analysis of hazardous characteristics. A TCLP extract (EPA method 1311) of each sample was analyzed for volatile organics (EPA method 8240) and for the eight Resource Conservation and Recovery Act (RCRA) metals (EPA method 6010). Analytical results indicated that all constituents were below RCRA regulatory levels. The analytical reports for the samples collected by DBS&A are contained in Appendix B.

Based on the analytical results, on December 2, 1994, CES submitted a work plan to OCD outlining additional excavation and treatment of all stockpiled soils. After OCD acceptance of the proposed work plan, TPC extended the dehydration area excavation primarily to the north and removed an additional 1,000 cubic yards of hydrocarbon-contaminated soil (Figure 7).





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During and after completing the additional excavation, TPC collected six soil samples to determine the remaining TPH and BTEX concentrations. Samples were collected at 7 feet and 12 feet bgs. Samples collected from 7 feet bgs contained TPH concentrations ranging from 15 to 2,600 mg/kg; samples collected from 12 feet bgs had no detectable TPH concentrations. BTEX concentrations at both depths were below the 50-mg/kg OCD standard with the exception of one sample (Table 6).

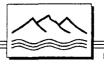
In order to complete the work plan approved by OCD, the stockpiled soils were treated. During the period of December 11 through 23, 1994, Pecos Valley Field Services of Pecos, Texas ran the stockpiled soils through a Kolberg soil screening plant and amended the soil with a nutrient solution to enhance biodegradation of hydrocarbons. The processed soils were placed back into the excavated area following treatment through the soil screening plant.

#### 4.2 SVE Pilot Tests

On November 20, 1994, DBS&A conducted four short-term SVE pilot tests. The pilot testing was conducted with the assistance of AcuVac Remediation (AcuVac) of Houston, Texas. AcuVac transported a mobile internal combustion engine (ICE) vapor extraction unit to the compressor station site and operated the unit under DBS&A's direction. The ICE draws a vacuum on the wells and at the same time achieves nearly complete oxidation of well vapors. The AcuVac pilot testing report is provided in Appendix E.

The SVE tests were conducted in order to assess whether an SVE system is a viable technology for the removal of PSH and adsorbed hydrocarbons by vapor means. The specific objectives of the SVE pilot tests were to

- Evaluate the effective radius of influence for SVE wells
- Determine operational flow rates and vacuums
- Estimate hydrocarbon mass removal rates



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The SVE pilot tests consisted of (1) a 4-hour test on monitor well MW-10, (2) a 3-hour test on well SVE-1A (deep zone), (3) a 30-minute test on well SVE-1B (shallow zone), and (4) a 1.5-hour test on monitor well MW-2. Wells SVE-1A, SVE-1B, and MW-2 are located near the engine room pits (DBS&A, 1995, Fig. 2). Tests were conducted at air flow rates ranging from approximately 3 to 15 cubic feet per minute (cfm) and vacuums of 45 to 233 inches of water. The single well tests indicated that approximately 1 to 2 cfm per linear foot of screen could be obtained from 2-inch-diameter SVE wells. AcuVac estimated that the effective radii of influence ranged from 70 feet to 100 feet.

Soil vapor samples were collected during testing of wells SVE-1B, MW-2, and MW-10 in order to evaluate hydrocarbon mass removal rates. Samples were collected in stainless steel canisters and shipped to Core Laboratories in Houston, Texas for analysis of BTEX, extended refinery gases (aliphatics and branched paraffins), and fixed gases ( $O_2/N_2/CO_2$ ). The analytical results from samples collected during the pilot tests are provided in Appendix E. In addition to the collection of samples for laboratory analyses, soil vapor concentrations were measured in the field with a Horiba<sup>®</sup> auto emissions analyzer provided by AcuVac. Fixed gas concentrations indicate that natural in-situ biodegradation of hydrocarbons is occurring, as evidenced by elevated  $CO_2$  concentrations (Appendix E). Non-methane hydrocarbon concentrations measured by Core Laboratory (23,200 ppmv in well MW-10) compare favorably with the Horiba<sup>®</sup> measurement made by AcuVac.

Table 7 summarizes the results of vapor analyses performed on samples collected during the SVE pilot testing. The highest concentrations of total hydrocarbon vapors, approximately 21,000 ppmv as measured by AcuVac, were extracted from monitor well MW-10 during the 4-hour SVE test.

The test results indicate that an SVE system can be used to remove hydrocarbon contamination by vapor means and that such a system will be effective in the dehydration area where contaminants are primarily low-molecular-weight pipeline distillates. SVE success will depend on the volatility of the subsurface hydrocarbons and sustainable air flow rates.

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# Table 7. Summary of Vapor Analyses in Soil GasRecovered from Above the Water TableWT-1 Compressor StationNovember 20, 1994

		Location	
Constituent	SVE-1B	MW-2	MW-10
Benzene	23	<1	319
Toluene	20	<1	504
Ethylbenzene	<1	<1	19
Xylene (total)	14	<10	153
Non-methane hydrocarbon	320	190	23,200
Methane	2,290	28,390	7,510

All analyses performed by Core Laboratories, Houston, TX All concentrations in ppmv



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#### 5. SUMMARY AND CONCLUSIONS

This report summarizes the November 15 through December 1, 1994 supplemental environmental investigation undertaken by Daniel B. Stephens & Associates, Inc. at Transwestern Pipeline Company's WT-1 compressor station. The purpose of the investigation was to evaluate the extent of subsurface impacts related to the release of wastewaters from the dehydration area. During the course of the investigation, background information was reviewed, and one temporary ground-water sampling boring and five monitor wells were installed. In addition, hydraulic tests (bail-down/recovery) were conducted, fluid levels were measured, all site monitor wells were surveyed to a common datum, and samples were collected from all site monitor wells for laboratory analysis.

Based on the data gathered to date, the following conclusions can be made regarding the site hydrogeologic properties and the extent of subsurface contamination:

- Ground water beneath the compressor station site is perched on underlying fine-grained sandstone and mudstone units. Ground water is encountered at approximately 45 to 55 feet below ground surface, and the saturated thickness ranges from 0 to 10 feet. Groundwater flow is generally to the northwest. There are no known uses for the perched water.
- Bail-down/recovery tests indicate that the average hydraulic conductivity of the perched ground-water system is approximately 5 x 10<sup>-2</sup> feet per day. The local ground-water velocity is estimated to be 5 feet per year.
- Field headspace and laboratory analyses indicate that the extent of actionable soil contamination near the dehydration area extends approximately 60 feet beyond the western property fence line.
- Benzene, toluene, xylene, and total naphthalene exceed the NMWQCC standards in the vicinity of monitor well MW-10. TPH concentrations in ground water consist primarily of gasoline-range constituents. PSH is present near the western fence line, as evidenced by the 1 foot of PSH measured in monitor well MW-10. Inorganic chemical analyses of



ENVIRONMENTAL SCIENTISTS AND ENGINEERS

water samples from the dehydration area indicated that NMWQCC standards were exceeded for TDS, chloride, iron, sulfate, and manganese.

 To date, corrective actions have consisted of constructing aboveground storage tanks within secondary containment structures, excavating and treating near-surface soils beneath the former dehydration area, and performing four soil vapor extraction pilot tests to determine remedial design parameters.



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#### **APPENDIX A**

## SOIL BORING LOGS AND WELL COMPLETION FORMS



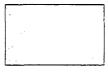
Silty sand with gravel



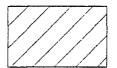
Silty sand

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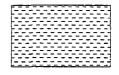
Caliche



Sandstone



Clayey and/or silty sandstone



30/42301

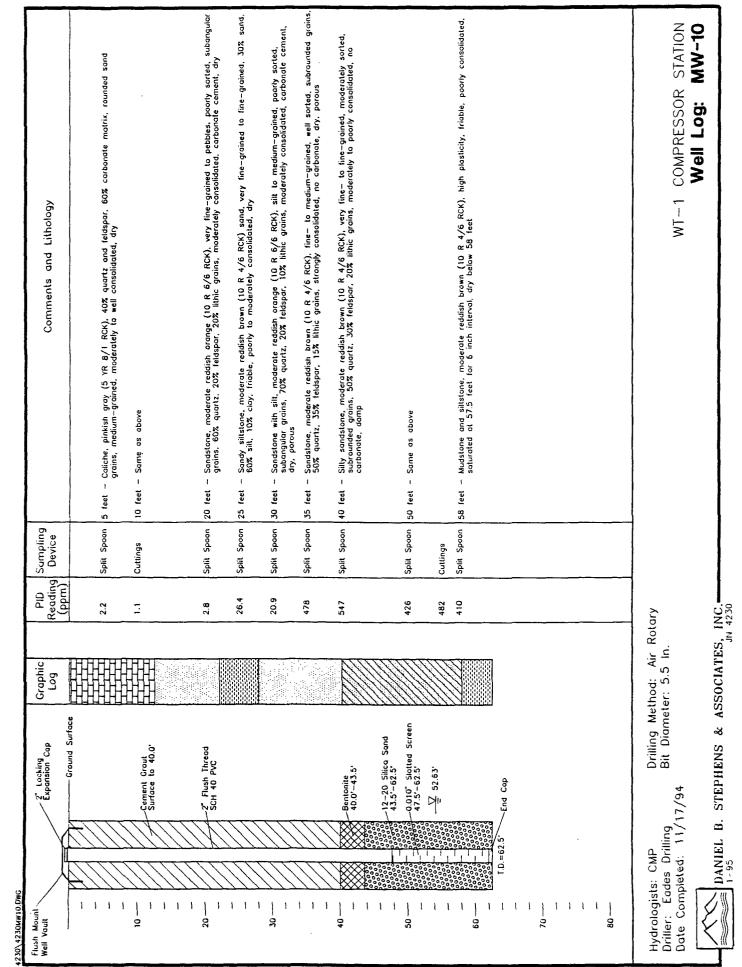
Mudstone

WT-1 COMPRESSOR STATION Graphic Symbols and General Descriptions of Boring Logs

Silty mudstone, moderate readisth brown (10 R 4/6 RCK), moderate plasticity, friable, micaceaus, moderately to well consolidated, damp to moist STATION **6-WW**  - Silty sandstone, light brown (5 YR 5/6 RCK), very fine- to fine-grained, poorly sorted, subrounded grains, 85% quartz, 10% feldspar, 5% lithic grains, poorly to moderately consolidated, calcareous, dry Sandstone. moderate reddish brawn (10 R 4/6 RCK), fine-grained, well sorted, subrounded grains, 70% quartz, 25% feldspar, 5% lithic grains. moderately to strongly consolidated. minor carbonate cement, damp Sitty sandstone, maderate reddish brown (10 R 4/6 RCK), very fine- to medium-grained, poorly sorted, angular to subrounded grains, minor small grovel (pebbles), 60% quartz, 25% feldspar, 15% lithic grains, moderately consolidated, carbonate cement, dry 35 feel - Sandstone, pale red (10 R 6/2 RCK), fine-grained, maderately to well sorted, subangular to subrounded grains, 55% quartz, 30% feldspor, 15% lithic grains, well consolidated, no carbonate, dry Caliche, pinkish gray (5 YR 8/1 RCK), medium-grained, well sorted, rounded grains, 70% sand in 30% carbonate matrix, poorly to moderately consolidated, dry COMPRESSOR Well Log: 60 feet - Same as above, alternating sandstone and mudstone layers, mudstone loyers maist to wet 20 feet - Same as above, more lithic grains, 10% pebbles of black obsidian, subangular WT-1Comments and Lithology feet - Same as above with few thin layers of mudstone 40 feet - Same as above, tine- to medium-grained Same as above, no pebbles 1.5 feet - Sail, silty sand with gravel 15 feet - Same as above ١ ١ 45 feet -50 feet -5 leet -10 feet 30 feet 25 feet 55 Sumpling Device Spoon Spoon šplit Spoon Split Spoon Split Spoon Split Spoon Spoon Spoon Spoon Spoon Spoon Split Spoon Cuttings Split Split Split Splii Split Split Split PID S Reading (ppm) 1.2 1.2 0.6 0.6 0.6 0.6 0.6 0.6 0.6 1.8 6.1 6.1 DANIEL B. STEPHENS & ASSOCIATES, INC. 1-95 Drilling Method: Air Rotary Bit Diameter: 5.5 In. Graphic Log Ground Surface -0.010" Slotted Screen 44.0"-59.0" -12-20 Silica Sand 40.5'-60.5' 2" Locking Expansion Cap Cement Grout Surface to 36.5' -2" Flush Thread SCH 40 PVC -Bentonite 36.5\*-40.5\* 55.14' -End Cap Driller: Eades Drilling Date Completed: 11/18/94 D I.D.=60.5 Hydrologists: CMP 423U/4230MW 9 BWG I ł I I 1 I I 1 L I ۱ 1 ł ł 0 1 20 ---100 40 | T ł 1 I I l 10% t 1 1 I ł 1 ł f Flush Mount. Well Voult 50 | ġ ġ

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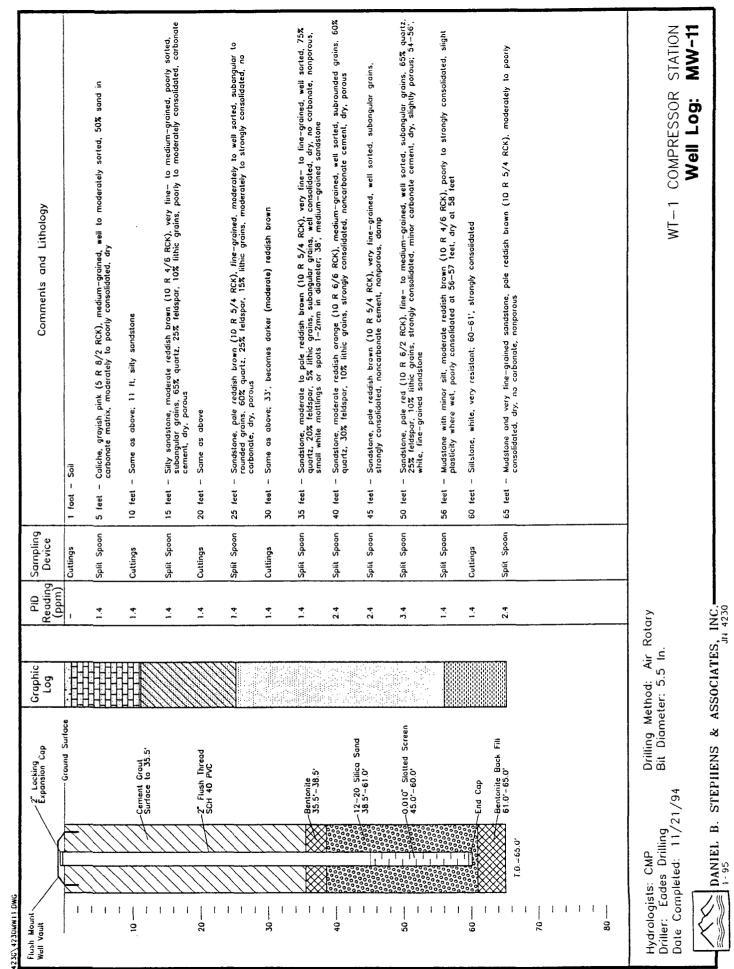
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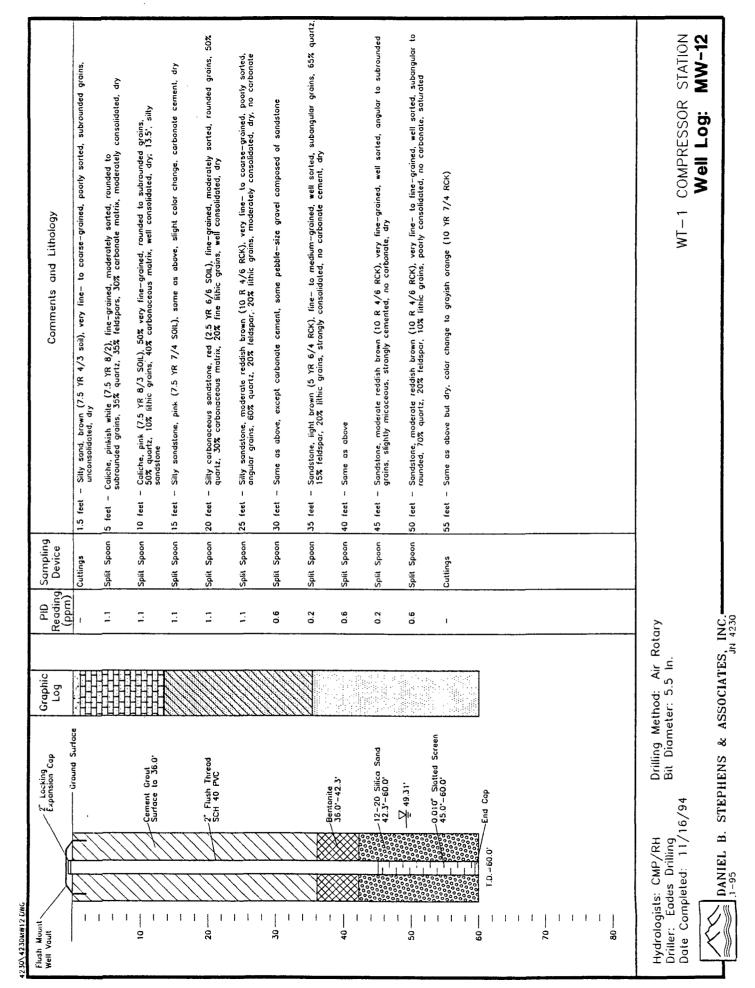
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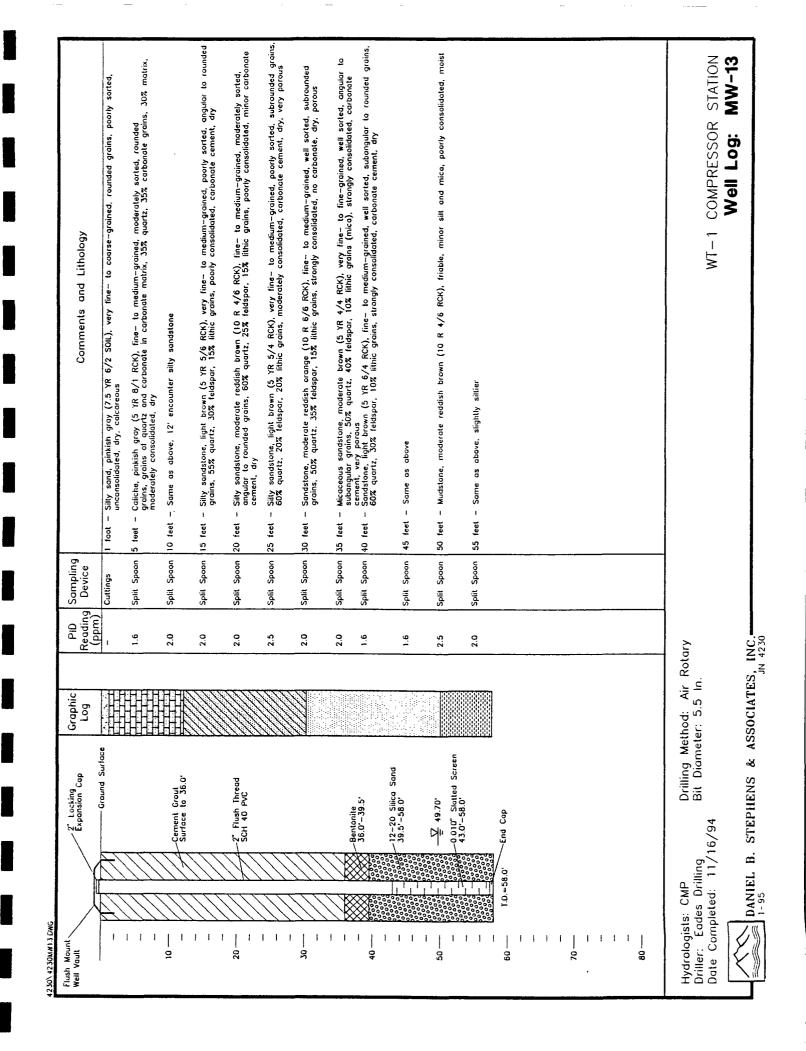
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Comments and Lithology	Coliche, pinkish gray (5 YR B/1 RCK), medium-grained, moderately sorted. 50–60% sond in carbonale matrix, moderately consolidated, dry	- Same as above; 11-12 feet encounter sitty sandstone	<ul> <li>Silty sandstone, moderate reddish orange (10 R 6/6 RCK) to light brown (5 YR 5/6 RCK), very line- to medium grained, poorly sorted, subangular grains, poorly to moderately consolidated, carbonate cement, porous, dry</li> </ul>		- Sandstone, light brown (5 YR 6/4 RCK) to moderate reddish brown (10 YR 4/6 RCK). very fine- to medium-grained. moderately to poorly sorted, subangular to rounded grains, moderately consolidated, porous. dry	<sup>-</sup> Sandstone, light brown (5 YR 6/4 RCK) to moderate reddish brown (10 YR RCK), very fine- to fine-grained, moderately to well sorted, subangular to rounded grains, moderately to strongly consolidated, dry to damp	<ul> <li>Sandstone, pale red (10 YR 6/2 RCK) to moderate reddish brown (10 R 4/6 RCK), very fine- to medium- grained, moderately to well sorted, subangular to rounded grains, moderately to strongly consolidated, damp; 55 feet, while fine-grained sandstone</li> </ul>	- Mudslone, moderate reddish brown (10 YR 4/6 RCK), triable, poorly lo moderately consolidated. wel	WT-1 COMPRESSOR STATION Boring Log: SB-3
	5 feet -	10 feet -	15 feet -	20 feet -	25 feet -	40 feet -	50 feet -	57 feet -	
Sampling Device	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	Cuttings	
PID Reading (ppm)	¥.	AN M	AN	AN	ž	¥	ę,	¢ Z	 <u>ک</u>
Graphic Log - Graund Surface		Cement Grout Surface to 59.0							Drilling Method: Air Rotary Bit Diameter: 5.5 In.
		Cement						1.D.=59.0'	lling 11/29
ł	()))	$\overline{//}$	$\overline{//}$	$\overline{//}$					Hydrologists: CMP Driller: Eades Dri Date Completed:

# **APPENDIX B**

# ANALYTICAL LABORATORY REPORTS FOR SOIL AND GROUND-WATER ANALYSES

Organic Analyses

# Hall Environmental Analysis Laboratory

Hall Environmental Analysis Laboratory 2403 San Mateo NE, Suite P-13 Albuquerque, NM 87110

Daniel B. Stephens and Associates, Inc. 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Dear Mr. Bob Marley,

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. Unless noted on sample page, all criteria for QA/QC acceptance levels fall within established parameters. These parameters are modeled from the EPA-600 14-79 019, March 1979, "Handbook for Analytical Quality Control in Water and Waste Water."

Please don't hesitate to contact me for any additional information or clarifications

Sincerely,

12/5/94

12/1/94

Scott Hallenbeck, Lab Manager

Project: ENRON WT-1

### Results for sample: MW-13 (52.5')

Date collected: 11/16/94	Date received: 11/18/94
Date extracted: 11/21,22/94	Date analyzed: 11/22,23/94
Client: Daniel B. Stephens and As	ssociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411046-1
Project Manager: Bob Marley	Sampled by: RH/CP
Matrix: Non-aqueous	

Test: EPA 8020

Compound	Result	<b>Detection Limit</b>	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 85 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	10	PPM (MG/KG)

BFB (Surrogate) Recovery = 99 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM (MG/KG)

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DNOP (Surrogate) Recovery = 96 %

# Results for sample: MW-12 (47.0')

Date collected: 11/16/94	Date received: 11/18/94
Date extracted: 11/21,22/94	Date analyzed: 11/22,23/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	Heal #: 9411046-2
Project Manager: Bob Marley	Sampled by: RH/CP
Matrix: Non-aqueous	

# Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 87 %

Dilution Factor = 1

# Test: EPA 8015 Modified

Compound	Result	<b>Detection</b> Limit	Units
Gasoline	nd	10	PPM (MG/KG)

BFB (Surrogate) Recovery = 101 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection</b> Limit	Units
Diesel	nd	5	PPM (MG/KG)

DNOP (Surrogate) Recovery = 102 %

### **Results for sample:** MW-10 (41.5')

Date collected: 11/17/94	Date received: 11/18/94				
Date extracted: 11/21,22/94	Date analyzed: 11/22,23/94				
Client: Daniel B. Stephens and Associates, Inc.					
Project Name: ENRON WT-1	Heal #: 9411046-3				
Project Manager: Bob Marley	Sampled by: RH/CP				
Matrix: Non-aqueous					

#### Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	5.1	2.5	PPM (MG/KG)
Toluene	71	2.5	PPM (MG/KG)
Ethylbenzene	5.1	2.5	PPM (MG/KG)
Total Xylenes	140	2.5	PPM (MG/KG)

BFB (Surrogate) Recovery = \*\* %

Dilution Factor = 50

Test: EPA 8015 Modified

Compound	Result	<b>Detection</b> Limit	Units
Gasoline	7,300	500	PPM (MG/KG)

BFB (Surrogate) Recovery = \*\* %

Dilution Factor = 50

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	380*	50	PPM (MG/KG)

DNOP (Surrogate) Recovery = 96 %

Dilution Factor = 10

\*Due to matrix interference from gasoline range H-C; peak pattern not characteristic of only diesel fuel, therefore, quantitated only that which was in diesel range and after gasoline range (>C18-C26).

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\*\* Surrogate non-recoverable due to sample dilution

Date collected: 11/17/94	Date received: 11/18/94			
Date extracted: NA	Date analyzed: 11/18/94			
Client: Daniel B. Stephens and Associates, Inc.				
Project Name: ENRON WT-1	HEAL #: 9411046-4			
Project Manager: Bob Marley	Sampled by: RH/CP			
Matrix: Aqueous				

### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	3.5	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	26	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	nd	0.2	PPB (UG/L)
1,2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	1.9	0.5	PPB (UG/L)
1, 1, 1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	3.1	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 92 % BCM (Surrogate) Recovery = 113 % Dilution Factor = 1

Date collected: 11/17/94	Date received: 11/18/94
Date extracted: 11/22/94	Date analyzed: 11/18,22/94
Client: Daniel B. Stephens and Asso	ciates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411046-4
Project Manager: Bob Marley	Sampled by: RH/CP
Matrix: Aqueous	

Test: EPA 504.1

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Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

# Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 100 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 123 %

# **Results for sample: Trip Blank**

Date collected: NA	Date received: 11/18/94
Date extracted: NA	Date analyzed: 11/18/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411046-7
Project Manager: Bob Marley	Sampled by: RH/CP
Matrix: Aqueous	

# Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (U(J/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 90 % BCM (Surrogate) Recovery = 101 % Dilution Factor = 1

# Results for sample: Trip Blank

Date collected: NA	Date received: 11/18/94
Date extracted: 11/22/94	Date analyzed: 11/18,22/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	Heal #: 9411046-7
Project Manager: Bob Marley	Sampled by: RH/CP
Matrix: Aqueous	

### Test: EPA 8015 Modified

Compound	Result	<b>Detection</b> Limit	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 102 %

Dilution Factor = 1

# Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 131 %

### Results for sample: MW-10 (49.0')

Date collected: 11/17/94	Date received: 11/18/94
Date extracted: 11/21,22/94	Date analyzed: 11/22,23/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411046-8
Project Manager: Bob Marley	Sampled by: NA
Matrix: Non-aqueous	

#### Test: EPA 8020

Compound	Result	<b>Detection Limit</b>	Units
Benzene	18	2.5	PPM (MG/KG)
Toluene	260	2.5	PPM (MG/KG)
Ethylbenzene	27	2.5	PPM (MG/KG)
Total Xylenes	400	2.5	PPM (MG/KG)

BFB (Surrogate) Recovery =\*\* %

Dilution Factor = 50

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	16,000	1000	PPM (MG/KG)

BFB (Surrogate) Recovery = \*\* %

Dilution Factor = 100

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	320*	50	PPM (MG/KG)

DNOP (Surrogate) Recovery = 94 %

Dilution Factor = 10

\*Due to matrix interference from gasoline range H-C; peak pattern not characteristic of only diesel fuel, therefore, quantitated only that which was in diesel range (>C18-C26).

\*\* Surrogate non-recoverable due to sample dilution

Date extracted: NA	Date analyzed: 11/18/94
Client: Daniel B. Stephens and Asso	ciates, Inc.
Project Name: ENRON WT-1	HEAL #: RB 11/18
Project Manager: Bob Marley	
Matrix: Aqueous	

### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chioroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (U(1/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (U(J/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (UC/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (U(I/L)

BFB (Surrogate) Recovery = 89 % BCM (Surrogate) Recovery = 80 % Dilution Factor = 1

Date extracted: 11/22/94	Date analyzed: 11/29/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	Heal #: RB 11/22
Project Manager: Bob Marley	
Matrix: Aqueous	

# Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1.2.3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a.h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 81 %

Date extracted: 11/22/94Date analyzed: 11/22/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1Heal #: RB 11/22Project Manager: Bob MarleyMatrix: Aqueous

#### Test: EPA 504.1

Compound	Result	<b>Detection</b> Limit	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

# Test: EPA 8015 Modified

Compound	Result	<b>Detection</b> Limit	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 98 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection</b> Limit	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 125 %

Date extracted:11/21,22/94Date analyzed:11/22,23/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1Heal #:RB 11/21,22Project Manager:Bob MarleyMatrix:Non-Aqueous

### Test: EPA 8020

Compound	Result	<b>Detection Limit</b>	Units		
Benzene	nd	0.05	PPM (MG/KG)		
Toluene	nd	0.05	PPM (MG/KG)		
Ethylbenzene	nd	0.05	PPM (MG/KG)		
Total Xylenes	nd	0.05	PPM (MG/KG)		

BFB (Surrogate) Recovery = 87 %

Dilution Factor = 1

# Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	10	PPM (MG/KG)

BFB (Surrogate) Recovery = 104 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	10	PPM (MG/KG)

DNOP (Surrogate) Recovery = 97 %

# Results for QC: Matrix Spike / Matrix Spike Dup

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Date extracted: NA	Date analyzed: 11/18/94					
Client: Daniel B. Stephens and Associates, Inc.						
Project Name: ENRON WT-1	HEAL #: 9411045-1 MS/MSD					
Project Manager: Bob Marley						
Matrix: Aqueous	Units: PPB (UG/L)					

# Test: EPA 8010/8020

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Compound	Sample	Amount	Matrix		MSD	MSD	
	Result	Added	Recov.	MS %	Recov.	%	RPD
Chlorobenzene	<0.2	20.0	20.0	100	20.4	102	2
Ethylbenzene	<0.5	20.0	19.8	99	20.3	102	2
1,1-DCE	< 0.2	20.0	18.8	94	19.8	99	5
Trans-1,2-DCE	<0.2	20.0	20.3	102	20.8	104	2
Carbon							
Tetrachloride	<0.2	20.0	20.7	104	20.8	104	0
1,2-DCA	<0.2	20.0	22.6	113	22.5	113	0
1,2-Dichloro-							
propane	<0.2	20.0	20.3	102	21.3	107	5
1.1.2-TCA	<0.2	20.0	21.1	106	20.8	104	1
PCE	<0.2	20.0	20.8	104	21.1	106	1
1,3-Dichloro-							
benzene	<0.2	20.0	18.0	90	20.2	101	12
1,4-Dichloro-							
benzene	< 0.2	20.0	17.6	88	20.3	102	14

# Results for QC: Blank Spike/Blank Spike Dup

Date extracted: 11/22/94	Date analyzed: 11/30/94
Client: Daniel B. Stephens and Asso	ciates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 11/22
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

# Test: EPA 8100

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Naphthalene	<0.5	10.0	7.3	73	6.9	69	6
Acenaphthylene	<0.5	10.0	7.6	76	7.9	79	4
Acenaphthene	<0.5	10.0	7.8	78	7.8	78	0
Flourene	<0.5	10.0	8.3	83	8.0	80	4
Phenanthrene	<0.5	10.0	9.5	95	9.7	97	2
Anthracene	<0.5	10.0	9.1	91	9.0	90	1
Pyrene	<0.5	10.0	9.2	92	9.1	91	1
Benzo(a)pyrene	<0.5	10.0	9.3	93	9.4	94	1
Benzo(g,h,i)-							
perylene	<1.0	10.0	10.1	101	10.0	100	1

### Results for QC: Matrix Spike/Matrix Spike Dup Blank Spike / Blank Spike Dup

Date extracted: 11/21,23/94	Date analyzed: 11/22,23/94					
Client: Daniel B. Stephens and Associates, Inc.						
Project Name: ENRON WT-1	HEAL #: BS/3SD 11/21					
Project Manager: Bob Marley	9411039-4 MS/MSD					
Matrix: Aqueous	Units: PPM (MG/L)					

# Test: EPA 8020

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Benzene	< 0.5	20.0	22.7	114	21.5	108	5
Toluene	< 0.5	20.0	21.3	107	20.6	103	3
Ethylbenzene	< 0.5	20.0	20.1	101	19.1	95	5
Total Xylenes	< 0.5	60.0	59.7	100	57.0	95	5

# Test: EPA 504.1

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
EDB	< 0.01	0.67	0.60	90	0.57	85	5

# Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Gasoline	< 0.05	0.50	0.44	89	0.43	87	2

### Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Diesel	<1.0	5.4	5.9	109	5.5	102	7

# Results for QC: Matrix Spike / Matrix Spike Dup

Date extracted: 11/17,22/94	Date analyzed: 11/18,23/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411044-4 MS/MSD
Project Manager: Bob Marley	BS/BSD 11/22
Matrix: Non-Aqueous	Units: PPM (MG/KG)

# Test: EPA 8020

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Benzene	< 0.05	1.00	0.98	98	0.94	94	4
Toluene	< 0.05	1.00	1.02	102	0.99	99	3
Ethylbenzene	< 0.05	1.00	0.92	92	0.94	94	2
Total Xylenes	< 0.05	3.00	2.88	96	2.93	98	2

# Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Gasoline	<10	50	43	87	44	88	2

# Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Diesel	<5.0	54	57	106	59	109	3

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Hall Environmental Analysis Laboratory 2403 San Mateo NE, Suite P-13 Albuquerque, NM 87110 12/05/94

Daniel B. Stephens and Associates, Inc. 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Dear Mr. Bob Marley,

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. Unless noted on sample page, all criteria for QA/QC acceptance levels fall within established parameters. These parameters are modeled from the EPA-600 14-79 019, March 1979, "Handbook for Analytical Quality Control in Water and Waste Water."

Please don't hesitate to contact me for any additional information or clarifications

Sincerely,

att Hall 12/5/94

Scott Hallenbeck, Lab Manager

Project: ENRON WT-1

Date collected: 11/18/94	Date received: 11/20/94
Date extracted: NA	Date analyzed: 11/21/94
Client: Daniel B. Stephens and Ass	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411052-1
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

# Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	9.000	13	PPB (UG/L)
Bromodichloromethane	nd	5.0	PPB (UG/L)
Bromoform	nd	25	PPB (UG/L)
Bromomethane	nd	25	PPB (UG/L)
Carbon Tetrachloride	nd	5.0	PPB (UG/L)
Chlorobenzene	nd	5.0	PPB (UG/L)
Chloroethane	nd	5.0	PPB (UG/L)
Chloroform	nd	5.0	PPB (UG/L)
Chloromethane	nd	5.0	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	25	PPB (UG/L)
Dibromochloromethane	nd	5.0	PPB (UG/L)
1.3-Dichlorobenzene	nd	5.0	PPB (UG/L)
1.2-Dichlorobenzene	nd	5.0	PPB (UG/L)
1.4-Dichlorobenzene	nd	5.0	PPB (UG/L)
Dichlorodifluoromethane	nd	5.0	PPB (UG/L)
1,1-Dichloroethane	nd	5.0	PPB (UG/L)
1.2-Dichloroethane	nd	5.0	PPB (UG/L)
1.1-Dichloroethene	nd	5.0	PPB (UG/L)
1.2-Dichloroethene (Cis)	nd	5.0	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	5.0	PPB (UG/L)
1.2-Dichloropropane	nd	5.0	PPB (UG/L)
cis-1.3-Dichloropropene	nd	5.0	PPB (UG/L)
trans-1,3-Dichloropropene	nd	5.0	PPB (UG/L)
Ethylbenzene	620	13	PPB (UG/L)
Dichloromethane	nd	50	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	5.0	PPB (UG/L)
Tetrachloroethene (PCE)	nd	5.0	PPB (UG/L)
Toluene	16.000	13	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	5.0	PPB (UG/L)
Trichloroethene (TCE)	nd	5.0	PPB (UG/L)
Vinyl Chloride	nd	5.0	PPB (UG/L)
Xylenes (Total)	8.500	13	PPB (UG/L)
Trichlorofluoromethane	nd	5.0	PPB (UG/L)

BFB (Surrogate) Recovery = 103 % BCM (Surrogate) Recovery = 85 % Dilution Factor = 25

Results for sample: MW-10

Date collected: 11/18/94	Date received: 11/20/94
Date extracted: 11/21,23/94	Date analyzed: 11/21,23,30/94
Client: Daniel B. Stephens and Ass	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411052-1
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

# Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	69	2.5	PPM (MG/L)

BFB (Surrogate) Recovery = 120 %

Dilution Factor = 50

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	10	5.0	PPM (MG/L)

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DNOP (Surrogate) Recovery = 104 %

Date collected: 11/18/94	Date received: 11/20/94
Date extracted: 11/22/94	Date analyzed: 11/30/94
Client: Daniel B. Stephens and Associ	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411052-1
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

### Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	850	10	PPB (UG/L)
2-Methyl Naphthalene	220	10	PPB (UG/L)
1-Methyl Naphthalene	200	10	PPB (UG/L)
Acenaphthalene	nd	10	PPB (UG/L)
Acenaphthene	14	10	PPB (UG/L)
Fluorene	nd	10	PPB (UG/L)
Phenanthrene	nd	10	PPB (UG/L)
Anthracene	nd	10	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a.h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 105 %

Date collected: 11/18/94	Date received: 11/20/94
Date extracted: 11/22/94	Date analyzed: 11/30/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	Heal #: 9411052-2
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2.3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a.h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

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Hexadecane (Surrogate) Recovery = 83 %

# **Results for sample:** Trip Blank

Date collected: NA	Date received: 11/20/94
Date extracted: NA	Date analyzed: 11/21/94
Client: Daniel B. Stephens and Ass	sociates, Inc.
Project Name: ENRON WT-1	Heal #: 9411052-6
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (U(J/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (U(1/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (U(7/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (U(i/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (U(J/L)
1.1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (U(1/L)
1.2-Dichloroethene (Cis )	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (U(J/L)
Toluene	nd	0.5	PPB (U(I/L)
1.1.1-Trichloroethane	nd	0.2	PPB (U(J/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (U(3/L)
Xylenes (Total)	nd	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 89 % BCM (Surrogate) Recovery = 88 % Dilution Factor = 1

# **Results for sample:** Trip Blank

Date collected: NA	Date received: 11/20/94
Date extracted: NA	Date analyzed: 11/21,23,30/94
Client: Daniel B. Stephens and Assoc	iates, Inc.
Project Name: ENRON WT-1	Heal #: 9411052-6
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

### Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 101 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 113 %

### Results for sample: MW-9 (50')

Date collected:11/19/94Date received:11/20/94Date extracted:11/22/94Date analyzed:11/23,28/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1Heal #:9411052-7Project Manager:Bob MarleySampled by:Rene HillMatrix:Non-aqueousNon-aqueousNon-aqueous

#### Test: EPA 8020

Compound	Result	<b>Detection Limit</b>	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery =90 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 97 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM (MG/KG)

DNOP (Surrogate) Recovery = 96 %

### Results for sample: MW-9 (55')

Date collected: 11/19/94	Date received: 11/20/94		
Date extracted: 11/22/94	Date analyzed: 11/23,28/94		
Client: Daniel B. Stephens and Associates, Inc.			
Project Name: ENRON WT-1	HEAL #: 9411052-8		
Project Manager: Bob Marley	Sampled by: Rene Hill		
Matrix: Non-aqueous			

### Test: EPA 8020

Compound	Result	<b>Detection Limit</b>	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 82 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	_nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 84 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM (MG/KG)

DNOP (Surrogate) Recovery = 100 %

Date extracted: NA	Date analyzed: 11/21/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: RB 11/21
Project Manager: Bob Marley	
Matrix: Aqueous	

### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (U(1/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis)	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1,2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xvienes (Total)	nd	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 93 % BCM (Surrogate) Recovery = 119 % Dilution Factor = 1

Date extracted: 11/22/94	Date analyzed: 11/29/94
Client: Daniel B. Stephens and Associ	ates, Inc.
Project Name: ENRON WT-1	Heal #: RB 11/22
Project Manager: Bob Marley	
Matrix: Aqueous	

# Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a.h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h,i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 81 %

Date extracted:11/22/94Date analyzed:11/28/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1Heal #:RB 11/22Project Manager:Bob MarleyMatrix:Non-Aqueous

#### Test: EPA 8020

Compound	Result	<b>Detection Limit</b>	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 96 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	10	PPM (MG/KG)

BFB (Surrogate) Recovery = 115 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	10	PPM (MG/KG)

DNOP (Surrogate) Recovery = 97 %

Date extracted:11/22/94Date analyzed:11/28/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1Heal #:RB 11/22Project Manager:Bob MarleyMatrix:Non-Aqueous

### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Bromodichloromethane	nd	0.01	PPM (MG/KG)
Bromoform	nd	0.05	PPM (MG/KC)
Bromomethane	nd	0.05	PPM (MG/KG)
Carbon Tetrachloride	nd	0.01	PPM (MG/KG)
Chlorobenzene	nd	0.01	PPM (MG/KG)
Chloroethane	nd	0.01	PPM (MG/KG)
Chloroform	nd	0.01	PPM (MG/KG)
Chloromethane	nd	0.01	PPM (MG/KG)
2-Chloroethylvinyl Ether	nd	0.05	PPM (MG/KG)
Dibromochloromethane	nd	0.01	PPM (MG/KG)
1.3-Dichlorobenzene	nd	0.01	PPM (MG/KG)
1.2-Dichlorobenzene	nd	0.01	PPM (MG/KG)
1. I-Dichlorobenzene	nd	0.01	PPM (MG/KG)
Dichlorodifluoromethane	nd	0.01	PPM (MG/KG)
1.1-Dichloroethane	nd	0.01	PPM (MG/KG)
1.2-Dichloroethane	nd	0.01	PPM (MG/KG)
1.1-Dichloroethene	nd	0.01	PPM (MG/KG)
1.2-Dichloroethene (Cis)	nd	0.01	PPM (MG/KG)
1.2-Dichloroethene (Trans)	nd	0.01	PPM (MG/KG)
1.2-Dichloropropane	nd	0.01	PPM (MG/KG)
cis-1.3-Dichloropropene	nd	0.01	PPM (MG/KG)
trans-1.3-Dichloropropene	nd	0.01	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Dichloromethane	nd	0.1	PPM (MG/KG)
1.1.2.2-Tetrachloroethane	nd	0.01	PPM (MG/KG)
Tetrachloroethene (PCE)	nd	0.01	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KC)
1,1.1-Trichloroethane	nd	0.01	PPM (MG/KG)
1.1.2-Trichloroethane	nd	0.01	PPM (MG/KG)
Trichloroethene (TCE)	nd	0.01	PPM (MG/KG)
Vinyl Chloride	nd	0.01	PPM (MG/KG)
Xvlenes (Total)	nd	0.05	PPM (MG/KG)
Trichlorofluoromethane	nd	0.01	PPM (MG/KG)

BFB (Surrogate) Recovery = 78 % BCM (Surrogate) Recovery = 89 % Dilution Factor = 1

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# Results for QC: Matrix Spike / Matrix Spike Dup

Date extracted: NA	Date analyzed: 11/18/94
Client: Daniel B. Stephens and Asso	ciates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411045-1 MS/MSD
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

# Test: EPA 8010/8020

Compound	Sample	Amount	Matrix		MSD	MSD	
	Result	Added	Recov.	MS %	Recov.	%	RPD
Chlorobenzene	<0.2	20.0	20.0	100	20.4	102	2
Ethylbenzene	<0.5	20.0	19.8	99	20.3	102	2
1.1-DCE	<0.2	20.0	18.8	94	19.8	99	5
Trans-1,2-DCE	< 0.2	20.0	20.3	102	20.8	104	2
Carbon							
Tetrachloride	< 0.2	20.0	20.7	104	20.8	104	0
1,2-DCA	< 0.2	20.0	22.6	113	22.5	113	0
1,2-Dichloro-							
propane	< 0.2	20.0	20.3	102	21.3	107	5
1.1.2-TCA	<0.2	20.0	21.1	106	20.8	104	1
PCE	<0.2	20.0	20.8	104	21.1	106	1
1,3-Dichloro-							
benzene	< 0.2	20.0	18.0	90	20.2	101	12
1.4-Dichloro-							
benzene	< 0.2	20.0	17.6	88	20.3	102	14

# Results for QC: Blank Spike/Blank Spike Dup

Date extracted: 11/22/94	Date analyzed: 11/30/94
Client: Daniel B. Stephens and Ass	ociates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 11/22
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

# Test: EPA 8100

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Naphthalene	<0.5	10.0	7.3	73	6.9	69	6
Acenaphthylene	< 0.5	10.0	7.6	76	7.9	79	4
Acenaphthene	<0.5	10.0	7.8	78	7.8	78	0
Flourene	< 0.5	10.0	8.3	83	8.0	80	4
Phenanthrene	< 0.5	10.0	9.5	95	9.7	97	2
Anthracene	< 0.5	10.0	9.1	91	9.0	90_	1
Pyrene	< 0.5	10.0	9.2	92	9.1	91	1
Benzo(a)pyrene	<0.5	10.0	9.3	93	9.4	94	1
Benzo(g,h,i)-							
perylene	<1.0	10.0	10.1	101	10.0	100	1

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## Results for QC: Matrix Spike/Matrix Spike Dup Blank Spike / Blank Spike Dup

Date extracted: 11/21,23/94	Date analyzed: 11/21,23,30/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 11/21,23
Project Manager: Bob Marley	9411052-5 MS/MSD
Matrix: Aqueous	Units: PPM (MG/L)

## Test: EPA 504.1

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
EDB	< 0.01	0.67	0.60	90	0.57	85	5

## Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Gasoline	0.16	0.50	0.67	101	0.68	103	1

## Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Diesel	<1.0	5.4	5.9	109	5.5	102	7

# Results for QC: Matrix Spike / Matrix Spike Dup

Date extracted: 11/22/94	Date analyzed: 11/28/94
Client: Daniel B. Stephens and Assoc	iates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411052-7 MS/MSD
Project Manager: Bob Marley	
Matrix: Non-Aqueous	Units: PPM (MG/KG)

# Test: EPA 8010/8020

Compound	Sample	Amount	Matrix		MSD	MSD	
	Result	Added	Recov.	MS %	Recov.	%	RPD
Chlorobenzene	< 0.01	1.00	1.08	108	1.03	103	5
Ethylbenzene	< 0.05	1.00	1.07	107	1.03	103	4
1,1-DCE	< 0.01	1.00	0.86	86	0.94	94	9
Trans-1,2-DCE	< 0.01	1.00	0.86	86	0.93	93	8
Carbon							
Tetrachloride	< 0.01	1.00	0.97	97	1.00	100	3
1,2-DCA	< 0.01	1.00	0.97	97	1.01	101	4
1,2-Dichloro-							
propane	< 0.01	1.00	1.06	106	1.12	112	6
1,1,2-TCA	< 0.01	1.00	0.98	98	1.07	107	9
PCE	< 0.01	1.00	0.93	93	1.06	106	13
1,3-Dichloro-							
benzene	< 0.01	1.00	1.03	103	1.18	118	14
1,4-Dichloro-							
benzene	< 0.01	1.00	1.10	110	1.19	119	8

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Hall Environmental Analysis Laboratory 2403 San Mateo NE, Suite P-13 Albuquerque, NM 87110

Daniel B. Stephens and Associates, Inc. 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Dear Mr. Bob Marley,

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. Unless noted on sample page, all criteria for QA/QC acceptance levels fall within established parameters. These parameters are modeled from the EPA-600 14-79 019, March 1979, "Handbook for Analytical Quality Control in Water and Waste Water."

Please don't hesitate to contact me for any additional information or clarifications

Sincerely,

fatt Hall

12/5/94

12/05/94

Scott Hallenbeck, Lab Manager

Project: ENRON WT-1

Date collected: 11/21/94	Date received: 11/23/94								
Date extracted: NA	Date analyzed: 11/23/94								
Client: Daniel B. Stephens and Associates, Inc.									
Project Name: ENRON WT-1	HEAL #: 9411059-1								
Project Manager: Bob Marley	Sampled by: Clarence Pigman								
Matrix: Aqueous									

## Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units			
Benzene	12	0.5	PPB (U(J/L)			
Bromodichloromethane	1.4	0.2	PPB (UG/L)			
Bromoform	nd	1.0	PPB (UG/L)			
Bromomethane	nd	1.0	PPB (UG/L)			
Carbon Tetrachloride	nd	0.2	PPB (UG/L)			
Chlorobenzene	nd	0.2	PPB (UG/L)			
Chloroethane	nd	0.2	PPB (UG/L)			
Chloroform	27	0.2	PPB (UG/L)			
Chloromethane	nd	0.2	PPB (UG/L)			
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)			
Dibromochloromethane	nd	0.2	PPB (U( I/L)			
1.3-Dichlorobenzene	nd	0.2	PPB (U(7/L)			
1.2-Dichlorobenzene	nd					
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)			
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)			
1.1-Dichloroethane	nd	0.2	PPB (UG/L)			
1.2-Dichloroethane	nd	0.2	PPB (UG/L)			
1.1-Dichloroethene	nd	0.2	PPB (UG/L)			
1.2-Dichloroethene (Cis)	nd	0.2	PPB (UG/L)			
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)			
1.2-Dichloropropane	nd	0.2	PPB (UG/L)			
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)			
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)			
Ethylbenzene	nd	0.5	PPB (UG/L)			
Dichloromethane	nd	2.0	PPB (UG/L)			
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)			
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)			
Toluene	nd	0.5	PPB (UG/L)			
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)			
1,1.2-Trichloroethane	nd	0.2	PPB (UG/L)			
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)			
Vinyl Chloride	nd	0.2	PPB (UG/L)			
Xylenes (Total)	nd	0.5	PPB (UG/L)			
Truchlorofluoromethane	nd	0.2	PPB (UG/L)			

BFB (Surrogate) Recovery = 93 % BCM (Surrogate) Recovery = 90 % Dilution Factor = 1

Date collected: 11/21/94	Date received: 11/23/94
Date extracted: 11/29/94	Date analyzed: 11/29,12/01/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411059-1
Project Manager: Bob Marley	Sampled by: Clarence Pigman
Matrix: Aqueous	

### Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 101 %

Dilution Factor = 1

## Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 111 %

Date collected: 11/21/94	Date received: 11/23/94
Date extracted: 11/23/94	Date analyzed: 12/02/94
Client: Daniel B. Stephens and Associ	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411059-1
Project Manager: Bob Marley	Sampled by: Clarence Pigman
Matrix: Aqueous	

## Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	0.7	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a,h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 83 %

### Results for sample: MW-11 (40')

Date collected: 11/21/94Date received: 11/23/94Date extracted: 11/28,29/94Date analyzed: 11/29,12/01/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1Heal #: 9411059-4Project Manager: Bob MarleySampled by:Clarence PigmanMatrix: Non-aqueousSampled by:Clarence Pigman

#### Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 98 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 103 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM (MG/KG)

DNOP (Surrogate) Recovery = 104 %

### Results for sample: MW-11 (56')

Date collected:11/21/94Date received:11/23/94Date extracted:11/28,29/94Date analyzed:11/29,12/01/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1HEAL #:9411059-5Project Manager:Bob MarleySampled by:Clarence PigmanMatrix:Non-aqueousNon-aqueousNon-aqueousNon-aqueous

### Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 100 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 95 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM (MG/KG)

DNOP (Surrogate) Recovery = 100 %

Date extracted: NA	Date analyzed: 11/23/94
Client: Daniel B. Stephens and Ass	ociates, Inc.
Project Name: ENRON WT-1	HEAL #: RB 11/23
Project Manager: Bob Marley	
Matrix: Aqueous	

## Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (U(1/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (U(1/L)
Dichlorodifluoromethane	nd	0.2	PPB (UC/L)
1.1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (U(J/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (U(J/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (U(J/L)
1.1.1-Trichloroethane	nd	0.2	. PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (U(J/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xyienes (Total)	nd	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 90 % BCM (Surrogate) Recovery = 105 % Dilution Factor = 1

Date extracted: 11/23/94	Date analyzed: 12/02/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	Heal #: RB 11/23
Project Manager: Bob Marley	
Matrix: Aqueous	

### Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a.h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h,i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 79 %

Date extracted: 11/29/94Date analyzed: 11/29,12/02/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1Heal #: RB 11/29Project Manager: Bob MarleyMatrix: Aqueous

Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 98 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection</b> Limit	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 113 %

Date extracted:11/28,29/94Date analyzed:11/29,12/01/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1Heal #:RB 11/28,29Project Manager:Bob MarleyMatrix:Non-Aqueous

#### Test: EPA 8020

Compound	Result	<b>Detection</b> Limit	Units		
Benzene	nd	0.05	PPM (MG/KG)		
Toluene	nd	0.05	PPM (MG/KG)		
Ethylbenzene	nd	0.05	PPM (MG/KG)		
Total Xylenes	nd	0.05	PPM (MG/KG)		

BFB (Surrogate) Recovery = 106 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units	
Gasoline	nd	5.0	PPM (MG/KG)	

BFB (Surrogate) Recovery = 107 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Diesel	nd	5.0	PPM (MG/KG)

17

DNOP (Surrogate) Recovery = 88 %

# Results for QC: Matrix Spike / Matrix Spike Dup

Date extracted: NA	Date analyzed: 11/23/94
Client: Daniel B. Stephens and Asso	ciates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411059-1 MS/MSD
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

## Test: EPA 8010/8020

Compound	Sample	Amount	Matrix		MSD	MSD	
	Result	Added	Recov.	MS %	Recov.	%	RPD
Chlorobenzene	<0.2	20.0	20.6	103	17.7	89	15
Ethylbenzene	< 0.5	20.0	20.3	102	17.6	88	14
1,1-DCE	<0.2	20.0	20.2	101	17.2	86	16
Trans-1,2-DCE	< 0.2	20.0	19.9	100	17.2	86	15
1,2-DCA	<0.2	20.0	21.7	109	19.0	95	13
1.2-Dichloro-							
propane	< 0.2	20.0	21.7	109	18.9	95	_14
1,1,2-TCA	< 0.2	20.0	22.4	112	20.2	101	10
PCE	< 0.2	20.0	20.8	104	18.2	91	13
1,3-Dichloro-							
benzene	< 0.2	20.0	19.8	99	17.5	88	12
1,4-Dichloro-							
benzene	<0.2	20.0	20.3	102	18.0	90	12

# Results for QC: Blank Spike/Blank Spike Dup

Date extracted: 11/23/94	Date analyzed: 12/02/94
Client: Daniel B. Stephens and Assoc	tiates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 11/23
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

# Test: EPA 8100

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Naphthalene	< 0.5	10.0	7.7	77	7.5	75	3
Acenaphthylene	<0.5	10.0	8.3	83	7.9	79	5
Acenaphthene	< 0.5	10.0	8.4	84	8.0	80	5
Flourene	<0.5	10.0	9.3	93	8.9	89	4
Phenanthrene	<0.5	10.0	9.9	99	10.2	102	3
Anthracene	< 0.5	10.0	9.6	96	9.8	98	2
Pyrene	< 0.5	10.0	9.8	98	9.8	98	0
Benzo(a)pyrene	<0.5	10.0	9.6	96	9.6	96	0
Benzo(g,h,i)-							
perylene	<1.0	10.0	10.5	105	10.6	106	1

### Results for QC: Matrix Spike/Matrix Spike Dup Blank Spike / Blank Spike Dup

Date extracted: 11/29/94	Date analyzed: 11/29,12/01/94
Client: Daniel B. Stephens and Asso	ciates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 11/29
Project Manager: Bob Marley	9411052-5 MS/MSD
Matrix: Aqueous	Units: PPM (MG/L)

## Test: EPA 504.1

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
EDB	< 0.01	0.67	0.61	91	0.59	88	3

### Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Gasoline	0.16	0.50	0.67	101	0.68	103	1

## Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Diesel	<1.0	5.4	5.4	100	5.7	106	5

## Results for QC: Matrix Spike / Matrix Spike Dup Blank Spike/Blank Spike Dup

Date extracted: 11/28,29/94	Date analyzed: 11/29,12/01/94		
Client: Daniel B. Stephens and Associates, Inc.			
Project Name: ENRON WT-1	HEAL #: 9411059-5 MS/MSD		
Project Manager: Bob Marley	9411059-4 MS/MSD		
Matrix: Non-Aqueous	Units: PPM (MG/KG)		

## Test: EPA 8020

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Benzene	< 0.05	1.00	1.09	109	1.12	112	3
Toluene	< 0.05	1.00	1.05	105	1.09	109	4
Ethylbenzene	< 0.05	1.00	0.97	97	1.01	101	4
Total Xylenes	< 0.05	3.00	3.13	104	3.25	108	4

## Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Gasoline	<10	50	44	88	43	86	2

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## Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Diesel	<5.0	54	47	87	55	102	16

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ı İ Hall Environmental Analysis Laboratory

Hall Environmental Analysis Laboratory 2403 San Mateo NE, Suite P-13 Albuquerque, NM 87110

Daniel B. Stephens and Associates, Inc. 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Dear Mr. Bob Marley,

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. Unless noted on sample page, all criteria for QA/QC acceptance levels fall within established parameters. These parameters are modeled from the EPA-600 14-79 019, March 1979, "Handbook for Analytical Quality Control in Water and Waste Water."

Please don't hesitate to contact me for any additional information or clarifications

Sincerely,

th Hallel

12/12/94

12/12 /94

Scott Hallenbeck, Lab Manager

Project: ENRON WT-1

Date collected: 12/1/94	Date received: $12/2/94$
Date extracted: NA	Date analyzed: 12/5/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-5
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Aqueous	

## Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
I. I-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis)	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (U(I/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 95 % BCM (Surrogate) Recovery = 94 % Dilution Factor = 1

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Date collected: 12/1/94	Date received: 12/2/94
Date extracted: 12/5,6/94	Date analyzed: 12/5,6,7/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-5
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Aqueous	

Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 99 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection</b> Limit	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 117 %

Date collected: 11/30/94	Date received: 12/2/94
Date extracted: 12/7/94	Date analyzed: 12/9/94
Client: Daniel B. Stephens and As	
Project Name: ENRON WT-1	HEAL #: 9412007-5
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Aqueous	

Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a.h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 86 %

# Results for sample: SB-3 @ 55'

Date collected: 11/28/94	Date received: 12/2/94
Date extracted: 12/5/94	Date analyzed: 12/6,7/94
Client: Daniel B. Stephens and Ass	
Project Name: ENRON WT-1	Heal #: 9412007-6
Project Manager: Bob Marley	Sampled by:BM/CP
Matrix: Non-aqueous	* 7

#### Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 99 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 98 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd*	5.0	PPM (MG/KG)

DNOP (Surrogate) Recovery = \*\* %

Dilution Factor = 1

\* Motor oil range H-C @ ~460 MG/KG \*\*Surrogate non-recoverable due to matrix interference

Date extracted: NADate analyzed: 12/5/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1HEAL #: RB 12/5Project Manager: Bob MarleyMatrix: Aqueous

### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	· PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (U(J/L)
1.1-Dichloroethane	nd	0.2	PPB (U(J/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (U(J/L)
1.2-Dichloroethene (Cis)	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (U(\/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (U(1/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (U(7/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (U(J/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (U(G/L)
Toluene	nd	0.5	PPB (U(J/L)
1.1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (U(1/L)
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (U(7/L)

BFB (Surrogate) Recovery = 95 % BCM (Surrogate) Recovery = 96 % Dilution Factor = 1

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Date extracted: 12/5,6/94Date analyzed: 12/5,6,7/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1Heal #: RB 12/5,6,7Project Manager: Bob MarleyMatrix: Aqueous

#### Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 97 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 99 %

Date extracted: 12/7/94	Date analyzed:	12/9/94
Client: Daniel B. Stephens and Associ	ates, Inc.	
Project Name: ENRON WT-1	Heal #: RB 12/7	
Project Manager: Bob Marley		
Matrix: Aqueous		

## Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a,h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 87 %

Date extracted:12/5/94Date analyzed:12/6,7/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1Heal #:RB 12/5Project Manager:Bob MarleyMatrix:Non-Aqueous

#### Test: EPA 8020

Compound	Result	Detection Limit	Units		
Benzene	nd	0.05	PPM (MG/KG)		
Toluene	nd	0.05	PPM (MG/KG)		
Ethylbenzene	nd	0.05	PPM (MG/KG)		
Total Xylenes	nd	0.05	PPM (MG/KG)		

BFB (Surrogate) Recovery = 100 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 99 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM (MG/KG)

DNOP (Surrogate) Recovery = 109 %

# Results for QC: Matrix Spike / Matrix Spike Dup

Date extracted: NA	Date analyzed: 12/5/94
Client: Daniel B. Stephens and Ass	ociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-5 MS/MSD
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

## Test: EPA 8010/8020

Compound	Sample	Amount	Matrix		MSD	MSD	
	Result	Added	Recov.	MS %	Recov.	%	RPD
Chlorobenzene	<0.2	20.0	19.7	99	21.0	105	6
Ethylbenzene	<0.5	20.0	19.8	99	20.6	103	4
1.1-DCE	< 0.2	20.0	22.2	111	20.5	103	8
Trans-1,2-DCE	<0.2	20.0	19.1	96	19.4	97	2
Carbon tet.	<0.2	20.0	18.3	92	16.9	85	8
1.2-DCA	<0.2	20.0	16.2	81	17.0	85	5
1.2-Dichloro-							
propane	<0.2	20.0	20.7	104	20.4	102	1
1.1,2 <b>-</b> TCA	<0.2	20.0	19.2	96	18.4	92	4
PCE	<0.2	20.0	21.6	108	20.4	102	6
1,3-Dichloro-							
benzene	<0.2	20.0	19.8	99	19.6	98	1
1,4-Dichloro-							
benzene	<0.2	20.0	20.8	104	18.5	93	12

## Results for QC: Matrix Spike/Matrix Spike Dup Blank Spike / Blank Spike Dup

Date extracted: 16/5,6/94	Date analyzed: 12/5,6,7/94
Client: Daniel B. Stephens and Ass	ociates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 12/5,6
Project Manager: Bob Marley	9411069-6 MS/MSD
Matrix: Aqueous	Units: PPM (MG/L), PPB (UG/L)

Test: EPA 504.1

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
EDB	< 0.01	0.67	0.59	88	0.60	90	2

## Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Gasoline	< 0.05	0.50	0.51	102	0.54	108	6

## Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Diesel	<1.0	5.4	5.6	104	6.2	115	10

# Results for QC: Blank Spike/Blank Spike Dup

Date extracted: 12/6/94	Date analyzed: 12/9/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 12/6
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

# Test: EPA 8100

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Naphthalene	<0.5	10.0	7.7	77	7.9	79	3
Acenaphthylene	< 0.5	10.0	9.1	91	8.8	88	3
Acenaphthene	<0.5	10.0	8.2	82	8.2	82	0
Flourene	<0.5	10.0	8.9	89	8.9	89	0
Phenanthrene	<0.5	10.0	10.0	100	10.0	100	0
Anthracene	<0.5	10.0	10.1	101	10.2	102	1
Pyrene	<0.5	10.0	9.8	98	10.2	102	4
Benzo(a)pyrene	<0.5	10.0	10.5	105	10.4	104	1
Benzo(g,h,i)-							
perylene	<1.0	10.0	12.3	123	11.9	119	3

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## Results for QC: Matrix Spike / Matrix Spike Dup Blank Spike/Blank Spike Dup

Date extracted: 12/5/94	Date analyzed: 12/6,7/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-8 MS/MSD
Project Manager: Bob Marley	9412007-7 MS/MSD
Matrix: Non-Aqueous	Units: PPM (MG/KG)

## Test: EPA 8020

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Benzene	< 0.05	1.00	0.94	94	0.87	87	8
Toluene	< 0.05	1.00	0.95	95	0.88	88	8
Ethylbenzene	< 0.05	1.00	0.88	88	0.81	81	8
Total Xylenes	< 0.05	3.00	2.59	86	2.43	81	6

## Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Gasoline	<5.0	50	42	84	40	80	5

## Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Diesel	<5.0	54	54	100	56	104	4

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# Inorganic Analyses



2709-D Pan American Freeway, NE - Albuquerque, NM 87107 Phone (505) 344-3777 - FAX (505) 344-4413

ATI I.D. 411373

December 12, 1994

Daniel B. Stephens & Associates 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Project Name/Number: ENRON WT-1 4230

Attention: Bob Marley

On 11/18/94, Analytical Technologies, Inc., (ADHS License No. AZ0015), received a request to analyze non-aqueous and 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.

EPA Method 8240 by TCLP analyses were added on 11/18/94 for samples "ENRON WT-1 EXCAVATION PIT (WT-1)", "MONUMENT" and "HAT MESA" per Bob Marley.

EPA Method 8080 analyses were cancelled on 11/18/94 for samples "ENRON WT-1 EXCAVATION PIT (WT-1)", "MONUMENT" and "HAT MESA" per Bob Marley.

EPA Method 418.1 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.

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

NIttell Rubt

Letitia Krakowski, Ph.D. Project Manager H. Mitchell Rubenstein, Ph.D. Laboratory Manager

MR:jt

Enclosure

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



CLIENT	:DANIEL B. STEPHENS & ASSOC.	DATE RECEIVED : 11/18/94
PROJECT #	:4230	
PROJECT NAME	: ENRON WT-1	REPORT DATE :12/12/94

ATI ID:	411373
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ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	ENRON WT-1 EXCAVATION PIT (WT-1)	NON-AQ	11/17/94
02	MONUMENT	NON-AQ	11/17/94
03	HAT MESA	NON-AQ	11/17/94
04	MW-1	AQUEOUS	11/15/94

#### ---TOTALS---

MATRIX	<u>#SAMPLES</u>
NON-AQ	3
AQUEOUS	1

#### 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.

#### GENERAL CHEMISTRY RESULTS

CLIENT	: DANIEL B. S	STEPHENS	& ASSOC.	ATI I.D.		: 411373
PROJECT #	: 4230			DATE RECEIV	ED	: 11/18/94
PROJECT NAME	: ENRON WT-1			DATE ANALYZ	ED	: 11/19/94
					<b></b> *	11/22/94
PARAMETER	· · · · · · · · · · · · · · · · · · ·	UNITS	01	02	03	
PETROLEUM HYDE	ROCARBONS, IR	MG/KG	31000	5600	1200	

## GENERAL CHEMISTRY - QUALITY CONTROL

t	CLIENT	: DANIEL	в.	STEPHENS	&	ASSOC.	ATI I.I	).	:	411373	
	PROJECT #	: 4230					SAMPLE	MATRI	x :	NON-AQ	
}	PROJECT NAME	: ENRON W	/T-1				UNITS		:	MG/KG	
	PARAMETER			אתד ד	~~	SAMPLE	DUP.		SPIKED SAMPLE		چ REC
	PARAMEIER			ATI I	<u>.u</u> .	RESULT	RESULT	RPD	SAMPLE	CONC.	REC
!	PETROLEUM HY	DROCARBON	S	11199	4#2	2 <20	<20	NA	180	140	129

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

## GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : DANIEL B. S	STEPHENS &	ASSOC.	ATI I.D	).	:	411373	
PROJECT # : 4230			SAMPLE	MATRI	х :	NON-AQ	
PROJECT NAME : ENRON WT-1			UNITS		:	MG/KG	
PARAMETER	ATI I.D.	SAMPLE RESULT	DUP. RESULT			SPIKE CONC.	% REC
PETROLEUM HYDROCARBONS	41137207	<20	<20	NA	170	140	121

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



## METALS RESULTS

.

## ATI I.D. : 411373

CLIENT : D.B. STEPHENS PROJECT # : 4230 PROJECT NAME : ENRON WT-1	& ASSOCI	IATES		DATE RECEIVED	: 11/18/94 : 12/12/94
PARAMETER	UNITS	01	02	03	
SILVER (TCLP 1311/6010) ARSENIC (TCLP 1311/6010) BARIUM (TCLP 1311/6010) CADMIUM (TCLP 1311/6010) CHROMIUM (TCLP 1311/6010) MERCURY (TCLP 1311/7470) LEAD (TCLP 1311/6010) SELENIUM (TCLP 1311/6010)	MG/L MG/L MG/L MG/L MG/L MG/L MG/L	<0.05 <0.1 0.66 <0.05 <0.10 <0.002 <0.10 <0.1	<0.05 <0.2 0.67 <0.05 <0.10 0.003 <0.20 <0.2	<0.05 <0.1 0.98 <0.05 <0.10 <0.002 <0.10 <0.10	

GCMS - RESULTS

ATI I.D. : 41137301

## TEST : EPA METHOD 8240 (TCLP 1311)

CLIENT : D.B. STEPHENS & ASSOCIATES PROJECT # : 4230 PROJECT NAME : ENRON WT-1 CLIENT I.D. : ENRON WT-1 EXCAVATION PIT (W SAMPLE MATRIX : SOIL	DATE RECEIVED : 11/18/94 DATE EXTRACTED : 11/21/94
COMPOUNDS	RESULTS
BENZENE CARBON TETRACHLORIDE CHLOROBENZENE CHLOROFORM 1,2-DICHLOROETHANE 1,1-DICHLOROETHENE METHYL ETHYL KETONE TETRACHLOROETHENE TRICHLOROETHENE VINYL CHLORIDE	<10 <10 <10 <10 <10 <10 <10 <10 <10 <10
SURROGATE PERCENT RECOVERIES	
DIBROMOFLUOROMETHANE (%) BROMOFLUOROBENZENE (%) TOLUENE-D8 (%)	103 103 100

## GCMS - RESULTS

ATI I.D. : 41137302

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TEST : EPA METHOD 8240 (TCLP 1311)

CLIENT : D.B. STEPHENS & ASSOCIATES PROJECT # : 4230 PROJECT NAME : ENRON WT-1 CLIENT I.D. : MONUMENT SAMPLE MATRIX : SOIL	DATE SAMPLED : 11/17/94 DATE RECEIVED : 11/18/94 DATE EXTRACTED : 11/21/94 DATE ANALYZED : 11/29/94 UNITS : UG/L DILUTION FACTOR : 1
COMPOUNDS	RESULTS
BENZENE CARBON TETRACHLORIDE CHLOROBENZENE CHLOROFORM 1,2-DICHLOROETHANE 1,1-DICHLOROETHENE METHYL ETHYL KETONE TETRACHLOROETHENE TRICHLOROETHENE VINYL CHLORIDE	<10 <10 <10 <10 <10 <10 <100 <10 <10 <10
SURROGATE PERCENT RECOVERIES	
DIERCMOFLUOROMETHANE (%) BROMCFLUORCBENZENE (%) TOLUENE-D8 (%)	103 103 99

#### GCMS - RESULTS

ATI I.D. : 41137303

i.

## TEST : EPA METHOD 8240 (TCLP 1311)

CLIENT : D.B. STEPHENS & ASSOCIA PROJECT # : 4230 PROJECT NAME : ENRON WT-1 CLIENT I.D. : HAT MESA SAMPLE MATRIX : SOIL	TES DATE SAMPLED : 11/17/94 DATE RECEIVED : 11/18/94 DATE EXTRACTED : 11/21/94 DATE ANALYZED : 11/29/94 UNITS : UG/L DILUTION FACTOR : 1
COMPOUNDS	RESULTS
BENZENE CARBON TETRACHLORIDE CHLOROBENZENE CHLOROFORM 1,2-DICHLOROETHANE 1,1-DICHLOROETHENE METHYL ETHYL KETONE TETRACHLOROETHENE TRICHLOROETHENE VINYL CHLORIDE	<10 <10 <10 <10 <10 <10 <100 <100 <10 <1
SURROGATE PERCENT RECOVERIES	
DIBROMOFLUOROMETHANE (%) BROMOFLUOROBENZENE (%) TOLUENE-D8 (%)	104 102 100

## GCMS - RESULTS

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## REAGENT BLANK

TEST : EPA METHOD 8240 (TCLP 1311)

CLIENT : D.B. STEPHENS & ASSOCIATES PROJECT # : 4230 PROJECT NAME : ENRON WT-1 CLIENT I.D. : REAGENT BLANK	ATI I.D. : 411373 DATE EXTRACTED : 11/21/94 DATE ANALYZED : 11/29/94 UNITS : UG/L DILUTION FACTOR : N/A
COMPOUNDS	RESULTS
BENZENE CARBON TETRACHLORIDE CHLOROBENZENE CHLOROFORM 1,2-DICHLOROETHANE 1,1-DICHLOROETHENE METHYL ETHYL KETONE TETRACHLOROETHENE TRICHLOROETHENE VINYL CHLORIDE	<10 <10 <10 <10 <10 <10 <100 <10 <10 <10
SURROGATE PERCENT RECOVERIES	
DIBROMOFLUOROMETHANE (%) BROMOFLUORCBENZENE (%) TOLUENE-D8 (%)	100 102 99

QUALIT TEST : EPA METHOD 8240 (TCLP 1311)	Y CONTR	OL DATA	ATI (	I.D.	:	411373	
CLIENT : D.B. STEPHENS & ASS PROJECT # : 4230 PROJECT NAME : ENRON WT-1 REF I.D. : 41249916	OCIATES			ANALYZEI Le Matrix S	: 2		
COMPOUNDS	SAMPLE RESULT		SPIKED SAMPLE	DUP. % SPIK REC.SAMP	ED	DUP. % REC.	RPD
1,1-DICHLOROETHENE TRICHLOROETHENE CHLORCBENZENE BENZENE	<1 <1 <1 <1	20 20 20 20 20	20 21 19 20	100 18 105 18 95 17 100 18		90 90 85 90	11 15 11 11

Average of Spiked Sample

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	ΞE	Volatie Organice GC/MS (624/8240)		i		_				B۲.	Tine:	Date			Time:	Date	
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	XV	Herbiades (615/8150)		<u></u> !								ime:		AEDEIVED BY		:901	Company:
	AN	Pesticides/PCB (608/8080)		X.	<b>X</b>	Ī	X	X			Signature:	Printed Name:	any.	回	Sign dure:	Printed Mane	oany:
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CUS1 AGE		SDWA Volatiles (502.1/503.1), 502.2 Reg. & Unreg.	;	· · ·	 					14		ļ	l				
<b>CU</b> PAGE		Chlorinated Hydrocarbons (601/8010) Aromatic Hydrocarbons (602/8320)	;		<u> </u>					_							
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		BTXE/MTBE (8020)					 			AMPLED & REFINOUISHED BY T. RELINQUISHED BY		1		R CEIVEORY			
		Diesel/Gasoline/BTXE/MTBE (MOD 6015/6020)		ļ		<u> </u> 				- 9		Printed Name:	>=	<b>VED</b>		Printed Name	<u>ن</u>
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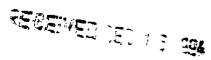
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COMPANY: Analytical Technologies, Inc. ADDRESS: 2709-D Pan American Freeway, NE Albuquerque, NM 87107	inc. əway, NE	DAE (ZAEM) 2TV	े ब ब ब	ALK, TTSS Mine/BTXE/MTBE/ (MOD 8015/8020)			CO2, METHANE	OF CONTAINERS
CLIENT PROJECT MANAGER:		רדוםב פאוכ ו כ	18310 19/618 WC 5/835 WC	HUCE	EB U BESTOS CE CE	CAL CO		
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PROJECT NUMBER: H1139 3	TOTAL NUMBER OF CONTAINERS	NTANGERS	SAN DIEGO			Signaure.		
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2709-D Pan American Freeway, NE Albuquerque, NM 87107 Phone (505) 344-3777 FAX (505) 344-4413

ATI I.D. 411383

December 13, 1994

Daniel B. Stephens 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Project Name/Number: ENRON WT-1 4230

Attention: Bob Marley

On 11/21/94, Analytical Technologies, Inc., (ADHS License No. AZ0015), received a request to analyze **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.

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

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

Letitia Krakowski, Ph.D. Project Manager

MR:jt

Enclosure

H. Mitchell Rubenstein, Ph.D. Laboratory Manager



SVE-1-MW

SB-2

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CLIENT PROJECT # PROJECT N	: D.B. STEPHENS & ASSOCIATES : 4230 HAME : ENRON WT-1 ATI I.D. : 411383	REPORT I	CEIVED : 11/21/94 DATE : 12/13/94
ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01 02 03	MW-10 MW-12 DUP-1	AQUEOUS AQUEOUS AQUEOUS	11/18/94 11/18/94 11/18/94

AQUEOUS

AQUEOUS

----- TOTALS -----

MATRIX	# SAMPLES
AOUEOUS	5

#### 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.

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11/19/94

11/19/94

#### GENERAL CHEMISTRY RESULTS

#### ATI I.D. : 411383

CLIENT : D.B. STEPHENS PROJECT # : 4230 PROJECT NAME : ENRON WT-1	& ASSOCI	IATES		DATE REG	: 11/21/94 : 12/13/94	
PARAMETER	UNITS	01	02	03	04	05
CARBONATE (CACO3) BICARBONATE (CACO3) HYDRCXIDE (CACO3) TOTAL ALKALINITY (AS CACO3) CHLORIDE (EPA 325.2) NO2/NO3~N, TOTAL (353.2) SULFATE (EPA 375.2) F. DISSOLVED SOLIDS (160.1)	MG/L MG/L MG/L MG/L MG/L MG/L MG/L	<1 804 <1 804 650 <0.06 12 2500	<1 228 <1 228 980 17 1100 3300	<1 1910 <1 1910 270 0.08 5 4300	<1 1940 <1 1940 290 0.07 5 4200	<1 460 <1 460 610 0.12 460 2100



#### GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : D.B. STEPHENS & ASSOCIATES PROJECT # : 4230 PROJECT NAME : ENRON WT-1

ATI I.D. : 411383

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PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE		% REC
CARBONATE BICARBONATE HYDROXIDE TOTAL ALKALINITY CARBONATE BICARBONATE HYDROXIDE TOTAL ALKALINITY CHLORIDE NITRITE/NITRATE-N (TOT SULFATE TOTAL DISSOLVED SOLIDS	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	41173604 41138303 41138301 41138301 41138302 41138302	118 <1 118 <1 1910 <1 1910 650 <0.06 1100	<1 117 <1 1930 <1 1930 650 <0.06 1100 3200	NA 0.9 NA 0.9 NA 1 NA 0 NA 0 3	NA NA NA NA NA NA 1600 2.05 1700 NA	NA NA NA NA NA 1000 2.00 500 NA	NA NA NA NA NA 95 102 120 NA

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

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METALS RESULTS

## ATI I.D. : 411383

CLIENT : D.B. STEPHENS PROJECT # : 4230		DATE REC	EIVED :	11/21/94		
PROJECT NAME : ENRON WT-1				REPORT D.	ATE :	12/13/94
PARAMETER	UNITS	01	02	03	04	05
SILVER (EPA 200.7/6010) ARSENIC (EPA 206.2/7060) BARIUM (EPA 200.7/6010) CALCIUM (EPA 200.7/6010) CADMIUM (EPA 213.2/7131) CHROMIUM (EPA 200.7/6010) ICOPPER (EPA 200.7/6010) MERCURY (EPA 245.1/7470) POTASSIUM (EPA 200.7/6010) MAGNESE (EPA 200.7/6010) MAGNESE (EPA 200.7/6010) SODIUM (EPA 200.7/6010) LEAD (EPA 239.2/7421) SELENIUM (EPA 270.2/7740) ZINC (EPA 200.7/6010)	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	<pre>&lt;0.010 0.019 0.580 348 &lt;0.0005 &lt;0.010 &lt;0.010 1.87 &lt;0.0002 5.6 201 2.41 165 &lt;0.002 &lt;0.005 0.057</pre>	<0.010 0.012 1.22	<0.010 <0.010 0.139	<0.010 <0.010 0.090	<0.010 <0.005 0.094 248 <0.0005 0.013 0.013 <0.050 <0.0002 13.4 143 0.231 279 <0.002 <0.005 1.15



#### METALS - QUALITY CONTROL

CLIENT : D.B. STEPHENS & ASSOCIATES PROJECT # : 4230 PROJECT NAME : ENRON WT-1

ATI I.D. : 411383

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT H	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SILVER ARSENIC BARIUM CADMIUM CHROMIUM COPPER IRON MERCURY POTASSIUM MAGNESIUM MAGNESIUM MANGANESE BODIUM	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	41138305 41138302 41138305 41178604 41138302 41138305 41138305 41138305 41138305 41138304 41178604 41178604 41138305 41138305	<0.005 0.094	<0.010 <0.005 0.101 56.5 <0.0005 0.012 0.012 <0.050 0.0002 3.6 9.8 0.231 19.0	NA NA 7 2 NA 8 8 8 NA NA 0 2 0 3	0.439 0.050 1.03 104 0.0042 0.900 0.465 0.384 0.0048 51.6 34.0 1.12 57.2	0.500 0.050 1.00 50.0 0.0050 1.00 0.500 1.00 0.0050 50.0 25.0 1.00 50.0	800 99899866695
LRAD SELENIUM DINC	MG/L MG/L MG/L	41138302 41138302 41138305	<0.002 0.016 1.15	<0.002 0.017 1.15	NA 6 0	0.046 0.050 1.60	0.050 0.050 0.500	92 68 90

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

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Average Result

Abuquerque, NM CHAIN UF COSTOUY ATILAB D. CHAIN UF COSTOUY ATILAB D. CHAIN UF COSTOUY ATILAB D. CHAIN DATE 14/20/94 PAGE OF A		3. & Unreg.	(1.31 (1.31) (1.31) (1.31) (1.31) (1.31) (1.32) (1.	OF CONTAINER Stats by TCLP (131 Stats Standards - Stats Stats Peeroleum TM/2758 Prosely 68 TM/2758	420	0 40	16,0	420			SAMRLE RECEIRT (* * SAMRLER & RELINQUISHED BY *), RELINQUISHED BY * 2. RELINQUISHED BY * 3. * DNI ANGES (5) Signature: 1, 2 5 Signature: Time: 5) Signature: 5)	YQINA	Company Phone:		Signature: Time: Signature: Time:	D FULTENED Printed Name: Date: Printed Name: Date: Partied Name: Date: Printed Name: Printed Name: Date: Printed Name: Printed Name: Date: Printed Name: Print	Company: Company: Analytical Technologies, Inc	ATTLENS Sur Disco (619) 458-9141 • Plocariz (602) 496-4400 • Seathe (206) 228-8335 • Parsacola (853) 644 051 644 051 644 051 44 - 2777 DISTRIBUTION: What Canary • ATT = Pink - Chicutta TOD	
ogies, Inc., Albuquerque, NM sacula - Fi. Collins - Portland - Albuquerque	PROJECT MANAGER: BID 121981 ETY	COMPANY: DANIER BUJERATUS FAMO		BILL TO: DANUED D, MENUENE + M-250C COMPANY: ADDRESS: ADDRESS:	nuəlotəq 108 CCM)	MW-10 11144 1330 420	M.W-12 (1/2/14/1430 14.0	DUP-1 NA NA 13.0	5015-1-MW 11/19/41 1330 1420	58-2 WA9417004		SAMPLE REGERVICORMATION SAMPLE RECEIRT S SAMPLE	PROJ. NAME. 1222 RUN WT-/ CUSTODY SEALS YOINA Print	P.O. HO.: RECEIVED INTACT RECEIVED INTACT RECEIVED INTACT	ARIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS	(HUSH) []24hr []48hr []72hr []1 WEEK (NORMAL) K12 WEEK 3			

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Anulytical factorologies, Inc.         Allonguary Mail         Chain of Custody           active sciences         Analytical factorologies, Inc.         Allonguary         Allonguary           active sciences         Allonguary         Allonguary         Allonguary         Allonguary           active sciences         Allonguary         Allonguary         Allonguary         Allonguary         Allonguary           active sciences         Allonguary         Allonguary	Company: Company: Control Ham (U. C. C. C. C. C. C. C. C. C. C. C. C. C.	C C C C C C C C C C C C C C C C C C C
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9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 411818

December 13, 1994

Daniel B. Stephens & Associates 6020 Academy NE Suite 100 Albuquerque, NM 87109

Project Name/Number: Enron WT-1/4230

Attention: Bob Marley

On 11/23/94, Analytical Technologies, Inc., received a request to analyze **aqeuous** sample(s). The sample(s) 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.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary S. The

Mary Tyer Project Manager

MT/jat

Enclosure

ADHS License No. AZ0061 Donald F. Weber, Laboratory Manager

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

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		D.B. STEPHENS & ASSOCIATES	DATE R	ECEIVED	:	11/23/94
PROJECT	 -	4230 ENRON WT-1 ATI I.D. : 411818	REPORT	DATE	:	12/12/94
-						

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	MW-9	AQUEOUS	11/21/94
02	SB-1	AQUEOUS	11/22/94
03	MW-7	AQUEOUS	11/22/94

----- TOTALS -----

MATRIX # SAMPLES ------AQUEOUS 3

#### ATI STANDARD DISPOSAL PRACTICE

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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.



#### GENERAL CHEMISTRY RESULTS

ATI I.D. : 411818

CLIENT : D.B. STEPHENS PROJECT # : 4230 PROJECT NAME : ENRON WT-1	ROJECT # : 4230							
PARAMETER	UNITS	01	02	03				
FOTAL ALKALINITY (AS CACO3) EHLORIDE (EPA 325.2) NITRITE (EPA 354.1) NITRATE AS N (EPA 353.2)	MG/L MG/L MG/L MG/L MG/L MG/L	326 <1 326 860	492 <1 492 750 <0.05 0.28	<1 327 400 <0.05 6.8				



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GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : D.B. STEPHENS & ASSOCIATES PROJECT # : 4230 PROJECT NAME : ENRON WT-1

ATI I.D. : 411818

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE		۶ REC
CARBONATE BICARBONATE HYDROXIDE TOTAL ALKALINITY	MG/L MG/L MG/L MG/L	41138303	<1 1910 <1 1910	<1 1930 <1 1930	NA 1 NA 1	NA NA NA NA	NA NA NA NA	NA NA NA NA
CHLORIDE NITRITE AS NITROGEN NITRATE AS NITROGEN SULFATE TOTAL DISSOLVED SOLIDS	MG/L MG/L MG/L MG/L MG/L	41185701 41149912 41181802 41185701 41181801	<0.05 0.28 240	126 <0.05 0.28 240 2900	0 NA 0 0 4	226 0.25 2.31 430 NA	100 0.25 2.00 200 NA	100 100 102 95 NA

<pre>% Recovery = (Spike Sample Result - Sample Result)</pre>			
Spike Concentration			
RPD (Relative Percent Difference) = (Sample Result - Duplicate Result)	x	100	
Average Result	Δ	100	



METALS RESULTS

ATI I.D. : 411818

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CLIENT : D.B. STEPHENS PROJECT # : 4230 PROJECT NAME : ENRON WT-1	& ASSOCIATES		DATE RECEIVED REPORT DATE	
PARAMETER	UNITS 01	02	03	

SILVER (EPA 200.7/6010)	MG/L	<0.010	<0.010	<0.010
ARSENIC (EPA 206.2/7060)	MG/L	<0.005	0.005	0.006
BARIUM (EPA 200.7/6010)	MG/L	0.043	0.085	0.032
CALCIUM (EPA 200.7/6010)	MG/L	452	275	323
CADMIUM (EPA 213.2/7131)	MG/L	<0.0005	<0.0005	<0.0005
CHROMIUM (EPA 200.7/6010)	MG/L	<0.010	<0.010	<0.010
COPPER (EPA 200.7/6010)	MG/L	<0.010	0.010	0.014
IRON (EPA 200.7/6010)	MG/L	<0.050	<0.050	<0.050
MERCURY (EPA 245.1/7470)	MG/L	<0.0002	<0.0002	<0.0002
POTASSIUM (EPA 200.7/6010)	MG/L	9.6	9.4	7.9
MAGNESIUM (EPA 200.7/6010)	MG/L	222	209	148
MANGANESE (EPA 200.7/6010)	MG/L	0.229	0.254	0.069
SODIUM (EPA 200.7/6010)	MG/L	295	322	244
LEAD (EPA 239.2/7421)	MG/L	<0.002	<0.002	<0.002
SELENIUM (EPA 270.2/7740)	MG/L	0.009	<0.005	0.008
ZINC (EPA 200.7/6010)	MG/L	0.092	4.73	<0.050



#### METALS - QUALITY CONTROL

CLIENT : D.B. STEPHENS & ASSOCIATES PROJECT # : 4230 PROJECT NAME : ENRON WT-1

#### ATI I.D. : 411818

	INTOC		SAMPLE	DUP.		SPIKED		8
PARAMETER	UNITS	ATI I.D.	RESULT	RESULT	RPD	SAMPLE	CONC	REC
SILVER	MG/L	41181802	<0.010	<0.010	NA	0.439	0.500	88
ARSENIC	MG/L	41185801	0.016	0.015	6	0.060	0.050	88
BARIUM	MG/L	41181802	0.085	0.079	7	0.982	1.00	90
CALCIUM	MG/L	41181803	323	334	3	378	50.0	110
CADMIUM	MG/L	41178801	<0.0005	<0.0005	NA	MSA	CC=	.9988
CHROMIUM	MG/L	41181802	<0.010	<0.010	NA	0.896	1.00	90
COPPER	MG/L	41181802	0.010	<0.010	NA	0.459	0.500	90
IRON	MG/L	41181802	<0.050	<0.050	NA	0.888	1.00	89
MERCURY	MG/L	41138304	<0.0002	0.0002	NA	0.0048	0.0050	96
MERCURY	MG/L	41183001	<0.0002	<0.0002	NA	0.0050	0.0050	100
POTASSIUM	MG/L	41181803	7.9	8.0	1	58.7	50.0	102
MAGNESIUM	MG/L	41181803	148	145	2	401	250	101
MANGANESE	MG/L	41181802	0.254	0.237	7	1.15	1.00	90
SODIUM	MG/L	41181803	244	251	3	284	50.0	80
LEAD	MG/L	41180601		<0.002	NA	0.042	0.050	84
SELENIUM	MG/L	41138302	0.016	0.017	6	0.050	0.050	68
ZINC	MG/L	41181802	4.73	4.43	7	14.9	10.0	102

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

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2709-D Pan American Freeway, NE Albuquerque, NM 87107 Phone (505) 344-3777 FAX (505) 344-4413

ATI I.D. 412312

December 22, 1994

Daniel B. Stephens & Associates 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Project Name/Number: ENRON-WT1 4230.2

Attention: Bob Marley

On 12/02/94, Analytical Technologies, Inc., (ADHS License No. A20015), 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.

Due to matrix interferences, selenium spike analysis was performed using the Method of Standard Additions (MSA). The spike result given is the correlation coefficient (CC), which is  $\geq 0.995$ .

For sample "MW-13", the Sulfuric Acid preserved bottle for Nitrate/Nitrite analysis was not received by ATI, Albuquerque.

EPA Method 8240 and RCRA Metal by TCLP analyses were performed by Analytical Technologies, Inc., 225 Commerce Drive, Fort Collins, CO.

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

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

Letitia Krakowski, Ph.D. Project Manager

A Witchell Rutel

H. Mitchell Rubenstein, Ph.D. Laboratory Manager

MR:jt

Enclosure

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



CLIENT	:DANIEL B. STEPHENS	DATE RECEIVED	:12/02/94
PROJECT #	:4230.2		
PROJECT NAME	: ENRON-WT1	REPORT DATE	:12/22/94
	ATI ID:	412312	

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DATE ATI # COLLECTED CLIENT DESCRIPTION MATRIX 01 MW-4AQUEOUS 12/01/94 02 MW-5 AQUEOUS 12/01/94 03 MW-6 AQUEOUS 11/30/94 04 MW-8 AQUEOUS 11/30/94 MW-13 05 AQUEOUS 12/01/94 06 PIT NON-AQ 11/30/94 07 DEHY NON-AQ 11/30/94

---TOTALS----

MATRIX	<u>#SAMPLES</u>
AQUEOUS	5
NON-AQ	2

#### 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.

## GENERAL CHEMISTRY RESULTS

#### ATI I.D. : 412312

CLIENT : D.B. STEPHENS PROJECT # : 4230.2	& ASSOC	IATES		DATE RE	CEIVED	: 12/02/94
PROJECT NAME : ENRON-WT1				REPORT I	DATE	: 12/22/94
PARAMETER	UNITS	01	02	03	04	05
CARBONATE (CACO3) BICARBONATE (CACO3) HYDROXIDE (CACO3) TOTAL ALKALINITY (AS CACO3) CHLORIDE (EPA 325.2) NO2/NO3-N, TOTAL (353.2) SULFATE (EPA 375.2) T. DISSOLVED SOLIDS (160.1)	MG/L MG/L MG/L MG/L MG/L MG/L MG/L	<1 273 <1 273 540 20 1000 2800	<1 1080 <1 1080 360 <0.06 <5 2000	<1 624 <1 624 700 <0.06 410 2400	<1 441 <1 441 590 0.44 330 1900	<1 273 <1 273 340 - 1400 2900

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GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT		:	D.B. STEPHENS & ASSOCIATES	
PROJECT	#	:	4230.2	
PROJECT	NAME	:	ENRON-WT1	

ATI I.D. : 412312

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE		% REC
CARBONATE BICARBONATE HYDROXIDE TOTAL ALKALINITY CARBONATE BICARBONATE HYDROXIDE TOTAL ALKALINITY CHLORIDE NITRITE/NITRATE-N (TOT SULFATE SULFATE TOTAL DISSOLVED SOLIDS	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	41231204 41256810 41253101 41280301 41231204 41255506 41231202	<1 441 <1 441 <1 451 26 5.7 330 67 2000	<1 444 <1 444 <1 456 <1 461 26 6.7 330 67 2000	NA 0.7 NA 0.7 NA 1 NA 0 0 0 0 0 0	NA NA NA NA NA S1 27.2 520 106 <sup>-</sup> NA	NA NA NA NA NA NA 25 20.0 200 40 NA	NA NA NA NA NA NA 100 102 95 95 98 NA

3 Recovery = (Spike Sample Result - Sample Result) Spike Concentration RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) Average Result

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METALS RESULTS

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## ATI I.D. : 412312

CLIENT : D.B. STEPHENS	& ASSOCI	ATES	1	DATE RECH	EIVED :	12/02/94
PROJECT # : 4230.2 PROJECT NAME : ENRON-WT1	<u>.</u>		]	REPORT DA	ATE :	12/22/94
PARAMETER	UNITS	01	02	03	04	05
SILVER (EPA 200.7/6010) ARSENIC (EPA 206.2/7060) BARIUM (EPA 200.7/6010) CALCIUM (EPA 200.7/6010) CADMIUM (EPA 213.2/7131) CHRCMIUM (EPA 200.7/6010) COPPER (EPA 200.7/6010) IRON (EPA 200.7/6010) MERCURY (EPA 245.1/7470) POTASSIUM (EPA 245.1/7470) POTASSIUM (EPA 200.7/6010) MAGNESE (EPA 200.7/6010) MANGANESE (EPA 200.7/6010) SODIUM (EPA 239.2/7421) SELENIUM (EPA 270.2/7740) ZINC (EPA 200.7/6010)	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	<0.010 0.007 0.025 332 <0.0005 <0.010 <0.010 <0.050 <0.0002 5.9 153 0.024 353 <0.002 0.020 <0.050	<0.010 <0.010 0.097	<0.010 <0.005 0.109 293 <0.0005 <0.010 <0.050 <0.0002 7.1 197 0.562 267 <0.002 <0.005 <0.005 <0.050	<0.010 0.006 0.052 247 <0.0005 <0.010 0.014 <0.050 <0.0002 6.0 137 0.136 221 <0.002 <0.005 <0.005	<0.010 <0.010 <0.050



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## METALS - QUALITY CONTROL

CLIENT		:	D.B. STEPHENS & ASSOCIATES	5
PROJECT	#	:	4230.2	
PROJECT	NAME	:	ENRON-WT1	

ATI I.D. : 412312

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	३ REC
SILVER	MG/L	41231204		<0.010	NA	0.477	0.500	95
ARSENIC	MG/L	41251801		0.055	2	0.096	0.050	84
BARIUM	MG/L	41231204	0.052	0.052	0	1.04	1.00	99
CALCIUM	MG/L	41231201	332	321	3	558	250	90
CADMIUM	MG/L	41231201	<0.0005	<0.0005	NA	0.0043	0.0050	86
CHROMIUM	MG/L	41231204	<0.010	<0.010	NA	0.955	1.00	96
COPPER	MG/L	41231204	0.014	0.015	7	0.511	0.500	99
IRON	MG/L	41231204	<0.050	<0.050	NA	0.959	1.00	96
MERCURY	MG/L	41253707	<0.0002	<0.0002	NA	0.0048	0.0050	96
POTASSIUM	MG/L	41250102	12.4	12.6	2	62.8	50.0	101
MAGNESIUM	MG/L	41231201	153	148	3	266	125	90
MANGANESE	MG/L	41231204	0.135	0.134	1	1.10	1.00	96
SODIUM	MG/L	41231201	353	346	2	459	100	106
LEAD	MG/L	41231201	<0.002	<0.002	NA	0.050	0.050	100
SELENIUM	MG/L	· 41231201		0.019	5	MSA	CC≈	.999
ZINC	MG/L	41231204	<0.050	<0.050	NA	0.504	0.500	101

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



## TCLP METALS

Lab Name: Analytical Technologies, Inc.

Client Name: ATI-NM

Client Project ID: SDM -- 412312

Lab Sample ID: RB 94-12-049

Sample Matrix: TCLP Leachate

Sample ID TCLP Blank

Date Collected: N/A

Prep Date: 12/12, 14/94

Date Analyzed: 12/12, 14/94

EPA HW	CAS			Concentration	Detection
Number	Number	Analyte	Method	(mg/L)	Limit (mg/L)
D004	7440-38-2	Arsenic	6010	ND	0.06
D005	7440-39-3	Barium	6010	ND	0.9
D006	7440-43-9	Cadmium	6010	ND ND	0.005
D007	7440-47-3	Chromium	6010	ND	0.01
D008	7439-92-1	Lead	6010	ND	0.05
D009	7439-97-6	Mercury	7470	ND	0.002
D010	7782-49-2	Selenium	6010	ND	0.1
D011	7440-22-4	Silver	6010	ND	0.01

ND = Not Detected

## TCLP METALS

Lab Name: Analytical Technologies, Inc.

Client Name: ATI-NM

Client Project ID: SDM -- 412312

Lab Sample ID: 94-12-049-01

Sample Matrix: TCLP Leachate

Sample ID
Pit

Date Collected: 11/30/94

Prep Date: 12/12, 14/94

Date Analyzed: 12/12, 14/94

EPA HW Number	CAS Number	Analyte	Method	Concentration (mg/L)	Detection Limit (mg/L)
			i includ		
D004	7440-38-2	Arsenic	6010	ND	0.06
D005	7440-39-3	Barium	6010	ND	0.9
D006	7440-43-9	Cadmium	6010	ND	0.005
D007	7440-47-3	Chromium	6010	ND	0.01
D008	7439-92-1	Lead	6010	ND	0.05
D009	7439-97-6	Mercury	7470	ND	0.002
D010	7782-49 <b>-</b> 2	Selenium	6010	ND	0.1
D011	7440-22-4	Silver	6010	ND	0.01

ND = Not Detected

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## TCLP METALS

Lab Name: Analytical Technologies, Inc.

Client Name: ATI-NM

Client Project ID: SDM -- 412312

Lab Sample ID: 94-12-049-02

Sample Matrix: TCLP Leachate

Sample ID	
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DEHY	

Date Collected: 11/30/94

Prep Date: 12/12, 14/94

Date Analyzed: 12/12, 14/94

EPA HW	CAS			Concentration	Detection
Number	Number	Analyte	Method	(mg/L)	Limit (mg/L)
D004	7440-38-2	Arsenic	6010	ND	0.05
D005	7440-39-3	Barium	6010	ND	0.9
D006	7440-43-9	Cadmium	6010	<sup>1</sup> ND	0.005
D007	7440-47-3	Chromium	6010	ND	0.01
D008	7439-92-1	Lead	6010	ND	0.05
D009	7439-97-6	Mercury	7470	ND	0.002
D010	7782-49-2	Selenium	6010	ND	0.1
D011	7440-22-4	Silver	6010	ND	0.01

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ND = Not Detected

## TCLP METALS MATRIX SPIKE

Sample ID	
Pit	

Lab Name: Analytical Technologies, Inc.

Client Name: ATI-NM

Lab Sample ID: 94-12-049-01

Prep Date: 12/14/94

Sample Matrix: TCLP Leachate

Date Analyzed: 12/14/94

Analyte	Spike Added (mg/L)	Sample Concentration (mg/L)	MS Concentration (mg/L)	MS Percent Recovery
Arsenic	2.0	< 0.06	2.1	105
Barium *	2.0	0.7	2.6	95
Cadmium	0.050	< 0.005	0.051	102
Chromium	0.20	< 0.01	0.16	\$0
Lead	0.50	< 0.05	0.50	100
Selenium	2.0	< 0.1	· 2.2	110
Silver	0.20	< 0.01	0.19	95

\*Native concentration is above instrument detection limit but below reporting limit.

	MSD	MSD	
	Concentration	Percent	RPD
Analyte	(mg/L)	Recovery	26
Arsenic	2.1	105	0
Barium	2.6	95	0
Cadmium	0.052	104	2
Chromium	0.16	80	0
Lead	0.50	100	0
Selenium	2.1	105	5
Silver	0.19	95	0

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## TCLP METALS MATRIX SPIKE

Sample ID In House

Lab Name: Analytical Technologies, Inc.

Client Name: ATI-NM

Lab Sample ID: 94-11-289-01

Prep Date: 12/12/94

Sample Matrix: TCLP Leachate

Date Analyzed: 12/12/94

Analyte	Spike	Sample	MS	MS
	Added	Concentration	Concentration	Percent
	(mg/L)	(mg/L)	(mg/L)	Recovery
Mercury	0.020	< 0.002	0.019	95

Analyte	MSD Concentration (mg/L)	MSD Percent Recovery	RPD %
Mercury	0.019	95	0

## TCLP VOLATILE ORGANICS

Method 8240

Lab Name: Analytical Technologies, Inc. Client Name: ATI-NM Client Project ID: SDM -- 412312 Lab Sample ID: WRB1 12/15/94

### Sample ID

## Reagent Blank

Date Collected: N/A Date Extracted: N/A Date Analyzed: 12/15/94

Sample Matrix: Water Sample Volume: 5 mL

EPA HW		CAS		Detection
Number	Analyte	Number	Result (mg/L)	Limit (mgL)
D043	Vinyl chloride	75-01-4	ND	0.01
D029	1,1-Dichloroethylene	75-35-4	ND	0.01
D022	Chloroform	67-66-3	ND	0.01
D028	1,2-Dichloroethane	107-06-2	ND	0.01
D035	Methyl ethyl ketone	78-93-3	ND	0.01
D019	Carbon tetrachloride	56-23-5	ND	0.01
D0-10	Trichloroethylene	79-01-6	ND	0.01
D018	Benzene	71-43-2	ND	0.01
D039	Tetrachloroethylene	127-18-4	. ND	0.01
D021	Chlorobenzene	108-90-7	ND	0.01

## SURROGATE RECOVERIES

Analyte	% Recovery	% Rec Limits
1.2-Dichloroethane-d4	109	76 - 114
Toluene-d8	99	88 - 110
Bromofluorobenzene	101	86 - 115

ND = Not Detected

# TCLP VOLATILE ORGANICS

Method 8240

Lab Name: Analytical Technologies, Inc. Client Name: ATI-NM Client Project ID: SDM -- 412312 Lab Sample ID: TCLPRB1 12/08/94

Sample ID	
TCLP	
Reagent Blank	

Date Cóllected: N/A Date Extracted: 12/08/94 Date Analyzed: 12/15/94

Sample Matrix: TCLP Leachate Sample Volume: 0.5 mL

EPA HW		CAS		Detection
Number	Analyte	Number	Result (mg'L)	Limit (mg/L)
1				
D043	Vinyl chloride	75-01-4	ND	0.1
D029	1.1-Dichloroethylene	75-35-4	ND	0.1
D022	Chloroform	67-66-3	ND	0.1
D028	1,2-Dichloroethane	107-06-2	ND	0.1
D035	Methyl ethyl ketone	78-93-3	ND	0.1
D019	Carbon tetrachloride	56-23-5	ND	0.1
D040	Trichloroethylene	79-01-6	ND	0.1
D018	Benzene	71-43-2	ND	0.1
D039	Tetrachloroethylene	127-18-4	ND	0.1
D021	Chlorobenzene	108-90-7	ND	0.1

### SURROGATE RECOVERIES

Analyte	% Recovery	% Rec Limits
1,2-Dichloroethane-d4	110	76 - 114
Toluene-d8	100	88 - 110
Bromofluorobenzene	100	86 - 115

ND = Not Detected

## TCLP VOLATILE ORGANICS

Method 8240

### Sample ID



Date Collected: 11/30/94 Date Extracted: 12/08/94 Date Analyzed: 12/15/94

ND

ND

0.1

0.1

Lab Name: Analytical Technologies, Inc. Client Name: ATI-NM Client Project ID: SDM -- 412312 Lab Sample ID: 94-12-049-01

Tetrachloroethylene

Chlorobenzene

Sample Matrix: TCLP Leachate Sample Volume: 0.5 mL

CAS EPA HW Detection Number Analyte Number Result (mg/L) Limit (mg/L) D043 75-01-4 0.1 Vinvl chloride ND D029 1,1-Dichloroethylene 75-35-4 ND 0.1 D022 67-66-3 0.1 Chloroform ND D028 1,2-Dichloroethane 107-06-2 0.1 ND D035 Methyl ethyl ketone 78-93-3 0.1 ND D019 Carbon tetrachloride 56-23-5 ND 0.1 79-01-6 D040 Trichloroethylene ND 0.1 71-43-2 0.1 D018 Benzene ND

## SURROGATE RECOVERIES

127-18-4

108-90-7

Analyte	% Recovery	% Rec Limits
1.2-Dichloroethane-d4	107	76 - 114
Toluene-d8	98	88 - 110
Bromofluorobenzene	101	86 - 115

ND = Not Detected

D039

D021

## TCLP VOLATILE ORGANICS

Method 8240

.

Lab Name: Analytical Technologies, Inc. Client Name: ATI-NM Client Project ID: SDM -- 412312 Lab Sample ID: 94-12-049-02

Sample	ID



Date Collected: 11/30/94 Date Extracted: 12/08/94 Date Analyzed: 12/15/94

Sample Matrix: TCLP Leachate Sample Volume: 0.5 mL

EPA HW		CAS		Detection
Number	Analyte	Number	Result (mg/L)	Limit (mg/L)
<b>DA</b> 43				
D043	Vinyl chloride	75-01-4	ND	0.1
D029	1,1-Dichloroethylene	75-35-4	ND	0.1
D022	Chloroform	67-66-3	ND	0.1
D02S	1,2-Dichloroethane	107-06-2	ND	0.1
D035	Methyl ethyl ketone	78-93-3	ND	0.1
D019	Carbon tetrachloride	56-23-5	ND	0.1
D040	Trichloroethylene	79-01-6	ND	0.1
D013	Benzene	71-43-2	ND	- 0.1
D039	Tetrachloroethylene	127-18-4	. ND	0.1
D021	Chlorobenzene	108-90-7	ND	0.1

## SURROGATE RECOVERIES

Anaiyte	% Recovery	% Rec Limits
1,2-Dichloroethane-d4 Toluene-d8	107 100	76 - 114 88 - 110
Bromofluorobenzene	102	86 - 115

ND = Not Detected

# TCLP VOLATILE MATRIX SPIKE RECOVERY

Method 8240

Lab Name: Analytical Technologies, Inc. Client Name: ATI-NM Client Project ID: SDM -- 412312 Lab Sample ID: 94-12-049-02

Sample ID	
DEHY	_
·	

Date Collected: 11/30/94 Date Extracted: 12/08/94 Date Analyzed: 12/15/94

Sample Matrix: TCLP Leachate Sample Volume: 0.5 mL

· · · · · · · · · · · · · · · · · · ·	Spike	Sample	MS	MS	QC
	Added	Concentration	Concentration	%	Limit
Analyte	(mg/L)	(mg/L)	(mg/L)	Rec	Recovery
X7. X X I / I	0.500		0.124	0.5	10 122
Vinyl chloride	0.500	ND	0.424	85	49 - 132
1,1-Dichloroethylene	0.500	ND	0.450	90	65 - 126
Chloroform	0.500	ND	0.493	99	68 - 123
1,2-Dichloroethane	0.500	ND	0.510	102	61 - 122
Methyl ethyl ketone	0.500	ND	0.445	89	26 - 156
Carbon tetrachloride	0.500	ND	0.475	95	80 - 113
Trichloroethylene	0.500	ND	0.500	100	81 - 108
Benzene	0.500	ND	0.506	101	60 - 129
Tetrachloroethylene	0.500	ND	0.457 🕚	91	75 - 116
Chlorobenzene	0.500	ND	0.497	99	81 - 107

### SURROGATE RECOVERIES

Analyte	% Recovery	% Rec Limits
1,2-Dichloroethane-d4	99	76 - 114
Toluene-d8	97	88 - 110
Bromofluorobenzene	105	86 - 115

ND = Not Detected

· · ·

REQUEST	Polynuckast Aromatics (610/8310) Polynuckast Aromatics (610/8310) Polynuckast Aromatics (610/8310) Polynuckast Aromatics (610/8300) SUMA Standards - Federal SUMA Standar	X X X X X X X X X X X X X X X X X X X	Time:     RELINCUISHED BY     Signature:       Time:     Signature:     Time:       Date:     Printed Name:     Date:       Date:     Company:     Company:       Timo:     Signature:     Date:       Fino:     Signature:     Date:       Date:     Company:     Date:       Timo:     Signature:     Date:       Date:     Parted Name:     Date:       Date:     Parted Name:     Date:       Pate:     Parted Name:     Date:
CITAIN OF COST (OBY ATT FABID) DATE: / 2 / 94 PAGE_/_OF_/	(1000 0010) GE2/00201 Dissel/Gasoline/BTXE/MTBE (MOD 8015/8022) BTXE/MTBE (8020) Chlorinated Hydrocarbons (601/8010) Chlorinated Hydrocarbons (602/8020) Chlorinated Hydrocarbons (602/8020) Pestiddes/PCB (608/8080) Herbiddes (615/8150) Base/Neutal/Acid Compounds GC/MS (625/3270) Volatile Organics GC/MS (624/8240)		SAMPLED & RELINQUISHED BY: A     RELINQUISHED BY: A       Signature:     Time:       Signature:     Time:       Printed Name:     Date:       Signature:     Time:       Signature:     Time:       Signature:     Date:       Printed Name:     Date:
AndlylicalTecnnologies,Inc., Albuquerque, NM San Diugu - Phoulinx - Suattle - Puntsacola - Ft. Collins - Pontand - Albuquerque DA PROJECT MANAGER: 7201, 74 × 2401			PROJECT INFORMATION     SAMPLE RECEIRT     SAMPLE NO.       PROJ. NO.:     4230.2     NO. CONTAINERS     23       PROJ. NAME:     E/NROM - WT     NO.     23       PROJ. NAME:     E/NROM - WT     CUSTODY SEALS     Y (N) NA       PROJ. NAME:     E/NROM - WT     CUSTODY SEALS     Y (N) NA       PROJ. NAME:     E/NROM - WT     CUSTODY SEALS     Y (N) NA       PROJ. NAME:     E/NROM - WT     CUSTODY SEALS     Y (N) NA       PROJ. NAME:     E/NROM - WT     CUSTODY SEALS     Y (N) NA       PROJ. NAME:     E/N/VU     RECEIVED INTACT     Printed N       PROJ. NAME:     E/N/VU     RECEIVED COLD     Y (N) NA       PROJ. I Jayn     I JASHI     RECEIVED COLD     NILK       ONUMENTS:     COMPANY     RECEIVED COLD     NILK       Comments:     Comments:     Company     Printed N       O ALEA     Sum PLoS     U/U     LecLud     CALACE

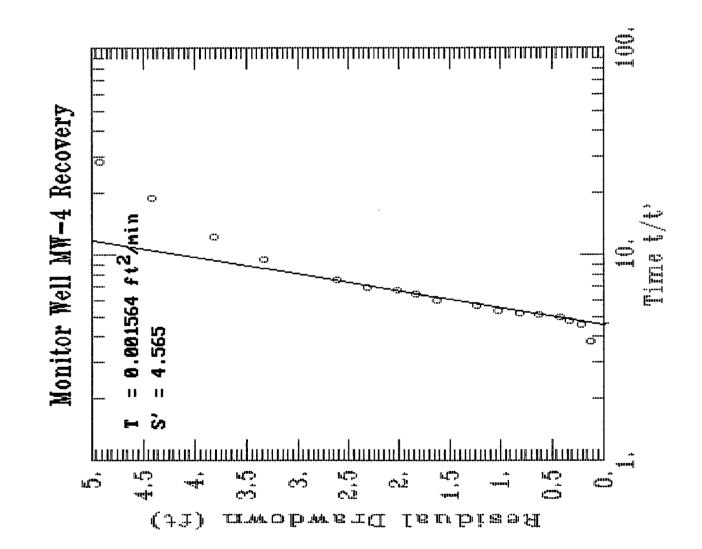
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Andylaced Technologies, lac.	HETWOHK PROJECT MANAGER: LETTIA KI	COMPANY: Analytical Technologies, Inc. ADDRESS: 2709-D Pan American Freeway, NE Albuquerque, NM 87107 Albuquerque, NM 87107	CCIENT PROJECT MANAGER:	SAMPLEID DATE	412312 -01 12/1	-02 112/1	-UZ 11/20	02/11 ho-	11/21 50-			PROJECT INFORMATION	PROJECT NUMBER: 4/10210	PHOJECT NAME: SDB	≥ ĉ	<b>REGUIRED</b> MS	TAT STANDARD) RUSHI	DUE DATE: 12/16	CLIENT DISCOUNT: 10 %	ATI Labs: San Diego (619) 458-9141 • Phounix (602) 496-4-

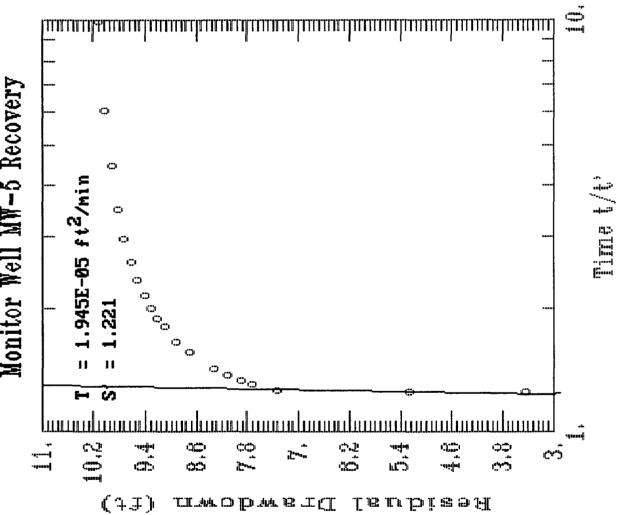
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# **APPENDIX C**

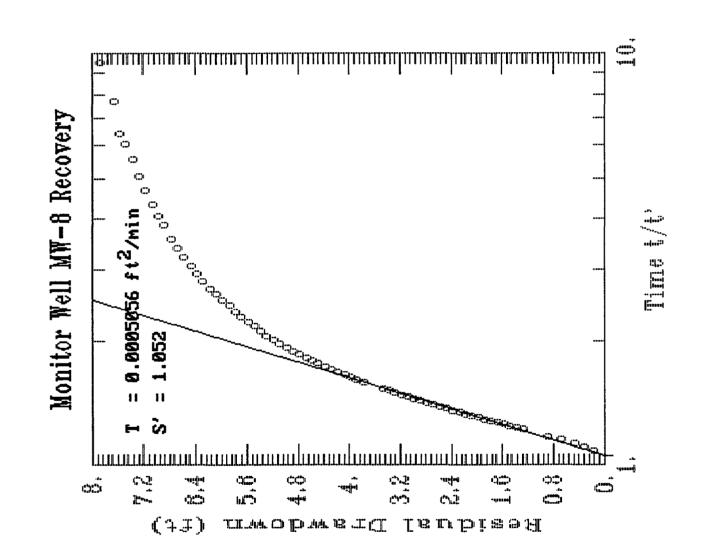
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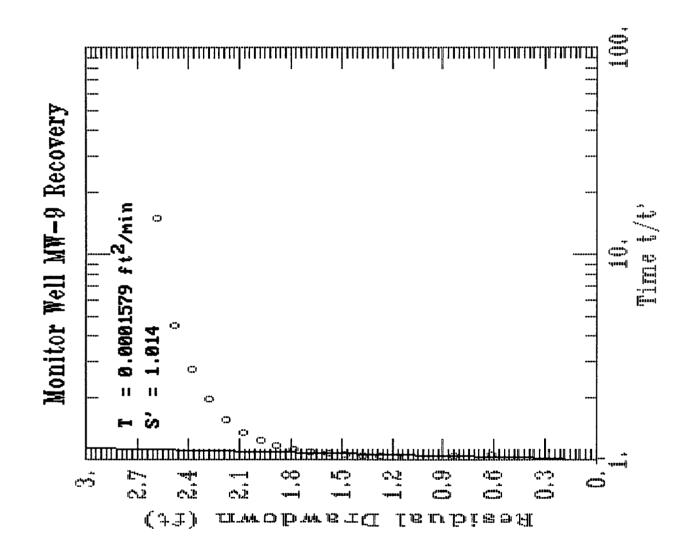
# RESULTS OF HYDRAULIC TESTING

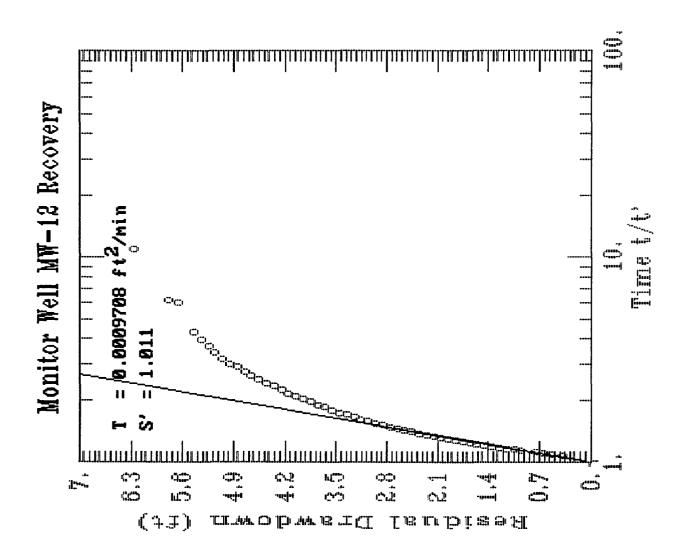




Monitor Well MW-5 Recovery







## Monitor Well MW-4 Bail-Recovery Test

Date:	12/01/94	
Initial depth to water:	47.18	(ft.)
Total depth of well:	58.37	(ft.)
Start Bailing:	08:19:00	
Stop Bailing:	08:28:10	
Purge volume:	15.00	(gal.)

Elapse	
Time	Displacement
(minutes)	(feet)
0.33	4.92
0.50	4.42
0.80	3.82
1.05	3.32
1.38	2.62
1.53	2.32
1.58	2.02
1.65	1.82
1.80	1.62
1.92	1.22
2.07	1.02
2.15	0.82
2.20	0.62
2.28	0.42
2.38	0.32
2.53	0.22
3.20	0.12

# Monitor Well MW-5 Bail-Recovery Test

Date:	12/1/94
Initial depth to water:	48.68 (ft.)
Total depth of well:	59.80 (ft.)
Start Bailing:	10:54:30
Stop Bailing:	11:14:30
Purge volume:	5.00 (gal.)

Elapse	
Time	Displacement
(minutes)	(feet)
1.67	10.12
2.97	10.02
4.35	9.92
6.02	9.82
7.67	9.72
9.37	9.62
11.15	9.52
13.02	9.42
14.87	9.32
16.73	9.22
18.63	9.12
22.82	8.92
26.32	8.72
34.75	8.32
39.67	8.12
43.75	7.92
48.22	7.72
56.83	7.32
104.50	5.26
154.50	3.42

## Monitor Well MW-8 Bail-Recovery Test

Date:	11/30/94
Initial depth to water:	49.52 (ft.)
Total depth of well:	59.27 (ft.)
Start Bailing:	13:05:00
Stop Bailiing:	13:14:15
Purge volume:	4.00 (gal.)

Elapse		Elapse	
Time	Displacement	Time	Displacement
(minutes)	(feet)	(minutes)	(feet)
10.33	7.88	23.73	3.98
10.63	7.68	24.27	3.88
10.95	7.58	24.78	3.78
11.07	7.48	25.33	4.68
11.28	7.38	25.90	4.58
11.53	7.28	26.48	3.48
11.77	7.18	27.07	3.38
12.02	7.08	27.67	3.28
12.27	6.98	28.35	3.18
12.50	6.88	29.03	3.08
12.85	6.78	29.72	2.98
13.12	6.68	30.47	2.88
13.42	6.58	31.37	2.78
13.73	6.48	32.23	2.68
14.03	6.38	33.07	2.58
14.37	6.28	34.03	2.48
14.70	6.18	34.97	2.38
15.00	6.08	35.93	2.28
15.33	5.98	37.08	2.18
15.65	5.88	38.17	2.08
16.03	5.78	39.35	1.98
16.38	5.68	40.68	1.88
16.77	5.58	41.97	1.78
17.12	5.48	43.50	1.68
17.53	5.38	44.97	1.58
17.93	5.28	46.50	1.48
18.35	5.18	48.30	1.38
18.77	5.08	50.17	1.28
19.23	4.98	61.00	0.88
19.62	4.88	68.08	0.68
20.03	4.78	80.00	0.46
20.45	4.68	92.00	0.31
20.88	4.58	114.00	0.17
21.28	4.48		
21.80	4.38		
22.25	4.28		1
22.75	4.18		
23.25	4.08		

## Monitor Well MW-9 Bail-Recovery Test

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Date:	11/30/94	
Initial depth to water:	55.52 (ft.)	
Total depth of well:	59.30 (ft.)	
Start Bailing:	09:33:00	
Stop Bailing:	09:36:30	
Purge volume:	1.20 (gal.)	ł

Elapse	
Time	Displacement
(minutes)	(feet)
3.75	2.58
4.50	2.48
5.48	2.38
7.12	2.28
9.60	2.18
12.90	2.08
17.67	1.98
23.48	1.88
30.07	1.78
36.63	1.68
45.18	1.58
54.50	1.48
64.08	1.38
74.10	1.28
86.42	1.18
74.00	0.84
52.00	0.61

# Monitor Well MW-12 Bail-Recovery Test

Date:	11/30/94
Initial depth to water:	50.45 (ft.)
Total depth of well:	60.20 (ft.)
Start Bailing:	11:05:00
Stop Bailing:	11:10:00
Purge volume:	3.30 (gal.)

Elapse		Elapse	
Time	Displacement	Time	Displacement
(minutes)	(feet)	(minutes)	(feet)
5.50	6.25	21.58	1.95
5.97	5.80	22.68	1.85
6.00	5.65	23.83	1.75
6.50	5.45	25.08	1.65
6.70	5.35	26.72	1.55
6.85	5.25	27.77	1.45
7.05	5.15	30.57	1.35
7.27	5.05	32.72	1.25
7.47	4.95	34.23	1.15
7.63	4.85	35.97	1.05
7.87	4.75	38.42	0.95
8.07	4.65	45.82	0.75
8.28	4.55	50.28	0.65
8.48	4.45	55.12	0.55
8.72	4.35	68.92	0.37
8.97	4.25		
9.27	4.15		
9.53	4.05		
9.85	3.95		
10.17	3.85		
10.50	3.75		
10.83	3.65		
11.23	3.55		
11.67	3.45		
12.10	3.35		
12.53	3.25		
13.00	3.15		
13.42	3.05		
13.93	2.95		
14.52	2.85		
15.08	2.75		
15.67	2.65		
16.30	2.55		
16.97	2.45		
17.88	2.35		
18.50	2.25		
19.55	2.15		
20.55	2.05		

# APPENDIX D

# SOIL EXCAVATION AND TREATMENT

## STATE OF NEW MEXICO ENERGY. MINERALS AND NATURAL RESOURCES DEPARTMENT



**BRUCE KING** 

GOVERNOR

**OIL CONSERVATION DIVISION** 

December 8, 199



2040 S. PACHECO SANTA FE, NEW MEXICO 87505 (505) 827-7131

CERTIFIED MAIL RETURN RECEIPT NO: P-667-242-184

Mr. Bill Kendrick ENRON Operations Corp. P.O. Box 1188 Houston, Texas 77251-1188

RE: WORK PLAN FOR REMEDIATION OF CONTAMINATED SOILS WT-1 COMPRESSOR STATION TRANSWESTERN PIPELINE CO.

Dear Mr. Kendrick:

The New Mexico Oil Conservation Division (OCD) has completed a review of Transwestern Pipeline Company's (TPC) December 2, 1994 "TREATMENT AND FINAL DISPOSITION OF SOIL AND CONCRETE DEBRIS AT THE TRANSWESTERN PIPELINE COMPANY WT-1 COMPRESSOR STATION". This document contains TPC's proposed work plan for onsite treatment of contaminated soils generated during remedial actions at TPC's WT-1 Compressor Station.

The above referenced work plan is approved with the following conditions:

- 1. Prior to implementing the remedial actions, TPC will provide to the OCD for approval the analyses which demonstrate that the soils are characteristically non-hazardous
- 2. Upon completion of the remedial actions, TPC will:
  - a. analyze the remediated soils for benzene, toluene, ethylbenzene, xylene and total petroleum hydrocarbons concentrations to determine the final remediation level achieved.
  - b. submit to the OCD a report containing the results of the remedial actions.
- 3. TPC will notify the OCD at least one week in advance of scheduled activities such that the OCD has the opportunity to witness the events and/or split samples.

Mr. Bill Kendrick December 8, 1994 Page 2

4. All original documents will be sent to the OCD Santa Fe Office with copies sent to the OCD Hobbs Office.

Please be advised that OCD approval does not relieve TPC of liability should their actions fail to adequately remediate contaminants related to TPC's activities. In addition, OCD approval does not relieve TPC of responsibility for compliance with any other federal, state or local laws and/or regulations.

If you have any questions, please contact me at (505) 827-5885.

Sincerely,

Con

William C. Olson Hydrogeologist Environmental Bureau

xc: Jerry Sexton, OCD Hobbs District Supervisor Wayne Price, OCD Hobbs District Office George Robinson, Cypress Engineering Sevices, Inc.

## **ENRON** OPERATIONS CORP.

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

December 2, 1994

Mr. William C. Olson Environmental Bureau New Mexico Oil Conservation Division 2040 S. Pacheco St. Santa Fe, New Mexico 87505

RE: Treatment and Final Disposition of Soil and Concrete Debris at the Transwestern Pipeline Company WT-1 Compressor Station

Dear Bill,

The purpose of this letter is to request approval for the proposed treatment and final disposition of soil which contains elevated TPH concentrations and the final disposition of concrete debris stockpiled on-site. The volume and origin of the stockpiled soil and debris is described in Table 1 below:

		Volume
Origin	Description	cu. yds.
WT-1 Dehy Area	soil excavated from the former WT-1 dehydration area	2300
WT-1 Dehy Area	soil remaining to be excavated from the former WT-1 dehydration area	1000
WT-1 Landfarm	soil from the cleanup of lube oil spills around the WT-1 engine room; this soil is currently managed in an on-site landfarm	850
Hat Mesa Field Compressor Unit	soil containing lube oil from a cleanup around the compressor engine foundation	20
Monument Junction Pig Trap	soil containing natural gas condensate from a cleanup around the pig trap	20
South Carlsbad Compressor Station	concrete debris from the removal of a compressor engine foundation	15
Total Volume of Soil & Debris		4205

Table 1. Volume and origin of stockpiled soil and debris at the WT-1 Compressor Station.

The following discussion presents a brief description of the origin, contaminant concentrations, hazardous characteristics, and proposed treatment and/or final disposition of each of the soil and concrete debris stockpiles described in Table 1.

#### WT-1 Dehy Area Soil

The dehy area soil was excavated from an area located on the Western boundary of the subject facility, Figure 1. This area was the former location of three dehydration reboilers and a pipeline pig receiver blowdown impoundment. Approximately 2300 cubic yards of soil were excavated in the summer of 1992 and stockpiled onsite. Several soil samples were recently collected from the stockpiled soil and delivered to a laboratory for analysis for TPH (EPA Method 418.1) and for BTEX compounds (EPA Method 8020). The results are presented in Table 2 below:

	TPH	Benzene	Toluene	Ethylbenzene	Xylene(s)	Total BTEX
Sample ID	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SP-1	4500	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040
SP-2	4500	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040
SP-3	4500	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040
SP-4	2000	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040
SP-5	4400	0.012	0.064	0.036	0.285	0.397
SP-8	3600	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040

Table 2. Analytical results for soil samples collected from the WT-1 Dehy Area soil.

A single composite soil sample was also recently collected from the stockpiled soil and delivered to a laboratory for analysis for hazardous characteristics. A TCLP extract (EPA Method 1311) of the sample was analyzed for volatile organics (EPA Method 8240) and for the eight RCRA metals (EPA Method 6010). Results indicated that all constituents were below detection limits with the exception of barium which was detected at a concentration of 0.66 mg/L in the TCLP extract, well below the RCRA regulatory level for barium of 100 mg/L.

### WT-1 Landfarm Soil

Approximately 850 cubic yards of soil, which was generated from the cleanup of lube oil spills around the WT-1 engine room, is currently managed in an on-site landfarm. Soil samples were collected from the landfarm soil in order to determine if the clean-up criteria had been met. The clean-up criteria for the landfarm soil was established at 100 mg/kg TPH concentration. The results of laboratory analysis are presented in Table 3 below:

Sample ID	TPH . mg/kg	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylene(s) mg/kg	Total BTEX mg/kg
LF-1	350	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040
LF-2	200	NA	NA	NA	NA	NA
LF-3	110	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040
LF-4	160	NA	NA	NA	NA	NA
LF-5	150	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040
LF-6	210	NA	NA	NA	NA	NA
LF-7	620	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040
LF-8	150	NA	NA	NA	NA	NA
Geometric Mean Conc.	. 209					

Table 3. Analytical results for soil samples collected from the Landfarm Area soil.

Analysis for hazardous characteristics were not run for this soil since this would have been completed prior to the issuance of a landfarm permit by the NMOCD.

Although the mean TPH concentration is greater than the permitted cleanup criteria, TPC proposes to cease operation of the on-site landfarm and to process the soil along with the dehy area excavated soil. It is apparent from the results presented in Table 3, with all BTEX compounds below detection limits, that the landfarm area soil no longer could pose a threat to ground water resources.

#### Hat Mesa Field Compressor Unit Soil

Also included in the WT-1 soil stockpile is approximately 20 cubic yards of soil that was recently hauled in from the Hat Mesa field compressor unit which is located approximately ten miles southeast of the WT-1 Station. This soil contains lube oil and was generated from a cleanup around a compressor engine foundation. A soil sample was

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recently collected from the stockpiled soil and delivered to a laboratory for analysis for TPH (EPA Method 418.1) and for BTEX compounds (EPA Method 8020). The results are presented in Table 4 below:

Table 4. Analytical results for soil samples collected from the Hat Mesa soil.

	TPH	Benzene	Toluene	Ethylbenzene	Xylene(s)	Total BTEX
Sample ID	<sup>.</sup> mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg_
SP-6R	590	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040

A single composite soil sample was recently collected from the Hat Mesa stockpiled soil and delivered to a laboratory for analysis for hazardous characteristics. A TCLP extract (EPA Method 1311) of the sample was analyzed for volatile organics (EPA Method 8240) and for the eight RCRA metals (EPA Method 6010). Results indicated that all constituents were below detection limits with the exception of barium which was detected at a concentration of 0.98 mg/L in the TCLP extract, well below the RCRA regulatory level for barium of 100 mg/L.

### **Monument Junction Pig Trap Soil**

Also included in the WT-1 soil stockpile is approximately 20 cubic yards of soil that was hauled in from the Monument Junction pig trap site which is located approximately fifteen miles south of the WT-1 Station. This soil contains natural gas condensate and was generated from a cleanup around a pig trap. A soil sample was recently collected from the stockpiled soil and delivered to a laboratory for analysis for TPH (EPA Method 418.1) and for BTEX compounds (EPA Method 8020). The results are presented in Table 5 below:

Table 5. Analytical results for soil samples collected from the Monument Junction soil.

	TPH	Benzene	Toluene	Ethylbenzene	Xylene(s)	Total BTEX
Sample ID	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SP-7R	4500	0.029	0.026	< 0.010	0.118	< 0.183

A single composite soil sample was recently collected from the Monument Junction stockpiled soil and delivered to a laboratory for analysis for hazardous characteristics. A TCLP extract (EPA Method 1311) of the sample was analyzed for volatile organics (EPA Method 8240) and for the eight RCRA metals (EPA Method 6010). Results indicated that all constituents were below detection limits with the exception of barium which was detected at a concentration of 0.67 mg/L in the TCLP extract, and mercury which was detected at a concentration of 0.003 mg/L in the TCLP extract, well below the RCRA regulatory levels for barium and mercury of 100 mg/L of 0.2 mg/L, respectively.

#### South Carlsbad Station Concrete Debris

Approximately 20 cubic yards of concrete debris from the removal of a compressor engine foundation at the South Carlsbad Station is currently stockpiled at the WT-1 Station. The concrete debris appears to be clean; i.e., free from either hydrocarbon impacted liquids, sludges, and/or soil.

#### **Excavation Soil Samples**

Soil samples were collected from the excavation area in order to determine if additional excavation might be necessary. The results of laboratory analysis are presented in Table 6 below:

Sample ID	TPH mg/kg	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylene(s) mg/kg	Total BTEX mg/kg
EN-1	4300	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040
EE-1	3700	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040
EW-1	4500	0.105	0.288	0.050	0.414	0.857
ES-1	240	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040
ES-2	< 5	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040

Table 6. Analytical results for soil samples collected from the Excavation Area soil.

Soil samples collected from South of the excavation area (ES-1 & ES-2) are relatively clean and therefore excavation is not proposed to extend any further South. The TPH concentration is apparently elevated to the East and West of the excavation (EE-1 & EW-1); however, Transwestern does not propose to extend the excavation in these directions because the current excavation is already bounded by the facility boundary on the West and gas pipelines on the East. Prior excavation activities extended the North wall of the excavation to the approximate center of a former pipeline pig receiver blowdown impoundment. This was a concrete surface impoundment which has been backfilled for several years. Transwestern proposes to extend the excavation area to the North approximately 20-30 feet in order to remove potentially impacted soil and concrete debris in this area. This will generate an additional 800 to 1000 cubic yards of impacted soil.

### **Proposed Final Disposition for Concrete Debris**

The concrete debris stockpiled on-site will be placed in the bottom of the excavation area and will be buried inplace.

#### **Proposed Soil Treatment and Final Disposition**

Transwestern proposes to process all of the stockpiled soil described above through a Kolberg soil screening plant. A copy of a brochure from the equipment manufacturer is attached. The contractor providing the labor and equipment will be Pecos Valley Field Service out of Pecos, Texas. Pecos Valley Field Service was selected due to their prior experience operating this type of equipment. During the screening process, a water based nutrient solution will be sprayed on the soil as the soil exits the screening plant. The nutrient solution will consist of a 50/50 mixture of the commonly available fertilizers indicated below (or a comparable brand and formulation):

Miracle-Gro; 36-6-6	and, Miracle-Gro; 18-24-16
Total Nitrogen	Total Nitrogen18%
1.2% Ammoniacal Nitrogen	6.3% Ammoniacal Nitrogen
1.9% Nitrate Nitrogen	5.0% Nitrate Nitrogen
32.9% Urea Nitrogen	6.7% Urea Nitrogen
Phosphoric Acid (P <sub>2</sub> O <sub>5</sub> )	Phosphoric Acid (P <sub>2</sub> O <sub>5</sub> )24%
Soluble Potash (K <sub>2</sub> O)	Soluble Potash (K <sub>2</sub> O)16%
Chelated Iron0.325%	Chelated Iron0.10%
	Copper0.05%
	Manganese0.05%
	Zinc

Prior experience with this method of processing soil has indicated that, within a period of two to three months after processing, BTEX concentrations can be reduced to below detection levels and TPH concentrations can reasonably be expected to be reduced to approximately 50% of the original concentration. Transwestern has proposed this action because it is a cost effective method to reduce the potential for future leaching of hydrocarbon compounds to ground water to a level commensurate with the specific conditions and environmental setting of the WT-1 Station site. The specific conditions and setting include such factors as: 1) the lack of current ground water use in the

area; 2) the limited amount of storm water infiltration in the area; 3) the relatively low initial TPH and BTEX concentrations; and 4) the effectiveness of the soil shredding process to further reduce BTEX concentrations.

The processed soil, with the exception of the landfarm area soil, will be placed directly back into the excavated area as it exits the soil screening plant. The soil from the landfarm area will either be spread out over a large area on-site or stockpiled for future use as backfill material.

Transwestern will complete the additional excavation activities and implement the proposed soil treatment upon approval of this proposal by your office. If you have any questions regarding this proposal, please contact George Robinson at (713) 646-7327.

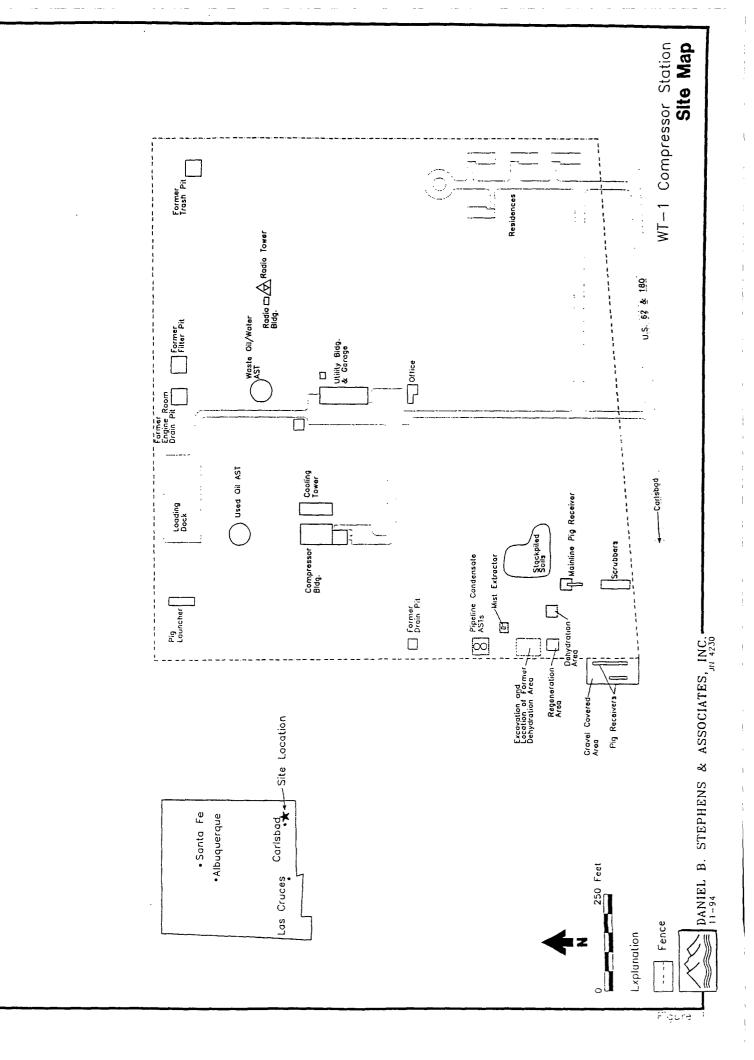
Sincerely,

Bill Kendrick Projects Group Manager EOC Environmental Affairs

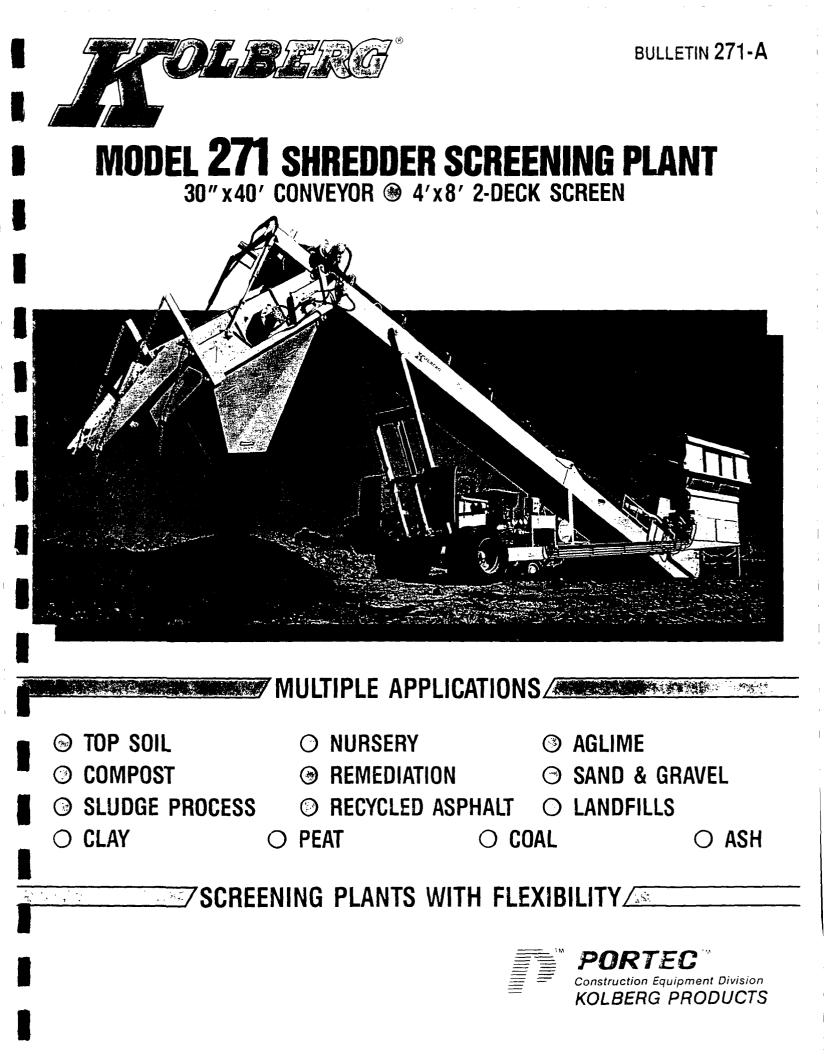
gcr/BK/attachments

xc: Wayne Price

NMOCD Hobbs District Office



1\4230\4230C01





# MODEL 271 SHREDDER S

## 30" x 40' CONVEYOI

#### ADJUSTABLE MATERIAL SPREADER

Evenly spreads material onto the screen cloth for maximum screening capability.

#### 4'x8' 2-DECK HIGH FREQUENCY SCREEN WITH VARIABLE SPEED CONTROL

Designed to provide maximum screening efficiency in multiple applications.

#### HYDRAULIC SCREEN ADJUST

Allows for quick "On the Fly" screen pitch adjustment of 15 to 50 degrees for optimum screening of various material characteristics.

TOP DECK "SIDE TENSION"

Wide range of choice for various applications.

**BOTTOM DECK "END TENSION"** 

Numerous styles and openings available to

SCREEN CLOTH

SCREEN CLOTH

#### **IDLERS/BELT**

CEMA Class B, 5" diameter. Sealed-for-life bearings. 2-ply belting.

AULARAC

#### CONVEYOR FRAMI

Formed steel construction to handle a variety of rha under tough load cond

#### HYDRAULIC UNDERCARRIAGE

Telescopic to maximize load-out height and to lower for travel.

#### OFF-PLANT STACKER CAPABILITIES

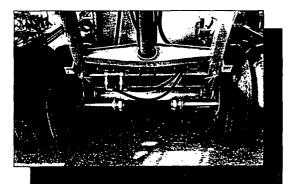
To operate two "off-plant" stackers for increased stockpile capacities.



#### SERIES 2 PORTABLE STACKING CONVEYOR

These optional stacking conveyors are ideally suited as companion stackers for the Model 271 screening plant. Available in 24" widths, 40' and 50' lengths and 30" width x 50' length. Reference the Kolberg Series 2 brochure for more detailed information.

SERVICE POINTS: Remote grease z-



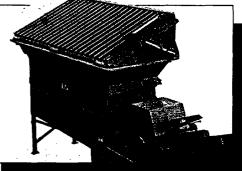
**HIGHWAY PORTABLE** Heavy-duty chassis. featuring single axle. dual wheels. air brakes. mud flaps. brake. tail and turn lights.

# SCREENING PLANT

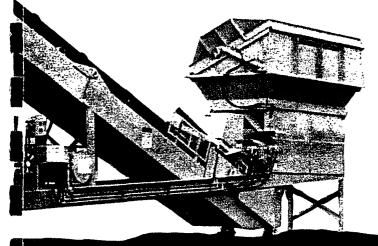
## • 4'x8' 2-DECK SCREEN

life ball

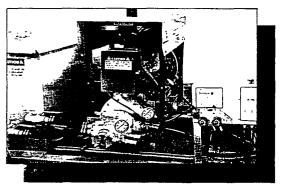
IME tion designed materials additions.



**SELF-RELIEVING HOPPER/GRIZZLY** 9 cu. yd. capacity designed to reduce material bridging and equipped with a rugged hydraulic activated sloped grizzly. Optional hopper wings are shown in photos.



se zerks for daily maintenance.

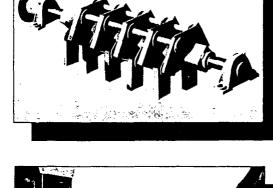


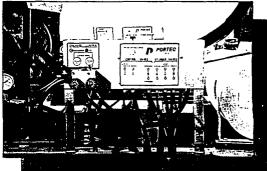
#### **POWER UNIT** 68 HP water cooled diesel with instrumentation, electric start and "high temperature/low oil" shut-down system to prevent engine damage.

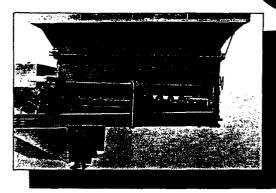
MILL SHREDDER An optional mill type shredder is available.

#### CONTROL CENTER

Instrumentation and controls mounted at ground level for ease of operation.





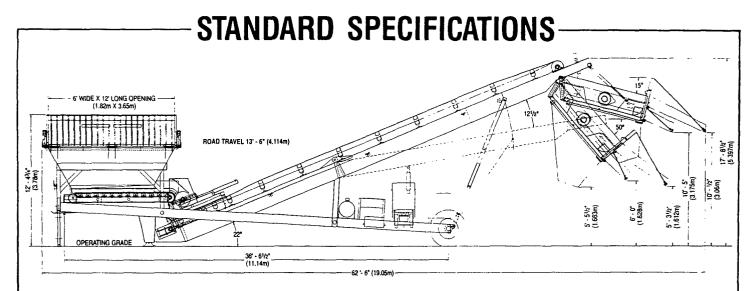


**VARIABLE SPEED BELT FEEDER** 9' - 6" long roller belt designed for precise material metering. Enclosed with easy access doors.

TINE SHREDDER Tine type shredder is designed for use in top soil and other related materials.



STANDARD FEATURES



#### SPECIFICATIONS AND/OR DIMENSIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

#### **VIBRATING SCREEN:**

4' x 8' 2-Deck high frequency with variable speed control. Adjustable eccentrics provide maximum screening efficiency in multiple applications.

SCREEN SPRINGS: Rubber shear springs enable screen to function vigorously at any angle.

**CHUTE/SUPPORTS:** Chute Support frame complete with a 6' - 0'' (1.82m) long top and 3' - 0'' (.914m) long bottom chute plus a fines collecting hopper.

#### HOPPER/BELT FEEDER:

**SELF-RELIEVING HOPPER:** Reduces material bridging and increases material flow with long, steep side walls. Hopper capacity of 9 cu. yd. heaped, and heavy 1/4" (6.35mm) plate steel construction and telescopic support legs for increased stability.

SLOPED GRIZZLY DUMP: Hydraulic activated cylinders and heavy duty 5<sup>1</sup>/2" (139.7mm) clear opening grizzly.

**BELT FEEDER:** Heavy-duty 9' - 6" (2.89m) long roller belt design with variable speed hydraulic drive for precise material metering.

#### SHREDDER CAPABILITIES:

**THE SHREDDER:** A "Tine" type shredder is included and designed for use in top soil and related applications.

**SHREDDER HOUSING:** Hydraulically slides "open" and "closed" for inspection and operation.

**UNIQUE INTERCHANGEABILITY:** A "Mill" design shredder is available for interchangeability or can be supplied in lieu of the standard "soil tiller."

#### POWER AND DRIVE SYSTEM:

**POWER UNIT:** A water cooled diesel produces 68 HP and is equipped with all instrumentation, electric start, battery, 45 gallon lockable fuel tank, and "high temperature/low oil" shut-down system.

**DRIVES:** All hydraulic with instrumentation and controls conveniently mounted at ground level to operate the main belt, screen, screen pitch, belt feeder, shredder, grizzly dump and conveyor lift. 100 gallon lockable Hydraulic Reservoir is also included.

**AMPLE POWER:** The diesel/hydraulic power unit is designed to operate two additional "off-plant" conveyors. (Conveyors not included).

#### HEAVY-DUTY CHASSIS/UNDERCARRIAGE:

**TRUCK TYPE CHASSIS:** Designed for dependable legal highway portability featuring a single axle with dual wheels, a king pin towing attachment, air brakes and a two speed landing gear.

**UNDERCARRIAGE MEMBERS:** Telescopic tubular design with hydraulic lift to elevate the conveyor to a maximum 22 degree operating incline, maximizing load-out height.

#### BASIC CONVEYOR:

**CONVEYOR:** 30" (762mm) wide x 40' (12.92m) long rigidly formed steel construction designed to handle a variety of material under tough load conditions. The conveyor frame also has a hinge design for lower travel dimensions.

#### **CONVEYOR COMPONENTS:**

HEAD PULLEY: Rubber lagged.

TAIL PULLEY: Self cleaning wing.

TROUGHING IDLERS: are 35 degree CEMA B type spaced on 4' - 0" (1.21m) centers.

RETURN IDLERS: are spaced on 10'0" (3.048m) centers. TAKE-UP: are heavy-duty screw type with protective rod covers. BELT CLEANER: positive cleaning with spring tensions. PAINT: Standard enamel Portec beige.

HIGHLY MOBILE TRAVEL: Width = 8' - 6" (2.590m) Height = 13' - 6" (4.114m) Weight = 22,000 lbs. (Approx.)

These well balanced machines can be moved quickly and easily.

#### STANDARD OPTIONS:

## ③ REMOTE CONTROL GRIZZLY DUMP ● WET SCREEN WITH SPRAY BARS ● COMPOSITE HOPPER LINERS ● "AR" STEEL LINERS ③ FEED HOPPER WINGS

Because Portec/Kolberg may use in its catalogs and iterature, lield photographs of its products which may have been modified by the owners, products lumished by Portec/Kolberg may not necessarily be as illustrated therein. Also continuous design progress makes it necessary that specifications be subject to change without notice. All sales of the products of Portec/Kolberg are subject to the provisions of its standard warranty. Portec/Kolberg does not warrant or represent that its products meet any federal, state or local statues, codes, ordinances, rules, standards or other regulations. including OSHA and MSHA, covering safety, pollution, electrical wiring, etc. Compinance with these statules and regulations is the responsibility of the user and will be dependent upon the area and the user is a mich the product is put by the user in some photographs, guards may have been removed for injustrative purposes or iy. This equipment should not be operated without all guards attached in their normal position. Placement of guards are: other safety equipment is often dependent upon the area and the use to which the product is put. A safety study should be installed by the user of the application, and, if required, additional guards, warning signs and other safety devices should be installed by the user, wherever appropriate celore operating the products.

PORTEC



P.O. BOX 220 • YANKTON, SOUTH DAKOTA PHONE: (605) 665-8771 • FAX: (605) 665-8858

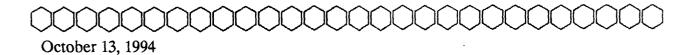
Construction Equipment Division KOLBERG PRODUCTS

WT-1 Excavation EN-1-E EN-2-W 80 EB-2-N **Β** 30 ΕΕ-2-Ν Dec. 194 Exc. EB-I-E Bottom of Orig. Exc. 25 ft. EE-1-5 55 Exc. EE-I 75 ' Ew-1 Mid 193 e≡ft. + 15'+ Des-1 55'-30 L I-ES-Z Final Dimension of Exc.: 105' × 55' × 10' Collected 5 samples on 10-5-94 EN-1 @ depth = 6' bgs ES-1 ES-Z EE-1 EN-1 . On 12/10 & 12/11 completed additional execution Collected 6 samples on 12/11/94 EE-1-5, EE-2-N, EN-1-E, ZEN-2-W @ 7' bgs.

EB-I-E & EB-Z-N @ 12' bys

#### Terra Laboratories, Ltd.

**Quality Analytical Services** 



George Robinson Transwestern Pipeline PO Box 1188, Rm. 3Ac3142 Houston, TX 77251

Re: Five (5) solid samples (Project Name: WT-1 Excavation) received on 10/06/94

Dear Mr. Robinson:

Attached are the final reports of analysis of the samples referenced above as per your analysis and/or method requests. The analysis for BTEX was subcontracted to Chem Coast Laboratory.

The samples were received in good condition and at  $12^{\circ}$  Centigrade.

We appreciate this opportunity to serve Transwestern Pipeline. Please let me, or Linda McKee, know if there is any other way we can help you.

Sincerely, any a

Larry D. Wallace Laboratory Director

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994 Page # 1 ranswestern Pipeline Co Reviewed by: JMH .O. BOX 1188, RM 3AC 3142 Customer#: , Tx 77251 Job Number: Houston ttn: Robinson, George Date Collected:10/05/94 Time Collected:1115 Sample Number: 94007002 roject Name: WT-1 EXCAVATION Date Received: 10/06/94 Sample ID: EN-1 GRAB Test Code Analyte Result Units Method Analyst \_\_\_\_\_\_ \_\_\_\_\_\_ 418\_1S'DTPH AnalysisPrep (Date/Time)10/111400init.6-3550PH'STPH (TotalPetroleumHydrocarbon4300ppm2-418.1 WJW 2-418.1 WJW AB'NAME Analyses subcontracted to: Chemcoast SUBCON'D Date subcontracted: 10/11 1200 JMH SUBCON'D Date subcontracted: JMH OMMENTS: FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit reparation and Analysis Method References:

- 1. ASTM: American Society for Testing and Materials, 1984.
- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).
- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Kin 10/13/44 Hange Miller

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994 Page # 1 ranswestern Pipeline Co Reviewed by: JMH P.O. BOX 1188, RM 3AC 3142 Houston , Tx 77251 Customer#: Job Number: Attn: Robinson, George Date Collected:10/05/94 Sample Number: 94007003 Time Collected:1120 Project Name: WT-1 EXCAVATION Sample ID: EE-1 GRAB Date Received: 10/06/94 Result Units Method Analyst Analyte Test Code 418\_1S'DTPH Analysis Prep(Date/Time)10/11 1400init.6-3550WJW'PH'STPH(Total Petroleum Hydrocarbon 3700ppm2-418.1WJWLAB'NAMEAnalyses subcontracted to:ChemcoastJMHSUBCON'DDate subcontracted:10/11 1200JMH COMMENTS:

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

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Jany Dollafian

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994

Cranswestern Pipeline CoP.O. BOX 1188, RM 3AC 3142Houston, Tx77251

Page # 1

Customer#: Job Number:

Reviewed by: JMH

ttn: Robinson, George

Sample Number: 94007004 Project Name: WT-1 EXCAVATION Sample ID: EW-1 GRAB

Time Collected:1240

Date Received: 10/06/94

Date Collected:10/05/94

Test Code	e Analyte	Result	Units	Method	Analyst	
'PH'S AB'NAME	TPH(Total Petroleum Hydrocarbon Analyses subcontracted to:	10/11 1400 4500 Chemcoast 10/11 1200	init. ppm	6-3550 2-418.1	WUW WUW MH JMH	
OMMENTS:						

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

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- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Ku 10/13/ap

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994 Page # 1 ranswestern Pipeline Co Reviewed by: JMH P.O. BOX 1188, RM 3AC 3142 Customer#: 77251 , Tx Houston Job Number: ttn: Robinson, George Date Collected:10/05/94 ample Number: 94007005 Time Collected:1300 roject Name: WT-1 EXCAVATION Sample ID: ES-1 GRAB Date Received: 10/06/94 Result Units Method Analyst Test Code Analyte 418\_1S'DTPH Analysis Prep(Date/Time)10/11 1400init.6-3550WJWPH'STPH(Total Petroleum Hydrocarbon 240ppm2-418.1WJWAB'NAMEAnalyses subcontracted to:ChemcoastJMHSUBCON'DDate subcontracted:10/11 1200JMH OMMENTS:

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

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#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994			Page # 1			
ranswestern Pipeline Co P.O. BOX 1188, RM 3AC 3142 Houston , Tx		Cus	iewed by:J. tomer#: Number:	MH		
attn: Robinson, George			Dat	e Collecte	d:10/05/9	94
ample Number: 94007006 roject Name: WT-1 EXCAVATION Sample ID: ES-2 GRAB				e Collecte e Received		94
Test Code Analyt	e	Resul	.t	Units	Method	Analyst
418_1S'D TPH Analysis Prep PH'S TPH(Total Petrole AB'NAME Analyses subcontr SUBCON'D Date subcontracte	eum Hydrocarbon racted to:	<5	ast	init. ppm	6-3550 2-418.1	WJW WJW JMH JMH
OMMENTS:						

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

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- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).
- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

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#### QUALITY CONTROL REPORT

Report To: Transwestern Pipeline Terra Laboratories Sample No(s). 94007002 - 94007006

			Precision			Accur	acy
Analyte	<u>Units</u>	<u>Blank</u>	Orig	Dup	<u>RPD(%)</u>	<u>MSR(%)</u>	LCSR(%)
<b>TPH (Batch A10119</b> Sample No. 94007006	,	< 5	< 1	< 1	-		95

Jarry addition

Terra Laboratories, Ltd.

10/13/94	09:58	<b>37</b> 13	470	8711

CHEM COAST INC.  $\rightarrow \rightarrow \rightarrow$  TERRA LAB

-



MEMBER OF

A.S.T.H.

A 0 C.S.

U Q.P. U S F

## CHEM COAST LABORATORY

INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338 713-470-8710 FAX: 713-470-8711 TLX: 765468

#### CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-7002

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

#### ANALYSIS

METHOD	TEST	INITIALS	RESULTS
SW 846 8020	BENZENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	TOLUENE, PPB	<b>JG/</b> TB	LESS THAN 10
SW 846 8020	ETHYLENE BENZENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	XYLENES, PPB	JG/TB	LESS THAN 10
BROMO FLUORO	BENZENE (SURR) % RECOVERY	= <u>119.9</u>	

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INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

HEMBER OF A 9.T M. A 0 C.9. U 0.P. U 5 P P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338 713-470-8710 FAX: 713-470-8711 TLX: 765468

CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-7003

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

ANALYSIS

METHOD	TEST	INITIALS	RESULTS
SW 846 8020	BENZENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	TOLUENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	ETHYLENE BENZENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	XYLENES, PPB	JG/TB	LESS THAN 10

Servie (O. Parma)

10/13/94 09:59 **3**713 470 8711 CHEM COAST INC.  $\rightarrow \rightarrow \rightarrow$  TERRA LAB Ø009/013 -1-1-0.00100 EM CC CHEM COAST LABORATORY INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS INC. 713-470-8710 P.O. Box 1338 MEMBER OF 11820 North H Street FAX: 713-470-8711 A.S.T M. A D G.S. La Porte, Tx. USA 77572-1338 TLX: 765468 UO.P. U.S.P CERTIFICATE OF ANALYSIS L-4131-4 SAMPLE DATE: 10/11/94 MARKINGS: 96-7004 CUSTOMER: TERRA LABORATORIES COMMODITY: WASTE SOLID SAMPLING: SUBMITTED ANALYSIS METHOD INITIALS RESULTS TEST SW 846 8020 105 BENZENE, PPB JG/TB SW 846 8020 TOLUENE, PPB JG/TB 288 SW 846 8020 ETHYLENE BENZENE, PPB JG/TB 50.3 SW 846 8020 XYLENES, PPB JG/TB 414 BROMO FLUORO BENZENE (SURR) RECOVERY = 90.61NOTE: 1:10 DILUTION FACTOR

April Corna

Ø010/013



## CHEM COAST LABORATORY

INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

MEMBER OF A S T M, A O C.S. U O.P. U.S P P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338 713-470-8710 FAX: 713-470-8711 TLX: 765468

#### CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-7005

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

#### ANALYSIS

METHOD	TEST	INITIALS	RESULTS
SW 846 8020	BENZENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	TOLUENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	ETHYLENE BENZENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	XYLENES, PPB	JG/TB	LESS THAN 10

BROMO FLUORO BENZENE (SURR)  $\$  RECOVERY = <u>95.20</u>

CHEM COAST INCORPORATED

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	:00 2713 470 8711 CH	$EM COAST INC. \rightarrow \rightarrow TI$	ERRA LAB Ø011/013
THEM CON	INDEPENDENT CUS PETROLEUM ANALYSIS - WATE	AST LABORAT TOMS APPROVED LA R ANALYSIS - INSTRU ETROCHEMICAL ANA	BORATORY IMENTATION ANALYSIS
INC. MEHARE OF ASTM AOCS. U.P.	P.O. Box 1338 11820 North H Street Lg Porte, Tx. USA 77572-1338		713-470-8710 FAX: 713-470-8711 TLX: 765468
U.S P	CERTIFICATE O		
-	L-413	1-4	
SAMPLE DATE:	10/11/94		
MARKINGS: 96-	7006		
CUSTOMER: TER	RA LABORATORIES		
COMMODITY: WA	STE SOLID		
SAMPLING: SUB	MITTED		
	ANALY	SIS	
METHOD	TEST	INITIALS	RESULTS
SW 846 8020	BENZENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	TOLUENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	ETHYLENE BENZENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	XYLENES, PPB	JG/TB	LESS THAN 10
BROMO FLUORO	BENZENE (SURR) % RECOV	ERY = <u>94.95</u>	

INCORPORATED

Free CAX CT 10/13/94 10:00 2713 470 8711

 $\textcircled{CT13} 470 8711 \qquad \qquad CHEM COAST INC. \rightarrow \rightarrow \rightarrow TERRA LAB$ 

012/013



### CHEM COAST LABORATORY



INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

MEMBER OF A.S.T M A O C.S U O P. U.S.P P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338 713-470-8710 FAX: 713-470-8711 TLX: 765468

#### QUALITY ASSURANCE/QUALITY CONTROL

ANALYZED DATE: 10/12/94

SAMPLE ID: L-4131-4

INITIALS: JG/TB

CUSTOMER: TERRA LABORATORIES

CUSTOMER SAMPLE ID: 94-7001

PAF	RAMETERS	BLANK	SPIK VALU ORIGINAL		SPIKE RECOVERY %	SAMPLE ORIGINAL	SAMPLE DUPLICATE	<pre>%DEV. DUP.</pre>
BFE	3 (SURR)		20	18.9	94.50	21.4	20.8	2.84
BEN	NZENE	0	20	18.8	94.00	18.4	18.7	1.62
TOI	LUENE	0	20	18.3	91.50	19.2	18.6	3.17
ETH BEN	HYL NZENE	0	20	19.2	96.00	20.1	20.9	3.90
XYI	LENES	0	30	29.7	99.00	30.5	30.1	1.32

CHEM COAST INCORPORATED - 1

CHEM COAST INC.  $\rightarrow \rightarrow \rightarrow$  TERRA LAB

Ø013/013



### CHEM COAST LABORATORY

INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

MEMBER OF A.S.T.M A.O.C.S. V.O.P. U.S.P

INC.

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P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338 713-470-8710 FAX: 713-470-8711 TLX: 765468

QUALITY ASSURANCE/QUALITY CONTROL

ANALYZED DATE: 10/12/94

CUSTOMER: TERRA LABORATORIES

SAMPLE ID: L-4131-4

INITIALS: JG/TB

CUSTOMER SAMPLE ID: 94-6988

	PARAMETERS	BLANK	SPIK VALU ORIGINAL	,	SPIKE RECOVERY %	SAMPLE ORIGINAL	SAMPLE DUPLICATE	<pre>\$DEV. DUP.</pre>
	BFB (SURR)		20	19.8	99.00	21.2	20.5	3.36
	BENZENE	0	20	20.1	100.50	19.0	19.0	0
	TOLUENE	0	20	20.7	103.50	18.2	18.9	3.77
	ethyl Benzene	0	20	20.5	102.50	19.3	18.4	5.84
	XYLENES	0	30	30.1	100.33	30.3	31.0	2.28

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τοργ	Frantizier Ferr Pipe		
CHAIN OF CUSTODY	Contrant     Contrant       TZ     ADRES       ATT     Project Name       TZ     Project Name       TT     Project Name </td		
	REPORT TO: REPORT TO: Pex 1188 RM 3A Pex 1 Per		COMPANY Transa ADDRESS P. O. B. CITY HELLS TEL ATTN SE 24HR DATE TIME 24HR 12:40 13:20 Hainquished by: Hainquished by:

Fax: (713) 334-3116

TERRA LABORATORIES LTD. League City, Texas 77573 (713) 334-5052 Fa

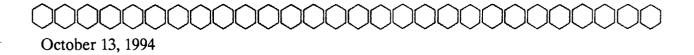
2525 South Shore Blvd.

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#### Terra Laboratories, Ltd.

Quality Analytical Services



George Robinson Transwestern Pipeline PO Box 1188, Rm. 3Ac3142 Houston, TX 77251

Re: Eight (8) solid samples (Project Name: WT-1 Soil Pile) received on 10/06/94

Dear Mr. Robinson:

Attached are the final reports of analysis of the samples referenced above as per your analysis and/or method requests. The analysis for BTEX was subcontracted to Chem Coast Laboratory.

The samples were received in good condition and at 12<sup>o</sup> Centigrade.

We appreciate this opportunity to serve Transwestern Pipeline. Please let me, or Linda McKee, know if there is any other way we can help you.

Sincerely, NY

Larry D. Wallace Laboratory Director

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994 Page # 1 Transwestern Pipeline Co Reviewed by: JMH P.O. BOX 1188, RM 3AC 3142 Customer#: Houston , Tx Job Number: 77251 Attn: Robinson, George Date Collected:10/05/94 Time Collected:1130 Sample Number: 94006986 Project Name: WT-1 SOIL PILE Sample ID: SP-1 GRAB Date Received: 10/06/94 Test Code Analyte Result Units Method Analyst \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ 418\_1S'D TPH Analysis Prep(Date/Time) 10/11 1300 init. 6-3550 WJW TPH'S TPH (Total Petroleum Hydrocarbon 4500 ppm 2-418.1 WJW LAB'NAME Analyses subcontracted to: Chemcoast SURCON'D Date subcontracted: 10/11 1200 JMH SUBCON'D Date subcontracted: JMH . \_ \_ \_ \_ \_ \_ \_ \_ \_ . COMMENTS: FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

- 1. ASTM: American Society for Testing and Materials, 1984.
- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).
- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

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#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994

Page # 1

	ern Pipeline Co 188, RM 3AC 3142 , Tx	77251		Custo	ewed by:JM omer#: Number:	ΙΉ	
Attn: Robi	nson, George			Date	Collected	:10/05/9	4
Project Na	nber: 94006987 ame: WT-1 SOIL PILI : SP-2 GRAB	E			Collected Received:		4
Test Code	e Analyte	е	Result		Units	Method	Analyst
rph's -Lab'name	TPH Analysis Prep TPH(Total Petroley Analyses subcontra Date subcontracted	um Hydrocarbon acted to:		st E		6-3550 2-418.1	WJW WJW JMH JMH

COMMENTS:

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

- 1. ASTM: American Society for Testing and Materials, 1984.
- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).
- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Kw 10/13/94 Harry Dollar

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994	Page # 1
Franswestern Pipeline Co P.O. BOX 1188, RM 3AC 3142 Houston , Tx 77251	Reviewed by:JMH Customer#: Job Number:
Attn: Robinson, George	Date Collected:10/05/94
Sample Number: 94006988	Time Collected:1140
Project Name: WT-1 SOIL PILE Sample ID: SP-3 GRAB	Date Received: 10/06/94
Test Code Analyte	Result Units Method Analyst
418_1S'D TPH Analysis Prep(Date/Time) TPH'S TPH(Total Petroleum Hydrocarbon LAB'NAME Analyses subcontracted to: SUBCON'D Date subcontracted:	4500 ppm 2-418.1 WJW Chemcoast JMH
COMMENTS :	
	<pre>quired to allow acceptable quantitation d) ppb = ug/L(Liquid), ug/kg(Soil)</pre>

- 1. ASTM: American Society for Testing and Materials, 1984.
- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).
- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Kw 10/13/94 Aarry Dottelour

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994

Pranswestern Pipeline CoP.O. BOX 1188, RM 3AC 3142Houston, Tx77251

Page # 1

Reviewed by:JMH Customer#: Job Number:

Attn: Robinson, George

Sample Number: 94006989 Project Name: WT-1 SOIL PILE Sample ID: SP-4 GRAB

Date Collected:10/05/94

Time Collected:1145

Date Received: 10/06/94

Test Code	e Analyte	Result	Units	Method	Analyst	
LAB'NAME	TPH (Total Petroleum Hydrocarbon	10/11 1300 2000 Chemcoast 10/11 1200	init. ppm	6-3550 2-418.1	WJW WJW JMH JMH	

COMMENTS:

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

- 1. ASTM: American Society for Testing and Materials, 1984.
- 2. EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).
- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

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#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994

Page # 1

ranswestern Pipeline CoP.O. BOX 1188, RM 3AC 3142Houston, Tx77251

Reviewed by:JMH Customer#: Job Number:

Attn: Robinson, George

ample Number: 94006990 roject Name: WT-1 SOIL PILE Sample ID: SP-5 GRAB . .

Time Collected:1135

Date Received: 10/06/94

Date Collected:10/05/94

Test Code	e Analyte	Result	Units	Method	Analyst	
LAB'NAME	TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon Analyses subcontracted to: Date subcontracted:	10/11 1300 4400 Chemcoast 10/11 1200	init. ppm	6-3550 2-418.1	WJW WJW JMH JMH	
OMMENTS						

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil)

init = date & time initiated BRL = Below Reporting Limit

- 1. ASTM: American Society for Testing and Materials, 1984.
- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).
- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Lev 10113/asp Sarry Osthelow

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994

Page # 1

'ransweste	ern Pipeline Co		Reviewed by:JMH
P.O. BOX 1	.188, RM 3AC 31	42	Customer#:
Houston	, Tx	77251	Job Number:

Attn: Robinson, George

Sample Number: 94006991 Project Name: WT-1 SOIL PILE Sample ID: SP-6R GRAB Date Collected:10/05/94

Time Collected:1155

Date Received: 10/06/94

Test Code	Analyte	Result	Units	Method	Analyst
'PH'S AB'NAME	TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon Analyses subcontracted to: Date subcontracted:	•	init. ppm	6-3550 2-418.1	WJW WJW JMH JMH
COMMENTS:					

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

- 1. ASTM: American Society for Testing and Materials, 1984.
- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).
- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

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#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994

Pranswestern Pipeline CoP.O. BOX 1188, RM 3AC 3142Houston, Tx77251

Page # 1

Reviewed by:JMH Customer#: Job Number:

ttn: Robinson, George

Sample Number: 94006992 Project Name: WT-1 SOIL PILE Sample ID: SP-7R GRAB Date Collected:10/05/94

Time Collected:1200

Date Received: 10/06/94

	Test Code	e Analyte	Result	Units	Method	Analyst
	rph's Lab'NAME	TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon Analyses subcontracted to: Date subcontracted:		init. ppm	6-3550 2-418.1	WJW WJW JMH JMH
1						

COMMENTS:

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

- 1. ASTM: American Society for Testing and Materials, 1984.
- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).
- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Jacup Dillam

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994 Page # 1 Franswestern Pipeline Co Reviewed by: JMH P.O. BOX 1188, RM 3AC 3142 Customer#: 77251 Job Number: Houston , Tx Attn: Robinson, George Date Collected:10/05/94 Sample Number: 94006993 Time Collected:1210 Project Name: WT-1 SOIL PILE Sample ID: SP-8 GRAB Date Received: 10/06/94 Test Code Units Method Analyst Result Analyte 418\_1S'DTPH Analysis Prep(Date/Time)10/11 1300init.6-3550WJWTPH'STPH(Total Petroleum Hydrocarbon 3600ppm2-418.1WJWLAB'NAMEAnalyses subcontracted to:ChemcoastJMHSUBCON'DDate subcontracted:10/11 1200JMH SUBCON'D Date subcontracted: 10/11 1200 JMH COMMENTS:

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

Preparation and Analysis Method References:

- 1. ASTM: American Society for Testing and Materials, 1984.
- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).
- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

A .

ferry William

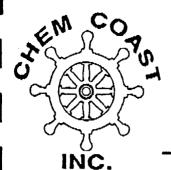
#### QUALITY CONTROL REPORT

Report To: Transwestern Pipeline Terra Laboratories Sample No(s). 94006986 - 94006993

				Precision		Accu	racy
Analyte	<u>Units</u>	<u>Blank</u>	Orig	Dup	<u>RPD(%)</u>	<u>MSR(%)</u>	LCSR(%)
<b>TPH (Batch 101194</b> ) Sample No. 94006995	,	< 5	189	199	5.2		93

Sarry Ostellar

Terra Laboratories, Ltd.





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INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

NENDER OF A.S.T H. 2.3 O A UO.P. U.S.P

P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

#### CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-6986

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

#### ANALYSIS

TEST	INITIALS	RESULTS
BENZENE, PPB	JG/TB	LESS THAN 10
TOLUENE, PPB	JG/TB	LESS THAN 10
ETHYLENE BENZENE, PPB	JG/TB	LESS THAN 10
XYLENES, PPB	JG/TB	LESS THAN 10
	TOLUENE, PPB ETHYLENE BENZENE, PPB	TOLUENE, PPB JG/TB ETHYLENE BENZENE, PPB JG/TB XYLENES, PPB JG/TB

Ma CHEM COAST INCORPORATED





INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

MEMBER OF A.S.T.M. AOCS. U Q.P. U.S.P

P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

#### CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-6987

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

ANALYSIS

METHOD	TEST	INITIALS	RESULTS
SW 846			
8020	BENZENE, PPB	JG/TB	LESS THAN 10
SW 846			
8020	TOLUENE, PPB	JG/TB	LESS THAN 10
SW 846			
8020	ETHYLENE BENZENE, PPB	JG/TB	LESS THAN 10
A17 0 ( C		•	
SW 846 8020			
8020	XYLENES, PPB	JG/TB	LESS THAN 10
BROMO FLUOR	O BENZENE (SURR) 🛛 💲 RECOVER	RY = 90.26	

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INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

HENDER OF A.S.T N A O C.S. U O.P. U.S.P P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

,

#### CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-6988

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

ANALYSIS METHOD TEST INITIALS RESULTS SW 846 8020 BENZENE, PPB JG/TB LESS THAN 10 SW 846 8020 TOLUENE, PPB JG/TB LESS THAN 10 SW 846 8020 ETHYLENE BENZENE, PPB JG/TB LESS THAN 10 SW 846 8020 XYLENES, PPB JG/TB LESS THAN 10 BROMO FLUORO BENZENE (SURR) RECOVERY = 97.20

CHÈM<sup>2</sup> COAST INCORPORATED





Ø015

INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

MEMBER OF A.S.T M. A O C.S. U O.P. V S.P

P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

#### CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-6989

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

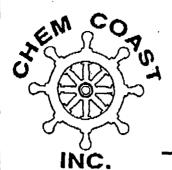
SAMPLING: SUBMITTED

#### ANALYSIS

Method	TEST	INITIALS	RESULTS
SW 846			
8020	BENZENE, PPB	JG/TB	LESS THAN 10
SW 846			
8020	Toluene, PPB	JG/TB	LESS THAN 10
SW 846			
8020	ETHYLENE BENZENE, PPB	JG/TB	LESS THAN 10
SW 846			
8020	XYLENES, PPB	JG/TB	LESS THAN 10

BROMO FLUORO BENZENE (SURR) % RECOVERY = <u>108.1</u>

COAST INCORPORATED





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INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

Nember of A.5 T N. A 0 C.5. U 0.P. U.5 P P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

#### CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-6990

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

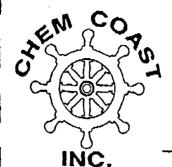
#### ANALYSIS

METHOD	TEST	INITIALS	RESULTS
SW 846			
8020	BENZENE, PPB	JG/TB	11.8
SW 846			
8020	TOLUENE, PPB	JG/TB	64.1
SW 846			
8020	ETHYLENE BENZENE, PPB	JG/TB	35.5
SW 846			
8020	XYLENES, PPB	JG/TB	284.5
	•	•	

BROMO FLUORO BENZENE (SURR) % RECOVERY = 93.00

Dana CHEM COAST INCORPORATED

CHEM COAST INC.  $\rightarrow \rightarrow \rightarrow$  TERRA LAB



## CHEM COAST LABORATORY



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INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

MEMBER OF A.STN. A O C.S. UOP. U.S.P

P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

#### CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-6991

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

#### ANALYSIS

METHOD	TEST	INITIALS	RESULTS
SW 846			
8020	BENZENE, PPB	JG/TB	LESS THAN 10
SW 846			
8020	TOLUENE, PPB	JG/TB	LESS THAN 10
SW 846			
8020	ETHYLENE BENZENE, PPB	JG/TB	LESS THAN 10
SW 846			
8020	XYLENES, PPB	JG/TB	LESS THAN 10

BROMO FLUORO BENZENE (SURR) % RECOVERY = 107.94

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Ø018

INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

MEMBER OF ASTN. A & C.S. U Ø P. U.S.P

P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

### CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-6992

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

ANALYSIS METHOD TEST INITIALS RESULTS SW 846 8020 BENZENE, PPB JG/TB 28.7 SW 846 8020 TOLUENE, PPB JG/TB 26.3 SW 846 8020 ETHYLENE BENZENE, PPB JG/TB LESS THAN 10 SW 846 8020 XYLENES, PPB JG/TB 118.4

BROMO FLUORO BENZENE (SURR) RECOVERY = 106.0

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#### 10/13/94 09:43 3713 470 8711

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# CHEM COAST LABORATORY



Ø019

INDEPENDENT CUSTOMS APPROVED LABORATORY. PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

MEMBER OF A.S.T.M A 0 C.S. VO.P. U.S.P

P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

## CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-6993

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

### ANALYSIS

METHOD	TEST	TITUTITATO	
		INITIALS	RESULTS
SW 846			
8020	BENZENE, PPB	JG/TB	LESS THAN 10
	·	00/10	DESS TRAN IU
SW 846			
8020	TOLUENE, PPB	JG/TB	LESS THAN 10
	·	00/10	TESS THAN IN
SW 846			
B020	ETHYLENE BENZENE, PPB	JG/TB	LESS THAN 10
	•		TUSS THAN TO
SW 846			
3020	XYLENES, PPB	JG/TB	LESS THAN 10
	•	/-4	THE THE
BROMO FLUOR	O BENZENE (SURR) * RECOVERY	= 97.64	

non CHEM COAST INCORPORATED

10/13/94 10:00 2713 470 8711

C713 470 8711 CHEM COAST INC.  $\rightarrow \rightarrow \rightarrow$  TERRA LAB

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## CHEM COAST LABORATORY



INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

MEMBER OF A.S.T.M A.O.C.S. U.O.P. U.S.P P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338 713-470-8710 FAX: 713-470-8711 TLX: 765468

## QUALITY ASSURANCE/QUALITY CONTROL

ANALYZED DATE: 10/12/94

SAMPLE ID: L-4131-4

INITIALS: JG/TB

CUSTOMER: TERRA LABORATORIES

CUSTOMER SAMPLE ID: 94-7001

PARAMETERS	BLANK	SPIK VALU ORIGINAL		SPIKE RECOVERY %	SAMPLE ORIGINAL	SAMPLE DUPLICATE	<pre>%DEV. DUP.</pre>
BFB (SURR)		20	18.9	94.50	21.4	20.8	2.84
BENZENE	0	20	18.8	94.00	18.4	18.7	1.62
TOLUENE	0	20	18.3	91.50	19.2	18.6	3.17
ETHYL BENZENE	0	20	19.2	96.00	20.1	20.9	3.90
XYLENES	0	30	29.7	99.00	30.5	30.1	1.32

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INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

МЕМВСК ОР А.S.T.M А.O.C.S. U.D.P. U.S.P

INC.

P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

QUALITY ASSURANCE/QUALITY CONTROL

ANALYZED DATE: 10/12/94

SAMPLE ID: L-4131-4

CUSTOMER: TERRA LABORATORIES

INITIALS: JG/TB

CUSTOMER SAMPLE ID: 94-6988

PARAMETERS	BLANK	SPIK VALU ORIGINAL	1	SPIKE RECOVERY %	SAMPLE ORIGINAL	SAMPLE DUPLICATE	\$DEV. DUP.
BFB (SURR)		20	19.8	99.00	21.2	20.5	3.36
BENZENE	0	20	20.1	100.50	19.0	19.0	0
TOLUENE	0	20	20.7	103.50	18.2	18.9	3.77
ethyl Benzene	0	20	20.5	102.50	19.3	18.4	5.84
XYLENES	0	30	30.1	100.33	30.3	31.0	2.28

				STATE ZP	FAX	P.O.#	Release #						/ / TERRA SAMPLE NO.	981-6986	741-6987	94-6988 88 K		2M 069 - 28- 200 MZ		94/-6992	94-6993	10 ann da	10-6-44	5 4	120	
					HOVE	P. le		DUESTED					111										.euli -	00:11	Time:	Time:
	REMIT TO:	we				50!1	211-2	ANALYSES REQUESTED					7777						-					10-694		Date:
CHAIN OF CUSTODY		3	ÆSS C	STATETX 2P 77251	ATTN ATTN ATTN			A					SAMPLE DESCRIPTION	SP-1 - 11/4	58-2-	5P-3 ~ 11/1/1	SP-4 / //////////////////////////////////	SP-51 11/1 1	SP-6R1 114	5P-7R- 11/1	59 - 8 -		Date: Time: notaver of talla.	15/94 12:15	Date: Time: Received by:	Date: Received by:
	REPORT	COMPANY Transmester P.	ESS P.O.	CITY HOUS Fac	ATTN GPOSTAL POINSON	Client Comments.)			0	0 1	 5 æ <	24HR	MATRIX	1:30 5/94 11:30 50%	11 ) ] 02:11				11:55	ani	1 12:10			12 a Blue	Halinquest better:	Reinquished by:

Fax: (713) 334-3116 TERRA LABORATORIES LTD. League City, Texas 77573 (713) 334-5052 Fax

2525 South Shore Blvd.

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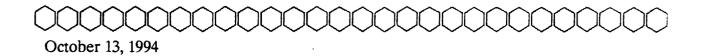
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## Terra Laboratories, Ltd.

Quality Analytical Services



George Robinson Transwestern Pipeline PO Box 1188, Rm. 3Ac3142 Houston, TX 77251

Re: Eight (8) solid samples (Project Name: WT-1 Landfarm) received on 10/06/94

Dear Mr. Robinson:

Attached are the final reports of analysis of the samples referenced above as per your analysis and/or method requests. The analysis for BTEX was subcontracted to Chem Coast Laboratory.

The samples were received in good condition and at 12<sup>o</sup> Centigrade.

We appreciate this opportunity to serve Transwestern Pipeline. Please let me, or Linda McKee, know if there is any other way we can help you.

Sincerely,

Larry D. Wallace Laboratory Director

2525 South Shore Blvd. League City, Texas 77573 (713) 334-5052 Fax: (713) 334-3116

#### LAB ANALYSIS REPORT

Report Dat	ce: OCT. 13 1994			]	Page # 1		
P.O. BOX 1	ern Pipeline Co 1188, RM <sup>.</sup> 3AC 3142 , Tx	77251		Custo	ewed by:JM omer#: Number:	ſH	
Attn: Robi	inson, George			Date	Collected	l:10/05/9	4
	nber: 94006994 ame: WT-1 LANDFARM			Time	Collected	l:1000	
	: LF-1 GRAB			Date	Received:	10/06/9	4
Test Code	e Analyte	2	Result		Units	Method	Analyst
TPH'S LAB'NAME	TPH Analysis Prep TPH(Total Petroleu Analyses subcontra Date subcontracted	IM Hydrocarbon acted to:	350	] st		6-3550 2-418.1	
COMMENTS :							

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

- 1. ASTM: American Society for Testing and Materials, 1984.
- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).
- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Ju 10/13/94 Jany alle

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994 Page # 1 **Franswestern** Pipeline Co Reviewed by: JMH P.O. BOX 1188, RM 3AC 3142 Customer#: Job Number: Houston , Tx 77251 Attn: Robinson, George Date Collected:10/05/94 Sample Number: 94006995 Time Collected:1000 Project Name: WT-1 LANDFARM Date Received: 10/06/94 Sample ID: LF-2 GRAB Result Units Method Analyst Test Code Analyte Result Units Method Analyst 418\_1S'D TPH Analysis Prep(Date/Time) 10/11 1300 init. 6-3550 WJW TPH'S TPH(Total Petroleum Hydrocarbon 200 ppm 2-418.1 WJW 

COMMENTS:

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

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- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

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#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994

ttn: Robinson, George

Sample Number: 94006996 Project Name: WT-1 LANDFARM

Sample ID: LF-3 GRAB

Page # 1

Trans	swest	ern P	ipel	line	Co		
P.O.	BOX	1188,	RM	3AC	3142		
Houst	on		, T2	c		77251	

Reviewed by:JMH Customer#: Job Number:

Date Collected:10/05/94

Time Collected:1000

Date Received: 10/06/94

Test Code	e Analyte	Result	Units	Method	Analyst
rph's Lab'name	TPH(Total Petroleum Hydrocarbon Analyses subcontracted to:	10/11 1400 110 Chemcoast 10/11 1200	init. ppm	6-3550 2-418.1	WJW WJW JMH JMH
COMMENTS					

COMMENTS:

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

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- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
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- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

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#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994	Page # 1
Franswestern Pipeline Co P.O. BOX 1188, RM 3AC 3142 Houston , Tx 77251	Reviewed by:JMH Customer#: Job Number:
ttn: Robinson, George	Date Collected:10/05/94
Sample Number: 94006997 Project Name: WT-1 LANDFARM Sample ID: LF-4 GRAB	Time Collected:1000 Date Received: 10/06/94
Test Code Analyte	Result Units Method Analyst
418_1S'D TPH Analysis Prep(Date/Time PH'S TPH(Total Petroleum Hydroc	·
COMMENTS:	

COOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

- 1. ASTM: American Society for Testing and Materials, 1984.
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- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Kw 10/13/94 Jany Dalle

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994			Pa	age # 1		
Franswestern Pipeline Co D.O. BOX 1188, RM 3AC 3142 Houston , Tx	77251		Custor	wed by:JM mer#: umber:	ĨH	
ttn: Robinson, George			Date (	Collected	l:10/05/9	94
Sample Number: 94006998 Project Name: WT-1 LANDFARM	n		Time (	Collected	l:1000	
Sample ID: LF-5 GRAB	1		Date I	Received:	10/06/9	94
Test Code Analyt	.e	Result	Ţ	Units	Method	Analyst
418_1S'D TPH Analysis Prep TPH'S TPH(Total Petrole AB'NAME Analyses subcontr SUBCON'D Date subcontracte	eum Hydrocarbon cacted to:	150	PI		6-3550 2-418.1	
COMMENTS :						

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

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- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
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- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Kei 10/13/ap Harry astallan

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994

Page # 1

Franswestern Pipeline Co P.O. BOX 1188, RM 3AC 3142	77251	Reviewed by:JMH Customer#: Job Number:
Houston , Tx Attn: Robinson, George	//251	Date Collected:10/05/94

Sample Number: 94006999 Project Name: WT-1 LANDFARM Sample ID: LF-6 GRAB Time Collected:1000

Date Received: 10/06/94

Test Code	e Analyte	Result	Units	Method	Analyst
	TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon		init. ppm	6-3550 2-418.1	
COMMENTS:					

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

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- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Farry addition

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994

Page # 1

77251	Cust	omer#:	1H	
	Date	e Collected	<b>1:</b> 10/05/9	4
	Time	e Collected	<b>1:</b> 1000	
	Date	Received:	: 10/06/9	4
e	Result	Units	Method	Analyst
um Hydrocarbon 6 acted to: C	20 Themcoast		6-3550 2-418.1	WJW WJW JMH JMH
	e (Date/Time) 1 um Hydrocarbon 6 acted to: 0	77251 Cust Job Date Time Date (Date/Time) 10/11 1400 um Hydrocarbon 620 acted to: Chemcoast	77251 Customer#: Job Number: Date Collected Time Collected Date Received e Result Units (Date/Time) 10/11 1400 init. um Hydrocarbon 620 ppm acted to: Chemcoast	77251Job Number:Date Collected:10/05/9Time Collected:1000Date Received: 10/06/9eResultUnitsMethod(Date/Time)10/11 1400init.6-3550um Hydrocarbon 620ppmacted to:Chemcoast

COMMENTS:

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

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Kud 10/13/201 Jaryy Darthelan

#### LAB ANALYSIS REPORT

Report Date: OCT. 13 1994

Page # 1

Franswestern Pipeline Co P.O. BOX 1188, RM 3AC 3142 Houston , Tx 77251

Attn: Robinson, George

Sample Number: 94007001 Project Name: WT-1 LANDFARM Sample ID: LF-8 GRAB Reviewed by:JMH Customer#: Job Number:

Date Collected:10/05/94

Time Collected:1000

Date Received: 10/06/94

Test Code	Analyte	Result	Units	Method	Analyst
	TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon		init. ppm	6-3550 2-418.1	

COMMENTS:

FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated BRL = Below Reporting Limit

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- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Kin 10117/94 Harry Olla

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A.S.T M.

A O C.S.

UO.P.

U.S.P

## CHEM COAST LABORATORY



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INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

### CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-6994

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

ANALYSIS METHOD TEST INITIALS RESULTS SW 846 8020 BENZENE, PPB JG/TB LESS THAN 10 SW 846 8020 TOLUENE, PPB JG/TB LESS THAN 10 SW 846 8020 ETHYLENE BENZENE, PPB JG/TB LESS THAN 10 SW 846 8020 XYLENES, PPB JG/TB LESS THAN 10 BROMO FLUORO BENZENE (SURR) % RECOVERY = <u>99,68</u>

INCORPORATED COAST っぺ

10/13/94	09:55	<b>3</b> 713	470	8711
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# CHEM COAST LABORATORY



INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

### CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-6996

C

INC.

MEMOER OF

A.STM

A 0 C.S.

U O.P. U.S P

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

ANALYSIS

METHOD	TEST	INITIALS	RESULTS
SW 846 8020	BENZENE, PPB	JC/TB	LESS THAN 10
SW 846 8020	TOLUENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	ETHYLENE BENZENE, PPB	JG/TB	LESS THAN 10
SW 846 8020	XYLENES, PPB	JG/TB	LESS THAN 10

Densi. Opproc

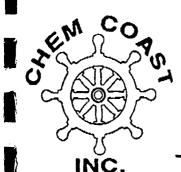
KEN CO	CHEM CO	AST LABORAI	ORY
J. J. J.	PETROLEUM ANALYSIS - WATE	TOMS APPROVED LA R ANALYSIS - INSTR ETROCHEMICAL ANA	UMENTATION ANALYSIS
INC. MEMBER OF A 5 T M A 0 C.S. U 0.P. U.S.P	P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338		713-470-8710 FAX: 713-470-8711 TLX: 765468
	CERTIFICATE C L-413		
SAMPLE DATE	: 10/11/94		
MARKINGS: 9	6-6998		
-	ERRA LABORATORIES		
CUSTOMER: T.	ERRA LABORATORIES WASTE SOLID		
CUSTOMER: T	ERRA LABORATORIES WASTE SOLID		
CUSTOMER: T. COMMODITY: N	ERRA LABORATORIES WASTE SOLID	SIS	
CUSTOMER: T. COMMODITY: N	ERRA LABORATORIES WASTE SOLID UBMITTED	SIS	RESULTS
CUSTOMER: T COMMODITY: N SAMPLING: SN	ERRA LABORATORIES WASTE SOLID UBMITTED ANALYS		RESULTS LESS THAN 10
CUSTOMER: T COMMODITY: N SAMPLING: SN METHOD SW 846	ERRA LABORATORIES WASTE SOLID UBMITTED ANALY: TEST	INITIALS	
CUSTOMER: T COMMODITY: N SAMPLING: SN METHOD SW 846 8020 SW 846	ERRA LABORATORIES WASTE SOLID UBMITTED ANALY: TEST BENZENE, PPB	INITIALS JG/TB	LESS THAN 10

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10/13/94 09:57 **3**7<u>13</u>470 8711

CHEM COAST INC.  $\rightarrow \rightarrow \rightarrow$  TERRA LAB

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## CHEM COAST LABORATORY



INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

HENBER OF A S.T H. A O C.S. U O.P. U.S.P

P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

## CERTIFICATE OF ANALYSIS L-4131-4

SAMPLE DATE: 10/11/94

MARKINGS: 96-7000

CUSTOMER: TERRA LABORATORIES

COMMODITY: WASTE SOLID

SAMPLING: SUBMITTED

#### ANALYSIS

METHOD	TEST	INITIALS	RESULTS
SW 846			
8020	BENZENE, PPB	JG/TB	LESS THAN 10
SW 846			
8020	TOLUENE, PPB	JG/TB	LESS THAN 10
SW 846			
8020	ETHYLENE BENZENE, PPB	JG/TB	LESS THAN 10
SW 846			
8020	XYLENES, PPB	JG/TB	LESS THAN 10

BROMO FLUORO BENZENE (SURR) % RECOVERY = <u>108.0</u>

TIEN CALCE THOODODAMED

C13 470 8711 CHEM COAST INC.  $\rightarrow \rightarrow \rightarrow$  TERRA LAB

Ø012/013



MEMBER OF

A.S.T.M

AOCS UOP. USP

# CHEM COAST LABORATORY



INDEPENDENT CUSTOMS APPROVED LABORATORY PETROLEUM ANALYSIS - WATER ANALYSIS - INSTRUMENTATION ANALYSIS CHEMICAL/PETROCHEMICAL ANALYSIS

P.O. Box 1338 11820 North H Street La Porte, Tx. USA 77572-1338

713-470-8710 FAX: 713-470-8711 TLX: 765468

## QUALITY ASSURANCE/QUALITY CONTROL

ANALYZED DATE: 10/12/94

SAMPLE ID: L-4131-4

INITIALS: JG/TB

CUSTOMER: TERRA LABORATORIES

CUSTOMER SAMPLE ID: 94-7001

	PARAMETERS	BLANK	SPIK VALU ORIGINAL	1	SPIKE RECOVERY %	SAMPLE ORIGINAL	SAMPLE DUPLICATE	<pre>%DEV. DUP.</pre>
_	BFB (SURR)		20	18.9	94.50	21.4	20.8	2.84
	BENZENE	0	20	18.8	94.00	18.4	18.7	1.62
Î	TOLUENE	0	20	18.3	91.50	19.2	18.6	3.17
	ETHYL BENZENE	0	20	19.2	96.00	20.1	20.9	3.90
ļ	XYLENES	0	30	29.7	99.00	30.5	30.1	1.32

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CHEM COAST INCORPORATED

10/13/94	10:01	<b>3</b> 713 470 87	11	CHEM COAST INC	. →→→ TERRA L	AB Ø	013/013
EN CO	D PET	INE ROLEUM AN	) EPENDENT ALYSIS - W	CUSTOMS APPRO ATER ANALYSIS	OVED LABORA - INSTRUMEN	TORY	
INC. MENDER OF A.STM A D C S. U O.P. U.S.P	La	P.O. Box 11820 North Porte, Tx. US	H Street A 77572-1338			713-470-871 FAX: 713-470- TLX: 76546	8711
		QUALITY	Y ASSURAN	CE/QUALITY CO	1111012		
ANALYZED DAT	E: 10/12	2/94		SAMPLE	ID: L-4131-	-4	
INITIALS: JG				CUSTOME	R: TERRA L	BORATORIES	5
CUSTOMER SAM	PLE ID:	94-6988					
PARAMETERS	BLANK	SPIK VALU ORIGINAL	(	SPIKE RECOVERY %	SAMPLE ORIGINAL	SAMPLE DUPLICATE	<pre>\$DEV. DUP.</pre>
BFB (SURR)		20	19.8	99.00	21.2	20.5	3.36
BENZENE	0	20	20.1	100.50	19.0	19.0	0
TOLUENE	0	20	20.7	103.50	18.2	18.9	3.77
ETHYL BENZENE	0	20	20.5	102.50	19.3	18.4	5.84
XYLENES	0	30	30.1	100.33	30.3	31.0	2.28

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## QUALITY CONTROL REPORT

Report To: Transwestern Pipeline Terra Laboratories Sample No(s). 94006994 - 94007001

			P	recision		Accu	racy
Analyte	<u>Units</u>	<u>Blank</u>	Orig	Dup	<u>RPD(%)</u>	<u>MSR(%)</u>	LCSR(%)
<b>TPH (Batch A10119</b> Sample No. 94007006		< 5	< 1	< 1	-		95

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Terra Laboratories, Ltd.

334-3116	ле С . STATE Д/Н В 56 15 2022 НА P.O.#
D. Fax: (713) 334-3116	The Line
LABORATORIES LTD. hy, Texas 77573 (713) 334-5052 HAIN OF CUSTODY	
LABORATORI City, Texas 77573 (C	ADDRESS ADDRES
TERRA LA League City, Texe CHAIN	DESCRIPTION The manual price of the price o
	Relive Co. Relive Co. Fruis 3/ Fruis 3/ SAMPLE DESCRIP SAMPLE DESCRIP SAMPLE DESCRIP Date: Time: Date: Time: Date: Time: Date: Time:
2525 South Shore Blvd.	
	Company Trans. 1.1.25

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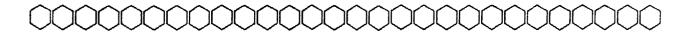
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## Terra Laboratories, Ltd.

Quality Analytical Services



December 20, 1994

James Robinson Cypress Engineering 16300 Katy Freeway, Suite 105 Houston, TX 77094

Re: Six (6) solid samples (Project Name: TPC WT-1 Pit) received on 12/12/94

Dear Mr. Robinson:

Attached are the final reports of analysis of samples referenced above as per your analysis and/or method requests.

The sample were received in good condition and at  $0^{\circ}$  Centigrade.

We appreciate this opportunity to serve Cypress Engineering. Please let me, or Linda McKee, know if there is any other way we can help you.

Sincerely,

any

Larry Ď. Wallace Laboratory Director

### LAB ANALYSIS REPORT

Report Date: DEC. 19 1994	Page # 1					
ypress Engineering 16300 Katy Frwy, Ste 105 Houston , Tx 77094	Reviewed by:TMG Customer#: Job Number:					
Attn: Robinson, James	Date Collected:12/11/94					
ample Number: 94008742	Time Collected:1400					
Froject Name: TPC WT-1 PIT Sample ID: EE-1-S	Date Received: 12/12/94					
Test Code Analyte	Result Units Method Analyst					
YLSTLS Total Xylenes TEXTLS Total BTEX aaaTFTS aaa-TFT (surr) ABFBS 4-BFB (surr) 18_1S'D TPH Analysis Prep(Date/Time) TPH'S TPH(Total Petroleum Hydrocarbon COMMENTS: FOOTNOTES: MI - Surrogate recovery is not Dil.Fx Minimum dilution requir ppm = mg/L(Liquid), mg/kg(Solid	<pre>&lt; 0.005 ppm 6-8020 NSH &lt; 0.005 ppm 6-8020 NSH &lt; 0.005 ppm 6-8020 NSH &lt; 0.010 ppm 6-8020 NSH &lt; 0.025 ppm 6-8020 NSH 97. % 74-121 NSH 95. % 75-115 NSH 12/16 1145 init. 6-3550 MLC 970 ppm 2-418.1 MLC</pre>					
<ul> <li>reparation and Analysis Method References:</li> <li>1. ASTM: American Society for Testing and Materials, 1984.</li> <li>2. EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).</li> <li>3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal &amp; Industrial Wastewater, 1982.</li> <li>4. HACH: Test Methods, accepted by EPA in November, 1983.</li> <li>5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.</li> <li>6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.</li> </ul>						

Rew 12/19/94 Jany Dillace

#### LAB ANALYSIS REPORT

Report Date: DEC. 19 1994 Page # 1 ypress Engineering Reviewed by: TMG 16300 Katy Frwy. Ste 105 Customer#: louston 77094 Job Number: , TX Attn: Robinson, James Date Collected:12/11/94 Time Collected:1400 ample Number: 94008743 roject Name: TPC WT-1 PIT Sample ID: EE-2-N Date Received: 12/12/94 Test Code Analyte Result Units Method Analyst - 

 12/15
 1640
 init.
 6-5030

 < 0.005</td>
 ppm
 6-8020

 < 0.005</td>
 ppm
 6-8020

 < 0.005</td>
 ppm
 6-8020

 < 0.005</td>
 ppm
 6-8020

 < 0.010</td>
 ppm
 6-8020

 < 0.025</td>
 ppm
 6-8020

 97.
 %
 74-121

 96.
 %
 75-115

 12/16
 1145
 init

 TEXS'D BTEX Analysis Prep(Date/Time) Z8020S Benzene NSH NSH TOL8020S Toluene NSH EBZ8020S Ethylbenzene YLSTLs Total Xylenes NSH NSH TEXTLS Total BTEX NSH aaaTFTs aaa-TFT (surr) NSH 4-BFB (surr) BFBs NSH 18\_1S'D TPH Analysis Prep(Date/Time) 12/16 1145 init. 6-3550 MLC TPH'S TPH(Total Petroleum Hydrocarbon < 25 ppm 2-418.1 MLC IOMMENTS: FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dil.Fx.- Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated B=found in blank J=>mdl< reporting limit reparation and Analysis Method References: ASTM: American Society for Testing and Materials, 1984. EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 2. 1978 (revised 1983). EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal 3. & Industrial Wastewater, 1982. HACH: Test Methods, accepted by EPA in November, 1983. SM: Standard Methods for the Examination of Water and Wastewater, 18th 5. edition. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992. Keny Willer

### LAB ANALYSIS REPORT

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Report Date: DEC. 19 1994	Page # 1				
ypress Engineering 16300 Katy Fwy., Ste 105 Houston , Tx 77094	Reviewed by:TMG Customer#: Job Number:				
attn: Robinson, James	Date Collected:12/11/94				
ample Number: 94008744	Time Collected:1400				
roject Name: TPC WT-1 PIT Sample ID: EN-1-E	Date Received: 12/12/94				
Test Code Analyte	Result Units Method Analyst				
<pre>OL8020S Toluene EBZ8020S Ethylbenzene YYLSTLs Total Xylenes TEXTLS Total BTEX aaaTFTs aaa-TFT (surr) 4BFBs 4-BFB (surr) 18_1S'D TPH Analysis Prep(Date/Time) TPH'S TPH(Total Petroleum Hydrocarbon FOOTNOTES: MI - Surrogate recovery is not Dil.Fx Minimum dilution requir ppm = mg/L(Liquid), mg/kg(Solid)</pre>	<pre>&lt; 0.005 ppm 6-8020 NSH &lt; 0.005 ppm 6-8020 NSH &lt; 0.005 ppm 6-8020 NSH .026 ppm 6-8020 NSH &lt; 0.041 ppm 6-8020 NSH 99. % 74-121 NSH 103. % 75-115 NSH 12/16 1145 init. 6-3550 MLC &lt; 25 ppm 2-418.1 MLC</pre>				
reparation and Analysis Method References	3:				
<ol> <li>ASTM: American Society for Testing and Materials, 1984.</li> <li>EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).</li> <li>EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal &amp; Industrial Wastewater, 1982.</li> <li>HACH: Test Methods, accepted by EPA in November, 1983.</li> <li>SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.</li> <li>SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.</li> </ol>					
	Rev 12/19/94 Larry Duble				

#### LAB ANALYSIS REPORT

Report Date: DEC. 16 1994 Page # 1 ypress Engineering Reviewed by: JMH 16300 Katy Fwy., Ste 105 Customer#: Houston , Tx 77094 Job Number: Attn: Robinson, James Date Collected:12/11/94 ample Number: 94008813 Time Collected:1400 roject Name: TPC WT-1 PIT Sample ID: EN-2-W Date Received: 12/12/94 Result Test Code Analyte Units Method Analyst ------\_\_\_\_\_ BTEXS'D BTEX Analysis Prep(Date/Time) 12/15 1818 init. 6-5030 NSH 

 BTEXS'D
 BTEX Analysis Prep(Date/Time)
 12/15 1818
 init.
 6-5030
 NSH

 Z8020S
 Benzene
 < 0.005</td>
 ppm
 6-8020
 NSH

 FOL8020S
 Toluene
 < 0.005</td>
 ppm
 6-8020
 NSH

 EBZ8020S
 Ethylbenzene
 < 0.005</td>
 ppm
 6-8020
 NSH

 IYLSTLs
 Total Xylenes
 < 0.010</td>
 ppm
 6-8020
 NSH

 IYLSTLs
 Total BTEX
 < 0.025</td>
 ppm
 6-8020
 NSH

 ITEXTLs
 Total BTEX
 < 0.025</td>
 ppm
 6-8020
 NSH

 AaaTFTs
 aaa-TFT (surr)
 104.
 %
 74-121
 NSH

 4BFBs
 4-BFB (surr)
 102.
 %
 75-115
 NSH

 18\_1S'D
 TPH Analysis Prep(Date/Time)
 12/14 1330
 init.
 6-3550
 MLC

 TPH'S
 TPH(Total Petroleum Hydrocarbon 15
 ppm
 2-418.1
 MLC

 28020S Benzene OL8020S Toluene EBZ8020S Ethylbenzene IYLSTLS Total Xylenes TEXTLS Total BTEX aaaTFTS aaa-TFT (surr) 4BFBS 4-BFB (surr) OMMENTS: FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dil.Fx. - Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated B=found in blank J=>mdl< reporting limit reparation and Analysis Method References: ASTM: American Society for Testing and Materials, 1984. 1. EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 2. 1978 (revised 1983). 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982. HACH: Test Methods, accepted by EPA in November, 1983. 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992. Larry Oshiller

#### LAB ANALYSIS REPORT

Report Date: DEC. 19 1994 Page # 1 ypress Engineering Reviewed by: TMG 16300 Katy Fwy., Ste 105 Customer#: Houston , Tx 77094 Job Number: ttn: Robinson, James Date Collected:12/11/94 ample Number: 94008814 Time Collected: 1400 roject Name: TPC WT-1 PIT Date Received: 12/12/94 Sample ID: EB-1-E Result Units Method Analyst Test Code Analyte 

 BTEXS'D
 BTEX Analysis Prep(Date/Time)
 12/16 1628
 init.
 6-5030
 NSH

 Z8020S
 Benzene
 < 0.4</td>
 ppm
 6-8020
 NSH

 FOL8020S
 Toluene
 < 0.4</td>
 ppm
 6-8020
 NSH

 FOL8020S
 Toluene
 < 0.4</td>
 ppm
 6-8020
 NSH

 EBZ8020S
 Ethylbenzene
 4.0
 ppm
 6-8020
 NSH

 YLSTLs
 Total Xylenes
 63
 ppm
 6-8020
 TMG

 STEXTLs
 Total BTEX
 < 67.8</td>
 ppm
 6-8020
 TMG

 aaaTFTs
 aaa-TFT (surr)
 108.
 %
 74-121
 NSH

 4BFBs
 4-BFB (surr)
 MI
 %
 75-115
 NSH

 18\_1S'D
 TPH Analysis Prep(Date/Time)
 12/14 1330
 init.
 6-3550
 MLC

 TPH'S
 TPH(Total Petroleum Hydrocarbon 2600
 ppm
 2-418.1
 MLC

 BTEXS'D BTEX Analysis Prep(Date/Time) 12/16 1628 init. 6~5030 NSH OMMENTS: BTEX Dil.Fx. X 200 FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dil.Fx.- Minimum dilution required to allow acceptable quantitation ppm = mg/L(Liquid), mg/kg(Solid) ppb = ug/L(Liquid), ug/kg(Soil) init = date & time initiated B=found in blank J=>mdl< reporting limit reparation and Analysis Method References: 1. ASTM: American Society for Testing and Materials, 1984.

- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).
- 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Kw 12/19/24 Sarry Del Doer

### LAB ANALYSIS REPORT

Report Date: DEC. 16 1994	Page # 1					
Cypress Engineering 16300 Katy Fwy., Ste 105 Houston , Tx 77094	Reviewed by:JMH Customer#: Job Number:					
Attn: Robinson, James	Date Collected:12/11/94					
Sample Number: 94008815 Project Name: TPC WT-1 PIT	Time Collected:1400					
Sample ID: EB-2-N	Date Received: 12/12/94					
Test Code Analyte	Result Units Method Analyst					
<pre>FOL8020S Toluene EBZ8020S Ethylbenzene XYLSTLs Total Xylenes BTEXTLs Total BTEX aaaTFTs aaa-TFT (surr) 4BFBs 4-BFB (surr) 418_1S'D TPH Analysis Prep(Date/Time) TPH'S TPH(Total Petroleum Hydrocarbon COMMENTS: BTEX Dil. Factor X 5 FOOTNOTES: MI - Surrogate recovery is not Dil.Fx Minimum dilution requi ppm = mg/L(Liquid), mg/kg(Solid)</pre>	<pre>&lt; 0.010 ppm 6-8020 NSH &lt; 0.010 ppm 6-8020 NSH &lt; 0.010 ppm 6-8020 NSH .29 ppm 6-8020 JMH &lt; 0.32 ppm 6-8020 JMH 93. % 74-121 NSH 108. % 75-115 NSH 12/14 1330 init. 6-3550 MLC 1400 ppm 2-418.1 MLC</pre>					
<ul> <li>Preparation and Analysis Method References:</li> <li>1. ASTM: American Society for Testing and Materials, 1984.</li> <li>2. EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983).</li> <li>3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal &amp; Industrial Wastewater, 1982.</li> <li>4. HACH: Test Methods, accepted by EPA in November, 1983.</li> <li>5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.</li> </ul>						
6. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.						

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## QUALITY CONTROL REPORT

## Report To: Cypress Engineering

Terra Laboratories Sample No(s). 94008742 - 94008744 & 94008813 - 94008815

				Precision		Accuracy						
Analyte	rte <u>Units</u> Blank		Orig	Dup	<u>RPD(%)</u>	<u>MSR(%)</u>	LCSR(%)					
BTEX (Batch 121594S) Sample No. 94008807 Spike												
MTBE	ppb	< 5	23	23	0	115						
Benzene	ppb	< 5	24	23	4	110	99					
Toluene	ppb	< 5	26	25	4	115	100					
Ethylbenzene	ppb	< 5	24	22	9	120	94					
Xylenes	ppb	< 10	87	77	12	122	101					
TPH (Batch 121694	S)											
Sample No. 94008870		< 25	< 25	< 25	-		99					
TPH (Batch 121494	S)											
Sample No. 94008696		< 25	< 25	< 25	-		91					
BTEX MEOH (Bate	:h 12169	4S) Blan	k Spike									
MTBE	ppb	< 5	17.64	19.85	11.8		88					
Benzene	ppb	< 5	19.92	20.55	3.1		100					
Toluene	ppb	< 5	20.25	20.58	1.6		101					
Ethylbenzene	ppb	< 5	20.29	20.71	2.0		101					
Xylenes	ppb	< 10	61.66	61.33	0.5		103					
1,3 DiCl2Bz	ppb	< 5	16.92	17.98	6.1		85					
1,4 DiCl2Bz	ppb	< 5	17.95	18.96	5.5		88					
1-2 DiCl2Bz	ppb	< 5	15.59	17.32	10.5		78					
BTEX MEOH (Bate	:h A121(	594S) Sai	mple No. 94	008814 Sr	oike							
Benzene	ppb	< 5	13	14	7	104	98					
Toluene	ppb	< 5	13	15	14	160*	102					
Ethylbenzene	ppb	< 5	20	23	14	24*	96					
Xylenes	ppb	< 10	168	191	13	147*	102					
1,3 DiCl2Bz	ppb	< 5	34	33	3.0	*						
1,4 DiCl2Bz	ppb	< 5	44	45	2.2	*						
1-2 DiCl2Bz	ppb	< 5	38	37	2.7	*						

\*Matrix Interference with Spike Recoveries; See MeOH Blank Spike and MeOH Blank Spike Dup ran same day.

Rew iz/21/94 Darry Willer

Terra Laboratories, Ltd.

FROM	PERCE	PTIV	E S	CIE	NT	IF		INS	TRU	ME	NTS,	, I	NC,				12	.12	2.19	994	0	Ø <b>:</b> 2:	9		NO.	1		P, 2	
334.3116				101115		FXX	P.O.#	Release #						TERRA SAMPLE NO.		874043	the state the	813 813	U	8-744-7815				Herriets BPC Tury	10 July 5 4				
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# **APPENDIX E**

## SOIL VAPOR EXTRACTION PILOT TEST

# AcuVac Remediation Report



November 25, 1994

9111 Katy Freeway Suite 303 Houston, TX 77024 (713) 468-6688: TEL (713) 468-6689: FAX

Mr Bob Marley Project Geologist Daniel B. Stephens & Associates, Inc. 6020 Academy NE, Ste 100 Albuquerque, NM 87109

Re: Pilot Test - Enron WT-1, DBS & A; Project #4230

Dear Bob:

November

Enclosed is the report on Pilot Testing performed October 20, 1994 at the above referenced location. The test was conducted using the AcuVac SVE I-6 System with various instrumentation including the HORIBA Analyzer.

#### Project Scope

• Connect the SVE System to wells MW-10, SVE-1, SVE-1MW and MW-2 as extraction wells (EW) and apply vacuum; record the vacuum and well flow and record all System data, including fuel flow (propane).

• The Test procedure is to provide variable rates of vacuum and flow over the test period.

• Install and observe the magnehelic gauges on the outer monitoring wells to determine if the selected extraction well is in vacuum communication with the outer monitoring wells.

• Take influent vapor samples to provide on-site HORIBA Analyzer data.

- Provide a method of sampling influent vapors with the flow through canisters.
- Measure the distances from the selected extraction wells to the outer wells.
- Operate the SVE System in a manner that all well vapors are passed through the engine to destruct the contaminants and exhausted to meet air emission standards.

• Complete the tests by providing a report consisting of operating and analytical data.

#### Fuel Use Information:

When the SVE System is running 100% on fuel from extraction well vapors at an altitude of 3,600 ft and the engine at 2,000 - 2,300 rpm, the maximum contaminated fuel destruction or burn rate is approximately 23.8 lbs/hr or 3.72 gals/hr of VOC contamination. During these tests, the wells vapors provided 29.0% of the fuel based on the calculations below.

### Fuel Use Calculations:

At 2,000 - 2,300 rpm and 44 BHP, the engine burns 6.08 gals propane/hr. Propane has 21,591 BTU/lb, and 4.24 lbs/gal. Total BTU = 21,591 x 6.08 x 4.24 = 556,833 BTU/hr. Gasoline = 149,520 BTU/gal. SVE Sys. max. contaminant consumption = 556,833 = 3.72 gals/hr. 149,520 Total engine hours = 10.0 hrs. Total gallons of propane burned = 43.0 gals = fuel for 7.07 hrs. Total gallons of contaminant vapors burned for 2.93 hrs = 10.9 gals. Gasoline weighs 6.38 lbs/gal. Total contaminant = 69.54 lbs = 6.95 lbs/hr (1.09 gals/hr) average for 10 hrs.

Summary of Data: See Exhibit A

Discussion of Data:

Prior to starting each test, all the SVE systems are checked for normal operation and each magnehelic gauge is checked and calibrated to "0". The propane tank is full so an accurate fuel consumption can be estimated for the total test time. Expandable well plugs are placed in the outer wells. Static well data is recorded on each outer well.

Test #1 was a 3.9 hour SVE test conducted from extraction well (EW) MW-10. The well is constructed from 2" schedule 80 PVC with TD of 62.60 ft and screened up 15 ft with sand pack, bentonite seal and grouted. DTGW at test time was 53.20 ft leaving a screened area above groundwater of 5.60 ft.

At the start of the test (0735 hours), the extraction well (EW) vacuum was set at 50" H<sub>2</sub>O with an initial flow of 10 cfm. Outer wells MW-9, 12 & 13 all recorded a pressure which was the static pressure data. Well MW-12 data was not included in the well data averaging since the vacuum was ineffective due to a large and deep excavation between EW and the well. HORIBA data indicated that the total HC was in the 15,500 ppm range with CO<sub>2</sub> at 2.82%. As the EW vacuum was increased to 60" H<sub>2</sub>O, a slight amount of surging on the EW vacuum gauge was noted. With all systems held constant, the EW vacuum increased to 80, 100 and +100" H<sub>2</sub>O indicating the screened area was probably reduced due to rising groundwater. The SVE vacuum was shut off to allow the groundwater to seek its natural level and the test was then restarted at 0825 hours. The EW vacuum was set at 30" H<sub>2</sub>O with a flow of 5 cfm. By 0900 hours, outer well MW-9 indicated a

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vacuum of 0.14" H<sub>2</sub>O, a change of approximately 0.30" H<sub>2</sub>O in 0.5 hours. The EW vacuum was increase to 40" H<sub>2</sub>O and a flow of 9 cfm. HORIBA data indicated that the total HC had increased to over 21,000 ppm and CO<sub>2</sub> over 4.20%. By 1030 hours, outer wells MW-9 & 13 were recording a vacuum in response to the EW vacuum of 50" H<sub>2</sub>O and flow of 12 cfm. Prior to the completion of the test, the EW vacuum was increased to 60" H<sub>2</sub>O with a flow of 14 cfm. By 1130 hours, significant vacuums were recorded on MW-9 & 13 and each well was over 220 ft from the extraction well (EW). The HC from the HORIBA data indicated the range remained approximately 21,500 ppm. After the SVE System was shut off, the outer well expandable plugs were left in place. At 1245 hours (1.25 hours after completion of Test #1), the static well data on MW-9, 12 & 13 indicated (0.15)" H<sub>2</sub>O pressure [( ) indicates well pressure]. This indicates that the recorded vacuums were the result of the vacuum placed on the extraction well.

Test #2 was a 3.0 hour SVE test conducted from extraction well (EW) SVE-1. This well is constructed from 2" schedule 80 PVC with TD = 36.0 ft and screened up 15.0 ft. There was no groundwater at this depth. Prior to the start of the test at 1200 hours, the static well data for the outer wells was recorded. Each recorded a well pressure varying from (0.10)" to (0.34)" H2O.

The initial EW vacuum was set at 40" H<sub>2</sub>O with a flow of 9 cfm. An instant vacuum was recorded on well SVE-1MW which was nested with SVE-1. The screened areas were 6.5 ft apart with a 2.0 ft bentonite seal. HORIBA data indicated the HC was 334 ppm with CO<sub>2</sub> of 2.54%. After two hours and the EW vacuum at 60" H<sub>2</sub>O and flow of 16 cfm, all the outer wells were recording a slight vacuum with SVE-1MW recording 1.30" H<sub>2</sub>O vacuum. During the next hour, the EW vacuum was increased to 80" H<sub>2</sub>O with flow of 24 cfm. By 1500 hours, all the outer wells had overcome the initial pressures and were recording reasonable vacuums. The trend on the HORIBA data was down, dropping from a high of 370 ppm to 210 ppm. At the completion of the test, the outer wells were responding quicker to EW vacuum and flow increases indicating a drying effect of the subsurface. One to two additional hours of SVE would most likely have enhanced the data.

Test #3 was a 0.42 hour SVE test conducted from extraction well (EW) SVE-1MW. This was planned as a quick test to determine well vacuum and flow. This well is constructed from 2" PVC with TD = 53.0 ft and screened up from 52.5 ft to 42.4 ft. DTGW at test time was 45.6 ft leaving 3.1 ft of screen above the groundwater. Prior to starting the test, the static well data indicated that vacuums from Test #2 remained on all the outer wells including SVE-1 which is the nested well described in Test #2.

The initial EW vacuum was set at 80" HzO with a flow of 3 cfm. From an SVE standpoint, the subsurface was considered a tight structure. Each outer well recorded a vacuum increase over the static data. HORIBA data indicated the HC was 866 ppm with CO<sub>2</sub> at 1.00%. After the initial data, the EW vacuum was set at 100" HzO and the flow dropped to 1-2 cfm. This was most likely due to rising

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groundwater reducing the screened area. However, at the end of the test, the outer wells, with the exception of SVE-1, recorded a vacuum increase. At 1535 hours, the test was completed.

Test #4 was a 1.5 hour SVE test conducted from well MW-2 as the extraction well (EW). The well data was not available (older existing well) to the SVE project engineer other than it was a 2" PVC well extending into the groundwater.

Prior to the start of the test, static data recorded from the outer wells indicated a vacuum remaining near the maximum recorded during Test #3. The initial vacuum was set at 120" H<sub>2</sub>O with a flow of +- 1 cfm. The reason the initial vacuum was set this high was because no well flow was recorded below this level. No change was recorded in the outer well vacuums. HORIBA data indicated the HC was 1,440 ppm with CO<sub>2</sub> of 3.76%. After the initial data was recorded, the well flow valve was opened to allow the EW vacuum to seek its maximum vacuum of 270" H<sub>2</sub>O and flow of 5-7 cfm. This well did not provide good SVE data as the outer well vacuums continued to decrease for the first hour of testing. The last data recorded, prior to the end of the test, indicated the outer wells were recording a slight increasing trend with the EW vacuum over 270" H<sub>2</sub>O. It is very unlikely that this well would respond as an SVE well.

#### Additional Information:

- Summary of Operating Data (Distances may vary from actual survey)
- Field Operating Data and Notes
- Figure 1 Plot of Observed Vacuum versus Distance at the Facility
- Site Photographs

#### Conclusion:

The tests indicated that soil vacuum extraction (SVE) would be an effective method of remediation for this facility. Although the observed vacuum on the outer observation wells was relatively low at the beginning of the test, the duration of the pilot test was short compared to continuous operation. However, the results give positive indication that the observed and reported wells were in vacuum communication with the selected SVE extraction well. Figure #1 indicated that the effective radius of influence would be from 70 to 100 ft with extraction well flow of 10 - 17 cfm and extraction well vacuum in the 50" - 70" HzO range. An approximation of the radius of influence may be obtained by determining the point at which the measured vacuum is 0.30 to 0.50" HzO. It is assumed that beyond the lower point, the pressure gradient (driving force) is negligible to effectively transport vaporized contaminants to the extraction well. Under continuous operation, vacuum and radius of influence may continue to increase 1 to 3 days. All other data must be considered in the final design for a remedial plan.

4.

The AcuVac SVE System performed as represented and should be considered a viable technology to use for the remediation of this location. The SVE System with the 140 CID, 4 cylinder engine can provide total extraction well flow of approximately 50 cfm with a vacuum, if required, up to 20" Hg. The System with 300 CID, 6 cylinder engine can provide total extraction well flow of approximately 120 cfm with a vacuum up to 20" Hg. These Systems are designed to consume heavy concentrations of VOCs and meet all air emission standards. The auxiliary fuel can be propane or natural gas.

Once you have reviewed the report, please call me if you have any questions.

Sincerely, تعلق

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James E. Sadler Product Engineer

Enclosure

# EXHIBIT "A"

### Test #1

## WT-1 Enron/DBS&A #4230

11/20/94	First Data Time 0735	Second Data Time 0805	Third Data Time 0825	Fourth Data Time 0900	Fifth Data Time 0930	Sixth Data Time 1000	Seventh Data Time 1030
Horiba-HC PPM	-	15,400	18,430	19,130	-	21,230	21,370
Horiba - C0 <sub>2</sub> %	-	2.82	4.00	3.88	-	4.22	4.54
Extraction Well Flow-CFM Well MW-10	10	8	5	5	9	9	12
Extraction Well Vacuum "H <sub>2</sub> 0 Well MW-10	50	60	30	30	40	40	50
Well MW-13 Vacuum "H <sub>2</sub> 0 Dist. 255 ft.	(.14)	(.15)	(.15)	(.12)	(.03)	(.02)	.25
Weil MW-12 Vacuum "H <sub>2</sub> 0 Dist ft.	(.05)	(.05)	(.03)	(.12)	(.12)	(.12)	(.12)
Well MW-9 Vacuum "H <sub>2</sub> 0 Dist. 225 ft.	(.05)	(.06)	(.15)	.14	.20	.24	.35

11/20/94	Eighth Data Time 1100	Ninth Data Time 1130	Tenth Data Time 1245	Average Data 4.0 Hrs.	Maximum Data
Horiba-HC PPM	21,450	21,720	-	19,819	21,513
Horiba - C0 <sub>2</sub> %	4.58	4.64		4.10	4.64
Extraction Well Flow-CFM Well MW-10	12	14	-	9.33	14
Extraction Well Vacuum "H <sub>2</sub> 0 Well MW-10	50	60	-	45.56	60
Well MW-13 Vacuum "H <sub>2</sub> 0 Dist. 255 ft.	.30	.36	(.15)	.30	.36
Well MW-12 Vacuum "H <sub>2</sub> 0 Dist. ft.	(.12)	(.12)	(.15)	.09	(.15)
Well MW-9 Vacuum "H <sub>2</sub> 0 Dist. 225 ft.	.40	.47	(.15)	.30	.47

() Indicates Well Pressure

# Test #2

WT-1 Enron/DBS&A #42
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11/20/94	First Data Time 1200	Second Data Time 1230	Third Data Time 1300	Fourth Data Time 1330	Fifth Data Time 1400	Sixth Data Time 1430	Seventh Data Time 1500
Horiba-HC PPM	334	370	340	286	246	-	210
Horiba - C0 <sub>2</sub> %	2.54	2.38	2.42	3.10	2.92	-	2.76
Extraction Well Flow-CFM Well SVE-1	9	9	9	16	16	24	25
Extraction Well Vacuum "H <sub>2</sub> 0 Well SVE-1	40	40	40	60	60	80	80
Well SVE-1MW Vacuum "H <sub>2</sub> 0 Dist. 0 ft.	.30	.50	.70	.98	1.30	1.65	1.90
Well MW-1 Vacuum "H <sub>2</sub> 0 Dist. 58 ft.	(24)	(.20)	(.13)	(.08)	.05	.10	.28
Well MW-2 Vacuum "H <sub>2</sub> 0 Dist. 95ft.	(35)	(35)	(.25)	(.15)	0	.10	.26
Well MW-3 Vacuum "H <sub>2</sub> 0 Dist. 101 ft.	(.07)	(.12)	.03	.03	.05	.12	.17

11/20/94	Average Data 3.0 Hrs.	Maximum Data
Horiba - C0 <sub>2</sub> %	2.69	3.1
Horiba-HC PPM	298	370
Extraction Well Flow-CFM Well SVE-1	15.43	25
Extraction Well Vacuum "H <sub>2</sub> 0 Well SVE-1	57.14	80
Well SVE-1MW Vacuum "H <sub>2</sub> 0 Dist. 0 ft.	1.05	1.90
Well MW-1 Vacuum "H <sub>2</sub> 0 Dist. 58 ft.	.14	.28
Well MW-2 Vacuum "H <sub>2</sub> 0 Dist. 95ft.	.12	.26
Well MW-3 Vacuum "H <sub>2</sub> 0 Dist. 101 ft.	.08	.17

() Indicates Well Pressure

Page.2

WT-1 Enron/DBS&A #4230

11/20/94	First Data Time 1510	Second Data Time 1535	Average Data 0.5 Hrs.	Maximum Data
Horiba-HC PPM	866	_	866	866
Horiba C0 <sub>2</sub> %	1.00		1.00	1.00
Extraction Well Flow-CFM Well SVE-1MW	3	1	2	3
Extraction Well Vacuum "H <sub>2</sub> 0 Well SVE-1MW	80	100	90	100
Well SVE-1 Vacuum "H <sub>2</sub> 0 Dist. 0 ft.	.26	.26	.26	.26
Well MW-1 Vacuum "H <sub>2</sub> 0 Dist. 58 ft.	.39	1.05	.72	1.05
Well MW-2 Vacuum "H <sub>2</sub> 0 Dist. 95 ft.	.24	.36	.30	.36
Well MW-3 Vacuum "H <sub>2</sub> 0 Dist. 101 ft.	.16	.18	.17	.18

() Indicates Well Pressure

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# Test #4

WT-1 Enron/DBS&A	<b>44230</b>
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11/20/94	First Data Time 1600	Second Data Time 1620	Third Data Time 1700	Fourth Data Time 1730	Average Data 1.5 Hrs.	Maximum Data
Horiba - C0 <sub>2</sub> %	3.76	4.14	-	-	3.95	4.14
Horiba-HC PPM	1,440	1,370	-	-	1,405	1,440
Extraction Well Flow-CFM Well MW-2	1	4	5	7	4.25	7.00
Extraction Well Vacuum "H <sub>2</sub> 0 Well MW-2	120	270	270	270	233	270
Well SVE-1MW Vacuum "H <sub>2</sub> 0 Dist. 0 ft.	1.3	1.05	.52	.50	.84	1.30
Well SVE-1 Vacuum "H <sub>2</sub> 0 Dist ft.	.08	.08	.05	.07	.07	.08
Well MW-1 Vacuum "H <sub>2</sub> 0 Dist. 120 ft.	.96	.88	.42	.48	.69	.96
Well MW-3 Vacuum "H <sub>2</sub> 0 Dist. 190 ft.	.19	.22	.07	.20	.17	.22

Note: First Data is static well vacuum - No SVE

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	ATE	11/20	2194	•			TEST NC	). <del>]_</del>		
100	05	They	icosed EU	) vocum	to 50" f	40, How	e lact	<u>m</u>		
		Prono	ine@ 100	CFH -AU	steady - N.	G Sanainer				
10	15	1	54 Dater-		. \		· · · ·			
	30				1 1		\ (			
	50		ded Data							
		1	er wells r			to EW (	Jacaum m	crease		
10	45	HORIB	A Data-	HC ste	eacly					
110	00	Recon	ded Data-	- A11 5	VE suste	ms norm	al - Out	er wells		
			9 × 13 c		3					
1.0	05					•				
	<u>v                                    </u>		cosrd El			•		11		
			ht saugin				Indicating	ground -		
		wat	er closin	g off s	screened	avea.				
113	30	Record	lad Data-	- AN SU	E suster	is norma	1- 600d	vocum		
			nse from							
·										
			nse on u		ia due	to longe	Excavat	IN DEAMON		
			and outer	•	·····		ويقدون ويعرف التحمي ويرتمون ومروع			
		-	- Complet				ر و والبه و الله و محمد و البلون من معر من معر و الم و مراجع و الم			
124	15	Record	lool stati	e data	on Mu	1 q € 13 -	- 1.25 hou	rs after		
							、 、			
	SUE off-All wells recorded (15)"Hro (Pressare)									

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OPERATING DATA - TEST NO \_\_\_\_\_

### ACUVAC SVE SYSTEM

	Date	11/20/94					
		Time	Time	Time	Time	Time	Time
	Parameter	II50 Hr. Meter	1200 Hr. Meter	1230 Hr. Meter	1300 Hr. Meter	1330 Hr. Meter	I400 Hr. Meter
			24.7	2512	2517	2612	26.7
<u>ح</u>	R.P.M.	·	1900	1900	1900	2200	2900
OWE	Oil Press P.S.I.		50	50	50	-50	50
E/BL/	Water Temp •F		160	160	160	160	160
ENGINE/BLOWER	Volts		13,5	13,5	13,5	13,5	13,5
卣	Intake Vac Hg	5	16	16	16	15	15
	Gas Flow Fuel/Propane cfh		140	140	140	1'70	170
FUEL/AIR	Air Flow cfm		70	20	20	25	25
FUEL	Well Flow SVE-1 cfm		9	9	9	16	16
_	Recovery Well Vac SVE- "H <sub>2</sub> 0		40	40	40	60	60
	Air Temp 'F	57	58	58	59	60	60
	Barometric Pressure Hg						
	SUE-IMW "H20	(.25)	.30	,50	.70	.98	1,30
	mw-1 "H20	(.24)	(.24)	(.,20)	(, 13)	(.08)	,05
	ო₩~გ <sup>"H</sup> 2 <sup>0</sup>	(.34)	(.35)	(,35)	(,25)	(,15)	0
	mw-3 "H20	(.10)	(,07)	(.12)	.03	.03	.05
MU	"H <sub>2</sub> 0					¢.	
ACUI	"H <sub>2</sub> 0						
רד א	" <sup>H</sup> 2 <sup>O</sup>	DATA DATA					
WE	" <sup>H</sup> 2 <sup>O</sup>	4					
MONITOR WELL VACUUM	"H <sub>2</sub> 0	1					
MOM	" <sup>H</sup> 2 <sup>O</sup>	Ц Ц Ц					
	"H <sub>2</sub> 0						
	"H <sub>2</sub> 0	h-T.i NO	· ( )	INDICATE	S WELL P	efssure	
	" <sup>H</sup> 2 <sup>0</sup>	S T					
	" <sup>H</sup> 2 <sup>O</sup>						
CT.	Vapor Wells On/Off	OFF	02	···_			>-
MANIFOLD	Air Injection Pressure P.S.I.	OFF					>
MA	Air Injection Flow cfm	OFF					>
	Samples		HORIBA				

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	Instr	ument		  €	<u> </u>			
TEST			HORIBA				>	、 
F	Time		1210	1245	1315	1345	1415	
LUENT	н-с	ppmv	334	370	340	786 ·	246	
VAPOR INFLUENT	<sup>CO</sup> 2		2,54	2,38	2.42	3,10	292	
VAF	c-0	%	.02	.01	,01	01	.01	
	H-C							
SNO	c0 <sub>2</sub>	ppmv						
EMISSIONS	c-0	<u> </u>			·			
Ē		%						
	Air/fu	el Ratio						
		- %						
2 میں ایک ایک ایک ایک ایک ایک ایک ایک ایک ایک						NOUEC		, , , , , , , , , , , , , , , , , , ,
DATE 11/20/94 TEST NO. 2								
				~ 1	<u>م</u>		: الذي الحال التي <u>مرين الخاصي من الم</u>	
114				1			s extractic	
115	0	Recorded static well data - Well Data - SUE-1 2" NUC TD=36.0'-Screened 21' to 36' - No groundwater						
(20		1					0'H20, Slow	1
191		1				• •	<u>e 2,547</u>	ti i
193	50				ystems norm	wh - No U	locaum nes	nonse
		1	outer w					
	45				slightly e			
13	00	1					Vocuum r	11
. 13	15				•• •	<u> </u>	e 2,427	<u>o</u>
(3	20	Incre	rosed EW	Vocuum	to 60" Hz	o tlow	16cfm	
	30	Recer	ded Data	- SVE-1	mw conti	nues an	increasing 1	irend
		Othe	r outer u	uells india	eating dec	reasing pre	ssare frew	nd
13	45				86 ppm , d	<b>.</b>	_ ·	
140	00	Record	led Data	-AIL SUE	Systems n	ormal - Slic	it vocuum	vespense
14	05				•		m to 80"Hzo, 1	1
14	<del>1</del> 15	HOR	BA bata	-HC d	lecreasing	<u>e</u> 241	oppm	
No	TE						an 52,5'-42.5	07500 5 45.6
							ومتعاقبة ويبياه فتنا بمنتك مبينك يحمدهم يتمي	

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and a state of

	AcuVac Remediation	OPE	RATING DATA	A - TEST	NO <u>2</u>		CUVAC SYSTEM
age _	<u> </u>	n ENRON i	WT-1-DB	<u> 514 423</u>	<u>30 pr</u>	oject Engr.SA	DLEE LUNDGREL
	Date	11/20/94	>				-
-		Time 1430	Time 1500	Time	Time	Time	Time
	Parameter	Hr. Meter 27,2	Hr. Meter 27,7	Hr. Meter	Hr. Meter	Hr. Meter	Hr. Meter
~	R.P.M.	2,500	2,500				
ENGINE/BLOWER	Oil Press P.S.I.	50	50				
E/BL	Water Temp •F	170	170				
NI DI	Volts	13.5	13,5			·	
卣	Intake Vac Hg	13	13				
	Gas Flow Fuel/Propane cfh	190	200+				
AIR	Air Flow cfm	25	25				
FUEL/AIR	Well Flow SUE cfm	24	25				
	Recovery Well Vac SUE-1 "H20	80	80				
	Air Temp 'F	61	60		=		· · · · · · · · · · · · · · · · · · ·
	Barometric Pressure Hg						
	SUE-(mw"H20 "H20"	1.65	1.90				
		.10	.28	•			
	mw-2 "H20	. 10	,26				
	mw-3 "H20	,12	. 17				
M	"H <sub>2</sub> 0					د.	
	"H <sub>2</sub> 0						
がて	"н <sub>2</sub> о						•
MEL	"H <sub>2</sub> 0						
TOR	"н <sub>2</sub> о						
MONITOR WELL VACUUM	"H20					· · · ·	
	"н <sub>2</sub> 0			· · ·			
	" <sup>H</sup> 2 <sup>0</sup>			•		·	
	"H <sub>2</sub> 0						
	" <sup>H</sup> 2 <sup>0</sup>						
В	Vapor Wells On/Off	ON	ON				
MANIFOLD	Air Injection Pressure P.S.I.	OFF	>	· · · ·			
MAI	Air Injection Flow cfm	OFF	<b>&gt;</b>	· · ·			
	Samples		HORIBA				
			INFLIENT				

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	Instrum	ent				]
TEST			HORIBA			
F	Time		1455	. ÷		
LUENT	H-C	ppmv	310	-		
VAPOR INFLUENT	co2	7.	2.76			
AA.	c-0	z	.01			
5	н-с	ppmv				
EMISSIONS	coz	%				
: EMI	C-0	~ %				
	Air/Fuel	Ratio			 	
		~ %				

1

# OPERATING DATA AND NOTES

DATE	11/20/24 TEST NO. 2
1430	Recorded Data - AU SUE Systems normal - Oceter
	wells indicating good vocuum response to increased EW
·	Uacyam
1455	HORIBA Data- HC continue on decreasing trend, HC
	recorded @ 210 ppm
1500	
	-EW vocuum of 80"HzO and flow of 25cFM - All
	-SUE systems normal - Propone flow over 200CFH
	TEST # 2 Completed -
l	
r 1	

(933107-PAGE2)

A	AcuVac Remediation		ERATING DAT			SVE	ACUVAC SYSTEM
Page _	Location	ENRON (	UT-1 D	BSÉ, A 4	230 Pr	oject Engr SA	DLER LUNDGRE
	Date	11/20/94	· · · · · · · · · · · · · · · · · · ·				
		Time 1505	Time 15(0	Time 1535	Time	Time	Time
	Parameter	Hr. Meter	Hr. Meter 27,8	Hr. Meter 28,3	Hr. Meter	Hr. Meter	Hr. Meter
~	R.P.M.	·	3000	3300			
ENGINE/BLOWER	Oil Press P.S.I.		50	50			
E/BLC	Water Temp •F		170	170			
IGINI	Volts	محمد الم	13,5	13.5			•
ā	Intake Vac Hg		13	13			
	Gas Flow Fuel/Propane cfh		180	190			
/AIR	Air Flow cfm	•	56	56			·
FUEL/AIR	Well Flow SVE-IMW cfm		3	١	·		
	Recovery Well VacSuE-1 MW"H20		80	100			
	Air Temp •F	58	58	560			
	Barometric Pressure Hg	· <b>-</b> .	1				
	SVE-1 "H20	.30	۵،6	.26			
	mw-1 "H20	.22	.39	1.05			
	mω-2 "H20	,21	.24	,360			
	mω-3 <sup>"H20</sup>	.12	.16	.18			
W	"H <sub>2</sub> 0					¢	
CUL	" <sup>H</sup> 2 <sup>0</sup>	····					
έλ T	"H <sub>2</sub> 0				· · · · · · · · · · · · · · · · · · ·		
MEL	"H <sub>2</sub> 0						
TOR	"H <sub>2</sub> 0						
MONITOR WELL VACUUM	"H20						
V	" <sup>H</sup> 2 <sup>0</sup>	225		······································			
	"H2 <sup>0</sup>	Å		•		·	
	"H2 <sup>0</sup>	V 2					
	"H <sub>2</sub> 0	· · · · · · · · · ·			•		
B	Vapor Wells On/Off	OFF	ON	an	·····		
MANIFOLD	Air Injection Pressure P.S.I.	OFF		>			
MAI	Air Injection Flow cfm	OFF		>			
	Samples		HORIBA Influent				

[		Instru				<del></del>	1	1	<del>رر الم</del>
	<u>م</u>		meric	HOMABA					
	TEST	Time		101-(1)-(					<u> </u>
				1515			·		
	ENT	H-C		0//	· •			· · · · · ·	
	FLU	c02	ppmv	866					
	R IN	~~2	7.	1.00		}			
	VAPOR INFLUENT	C-0							
ľ	_	H-C	<u> </u>	<u>,0</u> 2					
	SI.		ppmv						
	ENISSIONS	<sup>co</sup> 2	×						
	ENIIS	C-0							· · · ·
			···· %						
		ATr/Fue	el Ratio						
	<u> </u>		%						
			•••						
<i></i>				t.	OPERATIN	G DATA AND	NOTES		
7	DI	ATE	11/30	94				TEST NO	.3
	150	05	Connected SUE System to well SUE-IMW as						
			extraction well - Well Dates - This well is rested						
		_	with well SUE-1 with TD = 53.0' and screened 52.5-						
Γ			42.5' - The well is constructed from 2.0" PUC pipe-						
Γ			NT.	$C_{1}(1) = 4$	56 7	3.1' scree	ned area	above as	roundwater
									8
						<u>remain</u>	ing trom	prior	
┢					U SUE		• •	<u> </u>	" H . O
┠	12(	0				<u>Enitial El</u>			
╟						b sanfare		•	· //
╞						wells ind		ight voe.	leum
-						ie diata			
-	15	15	HORI	BA Dates	- HC C	2 866 pr	m		
L	15	20	Incr	cose Ew	Vocuum	to 100"	H10, fl	ow e 1.	-2cFm
Ľ	•					ropped bee			11
			clos	sing off	screene	d area.		- <b>\</b>	
[	15	35		•		well SVE	E-1 steade	y - Other a	outer usells
Γ						occum -E		•	1
Γ									- <del></del>
<u></u>	TEST Completed								

• .

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ge _	Date	11/20/94	DT-1 - D				
	Parameter	Time 1600 Hr. Meter	Time: 1620	Time 1700 Hr. Meter	Time 1730 Hr. Meter	Time Hr. Meter	Time Hr. Meter
	Falometel	Hr. Meter 28.7	Hr. Meter 29,0	Hr. Meter 29.7	30,2	nr. neter	nr. Neter
æ	R.P.M.	2100	2000	<u> </u>	3000		
ENGINE/BLOWER	Oil Press P.S.I.	50	50	50	50		
E/BL	Water Temp •F	165	165	165	160		
NI9	Volts	13,5	13,5	13,5	13,5		·
<u>ක</u>	Intake Vac Hg	15	18	18	. 18		
	Gas Flow Fuel/Propane cfh	160	180	180	180		
AIR	Air Flow cfm	25.	18	18	18		
FUEL/AIR	Well Flow MW-7 cfm	土一	4	5	7		
	Recovery Well Vac MW - J "H20	1120	270	270	270		
	Air Temp 'F	54	54	52	50		
	Barometric Pressure Hg	-	-	_	-		
	SVE-1 mw"H20	1.30	1.05	.52	,50		
	SVE-1 "H20	.08	80,	:05	.07		
	mω-ι <sup>"H20</sup>	.96	.88	. 42	, 48		
	mw-3 "H20	.19	.22	.07	.20		
M	"H <sub>2</sub> 0					<u>e</u>	
MONITOR WELL VACUUM	"H <sub>2</sub> 0						
2 1	" <sup>H</sup> 2 <sup>0</sup>	UE(					
WE	"H <sub>2</sub> 0	ビドレー					
IOLI	" <sup>H</sup> 2 <sup>0</sup>	H I S A					
NOM	"H <sub>2</sub> 0	A P F O W					
-	"H <sub>2</sub> 0	V TH					
•	"H <sub>2</sub> 0	U C C		·		•	
	"H <sub>2</sub> 0	LON LEAD					
<u> </u>	" <sup>H</sup> 2 <sup>0</sup>	~ ~ ~ ~ ~					
	Vapor Wells On/Off	OFFON	ON	ON	ON		
MANIFOLD	Air Injection Pressure P.S.I.	OFF			>		
Ž	Air Injection Flow cfm Samples	OFF			>		

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	Instrument					
TEST		HORIBA	HOUBA			
4	Time	1610	1630			
LUENT	H-C pp	nv 1440	1370		н. 	
VAPOR INFLUENT	<sup>co</sup> 2	× 3,76	4.14			
VAP	c-0	× .01	,01			
	H-C					
Ş.	ppn	iv		 		<u>_</u>
IOIS	co2	z				
EMISSIONS	C-0	x				·
	Air/fuel Ratio			 		
		×.				

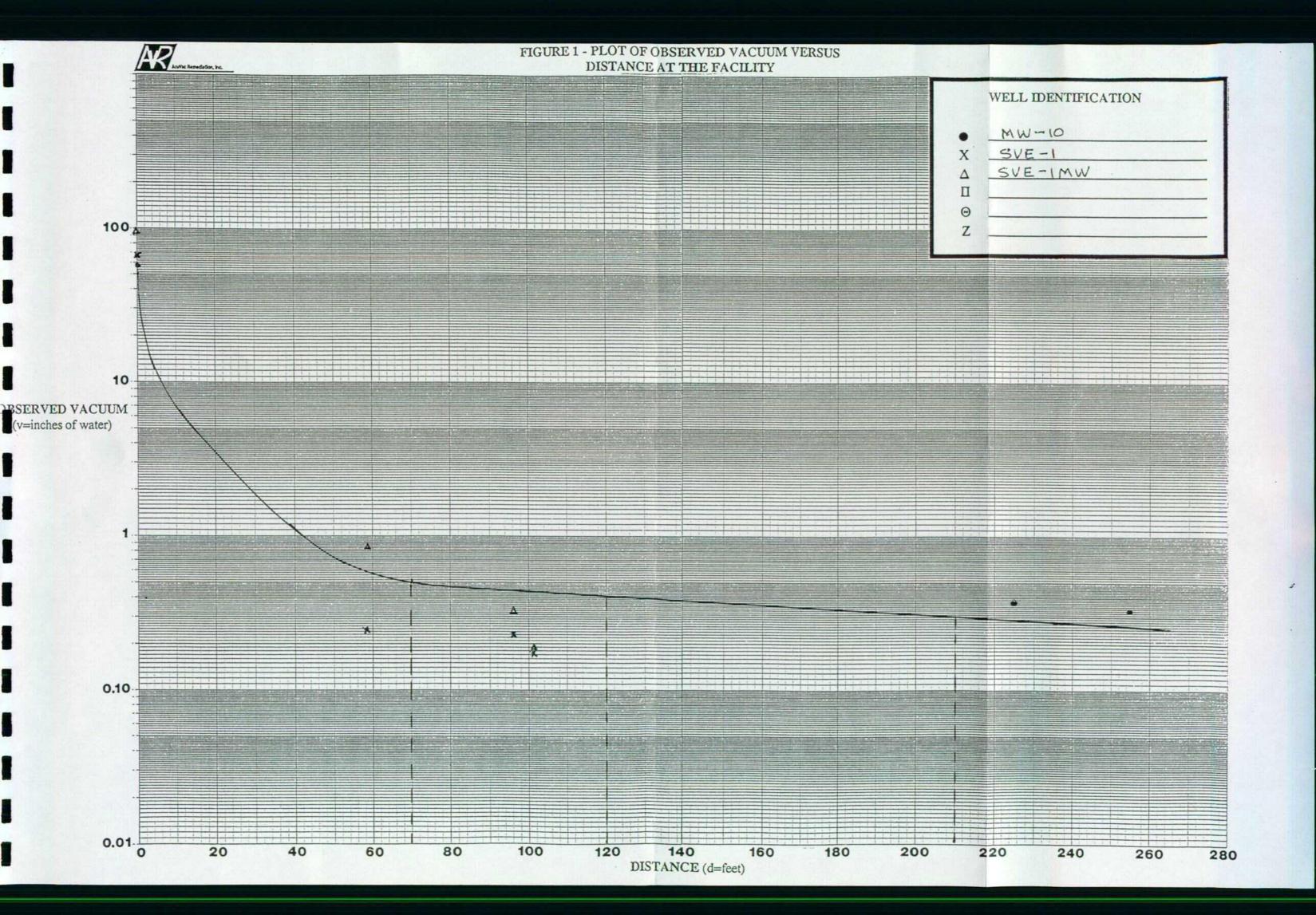
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# OPERATING DATA AND NOTES

DATE	11/20/94 TEST NO. 4
1550	Positioned SVE System near well MW-2 as extraction
·	well (EW) - Well data untrown other than 2" PUC
·	pipe into gnoundlescater
1555	Recorded static well data - Vacuum an outer wells
	remain near maximum level obtained during Test # 3
1600	START Test #3- Outer wells recording some vocuum
	as static datas Subsurface structure and for
	well construction contributing to high SUE vocucions
1610	Open SUE flow to maximum, EW vacuum maximum
	at 270-275"H20, flow @ 7-8 crm
1620	Recorded Data-Outer wells recording reduced vocuums x
	mes-3 which is up slightly-
1630	HORIBA Data HC@ 1370 ppm
1700	Recorded Data - All outer wells continue to record decrease
	EW vocume 270"Hr.D., flow 5-7 cr=m
1730	Recorded Data - Outer wells indicating slight increasing
	trend
1730	Test terminated - Well not responding to SVE- Deputed site @ 1815

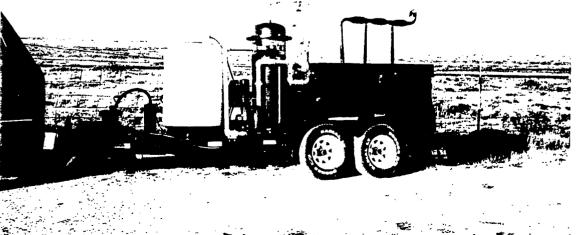
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# ENRON WT-1 - DANIEL B. STEPHENS & ASSOCIATES, INC. PROJECT #4230





# Soil Vapor Analyses



CORE LABORATORIES A N A L Y T I C A L R E P O R T Job Number: 945993 Prepared For: DANIEL B. STEPHENS & ASSOCIATES BOB MARLEY 6020 ACADEMY NE ALBUQUERQUE, NM 87109 Date: 12/13/94

499

Signature

Name: M. Jean Waits

Da

CORE LABORATORIES P O BOX 34766 HOUSTON, TX 77234-4282

Title: Supervising Chemist

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# LABORATORY TESTS RESULTS 12/13/94

## JOB NUMBER: 945993 CUSTOMER: DANIEL B. STEPHENS & ASSOCIATES ATTN: BOB MARLEY

CLIENT I.D.....: ENRON-WT-1 #4230 DATE SAMPLED.....: 11/20/94 TIME SAMPLED.....: 16:35 WORK DESCRIPTION...: MW-2

#### LABORATORY I.D...: 945993-0001 DATE RECEIVED....: 11/23/94 TIME RECEIVED....: 15:07 REMARKS.....: Core cylinder #1207

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Benzene, Toluene, Xylenes in Gas		*1			12/09/94	MIM
Benzene	<1	1	ppm v/v			
Toluene	<1	1	ppm v/v			
Ethyl Benzene	<1	1	ppm v/v			
Total Xylenes	<10	10	ppm v/v			
Refinery Gas Analysis, Extended		*1			12/08/94	РКТ
Hydrogen	<0.01	0.01	Mol %	ASTM D-1945		
Oxygen	13.311	0.01	Mol %	ASTM D-1945		
Nitrogen	77.970	0.01	Mol %	ASTM D-1945		
Carbon Monoxide	<0.01	0.01	Mot %	ASTM D-1946		
Carbon Dioxide	5.861	0.01	Mol %	ASTM D-1945		
Hydrogen Sulfide	<0.01	0.01	Mol %	1		
Methane	2.839	0.01	Mol %	ASTM D-1945		
Ethylene	<0.001	0.001	Mol %	ASTM D-1946	1	
Ethane	<0.001	0.001	Mol %	ASTM D-1945		
Propylene	<0.001	0.001	Mol %	ASTM D-2163		
Propane	<0.001	0.001	Mol %	ASTM D-1945		
Isobutane	<0.001	0.001	Mol %	ASTM D-1945		
Isobutylene	<0.001	0.001	Mol %	ASTM D-2163	}	
1-Butene	<0.001	0.001	Mol %	ASTM D-2163		
n-Butane	<0.001	0.001	Mol %	ASTM D-1945		
trans-2-Butene	<0.001	0.001	Mol %	ASTM D-2163		
cis-2-Butene	<0.001	0.001	Mol %	ASTM D-2163		
Isopentane	<0.001	0.001	Mol %			
n-Pentane				ASTM D-2163		
	<0.001	0.001	Mol %	ASTM D-2163		
Hexanes	0.001	0.001	Mol %			
Heptanes	0.001	0.001	Mol %			
Octanes	0.005	0.001	Mol %		l	
Nonanes	0.005	0.001	Mol %			
Decanes	0.005	0.001	Mol %			
Undecanes	0.002	0	Mol %		1	
Dodecanes Plus	0	0	Mol %			
					:	
	1					
	<u> </u>	l	l		l	
				BOX 34766 TON, TX 77234-4282		
				) 943-9776		
		PAGE:1				

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and contidential use this report has been made. The interpretations or opinions expressed representations contained in this report are based upon observations and material supplied by the client for whose exclusive and contidential use this report has been made. The interpretations or opinions expressed representations expressed representations expressed representations expressed representations expressed in the productivity, proper coefficient control of control of any reason whatsoever. This report shall not be reproduced except in its entirely, without the writen approval of Core Laboratories.



#### LABORATORY TESTS RESULTS 12/13/94

#### JOB NUMBER: 945993

#### CUSTOMER: DANIEL B. STEPHENS & ASSOCIATES

ATTN: BOB MARLEY

CLIENT I.D.....: ENRON-WT-1 #4230 DATE SAMPLED.....: 11/20/94 TIME SAMPLED.....: 13:40 WORK DESCRIPTION...: SVE-1

DATE RECEIVED:	11/23/94
TIME RECEIVED:	15:07
REMARKS	Core cylinder #1097

LABORATORY I.D...: 945993-0002

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Benzene, Toluene, Xylenes in Gas		*1			12/09/94	MTM
Benzene	23	1	ppm v/v			
Toluene	20	1	ppm v/v		1	
Ethyl Benzene	<1	1	ppm v/v			
Total Xylenes	14	10	ppm v/v			
Refinery Gas Analysis, Extended		*1			12/08/94	РКТ
Hydrogen	<0.01	0.01	Mol %	ASTM D-1945		
Oxygen	4.367	0.01	Mol %	ASTM D-1945		1
Nitrogen	87.986	0.01	Mol %	ASTM D-1945		
Carbon Monoxide	<0.01	0.01	Mol %	ASTM D-1946		
Carbon Dioxide	7.386	0.01	Mol %	ASTM D-1945	1	
Hydrogen Sulfide	<0.01	0.01	Mol %			
Methane	0.229	0.01	Mol %	ASTM D-1945	1	
Ethylene	<0.001	0.001	Mol %	ASTM D-1946	]	
Ethane	<0.001	0.001	Mol %	ASTM D-1945		
Propylene	<0.001	0.001	Mol %	ASTM D-2163		i
Propane	0.007	0.001	Mol %	ASTM D-1945		
Isobutane	0.004	0.001	Mol %	ASTM D-1945		
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n-Butane	0.002	0.001	Mol %	ASTM D-2105	Į	
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cis-2-Butene	<0.001		Mol %	ASTM D-2163		
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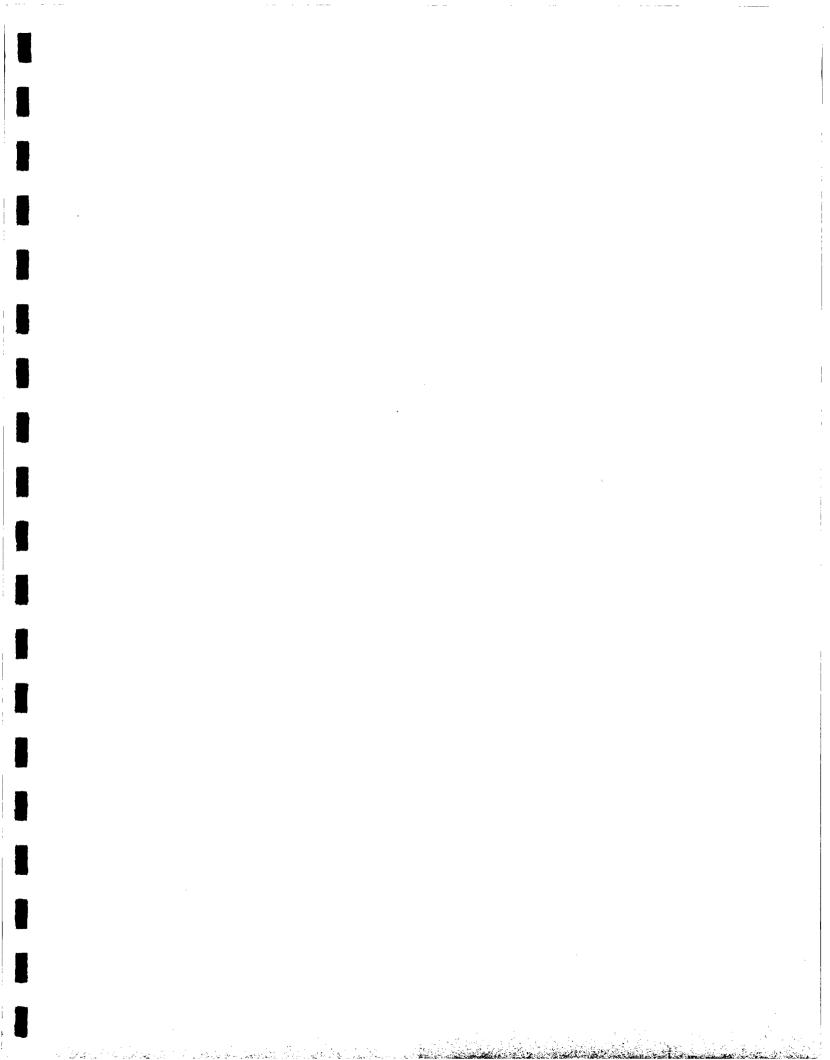


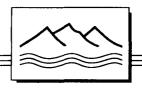
#### LABORATORY TESTS RESULTS 12/13/94 JOB NUMBER: 945993 CUSTOMER: DANIEL B. STEPHENS & ASSOCIATES sil éda e ATTN: BOB MARLEY CLIENT I.D.....: ENRON-WT-1 #4230 LABORATORY I.D...: 945993-0003 DATE SAMPLED.....: 11/20/94 DATE RECEIVED....: 11/23/94 TIME SAMPLED.....: 10:20 TIME RECEIVED....: 15:07 WORK DESCRIPTION ....: MW-10 REMARKS..... Core cylinder #1011 TEST DESCRIPTION FINAL RESULT LIMITS/\*DILUTION UNITS OF MEASURE TEST METHOD DATE. TECHN Benzene, Toluene, Xylenes in Gas \*1 12/09/94 MJW Benzene 319 1 ppm v/v Toluene 504 1 ppm v/v Ethyl Benzene 19 ppm v/v 1 Total Xylenes 153 10 ppm v/v Refinery Gas Analysis, Extended \*1 12/08/94 РКТ Hydrogen <0.01 0.01 Mol % ASTM D-1945 Oxygen 2.833 0.01 Mol % ASTM D-1945 80.836 Nitrogen 0.01 Mol % ASTM D-1945 Carbon Monoxide <0.01 0.01 Mol % ASTM D-1946 Carbon Dioxide 13.260 0.01 Mol % ASTM D-1945 Hydrogen Sulfide <0.01 0.01 Mol % Mol % ASTM D-1945 Methane 0.751 0.01 Ethylene <0.001 0.001 Mol % ASTM D-1946 Ethane 0.002 0.001 Mol % ASTM D-1945 Propylene <0.001 0.001 Mol % ASTM D-2163 Propane 0.007 0.001 Mol % ASTM D-1945 Mol % Isobutane 0.006 0.001 ASTM D-1945 0.001 Isobutylene 0.001 Mol % ASTM D-2163 1-Butene <0.001 0.001 Mol % ASTM D-2163 n-Butane 0.039 0.001 Mol % ASTM D-1945 trans-2-Butene <0.001 0.001 Mol % ASTM D-2163 cis-2-Butene <0.001 0.001 Mol % ASTM D-2163 Isopentane 0.151 0.001 Mol % ASTM D-2163 n-Pentane 0.211 0.001 Mol % ASTM D-2163 Hexanes 0.615 0.001 Mol % Heptanes 0.704 0.001 Mol % Mol % Octanes 0.434 0.001 Nonanes 0.121 0.001 Mol % 0.027 0.001 Mol % Decanes 0.002 Undecanes n Mol % Dodecanes Plus 0 0 Mol % P O BOX 34766 HOUSTON, TX 77234-4282 (713) 943-9776

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# SUPPLEMENTAL ENVIRONMENTAL INVESTIGATION WT-1 COMPRESSOR STATION FORMER ENGINE ROOM DRAIN AND FILTER PIT AREA

# RECEIVED

MAR 3 1 1995

Prepared for

Environmental Bureau Oil Conservation Division

# ENRON Operations Corp.

**Environmental Affairs Department** 

Houston, Texas

March 28, 1995

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DANIEL B. STEPHENS & ASSOCIATES, INC.

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### **EXECUTIVE SUMMARY**

Daniel B. Stephens & Associates, Inc. (DBS&A) was retained by ENRON Operations Corp. to conduct a supplemental environmental investigation at Transwestern Pipeline Company's (TPC) WT-1 Compressor Station, located in southeastern New Mexico. The compressor station boosts the pressure of the natural gas stream originating from two lateral pipelines and one primary pipeline heading to the northwest. This environmental investigation supplements the previous work performed by Metric Corporation (1991) and Brown & Root Environmental (1993).

The objective of this investigation was to characterize the distribution of organic and inorganic constituents in underlying soils and ground water detected during previous investigations of the former engine room drain and filter pit area. The scope of work included a background data review, completion of five additional ground-water monitor wells, one dual-completion soil vapor extraction (SVE) well, and two temporary ground-water sampling borings, sampling of soil and ground-water, in-situ tests of hydraulic properties, and summarizing interim corrective actions performed by TPC to date.

The site is underlain by the Quaternary Mescalero caliche and Gatuña Formation and the Triassic Santa Rosa sandstone. Perched ground water is present within the Santa Rosa sandstone at depths of approximately 45 to 55 feet below ground surface. The saturated thickness of the perched system ranges from approximately 0 to 10 feet; locally, ground-water flows toward the northwest. Bail-recovery tests indicate that the perched aquifer is of low permeability with an average hydraulic conductivity of  $5.0 \times 10^{-2}$  feet per day. The average ground-water flow velocity is approximately 5 feet per year based on the in-situ hydraulic tests. The perched system is underlain by approximately 350 to 550 feet of very fine-grained sandstones, siltstones, and shales of the Permian Dewey Lake Red Beds. In general, potable ground water is not present in the region.

The extent of actionable soil contamination near the former engine room drain and filter pits is limited to a roughly elliptical area centered on the pits that covers approximately 0.7 acre. Ground-water impacts extend north of the former pits; the New Mexico Water Quality Control Commission (NMWQCC) numerical standards for benzene, 1,1-dichloroethane, total dissolved

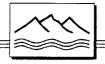
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solids, chloride, barium, sulfate, and manganese were exceeded in at least 1 of the 10 samples collected from wells in the area. In addition, 3.6 feet of phase-separated hydrocarbons (PSH) were measured within an on-site monitor well downgradient of the pits.

During this investigation, DBS&A conducted four short-term SVE pilot tests in order to assess hydrocarbon removal by vapor means. The single well tests indicated that approximately 1 to 2 cubic feet per minute per linear foot of screen can be obtained with applied vacuums ranging from 45 to 233 inches of water.



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### 1. INTRODUCTION

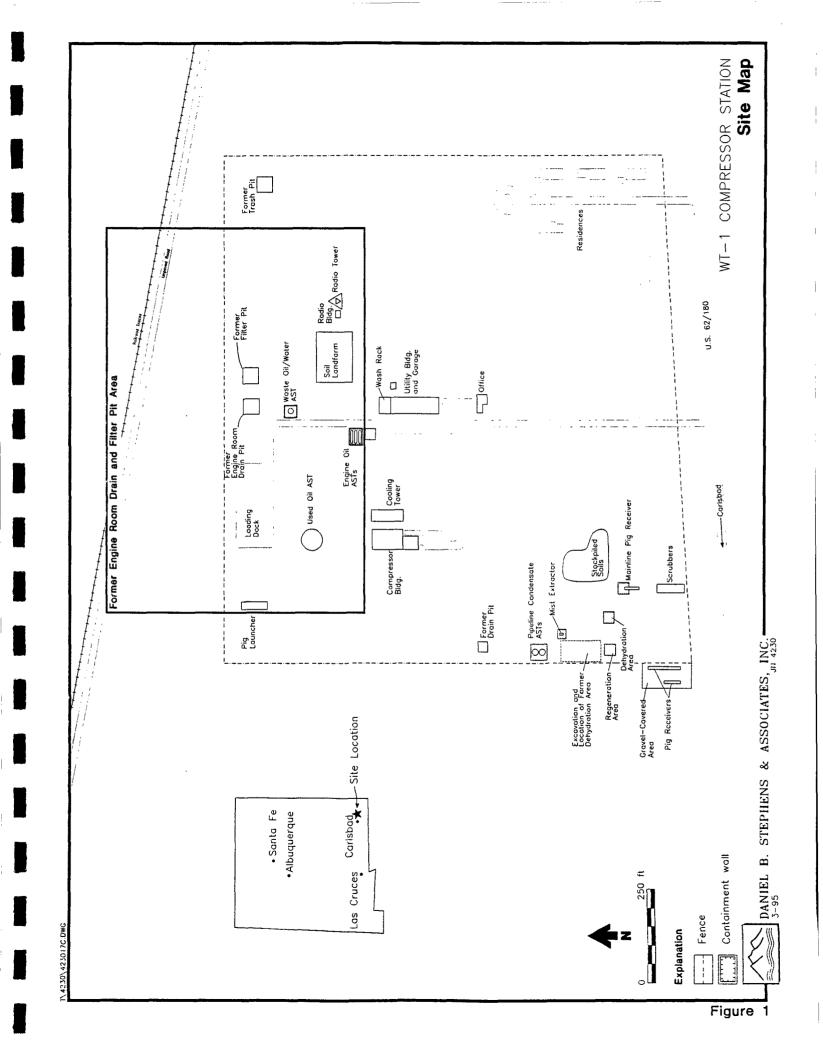
ENRON Operations Corp. (EOC) retained Daniel B. Stephens & Associates, Inc. (DBS&A) to conduct a supplemental environmental investigation (SEI) of soils and ground water underlying Transwestern Pipeline Company's (TPC) WT-1 Compressor Station. The site is located approximately 30 miles east of Carlsbad, New Mexico along U.S. Highway 62. The general site layout, showing the location of buildings, liquid storage areas, and the current area of investigation, is provided in Figure 1.

The compressor station boosts the pressure of the natural gas stream originating from two lateral pipelines and one primary pipeline heading toward Roswell, New Mexico. Past operational practices at the facility resulted in the release of waste liquids to the subsurface, primarily through the use of disposal pits. The engine room drain and filter pits (engine room pits) along the northern fence line received spent lubrication oils, degreasers, and filters generated during routine engine maintenance. Soil and ground-water impacts resulting from the use of the engine room pits are the subject of this report.

Previous hydrogeologic investigations at the site have identified impacts to soil and perched ground water underlying the former engine room pits (Metric Corporation, 1991; Brown & Root Environmental, 1993). The objectives of the SEI were to evaluate (1) the extent of subsurface impacts identified along the northern fence line by previous investigators, (2) the vertical extent and the hydraulic characteristics of the perched ground-water system, and (3) soil vapor extraction (SVE) parameters for future remedial design.

The SEI was conducted during the period of November 15 through December 1, 1994. In order to evaluate areas of potential hydrocarbon releases, DBS&A analyzed soils for volatile organic compounds (VOCs) using field and laboratory techniques. In addition, ground-water samples were submitted for analyses of organic and inorganic constituents to determine if water quality standards set by the New Mexico Water Quality Control Commission (NMWQCC) were exceeded. Specifically, the DBS&A investigation near the engine room pits included the following work:

• Three existing monitor wells near the engine room pits were sampled.





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- Five monitor wells, two temporary ground-water sampling borings, and one dualcompletion SVE well were installed.
- Soil samples were collected from each boring for field and laboratory analyses.
- Ground-water samples were collected from the newly installed monitor wells for laboratory analyses.
- Five hydraulic tests were conducted.
- Four SVE pilot tests were performed.
- The locations of all monitor wells were surveyed.

This report presents the methods and results of the investigation. Section 2 provides background information on the compressor station, including a summary of previously completed environmental work at the former engine room drain and filter pits. Section 3 describes the field procedures used during the investigation and the findings of the subsurface investigation. Section 4 provides a summary of the interim corrective actions completed by TPC and the SVE pilot tests conducted by DBS&A. Finally, Section 5 provides a summary of and the conclusions derived from the investigation.

Concurrently with the investigation of the former engine room drain and filter pits, DBS&A investigated another area at the compressor station, the former dehydration area near the southwest corner of the site. Investigation activities conducted by DBS&A in this area are described in a separate report (DBS&A, 1995).

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# 2. SITE BACKGROUND

This section provides background information relevant to DBS&A's investigation. Section 2.1 describes the site in greater detail. Section 2.2 describes the regional hydrogeologic setting. Section 2.3 provides a summary of previous environmental investigations undertaken at the former engine room drain and filter pits.

# 2.1 Site Description

The compressor station is situated on approximately 40 acres of land within Township 20 S, Range 32 E, Section 31 of Lea County, New Mexico. The site is located within the Pecos Valley section of the Great Plains physiographic province. The surrounding area is characterized by an irregular (hummocky) erosional surface containing numerous internally drained flat-bottomed playas. The interior drainages have formed in response to dissolution of underlying salt deposits and the subsequent collapse of overlying sedimentary beds. The ground at the compressor station gently slopes northward toward a collapse feature, and directly south of U.S. Highway 62, the ground surface slopes toward the southwest into another collapse feature known as Nash Draw. The station elevation is about 3550 feet above mean sea level; the mean annual precipitation is about 9 inches. Vegetative cover mostly consists of native grasses adapted to the arid environment.

## 2.2 Regional Hydrogeologic Framework

The stratigraphic units of importance regarding the regional hydrogeologic framework are, in ascending order, (1) the Permian Dewey Red Beds, (2) Triassic Santa Rosa sandstone, and (3) the Quaternary Gatuña Formation and Mescalero caliche. In general, potable ground water is not present below the Permian-Triassic unconformity marked by the contact between the Dewey Lake Red Beds and the Santa Rosa sandstone (Nicholson and Clebsch, 1961). Because of the limited occurrence of water, the compressor station receives its water from a pipeline that supplies local ranchers and industry. Sections 2.2.1 through 2.2.3 describe in detail the stratigraphic units present.



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# 2.2.1 Dewey Lake Red Beds

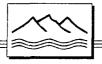
The Dewey Lake Red Beds consist of alternating thinly bedded sequences of reddish brown siltstones, shales, and very fine- to fine-grained sandstones. The sediments are frequently gypsiferous and are mottled by greenish-gray reduction spots (Lucas and Anderson, 1993). Lithologically, the sediments are well sorted, well rounded quartzarenites to slightly micaceous quartzarenites. In the vicinity of the site, the formation ranges in thickness from approximately 350 to 550 feet, thinning toward the west (Mercer, 1983). The formation impedes the interchange of perched water within the overlying Santa Rosa sandstone with the underlying evaporite-bearing rocks of Permian age.

# 2.2.2 Santa Rosa Sandstone

An erosional unconformity marks the contact between the Permian Dewey Lake Red Beds and the overlying Santa Rosa sandstone of Late Triassic age. The Santa Rosa sandstone consists of fine- to coarse-grained, poorly to moderately sorted, subangular to subrounded micaceous sandstones and conglomerate with interbeds of siltstone and mudstone (Mercer, 1983). In comparison to the Dewey Lake Red Beds, the formation is a relatively immature litharenite that does not contain gypsum.

The Santa Rosa sandstone is the lowest member of the Dockum group. The upper member of the Dockum group, the Chinle Formation, is absent in the area. The Santa Rosa sandstone is approximately 75 feet thick near the site and thickens rapidly to the east (Bachman, 1987).

The recharge area for the Santa Rosa sandstone is along north-trending outcrops located just west of the site and possibly along the Mescalero Ridge located approximately 15 miles to the north. Ground-water maps produced by Nicholson and Clebsch (1961) indicate a regional flow direction generally coincident with the south and east dip of the Triassic beds. However, on a more local scale, Wright (1990) presented monitor well water level data that indicated a northwesterly flow direction toward Laguna Totson. At the compressor station, ground-water elevations measured by DBS&A are consistent with a northwesterly flow direction or toward the internally drained basins (Section 3.2).



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Regional studies differ over the location of the Permian-Triassic boundary, the presence of internally drained regions, and perched ground-water lenses. This lack of consensus makes regional correlations extremely difficult with respect to formational contacts and flow directions. One area of agreement amongst previous investigators is that the Santa Rosa sandstone provides low yields to wells due to low formation permeability. Nicholson and Clebsch (1961) estimated the porosity of the formation to be on the order of 13 percent.

#### 2.2.3 Gatuña Formation and Mescalero Caliche

The Quaternary Gatuña Formation is distributed intermittently over a broad area in the Pecos drainage system. It consists of generally poorly consolidated pale reddish brown to yellowish sand, sandy clay, lenticular beds of gravel, and caliche that can be gypiferous. The unit was deposited primarily in channels and depressions probably related to the dissolution of underlying Permian Formations. The Gatuña Formation ranges from 0 to 100 feet thick in the region and thins to the east as it laps onto topographically high areas. This unit may be present in the most northern extent of the investigated area (Section 3.2). Ground water, if present, is restricted to discontinuous perched zones (Mercer, 1983).

The Gatuña Formation, and the Santa Rosa sandstone where the Gatuña Formation is not present, are covered with a caliche horizon of middle Pleistocene age that is informally referred to as the Mescalero caliche. The caliche was thought to be formed by calcium carbonate from migrating sands leaching into underlying soil horizons (Bachman, 1987).

# 2.3 **Previous Hydrogeologic Investigations**

The first investigation at the compressor station was performed by Metric Corporation in October 1991. Metric advanced a total of 6 soil borings (BH-1 through BH-6) to investigate subsurface conditions near the former engine room drain and filter pits, trash pit, and drain pit (Figures 1 and 2). Metric tested soil samples for the presence of VOCs using an organic vapor meter (OVM) and selected 2 to 3 samples from each soil boring (based on the OVM field screen) for submission to a laboratory for chemical analyses. Soil samples were analyzed for total recoverable petroleum hydrocarbons (TRPH) using EPA method 418.1, benzene, toluene,

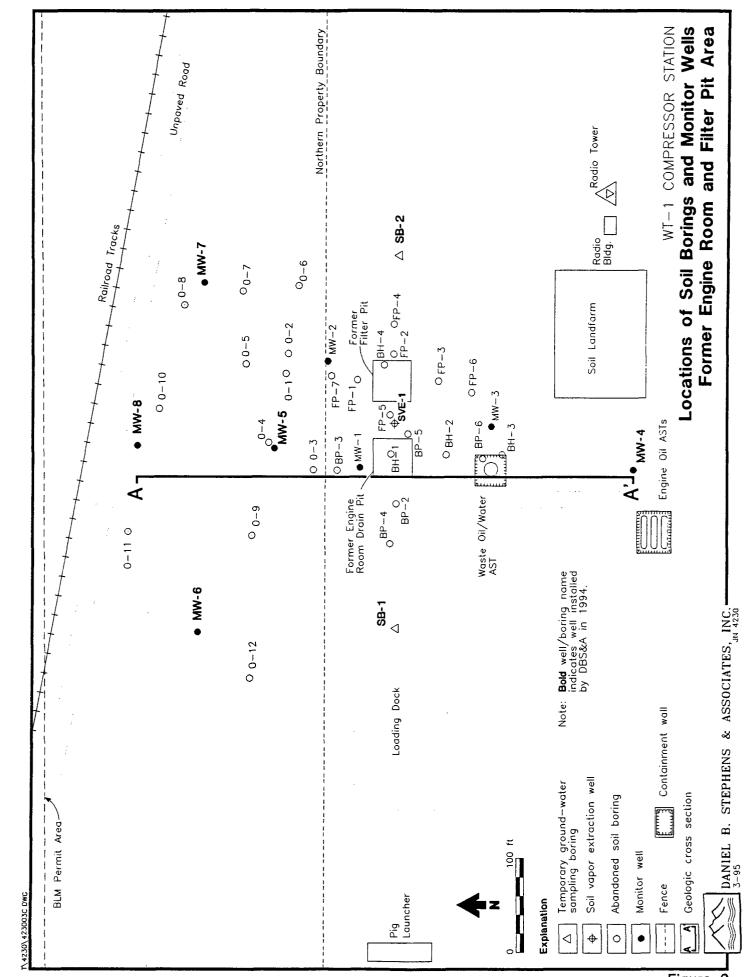


Figure 2



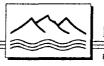
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ethylbenzene, and xylene (BTEX) using EPA method 8020 (modified), and selected organic compounds and metals using the toxic characteristic leaching procedure (TCLP).

Metric determined that actionable soil impacts were limited primarily to the engine room drain and filter pit area shown in Figure 2. The New Mexico Oil Conservation Division (OCD, 1993) regulatory guideline of 100 mg/kg total petroleum hydrocarbons (TPH) was exceeded for soils collected from borings BH-1, BH-2, and BH-4, located near the former engine room drain and filter pits. However, the OCD regulatory guideline of 50 mg/kg for total BTEX and the Environmental Protection Agency (EPA) TCLP limits (Code of Federal Regulations, Title 40, Section 261.24[b]) were not exceeded in any of the analyzed soils.

During the period of August through October 1992, Brown & Root Environmental advanced 28 soil borings and installed 3 monitor wells (MW-1 through MW-3 on Figure 2) to delineate the extent of subsurface impacts identified by Metric. Soil and ground-water samples were analyzed for TPH, BTEX, and TCLP organic compounds and metals. In order to drill off-site, TPC acquired access from the U.S. Bureau of Land Management for an area extending 300 feet north and west of the site fence line.

Brown & Root confirmed that actionable soil contamination is limited to the area immediately surrounding the engine room drain and filter pits and that ground-water impacts extend off-site to the north. Several core samples collected from soil borings near the former pits contained phase-separated hydrocarbons (PSH), and soil boring O-3 and monitor well MW-2 had measurable thicknesses of PSH in contact with the water table. Total BTEX concentrations ranged from non-detectable to over 1,900  $\mu$ g/L for ground-water samples collected during the investigation. With the exception of samples collected from soil boring BP-2, soil and ground-water samples did not exceed TCLP limits for the analyzed organic compounds and metals.



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# 3. SUBSURFACE INVESTIGATIONS

The following sections describe the subsurface investigation conducted by DBS&A in order to evaluate the extent of impacts identified by previous investigators. The general field procedures followed during this investigation are outlined in Section 3.1. Sections 3.2 and 3.3 describe the results of the site characterization and investigation. All field work was conducted in accordance with DBS&A standard operating procedures and a site-specific health and safety plan developed for the field program.

# 3.1 Drilling and Sampling Procedures

During the investigation, DBS&A installed five monitor wells, two temporary ground-water sampling borings, and one dual-completion SVE well to establish the distribution of soil and ground-water impacts, the direction of ground-water flow, ground-water hydraulics, and SVE design parameters. Drilling at the site was completed by Eades Drilling Company of Hobbs, New Mexico, using an Ingersoll Rand TH-75W air-rotary drilling rig. Drilling equipment and sampling devices were steam cleaned and inspected by DBS&A personnel prior to beginning each boring. In addition, all sampling equipment was decontaminated prior to each use by washing with Liquinox<sup>®</sup> detergent followed by a deionized water rinse.

## 3.1.1 Soil Sampling

As each borehole was advanced, core-barrel samples were collected at 5-foot intervals for geologic logging. In addition, drill cuttings were inspected to aid in logging. Appendix A contains the lithologic logs produced for each boring and, where applicable, the corresponding well construction diagrams.

Soil samples collected during drilling were tested for the presence of VOCs with an OVM equipped with a photoionization detector (PID). Field PID measurements were used to determine the presence of contaminated soils above applicable guidelines (those with PID readings greater than 100 parts per million volume [ppmv]) as described by OCD (1993). Drill cuttings generated



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during the investigation were stockpiled on clean plastic; one composite sample was collected from each investigation area to determine proper disposal.

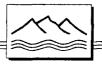
In general, the soil sample yielding the highest PID reading above background measurements and the soil sample collected from immediately above the water table were retained for laboratory analysis of TPH (EPA method 8015 modified) and BTEX. Soil samples collected from well SVE-1 were also analyzed for halogenated VOCs (EPA method 8010). All samples were collected in 250-ml glass jars and placed in an ice-filled cooler for shipment to Hall Environmental Analysis Laboratory (HEAL) in Albuquerque, New Mexico.

# 3.1.2 Well Installation

Monitor well borings were drilled to approximately 10 feet below the water table, or the bottom of the perched ground-water zone, whereupon a 2-inch-diameter monitor well was constructed in order to evaluate ground-water quality. The monitor well MW-4 soil boring was drilled approximately 20 feet below the perching layer for additional characterization of subsurface lithology and was subsequently backfilled with bentonite to the top of the perching layer prior to monitor well construction. Monitor wells were constructed with 15 feet of 2-inch, 0.010-inch machine-slotted polyvinyl chloride (PVC) screen, approximately 45 feet of flush-threaded 2-inch PVC blank casing, and 17 feet of 12-20 silica sand filter pack. Bentonite seals were emplaced on top of the filter packs, followed by a cement-bentonite grout to the ground surface. Surface completions consisted of 12-inch-diameter flush-grade vaults set within concrete.

In order to evaluate SVE design parameters, well cluster SVE-1 was drilled to a depth of approximately 5 feet below the water table. The well cluster consisted of two SVE wells with unique screened intervals. The wells were designated SVE-1A and SVE-1B for the deep and shallow zones, respectively (Appendix A). The annulus surrounding each screened interval was completed with 12-20 silica sand filter pack. A bentonite seal was placed between the two screened zones in order to isolate them. The upper bentonite seal was followed by a cement-bentonite grout to ground surface, whereupon the surface was completed as described for the monitor wells.

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Temporary ground-water sampling borings were drilled to a depth of 10 feet below the water table, whereupon a 2-inch-diameter galvanized steel pipe attached to a well screen was lowered into the open borehole. Following collection of ground-water samples, the temporary well was removed from the open boring and the hole was abandoned with cement-bentonite grout poured from the surface.

Following well installation, all borings and monitor wells installed by DBS&A were surveyed relative to the northeast property corner (for horizontal control) and mean sea level by John W. West Engineering Co. of Hobbs, New Mexico. Additionally, monitor wells installed by previous investigators were surveyed to the same reference so that accurate determination of ground-water flow directions could be made. A summary of completion information for wells and soil borings installed in the former engine room drain and filter pit area is provided in Table 1.

## 3.1.3 Ground-Water Sampling

During the investigation, ground-water samples were collected from each monitor well at the site. Prior to sampling, the depth to water was measured. The presence or absence of PSH was checked with product-finding paste and a fiberglass tape. The well was then bailed until approximately three casing volumes were purged or until the well was dry. During purging, field parameters (pH, temperature, and electrical conductivity) were measured and recorded every half casing volume. Purged ground water was contained in 55-gallon drums to be disposed by TPC upon receipt of analytical results. Ground-water samples were collected using dedicated, disposable polyethylene bailers.

Ground-water samples were analyzed for halogenated and aromatic VOCs (EPA method 8010/8020), TPH (EPA method 8015 modified), polynuclear aromatic hydrocarbons (PAHs) (EPA method 8100), major ions, total dissolved solids (TDS), and metals regulated by the NMWQCC. Samples were shipped in ice-filled chests to HEAL for organic analyses and to Analytical Technologies, Inc. (ATI) for inorganic analyses. Both laboratories are located in Albuquerque, New Mexico.

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# Table 1. Monitor Well/Soil Boring Locations and November 1994 Water Table Elevation Data Former Engine Room Drain and Filter Pits

	Loce	Location		Measuring Point <sup>3</sup>	Depth to Water from	Water Tahla	Total	Coroonod	Ton of
Well/Boring <sup>1</sup>	South <sup>2</sup> (feet)	West <sup>2</sup> (feet)	Date of Completion	Elevation (feet above msl)	Measuring Point <sup>3</sup> (feet)	Elevation (feet above msl)	Boring Depth (feet bgs)	Interval (feet bgs)	Silica Sand (feet bgs)
MW-1 <sup>4</sup>	36.2	661.8	08/12/92	3547.67	47.59	3500.08	53.5	43.5-53.5	41.0
MW-2 <sup>4</sup>	2.8	552.0	09/01/92	3546.28	PSH only	NA	50.0	40.0-50.0	38.0
MW-3⁴	174.5	619.3	08/28/92	3548.99	48.71	3500.28	48.5	38.5-48.5	35.5
MW-4	322.5	664.2	11/29/94	3548.29	47.18	3501.11	80.0	43.5-58.5	41.0
MW-5	-52.4	642.0	11/29/94	3543.59	48.68	3494.91	59.6	44.6-59.6	41.0
9-MM	-132.1	834.3	11/28/94	3543.29	50.22	3493.07	61.0	46.0-61.0	42.5
7-WM	-129.5	470.6	11/21/94	3541.97	47.67	3494.30	56.0	40.0-55.0	37.0
MW-8	-195.3	639.1	11/20/94	3541.47	49.20	3492.27	59.0	44.0-59.0	42.0
SB-1	74.9	830.2	11/20/94	3545.97 <sup>5</sup>	46.68	3499.29 <sup>6</sup>	56.8	NA	NA
SB-2	78.0	442.1	11/19/94	3543.67 <sup>5</sup>	46.84	3496.83 <sup>6</sup>	56.0	NA	NA
SVE-1A	73.0	616.0	11/18/94	3545.58	45.38	3500.20	53.0	42.5-52.5	41.2
SVE-1B	73.0	616.0	11/18/94	3545.61	AN	NA	37.5	21.0-36.0	18.3

Survey conducted by John W. West Engineering, Hobbs, NM; all measurements were made in November 1994.

<sup>1</sup> Refer to Figure 2 for locations <sup>2</sup> South and west coordinates relative to northeast property corner

<sup>3</sup> Measuring point is top of PVC casing <sup>4</sup> From Brown & Root Environmental, February 1993

msl = Mean sea level bgs = Below ground surface PSH = Phase-separated hydrocarbons NA = Not applicable

<sup>6</sup> Measuring point is top of cement plug
<sup>6</sup> Water table elevation suspect due to incomplete recovery

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In order to check intralaboratory precision, quality assurance/quality control samples, consisting of trip blanks and sample replicates, comprised approximately 5 percent of the water samples collected. Appendix B contains the HEAL and ATI reports with the supporting quality assurance and chain-of-custody documents for all soil and water samples submitted for analysis.

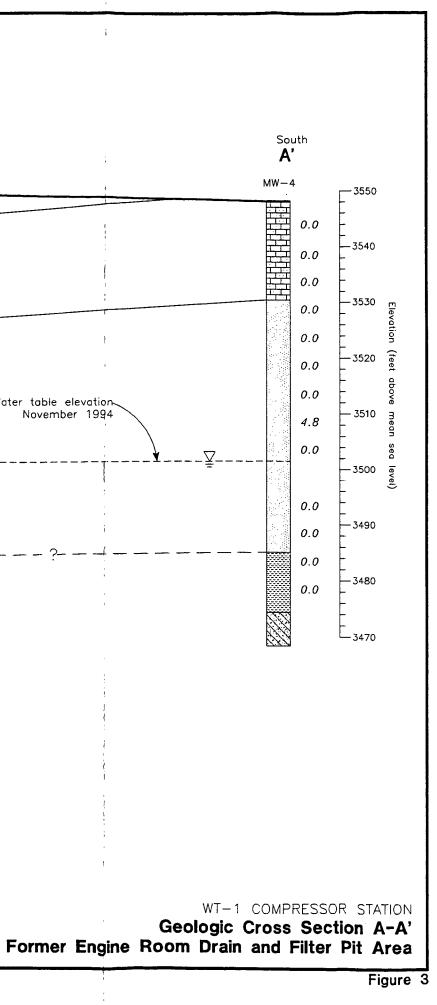
# 3.2 Site Hydrogeology

A hydrogeologic cross section developed from lithologic descriptions is provided as Figure 3; the location of the cross section is shown on Figure 2. Borings advanced during the investigation intersected sediments of the Mescalero caliche, and perhaps the Gatuña Formation at the northernmost extent of the investigation, and alternating sandstones, siltstones, and mudstones of the underlying Santa Rosa sandstone. In general, the lithology of the sediments directly underlying the site consist of the following:

- From ground surface to approximately 1.5 feet below ground surface (bgs), a brown to reddish gray gravelly sand to silty sand was encountered. The unit is poorly sorted, angular to rounded, unconsolidated, calcareous, and dry.
- From 1.5 to approximately 15 feet bgs, a pinkish gray to reddish orange, poorly to strongly consolidated sandy caliche (locally referred to as the Mescalero caliche) was encountered. The sand is fine- to medium-grained, well sorted, subrounded to rounded, and dry. The unit grades downward into a calcareous silty sandstone.
- From approximately 15 to 25 feet bgs, a light brown to reddish orange calcareous silty sandstone to sandstone is present. The unit is very fine- to medium-grained, poorly sorted, subangular to rounded, poorly to moderately consolidated, sometimes gypsiferous, and dry. This unit represents a transitional zone between overlying caliche and underlying Santa Rosa sandstone. The presence of gypsum at the northern part of the study area suggests that this unit may correspond to the Quaternary Gatuña Formation.
- From approximately 25 to 55 feet bgs, a moderate reddish brown sandstone and silty sandstone is present. The unit is very fine- to medium-grained with minor coarse-grained

North A

MW-3 3550-SVE-1 MW-5 MW-6 MW-8 Silty sand with gravely 0.0 -0.0 3540-0.0 0.0 0.0 0.0 НННН 0.0 Caliche 0.0 0.0 0.0 7.1 3530-0.0 0.0 0.0 29.2 level) 3.0 0.0 able 0.0 25.3 3520-0.0 avai sea 0.0 0.0 35.0 data an Sandstone with some 0.0 0.0 silty to clayey sandstone 0.0 Ŷ Water table elevation 85.0 Ξ 3510-November 1994 0.0 0.0 0.0 abo 33.1 3.0 0.0 0.0 tee (Leef 3500-0.0 422 Elevation 20.1. 0.0 42.2 0.0 <u>\_</u> 0.0 3490-222 222 222 0.0 0.0 3480-Approximate top of perching layer 3470— Note: Information for well MW-3 is from Brown & Root Environmental (1993). 50 ft Horizontal Scale Explanation Corrected PID reading (ppmv) 110 .Sandstone Clayey and/or silty sandstone Silty sand with gravel Clayey sand Mudstone Caliche DANIEL B. STEPHENS & ASSOCIATES, INC. =  $_{3-95}$  JN 4230 3-95





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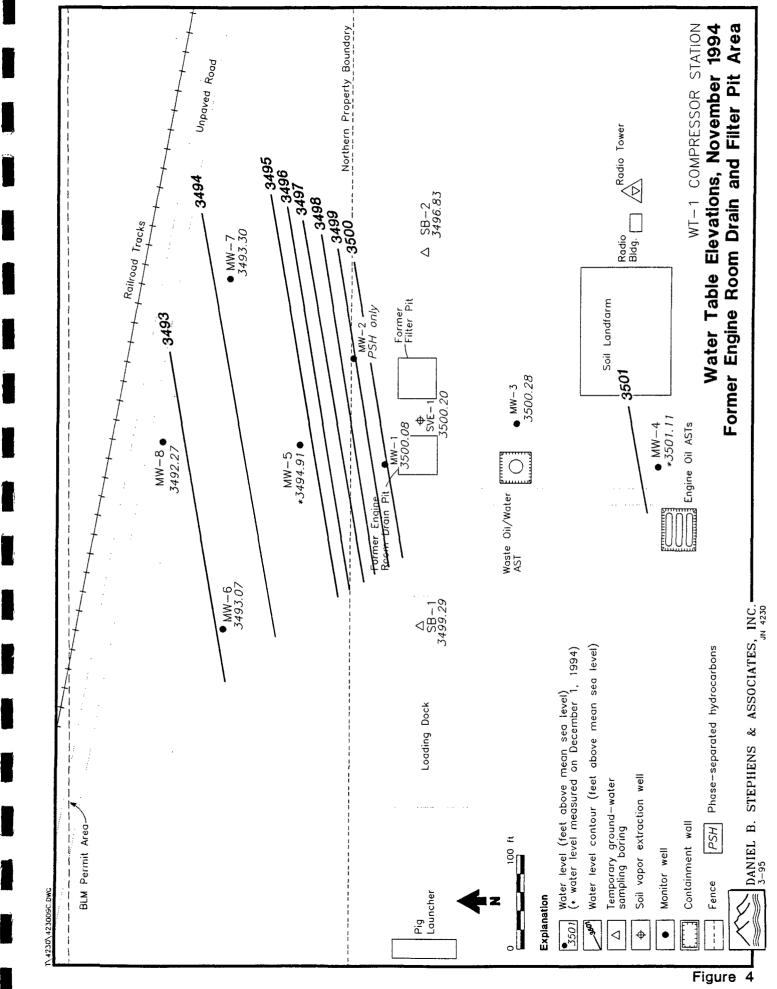
zones and some siltstone and mudstone layers that become more abundant with depth. The unit is often micaceous and is poorly to well sorted, subangular to rounded, and moderately to strongly consolidated with carbonate and noncarbonate cements. The sediments are often moist to wet where interbedded with mudstone.

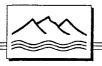
 From approximately 55 to 80 feet bgs, a light brown to moderate reddish brown sandstone to clayey sandstone is present. The sandstone is generally silty or very fine-grained with interbeds of clay, mudstone, and siltstone. The interval is poorly to strongly consolidated. Moisture content ranges from dry to saturated.

Ground water beneath the site is unconfined and occurs approximately 45 to 55 feet bgs based on November to December 1994 measurements (Table 1; DBS&A, 1995). The depth to water measurements listed on Table 1 represent the highest water table elevations recorded during the entire period of the field program. Following well completion, multiple measurements indicated that the water level recovery to static conditions required several hours to days as a result of the low permeability of the bedrock.

Ground water in the Santa Rosa sandstone is perched upon clays and mudstone present at approximately 60 feet bgs across the site. The perching layer is at least 20 feet thick based on lithologic descriptions from monitor well MW-4 (Appendix A). The saturated thickness of the perched zone appears to be controlled by the presence of local recharge and the textural composition of the underlying perching layer. Based on field observation, ground water that is perched upon the underlying units appears to be less than or equal to 10 feet thick.

A water table elevation map generated from depth to water measurements is shown in Figure 4. The map indicates that ground water generally flows toward the north-northwest, a finding that agrees with the flow direction determined by Wright (1990). The hydraulic gradient in the perched system averages 0.015 ft/ft, but ranges from 0.004 ft/ft near monitor well MW-3 to 0.064 ft/ft immediately downgradient of the engine room pits. The variation in local hydraulic gradient likely results from localized recharge near the former engine room waste pits.





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# 3.2.1 Hydraulic Testing and Data Analysis

Following well completion, DBS&A conducted bail-recovery tests on monitor wells MW-4, MW-5, and MW-8, as well as on MW-9 and MW-12 (DBS&A, 1995), to evaluate the in-situ hydraulic conductivity of the perched ground-water system. The five tests provided an expedient means of estimating local hydraulic conductivity (K). The test procedure consisted of bailing each monitor well dry and monitoring the recovery of the water level to the initial static level if practicable. The water level recovery was recorded at frequent intervals using a electronic water level indicator.

The bail-recovery test data were analyzed using an equation developed for recovery from constant rate pumping (Cooper and Jacob, 1946). The solution is a modification of the Theis equation for ground-water flow toward a pumping well. The solution can be applied to late-time data by treating the bail-down tests as short-term pumping tests. Late-time data are used to avoid well bore storage effects, which can significantly distort the early recovery data.

The procedure requires a graphical plot of residual head or recovery (arithmetic scale) versus t/t' (logarithmic scale). The value of t/t' equals the total time since bailing initially began divided by the time since bailing stopped. The total recovery over one log cycle and the average bailing rate are used to estimate transmissivity. The calculated transmissivity is then divided by the saturated thickness to estimate the average hydraulic conductivity for the test zone. Data plots resulting from the bail-recovery test analyses are included in Appendix C.

The estimated values of K for the five tests ranged from 2.5 x  $10^{-3}$  ft/day to 2.0 x  $10^{-1}$  ft/day with a geometric mean of 5.0 x  $10^{-2}$  ft/day (Table 2). Estimates of specific yield (S<sub>y</sub>) cannot be obtained by this method, but based on the observed grain size distributions and cementation, S<sub>y</sub> values are probably on the order of 0.04 to 0.08 for the perched system.



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# Table 2. Results of Hydraulic TestsWT-1 Compressor Station

Monitor Well	Hydraulic Conductivity <sup>1</sup> (ft/day
MW-4	2.0 x 10 <sup>-1</sup>
MW-5	2.5 x 10 <sup>-3</sup>
MW-8	7.4 x 10 <sup>-2</sup>
MW-9	6.1 x 10 <sup>-2</sup>
MW-12	<b>1.4 x 10</b> <sup>-1</sup>
Geometric mean	5.0 x 10 <sup>-2</sup>

<sup>1</sup> Calculated using Jacob-Cooper (1946) method

# 3.2.2 Rate of Ground-Water Movement

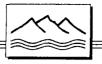
Average ground-water flow velocities can be estimated by Darcy's Law, using the following equation:

$$V = \frac{Ki}{n_e}$$

where v = average pore velocity

- K = hydraulic conductivity
- i = hydraulic gradient
- $n_e = effective porosity$

Assuming an effective porosity of 0.06 (estimated as 50% of total porosity), an average hydraulic gradient of 0.015, and a geometric mean hydraulic conductivity of 5.0 x  $10^{-2}$  ft/day (1.8 x  $10^{-5}$  cm/sec), the average ground-water velocity at the site is approximately 5 ft/yr. This equation provides a relatively high estimate of contaminant transport rates since it does not take into account retardation effects that inhibit contaminant migration.



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# 3.3 Delineation of Subsurface Impacts

As described in Section 3.1, soil and ground-water samples were collected from each monitor well and analyzed for organic and inorganic constituents. Appendix A contains the results of the headspace analysis for each boring, and analytical chemistry results are provided in Appendix B. The extents of soil and ground-water impacts near the former engine room pits are discussed in Sections 3.3.1 and 3.3.2, respectively.

# 3.3.1 Soil Impacts

Headspace analysis and analytical chemistry results for samples collected during the DBS&A SEI revealed that hydrocarbon concentrations near the former engine room pits were either not detectable or were well below OCD guidelines for hydrocarbons in soil. Table 3 summarizes organic analytical data for soils sampled by DBS&A in the investigation area.

Based on the data collected to date, it appears that actionable hydrocarbon impacts are limited to a roughly elliptical area centered between the two former pits covering an area of approximately 0.7 acre. Figure 5 shows in plan view the estimated extent of actionable soil contamination, based on the OCD regulatory guideline of 100 mg/kg for TPH, originating from the engine room pits. The posted values on Figure 5 represent the highest measured hydrocarbon concentrations based on samples collected during past and present investigations. Hydrocarbon contamination has spread laterally while migrating so that, as one moves farther away from the pits, the vertical extent of soil impacts diminish.

One soil sample was collected from well SVE-1 and analyzed for halogenated VOCs (EPA method 8010) to determine if these compounds had been released from the former engine room pits. The analyses indicated that low concentrations of 1,1,-dichloroethane (1,1,-DCA), tetrachloroethene (PCE), and 1,1,1-trichloroethane (1,1,1-TCA) are present in soil near the former pits (Table 3).

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# Table 3. Summary of Soils Analyses for Organic Constituents Former Engine Room Drain and Filter Pits

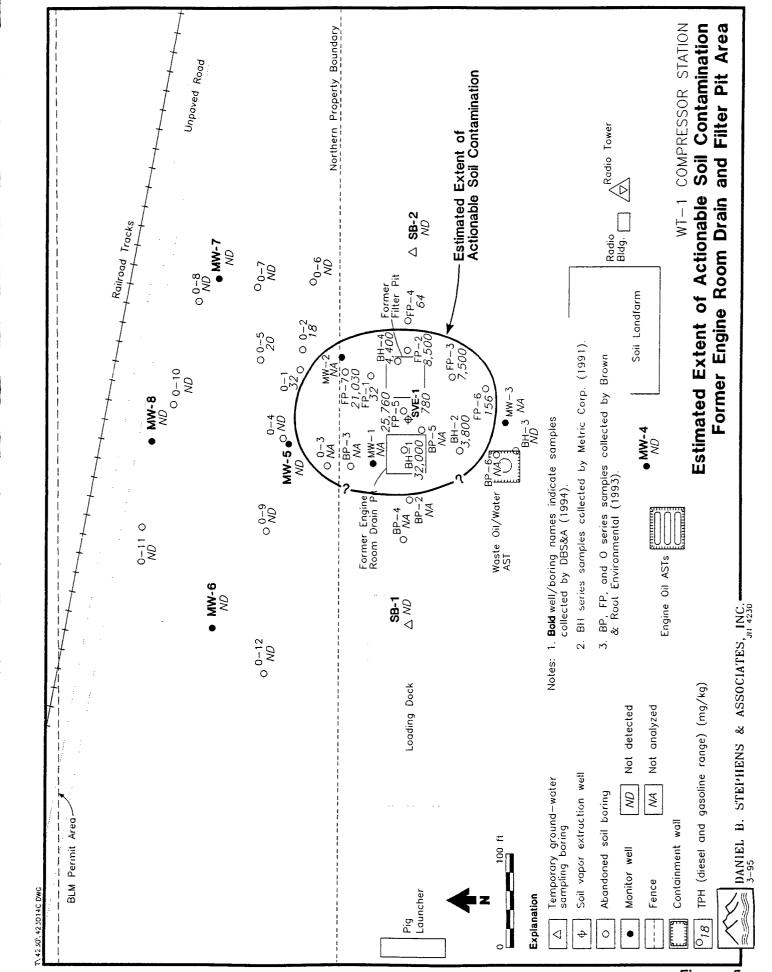
						Sample No. (Sample Date)	le No. e Date)				
		MW-4	MW-5	MW-5	9-WW	7-WM	MW-8	SB-1	SB-2	SVE-1	SVE-1
	Detection	@ 47'	@ 35'	@ 47'	@ 48'	@ 45'	@ 45'	@ 47'	@ 45'	@ 30'	@ 45'
Constituent	Limit	(11/29/94)	(11/29/94)	(11/29/94)	(11/29/94)	(11/21/94)	(11/18/94)	(11/18/94)	(11/18/94)	(11/18/94)	(11/18/94)
Total petroleum hydrocarbons by EPA method 8015 modified (mg/kg)	carbons by	EPA methe	od 8015 mo	dified (mg/	kg)						
Gasoline range (C <sub>6</sub> -C <sub>16</sub> )	5.0	ΟN	DN	DN	QN	Q	QN	Q	QN	140 <sup>a</sup>	63
Diesel range (C <sub>16</sub> -C <sub>36</sub> )	5.0	QN	QN	DN	ΟN	ΠN	ND	DN	ND	640 <sup>b</sup>	98°
Aromatic VOCs by EPA method 8020 (mg/kg)	4 method 8	1020 (mg/kg	(								
Benzene	0.05	QN	QN	ND	ND	ΠN	QN	QN	QN	₽Da	QN
Toluene	0.05	QN	QN	DN	ND	ND	ND	QN	QN	0.08 <sup>d</sup>	0.05
Ethylbenzene	0.05	DN	DN	ND	ND	ΠN	DN	QN	QN	0.13 <sup>d</sup>	QN
Total xylenes	0.05	Q	QN	DN	DN	QN	ND	QN	QN	1.3 <sup>d</sup>	0.82
Halogenated VOCs by EPA method 8010 (mg/kg)	EPA metho	od 8010 (mg	Vkg)								
1,1-Dichloroethane	0.01	NA	NA	NA	NA	NA	NA	NA	NA	0.4 <sup>d</sup>	NA
Tetrachloroethene	0.01	NA	NA	NA	NA	NA	NA	NA	NA	8.2 <sup>d</sup>	NA
1,1,1-Trichloroethane	0.01	AN	NA	NA	AN	NA	NA	NA	NA	7.3 <sup>d</sup>	NA

Notes: All analyses performed by Hall Environmental Analysis Laboratory, Albuquerque, NM

 Not detected
 Volatile organic compounds
 Not analyzed ND VOCs NA

<sup>a</sup> Sample analyzed at 5x dilution <sup>b</sup> Sample analyzed at 10x dilution; motor oil range hydrocarbons at ~33,000 mg/kg <sup>c</sup> Sample analyzed at 10x dilution; motor oil range hydrocarbons at ~860 mg/kg <sup>d</sup> Sample analyzed at 2x dilution

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# 3.3.2 Ground-Water Impacts

Tables 4 and 5 summarize the constituents detected in ground water beneath the former pits. The NMWQCC standard is also given in each table for comparison. Based on analyses of aromatic and halogenated VOCs and PAHs, the compounds that exceeded the NMWQCC standards are benzene, 1,1-DCA, and vinyl chloride. As shown in Table 4, ground-water samples from monitor wells MW-1, MW-5, and MW-8, temporary ground-water sampling borings SB-1 and SB-2, and SVE well SVE-1A contained organic compounds at concentrations exceeding the NMWQCC standards for one or more of the above compounds. Monitor well MW-2 was not sampled due to the absence of water and the presence of approximately 3.6 feet of PSH.

The TPH analyses indicated that petroleum hydrocarbons detected in ground water were primarily high-molecular-weight (diesel range) compounds (Table 4). The hydrocarbon composition is consistent with an engine lubrication oil source.

Benzene concentrations were slightly above the NMWQCC standards throughout much of the investigated area and displayed no particular concentration gradients or trends. Benzene is a relatively minor component of lubrication oils. In contrast, 1,1-DCA concentrations were highest near the former pits, as evidenced by data from monitor well MW-1, and decreased in the downgradient direction. Low concentrations of other organic compounds were detected in ground water, but were below NMWQCC standards. Figures 6 and 7 depict the distribution of selected organic compounds in the ground water beneath the former engine room pits.

The inorganic chemical analyses indicated that ground-water samples from each monitor well, including upgradient monitor well MW-4, exceeded the NMWQCC standards for TDS and chloride (Table 5). Several samples also exceeded NMWQCC standards for manganese, barium, and/or sulfate.



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# Table 4. Summary of Ground-Water Analyses for Organic Constituents Former Engine Room Drain and Filter Pits Page 1 of 2

						Well/Bo (Sampl	Well/Boring No. (Sample Date)					
Constituent	Detection Limit	MW-1 MW-3 (11/15/94) (11/16/94)		MW-4 (12/01/94)	MW-5 (12/01/94)	MW-6 (11/30/94)	MW-7 (11/22/94)	MW-8 (11/30/94)	SB-1 (11/22/94)	SB-2 (11/19/94)	SVE-1A (11/19/94)	NMWQCC Standard
Total petroleum hydrocarbons by EPA method 8015 modified	carbons by	EPA metho	od 8015 mo	odified (mg/L)	(1)							
Gasoline range (Ce-C16)	0.05	1.6ª	QN	QN	0.35	DN	QN	DN	0.13	0.16	0.98	None
Diesel range (C <sub>16</sub> -C <sub>36</sub> )	1.0	16 <sup>b</sup>	QN	DN	6.9°	QN	ND	DN	ND	1.5 <sup>b</sup>	3.5 <sup>d</sup>	None
Aromatic VOCs by EPA method 8020 (µg/L)	A method 8	1020 (Jug/L)										k
Benzene	0.5	12°	5.0	QN	20	1.8	7.0	12	16	24	12	10
Foluene	0.5	100	ND	QN	19	QN	QN	QN	29	ND	18	750
Ethylbenzene	0.5	100	QN	ND	8.3	ND	ND	ND	2.1	3.2	4.6	750
Fotal xylenes	0.5	110°	0.5	ND	26	0.5	ND	ND	19	0.7	15	620
Halogenated VOCs by EPA method 8010 (µg/L)	EPA metho	pd 8010 (µg	(1)									and the second
Bromodichloromethane	0.2	"UD"	NA	0.2	DN	ND	ND	ND	ND	ND	ND	None
Chloroethane	0.2	"UD"	NA	ND	8.9	0.5	ND	0.5	ND	2.2	35	None
Chloroform	0.2	"UD"	NA	7.6	QN	QN	ND	ND	ND	ND	ND	100
1,2-Dichlorobenzene	0.2	"UD"	NA	ND	0.5	0.2	ND	0.4	ND	ND	ND	None
1,1-Dichloroethane	0.2	°069	NA	0.9	18	13	23	71	5.8	21	120	25
1.2-Dichloroethane	0.2	6.7°	NA	ND	1.1	QN	0.3	0.0	QN	ND	5.3	10

Notes: All analyses performed by Hall Environmental Analysis Laboratory, Albuquerque, NM Bold values indicate concentration exceeds NMWQCC ground-water standard

NMWQCC = New Mexico Water Quality Control Commission

Not detected ND VOCs NA

Volatile organic compounds

Not analyzed

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\* Sample analyzed at 2x dilution

<sup>b</sup> C<sub>14</sub>-C<sub>26</sub> non-characteristic diesel range hydrocarbons

Non-characteristic diesel range hydrocarbons

 $^{\rm d}$  C<sub>14</sub>-C<sub>26</sub> non-characteristic diesel range hydrocarbons; detection limit = 1.0  $\mu g/L$  \* Sample analyzed at 10x dilution



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# Table 4. Summary of Ground-Water Analyses for Organic Constituents Former Engine Room Drain and Filter Pits Page 2 of 2

						Well/Bo (Sampl	Well/Boring No. (Sample Date)					
Constituent	Detection	MW-1 MW-3 MW-4 (11/15/94) (12/01/94)	MW-3 (11/16/94)	MW-4 (12/01/94)	MW-5 (12/01/94)		MW-6 MW-7 (11/30/94) (11/22/94)	MW-8 (11/30/94)	MW-8 SB-1 1/30/94) (11/22/94)	SB-2 (11/19/94)	SVE-1A (11/19/94)	NMWQCC Standard
Halogenated VOCs by EPA method 8010 (µg/L) (cont.)	EPA metho	pu) 0108 bo	/L) (cont.)									
1,1-Dichloroethene	0.2	2.2	NA	4.7	ND	2.9	2.3	1.3	ND	1.8	1.0	5
cis-1,2-Dichloroethene	0.2	2.8	NA	QN	12	6.8	7.3	18	0.5	0.3	20	None
Dichloromethane	2.0	420°	NA	DN	43	ND	QN	ND	ND	ND	006	None
Tetrachloroethene	0.2	16°	NA	0.5	0.8	0.4	0.4	DN	0.3	QN	4.6	20
1,1,1-Trichloroethane	0.2	"UN"	NA	ND	ND	QN	1.6	QN	ND	QN	6.8	60
Trichloroethene	0.2	28*	NA	QN	3.2	15	14	17	1.5	8.4	16	100
Vinyl chloride	0.2	ND°	NA	QN	ON	ND	0.3	0.2	ND	ND	1.2	1
Polynuclear aromatic hydrocarbons by EPA method 8100 (µg/L)	hydrocarbo	ns by EPA	method 81	(1/6rt) 00.							Constant of	
Naphthalene	0.5	7.01	NA	ON	ND	ND	ND	ND	ND	ND	QN	1
1-Methylnaphthalene	0.5	ND <sup>1</sup>	NA	QN	ND	ND	ND	ND	ND	1.0	ND	30%
2-Methylnaphthalene	0.5	ND'	NA	QN	ND	ND	DN	ND	ND	2.2	ND	
Fluorene	0.5	'UN'	NA	QN	ND	ND	DN	ON	0.8	0.9	DN	None

Notes: All analyses performed by Hall Environmental Analysis Laboratory. Albuquerque, NM Bold values indicate concentration exceeds NMWQCC ground-water standard

NMWQCC = New Mexico Water Quality Control Commission

= Volatile organic compounds = Not detected VOCS

= Not analyzed

Sample analyzed at 10x dilution

<sup>1</sup> Detection limit = 5.0 µg/L

\* NMWQCC standard is for total naphthalene, which includes naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene

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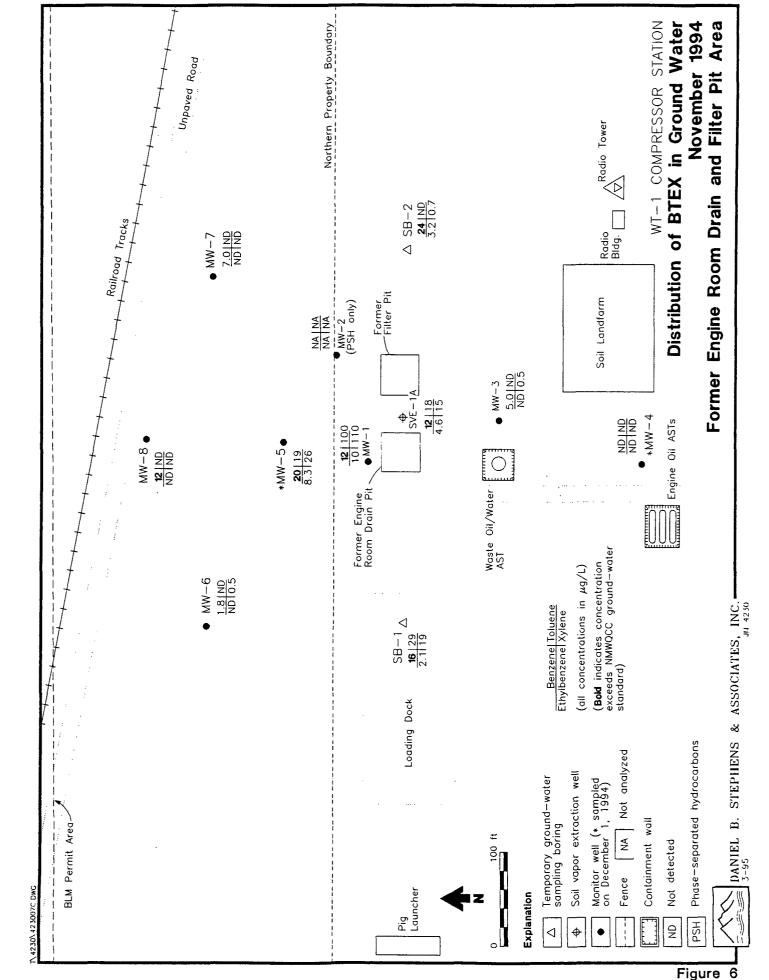
# Table 5. Summary of Ground-Water Analyses for Inorganic Constituents Former Engine Room Drain and Filter Pits

					Well No. (Sample Date)	No. e Date)				
Constituent	Detection Limit	MW-4 (12/01/94)	MW-5 (12/01/94)	MW-6 (11/30/94)	MW-7 (11/22/94)	MW-8 (11/30/94)	SB-1 (11/22/94)	SB-2 (11/19/94)	SVE-1A (11/19/94)	NMWQCC Standard
Major ions (mg/L)										
Calcium	0.1	332	185	293	323	247	275	248	293	None
Potassium	1.0	5.9	6.1	7.1	7.9	6.0	9.4	13.4	6.5	None
Magnesium	0.1	153	200	197	148	137	209	143	383	None
Sodium	0.1	353	326	267	244	221	322	279	339	None
Total alkalinity (as CaCO <sub>3</sub> )	1.0	273	1,080	624	327	441	492	460	1,940	None
Chloride	0.5	540	360	700	400	590	750	610	290	250
NO2/NO3 - N, total	0.06	20	QN	ND	6.8	0.44	0.28	0.12	0.07	10.0
Sulfate	5	1,000	ND	410	920	330	450	460	5	600
Total dissolved solids	10	2,800	2,000	2,400	2,400	1,900	2,300	2,100	4,200	1,000
Metals (mg/L)										
Silver	0.010	QN	ND	ND	QN	ND	QN	ND	QN	0.05
Arsenic	0.005	0.007	0.036	ND	0.006	0.006	0.005	QN	0.039	0.1
Barium	0.01	0.025	17.3	0.109	0.032	0.052	0.085	0.094	49.8	1.0
Cadmium	0.0005	ND	ND	ND	ND	ND	QN	QN	ND	0.01
Chromium	0.010	ND	ND	ND	ND	ND	QN	0.013	ND	0.05
Copper	0.010	QN	ND	ND	0.014	0.014	0.010	0.013	QN	1.0
Iron	0.050	QN	760.0	ND	ND	ND	ND	QN	060.0	1.0
Mercury	0.0002	QN	ND	ND	ND	ND	QN	ND	ND	0.002
Manganese	0.010	0.024	0.112	0.562	0.069	0.136	0.254	0.231	0.082	0.2
Lead	0.002	QN	ND	ND	ND	ND	ND	ND	ND	0.05
Selenium	0.005	0.020	ND	ND	0.008	ND	ND	QN	ND	0.05
Zinc	0.050	QN	ND	ND	QN	ON	4.73	1.15	ND	10

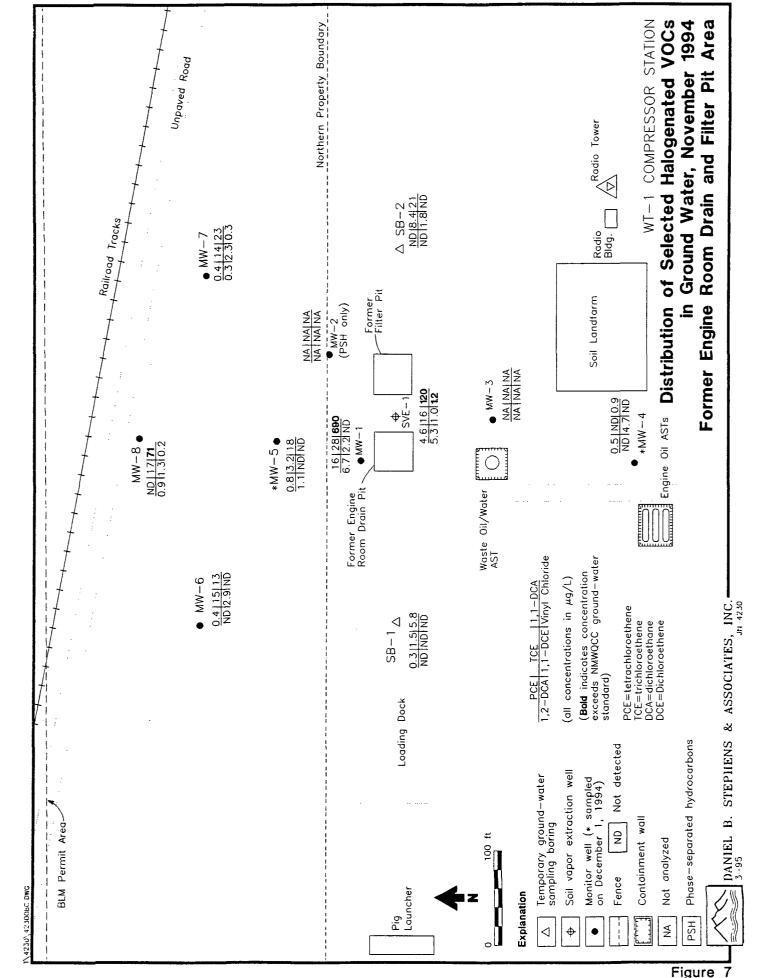
Notes: All analyses performed by Analytical Technologies, Inc., Albuquerque, NM Bold values indicate concentration exceeds NMWQCC ground-water standard. Metals samples were field filtered and acidified.

NMWQCC = New Mexico Water Quality Control Commission ND = Not detected

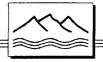
J:M230HYDROINV 395UNORG-ER.395



Figure



Figure



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# 4. CORRECTIVE ACTIONS

This section provides information concerning the interim corrective measures taken to remediate the contaminants identified by the SEI (Section 3). In order to prevent continued hydrocarbon releases to the subsurface, TPC has decommissioned the former engine pits and constructed secondary concrete containment walls around each AST. The pits were decommissioned by placing an impermeable soil/cement cap over each pit, thereby eliminating direct infiltration of precipitation.

Additionally, on November 20, 1994, DBS&A conducted four short-term SVE pilot tests on several of the wells present at the compressor station. The pilot testing was conducted with the assistance of AcuVac Remediation (AcuVac) of Houston, Texas. AcuVac transported a mobile internal combustion engine (ICE) vapor extraction unit to the site and operated the unit under DBS&A's direction. The ICE draws a vacuum on the wells and at the same time achieves nearly complete oxidation of well vapors. The AcuVac pilot testing report is provided in Appendix D.

The SVE tests were conducted in order to assess whether an SVE system is a viable technology for the removal of PSH and adsorbed hydrocarbons by vapor means. The specific objectives of the SVE pilot tests were to

- Evaluate the effective radius of influence for SVE wells
- Determine operational flow rates and vacuums
- Estimate hydrocarbon mass removal rates

The SVE pilot tests consisted of (1) a 4-hour test on monitor well MW-10 (DBS&A, 1995), (2) a 3-hour test on well SVE-1A (deep zone), (3) a 30-minute test on well SVE-1B (shallow zone), and (4) a 1.5-hour test on monitor well MW-2. Monitor well MW-10 is located near the dehydration area (Figure 1). Tests were conducted at air flow rates ranging from approximately 3 to 15 cubic feet per minute (cfm) and vacuums of 45 to 233 inches of water. The single well tests indicated



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that approximately 1 to 2 cfm per linear foot of screen could be obtained from 2-inch-diameter SVE wells. AcuVac estimated that the effective radii of influence ranged from 70 feet to 100 feet.

Soil vapor samples were collected during testing of wells SVE-1B, MW-2, and MW-10 in order to evaluate hydrocarbon mass removal rates. Samples were collected in stainless steel canisters and shipped to Core Laboratories in Houston, Texas for analysis of BTEX, extended refinery gases (aliphatics and branched paraffins), and fixed gases ( $O_2/N_2/CO_2$ ). The analytical results from samples collected during the pilot tests are provided in Appendix D. In addition to the collection of samples for laboratory analyses, soil vapor concentrations were measured in the field with a Horiba<sup>®</sup> auto emissions analyzer provided by AcuVac. Fixed gas concentrations indicate that natural in-situ biodegradation of hydrocarbons is occurring, as evidenced by elevated  $CO_2$  concentrations (Appendix D). Non-methane hydrocarbon concentrations measured by Core Laboratory (23,200 ppmv in well MW-10) compare favorably with the Horiba<sup>®</sup> measurement made by AcuVac.

Table 6 summarizes the results of vapor analyses performed on samples collected during the SVE pilot testing. The highest concentrations of total hydrocarbon vapors, approximately 21,000 ppmv as measured by AcuVac, were extracted from monitor well MW-10 during the 4-hour SVE test. Vapor concentrations near the former engine room drain and filter pits are apparently not as high.

The test results indicate that an SVE system can be used to remove hydrocarbon contamination by vapor means. SVE success will depend on the volatility of the subsurface hydrocarbons and sustainable air flow rates. Although an SVE system will be more effective in the former dehydration area (DBS&A, 1995), where contaminants are primarily low-molecular-weight pipeline distillates, SVE is a viable technology for mitigation of hydrocarbon-impacted soil and PSH on ground water.



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# Table 6. Summary of Vapor Analyses in Soil GasRecovered from Above the Water TableWT-1 Compressor StationNovember 20, 1994

		Location	
Constituent	SVE-1B	MW-2	MW-10
Benzene	23	<1	319
Toluene	20	<1	504
Ethylbenzene	<1	<1	19
Xylene (total)	14	<10	153
Non-methane hydrocarbon	320	190	23,200
Methane	2,290	28,390	7,510

All analyses performed by Core Laboratories, Houston, TX All concentrations in  $\ensuremath{\mathsf{ppw}}$ 



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# 5. SUMMARY AND CONCLUSIONS

This report summarizes the November 15 through December 1, 1994 supplemental environmental investigation undertaken by Daniel B. Stephens & Associates, Inc. at Transwestern Pipeline Company's WT-1 compressor station. The purpose of the investigation was to evaluate the extent of subsurface impacts related to the release of petroleum hydrocarbons and wastewaters from near the former engine room drain and filter pits. During the course of the investigation, background information was reviewed, and two temporary ground-water sampling borings, five monitor wells, and one dual-completion soil vapor extraction well were installed. In addition, hydraulic tests (bail-down/recovery) were conducted, fluid levels were measured, all site monitor wells were surveyed to a common datum, and samples were collected from all site monitor wells for laboratory analysis.

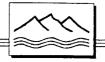
Based on the data gathered to date, the following conclusions can be made regarding the site hydrogeologic properties and the extent of subsurface contamination near the former engine room drain and filter pits:

- Ground water beneath the compressor station is perched on underlying fine-grained sandstone and mudstone units. Ground water is encountered at approximately 45 to 55 feet below ground surface, and the saturated thickness ranges from 0 to 10 feet. Groundwater flow is generally to the north-northwest; however, local flow directions appear to vary, perhaps in response to local heterogeneity and recharge zones. There are no known uses for the perched water.
- Bail-down/recovery tests indicate that the average hydraulic conductivity of the perched ground-water system is approximately 5 x 10<sup>-2</sup> feet per day. The local ground-water velocity is estimated to be 5 feet per year.
- Field headspace and laboratory analyses indicate that the extent of actionable soil contamination near the former engine room drain and filter pits cover a roughly elliptical area, centered on the former pits, of approximately 0.7 acre.



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- Near the former engine room drain and filter pits, benzene and 1,1-DCA exceed the New Mexico Water Quality Control Commission (NMWQCC) ground-water standards. Total petroleum hydrocarbons (TPH) in ground water are composed primarily of diesel-range constituents. Phase-separated hydrocarbons (PSH) are present near the northern fence line, as evidenced by the 3.6 feet of PSH measured in monitor well MW-2. Inorganic chemical analyses of water samples indicated that NMWQCC standards were exceeded for total dissolved solids (TDS) and chloride in all monitor wells and for barium, sulfate, and manganese in several wells. However, TDS and chloride concentrations were also exceeded in samples collected from an upgradient well.
- To date, corrective actions have consisted of decommissioning the former engine room pits, constructing aboveground storage tanks within secondary containment structures, and performing four soil vapor extraction pilot tests to determine remedial design parameters.



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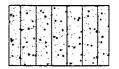
# **APPENDIX A**

# SOIL BORING LOGS AND WELL COMPLETION FORMS



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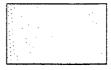
# Silty sand with gravel



Silty sand

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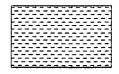
Caliche



Sandstone



Clayey and/or silty sandstone



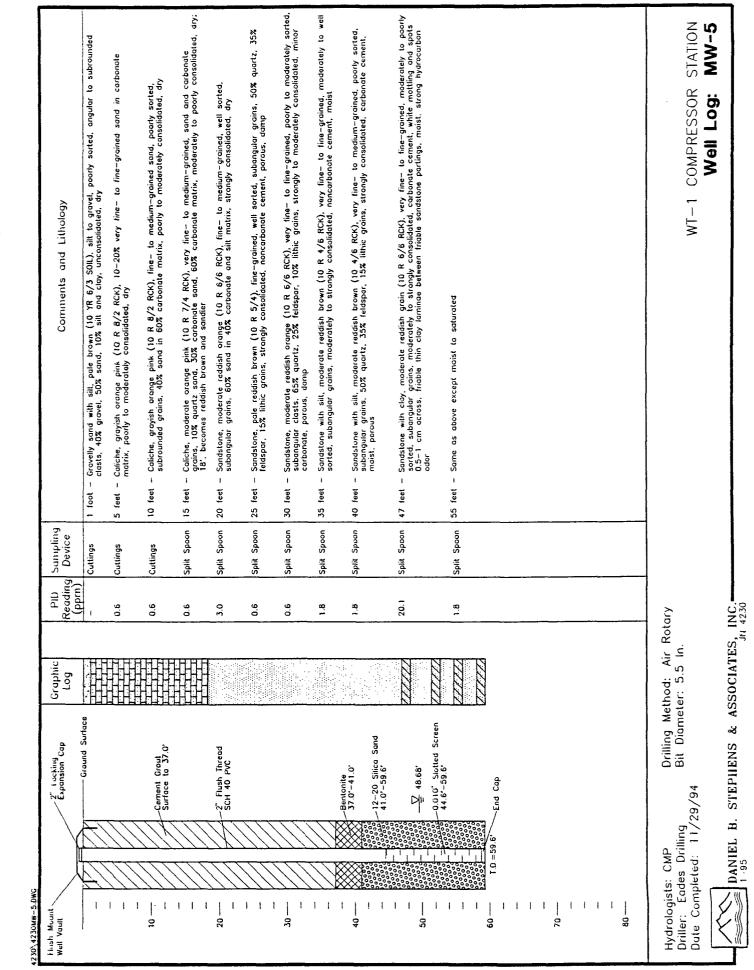
Mudstone

WT-1 COMPRESSOR STATION Graphic Symbols and General Descriptions of Boring Logs

DANIEL B. STEPHENS & ASSOCIATES, INC.-2-95 JN 4230

Caliche, grayish arange pink (10 R B/2 RCK) to moderate reddish orange (10 R 6/6 RCK). fine- to medium-grained, moderately sorted, subrounded grains, 70% sand in 30% carbonate matrix, moderate to poorly consolidated, dry Sandstone, moderate reddish arange (10 R 6/6 RCK), fine-grained, well sorted, subangular grain, 70% quartz. 20% feldspar, 10% lithic grains, moderately consolidated, carbonate cement, very porous, damp Sondstone, dork reddish brown (10 R 3/4 RCK), fine- to medium-grained, well sorted, subrounded grains, 70% quartz, 20% feldspar, 10% lithic grains, moderately to strongly consolidated, minor carbonate, very porous, damp - Same as above, pale reddish brown (10 R 4/2 RCK), not as well sorted, few 7- to 8-mm-across clay gauls STATION **MW-4**  Sandstone, light brown (5 YR 6/4 RCK), very tine- to fine-grained, poolly sorted, subangular grains, 602 quartz, 302 feldspor, 102 lithic grains, strongly consolidated, carbonate cement, dump, porous Mudstone (shale), moderate reddish brown (10 R 4/6 RCK), micaceous, minor silt, friable, moderately to
poorly consolidated, dry to damp, high plasticity when wetted 75 feet -- Clayey sand, pale reddish brown (10 R 6/2), very fine to fine-grained, poorly sorted, micaceous, cloy matrix, moderately to strongly consolidated, dry, noncarbonate cement, nonporous Sandstone, maderate reddish brown (10 R 4/6 RCK), fine-grained, well sarted, subrounded grains, moderately to strongly consolidated, noncarbonate cement, nonporous, saturated, minor clay in matrix Caliche, moderate redaish orange (10 R 6/B RCK), mostly fine- to medium-size carbonate clasts, poorly sorted, subangular grains, little or no quartz sand, moderately to strongly consolidated, dry WT-1 COMPRESSOR Well Log: - Same as above except moderate reddish brown (10 R 4/6) and moist, no clay gauls - Same as above except fine- to medium-grained, maist, not saturated - Same as above with 1- to 2-cm-across pale green reduction spots Comments and Lithology 45 feet - Same as above, moderate reddish brown Sarne as above - Same as above 10 feet - Same as above I 47 feet ł Т 1 5 feet feet feet 25 feet 30 feet 35 feet 40 feet 55 feet 60 feel 65 feet 70 feet feet 80 5 20 Spaan Spoon Split Spoon Split Spoon Split Spaon Split Spoon Sampling Spoon Split Spoon Spoon Split Spoon Split Spoon Split Spoon Split Spoon Device Cuttings Spliit Split Split Split PID Reading (mqq) DANIEL B. STEPHENS & ASSOCIATES, INC. 2 95 0.6 1.8 8.1 8.1 06 0.6 0.6 Drilling Method: Air Rotary Bit Diameter: 5.5 In. 0.6 0.6 0.6 0.6 0.6 1.8 Graphic Log H - Ground Surface -0.010" Slotted Screen 43.5'-58.5' ~12-20 Silica Sand 41.0'-61.0' 2" Locking Expansion Cap -Cement Grout Surface to 37.0' ~2" Flush Thread SCH 40 PVC ~Bentonite 37.0'-41.0' -Bentonite 61.0'-80.0' 47.18 -End Cap Date Completed: 11/29/94 Eades Drilling T.D.=80.0' Hydrologists: CMP 1 ΤĻ 1230\4230MW-4.DWG l 1 1 | 9 1 ł ł 1 1 1 40 I ł 60 ----50 ---22 Flush Mount. Well Vault Driller: 28 ģ ġ

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Electing Enominant cap     Graphic Log     Repuising (ppm)     Denvice (ppm)     Denvice (ppm)       - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore       - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore       - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore       - Math Thread     - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore     - Grand Surtore       - 4 Cop     Spitt Spoon     - Spitt Spoon     - Spitt Spoon     - Grand Surtore       Spitt Spoon     Spitt Spoon     Spitt Spoon     Spitt Spoon     Spitt Spoon	Comments and Lithology	Silty sand with gravel. reddish gray (5 YR 5/2 SOIL)	Caliche, pinkish gray (5 YR 8/1 RCK), medium-grained, well sorted, rounded grains, 70% sand in 30% carbonate matrix, poorty to moderately consolidated, dry	Same as above, grayish orange pink (5 YR 7/2 RCK)	<ul> <li>Caliche, moderate orange pink (10 R 7/4 RCK), fine- to medium-grained, moderately sorted, subrounded grains, 60% sand in 40% corbonate matrix, moderately to strongly consolidated, dry</li> </ul>	<ul> <li>Sandstane, moderate reddish arange (10 R 6/6 RCK), fine- to medium-grained, poorly sorted, angular grains, 40% quartz, 40% feldspar, 20% lithic grains, in 10% slit and carbonate matrix, moderately to strongly consolidated</li> </ul>	<ul> <li>Silty sandstone, moderate reddish brown (10 R 4/6 RCK), very fine- to to medium-grained, poorly sorted, angular grains, 30% quartz, 40% feldspar, 30% lithic grains, in silty carbonate matrix, moderately to strongly consolidated, dry, porous</li> </ul>	<ul> <li>Sandstone with silt, maderate reddish brown (10 R 4/6 RCK), fine- to medium-grained, well sorted, subraunded to rounded grains, minor coarse sand, 60% quart2, 30% feldspar, 10% lithic grains, moderately to poorly consolidated, carbonate and silt matrix carbonate cement, damp, porous</li> </ul>	<ul> <li>Silty sand with mudstone gravels, predominatly yellowish gray (5 Y B/1 RCK), fine- to medium-grained, moderately sorted, subrounded grains, reddish brown and alive gray stringers and gauls of mudstone, moderately consolidated, damp</li> </ul>	- Similar to above except sandstone is moderate reddish brown (10 R 4/6 RCK) with reddish brown mudstone and olive gray mottling comprised of silt and fine-grained sandstone	<ul> <li>Silty sandstone with mudstone gravels, moderate reddish brown (10 R 4/6 RCK), medium-grained, moderately to poorly sorted, subrounded grains, strongly consolidated, no corbonate, nonporous, wet, mudstone gauts up to several cm across</li> </ul>	– Sandstone, moderate reddish brown, fine- to medium-grained, well sorted. subrounded grains, 70% quartz. 25% tekspor, 5% lithic grains, moderately to strongly consolidated, no carbunate, porous, suturated, minor clay matrix				WT-1 COMPRESSOR STATION	בכע.
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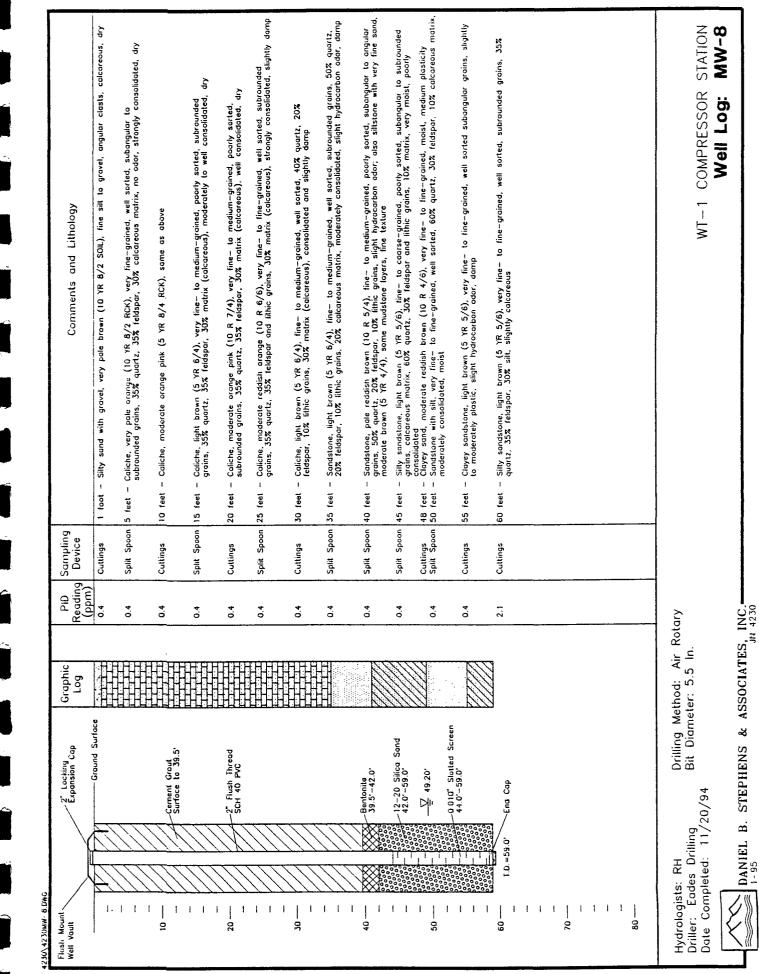
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Comments and Lithology	- Soil	Caliche, grayish pink (5 R 8/2 RCK), tine to medium sand in calcareous matrix, 60% sand. 40% matrix, poorly to moderately sorted, dry	- Some as above	<ul> <li>Caliche, pinkish gray (5 YR 8/1 RCK), fine-grained, well sorted, rounded grains, 30% sand, in 70% matrix, moderately to poorty consolidated, dry</li> </ul>	- Silty sand, moderate reddish brown (10 R 3/4 RCK), very fine- to medium-grained, poorly sorted, subangular grains, moderately consolidated, dry	<ul> <li>Silty sand, maderate readish brown (10 R 3/4 RCK), very fine- to medium-grained, poorly sorted, subangular grains, 60% quarts, 25% feldspar, 15% lithic grains, maderately consolidated, carbanate cement, dro. porous, agults of mudstane</li> </ul>	- Same as above	<ul> <li>Same as above</li> <li>Calcareous sandstone, grayish arange pink (10 R B/2), medium-grained, well sorted, rounded grains, 80%</li> <li>Calcareous sandstone, grayish arange consolidated, dry, may be slough from higher up borehole</li> </ul>	- Colcareous sandstone, grayish arange pink (10 R 8/2), same as above, may be slough from higher up barehole	- Sandsture, pale reddish brown (10 R 5/4 RCK), fine-grained, subangular grains, welk sorted, strongly consolidated. carbonate cement, wet, porous	- Sandstone, moderate reddish brown (10 R 3/4 RCK), fine-grained, moderately sorled, subangular grains. 65% quartz, 25% feldspar, 10% lithic grains, moderately to strongly consolidated, saturated				WT-1 COMPRESSOR STATION Well Log: MW-7
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Expansion Cap	Ground Surface		Cement Grout Control 10		ScH 40 PVC			1	1	22 - 0.010 <sup>°</sup> Slotted Screen	Cooocie	.0			Drilling Method: Air Rotary g Bit Diameter: 5.5 In. /21/94
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Graund Surface     Graphic Log     FID     Sampling       Gaund Surface     Cutimas     1 toot       et to Stills     0.0     spit spoon     10 test       et to Stills     0.1     spit spoon     10 test       et to Stills     0.1     spit spoon     10 test       et to Stills     0.4     spit spoon     20 test       et to Still     0.4     spit spoon     20 test       et to Still     0.4     spit spoon     20 test       et to Still     0.4     spit spoon     20 test       et to Still     0.4     spit spoon     20 test       et to Spit spoon     1.2     spit spoon     20 test       et to Spit spoon     2.1     spit spoon     20 test       et to Spit spoon     2.1     spit spoon     20 test       et to Spit spoon     2.1     spit spoon     20 test       et to Spit spoon     2.1     spit spoon     21 test       et to Spit spoon     2.1     spit spoon     21 test       et to Spit spoon     2.1     spit spoon     21 test       et to Spit spoon     2.1     spit spoon     21 test       et to Spit spit spoon     2.1     spit spoon     21 test       et to Spit spit spit spoon     2.1	Graphic Log     PID Coping (ppm)     Sampling Device     I toot       -     -     cuttags     1 toot       0.0     Spit Spoon     5 feet       0.1     0.4     Spit Spoon     26 feet       0.4     Spit Spoon     25 feet       0.4     Spit Spoon     25 feet       0.4     Spit Spoon     26 feet       0.4     Spit Spoon     26 feet       0.4     Spit Spoon     26 feet       0.4     Spit Spoon     26 feet       0.4     Spit Spoon     26 feet       0.4     Spit Spoon     36 feet       0.4     Spit Spoon     36 feet       0.4     Spit Spoon     36 feet       0.5     Spit Spoon     36 feet       0.4     Spit Spoon     36 feet       1.2     Spit Spoon     36 feet       1.2     Spit Spoon     36 feet       1.2     Spit Spoon     36 feet       1.2     Spit Spoon     36 feet       1.2     Spit Spoon     36 feet       1.2     Spit Spoon     36 feet       1.2     Spit Spoon     36 feet       1.2     Spit Spoon     36 feet       1.3     Spit Spoon     36 feet       1.4     Spit Spoon	Comments and Lithology	- Silty sand with gravel, brown (7.5 YR 5/3), silt to gravel clasts, poorly sorted, angular clasts, unconsolidated, calcareous, dry	Caliche, very pale orange (10 YR 8/2), fine to medium-grained, poorly sorted, subrounded grains, moderately consolidated, dry	Caliche, very pale orange (10 YR 8/2), very fine to medium-grained, poorly sorted, subangular to subraunded grains, more consolidated than above, dry	Caliche, light brown (5 YR 6/4). medium- to fine-grained. well sorted. subrounded grains, moderately consolidated, dry	<ul> <li>Calcareous sandstone, moderate redaish arange (10 R 6/2), coarse- to fine-grained, paorly sorted, subangulo grains, strongly consolidated, damp, hydrocarbon odor</li> </ul>	Silty sandstone, moderate reddish brown (10 R 4/6), medium- to fine-grained, well sorted, subrounded grains, moderately consolidated, damp	<ul> <li>Siltstone and mudstone, moderate reddish brown (10 R 4/6 RCK), high plasticity, wet, no carbonate, poorly consolidated</li> </ul>	- Sandstone with silt, pale reddish brown (10 R 5/4), medium-grained, well sorted, poorly consolidated, no carbonate	<ul> <li>Sandstone with silt, light brown (5 YR 5/6), coarse- to medium-grained, well sorted, poorly consolidated, colcareous matrix, hydrocarbon odor, damp</li> </ul>	<ul> <li>Silty sandstone, moderate brown (5 YR 5/6), medium- to coarse-grained, well sorted, poorly consolidated, no corbonate; at 47.5; there is a 1- to 2-foot-thick very moist clay layer with fine-grained sand</li> <li>Sondstone with silt, moderate brown (5 YR 4/4), very fine-grained, well sorted, moderately consolidated, no conchandie. dv</li> </ul>	1		WT-1 COMPRESSOR STATION Boring Log: SB-1
- Graund Surface - Graund Sur	Graphic Log Crophic Pillo Grannd Surface Cross	bu bu		ŝ	·			25	30	35			55 feel		
Ground Surface Ground Surface At Grout Surface At Grout Surface At Grout Surface At Grout Surface At Grout Surface At Comparison At Rote Bit Diameter: 5.5 In.	Graphic Ground Surface Cernent Grout & Contract Surface to State - 2 46.66 - 46.66 - 46.66 - 46.66 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	Sampli	Cuttings	Split Spo	Split Spo	Split Spo	Split Spo	Split Spo	Split Spo	Split Spo	Split Spo	Split Spo Split Spo	Cuttings		
Graphic Graund Surface Graund Surface de lo stelar feber feber better Bit Diameter: 5.5 in	Graphic Graund Surface Cernent Grout a Surface to Stars 	PID Reading (pom)		0.0	0.4	0.4	0.4	0.4	2.1	1.2	0.4	1.2	1		 ary
	Gr Cernent Gr Surface to 50, 10, 10, 10, 10, 10, 10, 10, 1		Surface												Method: Air neter: 5.5 In
	I.0.=56.8'		Ground	<del></del>	Cement Graut Surface to 56.8*	~	<del></del>				·····	<u>-</u> 46.68 <sup>.</sup>		_	+

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Graphic     Graphic     PID     Sampling       Lisurd Surface     Log     Pitting     Sampling       Cound Surface     The second surface     The second surface       Connel Grout     The second surface     The second surface       Connel Grout     The second surface     The second surface       Connel Grout     The second surface     The second surface       Connel Grout     The second surface     The second surface       Connel Grout     The second surface     The second surface       Connel Grout     The second surface     The second surface       Connel Grout     The second surface     The second surface       Contings     The second surface     The second surface       The second surface     The second surface     The second surface       The second surface     The second surface     The second surface       The second surface     The second surface     The second surface       The second surface     The second surface     The second surface       The second surface     The second surface     The second surface       The second surface     The second surface     The second surface       The second surface     The second surface     The second surface       The second surface     The second surface     The second surface	Graphic     Craphic     PID     Sampling       - Ground Surface     - Outlings     - Outlings       - Fib     - Outlings     - Outlings       - I to Ski.or     - I to Ski.or     - Outlings       - I to Ski.or     - Outlings     - Outlings       - I to Ski.or     - Outlings     - Outlings       - I to Ski.or     - Outlings     - Outlings       - Outling     - Outlings     - Outlings       - Outling     - Outlings     - Outlings       - Outling     - Outlings     - Outlings       - Outling     - Outlings     - Outlings       - Outling     - Outlings     - Outlings       - Outling     - Outlings     - Outlings       - Outling     - Outlings     - Outlings       - Outling     - Outlings     - Outlings       - Outling     - Outlings     - Outlings       - Outling     - Outlings     - Outlings       - Outling     - Outlings     - Outlings       - Outling     - Outlings     - Outlings       - Outling     - Outlings     - Outlings	Comments and Lithology	-	est - Cainche, very pare arange (10 YR 8/2 RCK), line-grained, well sorted, rounded grains, 80% sond. 20% carbonate matrix, matrix supported, poorly to moderately consolidated, dry	feet - Some as above	feet - Sandstone, moderate redaish brown (10 R 4/6 RCK), medium-grained, moderately sorted, subangular grains, matrix supported, carbonate and clay matrix, 85% sand, 15% matrix, poorly to moderately consolidated, damp	teet - Sandstone, pale reddish brown (10 R 5/4 RCK), very fine- to fine-grained, well sorted, subangular grains. maderatiely to well cansolidated, moist, no carbonate cement	23 feet - Brown to ton medium-grained sond (23-25') 25 feet - Same as above, fine-grained, well sorted, 70% quartz, 25% feldspar, 5% lithic grains	feet — Silty sandstone, pole reddish brown (10 R 5/4 RCK), very fine— to medium-grained, poarly sorted, subanglar grains, 60% quartz, 25% feldspar, 15% lithic grains, moderately to well consolidated, damp, carbonate cement	t	feet - Same as above	feet - Same as above except wet; 46', encounter water	feel - Same as above except saturated, some thin mudstone layers; 50'-52', mudstone layer	feet - Same as above except wet to moist					WT-1 COMPRESSOR STATION
Graphic Log Grant Surface Log Fridae la S6.0' Fridae Control Internation (ppm) Surface la S6.0' Fridae Internation (ppm) Surface la S6.0' Fridae Internation (ppm) Surface la S6.0' Fridae Internation (ppm) 11 11 11 11 11 11 11 11 11 11 11 11 11	Ground Surface     Ground Surface     Ground Surface     Property (point)       Commant Groud, Surface to State     Groud Surface     11       Surface to State     11     12       Surface to State     11     12       Surface to State     12     27       Surface to State     11     12       Surface to State     11     12       Surface to State     12     27       Surface to State     12     27       Surface to State     12     27       Surface to State     12     27       Surface to State     12     27       Surface to State     12     27       Surface to State     12     27       Surface to State     11     25       Surface to State     11     11	impling Device			••••			noc								 		 	
Ground Surface Ground Surface Surface to Sta.o' - ⊈ 46.84' Porilling Method: Air Roto Bit Diameter: 5.5 'In.	Ground Surface Comment Grout or Surface to St.or	PID Sc eading [ (ppm)	0	_												 	. <u></u>	 	>
	I.D = 56.0 I teted: 1														-				Drilling Method: Bit Diameter: 5.5 19/94

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Comments and Lithology	1 foot - Silty sand with gravel, pale brown (10 YR 6/3 soil), silt to gravel, poorly sorted, angular grains, unconsolidated, dry	5 feet Caliche, grayish orange pink (5 YR 7/2 RCK), fine- to medium-grained, well sorted, rounded grains, 70% sand, 30% carbonate matrix, moderately to poorly consolidated, dry	10 feet — Sand with silt, pale yellowish brown (gray) (10 YR 6/2 RCK), fine— to medium-grained, moderalely sorted, subrounded grains, 95% quartz, 5% feldspar, 10% lithic grains, poorly consolidated, carbonate cement, damp, strong hydrocarbon odor, hydrocarbon staining	15 feet - Caliche, light olive green (5 Y 6/1 RCK), very fine- to medium-grained, poorly sorted, subongular to rounded grains, 90% sand, 10% carbonate matrix, moderately consolidated, carbonate cement, damp, hydrocarbon staining and odor	20 feet — Sand, light brown (5 YR 6/4 RCK), very fine— to medium-grained, poorly sorted, subrounded grains, 75% quortz, 20% feldspar, 5% lithic grains, poorly consolidated, carbonate cement, damp, hydrocarbon staining and odor	25 feet — Sandstone, dark reddish brown (10 R 3/4 RCK), fine—grained, well sorted, rounded grains, 80% quortz, 5% feldspar, 15% lithic grains, poorly consolidated, minor carbonate, hydrocarbon staining and odor, moist	30 feet - Same as above	35 feet - Sandstone with clay, moderate reddish brown (10 R 4/6 RCK), clay to very fine-grained sand, poorly sorted. slight plasticity, poorly consolidated, carbonate cement, hydrocarbon odor, damp	40 feet - Sandstone, pale reddish brown (10 R 5/4 RCK), fine- to medium-grained, well sorted, subangular to rounded grains, 60% quartz, 25% feldspar, 15% lithic grains, strongly consolidated, little carbonate, dry, porous	45 feet - Same as above except fine-grained and moist, strong hydrocarbon odor below 44 feet	50 feet - Sandstone, dark reddish brown (10 R 3/4 RCK), fine-grained, well sorted, subrounded grains, 50% quartz 15% feldspor, 15% lithic grains, maderately to strongly consolidated, minor carbonate, wet, thin loyer of clay near 50 feet							In. to T.D. WT-1 COMPRESSOR STATION Well Log: SVE-1
Sampling Device	Cuttings	Split Spoon	Split Spoon	Split Spoon	Split Spoon	Split Spoon	Split Spoon	Split Spoan	Split Spoon	Split Spoon	Split Spoon							Ft., 5.5 lr
PID Reading (ppm)	1	0.6	6: 	2.1	29.2	25.3	35.0	85.0	33.1	42.2	42.2							-
Expansion Cap Graphic Log	Ground Surface	Sch 40 PVC	Cement Grout	Bentonite 14.5'-18.3'		8 - 500 61 - 500 50 - 500 - 0.020" Slotted Screen		24 - 000 29 - 000 20 - 0	Bentonite 30 315-41.2'	Sood	41.2*-53.0* 0.020° Slotte 42.5*-52.5* -End Cap							:: CMP Drilling Method: Air Rotary les Drilling Bit Diameter: 8.75 In. to 37.5 letcd: -11/18/94
Flush Mount Well Vault			01 				30		4     ∑∑€50		50	1	 03	11	0/	111	98  -	Hydrologists: CMP Driller: Eades Drilling Date Completed: 11/

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# **APPENDIX B**

# ANALYTICAL LABORATORY REPORTS FOR SOIL AND GROUND-WATER ANALYSES

# Organic Analyses

# Hall Environmental Analysis Laboratory

Hall Environmental Analysis Laboratory 2403 San Mateo NE, Suite P-13 Albuquerque, NM 87110

Daniel B. Stephens and Associates, Inc. 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Dear Mr. Bob Marley,

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. Unless noted on sample page, all criteria for QA/QC acceptance levels fall within established parameters. These parameters are modeled from the EPA-600 14-79 019, March 1979, "Handbook for Analytical Quality Control in Water and Waste Water."

Please don't hesitate to contact me for any additional information or clarifications

Sincerely,

12/5/94

Scott Hallenbeck, Lab Manager

Project: ENRON WT-1

12/1/94

Date collected: 11/16/94	Date received: 11/18/94						
Date extracted: 11/22/94	Date analyzed: 11/22/94						
Client: Daniel B. Stephens and Associates, Inc.							
Project Name: ENRON WT-1	Heal #: 9411046-5						
Project Manager: Bob Marley	Sampled by: RH/CP						
Matrix: Aqueous							

Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	5.0	0.5	PPB (UG/L)
Toluene	nd	0.5	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Total Xylenes	0.5	0.5	PPB (UG/L)

BFB (Surrogate) Recovery = 96 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 102 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 122 %

Date collected: 11/15/94	Date received: 11/18/94
Date extracted: NA	Date analyzed: 11/21/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	Heal #: 9411046-6
Project Manager: Bob Marley	Sampled by: RH/CP
Matrix: Aqueous	

# Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	12	5.0	PPB (UG/L)
Bromodichloromethane	nd	2.0	PPB (UG/L)
Bromoform	nd	10	PPB (UG/L)
Bromomethane	nd	10	PPB (UG/L)
Carbon Tetrachloride	nd	2.0	PPB (UG/L)
Chlorobenzene	nd	2.0	PPB (UG/L)
Chloroethane	nd	2.0	PPB (UG/L)
Chloroform	nd	2.0	PPB (UG/L)
Chloromethane	nd	2.0	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	10	PPB (UG/L)
Dibromochloromethane	nd	2.0	PPB (U(J/L)
1,3-Dichlorobenzene	nd	2.0	PPB (UG/L)
1.2-Dichlorobenzene	nd	2.0	PPB (UG/L)
1.4-Dichlorobenzene	nd	2.0	PPB (UG/L)
Dichlorodifluoromethane	nd	2.0	PPB (UG/L)
1.1-Dichloroethane	690	2.0	PPB (UG/L)
1.2-Dichloroethane	6.7	2.0	PPB (UC/L)
1.1-Dichloroethene	2.2	2.0	PPB (UG/L)
1.2-Dichloroethene (Cis )	2.8	2.0	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	2.0	PPB (UG/L)
1.2-Dichloropropane	nd	2.0	PPB (UG/L)
cis-1.3-Dichloropropene	nd	2.0	PPB (UG/L)
trans-1,3-Dichloropropene	nd	2.0	PPB (UG/L)
Ethylbenzene	10	5.0	PPB (UG/L)
Dichloromethane	420	20	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	2.0	PPB (UG/L)
Tetrachloroethene (PCE)	16	2.0	PPB (UG/L)
Toluene	100	5.0	PPB (UG/L)
1.1.1-Trichloroethane	nd	2.0	PPB (UG/L)
1.1.2-Trichloroethane	nd	2.0	PPB (UG/L)
Trichloroethene (TCE)	28	2.0	PPB (UG/L)
Vinyl Chloride	nd	2.0	PPB (UG/L)
Xylenes (Total)	110	5.0	PPB (UC/L)
Trichlorofluoromethane	nd	2.0	PPB (UG/L)

BFB (Surrogate) Recovery = 93 % BCM (Surrogate) Recovery = 97 % Dilution Factor = 10

Date collected: 11/15/94	Date received: 11/18/94
Date extracted: 11/22/94	Date analyzed: 11/30/94
Client: Daniel B. Stephens and Ass	ociates, Inc.
Project Name: ENRON WT-1	Heal #: 9411046-6
Project Manager: Bob Marley	Sampled by: RH/CP
Matrix: Aqueous	

Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	7.0	5.0	PPB (UG/L)
2-Methyl Naphthalene	nd	5.0	PPB (UG/L)
1-Methyl Naphthalene	nd	5.0	PPB (UG/L)
Acenaphthalene	nd	5.0	PPB (UG/L)
Acenaphthene	nd	5.0	PPB (UG/L)
Fluorene	nd	5.0	PPB (UG/L)
Phenanthrene	nd	5.0	PPB (UG/L)
Anthracene	nd	5.0	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1.2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a,h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 80 %

Date collected: 11/15/94	Date received: 11/18/94
Date extracted: 11/22/94	Date analyzed: 11/21,22/94
Client: Daniel B. Stephens and Associ	ates, Inc.
Project Name: ENRON WT-1	Heal #: 9411046-6
Project Manager: Bob Marley	Sampled by: RH/CP
Matrix: Aqueous	

Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Gasoline	1.6	0.1	PPM (MG/L)

BFB (Surrogate) Recovery = 103 %

Dilution Factor = 2

#### Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Diesel	16*	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 120 %

Dilution Factor = 1

\*C14-C26 non-characteristic diesel range hydrocarbons

# **Results for sample: Trip Blank**

Date collected: NA	Date received: 11/18/94
Date conected. NA	
Date extracted: NA	Date analyzed: 11/18/94
Client: Daniel B. Stephens and Asso	ociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411046-7
Project Manager: Bob Marley	Sampled by: RH/CP
Matrix: Aqueous	

# Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1,3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1,2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1,3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1,1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 90 % BCM (Surrogate) Recovery = 101 % Dilution Factor = 1

# Results for sample: Trip Blank

Date collected: NA	Date received: 11/18/94
Date extracted: 11/22/94	Date analyzed: 11/18,22/94
Client: Daniel B. Stephens and Associ	iates, Inc.
Project Name: ENRON WT-1	Heal #: 9411046-7
Project Manager: Bob Marley	Sampled by: RH/CP
Matrix: Aqueous	

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 102 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 131 %

	Date extracted: NA	Date analyzed: 11/18/94
ł	Client: Daniel B. Stephens and A	Associates, Inc.
	Project Name: ENRON WT-1	HEAL #: RB 11/18
	Project Manager: Bob Marley	
	Matrix: Aqueous	

#### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1,1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (U(J/L)
1.1.1-Trichloroethane	nd	0.2	PPB (U(G/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (UC/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (U(;/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 89 % BCM (Surrogate) Recovery = 80 % Dilution Factor = 1

Date extracted: 11/22/94	Date analyzed: 11/29/94
Client: Daniel B. Stephens and Ass	ociates, Inc.
Project Name: ENRON WT-1	Heal #: RB 11/22
Project Manager: Bob Marley	
Matrix: Aqueous	

# Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a,h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 81 %

Date extracted: 11/22/94Date analyzed: 11/22/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1Heal #: RB 11/22Project Manager: Bob MarleyMatrix: Aqueous

#### Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 98 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 125 %

Date extracted: 11/21,22/94Date analyzed: 11/22,23/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1Heal #: RB 11/21,22Project Manager: Bob MarleyMatrix: Non-Aqueous

#### Test: EPA 8020

Compound	Result	<b>Detection Limit</b>	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd_	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 87 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	10	PPM (MG/KG)

BFB (Surrogate) Recovery = 104 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	10	PPM (MG/KG)

DNOP (Surrogate) Recovery = 97 %

Date extracted: NA	Date analyzed: 11/18/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411045-1 MS/MSD
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

# Results for QC: Matrix Spike / Matrix Spike Dup

# Test: EPA 8010/8020

Compound	Sample	Amount	Matrix		MSD	MSD	
	Result	Added	Recov.	MS %	Recov.	%	RPD
Chlorobenzene	<0.2	20.0	20.0	100	20.4	102	2
Ethylbenzene	< 0.5	20.0	19.8	99	20.3	102	2
1,1-DCE	< 0.2	20.0	18.8	94	19.8	99	5
Trans-1,2-DCE	< 0.2	20.0	20.3	102	20.8	104	2
Carbon							
Tetrachloride	< 0.2	20.0	20.7	104	20.8	104	0
1.2-DCA	< 0.2	20.0	22.6	113	22.5	113	0
1,2-Dichloro-					1		
propane	< 0.2	20.0	20.3	102	21.3	107	5
1,1,2 <b>-</b> TCA	<0.2	20.0	21.1	106	20.8	104	1
PCE	< 0.2	20.0	20.8	104	21.1	106	1
1,3-Dichloro-							
benzene	<0.2	20.0	18.0	90	20.2	101	12
1,4-Dichloro-							
benzene	< 0.2	20.0	17.6	88	20.3	102	14

# Results for QC: Blank Spike/Blank Spike Dup

Date extracted: 11/22/94	Date analyzed: 11/30/94
Client: Daniel B. Stephens and As	ssociates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 11/22
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

# Test: EPA 8100

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Naphthalene	< 0.5	10.0	7.3	73	6.9	69	6
Acenaphthylene	<0.5	10.0	7.6	76	7.9	79	4
Acenaphthene	< 0.5	10.0	7.8	78	7.8	78	0
Flourene	<0.5	10.0	8.3	83	8.0	80	4
Phenanthrene	<0.5	10.0	9.5	95	9.7	97	2
Anthracene	<0.5	10.0	9.1	91	9.0	90	1
Pyrene	<0.5	10.0	9.2	92	9.1	91	1
Benzo(a)pyrene	<0.5	10.0	9.3	93	9.4	94	1
Benzo(g,h,i)-							
perylene	<1.0	10.0	10.1	101	10.0	100	1

# Results for QC: Matrix Spike/Matrix Spike Dup Blank Spike / Blank Spike Dup

Determine to 11/01/02/04	Data an already $11/92.92/04$
Date extracted: 11/21,23/94	Date analyzed: 11/22,23/94
Client: Daniel B. Stephens and A	Associates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 11/21
Project Manager: Bob Marley	9411039-4 MS/MSD
Matrix: Aqueous	Units: PPM (MG/L)

### Test: EPA 8020

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Benzene	< 0.5	20.0	22.7	114	21.5	108	5
Toluene	< 0.5	20.0	21.3	107	20.6	103	3
Ethylbenzene	< 0.5	20.0	20.1	101	19.1	95	5
Total Xylenes	< 0.5	60.0	59.7	100	57.0	95	5

Test: EPA 504.1

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
EDB	< 0.01	0.67	0.60	90	0.57	85	5

# Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Gasoline	< 0.05	0.50	0.44	89	0.43	87	2

## Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Diesel	<1.0	5.4	5.9	109	5.5	102	7

# Results for QC: Matrix Spike / Matrix Spike Dup

Date extracted: 11/17,22/94	Date analyzed: 11/18,23/94			
Client: Daniel B. Stephens and Associates, Inc.				
Project Name: ENRON WT-1	HEAL #: 9411044-4 MS/MSD			
Project Manager: Bob Marley	BS/BSD 11/22			
Matrix: Non-Aqueous	Units: PPM (MG/KG)			

# **Test: EPA 8020**

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	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Benzene	< 0.05	1.00	0.98	98	0.94	94	4
Toluene	< 0.05	1.00	1.02	102	0.99	99	3
Ethylbenzene	< 0.05	1.00	0.92	92	0.94	94	2
Total Xylenes	< 0.05	3.00	2.88	96	2.93	98	2

#### Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Gasoline	<10	50	43	87	44	88	2

# Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Diesel	<5.0	54	57	106	59	109	3

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Hall Environmental Analysis Laboratory 2403 San Mateo NE, Suite P-13 Albuquerque, NM 87110

Daniel B. Stephens and Associates, Inc. 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Dear Mr. Bob Marley,

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. Unless noted on sample page, all criteria for QA/QC acceptance levels fall within established parameters. These parameters are modeled from the EPA-600 14-79 019, March 1979, "Handbook for Analytical Quality Control in Water and Waste Water."

Please don't hesitate to contact me for any additional information or clarifications

Sincerely,

att Hall 12/5/94

12/05/94

Scott Hallenbeck, Lab Manager

Project: ENRON WT-1

# **Results for sample: Dup-1**

Date collected: NA	Date received: 11/20/94
Date extracted: NA	Date analyzed: 11/21/94
Client: Daniel B. Stephens and Ass	ociates, Inc.
Project Name: ENRON WT-1	Heal #: 9411052-3
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

# Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	12	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	40	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	100	0.2	PPB (UG/L)
1.2-Dichloroethane	5.6	0.2	PPB (UG/L)
1.1-Dichloroethene	0.9	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	23	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	4.9	0.5	PPB (UG/L)
Dichloromethane	950	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	5.0	0.2	PPB (UG/L)
Toluene	20	0.5	PPB (UG/L)
1.1.1-Trichloroethane	7.2	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	19	0.2	PPB (UG/L)
Vinyl Chloride	1.0	0.2	PPB (UG/L)
Xylenes (Total)	28	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 95 % BCM (Surrogate) Recovery = 106 % Dilution Factor = 1

# **Results for sample: Dup-1**

Date collected: NA	Date received: 11/20/94
Date extracted: 11/21,23/94	Date analyzed: 11/21,23,12/2/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	Heal #: 9411052-3
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

**Test: EPA 504.1** 

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	0.97	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 105 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	3.2 *	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 111 %

Dilution Factor = 1

\* C-14-C26 non-characteristic diesel range H-C

# **Results for sample: Dup-1**

Date collected: NA	Date received: 11/20/94
Date extracted: 11/22/94	Date analyzed: 11/30/94
Client: Daniel B. Stephens and Asso	ciates, Inc.
Project Name: ENRON WT-1	Heal #: 9411052-3
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1.2.3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a.h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 86 %

Dilution Factor = 1

# Results for sample: SVE-1-MW

Date collected: 11/19/94	Date received: 11/20/94
Date extracted: NA	Date analyzed: 11/21/94
Client: Daniel B. Stephens and Associ	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411052-4
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

# Test: EPA 8010/8020

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Analyte:	Results	Detection Limit	Units
Benzene	12	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromotorm	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	35	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	120	0.2	PPB (UG/L)
1.2-Dichloroethane	5.3	0.2	PPB (UG/L)
1.1-Dichloroethene	1.0	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	20	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1,2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	4.6	0.5	PPB (UG/L)
Dichloromethane	900	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	4.6	0.2	PPB (UG/L)
Toluene	18	0.5	PPB (UG/L)
1.1.1-Trichloroethane	6.8	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	16	0.2	PPB (UG/L)
Vinyl Chloride	1.2	0.2	PPB (UG/L)
Xylenes (Total)	15	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 96 % BCM (Surrogate) Recovery = 111 % Dilution Factor = 1

# Results for sample: SVE-1-MW

Date collected: 11/19/94	Date received: 11/20/94
Date extracted: 11/21,23/94	Date analyzed: 11/21,23,12/2/94
Client: Daniel B. Stephens and Asso	ociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411052-4
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

**Test: EPA 504.1** 

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Gasoline	0.98	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 104 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection</b> Limit	Units
Diesel	3.5 *	<1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 124 %

Dilution Factor = 1

\*C14-C26 non-characteristic diesel range H-C

# Results for sample: SVE-1-MW

Date collected: 11/19/94	Date received: 11/20/94
Date extracted: 11/22/94	Date analyzed: 11/30/94
Client: Daniel B. Stephens and Assoc	ciates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411052-4
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	_nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a.h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 59 %

Dilution Factor = 1

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Date collected: 11/19/94	Date received: 11/20/94		
Date extracted: NA	Date analyzed: 11/21/94		
Client: Daniel B. Stephens and Associates, Inc.			
Project Name: ENRON WT-1	HEAL #: 9411052-5		
Project Manager: Bob Marley	Sampled by: Rene Hill		
Matrix: Aqueous			

# Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	24	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	2.2	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (U(J/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	21	0.2	PPB (U(7/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	1.8	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	0.3	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	3.2	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	8.4	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	0.7	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 93 % BCM (Surrogate) Recovery = 88 % Dilution Factor = 1

Date collected: 11/19/94	Date received: 11/20/94			
Date extracted: 11/21,23/94	Date analyzed: 11/21,23,30/94			
Client: Daniel B. Stephens and Associates, Inc.				
Project Name: ENRON WT-1	HEAL #: 9411052-5			
Project Manager: Bob Marley	Sampled by: Rene Hill			
Matrix: Aqueous				

Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	0.16	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 107 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	1.5*	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 118 %

Dilution Factor = 1

\* C-14-C26 Non-characteristic diesel range hydrocarbons

Date collected: 11/19/94	Date received: 11/20/94			
Date extracted: 11/22/94	Date analyzed: 11/30/94			
Client: Daniel B. Stephens and Associates, Inc.				
Project Name: ENRON WT-1	HEAL #: 9411052-5			
Project Manager: Bob Marley	Sampled by: Rene Hill			
Matrix: Aqueous				

Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	2.2	0.5	PPB (UG/L)
1-Methyl Naphthalene	1.0	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	0.9	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a,h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 69 %

# **Results for sample: Trip Blank**

Date collected: NA	Date received: 11/20/94
Date extracted: NA	Date analyzed: 11/21/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	Heal #: 9411052-6
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (U(J/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UC/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis)	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 89 % BCM (Surrogate) Recovery = 88 % Dilution Factor = 1

### **Results for sample: Trip Blank**

Date collected: NA	Date received: 11/20/94
Date extracted: NA	Date analyzed: 11/21,23,30/94
Client: Daniel B. Stephens and Ass	ociates, Inc.
Project Name: ENRON WT-1	Heal #: 9411052-6
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Aqueous	

**Test: EPA 504.1** 

Compound	Result	<b>Detection</b> Limit	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 101 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 113 %

### Results for sample: SVE-1 (30')

Date collected:11/18/94Date received:11/20/94Date extracted:11/22/94Date analyzed:11/23,29/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1HEAL #:9411052-9Project Manager:Bob MarleySampled by:NAMatrix:Non-aqueousNon-aqueousNA

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	140	25	PPM (MG/KG)

BFB (Surrogate) Recovery = \*\* %

Dilution Factor = 5

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	640*	50	PPM (MG/KG)

DNOP (Surrogate) Recovery = \*\* %

Dilution Factor = 10

\* Motor oil Range H-C @ approximately 33,000 MG/KG

\*\* Surrogate unrecoverable due to matrix interference and sample dilution.

# Results for sample: SVE-1 (30')

Date collected: 11/18/94	Date received: 11/20/94
Date extracted: 11/22/94	Date analyzed: 11/30/94
Client: Daniel B. Stephens and Associ	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411052-9
Project Manager: Bob Marley	Sampled by: Rene Hill
Matrix: Non-aqueous	

# Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.1	PPM (MG/KG)
Bromodichloromethane	nd	0.02	PPM (MG/KG)
Bromoform	nd	0.1	PPM (MC/KG)
Bromomethane	nd	0.1	PPM (MG/KG)
Carbon Tetrachloride	nd	0.02	PPM (MG/KG)
Chlorobenzene	nd	0.02	PPM (MG/KG)
Chloroethane	nd	0.02	PPM (MG/KG)
Chloroform	nd	0.02	PPM (MG/KG)
Chloromethane	nd	0.02	PPM (MG/KG)
2-Chloroethylvinyl Ether	nd	0.1	PPM (MG/KG)
Dibromochloromethane	nd	0.02	PPM (MG/KG)
1.3-Dichlorobenzene	nd	0.02	PPM (MG/KG)
1.2-Dichlorobenzene	nd	0.02	PPM (MG/KG)
1.4-Dichlorobenzene	nd	0.02	PPM (MG/KG)
Dichlorodifluoromethane	nd	0.02	PPM (MG/KG)
1.1-Dichloroethane	0.4	0.02	PPM (MG/KG)
1.2-Dichloroethane	nd	0.02	PPM (MC/KG)
1.1-Dichloroethene	nd	0.02	PPM (MG/KG)
1.2-Dichloroethene (Cis)	nd	0.02	PPM (MG/KG)
1.2-Dichloroethene (Trans)	nd	0.02	PPM (MG/KG)
1.2-Dichloropropane	nd	0.02	PPM (MG/KG)
cis-1.3-Dichloropropene	nd	0.02	PPM (MG/KG)
trans-1.3-Dichloropropene	nd	0.02	PPM (MG/KG)
Ethylbenzene	0.13	0.1	PPM (MG/KG)
Dichloromethane	nd	0.2	PPM (MG/KG)
1.1.2.2-Tetrachloroethane	nd	0.02	PPM (MG/KG)
Tetrachloroethene (PCE)	8.2	0.02	PPM (MG/KG)
Toluene	0.08	0.1	PPM (MG/KG)
1.1.1-Trichloroethane	7.3	0.02	PPM (MC/KG)
1.1.2-Trichloroethane	nd	0.02	PPM (MG/KG)
Trichloroethene (TCE)	nd	0.02	PPM (MG/KG)
Vinyl Chloride	nd	0.02	PPM (MG/KG)
Xylenes (Total)	1.3	0.1	PPM (MG/KG)
Trichlorofluoromethane	nd	0.02	PPM (MG/KG)

BFB (Surrogate) Recovery = 84 % BCM (Surrogate) Recovery = 106 % Dilution Factor = 2

# Results for sample: SVE-1 (45')

Date collected: 11/18/94	Date received: 11/20/94
Date extracted: 11/22/94	Date analyzed: 11/23,29/94
Client: Daniel B. Stephens and Ass	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411052-10
Project Manager: Bob Marley	Sampled by: NA
Matrix: Non-aqueous	

#### Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	0.05	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	0.82	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 98 %

Dilution Factor = 1

## Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	63	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = \*\* %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Diesel	98	50	PPM (MG/KG)

DNOP (Surrogate) Recovery = \* %

Dilution Factor = 10

\* Motor oil range H-C at approximately 860 MG/KG

\*\* Surrogate unrecoverable due to matrix interference.

# Results for sample: SB-2 (45')

Date collected: 11/18/94	Date received: 11/20/94
Date extracted: 11/22/94	Date analyzed: 11/23,29/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411052-11
Project Manager: Bob Marley	Sampled by: NA
Matrix: Non-aqueous	

Test: EPA 8020

Compound	Result	<b>Detection Limit</b>	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 94 %

Dilution Factor = 1

## Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 99 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM (MG/KG)

DNOP (Surrogate) Recovery = 82 %

# **Results for sample:** SB-1 (47')

Date collected: 11/18/94	Date received: 11/20/94
Date extracted: 11/22/94	Date analyzed: 11/23,28/94
Client: Daniel B. Stephens and Associ	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411052-12
Project Manager: Bob Marley	Sampled by: NA
Matrix: Non-aqueous	· ·

Test: EPA 8020

Compound	Result	<b>Detection Limit</b>	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 89 %

Dilution Factor = 1

## Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 95 %

Dilution Factor = 1

# Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM (MG/KG)

DNOP (Surrogate) Recovery = 84 %

#### Results for sample: MW-8 (45')

Date collected:11/18/94Date received:11/20/94Date extracted:11/22/94Date analyzed:11/23,28/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1HEAL #:9411052-13Project Manager:Bob MarleySampled by:NAMatrix:Non-aqueousNon-aqueousNA

Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 93 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 96 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM (MG/KG)

DNOP (Surrogate) Recovery = 86 %

Date extracted: NADate analyzed: 11/21/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1HEAL #: RB 11/21Project Manager: Bob MarleyMatrix: Aqueous

### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (UG/L)
1.1.1.Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 93 % BCM (Surrogate) Recovery = 119 % Dilution Factor = 1

Date extracted:11/22/94Date analyzed:11/29/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1Heal #:RB11/22Project Manager:Bob MarleyMatrix:Aqueous

## Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2.3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a,h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h,i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 81 %

Date extracted: 11/21,23,30/94Date analyzed: 11/21,23,30/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1Heal #: RB 11/21,23,30Project Manager: Bob MarleyMatrix: Aqueous

Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 96 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 112 %

Date extracted: 11/22/94Date analyzed: 11/28/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1Heal #: RB 11/22Project Manager: Bob MarleyMatrix: Non-Aqueous

Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 96 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	10	PPM (MG/KG)

BFB (Surrogate) Recovery = 115 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection</b> Limit	Units
Diesel	nd	10	PPM (MG/KG)

DNOP (Surrogate) Recovery = 97 %

Date extracted:11/22/94Date analyzed:11/28/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1Heal #:RB 11/22Project Manager:Bob MarleyMatrix:Non-Aqueous

## Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Bromodichloromethane	nd	0.01	PPM (MG/KG)
Bromoform	nd	0.05	PPM (MG/KG)
Bromomethane	nd	0.05	PPM (MG/KG)
Carbon Tetrachloride	nd	0.01	PPM (MG/KG)
Chlorobenzene	nd	0.01	PPM (MG/KG)
Chloroethane	nd	0.01	PPM (MG/KG)
Chloroform	nd	0.01	PPM (MG/KG)
Chloromethane	nd	0.01	PPM (MG/KG)
2-Chloroethylvinyl Ether	nd	0.05	PPM (MG/KG)
Dibromochloromethane	nd	0.01	PPM (MG/KG)
1.3-Dichlorobenzene	nd	0.01	PPM (MG/KG)
1.2-Dichlorobenzene	nd	0.01	PPM (MG/KG)
1.4-Dichlorobenzene	nd	0.01	PPM (MG/KG)
Dichlorodifluoromethane	nd	0.01	PPM (MG/KG)
1.1-Dichloroethane	nd	0.01	PPM (MG/KG)
1.2-Dichloroethane	nd	0.01	PPM (MG/KG)
1.1-Dichloroethene	nd	0.01	PPM (MG/KG)
1.2-Dichloroethene (Cis )	nd	0.01	PPM (MG/KG)
1.2-Dichloroethene (Trans)	nd	0.01	PPM (MG/KG)
1.2-Dichloropropane	nd	0.01	PPM (MG/KG)
cis-1,3-Dichloropropene	nd	0.01	PPM (MG/KG)
trans-1.3-Dichloropropene	nd	0.01	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Dichloromethane	nd	0.1	PPM (MG/KG)
1,1.2.2-Tetrachloroethane	nd	0.01	PPM (MG/KG)
Tetrachloroethene (PCE)	nd	0.01	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
1.1.1-Trichloroethane	nd	0.01	PPM (MG/KG)
1.1.2-Trichloroethane	nd	0.01	PPM (MG/KG)
Trichloroethene (TCE)	nd	0.01	PPM (MG/KG)
Vinyl Chloride	nd	0.01	PPM (MG/KG)
Xylenes (Total)	nd	0.05	PPM (MG/KG)
Trichlorofluoromethane	nd	0.01	PPM (MG/KG)

BFB (Surrogate) Recovery = 78 % BCM (Surrogate) Recovery = 89 % Dilution Factor = 1

# Results for QC: Matrix Spike / Matrix Spike Dup

Date extracted: NA	Date analyzed: 11/18/94
Client: Daniel B. Stephens and Ass	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411045-1 MS/MSD
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

# Test: EPA 8010/8020

Compound	Sample	Amount	Matrix		MSD	MSD	
	Result	Added	Recov.	MS %	Recov.	%	RPD
Chlorobenzene	<0.2	20.0	20.0	100	20.4	102	2
Ethylbenzene	<0.5	20.0	19.8	99	20.3	102	2
1,1-DCE	<0.2	20.0	18.8	94	19.8	99	5
Trans-1,2-DCE	<0.2	20.0	20.3	102	20.8	104	2
Carbon							
Tetrachloride	<0.2	20.0	20.7	104	20.8	104	0
1,2-DCA	<0.2	20.0	22.6	113	22.5	113	0
1,2-Dichloro-							
propane	<0.2	20.0	20.3	102	21.3	107	5
1,1,2 <b>-</b> TCA	<0.2	20.0	21.1	106	20.8	104	1
PCE	<0.2	20.0	20.8	104	21.1	106	1
1,3-Dichloro-							
benzene	<0.2	20.0	18.0	90	20.2	101	12
1,4-Dichloro-							
benzene	< 0.2	20.0	17.6	88	20.3	102	14

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# Results for QC: Blank Spike/Blank Spike Dup

Date extracted: 11/22/94	Date analyzed: 11/30/94
Client: Daniel B. Stephens and Asso	ciates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 11/22
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

Test: EPA 8100

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Naphthalene	<0.5	10.0	7.3	73	6.9	69	6
Acenaphthylene	<0.5	10.0	7.6	76	7.9	79	4
Acenaphthene	< 0.5	10.0	7.8	78	7.8	78	0
Flourene	<0.5	10.0	8.3	83	8.0	80	4
Phenanthrene	<0.5	10.0	9.5	95	9.7	97	2
Anthracene	<0.5	10.0	9.1	91	9.0	90	1
Pyrene	<0.5	10.0	9.2	92	9.1	91	1
Benzo(a)pyrene	<0.5	10.0	9.3	93	9.4	94	1
Benzo(g,h,i)-							
perylene	<1.0	10.0	10.1	101	10.0	100	1

# Results for QC: Matrix Spike/Matrix Spike Dup Blank Spike / Blank Spike Dup

Date extracted: 11/21,23/94	Date analyzed: 11/21,23,30/94
Client: Daniel B. Stephens and Ass	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 11/21,23
Project Manager: Bob Marley	9411052-5 MS/MSD
Matrix: Aqueous	Units: PPM (MG/L)

Test: EPA 504.1

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
EDB	< 0.01	0.67	0.60	90	0.57	85	5

# Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Gasoline	0.16	0.50	0.67	101	0.68	103	1

## Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Diesel	<1.0	5.4	5.9	109	5.5	102	7

# Results for QC: Matrix Spike / Matrix Spike Dup

Date extracted: 11/22/94	Date analyzed: 11/28/94
Client: Daniel B. Stephens and Ass	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411052-7 MS/MSD
Project Manager: Bob Marley	
Matrix: Non-Aqueous	Units: PPM (MG/KG)

# Test: EPA 8010/8020

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Compound	Sample	Amount	Matrix		MSD	MSD	
	Result	Added	Recov.	MS %	Recov.	%	RPD
Chlorobenzene	<0.01	1.00	1.08	108	1.03	103	5
Ethylbenzene	< 0.05	1.00	1.07	107	1.03	103	4
1,1-DCE	<0.01	1.00	0.86	86	0.94	94	9
Trans-1,2-DCE	< 0.01	1.00	0.86	86	0.93	93	8
Carbon							
Tetrachloride	<0.01	1.00	0.97	97	1.00	100	3
1,2-DCA	<0.01	1.00	0.97	97	1.01	101	4
1,2-Dichloro-							
propane	<0.01	1.00	1.06	106	1.12	112	6
1,1,2-TCA	<0.01	1.00	0.98	98	1.07	107	9
PCE	<0.01	1.00	0.93	93	1.06	106	13
1,3-Dichloro-							
benzene	<0.01	1.00	1.03	103	1.18	118	14
1,4-Dichloro-							
benzene	<0.01	1.00	1.10	110	1.19	119	8

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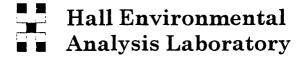
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MALL ENVIRONMENTAL ANALYSIS LABORATORY 2403 Som Mateo NE. Suite P-13	Albuquerque, New Mexico 87110 505.880.1803	ANALYSIS REQUEST		(ləsə)	(Gas/	BE (60 3.1) 2.1) 2.1) 2.1) 2.20 2.20 2.20 2.20 2.20 2.20 2.20 2.2	2108 b T + 38 7 + 38 314 bo 314 bo 314 bo 314 bo 302 bo 405 bo	After the structure of the structure	Z						Remarks: Pacyo 2 of 2
	Project Name: EXRON WT-1	Project #:	4230	Project Manager:	BUD MARTELY	Sampler: C/2/R/R/	Samples Cold? Sa Yes DN0	Number/Volume HgCl2 HCI Other	1/25000 mint 411052.13 X						Received By: (Signature) USev Letter 2000 - 11/21/54 Received By: (Signature)
CHAIN-OF-CUSTODY RECORD	Client: CANIEL B. STEPHENS TALLOC	Address 6022 ACAOPTIN & Nor #100	ALBUQUERQUE MIN	87104		Phone #: 525-822-8400	Fux#: 52-82-82-2278	Date Time Matrix Sample I.D. No.	(5h) 8-MW 7105 05/1 ht/10/1						Date: Time: Relinquished By: (Signature) 11/20/11/21/30 Concerned Providence) Date: Time: Relinquished By: (Signature)



Hall Environmental Analysis Laboratory 2403 San Mateo NE, Suite P-13 Albuquerque, NM 87110

Daniel B. Stephens and Associates, Inc. 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Dear Mr. Bob Marley,

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. Unless noted on sample page, all criteria for QA/QC acceptance levels fall within established parameters. These parameters are modeled from the EPA-600 14-79 019, March 1979, "Handbook for Analytical Quality Control in Water and Waste Water."

Please don't hesitate to contact me for any additional information or clarifications

Sincerely,

A Hall

12/5/94

12/05/94

Scott Hallenbeck, Lab Manager

**Project: ENRON WT-1** 

Date collected: 11/22/94	Date received: 11/23/94
Date extracted: NA	Date analyzed: 11/23/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	Heal #: 9411059-2
Project Manager: Bob Marley	Sampled by:Clarence Pigman
Matrix: Aqueous	

# Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	16	0.5	PPB (UC/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	5.8	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	0.5	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	2.1	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	0.3	0.2	PPB (UG/L)
Toluene	29	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	1.5	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	19	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 91% BCM (Surrogate) Recovery = 119 % Dilution Factor = 1

Date collected: 11/22/94	Date received: 11/23/94
Date extracted: 11/29/94	Date analyzed: 11/29,12/1/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	Heal #: 9411059-2
Project Manager: Bob Marley	Sampled by:Clarence Pigman
Matrix: Aqueous	

**Test: EPA 504.1** 

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

# Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Gasoline	0.13	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 104 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 117 %

Date collected: 11/22/94	Date received: 11/23/94
Date extracted: 11/23/94	Date analyzed: 12/02/94
Client: Daniel B. Stephens and Associ	ates, Inc.
Project Name: ENRON WT-1	Heal #: 9411059-2
Project Manager: Bob Marley	Sampled by:Clarence Pigman
Matrix: Aqueous	

Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	0.8	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a.h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

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Hexadecane (Surrogate) Recovery = 73 %

Date collected: 11/22/94	Date received: 11/23/94
Date extracted: NA	Date analyzed: 11/23/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411059-3
Project Manager: Bob Marley	Sampled by: Clarence Pigman
Matrix: Aqueous	

## Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	7.0	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1,1.Dichloroethane	23	0.2	PPB (UG/L)
1,2-Dichloroethane	0.3	0.2	PPB (UG/L)
1.1-Dichloroethene	2.3	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	7.3	0.2	PPB (U(J/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	0.4	0.2	PPB (UG/L)
Toluene	_nd	0.5	PPB (U(J/L)
1.1,1-Trichloroethane	_ 1.6	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	14	0.2	PPB (UG/L)
Vinyl Chloride	0.3	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (UC/L)
Trichlorofluoromethane	nd	0.2	PPB (U(7/L)

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BFB (Surrogate) Recovery = 90 % BCM (Surrogate) Recovery = 97 % Dilution Factor = 1

Date collected: 11/22/94	Date received: 11/23/94
Date extracted: 11/29/94	Date analyzed: 11/29,12/01/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411059-3
Project Manager: Bob Marley	Sampled by: Clarence Pigman
Matrix: Aqueous	

Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 109 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 117 %

Date collected: 11/22/94	Date received: 11/23/94
Date extracted: 11/23/94	Date analyzed: 12/02/94
Client: Daniel B. Stephens and Associ	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411059-3
Project Manager: Bob Marley	Sampled by: Clarence Pigman
Matrix: Aqueous	

Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a,h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h,i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 69 %

#### **Results for sample: MW-7 (45')**

Date collected:11/21/94Date received:11/23/94Date extracted:11/28,29/94Date analyzed:11/29,12/01/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1HEAL #:9411059-6Project Manager:Bob MarleySampled by:Clarence PigmanMatrix:Non-aqueousNon-aqueousNon-aqueousNon-aqueous

Test: EPA 8020

Compound	Result	<b>Detection Limit</b>	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 95 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 99 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM(MG/KG)

DNOP (Surrogate) Recovery = 115 %

Date extracted: NA	Date analyzed: 11/23/94
Client: Daniel B. Stephens and Associ	iates, Inc.
Project Name: ENRON WT-1	HEAL #: RB 11/23
Project Manager: Bob Marley	
Matrix: Aqueous	

# Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1,3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UC/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	_0.2	PPB (U(I/L)
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (U(J/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 90 % BCM (Surrogate) Recovery = 105 % Dilution Factor = 1

Date extracted:11/23/94Date analyzed:12/02/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1Heal #:RB11/23Project Manager:Bob MarleyMatrix:Aqueous

### Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2.3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a.h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h,i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 79 %

Date extracted: 11/29/94Date analyzed: 11/29,12/02/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1Heal #: RB 11/29Project Manager: Bob MarleyMatrix: Aqueous

Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 98 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units	
Diesel	nd	1.0	PPM (MG/L)	

DNOP (Surrogate) Recovery = 113 %

Date extracted:11/28,29/94Date analyzed:11/29,12/01/94Client:Daniel B. Stephens and Associates, Inc.Project Name:ENRON WT-1Heal #:RB 11/28,29Project Manager:Bob MarleyMatrix:Non-Aqueous

#### **Test: EPA 8020**

Compound	mpound Result		Units		
Benzene	nd	0.05	PPM (MG/KG)		
Toluene	nd	0.05	PPM (MG/KG)		
Ethylbenzene	nd	0.05	PPM (MG/KG)		
Total Xylenes	nd	0.05	PPM (MG/KG)		

BFB (Surrogate) Recovery = 106 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units	
Gasoline	nd	5.0	PPM (MG/KG)	

BFB (Surrogate) Recovery = 107 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection</b> Limit	Units	
Diesel	nd	5.0	PPM (MG/KG)	

DNOP (Surrogate) Recovery = 88 %

# Results for QC: Matrix Spike / Matrix Spike Dup

Date extracted: NA	Date analyzed: 11/23/94
Client: Daniel B. Stephens and Asso	ciates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411059-1 MS/MSD
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

# Test: EPA 8010/8020

Compound	Sample	Amount	Matrix		MSD	MSD	
	Result	Added	Recov.	MS %	Recov.	%	RPD
Chlorobenzene	<0.2	20.0	20.6	103	17.7	89	15
Ethylbenzene	< 0.5	20.0	20.3	102	17.6	88	14
1,1-DCE	<0.2	20.0	20.2	101	17.2	86	16
Trans-1,2-DCE	<0.2	20.0	19.9	100	17.2	86	15
1,2-DCA	<0.2	20.0	21.7	109	19.0	95	13
1,2-Dichloro-							
propane	<0.2	20.0	21.7	109	18.9	95	14
1,1,2 <b>-</b> TCA	<0.2	20.0	22.4	112	20.2	101	10
PCE	<0.2	20.0	20.8	104	18.2	91	13
1,3-Dichloro-							
benzene	<0.2	20.0	19.8	99	17.5	88	12
1,4-Dichloro-							
benzene	<0.2	20.0	20.3	102	18.0	90	12

# Results for QC: Blank Spike/Blank Spike Dup

Date extracted: 11/23/94	Date analyzed: 12/02/94				
Client: Daniel B. Stephens and Associates, Inc.					
Project Name: ENRON WT-1	HEAL #: BS/BSD 11/23	(			
Project Manager: Bob Marley					
Matrix: Aqueous	Units: PPB (UG/L)				

# Test: EPA 8100

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Naphthalene	< 0.5	10.0	7.7	77	7.5	75	3
Acenaphthylene	<0.5	10.0	8.3	83	7.9	79	5
Acenaphthene	< 0.5	10.0	8.4	84	8.0	80	5
Flourene	< 0.5	10.0	9.3	93	8.9	89	4
Phenanthrene	< 0.5	10.0	9.9	99	10.2	102	3
Anthracene	< 0.5	10.0	9.6	96	9.8	98	2
Pyrene	<0.5	10.0	9.8	98	9.8	98	0
Benzo(a)pyrene	<0.5	10.0	9.6	96	9.6	96	0
Benzo(g,h,i)-							
perylene	<1.0	10.0	10.5	105	10.6	106	1

# Results for QC: Matrix Spike/Matrix Spike Dup Blank Spike / Blank Spike Dup

Date extracted: 11/29/94	Date analyzed: 11/29,12/01/94				
Client: Daniel B. Stephens and Associates, Inc.					
Project Name: ENRON WT-1	HEAL #: BS/BSD 11/29				
Project Manager: Bob Marley	9411052-5 MS/MSD				
Matrix: Aqueous	Units: PPM (MG/L)				

**Test: EPA 504.1** 

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
EDB	< 0.01	0.67	0.61	91	0.59	88	3

# Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Gasoline	0.16	0.50	0.67	101	0.68	103	1

## Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Diesel	<1.0	5.4	5.4	100	5.7	106	5

# Results for QC: Matrix Spike / Matrix Spike Dup Blank Spike/Blank Spike Dup

Date extracted: 11/28,29/94	Date analyzed: 11/29,12/01/94
Client: Daniel B. Stephens and Ass	ociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9411059-5 MS/MSD
Project Manager: Bob Marley	9411059-4 MS/MSD
Matrix: Non-Aqueous	Units: PPM (MG/KG)

# Test: EPA 8020

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Benzene	< 0.05	1.00	1.09	109	1.12	112	3
Toluene	< 0.05	1.00	1.05	105	1.09	109	4
Ethylbenzene	< 0.05	1.00	0.97	97	1.01	101	4
Total Xylenes	< 0.05	3.00	3.13	104	3.25	108	4

# Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Gasoline	<10	50	44	88	43	86	2

# Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Diesel	<5.0	54	47	87	55	102	16

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Hall Environmental Analysis Laboratory 2403 San Mateo NE, Suite P-13 Albuquerque, NM 87110

Daniel B. Stephens and Associates, Inc. 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Dear Mr. Bob Marley,

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. Unless noted on sample page, all criteria for QA/QC acceptance levels fall within established parameters. These parameters are modeled from the EPA-600 14-79 019, March 1979, "Handbook for Analytical Quality Control in Water and Waste Water."

Please don't hesitate to contact me for any additional information or clarifications

Sincerely,

Hallah

12/12/94

12/12 /94

Scott Hallenbeck, Lab Manager

Project: ENRON WT-1

Date collected: 12/1/94	Date received: 12/2/94
Date extracted: NA	Date analyzed: 12/5/94
Client: Daniel B. Stephens and Associ	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-1
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Aqueous	

# Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	0.2	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	7.6	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	0.9	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	4.7	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1,1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	0.5	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

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BFB (Surrogate) Recovery = 92 % BCM (Surrogate) Recovery = 85 % Dilution Factor = 1

Date collected: 12/1/94	Date received: 12/2/94
Date extracted: 12/5,6/94	Date analyzed: 12/5,6,7/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-1
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Aqueous	

**Test: EPA 504.1** 

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Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 97 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 117 %

Date collected: 12/1/94	Date received: 12/2/94
Date extracted: 12/7/94	Date analyzed: 12/9/94
Client: Daniel B. Stephens and Asso	ciates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-1
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Aqueous	

Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2.3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a,h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h,i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 80 %

Dilution Factor = 1

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Date collected: 12/1/94	Date received: 12/2/94		
Date extracted: NA	Date analyzed: 12/6/94		
Client: Daniel B. Stephens and Associates, Inc.			
Project Name: ENRON WT-1	Heal #: 9412007-2		
Project Manager: Bob Marley	Sampled by:BM/CP		
Matrix: Aqueous			

### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	20	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	8.9	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	0.5	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	18	0.2	PPB (UG/L)
1.2-Dichloroethane	1.1	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis)	12	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	8.3	0.5	PPB (UG/L)
Dichloromethane	43	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	0.8	0.2	PPB (UG/L)
Toluene	19	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	3.2	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (U(C/L)
Xylenes (Total)	26	0.5	PPB (U(J/L)
Trichlorofluoromethane	nd	0.2	PPB (U(1/L)

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BFB (Surrogate) Recovery = 100 BCM (Surrogate) Recovery = 102 % Dilution Factor = 1

Date collected: 12/1/94	Date received: 12/2/94		
Date extracted: 12/5,6/94	Date analyzed: 12/5,6,7/94		
Client: Daniel B. Stephens and Associates, Inc.			
Project Name: ENRON WT-1	Heal #: 9412007-2		
Project Manager: Bob Marley	Sampled by:BM/CP		
Matrix: Aqueous			

Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Gasoline	0.35	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 111 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Diesel	6.9*	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 112 %

Dilution Factor = 1

\* Non-characteristic diesel range H-C

Date collected: 12/1/94	Date received: 12/2/94		
Date extracted: $12/7/94$	Date analyzed: 12/9/94		
Client: Daniel B. Stephens and Associates, Inc.			
Project Name: ENRON WT-1	Heal #: 9412007-2		
Project Manager: Bob Marley	Sampled by:BM/CP		
Matrix: Aqueous			

Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a,h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h,i) perylene	nd	1.0	PPB (UG/L)

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Hexadecane (Surrogate) Recovery = 84 %

Dilution Factor = 1

Date collected: 11/30/94	Date received: 12/2/94
Date extracted: NA	Date analyzed: 12/5/94
Client: Daniel B. Stephens and Assoc	iates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-3
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Aqueous	

### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	1.8	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	0.5	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	0.2	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UC/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	13	0.2	PPB (UG/L)
1,2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	2.9	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	6.8	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	0.4	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1, 1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	15	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	0.5	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 96 % BCM (Surrogate) Recovery = 103 % Dilution Factor = 1

Date collected: 11/30/94	Date received: 12/2/94
Date extracted: 12/5,6/94	Date analyzed: 12/5,6,7/94
Date Childered. 12/0,0/01	Daw analyzeu. 12/0,0,1/04
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-3
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Aqueous	

**Test: EPA 504.1** 

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 96 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 116 %

Date collected: 11/30/94	Date received: 12/2/94
Date extracted: 12/7/94	Date analyzed: 12/9/94
Client: Daniel B. Stephens and As	sociates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-3
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Aqueous	

Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a,h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h,i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 64 %

Dilution Factor = 1

Date collected: 11/30/94	Date received: 12/2/94
Date extracted: NA	Date analyzed: 12/5/94
Client: Daniel B. Stephens and Asso	ciates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-4
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Aqueous	

### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	12	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (U(J/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	0.5	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (U(G/L)
1.2-Dichlorobenzene	0.4	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	71	0.2	PPB (UG/L)
1.2-Dichloroethane	0.9	0.2	PPB (UG/L)
1.1-Dichloroethene	1.3	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	18	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UC/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (U(7/L)
Toluene	nd	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UC/L)
1, 1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	17	0.2	PPB (UG/L)
Vinyl Chloride	0.2	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (UG/L)
Trichlorotluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 94 % BCM (Surrogate) Recovery = 108 % Dilution Factor = 1

Date collected: 11/30/94	Date received: 12/2/94
Date extracted: 12/5,6/94	Date analyzed: 12/5,6,7/94
Client: Daniel B. Stephens and Associ	•
Project Name: ENRON WT-1	HEAL #: 9412007-4
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Aqueous	

Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 103 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 114 %

Dilution Factor = 1

Date collected: 11/30/94	Date received: 12/2/94
Date extracted: 12/7/94	Date analyzed: 12/9/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-4
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Aqueous	-

Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a.h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h,i) perylene	nd	1.0	PPB (UG/L)

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Hexadecane (Surrogate) Recovery = 79 %

Dilution Factor = 1

#### Results for sample: MW-5 @ 35'

Date collected: 11/29/94	Date received: 12/2/94
Date extracted: 12/5/94	Date analyzed: 12/6,7/94
Client: Daniel B. Stephens and Associ	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-7
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Non-aqueous	

Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 93 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 93 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Diesel	nd	5.0	PPM (MG/KG)

DNOP (Surrogate) Recovery = 108 %

#### Results for sample: MW-5 @ 47'

Date collected: 11/29/94	Date received: 12/2/94
Date extracted: 12/5/94	Date analyzed: 12/6,7/94
Client: Daniel B. Stephens and Associa	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-8
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Non-aqueous	

#### **Test: EPA 8020**

Compound	Result	<b>Detection Limit</b>	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 87 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 88 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM(MG/KG)

DNOP (Surrogate) Recovery = 114 %

#### Results for sample: MW-4 @ 47'

Date collected: 11/29/94	Date received: 12/2/94
Date extracted: 12/5/94	Date analyzed: 12/6,7/94
Client: Daniel B. Stephens and Associ	ates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-9
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Non-aqueous	

Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 91 %

Dilution Factor = 1

### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 91 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM(MG/KG)

DNOP (Surrogate) Recovery = 121 %

#### Results for sample: MW-6 @ 48'

Date collected: 11/29/94	Date received: 12/2/94
Date extracted: 12/5/94	Date analyzed: 12/7/94
Client: Daniel B. Stephens and Assoc	iates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-10
Project Manager: Bob Marley	Sampled by: BM/CP
Matrix: Non-aqueous	

Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 83 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 83 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM(MG/KG)

DNOP (Surrogate) Recovery = 116 %

Date extracted: NA	Date analyzed: 12/5/94
Client: Daniel B. Stephens and Ass	ociates, Inc.
Project Name: ENRON WT-1	HEAL #: RB 12/5
Project Manager: Bob Marley	
Matrix: Aqueous	

#### Test: EPA 8010/8020

Analyte:	Results	Detection Limit	Units
Benzene	nd	0.5	PPB (UG/L)
Bromodichloromethane	nd	0.2	PPB (UG/L)
Bromoform	nd	1.0	PPB (UG/L)
Bromomethane	nd	1.0	PPB (UG/L)
Carbon Tetrachloride	nd	0.2	PPB (UG/L)
Chlorobenzene	nd	0.2	PPB (UG/L)
Chloroethane	nd	0.2	PPB (UG/L)
Chloroform	nd	0.2	PPB (UG/L)
Chloromethane	nd	0.2	PPB (UG/L)
2-Chloroethylvinyl Ether	nd	1.0	PPB (UG/L)
Dibromochloromethane	nd	0.2	PPB (UG/L)
1.3-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.2-Dichlorobenzene	nd	0.2	PPB (UG/L)
1.4-Dichlorobenzene	nd	0.2	PPB (UG/L)
Dichlorodifluoromethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethane	nd	0.2	PPB (UG/L)
1.2-Dichloroethane	nd	0.2	PPB (UG/L)
1.1-Dichloroethene	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Cis )	nd	0.2	PPB (UG/L)
1.2-Dichloroethene (Trans)	nd	0.2	PPB (UG/L)
1.2-Dichloropropane	nd	0.2	PPB (UG/L)
cis-1.3-Dichloropropene	nd	0.2	PPB (UG/L)
trans-1.3-Dichloropropene	nd	0.2	PPB (UC/L)
Ethylbenzene	nd	0.5	PPB (UG/L)
Dichloromethane	nd	2.0	PPB (UG/L)
1.1.2.2-Tetrachloroethane	nd	0.2	PPB (UG/L)
Tetrachloroethene (PCE)	nd	0.2	PPB (UG/L)
Toluene	nd	0.5	PPB (UG/L)
1.1.1-Trichloroethane	nd	0.2	PPB (UG/L)
1.1.2-Trichloroethane	nd	0.2	PPB (UG/L)
Trichloroethene (TCE)	nd	0.2	PPB (UG/L)
Vinyl Chloride	nd	0.2	PPB (UG/L)
Xylenes (Total)	nd	0.5	PPB (UG/L)
Trichlorofluoromethane	nd	0.2	PPB (UG/L)

BFB (Surrogate) Recovery = 95 % BCM (Surrogate) Recovery = 96 % Dilution Factor = 1

Date extracted: 12/5,6/94Date analyzed: 12/5,6,7/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1Project Manager: Bob MarleyMatrix: Aqueous

#### Test: EPA 504.1

Compound	Result	<b>Detection Limit</b>	Units
EDB	nd	0.01	PPB (UG/L)

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Gasoline	nd	0.05	PPM (MG/L)

BFB (Surrogate) Recovery = 97 %

Dilution Factor = 1

Test: EPA 8015 Modified

Compound	Result	Detection Limit	Units
Diesel	nd	1.0	PPM (MG/L)

DNOP (Surrogate) Recovery = 99 %

Date extracted: 12/7/94Date analyzed: 12/9/94Client: Daniel B. Stephens and Associates, Inc.Project Name: ENRON WT-1Heal #: RB 12/7Project Manager: Bob MarleyMatrix: Aqueous

#### Test: EPA 8100

Compound	Result	Detection limit	Units
Naphthalene	nd	0.5	PPB (UG/L)
2-Methyl Naphthalene	nd	0.5	PPB (UG/L)
1-Methyl Naphthalene	nd	0.5	PPB (UG/L)
Acenaphthalene	nd	0.5	PPB (UG/L)
Acenaphthene	nd	0.5	PPB (UG/L)
Fluorene	nd	0.5	PPB (UG/L)
Phenanthrene	nd	0.5	PPB (UG/L)
Anthracene	nd	0.5	PPB (UG/L)
Fluoranthrene	nd	0.5	PPB (UG/L)
Pyrene	nd	0.5	PPB (UG/L)
Benzo (a) anthracene	nd	0.5	PPB (UG/L)
Chrysene	nd	0.5	PPB (UG/L)
Benzo (b) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (k) fluoranthene	nd	0.5	PPB (UG/L)
Benzo (a) pyrene	nd	0.5	PPB (UG/L)
Indeno (1,2,3-cd) pyrene	nd	1.0	PPB (UG/L)
Dibenzo (a,h) anthracene	nd	1.0	PPB (UG/L)
Benzo (g,h.i) perylene	nd	1.0	PPB (UG/L)

Hexadecane (Surrogate) Recovery = 87 %

Dilution Factor = 1

Date extracted: 12/5/94	Date analyzed: 12/6,7/94
Client: Daniel B. Stephens and Ass	ociates, Inc.
Project Name: ENRON WT-1	Heal #: RB 12/5
Project Manager: Bob Marley	
Matrix: Non-Aqueous	

### Test: EPA 8020

Compound	Result	Detection Limit	Units
Benzene	nd	0.05	PPM (MG/KG)
Toluene	nd	0.05	PPM (MG/KG)
Ethylbenzene	nd	0.05	PPM (MG/KG)
Total Xylenes	nd	0.05	PPM (MG/KG)

BFB (Surrogate) Recovery = 100 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Gasoline	nd	5.0	PPM (MG/KG)

BFB (Surrogate) Recovery = 99 %

Dilution Factor = 1

#### Test: EPA 8015 Modified

Compound	Result	<b>Detection Limit</b>	Units
Diesel	nd	5.0	PPM (MG/KG)

DNOP (Surrogate) Recovery = 109 %

# Results for QC: Matrix Spike / Matrix Spike Dup

Date extracted: NA	Date analyzed: 12/5/94
Client: Daniel B. Stephens and Assoc	riates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-5 MS/MSD
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

## Test: EPA 8010/8020

Compound	Sample	Amount	Matrix		MSD	MSD	
	Result	Added	Recov.	MS %	Recov.	%	RPD
Chlorobenzene	<0.2	20.0	19.7	99	21.0	105	6
Ethylbenzene	<0.5	20.0	19.8	99	20.6	103	4
1,1-DCE	<0.2	20.0	22.2	111	20.5	103	8
Trans-1,2-DCE	<0.2	20.0	19.1	96	19.4	97	2
Carbon tet.	<0.2	20.0	18.3	92	16.9	85	8
1,2-DCA	<0.2	20.0	16.2	81	17.0	85	5
1,2-Dichloro-							
propane	<0.2	20.0	20.7	104	20.4	102	1
1.1,2 <b>-</b> TCA	<0.2	20.0	19.2	96	18.4	92	4
PCE	<0.2	20.0	21.6	108	20.4	102	6
1,3-Dichloro-							
benzene	<0.2	20.0	19.8	99	19.6	98	1
1,4-Dichloro-							
benzene	<0.2	20.0	20.8	104	18.5	93	12

### Results for QC: Matrix Spike/Matrix Spike Dup Blank Spike / Blank Spike Dup

Date extracted: 16/5,6/94	Date analyzed: 12/5,6,7/94
Client: Daniel B. Stephens and Asso	ociates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 12/5,6
Project Manager: Bob Marley	9411069-6 MS/MSD
Matrix: Aqueous	Units: PPM (MG/L), PPB (UG/L)

Test: EPA 504.1

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
EDB	< 0.01	0.67	0.59	88	0.60	90	2

## Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Gasoline	< 0.05	0.50	0.51	102	0.54	108	6

### Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Diesel	<1.0	5.4	5.6	104	6.2	115	10

# Results for QC: Blank Spike/Blank Spike Dup

Date extracted: 12/6/94	Date analyzed: 12/9/94
Client: Daniel B. Stephens and Ass	ociates, Inc.
Project Name: ENRON WT-1	HEAL #: BS/BSD 12/6
Project Manager: Bob Marley	
Matrix: Aqueous	Units: PPB (UG/L)

Test: EPA 8100

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Naphthalene	<0.5	10.0	7.7	77	7.9	79	3
Acenaphthylene	< 0.5	10.0	9.1	91	8.8	88	3
Acenaphthene	<0.5	10.0	8.2	82	8.2	82	0
Flourene	< 0.5	10.0	8.9	89	8.9	89	0
Phenanthrene	< 0.5	10.0	10.0	100	10.0	100	0
Anthracene	<0.5	10.0	10.1	101	10.2	102	1
Pyrene	< 0.5	10.0	9.8	98	10.2	102	4
Benzo(a)pyrene	<0.5	10.0	10.5	105	10.4	104	1
Benzo(g,h,i)-							
perylene	<1.0	10.0	12.3	123	11.9	119	3

### Results for QC: Matrix Spike / Matrix Spike Dup Blank Spike/Blank Spike Dup

Date extracted: 12/5/94	Date analyzed: 12/6,7/94
Client: Daniel B. Stephens and Asso	ciates, Inc.
Project Name: ENRON WT-1	HEAL #: 9412007-8 MS/MSD
Project Manager: Bob Marley	9412007-7 MS/MSD
Matrix: Non-Aqueous	Units: PPM (MG/KG)

### Test: EPA 8020

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Benzene	< 0.05	1.00	0.94	94	0.87	87	8
Toluene	< 0.05	1.00	0.95	95	0.88	88	8
Ethylbenzene	< 0.05	1.00	0.88	88	0.81	81	8
Total Xylenes	< 0.05	3.00	2.59	86	2.43	81	6

### Test: EPA 8015 Modified

	Sample	Amount	Matrix		MSD	MSD	
Compound	Result	Added	Recov.	MS %	Recov.	%	RPD
Gasoline	<5.0	50	42	84	40	80	5

### Test: EPA 8015 Modified

	Sample	Amount	Blank		BSD	BSD	
Compound	Result	Added	Recov.	BS %	Recov.	%	RPD
Diesel	<5.0	54	54	100	56	104	4

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	Hall Environmental Analysis Laboratory 2403 Som Mateo NE, Suite P-13													2								
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		Project Name: ENRON	Project #:	4230.	Project Manager:	Sampler: E	Samples Cold?	Number/Volume	6-40ml	6-40ml	6-40mD	6-40n X 1-12	5-40ml	-Sue 2 - 1	1,5 at 2-1	1-250ml,	Inchnoss-1	1-250 M 201	1-250ml Jar	Receive	þ	Receive
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	CHAIN-OF-CUSTODY RECORD	Client: Daniel B. Stephens	Academy NE	V37/09		3400	£±88	Sample	MW-4	MM-5	MW-b	8-WW	MW-13	583040		MW-5Q	MW - 5 @ 41	Nw-4 (	1 m-10	ied By: (Signature)	4 /1/lm	Relinquished By: (Signature)
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Inorganic Analyses



2709-D Pan American Freeway NE Albuquerque, NM 87107 Phone (505) 344-3777 FAX (505) 344-4413

#### ATI I.D. 411373

December 12, 1994

Daniel B. Stephens & Associates 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Project Name/Number: ENRON WT-1 4230

Attention: Bob Marley

On 11/18/94, Analytical Technologies, Inc., (ADHS License No. AZ0015), received a request to analyze non-aqueous and 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.

EPA Method 8240 by TCLP analyses were added on 11/18/94 for samples "ENRON WT-1 EXCAVATION PIT (WT-1)", "MONUMENT" and "HAT MESA" per Bob Marley.

EPA Method 8080 analyses were cancelled on 11/18/94 for samples "ENRON WT-1 EXCAVATION PIT (WT-1)", "MONUMENT" and "HAT MESA" per Bob Marley.

EPA Method 418.1 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.

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

Letitia Krakowski, Ph.D. Project Manager

H. Mitchell Rubenstein, Ph.D. Laboratory Manager

MR:jt

Enclosure



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CLIENT	:DANIEL B. STEPHENS & ASSOC.	DATE RECEIVED : 11/18/94
PROJECT #	: 4230	
PROJECT NAME	:ENRON WT-1	REPORT DATE :12/12/94

ATI ID: 411373

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	ENRON WT-1 EXCAVATION PIT (WT-1)	NON-AQ	11/17/94
02	MONUMENT	NON-AQ	11/17/94
03	HAT MESA	NON-AQ	11/17/94
04	MW-1	AQUEOUS	11/15/94

---TOTALS---

MATRIX	<u>#SAMPLES</u>
NON-AQ	3
AOUEOUS	1

#### 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. Analytical Technologies, Inc. GENERAL CHEMISTRY RESULTS

ATI I.D. : 411373

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CLIENT : D.B. STEPHENS PROJECT # : 4230 PROJECT NAME : ENRON WT-1	S & ASSOCI	LATES	DATE RECEIVED REPORT DATE	11/18/94 12/12/94
PARAMETER	UNITS	04		 
CARBONATE (CACO3) BICARBONATE (CACO3) HYDROXIDE (CACO3) TOTAL ALKALINITY (AS CACO3) CHLORIDE (EPA 325.2) NO2/NO3-N, TOTAL (353.2) SULFATE (EPA 375.2) T. DISSOLVED SOLIDS (160.1)	MG/L MG/L MG/L MG/L MG/L MG/L MG/L	<1 1610 <1 1610 190 <0.06 <5 2900		

Analytical Technologies, loc GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT PROJECT # PROJECT NAME	: 4	230	STEPHE WT-1	NS &	ASSO	OCIATI	ES	ATI	I.D.	: 4113	73	
PARAMETER			UN	ITS	ATI	I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE		۶ REC
CARBONATE BICARBONATE HYDROXIDE TOTAL ALKALIN CHLORIDE NITRITE/NITRA SULFATE TOTAL DISSOLV	TE-	N (TC	MG	/L /L /L /L	4113 4124 4116	37304 38301 9902 3931 36801	1610 <1 1610 650 <0.06 1100	<1 1600 <1 1600 650 <0.06 1100 3400	NA 0.6 NA 0.5 0 NA 0 0	NA NA NA 1600 2.00 2000 NA	NA NA NA 1000 2.00 1000 NA	NA NA NA 95 100 90 NA

<pre>% Recovery = (Spike Sample Result - Sample Result)</pre>		
RPD (Relative Percent Difference) = (Sample Result - Duplicate Result)	x	100
Average Result	••	100



#### METALS RESULTS

#### ATI I.D. : 411373

CLIENT : D.B. STEPHENS PROJECT # : 4230 PROJECT NAME : ENRON WT-1	& ASSOCI		DATE RECEIVED REPORT DATE	
PARAMETER	UNITS	04		
MERCURY (EPA 245.1/7470) POTASSIUM (EPA 200.7/6010) MAGNESIUM (EPA 200.7/6010)	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	0.110 24.0 485 <0.0005 <0.010 <0.010 0.325 <0.0002 59.1 175 0.100 216 <0.002 <0.002 <0.005		



METALS - QUALITY CONTROL

ì	CLIENT		:	D.B.	STEPHENS	Se	ASSOCIATES				
	PROJECT	#	:	4230							
ļ	PROJECT	NAME	:	ENRON	WT-1			ATI	I.D.	:	411373

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT F	RPD	SPIKED SAMPLE		३ REC
SILVER	MG/L	41137304		<0.010	NA	0.409	0.500	82
SILVER	MG/L	41173728		<0.05	NA	0.88	1.00	88
ARSENIC	MG/L	41137304		0.105	5	0.150	0.050	80
ARSENIC	MG/L	41173728		<0.1	NA	1.0	1.0	100
BARIUM	MG/L	41137304		23.0	4	34.0	10.0	100
BARIUM	MG/L	41173728		0.78	3	4.34	4.00	88
CALCIUM	MG/L	41176501			0.8	148	50.0	106
CADMIUM	MG/L	41137304		<0.0005	NA	0.0046	0.0050	92
CADMIUM	MG/L	41173728		<0.05	NA	0.92	1.00	92
CHROMIUM	MG/L	41137304		<0.010	NA	0.852	1.00	35
CHROMIUM	MG/L	41173728		<0.10	NA	0.87	1.00	87
COPPER	MG/L	41137304		<0.010	NA	0.449	0.500	90
IRCN	MG/L	41137304		0.310	5	1.16	1.00	84
MERCURY	MG/L	41178607	<0.0002	<0.0002	NA	0.0050	0.0050	100
MERCURY	MG/L	41173716		<0.002	NA	0.048	0.050	96
POTASSIUM	MG/L	41176501		5.6	6	52.1	50.0	92
MAGNESIUM	MG/L	41176501		22.0	2	47.1	25.0	99
MANGANESE	MG/L	41137304		0.098	2	0.968	1.00	87
SCDIUM	MG/L	41176501		112	2	208	100	94
LEAD	MG/L	41137304		<0.002	NA	0.042	0.050	84
LEAD	MG/L	41173728		<0.10	NA	0.90	1.00	90
SELENIUM	MG/L	41137304		<0.005	NA	0.027	0.050	54
SELENIUM	MG/L	41173728		<0.1	NA	1.0	1.0	100
ZINC	MG/L	41137304	<0.050	<0.050	NA	0.468	0.500	94

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

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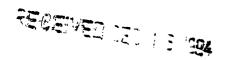
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Analytical **Technologies,** Inc.

2709-D Pan American Freeway, NE Albuquerque, NM 87107 Phone (505) 344-3777 FAX (505) 344-4413

ATI I.D. 411383

December 13, 1994

Daniel B. Stephens 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Project Name/Number: ENRON WT-1 4230

Attention: Bob Marley

On 11/21/94, Analytical Technologies, Inc., (ADHS License No. AZ0015), received a request to analyze 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.

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

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

Elladar.

Letitia Krakowski, Ph.D. Project Manager

MR:jt

Enclosure

H. Mitchell Rubenstein, Ph.D. Laboratory Manager



	: D.B. STE: # : 4230 NAME : ENRON WT	PHENS & ASSOCIATES -1 ATI I.D. : 41	REPORT	RECEIVED : 11/21/94 C DATE : 12/13/94
ATI #	CLIENT DESC	RIPTION	MATRIX	DATE COLLECTED
01 02 03 04 05	MW-10 MW-12 DUP-1 SVE-1-MW SB-2		AQUEOUS AQUEOUS AQUEOUS AQUEOUS AQUEOUS	11/18/94 11/18/94 11/18/94 11/19/94 11/19/94
<b>A</b>	143 MD 7 14	TOTALS		
		# SAMPLES		
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	i	ATI STANDARD DISPO	SAL PRACTICE	
date of	this report. If	roject will be disp an extended storad rtment before the s	ge period is requi	(30) days from the red, please contact date.

Analytical Technologies, Inc.

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#### GENERAL CHEMISTRY RESULTS

#### ATI I.D. : 411383

CLIENT : D.B. STEPHENS PROJECT # : 4230 PROJECT NAME : ENRON WT-1	& ASSOCI	IATES		DATE RE REPORT		: 11/21/94 : 12/13/94
PARAMETER	UNITS	01	02	03	04	05
CARBONATE (CACO3) BICARBONATE (CACO3) HYDROXIDE (CACO3) TOTAL ALKALINITY (AS CACO3) CHLORIDE (EPA 325.2) NO2/NC3-N, TOTAL (353.2) SULFATE (EPA 375.2) T. DISSOLVED SOLIDS (160.1)	MG/L MG/L MG/L MG/L MG/L MG/L MG/L	<1 804 <1 804 650 <0.06 12 2500	<1 228 <1 228 980 17 1100 3300	<1 1910 <1 1910 270 0.08 5 4300	<1 1940 <1 1940 290 0.07 5 4200	<1 460 <1 460 510 0.12 460 2100



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#### GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : D.B. STEPHENS & ASSOCIATES PROJECT # : 4230 PROJECT NAME : ENRON WT-1

ATI I.D. : 411383

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE		۹ REC
CAREONATE BICARBONATE HYDROXIDE TOTAL ALKALINITY CARBONATE BICARBONATE HYDROXIDE TOTAL ALKALINITY CHLORIDE NITRITE/NITRATE-N (TOT SULFATE TOTAL DISSOLVED SOLIDS	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	41178604 41138303 41138301 41138301 41138302 41138302	<0.05 1100	<1 117 <1 1930 <1 1930 550 <0.06 1100 3200	NA 0.9 NA 0.9 NA 1 NA 1 0 NA 0 3	NA NA NA NA NA 1600 2.05 1700 NA	NA NA NA NA NA NA 1000 2.00 500 NA	NA NA NA NA NA NA NA 35 102 120 NA

Average Result

Analytical Technologies, Inc.

METALS RESULTS

ATI I.D. : 411383

CLIENT : D.B. STEPHENS PROJECT # : 4230	& ASSOCI	ATES	Ξ	DATE RECI	EIVED : 3	11/21/94
PRCJECT NAME : ENRCN WT-1			i	REPORT DA	ATE : 1	2/13/94
PARAMETER	UNITS	01	02	03	04	05
SILVER (EPA 200.7/6010) ARSENIC (EPA 206.2/7060) BARIUM (EPA 200.7/6010) CALCIUM (EPA 200.7/6010) CADMIUM (EPA 213.2/7131) CHROMIUM (EPA 200.7/6010) COPPER (EPA 200.7/6010) IRON (EPA 200.7/6010) MERCURY (EPA 245.1/7470) POTASSIUM (EPA 200.7/6010) MAGNESE (EPA 200.7/6010) MANGANESE (EPA 200.7/6010) SCDIUM (EPA 239.2/7421) SELENIUM (EPA 270.2/7740) LINC (EPA 200.7/6010)	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	<0.010 0.019 0.580 348 <0.0005 <0.010 1.87 <0.0002 5.5 201 2.41 165 <0.002 <0.002 <0.005 0.057	<0.010 0.012 1.22 <0.0002	<pre>&lt;0.010 0.038 56.2 298 &lt;0.0005 &lt;0.010 &lt;0.010 0.139 &lt;0.0002 7.2 392 0.078 342 &lt;0.002 &lt;0.002 &lt;0.005 &lt;0.350</pre>	293 <0.0005 <0.010 <0.010 0.090	<0.010 <0.005 0.094 248 <0.0005 0.013 0.013 <0.050 <0.002 13.4 143 0.231 279 <0.002 <0.002 <0.005 1.15



### METALS - QUALITY CONTROL

CLIENT		:	Э.З.	STEPHENS	£	ASSOCIATES
PROJECT	<del>#</del>	:	4230			
PROJECT	NAME	:	ENRO	WT-1		

ATI I.D. : 411383

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE		% REC
SILVER ARSENIC BARIUM CALCIUM CADMIUM COPPER IRON MERCURY POTASSIUM MAGNESSIUM MANGANESE SODIUM LEAD SELENIUM	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	41178604 41138305 41178604 41138302 41138302	<0.005 0.094 57.8 <0.0005 0.013 0.013 <0.050 <0.0002 3.6 10.0 0.231 19.6 <0.002 0.016	<pre>&lt;0.010 &lt;0.005 0.101 56.5 &lt;0.0005 0.012 0.012 &lt;0.050 0.0002 3.5 9.8 0.231 19.0 &lt;0.002 0.017</pre>	NA NA 7 2 NA 8 8 NA 0 2 0 3 NA 6	$\begin{array}{c} 0.439\\ 0.050\\ 1.03\\ 104\\ 0.0042\\ 0.300\\ 0.465\\ 0.334\\ 0.304\\ 51.6\\ 34.0\\ 1.12\\ 67.2\\ 0.346\\ 0.050\end{array}$	$\begin{array}{c} 0.500\\ 0.050\\ 1.00\\ 50.0\\ 0.0050\\ 1.00\\ 0.500\\ 1.00\\ 0.500\\ 1.00\\ 50.0\\ 50.0\\ 1.00\\ 50.0\\ 1.00\\ 50.0\\ 0.050\\ 0.050\\ 0.050\end{array}$	800 81988890666695280
3110	MG/L	41138305	1.15	1.15	0	1.50	0.500	90

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

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

1010gies,Inc., Albuquerque, NM CHAIN UF CUSTODY ATILABI.D. (CHAIN UF CUSTODY ATILABI.D. (Chains - Pontiand - Albuquerque DATE: 1/20/21/2 PAGE OF		PECOLEUM HYDROZEDORS (615/8150)         PECOLEUM HYDROZEDORS (615/8150)         PECOLEUM HYDROZEDORS (615/8150)         PECOLEUM HYDROZEDORS (615/8150)         Desel(Gasoline/BTXE/MTEE (MOD 8015/8020)         Down and to the train the table of the table of table of table of table of table of table of table of table of table of table of table of table of table of table of table of t		1430 H20	NA NA BLO	11/19/91 1330 1420	W/4/4/1700 ULAO DS 200 XX 200 000 000 000 000 000 000 000		ATION - SAMPLE RECEIRT - SAMPLED & RELINQUISHED BY 1: RELINQUISHED BY - 2. RELINQUISHED BY - 3.	NO. CONTAINERS Supreduce: 1, 25 Supreduce: Supreduce: Supreduce: Supreduce: Supreduce: Supreduce: Supreduce: Supreduce: Supreduce: Supreduce: Supreduce: Supremove Sup	-/ CUSTODY SEALS Y(A) HA Print	Company: $D(\lambda - j) + D = \xi(\lambda - 2j - \epsilon^{j} + t, t)$ $D(\lambda - j) + D = \xi(\lambda - 2j - \epsilon^{j} + t, t)$	RECEIPTEND FOR SUPPORTED AND A RECEIVED AND A RECEIVED BY (F Scionatore: Time: Scionatore: Scionatore: Time: Scionatore:	FIRD FUTERET	Printed Name: Date:	Company. Company.	• Flueric (602) 496-4400 • Seatth (206) 228 8335 • Parcacola (90:1) 474 1001 • Portland (503) 684 0:147 • Albuqueroue (505) 344 3777 DISTRIBUTION: White Canary • ATI • Pick • ODICIMATOR
Andlytical Technologies, Inc., Albuquerque, NM San Dugo - Phoenix - Soutto - Pensacola - Fi. Collins - Pontand - Albuquerque	PHOJECT MANAGER: P.J. P. P.J.R. L. C.Y.		MW-10 11/12/4/1330	MW-12 4/18/1430	NA- NA	5015-1-MM 11991 13	SB-2 W/4/94/1700		PROJECT INFORMATION	Гнол. ио. 4230 No. с	PROJ. NAME: 12W/UN WT-1	SHIPPED VIA: MESP A. R. R. L. (N GB	H RUSIA CLEAR (1981 CLAREN ALTREAMENT (1991)	Comments WAIG SAMDIPS FILED			ATL abs: Sun Dieue (619) 458 9141 • Fluenik (602) 496 4100 • Seattle (206) 228 8335 • Pansa

HE RYOHK PHOJECT MANAGER. LETTIA KRAKOWSKI	OWSKI				ANALYSIS REQUEST				
Analytical Technologies, Inc. 2/09-D Pan American Freeway, NE Albuquerque, NM 87107	ic. way, NE	Q	EON/CON (SING SCI ISVEW) 5	י גי אומי כק לה ואש	81225/WTBE/ (MOD 8015/5020)				Soline/BTXE/ (MOD 8015/5020)
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E			· · · · · · · · · · · · · · · · · · ·	Puritod Riamo:	launo: Dato:		Printed Name	2 //(OL	er/Jul
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9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

#### ATI I.D. 411818

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December 13, 1994

Daniel B. Stephens & Associates 6020 Academy NE Suite 100 Albuquerque, NM 87109

Project Name/Number: Enron WT-1/4230

Attention: Bob Marley

On 11/23/94, Analytical Technologies, Inc., received a request to analyze **aqeuous** sample(s). The sample(s) 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.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary X. 4 Mary Tyer

Project Manager

MT/jat

Enclosure

ADHS License No. AZ0061 Donald F. Weber, Laboratory Manager

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

Analytical Technologies, Inc.

	alyrical <b>lechnologi</b>			
	: D.B. # : 4230	STEPHENS & ASSOCIATES	DATE	RECEIVED : 11/23/9
	NAME : ENRON	WT-1 ATI I.D. : 41		T DATE : 12/12/94
ATI #	CLIENT D	DESCRIPTION	MATRIX	DATE COLLECTER
01 02 03	MW-9 SB-1 MW-7		AQUEOUS AQUEOUS AQUEOUS	11/21/94 11/22/94 11/22/94
		TOTALS		
	MATRIX	# SAMPLES		
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		ATI STANDARD DISPO	OSAL PRACTICE	
date of	this report.	s project will be dis If an extended stora lepartment before the	age period is requ	ired, please conta



### GENERAL CHEMISTRY RESULTS

ATI I.D. : 411818

I.

CLIENT : D.B. STEPHENS PROJECT # : 4230 PROJECT NAME : ENRON WT-1	& ASSOCI	ATES		DATE RECEIVED REPORT DATE	
PARAMETER	UNITS	01	02	03	
SULFATE (EPA 375.2)	MG/L MG/L MG/L MG/L		<1 492 <1 492 750 <0.05 0.28 450 2300	<1 327 400 <0.05 6.8	



GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : D.B. STEPHENS & ASSOCIATES PROJECT # : 4230 PROJECT NAME : ENRON WT-1

ATI I.D. : 411818

L.

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE		% REC
CARBONATE BICARBONATE HYDROXIDE TOTAL ALKALINITY	MG/L MG/L MG/L MG/L	41138303	<1 1910 <1 1910	<1 1930 <1 1930	NA 1 NA 1	NA NA NA NA	NA NA NA NA	NA NA NA NA
CHLORIDE NITRITE AS NITROGEN NITRATE AS NITROGEN SULFATE TOTAL DISSOLVED SOLIDS	MG/L MG/L MG/L MG/L MG/L	41185701 41149912 41181802 41185701 41181801	<0.05 0.28 240	126 <0.05 0.28 240 2900	0 NA 0 0 4	226 0.25 2.31 430 NA	100 0.25 2.00 200 NA	100 100 102 95 NA

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

Average Result



METALS RESULTS

ATI I.D. : 411818

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CLIENT: D.B. STEPHENS & ASSOCIATESDATE RECEIVED : 11/23/94PROJECT #: 4230REPORT DATE : 12/12/94PROJECT NAME : ENRON WT-1REPORT DATE : 12/12/94PARAMETERUNITS 0102O3SILVER (EPA 200.7/6010)MG/L <0.010 <0.010 <0.010</td>ARSENIC (EPA 206.2/7060)MG/L <0.005 0.005 0.006</td>BARIUM (EPA 200.7/6010)MG/L <0.005 0.005 0.002</td>CALCIUM (EPA 200.7/6010)MG/L 452 275 323CADMIUM (EPA 200.7/6010)MG/L <0.010 <0.010 <0.010</td>COPPER (EPA 200.7/6010)MG/L <0.010 <0.010 <0.010</td>COPPER (EPA 200.7/6010)MG/L <0.010 <0.010 <0.010</td>COPPER (EPA 200.7/6010)MG/L <0.050 <0.0002 <0.0002</td>POTASSIUM (EPA 200.7/6010)MG/L <0.050 <0.050 <0.050</td>MERCURY (EPA 200.7/6010)MG/L 222 09 148MANGANESE (EPA 200.7/6010)MG/L 0.229 0.254 0.069SODIUM (EPA 239.2/7610)MG/L 295 322 244LEAD (EPA 239.2/7421)MG/L <0.002 <0.002 <0.002</td>SELENIUM (EPA 270.2/7740)MG/L 0.009 <0.050 0.058</td>ZINC (EPA 200.7/6010)MG/L 0.092 4.73 <0.050</td>



METALS - QUALITY CONTROL

CLIENT : D.B. STEPHENS & ASSOCIATES PROJECT # : 4230 PROJECT NAME : ENRON WT-1

ATI I.D. : 411818

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE		% REC
SILVER	MG/L	41181802	<0.010	<0.010	NA	0.439	0.500	88
ARSENIC	MG/L	41185801	0.016	0.015	6	0.060	0.050	88
BARIUM	MG/L	41181802	0.085	0.079	7	0.982	1.00	90
CALCIUM	MG/L	41181803	323	334	3	378	50.0	110
CADMIUM	MG/L	41178801	<0.0005	<0.0005	NA	MSA	CC=	.998
CHROMIUM	MG/L	41181802	<0.010	<0.010	NA	0.896	1.00	90
COPPER	MG/L	41181802	0.010	<0.010	NA	0.459	0.500	90
ERON	MG/L	41181802	<0.050	<0.050	NA	0.888	1.00	89
1ERCURY	MG/L	41138304	<0.0002	0.0002	NA	0.0048	0.0050	96
MERCURY	MG/L	41183001	<0.0002	<0.0002	NA	0.0050	0.0050	100
POTASSIUM	MG/L	41181803	7.9	8.0	1	58.7	50.0	102
AGNESIUM	MG/L	41181803	148	145	2	401	250	101
MANGANESE	MG/L	41181802	0.254	0.237	7	1.15	1.00	90
SODIUM	MG/L	41181803	244	251	3	284	50.0	80
LEAD	MG/L	41180601	<0.002	<0.002	NA	0.042	0.050	84
SELENIUM	MG/L	41138302	0.016	0.017	6	0.050	0.050	68
ZINC	MG/L	41181802	4.73	4.43	7	14.9	10.0	102

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

PROJECT MANAGER:	GER: BOB MARL	11 PT JY						ANAL	YS S	HE C	REGUEST					100 100 100 100		
COMPANY: ADDHESS:	DANIEL B. STANY	FUR AL	+1350C	3050) -	illar.	& Unreg.			(0728/2									minny
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2709-D Pan American Freeway, NE Albuquerque, NM 87107 Phone (505) 344-3777 FAX (505) 344-4413

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### ATI I.D. 412312

December 22, 1994

Daniel B. Stephens & Associates 6020 Academy NE, Suite 100 Albuquerque, NM 87109

Project Name/Number: ENRON-WT1 4230.2

Attention: Bob Marley

On 12/02/94, 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.

Due to matrix interferences, selenium spike analysis was performed using the Method of Standard Additions (MSA). The spike result given is the correlation coefficient (CC), which is  $\geq 0.995$ .

For sample "MW-13", the Sulfuric Acid preserved bottle for Nitrate/Nitrite analysis was not received by ATI, Albuquerque.

EPA Method 8240 and RCRA Metal by TCLP analyses were performed by Analytical Technologies, Inc., 225 Commerce Drive, Fort Collins, CO.

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

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

Letitia Krakowski, Ph.D. Project Manager

A Witchell Rutet

H. Mitchell RubeHstein, Ph.D. Laboratory Manager

MR:jt

Enclosure

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



CLIENT	:DANIEL B. STEPHENS	DATE RECEIVED	:12/02/94
PROJECT #	:4230.2		
PROJECT NAME	: ENRON-WT1	REPORT DATE	:12/22/94

ATI ID: 412312	
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ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	MW-4	AQUEOUS	12/01/94
02	MW-5	AQUEOUS	12/01/94
03	MW-6	AQUEOUS	11/30/94
04	MW-8	AQUEOUS	11/30/94
05	MW-13	AQUEOUS	12/01/94
05	PIT	NON-AQ	11/30/94
07	DEHY	NON-AQ	11/30/94

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

<u>#SAMPLES</u>
5
2

### 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. Analytical **Technologies**, Inc.

## GENERAL CHEMISTRY RESULTS

ATI I.D. : 412312

CLIENT : D.B. STEPHENS PROJECT # : 4230.2 PROJECT NAME : ENRON-WT1	& ASSOCI	ATES		DATE REC		: 12/02/94 : 12/22/94
PARAMETER	UNITS	01	02	03	04	05
CARBONATE (CACO3) BICARBONATE (CACO3) HYDROXIDE (CACO3) TOTAL ALKALINITY (AS CACO3) CHLCRIDE (EPA 325.2) NO2/NO3-N, TOTAL (353.2) SULFATE (EPA 375.2) T. DISSOLVED SOLIDS (160.1)	MG/L MG/L MG/L MG/L MG/L MG/L MG/L	<1 273 <1 273 540 20 1000 2800	<1 1080 <1 1080 360 <0.06 <5 2000	<1 624 <1 624 700 <0.05 410 2400	<1 441 <1 590 0.44 330 1900	<1 273 <1 273 340 - 1400 2900

Analytical **Technologies**, Inc.

### GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT		:	D.B. STEPHENS & ASSOCIATES
PROJECT	#	:	4230.2
PROJECT	NAME	:	ENRON-WT1

### ATI I.D. : 412312

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE		% REC
CARBONATE BICARBONATE HYDROXIDE TOTAL ALKALINITY CARBONATE BICARBONATE HYDROXIDE TOTAL ALKALINITY CHLORIDE NITRITE/NITRATE-N (TOT SULFATE SULFATE TOTAL DISSOLVED SOLIDS	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	41231204 41256810 41253101 41280301 41231204 41255506 41231202	<1 441 <1 451 <1 451 26 6.7 330 57 2000	<1 444 <1 456 <1 461 26 6.7 330 67 2000	NA 0.7 NA 0.7 NA 1 NA 1 0 0 0 0 0	NA NA NA NA NA NA 51 27.2 520 106 NA	NA NA NA NA NA 25 20.0 200 40 NA	NA NA NA NA NA NA 100 102 95 95 98 NA

3 Recovery = (Spike Sample Result - Sample Result) Spike Concentration
RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) Average Result

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METALS RESULTS

### ATI I.D. : 412312

CLIENT : D.B. STEPHENS PROJECT # : 4230.2	& ASSOCI	ATES	i	DATE RECI	EIVED :	12/02/94
PROJECT NAME : ENRON-WT1				REPORT DA	ATE :	12/22/94
PARAMETER	UNITS	01	02	<u>0</u> 3	04	05
SILVER (EPA 200.7/6010) ARSENIC (EPA 206.2/7060) BARIUM (EPA 200.7/6010) CALCIUM (EPA 200.7/6010) CADMIUM (EPA 213.2/7131) CHRCMIUM (EPA 200.7/6010) COPPER (EPA 200.7/6010) IRCN (EPA 200.7/6010) MERCURY (EPA 245.1/7470) PCTASSIUM (EPA 200.7/6010) MAGNESE (EPA 200.7/6010) MANGANESE (EPA 200.7/6010) SODIUM (EPA 239.2/7421) SELENIUM (EPA 270.2/7740) ZINC (EPA 200.7/6010)	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	<0.010 0.007 0.025 332 <0.0005 <0.010 <0.010 <0.050 <0.0002 5.9 153 0.024 353 <0.002 353 <0.002 0.020 <0.050	<0.010 <0.010 0.097	<pre>&lt;0.010 &lt;0.005 0.109 293 &lt;0.0005 &lt;0.010 &lt;0.010 &lt;0.050 &lt;0.0002 7.1 197 0.562 267 &lt;0.002 &lt;0.005 &lt;0.005 &lt;0.005</pre>	<0.010 0.006 0.052 247 <0.0005 <0.010 0.014 <0.050 <0.0002 6.0 137 0.136 221 <0.002 <0.005 <0.005 <0.050	<0.010 0.005 0.043 491 <0.0005 <0.010 <0.010 <0.050 <0.0002 9.3 124 <0.010 115 <0.002 0.005 <0.005 <0.005 <0.005 <0.005



#### METALS - QUALITY CONTROL

CLIENT : D.B. STEPHENS & ASSOCIATES PROJECT # : 4230.2 PROJECT NAME : ENRON-WT1

ATI I.D. : 412312

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE		% REC
SILVER	MG/L	41231204	<0.010	<0.010	NA	0.477	0.500	95
ARSENIC	MG/L	41251801	0.054	0.055	2	0.096	0.050	84
BARIUM	MG/L	41231204	0.052	0.052	0	1.04	1.00	99
CALCIUM	MG/L	41231201	332	321	3	558	250	90
CADMIUM	MG/L	41231201	<0.0005	<0.0005	NA	0.0043	0.0050	86
CHROMIUM	MG/L	41231204	<0.010	<0.010	NA	0.955	1.00	96
COPPER	MG/L	41231204	0.014	0.015	7	0.511	0.500	99
IRON	MG/L	41231204	<0.050	<0.050	NA	0.959	1.00	95
MERCURY	MG/L	41253707	<0.0002	<0.0002	NA	0.0048	0.0050	36
POTASSIUM	MG/L	41250102	12.4	12.5	2	62.3	50.0	101
MAGNESIUM	MG/L	41231201	153	148	3	266	125	90
MANGANESE	MG/L	41231204	0.136	0.134	1	1.10	1.00	96
SODIUM	MG/L	41231201	353	346	2	459	100	105
LEAD	MG/L	41231201	<0.002	<0.002	NA	0.050	0.050	100
SELENIUM	MG/L	41231201	0.020	0.019	5	MSA	CC=	.9999
ZINC	MG/L	41231204	<0.050	<0.050	NA	0.504	0.500	101

<sup>3</sup> Recovery = (Spike Sample Result - Sample Result) ------ X 100 Spike Concentration RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) ------ X 100 Average Result

ALYSIS REQUEST	Volatile Organics GC/MS (624/8240)         Poiynuclear Aromatics (610/8310)         Poiynuclear Aromatics (610/8310)         SDWA Primary Standards - Arizona         SDWA Primary Standards - Arizona         SDWA Primary Standards - Federal         SDWA Primary Standards - Federal         SDWA Primary Standards - Federal         SDWA Primary Standards - Federal         SDWA Primary Standards - Federal         SDWA Primary Standards - Federal         SDWA Primary Standards - Federal         SDWA Primary Standards - Federal         SDWA Primary Standards - Federal         SDWA Primary Standards - Federal         SDWA Secondary Standards - Federal         SDWA Primary Standards - Federal         SDWA Primary Standards - Federal         STD         AND - TO - TO - TO - TO - TO - TO - TO - T					X X X			1 BY: 2. RELINDUISHED BY:	ne: Sig	Date: Printed Name: Date:	Company.	2. RECEIVED BY:(LA	Inno: Superupo:	Date: Provised Name 1 Date: 17/	
DATE: <u>12/2/79</u> _PAGE_L_OF_LLL	(MOD 8015) Gas/Diese! Diesel/Gasoline/BTXE/MTBE (MOD 8015/8022) BTXE/MTBE (8020) Chlorinated Hydrocarbons (601/8010) Aromatic Hydrocarbons (602/8020) SDWA Volatiles (602/8020) TWA Volatiles (602/8020) Festidues/PCB (608/6080) Pestidues/PCB (608/6080) Base/Neutral/Acid Compounds GC/MS (625/3270)						X		Walled & Belinguished by a state night by	Signature:	Printed Name: Date: Printed Name:	Phone:	FD BY/		Printed Name: Date: Printed Name:	c
San Diego - Phrounix - Suartho - Pensacola - Fit Cultins - Portland - Albuquerque D PriOJECT MANAGER: アンロト アイッアゼッイ	COMPANY: Curaui B. Skohuns Hassoc. ADUHESS: 6020 Acadumy NE Suite 100 PHONE: 822 9400 PHONE: 822 9400 EAX: 822 9400 BILL TO: 620 PR ADO BILL TO: 620 PR ADO COMPANY: ENPONENTING AFRICES 1400 Sinith ADE THE WATH LABID SAMPLE ID PATE THE WATH LABID	1~ 0-H 0-8 0 18/11 ci	2000 LUNIS	AAM/- 6 11/20/20 1530 120 02	1.130/94 1575	13 12/194 1000 Hr O	1 V. oS	DEHY [11/30/19 /45 Soul 07]	PROJECT INFORMATION	4230.2 HO. CONTAINERS	PROJ. NAME. ENIZON - WT CUSTODY SEALS Y NY NA Print	- 0/-3	TO TOR FUSH PHONE (STREAM	1.3484 1.1/244 1.1 WEEK (1.0.1.1.1.1.2 WEEK		Connent

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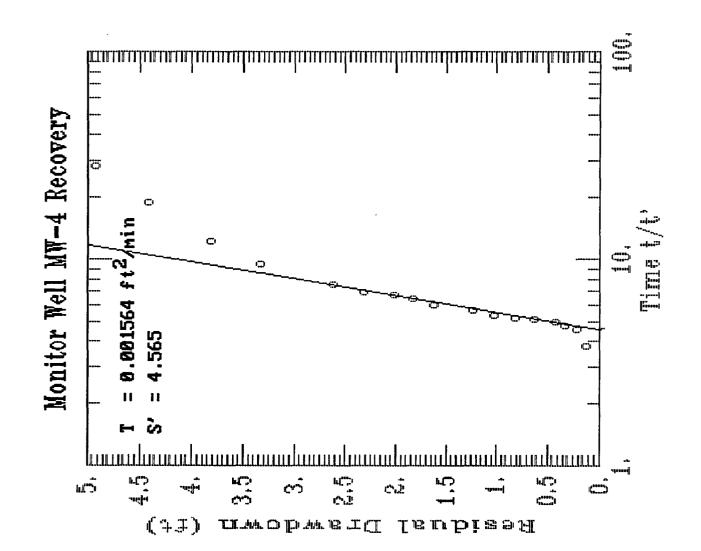
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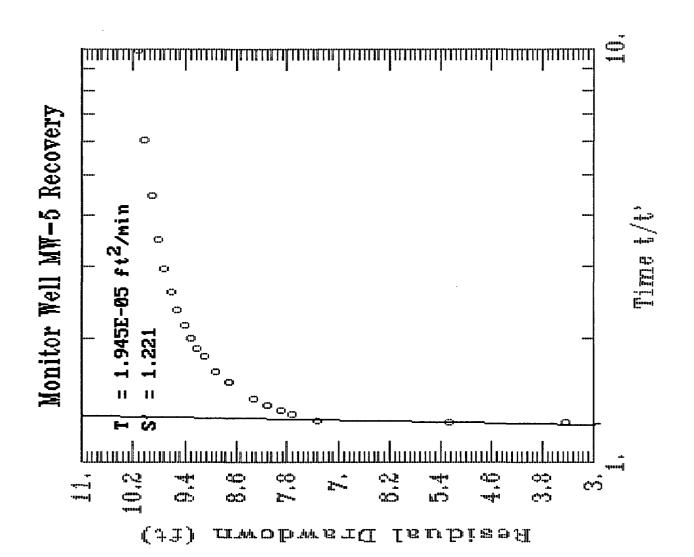
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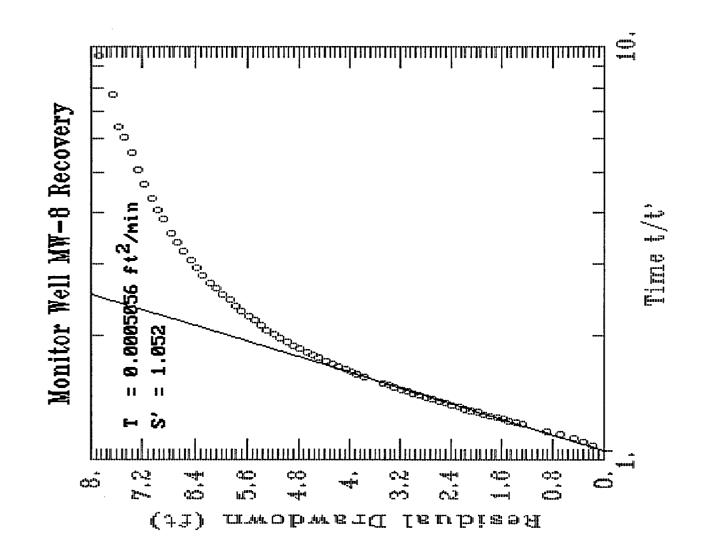
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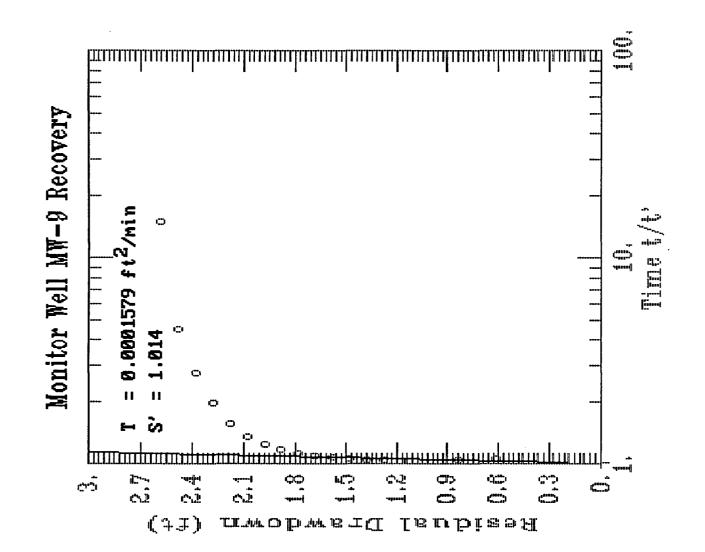
# **APPENDIX C**

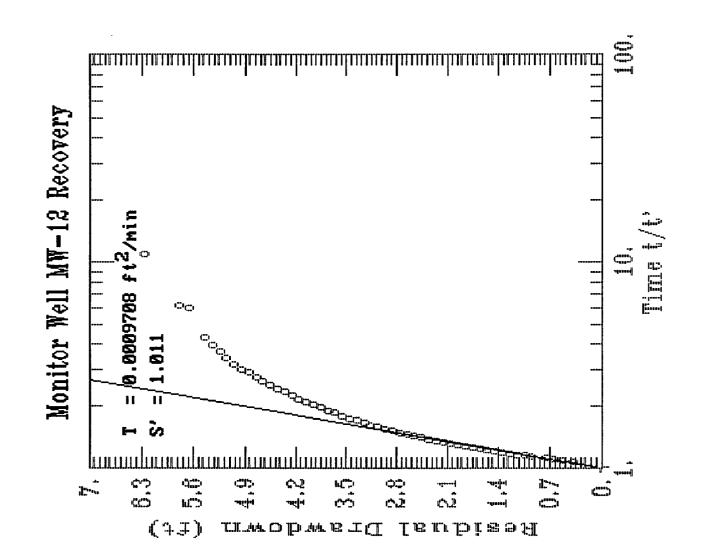
# RESULTS OF HYDRAULIC TESTING











## Monitor Well MW-4 Bail-Recovery Test

Date:	12/01/94	
Initial depth to water:	47.18	(ft.)
Total depth of well:	58.37	(ft.)
Start Bailing:	08:19:00	
Stop Bailing:	08:28:10	
Purge volume:	15.00	(gal.)

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Elapse	
Time	Displacement
(minutes)	(feet)
0.33	4.92
0.50	4.42
0.80	3.82
1.05	3.32
1.38	2.62
1.53	2.32
1.58	2.02
1.65	1.82
1.80	1.62
1.92	1.22
2.07	1.02
2.15	0.82
2.20	0.62
2.28	0.42
2.38	0.32
2.53	0.22
3.20	0.12

## Monitor Well MW-5 Bail-Recovery Test

Date:	12/1/94	
Initial depth to water:	48.68	(ft.)
Total depth of well:	59.80	(ft.)
Start Bailing:	10:54:30	
Stop Bailing:	11:14:30	
Purge volume:	5.00	(gal.)

Elapse		
Time	Displacement	
(minutes)	(feet)	
1.67	10.12	
2.97	10.02	
4.35	9.92	
6.02	9.82	
7.67	9.72	
9.37	9.62	
11.15	9.52	
13.02	9.42	
14.87	9.32	
16.73	9.22	
18.63	9.12	
22.82	8.92	
26.32	8.72	
34.75	8.32	
39.67	8.12	
43.75	7.92	
48.22	7.72	
56.83	7.32	
104.50	5.26	
154.50	3.42	

## Monitor Well MW-8 Bail-Recovery Test

Date: 11/30/9		
Initial depth to water:	49.52	(ft.)
Total depth of well:	59.27	(ft.)
Start Bailing:	13:05:00	
Stop Bailiing:	13:14:15	
Purge volume:	4.00	(gal.)

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Elapse		Elapse	
Time	Displacement	Time	Displacement
(minutes)	(feet)	(minutes)	(feet)
10.33	7.88	23.73	3.98
10.63	7.68	24.27	3.88
10.95	7.58	24.78	3.78
11.07	7.48	25.33	4.68
11.28	7.38	25.90	4.58
11.53	7.28	26.48	3.48
11.77	7.18	27.07	3.38
12.02	7.08	27.67	3.28
12.27	6.98	28.35	3.18
12.50	6.88	29.03	3.08
12.85	6.78	29.72	2.98
13.12	6.68	30.47	2.88
13.42	6.58	31.37	2.78
13.73	6.48	32.23	2.68
14.03	6.38	33.07	2.58
14.37	6.28	34.03	2.48
14.70	6.18	34.97	2.38
15.00	6.08	35.93	2.28
15.33	5.98	37.08	2.18
15.65	5.88	38.17	2.08
16.03	5.78	39.35	1.98
16.38	5.68	40.68	1.88
16.77	5.58	41.97	1.78
17.12	5.48	43.50	1.68
17.53	5.38	44.97	1.58
17.93	5.28	46.50	1.48
18.35	5.18	48.30	1.38
18.77	5.08	50.17	1.28
19.23	4.98	61.00	0.88
19.62	4.88	68.08	0.68
20.03	4.78	80.00	0.46
20.45	4.68	92.00	0.31
20.88	4.58	114.00	0.17
21.28	4.48		
21.80	4.38		
22.25	4.28		
22.75	4.18		
23.25	4.08	L	

## Monitor Well MW-9 Bail-Recovery Test

Date:	11/30/94	
Initial depth to water:	55.52	(ft.)
Total depth of well:	59.30	(ft.)
Start Bailing:	09:33:00	
Stop Bailing:	09:36:30	
Purge volume:	1.20	(gal.)

Elapse		
Time	Displacement	
(minutes)	(feet)	
3.75	2.58	
4.50	2.48	
5.48	2.38	
7.12	2.28	
9.60	2.18	
12.90	2.08	
17.67	1.98	
23.48	1.88	
30.07	1.78	
36.63	1.68	
45.18	1.58	
54.50	1.48	
64.08	1.38	
74.10	1.28	
86.42	1.18	
74.00	0.84	
52.00	0.61	

## Monitor Well MW-12 Bail-Recovery Test

Date:	11/30/94
Initial depth to water:	50.45 (ft.)
Total depth of well:	60.20 (ft.)
Start Bailing:	11:05:00
Stop Bailing:	11:10:00
Purge volume:	3.30 (gal.)

Elapse		Elapse	
Time	Displacement	Time	Displacement
(minutes)	(feet)	(minutes)	(feet)
5.50	6.25	21.58	1.95
5.97	5.80	22.68	1.85
6.00	5.65	23.83	1.75
6.50	5.45	25.08	1.65
6.70	5.35	26.72	1.55
6.85	5.25	27.77	1.45
7.05	5.15	30.57	1.35
7.27	5.05	32.72	1.25
7.47	4.95	34.23	1.15
7.63	4.85	35.97	1.05
7.87	4.75	38.42	0.95
8.07	4.65	45.82	0.75
8.28	4.55	50.28	0.65
8.48	4.45	55.12	0.55
8.72	4.35	68.92	0.37
8.97	4.25		
9.27	4.15		
9.53	4.05		
9.85	3.95		
10.17	3.85		
10.50	3.75		
10.83	3.65		
11.23	3.55		
11.67	3.45		
12.10	3.35		
12.53	3.25		
13.00	3.15		
13.42	3.05		
13.93	2.95		
14.52	2.85		
15.08	2.75		
15.67	2.65		
16.30	2.55		
16.97	2.45		
17.88	2.35		
18.50	2.25		
19.55	2.15		
20.55	2.05		

# APPENDIX D

# SOIL VAPOR EXTRACTION PILOT TEST

# AcuVac Remediation Report



9111 Katy Freeway Suite 303 Houston, TX 77024 (713) 468-6688: TEL (713) 468-6689: FAX

November 25, 1994

Mr Bob Marley Project Geologist Daniel B. Stephens & Associates, Inc. 6020 Academy NE, Ste 100 Albuquerque, NM 87109

Re: Pilot Test - Enron WT-1, DBS & A; Project #4230

Dear Bob:

Enclosed is the report on Pilot Testing performed October 20, 1994 at the above referenced location. The test was conducted using the AcuVac SVE I-6 System with various instrumentation including the HORIBA Analyzer.

### Project Scope:

• Connect the SVE System to wells MW-10, SVE-1, SVE-1MW and MW-2 as extraction wells (EW) and apply vacuum; record the vacuum and well flow and record all System data, including fuel flow (propane).

• The Test procedure is to provide variable rates of vacuum and flow over the test period.

• Install and observe the magnehelic gauges on the outer monitoring wells to determine if the selected extraction well is in vacuum communication with the outer monitoring wells.

• Take influent vapor samples to provide on-site HORIBA Analyzer data.

• Provide a method of sampling influent vapors with the flow through canisters.

• Measure the distances from the selected extraction wells to the outer wells.

• Operate the SVE System in a manner that all well vapors are passed through the engine to destruct the contaminants and exhausted to meet air emission standards.

• Complete the tests by providing a report consisting of operating and analytical data.

#### Fuel Use Information:

When the SVE System is running 100% on fuel from extraction well vapors at an altitude of 3,600 ft and the engine at 2,000 - 2,300 rpm, the maximum contaminated fuel destruction or burn rate is approximately 23.8 lbs/hr or 3.72 gals/hr of VOC contamination. During these tests, the wells vapors provided 29.0% of the fuel based on the calculations below.

### Fuel Use Calculations:

At 2,000 - 2,300 rpm and 44 BHP, the engine burns 6.08 gals propane/hr. Propane has 21,591 BTU/lb, and 4.24 lbs/gal. Total BTU = 21,591 x 6.08 x 4.24 = 556,833 BTU/hr. Gasoline = 149,520 BTU/gal. SVE Sys. max. contaminant consumption = 556,833 = 3.72 gals/hr. 149,520 Total engine hours = 10.0 hrs. Total gallons of propane burned = 43.0 gals = fuel for 7.07 hrs. Total gallons of contaminant vapors burned for 2.93 hrs = 10.9 gals. Gasoline weighs 6.38 lbs/gal. Total contaminant = 69.54 lbs = 6.95 lbs/hr (1.09 gals/hr) average for 10 hrs.

Summary of Data: See Exhibit A

Discussion of Data:

Prior to starting each test, all the SVE systems are checked for normal operation and each magnehelic gauge is checked and calibrated to "0". The propane tank is full so an accurate fuel consumption can be estimated for the total test time. Expandable well plugs are placed in the outer wells. Static well data is recorded on each outer well.

Test #1 was a 3.9 hour SVE test conducted from extraction well (EW) MW-10. The well is constructed from 2" schedule 80 PVC with TD of 62.60 ft and screened up 15 ft with sand pack, bentonite seal and grouted. DTGW at test time was 53.20 ft leaving a screened area above groundwater of 5.60 ft.

At the start of the test (0735 hours), the extraction well (EW) vacuum was set at 50" H<sub>2</sub>O with an initial flow of 10 cfm. Outer wells MW-9, 12 & 13 all recorded a pressure which was the static pressure data. Well MW-12 data was not included in the well data averaging since the vacuum was ineffective due to a large and deep excavation between EW and the well. HORIBA data indicated that the total HC was in the 15,500 ppm range with CO<sub>2</sub> at 2.82%. As the EW vacuum was increased to 60" H<sub>2</sub>O, a slight amount of surging on the EW vacuum gauge was noted. With all systems held constant, the EW vacuum increased to 80, 100 and +100" H<sub>2</sub>O indicating the screened area was probably reduced due to rising groundwater. The SVE vacuum was shut off to allow the groundwater to seek its natural level and the test was then restarted at 0825 hours. The EW vacuum was set at 30" H<sub>2</sub>O with a flow of 5 cfm. By 0900 hours, outer well MW-9 indicated a vacuum of 0.14" H2O, a change of approximately 0.30" H2O in 0.5 hours. The EW vacuum was increase to 40" H2O and a flow of 9 cfm. HORIBA data indicated that the total HC had increased to over 21,000 ppm and CO<sub>2</sub> over 4.20%. By 1030 hours, outer wells MW-9 & 13 were recording a vacuum in response to the EW vacuum of 50" H2O and flow of 12 cfm. Prior to the completion of the test, the EW vacuum was increased to 60" H2O with a flow of 14 cfm. By 1130 hours, significant vacuums were recorded on MW-9 & 13 and each well was over 220 ft from the extraction well (EW). The HC from the HORIBA data indicated the range remained approximately 21,500 ppm. After the SVE System was shut off, the outer well expandable plugs were left in place. At 1245 hours (1.25 hours after completion of Test #1), the static well data on MW-9, 12 & 13 indicated (0.15)" H2O pressure [( ) indicates well pressure]. This indicates that the recorded vacuums were the result of the vacuum placed on the extraction well.

Test #2 was a 3.0 hour SVE test conducted from extraction well (EW) SVE-1. This well is constructed from 2" schedule 80 PVC with TD = 36.0 ft and screened up 15.0 ft. There was no groundwater at this depth. Prior to the start of the test at 1200 hours, the static well data for the outer wells was recorded. Each recorded a well pressure varying from (0.10)" to (0.34)" HzO.

The initial EW vacuum was set at 40" H $_{2}O$  with a flow of 9 cfm. An instant vacuum was recorded on well SVE-1MW which was nested with SVE-1. The screened areas were 6.5 ft apart with a 2.0 ft bentonite seal. HORIBA data indicated the HC was 334 ppm with CO<sub>2</sub> of 2.54%. After two hours and the EW vacuum at 60" H $_{2}O$  and flow of 16 cfm, all the outer wells were recording a slight vacuum with SVE-1MW recording 1.30" H $_{2}O$  vacuum. During the next hour, the EW vacuum was increased to 80" H $_{2}O$  with flow of 24 cfm. By 1500 hours, all the outer wells had overcome the initial pressures and were recording reasonable vacuums. The trend on the HORIBA data was down, dropping from a high of 370 ppm to 210 ppm. At the completion of the test, the outer wells were responding quicker to EW vacuum and flow increases indicating a drying effect of the subsurface. One to two additional hours of SVE would most likely have enhanced the data.

Test #3 was a 0.42 hour SVE test conducted from extraction well (EW) SVE-1MW. This was planned as a quick test to determine well vacuum and flow. This well is constructed from 2" PVC with TD = 53.0 ft and screened up from 52.5 ft to 42.4 ft. DTGW at test time was 45.6 ft leaving 3.1 ft of screen above the groundwater. Prior to starting the test, the static well data indicated that vacuums from Test #2 remained on all the outer wells including SVE-1 which is the nested well described in Test #2.

The initial EW vacuum was set at 80" H<sub>2</sub>O with a flow of 3 cfm. From an SVE standpoint, the subsurface was considered a tight structure. Each outer well recorded a vacuum increase over the static data. HORIBA data indicated the HC was 866 ppm with CO<sub>2</sub> at 1.00%. After the initial data, the EW vacuum was set at 100" H<sub>2</sub>O and the flow dropped to 1-2 cfm. This was most likely due to rising

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groundwater reducing the screened area. However, at the end of the test, the outer wells, with the exception of SVE-1, recorded a vacuum increase. At 1535 hours, the test was completed.

Test #4 was a 1.5 hour SVE test conducted from well MW-2 as the extraction well (EW). The well data was not available (older existing well) to the SVE project engineer other than it was a 2" PVC well extending into the groundwater.

Prior to the start of the test, static data recorded from the outer wells indicated a vacuum remaining near the maximum recorded during Test #3. The initial vacuum was set at 120" H<sub>2</sub>O with a flow of +- 1 cfm. The reason the initial vacuum was set this high was because no well flow was recorded below this level. No change was recorded in the outer well vacuums. HORIBA data indicated the HC was 1,440 ppm with CO<sub>2</sub> of 3.76%. After the initial data was recorded, the well flow valve was opened to allow the EW vacuum to seek its maximum vacuum of 270" H<sub>2</sub>O and flow of 5-7 cfm. This well did not provide good SVE data as the outer well vacuums continued to decrease for the first hour of testing. The last data recorded, prior to the end of the test, indicated the outer wells were recording a slight increasing trend with the EW vacuum over 270" H<sub>2</sub>O. It is very unlikely that this well would respond as an SVE well.

### Additional Information:

- Summary of Operating Data (Distances may vary from actual survey)
- Field Operating Data and Notes
- Figure 1 Plot of Observed Vacuum versus Distance at the Facility
- Site Photographs

### Conclusion:

The tests indicated that soil vacuum extraction (SVE) would be an effective method of remediation for this facility. Although the observed vacuum on the outer observation wells was relatively low at the beginning of the test, the duration of the pilot test was short compared to continuous operation. However, the results give positive indication that the observed and reported wells were in vacuum communication with the selected SVE extraction well. Figure #1 indicated that the effective radius of influence would be from 70 to 100 ft with extraction well flow of 10 - 17 cfm and extraction well vacuum in the 50" - 70" H $_{2}$ O range. An approximation of the radius of influence may be obtained by determining the point at which the measured vacuum is 0.30 to 0.50" H $_{2}$ O. It is assumed that beyond the lower point, the pressure gradient (driving force) is negligible to effectively transport vaporized contaminants to the extraction well. Under continuous operation, vacuum and radius of influence may continue to increase 1 to 3 days. All other data must be considered in the final design for a remedial plan.

The AcuVac SVE System performed as represented and should be considered a viable technology to use for the remediation of this location. The SVE System with the 140 CID, 4 cylinder engine can provide total extraction well flow of approximately 50 cfm with a vacuum, if required, up to 20" Hg. The System with 300 CID, 6 cylinder engine can provide total extraction well flow of approximately 120 cfm with a vacuum up to 20" Hg. These Systems are designed to consume heavy concentrations of VOCs and meet all air emission standards. The auxiliary fuel can be propane or natural gas.

Once you have reviewed the report, please call me if you have any questions.

Sincerely, تقلك

James E. Sadler Product Engineer

Enclosure

### EXHIBIT "A"

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### Test #1

### WT-1 Enron/DBS&A #4230

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11/20/94	First Data Time 0735	Second Data Time 0805	Third Data Time 0825	Fourth Data Time 0900	Fifth Data Time 0930	Sixth Data Time 1000	Seventh Data Time 1030
Horiba-HC PPM	-	15,400	18,430	19,130	-	21,230	21,370
Horiba - C0 <sub>2</sub> %	-	2.82	4.00	3.88	~	4.22	4.54
Extraction Well Flow-CFM Well MW-10	10	8	5	5	9	9	12
Extraction Well Vacuum "H <sub>2</sub> 0 Well MW-10	50	60	30	30	40	40	50
Well MW-13 Vacuum "H <sub>2</sub> 0 Dist. 255 ft.	(.14)	(.15)	(.15)	(.12)	(.03)	(.02)	.25
Well MW-12 Vacuum "H <sub>2</sub> 0 Dist ft.	(.05)	(.05)	(.03)	(.12)	(.12)	(.12)	(.12)
Well MW-9 Vacuum "H <sub>2</sub> 0 Dist. 225 ft.	(.05)	(.06)	(.15)	.14	.20	.24	.35

11/20/94	Eighth Data Time 1100	Ninth Data Time 1130	Tenth Data Time 1245	Average Data 4.0 Hrs.	Maximum Data
Horiba-HC PPM	21,450	21,720	-	19,819	21,513
Horiba - C0 <sub>2</sub> %	4.58	4.64		4.10	4.64
Extraction Well Flow-CFM Well MW-10	12	14	-	9.33	14
Extraction Well Vacuum "H <sub>2</sub> 0 Well MW-10	50	60	-	45.56	60
Well MW-13 Vacuum "H <sub>2</sub> 0 Dist. 255 ft.	.30	.36	(.15)	.30	.36
Well MW-12 Vacuum "H <sub>2</sub> 0 Dist. ft.	(.12)	(.12)	(.15)	.09	(.15)
Well MW-9 Vacuum "H $_20$ Dist. 225 ft.	.40	.47	(.15)	.30	.47

() Indicates Well Pressure

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## Test #2

W	<b>T-1</b>	Enron/DBS&A #4230
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11/20/94	First Data Time 1200	Second Data Time 1230	Third Data Time 1300	Fourth Data Time 1330	Fifth Data Time 1400	Sixth Data Time 1430	Seventh Data Time 1500
Horiba-HC PPM	334	370	340	286	246	-	210
Horiba - C0 <sub>2</sub> %	2.54	2.38	2.42	3.10	2.92	-	2.76
Extraction Well Flow-CFM Well SVE-1	9	9	9	16	16	24	25
Extraction Well Vacuum "H <sub>2</sub> 0 Well SVE-1	40	40	40	60	60	80	80
Well SVE-1MW Vacuum "H <sub>2</sub> 0 Dist. 0 ft.	.30	.50	.70	.98	1.30	1.65	1.90
Well MW-1 Vacuum "H <sub>2</sub> 0 Dist. 58 ft.	(.24)	(20)	(.13)	(.08)	.05	.10	.28
Well MW-2 Vacuum "H <sub>2</sub> 0 Dist. 95ft.	(35)	(35)	(.25)	(.15)	0	.10	.26
Well MW-3 Vacuum "H <sub>2</sub> 0 Dist. 101 ft.	(.07)	(.12)	.03	.03	.05	.12	.17

11/20/94	Average Data 3.0 Hrs.	Maximum Data
Horiba - C0 <sub>2</sub> %	2.69	3.1
Horiba-HC PPM	298	370
Extraction Well Flow-CFM Well SVE-1	15.43	25
Extraction Well Vacuum "H <sub>2</sub> 0 Well SVE-1	57.14	80
Well SVE-1MW Vacuum "H <sub>2</sub> 0 Dist. 0 ft.	1.05	1.90
Well MW-1 Vacuum "H <sub>2</sub> 0 Dist. 58 ft.	.14	.28
Well MW-2 Vacuum "H <sub>2</sub> 0 Dist. 95ft.	.12	.26
Well MW-3 Vacuum "H <sub>2</sub> 0 Dist. 101 ft.	.08	.17

() Indicates Well Pressure

Page.2

## Test #3

WT-1 En	ron/DBS&A #4230
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11/20/94	First Data Time 1510	Second Data Time 1535	Average Data 0.5 Hrs.	Maximum Data
Horiba-HC PPM	866	-	866	866
Horiba C0₂%	1.00		1.00	1.00
Extraction Well Flow-CFM Well SVE-1MW	3	1	2	3
Extraction Well Vacuum "H <sub>2</sub> 0 Well SVE-1MW	80	100	90	100
Well SVE-1 Vacuum "H <sub>2</sub> 0 Dist. 0 ft.	.26	.26	26	.26
Well MW-1 Vacuum " $H_20$ Dist. 58 ft.	39	1.05	.72	1.05
Well MW-2 Vacuum "H <sub>2</sub> 0 Dist. 95 ft.	.24	.36	.30	36
Well MW-3 Vacuum "H <sub>2</sub> 0 Dist. 101 ft.	.16	.18	.17	.18

() Indicates Well Pressure

## Test #4

### WT-1 Enron/DBS&A #4230

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11/20/94	First Data Time 1600	Second Data Time 1620	Third Data Time 1700	Fourth Data Time 1730	Average Data 1.5 Hrs.	Maximum Data
Horiba - C0 <sub>2</sub> %	3.76	4.14	-	-	3.95	4.14
Horiba-HC PPM	1,440	1,370	-	-	1,405	1,440
Extraction Well Flow-CFM Well MW-2	1	4	5	7	4.25	7.00
Extraction Well Vacuum "H <sub>2</sub> 0 Well MW-2	120	270	270	270	233	270
Well SVE-1MW Vacuum "H <sub>2</sub> 0 Dist. 0 ft.	1.3	1.05	.52	.50	.84	1.30
Weil SVE-1 Vacuum "H <sub>2</sub> 0 Dist ft.	.08	.08	.05	.07	.07	.08
Well MW-1 Vacuum "H <sub>2</sub> 0 Dist. 120 ft.	.96	.88	.42	.48	.69	.96
Well MW-3 Vacuum "H <sub>2</sub> 0 Dist. 190 ft.	.19	.22	.07	.20	.17	.22

Note: First Data is static well vacuum - No SVE

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	OPERATING DATA - TEST NO ACUVAC SVE SYSTEM ge Location EN DAN WT-1 DBS&A 4230 Project Engr. SADLER LUNDER								
	Date 11/20/94								
	Parameter	Time 0735 Hr. Meter	Time 0805 Hr. Meter	Time 0825 Hr. Meter	Time Oq OO Hr. Meter	Time OQ30 Hr. Meter	Time 1000 Hr. Meter		
<u></u>	R.P.M.	30.2	20.7	21.0	21.6	2300	3300		
WER	Oil Press		<u>2100</u> 60	2100	2100	55	50		
IN IN	P.S.I. Water Temp	160	160	160	160	160	160		
ENGINE/BLOWER	•F Volts	13.5	13,5	13,5	13,5	13,5	13,5		
Ä	Intake Vac Hg	17	17	17	15	15	15		
1	Gas Flow Fuel/Propane cfh	110	/00	120	105	110	110		
AIR	Air Flow cfm	18	18	21	25	25	9.		
FUEL/AIR	Well Flow MW-10 cfm	10	8	5	5	9	9		
H	Recovery Well Vac ML -10 "H20	50	60	30	30	40	40		
	Air Temp 'F	39	40	42	48	49	52		
	Barometric Pressure Hg		-	-	-		-		
1	MW-13 "H20	(.14)	(.15)	(.15)	(.12)	(.03)	(.07)		
	<u>Μω-12 "H20</u>	(,05)	(.05)	(.03)	(.12)	(.12)	(.12)		
1	mw -9 "H20	(.05)	(.06)	(.15)	JI4	, 90	.24		
-	"H <sub>2</sub> 0					c			
MUN	"H <sub>2</sub> 0 "H <sub>2</sub> 0								
VACL	"12 <sup>0</sup> "H <sub>2</sub> 0		· · · · · · · · · · · · · · · · · · ·	· · ·			·		
ELL	"2 <sup>0</sup> "Н <sub>2</sub> 0	· · · · · · · · · · · · · · · · · · ·					· · · · · · · · · · · · · · · · · · ·		
DR W	"2° "Н <sub>2</sub> 0								
MONITOR WELL VACUUM	"H <sub>2</sub> 0								
MO					· · · · · · · · · · · · · · · · · · ·				
				· · · · · · · · · · · · · · · · · · ·					
	"н <sub>2</sub> 0	·	[	LNDICATE	S WELL Pr	ESSURE			
1	"н <sub>2</sub> о	· · · · · · · · · · · · · · · · · · ·		<u>.</u>					
<u>.                                    </u>	Vapor Wells	ON							
<b>GLIOTINA</b>	On/Off Air Injection Pressure P.S.I.	015							
MAN	Pressure P.S.I. Air Injection Flow cfm	OFF	·				>		
	Samples		HORIDA	Hoilign Inflient	Horiba Thalient	hoiziga Thruent			

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	Instrumer	nt					-	
TEST			HORIBA			→		
<u> </u>	Time		0755	0835	0910	0945		
LUENT	н-с	ppmv	15,400	18430	19,130	21,230		
VAPOR INFLUENT	co2	×	2.82	4.00	3,88	チュラシ		
VAP	C-0	%	.03	,03	.03_	,04		
	H-C							
Ş		ppmv						
IOISS	<sup>co</sup> 2	×						
: EMISSIONS	C-0	×.						
	Air/Fuel						·	
		- %					· · · · · ·	

## OPERATING DATA AND NOTES

DATE	11/20/44 TEST NO. 1
0700	Annived at location - Positioned SVE System near well
	MW-10 as extraction well (EW) - Well Data - 2" PUC,
	TD = 62,60' screened up 15.0' - DTEW = 53.20' - Large open
	pit between EW and MW-12 -Distance MW-10 to = 225' 255'
0735	START TEST # 2 - Set initial vacuum e 50"Had flow e 10 cam - All
	SUE systems normal - Proponce 110 cFH
0755	HORIBA DATA- HC @ 15,400ppm, COre 2182
0805	Recorded Data- EW vocuum @ 60"Hro, flaw @ BCFM - Sub surface
	structure moderately tight -
0810	Rapid rise in EW vocum 50 - 80 - 100 + "Hro - Most likely
·	rising ground water reducing screened area-
0870	shut off EW - DTEW 52,54'
0825	Restort Test # 1 - Initial vocum @ 30"HD, flav @ 5cFM
0835	
0900	Recorded Data-All SUE systems steady - Increased EW use to 40" And
0930	Recorded Data-Outer well MW-9 recording vocuum - EW view @ 40"Hrd
0945	HORIBA Data- HC increasing @ 19,130mm
1000	Recorded Data-All SUE systems normal-Outer wells MW-1349 recording voccourd

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(933107-PAGE2)

age $\Delta$ Location         EdoN         WT-1 $-\Delta B Sci A$ $4 \exists 2 i i$ Project Engr. SADLE2 [Lutible           bate         II ( $\exists 0$ ( $44$ file         II ( $\exists 0$ ( $130$ II ( $d - 1$ Parameter         Hr. Reter         Hr. Reter         Hr. Reter         Hr. Reter         Hr. Reter         Hr. Reter           01 Frees          SO         SO              01 Frees          SO         SO              01 Frees          SO         SO              01 Frees          SO         SO              Vitte         13,5         13,5         13,5              10 Attace Vas          1/2         1/4              10 Mill<0 Crist         1/2         1/2               10 Mill<0 Crist         1/2 <th></th> <th>AcuVac Remediation</th> <th>OPE</th> <th>RATING DAT.</th> <th>A - TEST NO</th> <th>o <u> </u></th> <th></th> <th>CUVAC SYSTEM</th> <th></th>		AcuVac Remediation	OPE	RATING DAT.	A - TEST NO	o <u> </u>		CUVAC SYSTEM	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Page _	ے _ Locatio	n Erow W-	T-1 -0B	SEA 42	<u>30 Pro</u>	ject Engr.SA	DLER   LUNG	SERE
Parameter         IO20         1100         II30         IQ45           Hr. Heter         Hr. Heter         Hr. Heter         Hr. Heter         Hr. Heter         Hr. Heter           23.1         23.6         24.1		Date	11/20/94	·		>			. •
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		Panameter	1	1100	1130	1245			
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Ř		2300	9300	9900				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	T MO	P.S.I.	50	50					
Mg       15       15       14          Bas Flow Fuel/Progene cfn       (DO       100       95          Air Flow MU -10 cfm       13       13       14          MU -10 cfm       13       13       14          Mu -10 cfm       13       13       14          Mu -10 cfm       13       13       14          Barometric Pressure Hg             Mu -13 "120       .25       .30       .36       (.15)         Mu -13 "120       .35       .40       .47       (.15)         Mu -13 "120       .35       .40       .47       (.15)         Mu -13 "120       .35       .40       .47       (.15)         Mu -13 "120       .35       .40       .47       (.15)         Mu -13 "120       .35       .40       .47       .15)         Mu -13 "120       .35       .40       .47       .15)         Mu -14 "120       .35       .40       .47       .15)         Mu -14 "120       .35       .40       .47       .15)         Mu -14 "120       .35       .40 <td>(E/BI</td> <td>•F</td> <td>160</td> <td></td> <td></td> <td><u> </u></td> <td>· .</td> <td></td> <td></td>	(E/BI	•F	160			<u> </u>	· .		
Mg       15       15       14          Bas Flow Fuel/Progene cfn       (DO       100       95          Air Flow MU -10 cfm       13       13       14          MU -10 cfm       13       13       14          Mu -10 cfm       13       13       14          Mu -10 cfm       13       13       14          Barometric Pressure Hg             Mu -13 "120       .25       .30       .36       (.15)         Mu -13 "120       .35       .40       .47       (.15)         Mu -13 "120       .35       .40       .47       (.15)         Mu -13 "120       .35       .40       .47       (.15)         Mu -13 "120       .35       .40       .47       (.15)         Mu -13 "120       .35       .40       .47       .15)         Mu -13 "120       .35       .40       .47       .15)         Mu -14 "120       .35       .40       .47       .15)         Mu -14 "120       .35       .40       .47       .15)         Mu -14 "120       .35       .40 <td>NGIN</td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td>	NGIN				1				
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3L/AJI	cfm					· · · · · · · · · · · · · · · · · · ·		•
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	E E	MW-10 cfm Recovery Well	1				· ·		
			1	T	1		 		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1	•F		55	56				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Pressure Hg			-			·	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1	mw-15 "H-0							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		INW -12						·	
MODOV         "H20         ©           "H20		$1 m \omega = 1$	.35	, 40	.41	(.15)		· · · · · · · · · · · ·	
"H20     () Indicates Well Presence       "H20     () Indicates Well Presence       "H20     () Indicates Well Presence       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       On/off     ON       ON     () OFF       Pressure P.S.I.     OFF       Air Injection     OFF       Flow     cfm       Samples     HORIBA       HORIBA     HORIBA						` <u>`</u>	¢		
"H20     () Indicates Well Presence       "H20     () Indicates Well Presence       "H20     () Indicates Well Presence       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       On/off     ON       Pressure P.S.I.     OFF       Air Injection     OFF       Flow     cfm       Samples     HORIBA       HORIBA     HORIBA	NON:	"H <sub>2</sub> 0				· · · ·		<u> </u>	
"H20     () Indicates Well Presence       "H20     () Indicates Well Presence       "H20     () Indicates Well Presence       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       On/off     ON       Pressure P.S.I.     OFF       Air Injection     OFF       Flow     cfm       Samples     HORIBA       HORIBA     HORIBA	VAC	"н <sub>2</sub> 0			·	·			
"H20     () Indicates Well Presence       "H20     () Indicates Well Presence       "H20     () Indicates Well Presence       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       On/off     ON       Pressure P.S.I.     OFF       Air Injection     OFF       Flow     cfm       Samples     HORIBA       HORIBA     HORIBA	VELL	"H <sub>2</sub> 0							•
"H20     () Indicates Well Presence       "H20     () Indicates Well Presence       "H20     () Indicates Well Presence       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       On/off     ON       ON     () OFF       Pressure P.S.I.     OFF       Air Injection     OFF       Flow     cfm       Samples     HORIBA       HORIBA     HORIBA	OR .	"H <sub>2</sub> 0							
"H20     () Indicates Well Presence       "H20     () Indicates Well Presence       "H20     () Indicates Well Presence       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       "H20     () OFF       On/off     ON       Pressure P.S.I.     OFF       Air Injection     OFF       Flow     cfm       Samples     HORIBA       HORIBA     HORIBA	LINO	"H <sub>2</sub> 0					· · · · ·		
Image: Samples     Image: Sample	N N	"н <sub>2</sub> 0							
Image: Waper Wells     Image: Waper Wells       Image: Waper Wells     ON       Image: Waper Wells     ON       Image: Waper Wells     ON       Image: Waper Wells     ON       Image: Waper Wells     ON       Image: Waper Wells     ON       Image: Waper Wells     ON       Image: Waper Wells     ON       Image: Waper Wells     OFF       Image: Waper Wells     OFF       Image: Waper Walls     OFF       Image: Waper Walls     OFF       Image: Waper Walls     OFF       Image: Waper Walls     OFF       Image: Waper Walls     OFF       Image: Waper Walls     OFF       Image: Waper Walls     OFF       Image: Waper Walls     OFF       Image: Waper Walls     OFF       Image: Waper Walls     OFF       Image: Waper Walls     OFF       Image: Waper Walls     OFF       Image: Walls     OFF       Image: Walls     Image: Walls       Image: Walls     Image: Walls       Image: Walls     Image: Walls       Image: Walls     Image: Walls       Image: Walls     Image: Walls       Image: Walls     Image: Walls       Image: Walls     Image: Walls       Image: Walls     <		" <sup>H</sup> 2 <sup>0</sup>		()	Indicate	S WELL P	RESSURE	· · ·	
Open Wells     ON     OFF       On/Off     ON     OFF       Air Injection     OFF       Pressure P.S.I.     OFF       Air Injection     OFF       Flow     ofm       Samples     HORIBA		"H <sub>2</sub> 0	· ·						
On/Off     ON     DEF       Air Injection Pressure P.S.I.     OFF       Air Injection Flow     OFF       Samples     HORIBA		"H2 <sup>0</sup>	· · ·		· ·				
Samples HORIBA HORIBA	a	On/Off	ON			OFF		· ·	
Samples HORIBA HORIBA	NIFO	Air Injection	OFF						
AOKIBIS HOKIBA HORIBA	MAI	Air Injection	OFF	······································		Ð			
	•						·		

ſ		Instrume	nt				-	
	TEST			HORIBA	, « <u> </u>	<del>&gt;</del>		
	Ц.	Time		1015	1045	1115		·
	LUENT	H-C	ppmv	21,370	21,450	-21,720		
	VAPOR INFLUENT	<sup>c0</sup> 2		4,54	4,58	4.64		
L	Γ.Υ.	c-o	%	,04		,04	 	
ſ		H-C						
	SZ		ppmv				 	
	EMISSIONS	<sup>co</sup> 2	z					
	EMI	C-0						
			<u>x</u>					
	· · [	Air/Fuel	Ratio			·		
	<u> </u>						 	

## OPERATING DATA AND NOTES

DATE	11/20/94 TEST NO. 1_
1005	Thereased EW vocum to 50" Hro, How e DeFM
	Propane @ 100 CFH - All sleady - No sanging
1015	HORIBH Date- HC up slightly
1030	Recorded Data- AV systems steady -EW vocuum & flow steady
	Outer wells MW-9413 responding to EW vacuum increase
1045	HORIBA Data- HC steady
1100	Recorded Data - All SVE systems normal - Outer wells
	MW 9 \$ 13 continue on increasing trend - Good ROI
1105	Increased EW vocuum to 60"H20, flaw @ 14 CFM
	Slight sanging of EW voccum gauge indicating ground-
	water closing off screened area.
1130	Recorded Data- All SUE systems normal- Good vocaum
	response from outer wells MW-92,13-No vocaim
	response on well MW-12 due to longe excavation between
	EW and outer well
	Test Campleted -
1295	Recorded static data on MW 9213 - 1.25 hours after
	SUE off-All wells recorded (15)"Hro (Pressare)

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	AcuVac Remediation	OPI	ERATING DATA	A - TEST N	o <u></u>		CUVAC SYSTEM
Page _	Locatio	n <u>Enron</u> u	1-TC	BSZA 42	<u>130</u> Pro	ject Engr.S <u>M</u>	der Lunderen
	Date	11/20/94			·		
a contraction of the second seco	Parameter	Time (150 Hr. Meter	Time 1200 Hr. Meter	Time 1230 Hr. Meter	Time 1300 Hr. Meter	Time 1330 Hr. Meter	Time (400 Hr. Meter
			24.7	みちん	25.7	26.2	26.7
Ř	R.P.M.		1900	1900	1900	2200	2500
engine/blower	Oil Press P.S.I.	·	50	50	50	50	-50
E/BL	Water Temp •F	-	160	160	160	160	160
NION	Volts	<b></b>	13,5	13.5	13,5	13,5	13,5
白	Intake Vac Hg	. –	16	16	16	15	15
	Gas Flow Fuel/Propane cfh		140	140	140	170	170
AIR	Air Flow cfm		20	20	20	25	- 25
FUEL/AIR	Well Flow SVE-1 cfm	-	9	9	9	16	16
ш.	Recovery Well Vac SVE-( "H <sub>2</sub> 0		40	40	40	60	60
	Air Temp •F	57	58	58	59	60	60
	Barometric Pressure Hg	-					
	SUE-INW "H20	(.25)	.30	,50	.70	.98	1,30
	MW-1 "H20	(.24)	(.24)	(.,20)	(, (3)	(.08)	,05
	mw-2 "H20	(.34)	(.35)	(,35)	(,25)	(,15)	0
1	mw-3 "H20	(,10)	(,07)	(.12)	.03	,03	,05
Z	"H <sub>2</sub> 0					с. С	
CUU	"H <sub>2</sub> 0						
MONITOR WELL VACUUM	"н <sub>2</sub> о	A-TA					
VELI	"н <sub>2</sub> 0	4				· · · · · · · · · · · · · · · · · · ·	
OR V	"н <sub>2</sub> о	J					
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	"н <sub>2</sub> 0	NON	- ()		(1) · · · · · · · · · · · · · · · · · · ·	•	
	"H <sub>2</sub> 0	STATI NO		TNDICATE	S WELL P	ressure	
	- "н <sub>2</sub> о	(V)					·
ļ <u> </u>	Vapor Wells	مرمور		<u> </u>	·		
FOLI	On/Off Air Injection	OFF	.01	······································			
MANIFOLD	Pressure P.S.I. Air Injection	OFF				<u></u>	
2	Flow cfm Samples	OFF	100.00			· · · · · · · · · · · · · · · · · · ·	
4.		· .	HOLIBA INFLUENT	>	>	·>	>

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	Instru	/ment				[				
TEST			HORIBA							
<b>H</b>	Time		1210	1245	1315	1345	1415			
LUENT	н-с	ppmv	334	370	340	286	246			
VAPOR INFLUENT	<sup>co</sup> 2	%	2,54	2,38	2.42	3,10	२.प२			
VAF	c-0	<u>z</u>	.02	.01	.01	01	.01			
<b>.</b>	н-с									
SNO	<sup>C0</sup> 2	ppmv								
EMISSIONS	с-о	%			·····			·		
		%								
	Air/Fu	el Ratio								
		- %								
		***				Nome				
				<u>OPERATIN</u>	G DATA AND	NOTES				
<u>رم</u>	ATE	11/30		<u> </u>	·. ••		TEST NO			
114	0			<b>`</b>				in well (EW)		
115	£	•	Recorded static well data - Well Data - SUE-1 2" NUC TD = 36.0'-Screened 21' to 36' - No groundwater							
		} · ·				•				
120	$\infty$	STAR	TTEST #	2 Initia	L EW va.	euum Q 4	0'H20, -5(a	WEQCFM		
13	10	1				ppm cos		1		
123	30	Recon	loch Data-	ita-All SUE systems normal - No vocceum response						
		from	outer w	ells						
13	45					370 ppm				
13	300					ing slight				
. 13	15	Hori	BA Data -	HCC	340 ppm (	CO2 level	e 2.42°	70		
(3	30	Incre	resed EW	Vocuum	to 60" Hz	o flow	16cFm			
137	30	~			· · ·	nues an	• • ·	· · · · · · · · · · · · · · · · · · ·		
<b> </b>		Othe	r outer u	ells indie	ating dec	reasing pre	ssave tra	ind		
13	1345 HORIBA Data - HZ C 286 ppm, decreasing trend									
14	00	Record	led Data	-AN SUE	Systems n	ormal - Slic	ht vocum	n vespense		
14	05	an	outer well	ls - 1405	- Increased	EW vocan	m to 80"H30	How @ 22cr		
14	415	4014	BA bata	-HC d	lecreasing	e 241	oppm	<b>3370</b>		
No	TE	well 5	UE-IMW no	ested with	SUE-1 with	<u>TO=53', Sere</u>	$\frac{52.5'-42}{}$	5 45.6		

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A	AcuVac Remediation	OPE	RATING DAT	A - TEST N	ro <u> </u>	– A SVE	CUVAC SYSTEM
Page _	ے Locatio	n ENRON i	NT-1 -DB	<u>514 423</u>	O Pro	oject Engr.SA	DLEC LUNDEREI
	Date	11/20/94	<b>→</b>				
	Parameter	Time 1430 Hr. Meter	Time 1500 Hr. Meter	Time Hr. Meter	Time Hr. Meter	Time Hr. Meter	Time Hr. Meter
		27,2	27,7	in . necei	in . neter		
~	R.P.M.	2500	2500				
ENGINE/BLOWER	Oil Press P.S.I.	50	50				
L BL	Water Temp •F	170	170				
<b>VID</b>	Volts	13,5	13,5			•	
<b>哲</b>	Intake Vac Hg	13	13				
1.	Gas Flow Fuel/Propane cfh	190	200+			•	
FUEL/AIR	Air Flow cfm	25	25				
FUEI	Well Flow SUE cfm	24	25				
	Recovery Well Vac SUE-1 "H <sub>2</sub> 0	80	80				
	Air Temp *F	61	60			·	
	Barometric Pressure Hg						
	SUE ~ mw"H20	1.65	1.90				•
	mω -1 " <sup>H</sup> 2 <sup>0</sup>	.10	.28	•			
	<u>พพ-ว <sup>"H20</sup></u>	. 10	.26				•
	mw-3 "H20	,12	. 17				
MU	"H <sub>2</sub> 0					¢.	
ACU	"H <sub>2</sub> 0						
	"H <sub>2</sub> 0					-	· · ·
K WE	"н <sub>2</sub> 0			·			
MONITOR WELL VACUUM	"H <sub>2</sub> 0						
MON	"H <sub>2</sub> 0						
	"H <sub>2</sub> 0						
	"H <sub>2</sub> 0			•		•	
	"H <sub>2</sub> 0						
<u>.</u>	" <sup>H</sup> 2 <sup>0</sup>				<u> </u>		
OLD	Vapor Wells On/Off	ON	ON				
MANIFOLD	Air Injection Pressure P.S.I.	OFF	>				
Ý	Air Injection Flow cfm	OFF	>				
	Samples		HORIBA INFLIENT				
1					J		

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	Instrum	ent					-	
TEST			HORIBA					
H H	Time				, t			
	L,		1455			 	·	<u> </u>
Ł	н-с				_			
n n		ppmv	310					
INF	coz							
В		%	2.76					
VAPOR INFLUENT	C-0	×	,01					
	H-C	<u> </u>	<u>``````</u>					
		ppmv						
NO	<sup>co</sup> 2	ppma						<sup>_</sup>
SSIC		%						
EMISSIONS	C-0							
		~ %						
	Air/Fuel	Ratio						
							·	1
			l			<u> </u>		

## OPERATING DATA AND NOTES

DATE	11/20/24 TEST NO. 2
1430	Recorded Data - AU SVE Systems normal - Outer
	wells indicating good vocuum response to increased EW
i	Udeuum
1455	HORIBA Data - HC continue on decreasing trend, HC
	recorded @ 210 ppm
1500	
	EW vocuum of 80"HzO and flow of 25cFM - All
	-SUE systems normal - Propose flow over 200 CFH
	TEST # 2 Completed -

(933107-PAGE2)

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	AcuVac Remediation	OPE	RATING DAT	A - TEST N	o <u>3</u>		CUVAC SYSTEM
Page _	Locatio	n ENRON (	1 I-TU	DBSÉ, A 4	230_ Pr	oject Engr SAD	LER LUNDGREN
	Date	11/20/94	· · · · · · · · · · · · · · · · · · ·	>			
		Time 1505	Time /5(0	Time 1535	Time	Time	Time
	Parameter	Hr. Meter	Hr. Meter 27,8	Hr. Meter 28,3	Hr. Meter	Hr. Meter	Hr. Meter
~	R.P.H.		3000	9300		· ·	
ENGINE/BLOWER	Oil Press P.S.I.	·	50	50			
3/BLC	Water Temp •F		170	170		-	
INID	Volts		13,5	13.5		·.	•
Ā	Intake Vac Hg		13	13			
	Gas Flow Fuel/Propane cfh		180	190	· ·		
AIR	Air Flow cfm		56	56			• · ·
fuel/air	Well Flow		3	1			
	SVE - I MU cfm Recovery Well Vac SvE-I MU"H-0	<b>-</b> .	80	100			
1	Air Temp •F	58	58	5,6			
	Barometric Pressure Hg	<u> </u>					
	SVE-1 "H20	.20	.26	.26		-	•
	mw-1 "H20	.22	.39	1.05			
	MW-2 "H20	,21	.24	,36			
	mw-3 "H20	12	.16	.18			· · · · · · · · · · · · · · · · · · ·
W	"H <sub>2</sub> 0					é	
cnn	"H2 <sup>0</sup>			·	•		
L VA	"H <sub>2</sub> 0	<u> </u>					
WEL	"H20						······
ror	"H <sub>2</sub> 0						
MONITOR WELL VACUUM	"н <sub>2</sub> о					· ·	· · · · · · · · · · · · · · · · · · ·
X	"н <sub>2</sub> 0	U D U D U D					- <u>-</u>
	"н <sub>2</sub> о	d d					
	"н <sub>2</sub> 0	¥ 2					
	"H2 <sup>0</sup>			· · ·	•		
9	Vapor Wells On/Off	OFF	ON	ON			
MANIFOLD	Air Injection Pressure P.S.I.	OFF		<del>&gt;</del>	,	-	
MA	Air Injection Flow cfm	OFF					<u> </u>
	Samples		HORIBA Influent				

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	Instrument			1		[]
TEST		HORABA				
	Time	1515			۵. •	
LUENT	H-C ppmv	866				
VAPOR INFLUENT	<sup>co</sup> 2 x	1.00				
4AP	с-о х	<u>,0</u> 2				
	H-C ppmv					
: EMISSIONS	<sup>co</sup> 2		· · · · · · · · · · · · · · · · · · ·			
: EMI	C-0					
	Air/Fuel Ratio					
	~ %					

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## OPERATING DATA AND NOTES

DATE	11/20/94 TEST NO. 3
1505	Connected SUE System to well SUE-IMW as
	extraction well - Well Dates- This well is rested
· · · · · · · · · · · · · · · · · · ·	with well SUE-1 with TD = 53,0' and screened 52,5-
	42.5' - The well is constructed from 2.0" PUC pipe -
	DTGW = 45.6' - 3.1' screened area above groundwater
	NOTE-STATIC vocuum remaining from prior SVE
	-test on well SUE-1
15(0	Stort Test # 3 - Initial EW vocuum @ 80" Hro
	flow @ 3.0 crm - Subsanface structure very tight.
	Recorded data- Outer wells indicating slight vocuum
	increase over statie data
1515	HORIBA Data- HC @ 866 ppm
1520	Increase EW voccum to 100" H.O, flow @ 1-2 cFm
	Flow most littly dropped because of groundwater
	closing off screened area.
1535	Recorded Daita-Hested well SVE-1 steady - Other outer wells
	indicating increased vocuum - EW vocuum gauge surging
	TEST Completed

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age _	Locatio	n ENRON U	DT-1 - D	BSEA 4	12-30 Pro	ject Engr.S <u>r</u>	DLER LUNDE
	Date	11/20/94			>		
		Time 1600	Time: 1620	Time 1700	Time 1730	Time	Time
	Parameter	Hr. Meter 28,7	Hr. Meter 29,0	Hr. Meter 29.7	Hr. Meter 30, 2	Hr. Meter	Hr. Meter
· · ·	R.P.M.	2100	2000	3000	2000		
ENGINE/BLOWER	Oil Press P.S.I.	50	50	50	50		· · ·
EABLC	Water Temp •F	165	165	165	160		
(CIN)	Volts	13,5	13,5	13,5	13,5		· .
<u>ن</u>	Intake Vac Hg	15	18	18	18		· · · ·
	Gas Flow Fuel/Propane cfh	160	180	180	180		
/AIR	Air Flow cfm	25.	18	18	18		
FUEL/AIR	Well Flow MW-7 cfm	土1	4	5	7		
	Recovery Well Vac mw - A "H <sub>2</sub> 0	130	270	270	270		
	Air Temp •F	54	54	ちみ	50		· ·
	Barometric Pressure Hg	-	~	_			
	SVE-1 mw"H20	1.30	1.05	,52	,50		
	SVE-1 "H20	.08	80,	:05	.07		
	mω-ι <sup>"H20</sup>	.96	.88	. 42	, 48		
	mω-3 <sup>"H20</sup>	.19	.22	.07	.20		
M	" <sup>H</sup> 2 <sup>0</sup>					¢	
Acut	" <sup>H</sup> 2 <sup>0</sup>	1					
17 A	"н <sub>2</sub> 0	U EI					· .
WEI	"H2 <sup>0</sup>						
TOR	" <sup>H</sup> 2 <sup>0</sup>	TIC .					
MONITOR WELL VACUUM	" <sup>H</sup> 2 <sup>0</sup>	T C H					
4	"H <sub>2</sub> 0	S of					
	" <sup>H</sup> 2 <sup>0</sup>	UCC PPP				·	
	" <sup>H</sup> 2 <sup>0</sup>	0 4 4					
•	"H <sub>2</sub> 0	200			•		
3	Vapor Wells On/Off	OFFON	ON	ON	oN		
MANIFOLD	Air Injection Pressure P.S.I.	OFF					
IAM	Air Injection Flow cfm	OFF			<del>&gt;</del>	· · ·	
	Samples	HORIBA Influent	HORIBA Influent				

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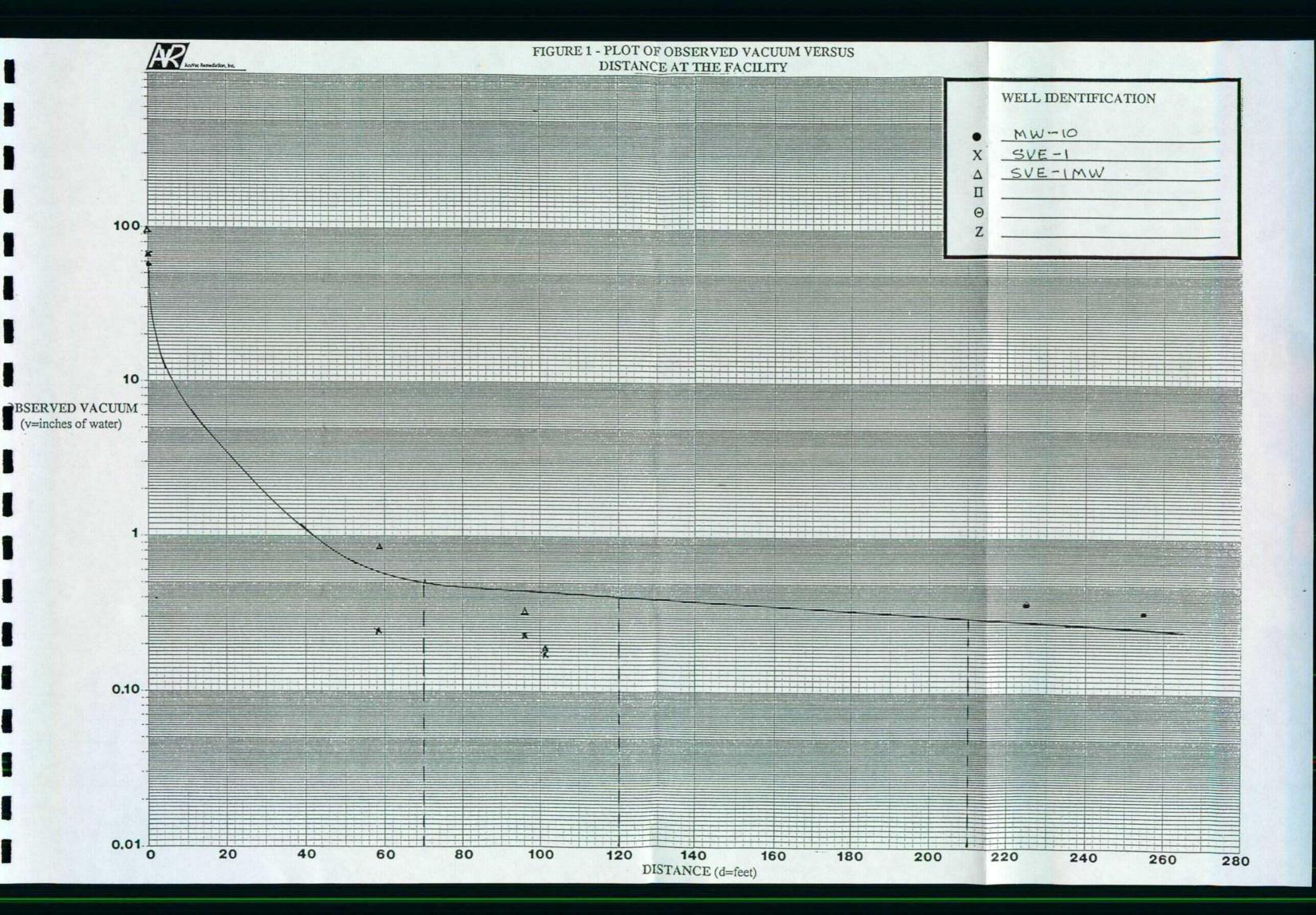
	Instrument						
TEST		HORIBA	HOUBA			·	
F	Time	1610	1630			· · · ·	
LUENT	Н-С ррту	1440	1370				
VAPOR INFLUENT	<sup>co</sup> 2 ×	3,76	4.14				
A.A.	с-о Х	٥٥١ ال	,01				
	H-C						
NS N	ppmv						
EMISSIONS	<sup>co</sup> 2 %			<u>.</u>			
EMI	C-0						
	%						
	Air/Fuel Ratio						

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## OPERATING DATA AND NOTES

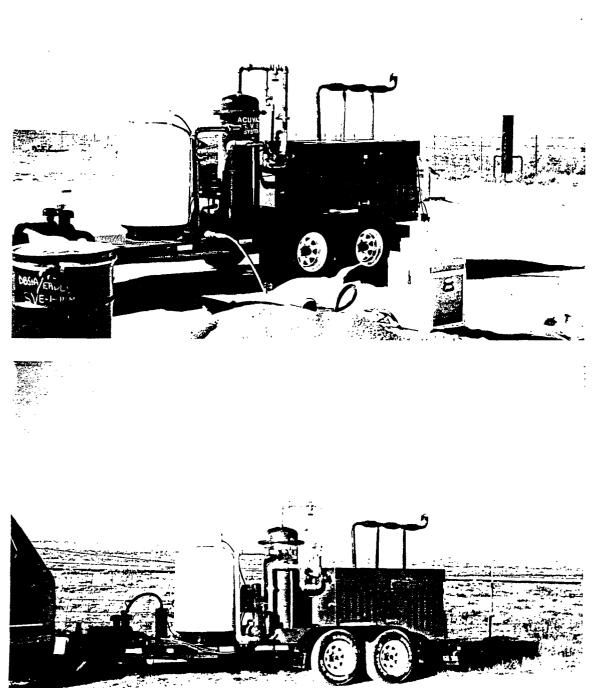
DATE	11/20/94 TEST NO. 4
1550	Positioned SVE System near well MW-2 as extraction
·	well (EW) - Well data untrown other than 2" PUC
i	pipe into groundwater
1555	Recorded static well data - Vocuum on outer wells
	remain near maximum level obtained during Test # 3
1600	START Test #3- Outer wells recording some vocuum
	as statie data- Subsurface structure and for
	well construction contributing to high SUE vocuums
1610	Open SUE flow to maximum EW vocuum maximum
-	at 270-275"H20, flow @ 7-8 cFm
1620	Recorded Data-Outer wells recording reduced vocumes X
	MW-3 which is up slightly-
1630	HORIBA Data HE @ 1370ppm
1700	Recorded Data - All outer wells continue to record decrease
	EW vocume 270"How, flow 5-7 crm
1730	Recorded Data - Outer wells indicating slight increasing
	trend
1730	Test terminated - Well not responding to SVE- Departed site @ 1815

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## ENRON WT-1 - DANIEL B. STEPHENS & ASSOCIATES, INC. PROJECT #4230

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# Soil Vapor Analyses



CORE LABORATORIES A N A L Y T I C A L R E P O R T Job Number: 945993 Prepared For: DANIEL B. STEPHENS & ASSOCIATES BOB MARLEY 6020 ACADEMY NE ALBUQUERQUE, NM 87109 Date: 12/13/94

Signature

Name: M. Jean Waits

12/13/94 Date:

CORE LABORATORIES P O BOX 34766 HOUSTON, TX 77234-4282

Title: Supervising Chemist

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## LABORATORY TESTS RESULTS 12/13/94

#### JOB NUMBER: 945993

CUSTOMER: DANIEL B. STEPHENS & ASSOCIATES

### ATTN: BOB MARLEY

CLIENT I.D.....: ENRON-WT-1 #4230 DATE SAMPLED.....: 11/20/94 TIME SAMPLED.....: 16:35 WORK DESCRIPTION...: MW-2

#### LABORATORY I.D...: 945993-0001 DATE RECEIVED....: 11/23/94 TIME RECEIVED....: 15:07 REMARKS.....: Core cylinder #1207

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTIO	NUNITS OF MEASURE	TEST METHOD	DATE	TECHN
Benzene, Toluene, Xylenes in Gas		*1			12/09/94	MJW
Benzene	<1	1	ppm v/v			
Toluene	<1	1	ppm v/v			
Ethyl Benzene	<1	1	ppm v/v			
Total Xylenes	<10	10	ppm v/v			
Refinery Gas Analysis, Extended		*1			12/08/94	РКТ
Hydrogen	<0.01	0.01	Mol %	ASTM D-1945		
Oxygen	13.311	0.01	Mol %	ASTM D-1945		
Nitrogen	77.970	0.01	Mol %	ASTM D-1945		
Carbon Monoxide	<0.01	0.01	Mol %	ASTM D-1946		
Carbon Dioxide	5.861	0.01	Mol %	ASTM D-1945		
Hydrogen Sulfide	<0.01	0.01	Mol %			
Methane	2.839	0.01	Mot %	ASTM D-1945		
Ethylene	<0.001	0.001	Mol %	ASTM D-1946		
Ethane	<0.001	0.001	Mol X	ASTM D-1945		
Propylene	<0.001	0.001	Mol %	ASTM D-2163		
Propane	<0.001	0.001	Mol %	ASTM D-1945		
Isobutane	<0.001	0.001	Mol %	ASTM D-1945		
Isobutylene	<0.001	0.001	Mol %	ASTM D-2163		
1-Butene	<0.001	0.001	Mol %	ASTM D-2163		
n-Butane	<0.001	0.001	Mol X	ASTM D-1945		
trans-2-Butene	<0.001	0.001	Mol %	ASTM D-2163		
cis-2-Butene	<0.001	0.001	Mol %	ASTM D-2163		
Isopentane	<0.001	0.001	Mol %	ASTM D-2163		
n-Pentane	<0.001	0.001	Mol %	ASTM D-2163		
Hexanes	0.001	0.001	Mol %			
Heptanes	0.001	0.001	Mol %			
Octanes	0.005	0.001	Mol X			
Nonanes	0.005	0.001	Mol %	1		
Decanes	0.005	0.001	Mol %			
Undecanes	0.002	0	Mol %			
Dodecanes Plus	0.002	0	Mol %			
bodecalles Flus	· · ·		MOC 20			
				1		
				1		
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1				O BOX 34766		
				USTON, TX 77234-42	82	
			(7	13) 943-9776		
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#### LABORATORY TESTS RESULTS 12/13/94 행장 도망 관광 erra egyangage CUSTOMER: DANIEL B. STEPHENS & ASSOCIATES JOB NUMBER: 945993 ATTN: BOB MARLEY CLIENT I.D.....: ENRON-WT-1 #4230 LABORATORY I.D...: 945993-0002 DATE SAMPLED..... 11/20/94 DATE RECEIVED ....: 11/23/94 TIME SAMPLED.....: 13:40 TIME RECEIVED....: 15:07 WORK DESCRIPTION ....: SVE-1 REMARKS.....: Core cylinder #1097 TEST DESCRIPTION FINAL RESULT LIMITS/\*DILUTION UNITS OF MEASURE TEST METHOD DATE TECHN Benzene, Toluene, Xylenes in Gas \*1 12/09/94 NUM 23 Benzene 1 ppm v/v 20 Toluene 1 ppm v/v Ethyl Benzene <1 1 ppm v/v 14 Total Xylenes 10 ppm v/v Refinery Gas Analysis, Extended \*1 12/08/94 PKT Hydrogen <0.01 0.01 Mol % ASTM D-1945 4.367 0.01 Oxygen Mol % ASTM D-1945 87.986 Nitrogen 0.01 Mol % ASTM D-1945 Carbon Monoxide <0.01 0.01 Mol % Mol % ASTM D-1946 Carbon Dioxide 7.386 ASTM D-1945 0.01 Hydrogen Sulfide <0.01 0.01 Mol % Methane 0.229 0.01 Mol % ASTM D-1945 <0.001 Mol % Ethylene 0.001 ASTM D-1946 Ethane <0.001 0.001 Mol % ASTM D-1945 <0.001 0.001 Propylene Moi % ASTM D-2163 Propane 0.007 0.001 Mol % ASTM D-1945 0.004 Isobutane 0 001 Mol % ASTM D-1945 Isobutylene <0.001 0.001 Mol % ASTM D-2163 <0.001 0.001 1-Butene Mol % ASTM D-2163 n-Butane 0.002 0.001 Mol % ASTM D-1945 trans-2-Butene <0.001 0.001 Mol % ASTM D-2163 <0.001 cis-2-Butene 0.001 Mol % ASTM D-2163 Isopentane 0.001 0.001 Mol % ASTM D-2163 0.001 0.001 Mol % n-Pentane ASTM D-2163 Hexanes 0.002 0.001 Mol % Heptanes 0.007 0.001 Mol % Octanes 0.005 0.001 Mol % Nonanes 0.003 0.001 Mol % <0.001 0.001 Decanes Mol % Undecanes 0 Mol % 0 Dodecanes Plus 0 0 Mol % P O BOX 34766 HOUSTON, TX 77234-4282 (713) 943-9776

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### LABORATORY TESTS RESULTS 12/13/94

#### JOB NUMBER: 945993

## CUSTOMER: DANIEL B. STEPHENS & ASSOCIATES ATTN: BOB MARLEY

CLIENT I.D.....: ENRON-WT-1 #4230 DATE SAMPLED.....: 11/20/94 TIME SAMPLED.....: 10:20 WORK DESCRIPTION...: MW-10

#### LABORATORY I.D...: 945993-0003 DATE RECEIVED...: 11/23/94 TIME RECEIVED...: 15:07 REMARKS.....: Core cylinder #1011

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Benzene, Toluene, Xylenes in Gas		*1			12/09/94	MIM
Benzene, Toluene, Xylenes in Gas Benzene Toluene Ethyl Benzene Total Xylenes Refinery Gas Analysis, Extended Hydrogen Oxygen Nitrogen Carbon Monoxide Carbon Dioxide Hydrogen Sulfide Methane Ethylene Ethylene Ethylene Bobutane Isobutane Isobutane Isobutylene 1-Butene n-Butane trans-2-Butene cis-2-Butene Isopentane n-Pentane Hexanes Heptanes Octanes Nonanes Decanes Undecanes Plus	$\begin{array}{c} 319\\ 504\\ 19\\ 153\\ \hline\\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\$	*1 1 1 1 1 1 0.01 0.01 0.01 0.01 0.01 0.	ppm v/v ppm v/v ppm v/v ppm v/v Mol % M	ASTM D-1945 ASTM D-1945 ASTM D-1945 ASTM D-1946 ASTM D-1946 ASTM D-1945 ASTM D-1945 ASTM D-2163 ASTM D-2163 ASTM D-2163 ASTM D-2163 ASTM D-2163 ASTM D-2163 ASTM D-2163 ASTM D-2163 ASTM D-2163	12/09/94	PKT
			 		1	
			HOUS	BOX 34766 STON, TX 77234-4282 9 943-9776		

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					BTEX + MT											Remarks:	
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	4230	er: MAR	ACUV		<u></u>					_							
	. N	Vanage		Cold?	Volume	1.500 J		d								ACCEIVED BY	
Project Name: EWX'@ #	hoter "	Project Manager: BOB 1	Sampler:	Samples Cold?	Number/Volume	1.50	6	Soond									
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ORD 7 A-550	0110		2		Sample I.D. No.			01									
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CHAIN-OF-CUSTODY RECORD	PLOUDUERQUE NM		#: 505-		Time	1635	1340	1020								Time: (630 Time:	
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