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REPORTS

DATE: March 1995

Additional Investigation and Closure Activities at the Transwestern Pipeline Company Atoka 1 Compressor Station Artesia, New Mexico ł

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This report was prepared in accordance with the standards of the environmental consulting industry at the time it was prepared. It should not be relied upon by parties other than those for whom it was prepared, and then only to the extent of the scope of work which was authorized. This report does not guarantee that no additional environmental contamination beyond that described in this report exists at the site.

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CHAPTER 1

INTRODUCTION

The following section presents a brief discussion of the project objectives and scope of work. In addition, a brief description of the site is given along with a description of a previous investigation.

Project Objectives

In the "Work Plan/Closure Plan for Atoka 1 Compressor Station," dated August 29, 1994, Brown and Caldwell defined the project objectives as follows:

- 1) determine the vertical and horizontal extent of impacted soil and ground water at and adjacent to the Atoka 1 facility,
- 2) close the former concrete-lined surface impoundment, and
- 3) collect soil and ground water information necessary to evaluate remediation/closure alternatives for potentially impacted soil and groundwater at the facility.

Scope of Work

On September 28, 1994, the New Mexico Oil Conservation Division (NMOCD) approved the above referenced work plan, with some exceptions. In accordance with the approved work plan, Brown and Caldwell completed the removal, overexcavation, and sampling of the former concrete-lined surface impoundment and the installation and sampling of five soil borings, with two of the borings being completed as permanent monitoring wells. In addition to the approved work plan, Brown and Caldwell installed and collected samples from six more soil borings, of which two were completed as permanent monitoring wells. A description of the field activities conducted during the performance of this work plan is discussed in the subsequent sections of this report.

Site Description

The Transwestern Pipeline Company's (Transwestern) Atoka 1 Compressor Station (facility) is located approximately 10 miles southeast of Artesia, New Mexico. The site occupies approximately 1.5 acres in the NE/4, NE/4 of Section 1, Township 18 South, Range 27 East. The parcel on which the facility lies is leased from the US Department of the Interior Bureau of Land Management (BLM). A topographic map showing the location of the facility is presented as Figure 1.

In general, the facility consists of five compressor units and their associated piping, a control building, a dehydrator unit, and various aboveground storage tanks (ASTs). Prior to recent closure activities, a concrete-lined surface impoundment was also present at the facility. A site plan which illustrates the layout of various structures at the facility is presented as Figure 2.

Previous Investigation

During June and July of 1993, a preliminary subsurface investigation was conducted to assess potential impact from the concrete-lined surface impoundment at the facility. Brown & Root Environmental drilled twelve soil borings, subsequently, four were completed as monitoring wells. A site map displaying the boring and well locations is included as Figure 3. The following sections describe the results of that investigation.

<u>Site Hydrogeology</u>. Ground water levels and recharge rates in the wells varied. Ground water was encountered during drilling at depths ranging from 47 to 63 feet below ground surface (bgs). After well stabilization, the levels varied significantly, ranging from 36 to 60 feet bgs or from 31.56 to 58.45 feet in elevation.

Ground water recharge also varied considerably. Three of the four monitoring wells were bailed dry. Monitoring wells MW-1 and MW-4 recharged very slowly, on the order of days, and monitoring well MW-3 required several hours to recharge. Monitoring well MW-2 could not be bailed dry.

Soil Impact. Soil samples sent to the laboratory were analyzed for total petroleum hydrocarbons (TPH) using EPA Method 418.1. Soil samples collected from Borings AT1-1 though AT1-6 were analyzed for volatile organics using EPA Method 8240 and semivolatile organics using EPA Method 8270. Soil samples collected from borings AT1-7 though AT1-10 were analyzed for benzene, toluene, ethylbenzene, and xylene (BTEX) using EPA Method 8020.

The near surface (less than 20 feet bgs) soils near the historical bermed pipeline petroleum hydrocarbon liquids tank area appear to be impacted. Subsurface soil samples collected from boring AT1-4 detected volatile organic constituents ethylbenzene, toluene, and xylene at concentrations of 6.2 mg/kg, 1 mg/kg, and 40 mg/kg, respectively. The detection limits on the other volatile organic constituents analyzed for, in that sample, were elevated due to matrix interference. TPH was detected at 410 mg/kg and bis(2-Ethylhexyl)phthalate, a semivolatile compound, was detected at 1.5 mg/kg.

Deeper subsurface soil (greater than 20 feet bgs) impact is indicated from laboratory analytical and field screening results from soil samples collected from borings AT1-2 and AT1-7, located west of the concrete-lined surface impoundment. The sample collected from the 32 to 34 foot interval bgs in boring AT1-2 detected ethylbenzene, toluene, and xylenes at concentrations of 0.97 mg/kg, 30 mg/kg, and 40 mg/kg, respectively. The detection limits on the other volatile organic constituents analyzed for, in that sample, were elevated due to matrix interference. The sample collected from the 47 to 48.5 foot bgs interval in boring AT1-7 detected benzene, toluene, ethylbenzene, and xylene at concentrations of 2 mg/kg, 1.7 mg/kg, 6.7 mg/kg, and 12.3 mg/kg, respectively. TPH was detected at concentrations of 4,400 mg/kg and 150 mg/kg, respectively.

<u>Ground Water Impact</u>. Ground water samples were analyzed for TPH by EPA Method 418.1 and total dissolved solids (TDS) using EPA Method 160.1. Ground water from monitor well MW-1 (AT1-2W) was sampled for volatile organics using EPA Method 8240 and semivolatile organics using EPA Method 8270. The other three wells were analyzed for BTEX constituents only using EPA Method 8020.

Phase separated hydrocarbons (PSH) were observed in MW-1. Because of the PSH, TPH and BTEX concentrations in ground water collected from that well were elevated. The ground water sample collected from monitor well MW-2 (boring AT1-7) detected TPH and benzene, toluene, ethylbenzene and xylene at concentrations of 12 mg/L, 3.6 mg/L, 0.4 mg/L, 9.8 mg/L, and 3.17 mg/L, respectively. Monitor well MW-4 (boring AT1-3), located west of the concrete-lined surface impoundment, detected TPH and benzene, toluene, ethylbenzene and xylene at concentrations of 0.6 mg/L, 0.061 mg/L, 0.004 mg/L, 0.020 mg/L, and 0.068 mg/L, respectively. Monitor well MW-3 detected TPH, benzene, and toluene at concentrations of 1.1 mg/L, 0.007 mg/L, and 0.006 mg/L, respectively.

TDS concentrations ranged from 4,600 mg/L in monitor well MW-4 to 7,700 mg/L in the monitor well containing PSH (MW-1).

CHAPTER 2

CONCRETE-LINED SURFACE IMPOUNDMENT CLOSURE

The following is a discussion of the removal of the concrete-lined surface impoundment, the initial excavation of hydrocarbon-affected soils from the surface impoundment, the expanded excavation of the surface impoundment, and excavation of soils in the area of the previous soil boring AT1-4. Verification sampling and disposition of the materials related to the closure of the surface impoundment will also be discussed.

Removal of the Surface Impoundment

On October 12, 1994, the surface impoundment was removed. Approximately two feet of residual material (solids, liquids, and sludge) had remained in the surface impoundment. The solids and sludge were removed with shovels and a backhoe. A bermed area was constructed and lined with heavy-gauge plastic for the storage of the solid and sludge material. This material was placed in the bermed area and covered with plastic.

Following the removal of the residual material, a backhoe and dozer were used to remove the concrete lining of the surface impoundment. The waste concrete was placed on plastic to await disposal.

Initial Excavation and Sampling of Surface Impoundment Soils

During the removal of concrete, stained soils were observed behind each wall and beneath the floor of the surface impoundment. An initial excavation using a track hoe, was conducted to remove the stained soil from each wall and the floor of the surface impoundment area. After stained soils were removed, soil samples from the floor and each wall of the excavation were collected for field screening and laboratory analysis to determine if the overexcavation of soils should be continued.

The soil samples were screened using the ambient temperature headspace (ATH) method to measure total volatile organic compounds (VOCs), the PETRO RISc® immunoassay test kits from ENSYS, Inc. for measuring total petroleum hydrocarbons (TPH), General Analysis Corporation (GAC) TPH test kits, or a combination of these methods.

The ATH method of field screening is accomplished by placing a portion of a soil sample in a resealable plastic bag. The soil sample in the bag is allowed to remain undisturbed for approximately five minutes at temperatures of at least 60 degrees Fahrenheit, which allows for

the accumulation of volatile organic compounds (VOCs). After five minutes, the sample is shaken vigorously for approximately one minute, the probe of a photoionization detector (PID) or a flame ionization detector (FID) is inserted into the bag and a measurement of the concentration of VOCs is taken.

Immunoassay test kits use antibodies to detect the presence of hydrocarbon compounds in a methanol extraction solution obtained from soil samples. The extraction solution is placed in a test tube, coated with a particular antibody, producing a color change in the presence of hydrocarbon compounds. The relative concentration of hydrocarbons is measured by comparing the color of the sample with a calibrated color chart or using a portable photometer. The PETRO RISc® test kit for soil conforms to EPA Method 4030.

The GAC test kit for the analysis of TPH uses a process similar to EPA Method 418.1. Freon is used to extract hydrocarbons from a soil sample. The extraction solution is then analyzed by IR spectrophotometry to determine the concentration of TPH in the soil sample.

Following the initial excavation of stained soils from the surface impoundment, a total of seven confirmation soil samples were collected from the floor and walls of the excavation. The soil samples were collected using a trackhoe to obtain soil from the excavation and a clean stainless steel trowel to transfer soil from the trackhoe into a laboratory-supplied container. The soil samples collected from the surface impoundment excavation on October 13, 1994 were labelled, packed on ice, and delivered to Environmental Lab of Texas in Odessa, Texas using chain-of-custody procedures. The confirmation soil samples were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8020 and TPH by EPA Method 418.1.

Laboratory analytical results of the confirmation soil samples indicated that TPH concentrations ranged from 55 milligrams per kilogram (mg/kg) in SINW-1-9, collected at a depth of approximately 9 feet from the north wall of the excavation, to 5,284 mg/kg in sample SISW-1-9, collected at a depth of approximately 9 feet from the south wall of the excavation. The locations and analytical results of these initial confirmation samples are shown on Figure 4. In addition, total BTEX concentrations were reported to range from below the laboratory detection limits (0.60 mg/kg for total BTEX) in samples SIEW-1-6, SIEW-1-9, SINW-1-6, and SINW-1-9 to as much as 284 mg/kg in sample SIWW-1-9. Benzene was reported to be below the laboratory detection limit of 0.10 mg/kg in each sample. A summary of the analytical results for these confirmation soil samples is presented in Table 1. The laboratory analytical results and chain of custody forms are included in Appendix B.

Based on the laboratory analytical results of these confirmation samples, three small trenches were excavated to assist in determining the vertical and horizontal extent of hydrocarbon impacted soils in the vicinity of the surface impoundment excavation. One trench was located to the northwest, one to the southwest, and one to the southeast of the surface impoundment excavation. Trench locations are shown on Figure 5. Soil samples were field screened during trenching to determine the possible horizontal extent of the hydrocarbon impacted soils to determine the collection of confirmation samples. One confirmation soil sample for laboratory analysis was collected from each of the three trenches on October 15, 1994. The soil samples were labelled, packed on ice, and shipped by overnight delivery to Terra Laboratories, Inc. using chain-of-custody procedures. The confirmation soil samples were analyzed for BTEX using EPA Method 8020 and TPH using EPA Method 418.1.

Laboratory analytical results of trench confirmation samples, shown on Figure 5, indicated that TPH concentrations ranged from 28 mg/kg in sample SWT-1-10, collected from the wall of the southwest trench, to 33 mg/kg, in samples SET-1-10 and MT-2-10, collected from the wall of the southeast and northwest trench; respectively. In addition, each BTEX constituent was reported to be below the respective laboratory detection limits. A summary of the analytical results for these confirmation soil samples is presented in Table 2. The laboratory analytical results and chain of custody forms are included in Appendix B.

Expanded Excavation of Surface Impoundment Soils

Based on the laboratory analytical results for the confirmation samples, the surface impoundment excavation was expanded horizontally and vertically.

On November 20, 1995, at the conclusion of overexcavation activities, an additional seven confirmation samples were collected from the walls and floor of the excavation. The soil samples were collected and packed in the same manner as the previous soil samples, and shipped by overnight delivery to Terra Laboratories, Ltd. using chain-of-custody procedures. The soil samples were analyzed for BTEX using EPA Method 8020 and TPH using EPA Method 418.1.

Based on the laboratory analytical results TPH and BTEX constituents were detected in samples I-3 (west floor), I-4 (east wall), I-5 (east floor), and I-6 (south wall) only. Concentrations of TPH ranged from 270 mg/kg in sample I-6 to 3,900 mg/kg in sample I-3. Concentrations of total BTEX ranged from 81.6 mg/kg in sample I-3 to 0.013 mg/kg in sample I-6. Benzene concentrations were reported to be below the laboratory detection limit in each sample. The expanded excavation is shown on Figure 6. An enlarged view of the final excavation area along with the confirmation sample locations are shown on Figure 7. A

summary of the analytical results for these confirmation samples is presented in Table 3. The laboratory analytical results and chain of custody forms are included in Appendix D.

The final excavation of the surface impoundment covered an area of approximately 2,300 square feet and 12 to 14 feet in depth. A total of approximately 1,100 cubic yards of soil was excavated.

Overexcavation and Sampling of Soils in the Area of the Previous Boring AT1-4

In addition to the overexcavation of soils at the concrete-lined surface impoundment, soils were excavated from an area near the previous soil boring AT1-4. The excavation of soils, field screening methods, and the collection of confirmation soil samples were conducted the same as the overexcavation activities at the surface impoundment. The soil samples were labelled, packed, and shipped to Terra Laboratories, Ltd., in the same manner as the confirmation samples collected from the surface impoundment excavation. The confirmation samples were analyzed for BTEX by EPA Method 8020 and TPH by EPA Method 418.1.

Laboratory analytical results for the confirmation samples collected on October 15, 1994 indicated that TPH concentrations ranged from below the laboratory detection limit of 25 mg/kg in samples AT4-WT1-9 (western edge of excavation) and AT4-SW-9 (south wall of excavation) to 25,000 mg/kg in sample AT4-EW-9 (east wall of excavation). Concentrations of total BTEX ranged from below the laboratory detection limits in samples AT4-WT1-9 and AT4-SW-9 to 165 mg/kg in sample AT4-EW-9. Laboratory analytical results for these confirmation samples are presented in Table 4. The location and approximate size of the final excavated area is shown on Figure 6. Figure 8 displays the locations of the samples collected and the analytical results. The laboratory analytical reports and chain-of-custody documents are included in Appendix E.

Based on the laboratory analytical results of the confirmation samples, the excavation was expanded to the east and additional soil was removed from the floor. On November 20, 1995, following the overexcavation conducted on the basis of field screening results, an additional five confirmation samples were collected from the east wall, near the corners of the east wall, and from the floor of the excavation. The soil samples were collected, screened, labelled, packed, and shipped to Terra Laboratories, Ltd. in the same manner as previously described. The soil samples were analyzed for BTEX by EPA Method 8020 and TPH by EPA Method 418.1.

Figure 8 also shows the confirmation samples and analytical results of the expanded excavation confirmation samples. Laboratory analytical results indicated that TPH was detected in samples B-4 (east wall) and B-6 (east floor) only at concentrations of 25 mg/kg in B-6 and

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870 mg/kg in sample B-4. BTEX constituents were detected in sample B-4 only. Toluene was the only constituent detected and was reported at a concentration of 0.019 mg/kg. Laboratory analytical results for these confirmation samples are presented in Table 5. The laboratory analytical reports and chain of custody documents are included in Appendix F.

The final excavation covered an aerial extent of approximately 1,800 square feet and varied in depth from approximately 10 feet on the west end to approximately 18 feet on the east end. A total of approximately 900 cubic yards of soil was excavated.

Disposition of Soils and Concrete

The waste concrete from the demolition of the surface impoundment was stockpiled on plastic to await the conclusion of excavation activities. Soils generated from the excavations at the impoundment and AT1-4 areas were also stockpiled on plastic. At the conclusion of excavation activities, the waste concrete was placed in the bottom of the two excavated areas.

During the excavation of the surface impoundment and AT1-4 areas, one composite sample was collected from the stockpiled soils. The composite sample was collected by obtaining soil from each stockpile. In addition, after approval was obtained from the New Mexico Oil Conservation Division (NMOCD), the stockpiled soils (approximately 2,000 cubic yards) were shredded, mixed with water and fertilizer, and used as backfill for the two excavated areas.

CHAPTER 3

SOIL INVESTIGATION

This section presents results of the soil investigation conducted at the facility.

Regional Geology and Hydrogeology

The Atoka 1 Compressor Station is located in the Pecos Valley section of the Southern High Plains physiographic province. The area is characterized by broad plains and rolling hills with transecting bluffs and shallow river valleys. The site is situated atop Quaternary sedimentary deposits overlying formations of the Artesia Group of Permian age.

The Artesia Group is positioned stratigraphically above the San Andres limestone and is composed of carbonate, sandstone and evaporite strata. The units comprising the Artesia Group, from youngest to oldest, are the Tansil Formation, Yates Sandstone, Seven Rivers Formation, Queen Formation, and the Grayburg Formation. Both the Artesia Group and the underlying San Andres Limestone were deposited along the shelves associated with the Delaware Basin. Evaporite sequences were generally deposited along the distal portions of the shelves during the early Guadalupian and encroached toward the reefs associated with the basins during the late Guadalupian, denoting the impending end of the inland sea in the region.

Information regarding major and/or minor aquifers in the area was not available for this report.

Site Geology and Hydrogeology

Based on the eleven soil borings drilled for this investigation and a previous investigation, native soils beneath the facility consist of a predominantly tan cover of mixed sand, silt, clay, and gravel from ground surface to as much as two feet below grade. This mixed cover is underlain by a tan to sometimes pink, unconsolidated to semiconsolidated silt to as much as 29 feet below grade. This silt contains abundant gravel. Underlying the silt, a discontinuous, reddish-brown, semiconsolidated to consolidated sand and sandstone was encountered in some of the soil borings. Below the sand and sandstone, a reddish brown clay interbedded with gypsum and anhydrite was encountered to total depth.

During this assessment, water was only encountered in borings drilled near the south fenceline and to the southwest of the facility. However, when present, water was typically encountered at depths of 29 to 46 feet. The water-bearing zone encountered during this

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investigation was typically a reddish-brown sand which contains large amounts of silt and clay. Figure 9 shows the locations of the eleven newly drilled soil borings. Figure 10 shows the locations of three cross-sections, two north-south cross-sections and one west-east cross-section, which are shown as Figures 11-13. Water levels and OVM results are also shown on the cross-sections.

Water at and surrounding the facility appears to be in discontinuous perched zones. Water was encountered and measured at various elevations in the previously installed and newly installed monitoring wells. In addition, water was not encountered in several of the soil borings drilled during this investigation. A hydraulic gradient was therefore not calculated. However, due to the presence of hydrocarbons in monitoring wells located southwest of the site, it is assumed that water beneath the facility flows in a southwesterly direction.

Drilling and Sampling of Soil Borings

During November 15 through December 8, Brown and Caldwell drilled and sampled eleven soil borings. The soil borings were drilled using air rotary drilling techniques and were sampled using a 2-foot split spoon sampler or a 10-foot NX-sized core barrel. In soil boring AT1-11, soil samples were first collected with the split-spoon sampler at 10-foot intervals from ground surface to 28 feet. Then the boring was continuously sampled with the core barrel to 65 feet. The core barrel was then used to collect samples at 10-foot intervals to total depth. Each of the other ten soil borings were typically sampled on 10-foot intervals from ground surface to total depth. Borings AT1-12 and AT1-13 were sampled with a split-spoon sampler until refusal was encountered. At that point the borings were sampled using the core barrel to total depth. The remaining soil borings are shown on Figure 9. Collected soil samples and visually inspected drill cuttings were used to construct boring logs. Boring logs for each soil boring are presented in Appendix A.

Each soil sample collected was split into two portions. The first portion was placed into a sealed plastic bag and placed on ice. The other half of the sample was placed in a sealed plastic bag and set aside for approximately five minutes to allow for the accumulation of any volatile organic compounds (VOCs) in the headspace of the bag. The soil sample in the plastic bag was then screened using the probe of a flame ionization detector (FID) to pierce the bag and obtain a headspace measurement of VOCs. The headspace readings are shown on the soil boring logs located in Appendix A.

Soil samples were selected for laboratory analysis based on field screening and visual inspection. In the soil borings where water was not encountered, the sample with the highest FID reading and the sample from the bottom of the boring were submitted for laboratory analysis. In the soil borings where water was encountered, the sample from the capillary fringe and the sample with the highest FID reading were submitted for laboratory analysis.

Following the completion of soil sampling activities, the samples selected for laboratory analysis, accompanied by trip blanks, were shipped to Terra Laboratories, Ltd. in League City by overnight delivery using chain of custody protocol. The soil samples were analyzed for BTEX using EPA Method 8020 and TPH using EPA Method 418.1.

Downhole equipment was steam cleaned prior to drilling and between each soil boring. Sampling equipment used by Brown and Caldwell was cleaned prior to the collection of each sample by washing with a mixture of tap water and a laboratory-grade detergent, rinsing with tap water, and a final rinse with distilled water.

Analytical Results For Soil Samples

As shown on Table 6, benzene was detected in several of the soil samples collected from the newly drilled soil borings. Concentrations of benzene ranged from 0.008 milligrams per kilogram (mg/kg) in sample AT1-13-9, collected from boring AT1-13 at a depth interval of 99 to 101 feet below ground surface to 0.088 mg/kg in sample AT1-11-10, collected from soil boring AT1-11 at a depth interval of 61 to 65 feet below ground surface. Benzene was reported to be below laboratory detection limits in samples AT1-11-14, AT1-14-7, AT1-16-2, AT1-16-4, AT1-17-3, AT1-17-4 AT1-18-9, and AT1-18-11.

Total BTEX concentrations ranged from below the laboratory detection limits for each constituent in samples AT1-11-14, AT1-16-2, AT1-16-4, and AT1-17-3 to 10.39 mg/kg in sample AT1-18-9 collected from a depth interval of 79 to 81 feet below ground surface.

Concentrations of (TPH), above the laboratory detection limit, were reported in samples AT1-11-10, AT1-11-14, AT1-17-4, and AT1-18-9 only. Concentrations ranged from 41 mg/kg in sample AT1-11-14 to 170 mg/kg in sample AT1-18-9.

A summary of the laboratory analytical results for soil samples, including the sampling depth intervals, is presented in Table 6. The laboratory analytical results for the trip blanks are also included in Table 6. The laboratory analytical reports for soil samples and associated trip blanks are presented in Appendix G.

CHAPTER 4

WATER INVESTIGATION

The following section describes the procedures and results of the water investigation conducted at the facility.

Installation and Development of Monitoring Wells

After completion of soil sampling activities, soil borings AT1-14, AT1-15, AT1-16, and AT1-17 were completed as permanent monitoring wells. Each monitoring well was completed by placing 2-inch-diameter PVC well screen (0.010 slot) into the boring followed by 2-inch-diameter PVC casing to the surface. The length of the screened interval varied with each monitoring well. A filter pack composed of clean No. 2 blasting sand was added to the annulus to approximately 2 feet above the top of the well screen. Above the top of the filter pack, approximately 2 feet of bentonite pellets were added to the annulus and hydrated to form a seal. A cement/bentonite grout slurry was then added to the annulus to near ground surface. A flush-mounted surface completion was constructed for each of the monitoring wells. The location of the newly installed monitoring wells, as well as the previously existing monitoring wells, and the measured water elevations are shown on Figure 14. Water was not encountered in borings ATI-11, ATI-12, ATI-13, ATI-18, ATI-19, ATI-20, and ATI-21. The locations of these "dry" borings are also shown as Figure 9 and Figure 14. Well construction details for the newly installed monitoring wells are shown on the boring logs presented in Appendix F.

The depth to water in each of the newly installed monitoring wells was measured with an oil/water interface probe to the nearest 0.01 foot and recorded. It should be noted that no water was observed in MW-8 after its installation. However, water had accumulated in the well by January 4, 1995. Cumulative water elevation data is presented in Table 7.

The depth to water measurements were used to calculate approximate well volumes for each monitoring well. Each of the newly installed monitoring wells, with the exception of MW-8, was developed with a dedicated, disposable bailer to remove fine sediments. Water was removed from each well until the fine sediments were removed, it was determined that further development would not improve the clarity of the water, or the well bailed dry. MW-8 was not developed.

Purging and Sampling of Monitoring Wells

Prior to purging, depth to water measurements were obtained from the previously existing monitoring wells and the newly installed monitoring wells. Phase-separated hydrocarbons (PSH) were observed in monitoring wells MW-1 and MW-2 at thicknesses of 0.7 feet and 0.04 feet,

respectively. The depth to water measurements were used to determine well volumes for monitoring wells MW-3, MW-4, MW-5, MW-6, and MW-7.

Purging was accomplished by manual bailing with dedicated, disposable bailers. Water was removed from each well until stability was achieved, or the well bailed dry. Stability was determined by field testing the pH, temperature, and specific conductance of the water during purging. After approximately one well volume was removed, a measurement was taken of the pH, temperature, and specific conductance. Subsequent measurements of each parameter were made until the measurement for each parameter was within 5% of the previous measurement. Purging was terminated and water samples were collected.

Water samples were obtained by lowering a dedicated, disposable bailer into each well. The water samples were immediately placed in laboratory-supplied containers and placed on ice. Following the completion of water sampling activities, the samples, accompanied by trip blanks, were shipped to Terra Laboratories, Ltd. in League City by overnight delivery using chain of custody protocol.

On January 4, 1995, water was observed in monitoring well MW-8. Due to the well initially being dry after installation and not recharging for over a week, the well was not purged. However, on January 7, 1995, a sample was collected for laboratory analysis. A water sample was collected from MW-8 using the procedures described above.

In addition to the water samples collected, a sample of the PSH observed in monitoring well MW-1 was collected for laboratory analysis. MW-1 was first purged of the existing PSH, and allowed to remain undisturbed until enough PSH was present in the well to obtain a sample. Removal of the PSH and sampling was conducted by lowering a dedicated, disposable bailer into the well. The PSH sample was immediately placed into laboratory-supplied containers and placed on ice. The sample was packed and shipped using appropriate procedures for the shipment of hazardous materials, and delivered by overnight delivery to Core Laboratories, Inc. in Houston, Texas.

Water samples collected for laboratory analysis were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8020, polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270, total metals (RCRA list) by EPA Methods 6010 and 7470, and major cations and ions. The water sample obtained from MW-8 was also analyzed for total dissolved solids (TDS) using EPA Method 160.1.

Analytical Results For Water Samples

As shown in Table 8 and on Figure 15, concentrations of benzene above the laboratory detection limits were reported in the samples from each of the monitoring wells except MW-8 which was reported to be below detection limits for each BTEX constituent. Concentrations ranged from 0.014 milligrams per liter (mg/L) in the sample from MW-3 to 6.2 mg/L in the sample from MW-5. Total BTEX concentrations ranged from 0.014 mg/L in MW-3 to 27.7 mg/L in MW-5.

No PAHs were reported to be above the laboratory detection limit of 0.010 mg/L in any of the water samples collected. Barium was the only metal reported to be above laboratory detection limits. It was reported in each water sample collected. Concentrations ranged from 0.04 mg/L in samples MW-3 and MW-4 to 1.2 mg/L in sample MW-7.

As shown in Table 8, concentrations of calcium ranged from 210 mg/L in MW-6 to 740 mg/L in MW-4. Concentrations of magnesium ranged from 100 mg/L in MW-6 to 550 mg/L in MW-5. Concentrations of potassium ranged from 1.7 mg/L in MW-7 to 8.5 mg/L in MW-3. Concentrations of sodium ranged from 200 mg/L in MW-7 to 580 mg/L in MW-8. Concentrations of chloride ranged from 170 mg/L in MW-4 to 610 mg/L in MW-8, and concentrations of sulfate ranged from 940 mg/L in MW-6 to 4,900 mg/L in MW-3.

As shown in Table 8, TDS was reported in the sample from MW-8 at a concentration of 4,800 mg/L.

A summary of the laboratory analysis for groundwater samples reported above, including associated trip blanks, is presented in Table 8. A summary of the laboratory analysis of major cations and ions is also included in Table 8. The laboratory analytical reports and chain of custody documents are presented in Appendix H.

A capillary analysis of PSH collected from MW-1 was also performed. The following is a breakdown of composition based on percentage of the liquid volume (LV%):

paraffins	=	16.89 LV%
naphthenes	=	38.11 LV%
aromatics	=	8.01 LV%
isoparaffins	=	33.70 LV%
olefins	=	0.00 LV%
unidentified	=	3.29 LV%
total	=	100.0 LV%

Based on laboratory analysis, the PSH was identified by Core Laboratories as being characteristic of natural gas condensate. The laboratory analytical report and chain of custody document for the PSH sample are included in Appendix I.

CHAPTER 5

CONCLUSIONS

Based on the information collected during the performance of the concrete-lined surface impoundment closure activities, and the soil and water investigation, Brown and Caldwell presents the following conclusions:

- 1) Shallow soils at the site consist of light brown to white caliche, silts and sandstone while deeper soils consist mainly of a reddish brown, dense clay interbedded with gypsum and anhydride.
- 2) Benzene was below 10 mg/kg, total BTEX was below 50 mg/kg, and TPH was below 1,000 mg/kg as indicated by laboratory analysis of final confirmation samples collected from the former surface impoundment excavation.

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- 3) Benzene was below 10 mg/kg, total BTEX was below 50 mg/kg, and TPH was below 1,000 mg/kg in samples collected from the west wall, south wall, and east wall from the area near the previous boring AT1-4 excavation.
- 4) Benzene was reported to be below 10 mg/kg in the sample collected from the north wall of the excavation in the area of previous boring AT1-4; however, total BTEX was reported to be 165 mg/kg, and TPH was reported at a concentration of 25,000 mg/kg. The excavation of the north wall was halted to prevent undermining an existing containment wall.
- 5) Detectable concentrations of hydrocarbons were present in deeper soils on the adjacent property to the south of the site and to the west of the AST containment area and north of the Compressor Buildings No. 3 and No. 4 on-site as indicated by laboratory analysis of soil samples collected from the soil drilled during this investigation.
- 6) There are discontinuous, perched water-bearing zones located beneath the facility based on water elevations observed in the monitoring wells located on-site and on the adjacent property.
- 7) PSH was observed in monitoring wells MW-1 and MW-2 at thicknesses of 0.7 feet and 0.04 feet, respectively.

- 8) Hydrocarbon constituents are present in each of the monitoring wells located onsite and on the adjacent property to the south of the facility as indicated by laboratory analysis of water samples, except well MW-8. Monitoring well MW-5, located on site near the southwest corner of the facility, reported the highest concentrations of BTEX constituents.
- 9) No PAHs above laboratory detection limits were reported in any of the water samples collected for analysis.
- 10) The PSH sample collected from monitoring well MW-1 indicated that the liquid composition is typical of natural gas condensate as indicated by laboratory analysis.

Use or disclosure of data contained on this sheet is subject to the restriction specified at the beginning of this document.

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Laboratory Analytical Results for Initial Confirmation Soil Samples-Surface Impoundment Excavation

				В	TEX - 80	20 (mg/k	g)
Sample ID	Description	Date	TPH - 418.1 (mg/kg)	Benzene	Toluene	Ethylbenzene	Xylenes
SIEW-1-6	Surface impoundment; approximately 6 feet down on the east wall.	10/13/94	209	<0.1	<0.1	<0.1	<0.3
SIEW-1-9	Surface impoundment, approximately 9 feet down on the east wall.	10/13/94	932	<0.1	<0.1	<0.1	<0.3
SINW-1-6	Surface impoundment; approximately 6 feet down on the north wall.	10/13/94	73	<0.1	<0.1	<0.1	<0.3
SINW-1-9	Surface impoundment; approximately 9 feet down on the north wall.	10/13/94	55	<0.1	<0.1	<0.1	<0.:
SISW-1-9	Surface impoundment; approximately 9 feet down on the south wall.	10/13/94	5,284	<0.1	<0.1	12.2	132.4
SIWW-1-9	Surface impoundment; approximately 9 feet down on the west wall.	10/13/94	3,894	<0.1	81.8	20.5	181.
SIFM-1-10	Surface impoundment; from near the southeast corner of the excavation floor.	10/13/94	4,118	<0.1	<0.1	9.6	103.

Laboratory Analytical Results for Trench Samples

				BTEX - 8020 (mg/kg)				
Sample ID	Description	Date	TPH - 418.1 (mg/kg)	Benzene	Toluene	Ethylbenzene	Xylenes	
MT-2-10	Surface impoundment; approximately 10 feet down Trench MT	10/15/94	33	<0.1	<0.1	<0.1	<0.3	
SET-3-10	Surface impoundment; approximately 10 feet down in Trench SET	10/15/94	33	<0.1	<0.1	<0.1	<0.3	
SWT-1-10	AT1-4 area; approx. 10 feet down in Trench SWT	10/15/94	28	<0.1	<0.1	<0.1	<0.3	

Laboratory Analytical Results for Final Confirmation Soil Samples-Surface Impoundment Excavation

					BTEX - 80	20 (mg/kg)	
Sample ID	Description	Date	TPH - 418.1 mg/kg	Benzene	Toluene	Ethylbenzene	Xylenes
I-1	Surface impoundment; approximately 10-12 feet down on west wall	11/20/94	<25	<0.005	<0.005	<0.005	<0.010
I-2	Surface impoundment; approximately 10-12 feet down on north wall	11/20/94	<25	<0.005	<0.005	<0.005	<0.010
I-3	Surface impoundment; from floor, near west side	11/20/94	3900	<2.0	3.6	7	71
I-4	Surface impoundment; approximately 10-12 down on east wall	11/20/94	370	<0.005	0.01	0.017	0.23
I-5	Surface impoundment; from floor near east side	11/20/94	2,100	<0.10	0.45	0.33	4.1
I-6	Surface impoundment; approximately 10-12 feet down on south wall	11/20/94	270	<0.005	<0.005	<0.005	0.013
I-8	Surface impoundment; approximately 10-12 feet down SE corner	11/20/94	<25	<0.005	<0.005	<0.005	<0.01

Laboratory Analytical Results for Initial Confirmation Soil Samples-AT1-4 Excavation

				B	TEX - 80	20 (mg/k	g)
Sample ID	Description	Date	TPH - 418.1 (mg/kg)	Benzene	Toluene	Ethylbenzene	Xylenes
AT4-WT1-9	AT1-4 area; approximately 9 feet down in the west trench of the excavation	10/15/94	<25	<0.01	<0.01	<0.01	<0.03
AT4-SW-9	AT1-4 area; approximately 9 feet down on south wall	10/15/94	<25	<0.02	<0.02	<0.02	<0.06
AT4-FM-11	AT1-4 area; approximately 11 feet down near center of floor	10/15/94	2,700	<4.0	18	8	69
AT4-EW-9	AT1-4 area; approximately 9 feet down on the east wall	10/15/94	25,000	<4.0	41	14	110
AT4-NW-9	AT1-4 area; approximately 9 feet down on the north wall	10/15/94	3,100	<4.0	26	11	93

Laboratory Analytical Results for Final Confirmation Soil Samples-AT1-4 Excavation

				BTEX - 8020 (mg/kg))
Sample ID	Description	Date	TPH - 418.1 (mg/kg)	Benzene	Toluene	Ethylbenzene	Xylenes
B-2	AT1-4 area; approximately 10- 12 feet down in north corner	11/20/94	<25	<0.005	<0.005	<0.005	<0.01
В-3	AT1-4 area; approximately 10- 12 feet down on east wall	11/20/94	<25	<0.005	<0.005	<0.005	<0.01
B-4	AT1-4 area; approximately 10- 12 feet down on east wall	11/20/94	830	<0.005	<0.005	<0.005	0.019
B-5	AT1-4 area; approx. 10-12 feet down on south wall	11/20/94	<25	<0.005	<0.005	<0.005	<0.01
B-6	AT1-4 area; from floor near the east wall	11/20/94	25	<0.005	<0.005	<0.005	<0.01
TB-2	Trip Blank	11/20/94	NA	<0.002	<0.002	<0.002	<0.004

Laboratory Analytical Results for Soil Boring Samples

		·····		BTEX - 8020 mg/kg				
Sample ID	Depth (ft)	Date	TPH - 418.1 mg/kg	Benzene	Ethylbenzene	Toluene	Xylenes	
AT1-11-10	61-65	11/16/94	130	0.088	<0.005	0.04	<0.021	
AT1-11-14	99-101	11/19/94	41	<0.005	<0.005	<0.010	<0.030	
AT1-12-9	69-71	11/17/94	<25	0.007	<0.005	<0.005	<0.010	
AT1-12-12	99-101	11/17/94	<25	0.055	<0.005	<0.005	<0.010	
AT1-13-6	69-71	11/18/94	<25	0.012	<0.005	<0.005	<0.010	
AT1-13-9	99-101	11/19/94	<25	0.008	<0.005	<0.005	<0.010	
AT1-14-5	49-51	11/20/94	<25	0.015	<0.005	<0.005	<0.010	
AT1-14-7	69-71	11/20/94	<25	<0.005	<0.005	0.005	<0.010	
AT1-15-4	39-41	11/20/94	<25	0.018	0.009	0.11	0.091	
AT1-15-5	49-51	11/21/94	<25	0.032	0.02	0.21	0.23	
TB-1	Trip Blank	11/21/94	NA	<0.002	<0.002	<0.002	<0.004	
AT1-16-2	19-21	11/29/94	<25	<0.005	<0.005	<0.005	<0.010	
AT1-16-4	39-41	11/30/94	<25	<0.005	<0.005	<0.005	<0.011	
AT1-17-3	29-31	11/30/94	<25	<0.005	<0.005	<0.005	<0.010	
AT1-17-4	39-41	11/30/94	86	<0.020	0.36	0.21	3.1	
AT1-18-9	79-81	12/1/94	170	<0.020	1	0.59	8.8	
AT1-18-11	99-101	12/2/94	<25	<0.005	0.007	0.003	0.075	
TB-3	Trip Blank	12/2/94	NA	<0.002	<0.002	<0.002	<0.004	
AT1-19	81-86	1/7/95	140	0.053	0.61	0.071	0.63	
AT1-19	110-115	1/7/95	16	<0.010	0.01	<0.010	<0.020	
AT1-20	81-86	1/6/95	960	0.052	0.6	0.24	2	
AT1-20	96-101	1/6/95	<15	<0.005	0.014	<0.005	<0.010	
AT1-21	29-34	1/7/95	18	<0.005	<0.005	<0.005	<0.010	
AT1-21	44-49	1/7/95	<15	0.005	0.018	<0.014	<0.042	

Water Elevation Data

Transwestern Pipeline Company Atoka 1 Compressor Station Artesia, New Mexico

Monitoring Well ID	Surveyed Top of Casing (ft)	Date Measured	Depth to PSH from TOC (ft)	Depth to Water from TOC (ft)	Water Elevation (ft)	Adjusted Water Elevation (ft)
MW-1	94.68	7/21/93	Unknown	Unknown	Unknown	31.56
	94.65	12/2/94	56.12	56.82	37.83	38.39
MW-2	96.45	7/21/93		42.38	54.07	54.07
	96.45	12/2/94	42.31	42.35	54.10	54.13
MW-3	95.00	7/21/93		36.55	58.45	58.45
	95.00	12/2/94		32.23	62.77	62.77
MW-4	94.02	7/21/93		49.92	44.10	44.10
	94.02	12/2/94		46.38	47.64	47.64
MW-5	NA	7/21/93	NA	NA	NA	
	98.22	12/2/94		34.40	63.82	63.82
MW-6	NA	7/21/93	NA	NA	NA	
	99.62	12/2/94		36.00	63.62	63.62
MW-7	NA	7/21/93	NA	NA	NA	
	99.14	12/2/94		45.58	53.56	53.56
MW-8	NA	7/21/93	NA	NA	NA	
	95.98	1/4/95		28.70	67.28	67.28

PSH = Phase-separated hydrocarbons.

NA = Not applicable. The indicated monitoring wells were not installed at the time of the July 1993 monitoring event.

Unknown = The previous investigation report indicated the presence of PSH in well MW-2; however, no measurements were given.

Note 1: A correction factor of 0.8 was used in calculating the Adjusted Water Elevations for wells containing PSH.

Note 2: The top of casing elevation for the previously existing monitoring wells were resurveyed along with the newly installed wells.

Laboratory Analytical Results for Water Samples

Transwestern Pipeline Company

Atoka 1 Compressor Station

Artesia, New Mexico

				Sample Ide	entification			
ANALYTE	MW-3	MW-4	TB-1	MW-5	MW-6	MW-7	TB-2	MW-8
	12/2/94	12/2/94	12/2/94	12/2/94	12/2/94	12/2/94	12/2/94	1/3/95
BTEX by EPA Method 8020 (mg/L)								
Benzene	0.014	0.23	< 0.002	6.2	0.36	0.62	<0.002	<0.002
Ethylbenzene	<0.002	<0.002	< 0.002	1.1	0.05	0.17	<0.002	<0.002
Toluene	<0.002	0.06	< 0.002	13	<0.01	1.1	<0.002	<0.002
Xylenes	<0.004	0.13	<0.004	7.4	<0.02	1.1	< 0.004	<0.004
Polynuclear Aromatic Hydrocarbons								
by EPA Method 8270 (mg/L)		ļ/						
Acenaphthene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Acenaphthylene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Anthracene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Benzo (a) anthracene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Benzo (a) pyrene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Benzo (b) fluoroanthene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Benzo (g,h,i) perylene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Benzo (k) fluoroanthene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Chrysene	<0.010	0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Dibenz (a,h) anthracene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Fluoroanthene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Fluorene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Indeno (1,2,3-cd) pyrene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Naphthalene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Phenanthrene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010
Pyrene	<0.010	<0.010	NA	<0.010	<0.010	<0.010	NA	<0.010

mg/L = milligrams per liter

NA = Not analyzed for the indicated parameter.

Note: EPA Method 8270 was used in place of EPA Method 8100 for the analysis of polycyclic aromatic hydrocarbons.

TABLE 8 (cont.)

Laboratory Analytical Results for Water Samples

Transwestern Pipeline Company

Atoka 1 Compressor Station

Artesia, New Mexico

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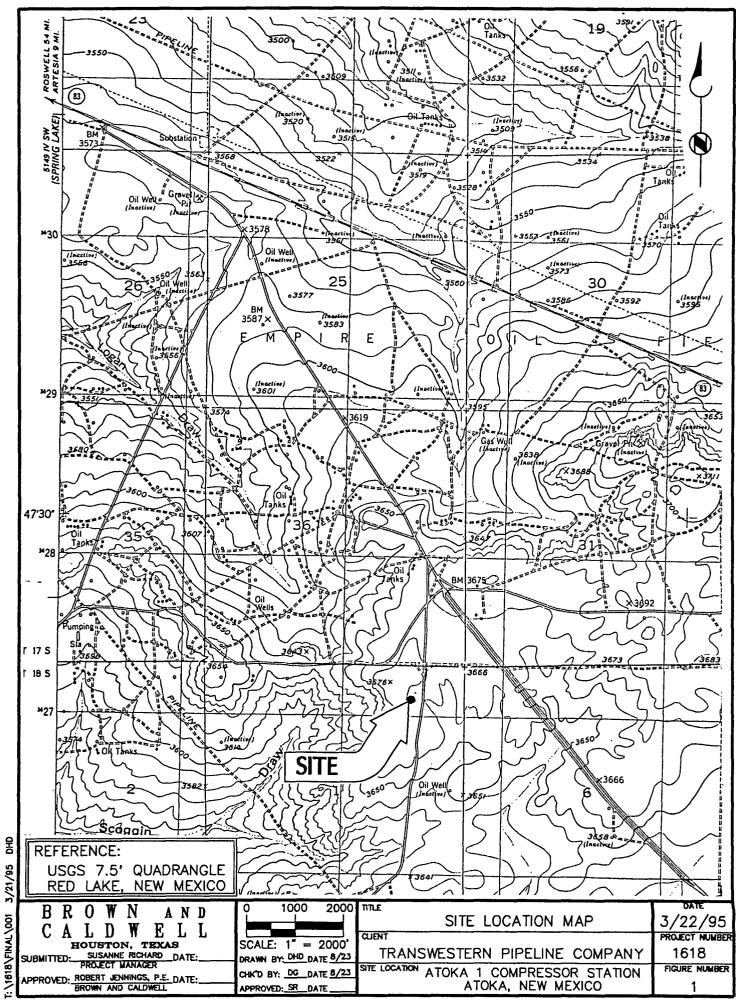
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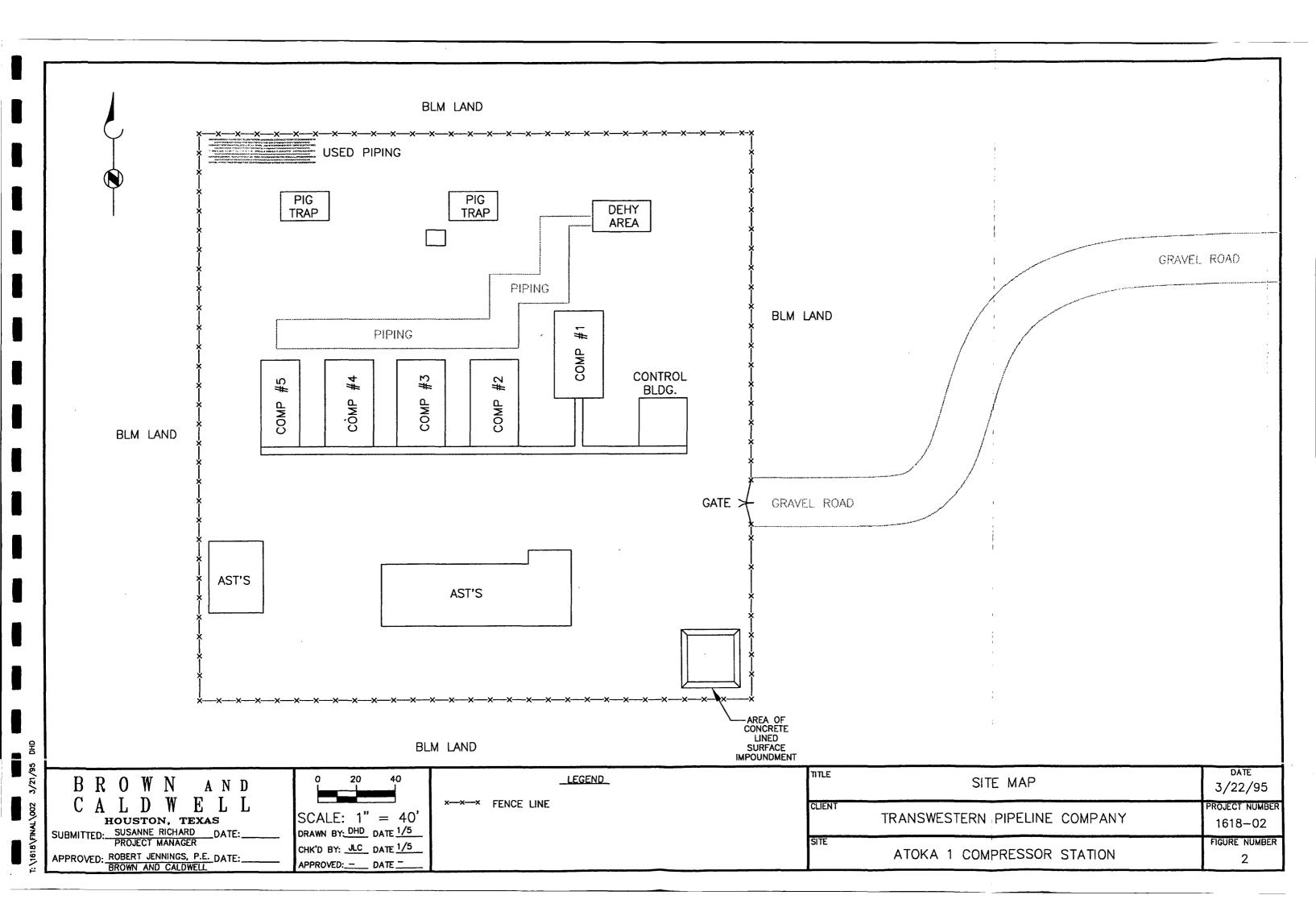
				Sample Ide	entification			
ANALYTE	MW-3	MW-4	TB-1	MW-5	MW-6	MW-7	TB-2	MW-8
	12/2/94	12/2/94	12/2/94	12/2/94	12/2/94	12/2/94	12/2/94	1/3/95
Total Metals by EPA Methods 6010 and 7470 (mg/L)								
Arsenic	<0.6	<0.6	NA	<0.6	<0.6	<0.6	NA	<0.6
Barium	0.04	0.04	NA	0.24	0.48	1.2	NA	0.05
Cadmium	<0.03	<0.03	NA	<0.03	<0.03	<0.03	NA	<0.03
Chromium	<0.03	<0.03	NA	<0.03	<0.03	<0.03	NA	<003
Lead	<0.1	<0.1	NA	<0.1	<0.1	<0.1	NA	<0.1
Mercury	<0.0002	<0.0002	NA	<0.0002	<0.0002	<0.0002	NA	<0.0002
Selenium	<0.6	<0.6	NA	<0.6	<0.6	<0.6	NA	<0.6
Silver	<0.03	<0.03	NA	<0.03	<0.03	<0.03	NA	<0.03
Total Dissolved Solids by EPA Method 160.1 (mg/L)	NA	NA	NA	NA	NA	NA	NA	4,800
Major Cations and Anions by EPA Methods 6010,								
325.3, and 375.4 (mg/L)								
Calcium	600	740	NA	560	210	340	NA	690
Magnesium	550	270	NA	150	100	170	NA	260
Potassium	8.5	1.9	NA	3.3	3.5	1.7	NA	3.3
Sodium	460	240	NA	370	210	200	NA	580
Chloride, Titrimetric	470	170	NA	530	420	350	NA	610
Sulfate	4,900	1,900	NA	1,400	940	1,100	NA	2,100
Alkalinity Analysis by EPA Method 310.1 (mg/L)								
Carbonate Alkalinity	<2	<2	NA	<2	<2	<2	NA	<1
Bicarbonate Alkalinity	200	420	NA	570	230	620	NA	290

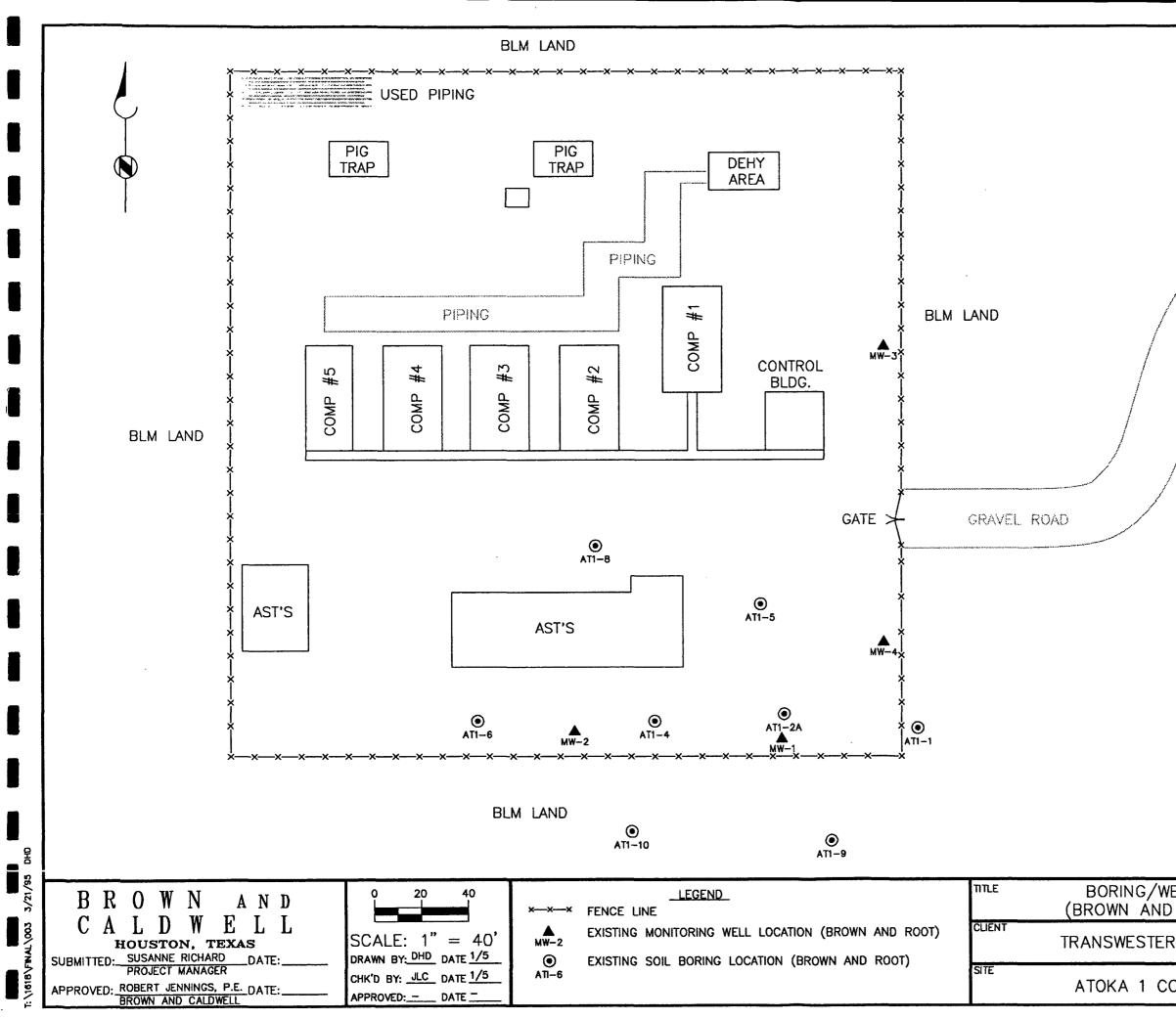
mg/L = milligrams per liter

NA = Not analyzed for the indicated parameter

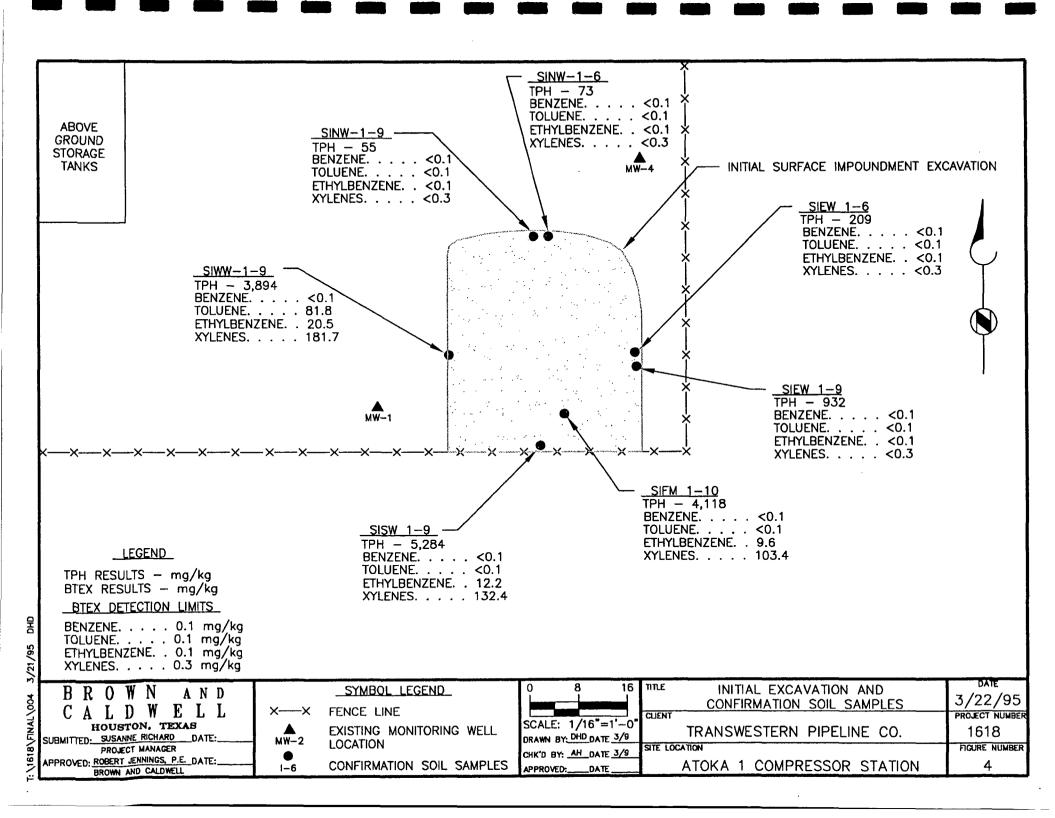


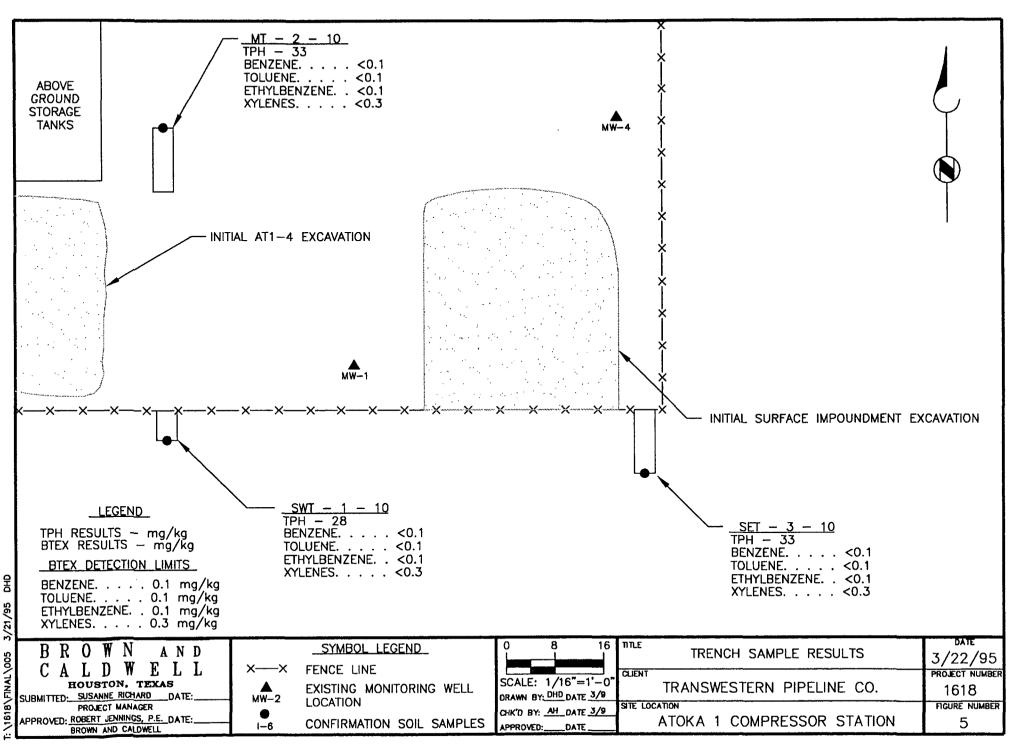
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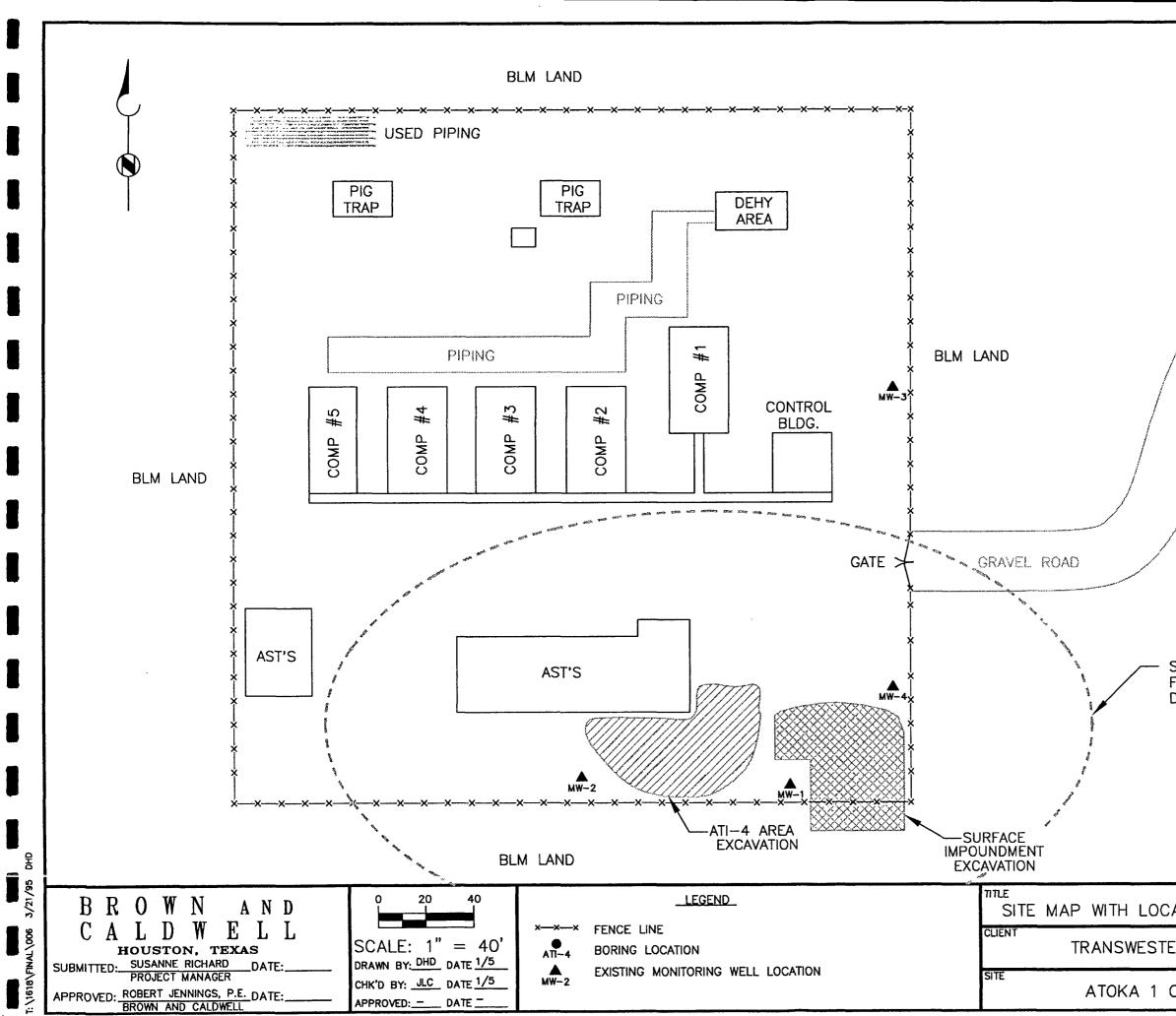




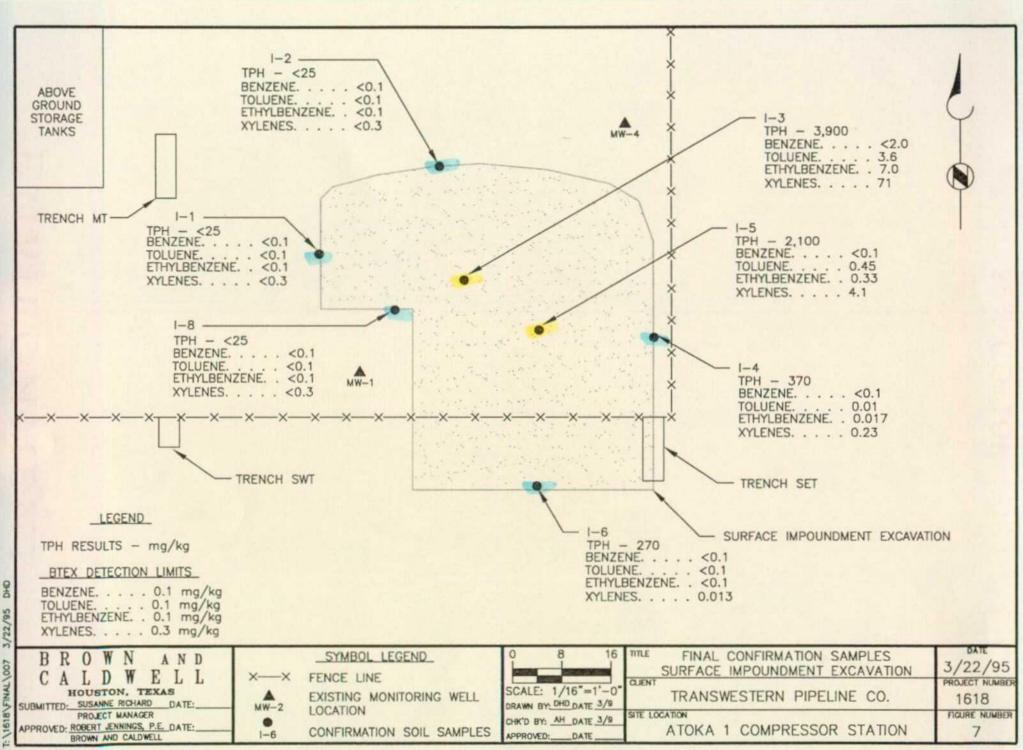
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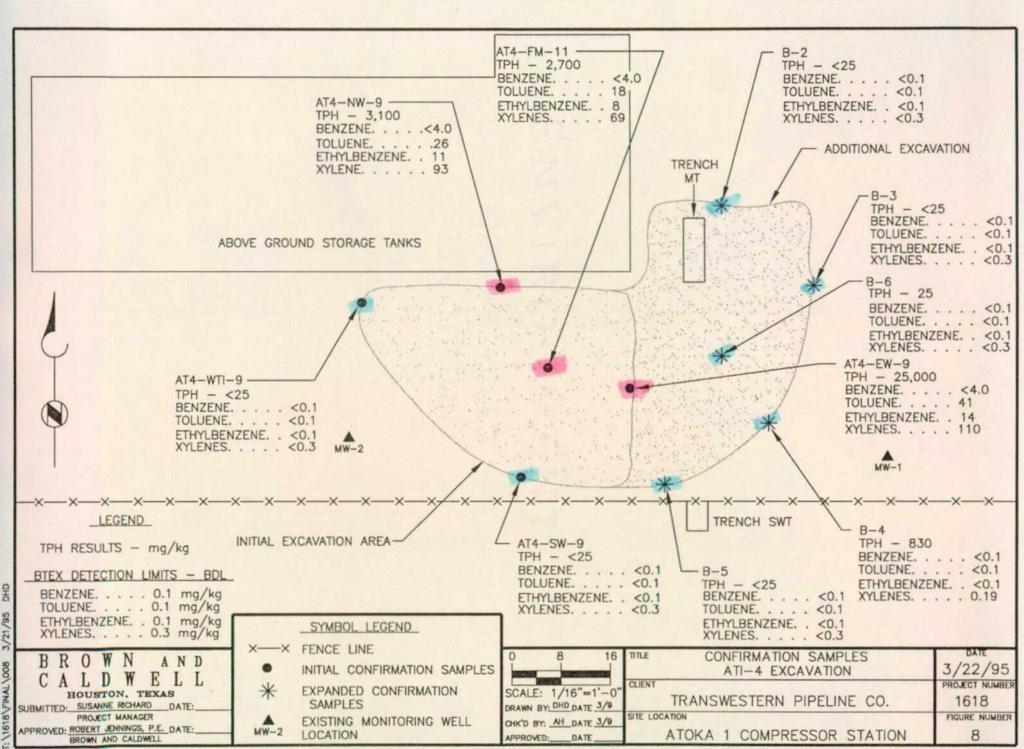




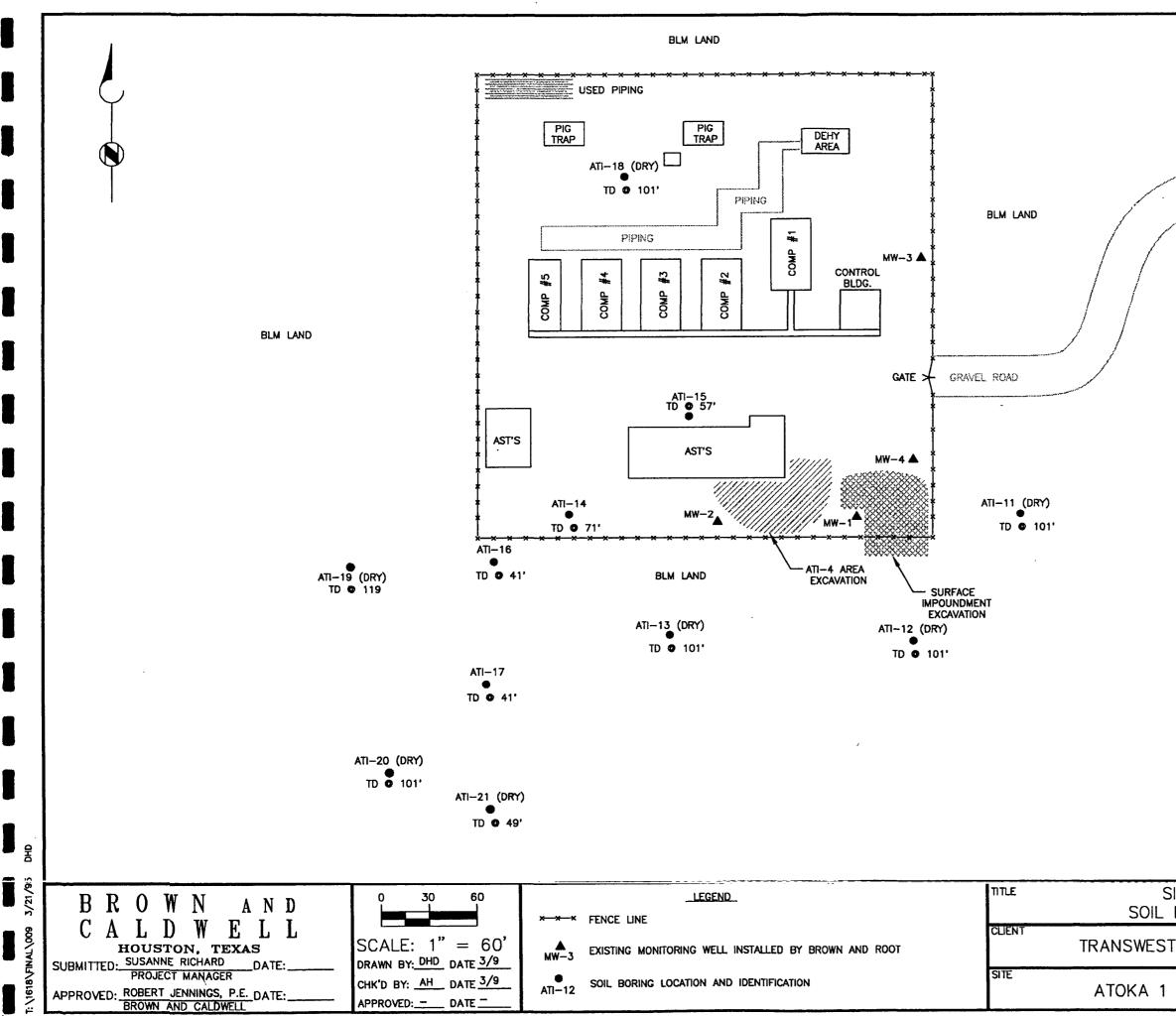
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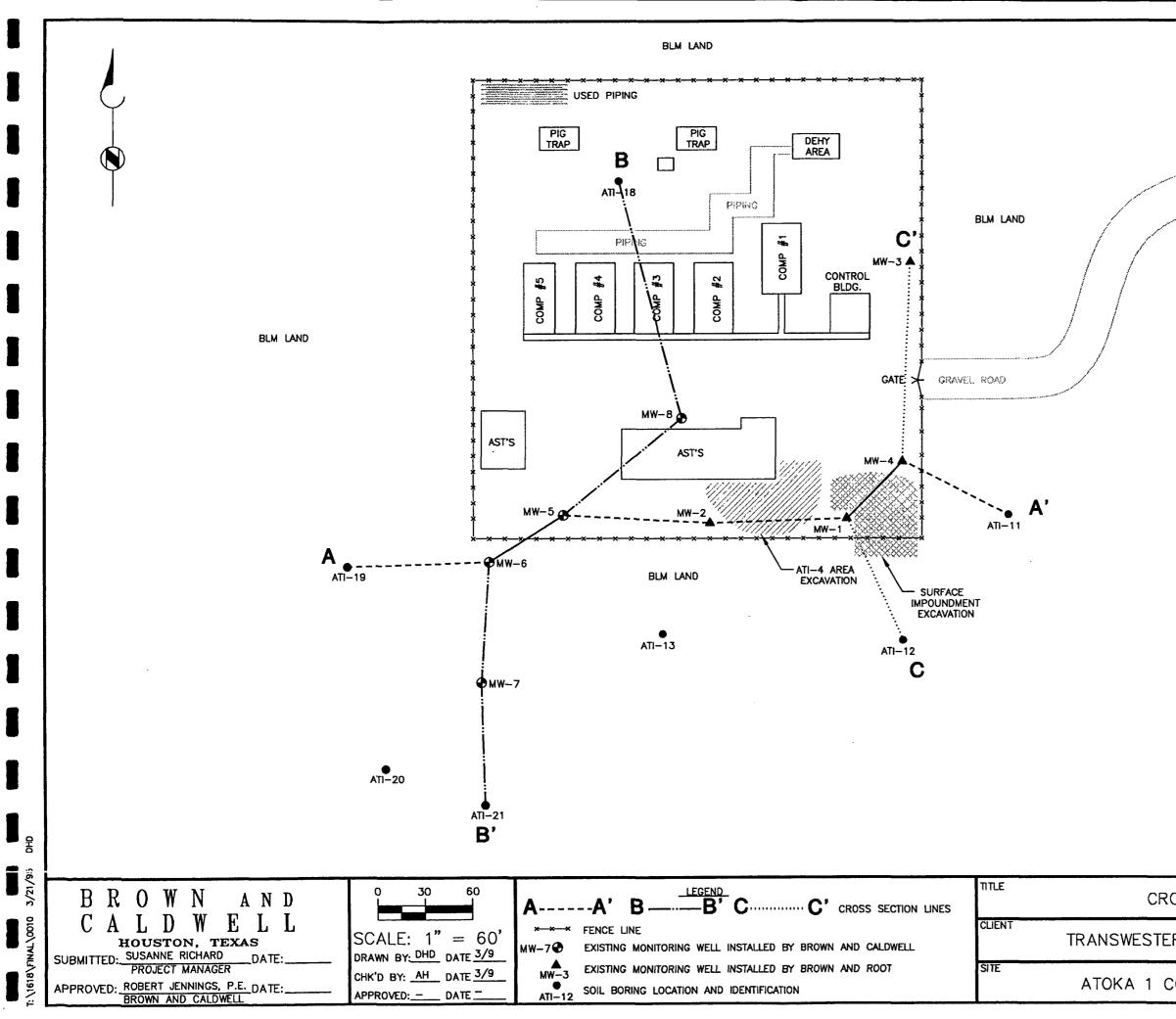
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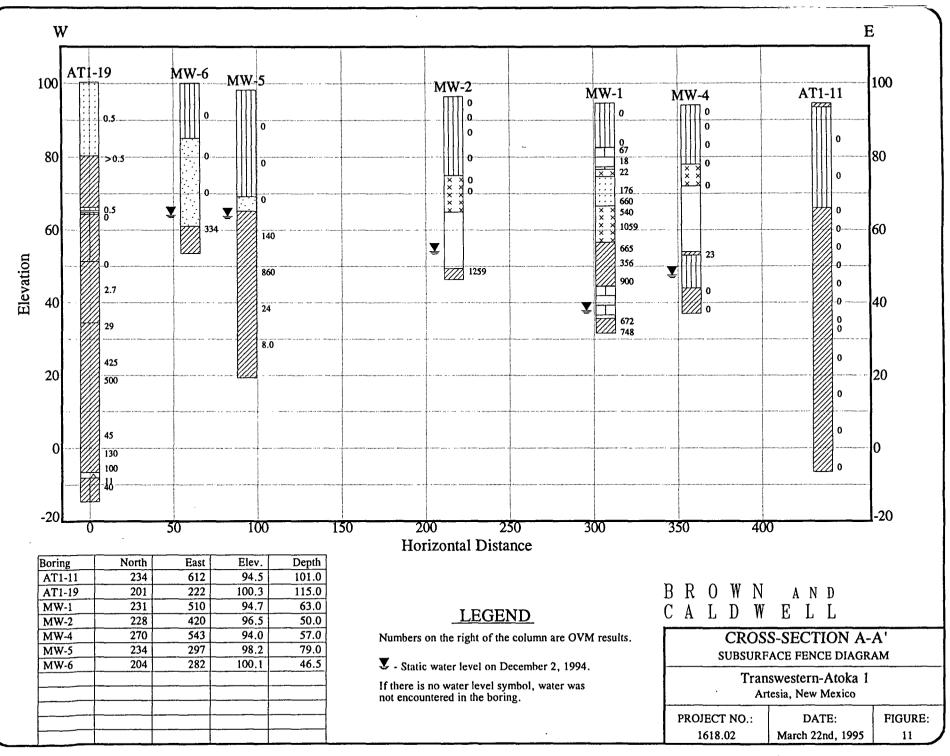
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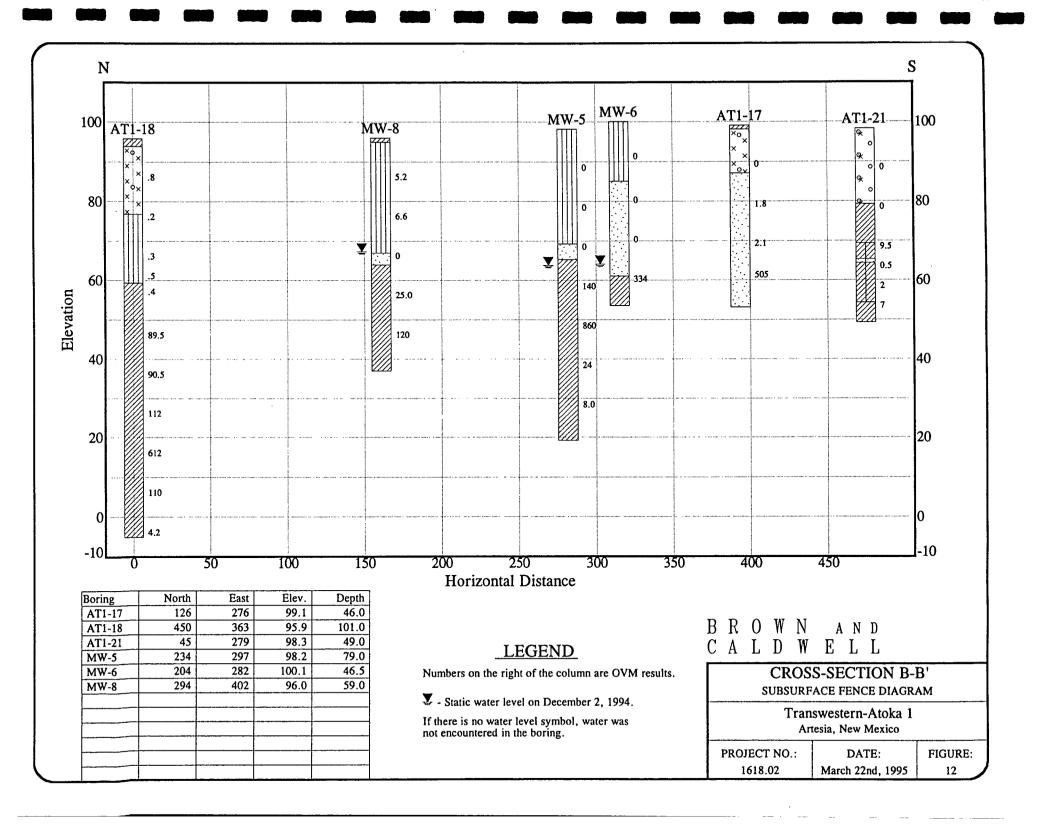
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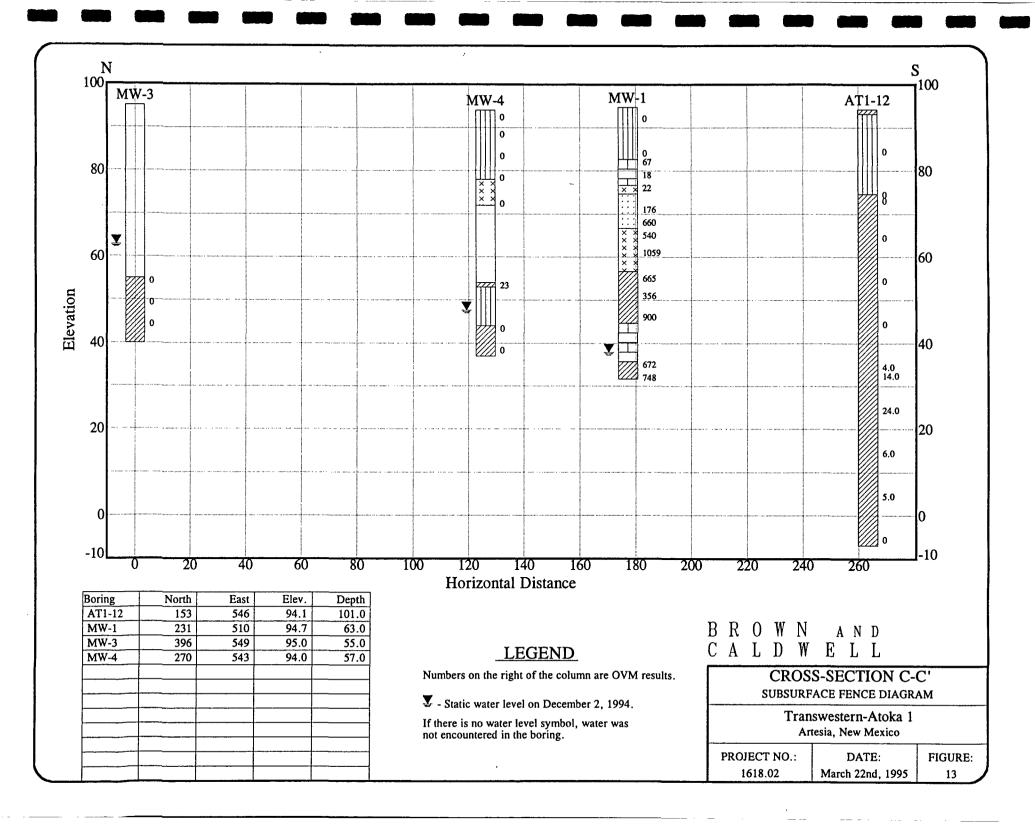


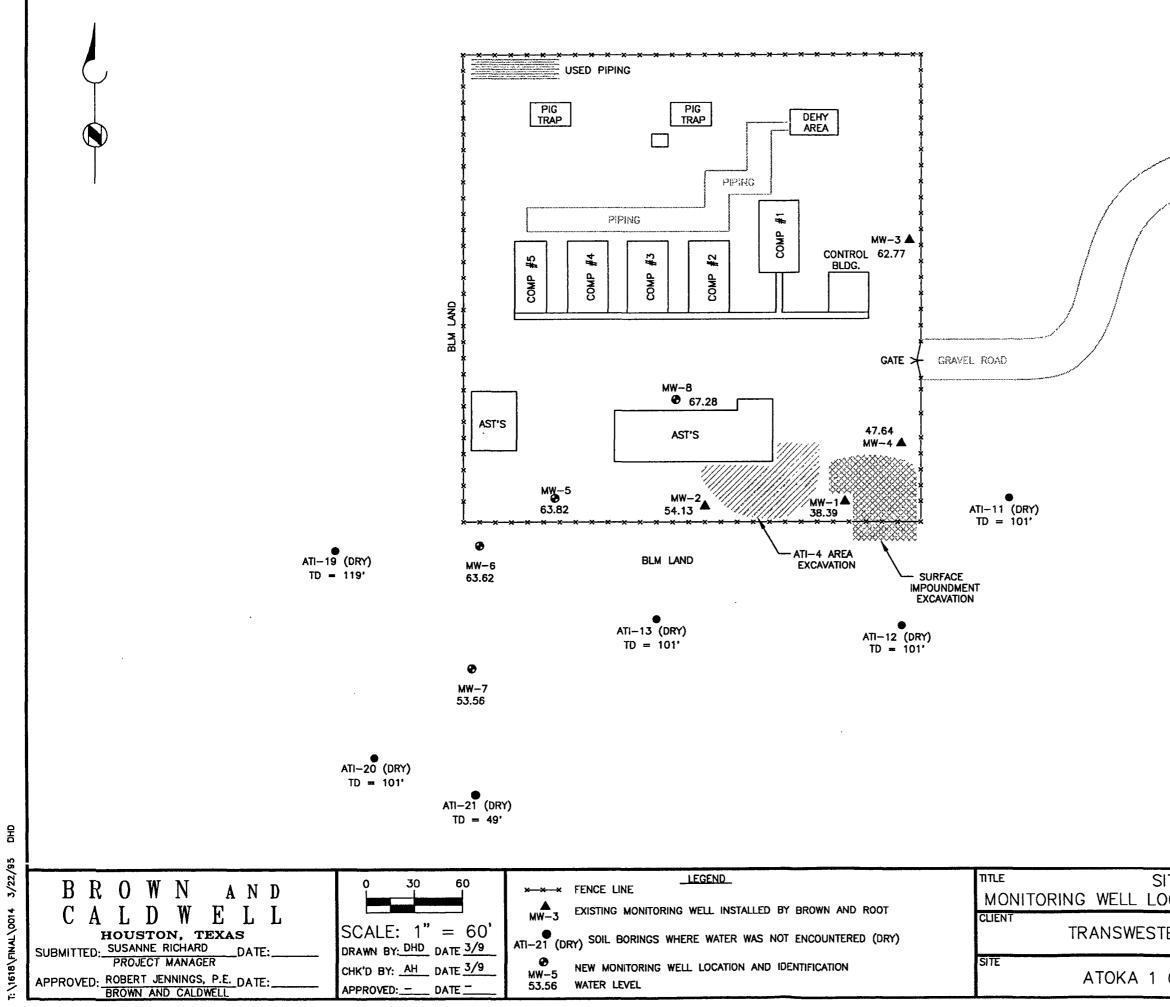
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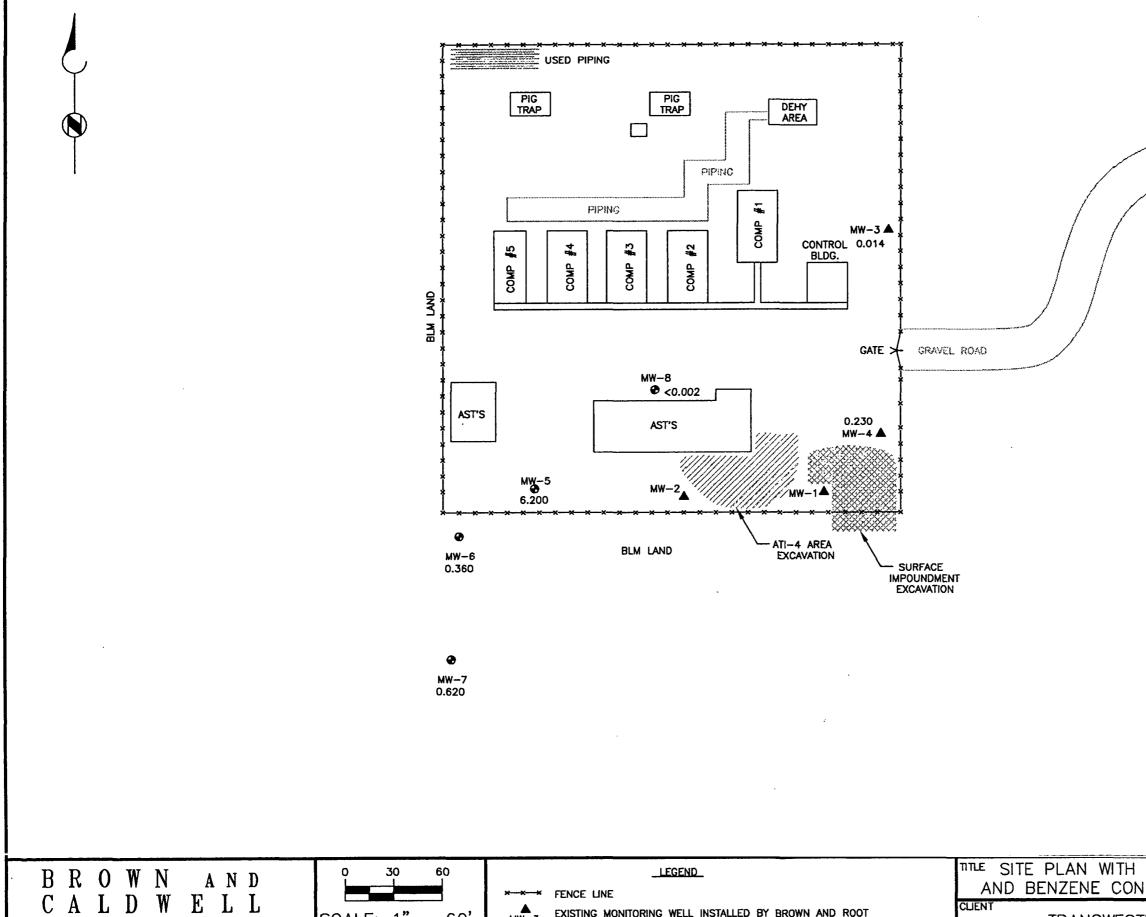
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FINAL \001

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 \bigstar_{MW-3} EXISTING MONITORING WELL INSTALLED BY BROWN AND ROOT SCALE: 1'' = 60'HOUSTON, TEXAS SUBMITTED: SUSANNE RICHARD PROJECT MANAGER DRAWN BY: DHD DATE 3/9 _DATE: • NEW MONITORING WELL LOCATION AND IDENTIFICATION SITE CHK'D BY: AH DATE 3/9 M₩-4 BENZENE CONCENTRATIONS IN GROUNDWATER MEASURED IN mg/L APPROVED: ROBERT JENNINGS, P.E. DATE: BROWN AND CALDWELL 0.230 APPROVED: -___ DATE ___

	2
GRAVEL ROAD	
PLAN WITH MONITORING WELL LOCATIONS ENZENE CONCENTRATIONS IN GROUNDWATER	DATE 3/22/95
	PROJECT NUMBER
	1618-02 FIGURE NUMBER
ATOKA 1 COMPRESSOR STATION	15

APPENDIX A

Soil Boring/Monitor Wells

	Borin	g 🚺 Monitoring	Well	E	Boring	/Wel	l Nur	nber:			<u>AT1</u>	-11	Sheet1	0
Borin	g Lo	cation: Artesia, NM							Elev	ation an	d Datu	m:	·····	
Drilli	ng C	ontractor: GPI		Driller: V	v. c	ows	er		8	Started pleted	: 11/	15/94	Date Finished: 11/1	19
Drilli	ng E	quipment: Mobil B-61	·····	Borehole I	Diame	ter:	3.88	3"	Dept	h: (feet			Water Depth: (feet)	
Samp	ling	Method: CME Sampler/	NX Core	·····					Turn				STRUCTION	
Drilli	ng N	lethod: HSA/Air Rotary		Drilling Fl	uid:				of W	e and Di ell Casi	ng:			
Backf	fill M	laterial:			. <u> </u>					Size:		Filter M	aterial:	
Logge	ed By	: Jack Cooper	Checked B	By:					Deve	elopmen	t Meth	od:		
	ě					s			raphic	Log				
Depth (feet)	USC Soil Type	Descrip	tion		Recovery %	Blow Counts	Sample No.	Sample	Lithology	Backfill	dd WAO Weadings		Remarks	
	ML	CLAY and GRAVEL; brown SILT; tan to brown; some ca		-										1
10 10 10 10 10 11 10 11 10 11 11		Becoming pink. Pink to light reddish brown, semiconsolidated, dry; black caliche present.	sandy, ìnclusions wi	ith some			2	X			0		-11-1 from 9' - 11' -11-2 from 19' - 21'	

Participation Part	Soil Bo	ring	X Monitoring Well	Boring	/Wel	l Nur			11.	1-11 Sheet <u>3</u>
80 12 0 Sample AT1-11-12 from 79.0' - 80 13 0 Sample AT1-11-13 from 89.0' - 90 14 0 0	Depth (feet)	USC Soil Type	Description	Recovery %	Blow Counts	Sample No.		Backfill		
90-1 11 95-1 14 0	11111		CLAY, dense, reddish brown with interbedded GYPSUM and ANHYDRITE			12			0	
	11111		÷			13			_	Sample AT1-11-13 from 89.0' - 91.0'
100 -	95 		r.D. Boring at 101.0 feet.			14				Sample AT1-11-14 from 99.0' - 101.0'

BR CA	L	WNAND DWELL ame. Transwestern - Atoka 1	ВО	KI	N	G	L			Numb	ber: <u>1618</u>	3.02	
Proje Soil E			I	Boring	/Wel	l Nur	nber				<u>1-12</u>	Sheet _1	of _
Borin	g Lo	cation: Artesia, NM					_	Eleva	ation an	id Dat	um:		
Drilli	ng C	Contractor: GPI	Driller: V	v. c	ows	er		51		: 11	/16/94	Date Finished: 11/1	6/94
Drilli	ng E	quipment: Mobil B-61	Borehole I	Diame	ter:	3.88	3"	Com Dept	pleted h: (feet) 10	1.0	Water Depth: (feet)	
Sampl	ling	Method: CME Sampler/NX Core										ISTRUCTION	
Drilli	ng M	fethod: HSA/Air Rotary	Drilling Fl	uid:				of W	e and Di Vell Casi	ing:			
Backf	ill M	faterial:	·					Slot			Filter M	laterial:	
Logge	ed By	y: Jack Cooper Checked	By:					Deve	elopmen	it Met	hod:		
	e						0	Fraphic	Log				Ģ
Depth (feet)	USC Soil Type	Description		Recovery %	Blow Counts	Sample No.	Sample	Lithology	Backfill	Wdd Wdd Readings		Remarks	Flevation (feet)
	ML	CLAY, SILT, and GRAVEL. SILT; tan with abundant caliche, dry.											
	CL	CLAY; dense, reddish brown with interb GYPSUM and ANHYDRITE, some blac inclusions in the clay, slickensides				23	X			0	Sample AT1	1-12-1 from 9.0' - 11.0' 1-12-2 from 19.0' 19.5' 1-12-3 from 19.5' -	

Proje Soil E			Boring	/Wel	l Nur	1			ber: <u>1618.02</u> 1-12 <u>Sheet 2</u>
Depth (feet)	USC Soil Type	Description	Recovery %	Blow Counts	Sample No.		Lithology Backfill	HAO WAO Readings	1
35 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1		CLAY; dense, reddish brown with interbedded GYPSUM and ANHYDRITE, slickensides			5 7 8			0	Sample AT1-12-5 from 39.0' - 41.0' Sample AT1-12-6 from 49.0' - 51.0' Sample AT1-12-7 from 59.0' - 61.0' Sample AT1-12-8 from 61.0' - 64.0'
65					9			24	Sample At1-12-9 from 69.0' - 71.0'

Soil Bo	Nan		Boring		1 Nm	mhe			AT.	er: <u>1618.02</u> 1-12 <u>Sheet 3</u>
				3/ WC I		<u> </u>	Graphic		T	
Depth (feet)	Uac Join 1ype	Description	Recovery %	Blow Counts	Sample No.		Γ.	Backfill	Wdd WAO Readings	
80-		CLAY; dense, reddish brown, with interbedded GYPSUM and ANHYDRITE			10				6	Sample AT1-12-10 from 79.0' - 81.0'
85	s	Some Siltstone and Sandstone gravel present			11				5	Sample AT1-12-11 from 89.0' - 91.0'
95	T	T.D. Boring at 101.0 feet.			12				0	Sample AT1-12-12 from 99.0' - 101.0'

B R C A	0 L	WN AND DWELL		ВО	RI	Ν	G	L	0					
Proje			_		oring	/Wel	I N117		<u> </u>			_{er: <u>1618</u> 1-13}	3.02 Sheet	
Soil E Borin		cation: Artesia, NM		<u>_</u>	oring	,,	1 1 1 1	noer		vation ar			Sneet	
<u> </u>		Contractor: GPI		Driller: V	v. c	ows	er		8	te Started			Date Finished: 11/1	8/94
		quipment: Mobil B-61		Borehole D)iame	ter:	3.88	3"	Co	mpleted pth: (feet			Water Depth: (feet)	
		Method: CME Sampler/N	X Core	L							·		ISTRUCTION	
		Method: HSA/Air Rotary		Drilling Flu	uid:				Tyj of '	pe and D Well Cas	iamete ing:	۲.		
Backt	fill N	faterial:		•					Slo	t Size:		Filter M	laterial:	
Logg	ed B	y: Jack Cooper	Checked 1	By:					De	velopmen	nt Met	hod:		
	<u>د محمد الم</u>							G	raphi	ic Log				
Depth (feet)	K USC Soil Type	Descriptio SILT; tan with abundant calich			Recovery %	Blow Counts	Sample No.	Sample	Lithology	Backfill	Wdd WAO Readings		Remarks	Elevation (feet)
20 21 30		SILT; reddish brown, indurated	1, sandy				1				0	Sampler reft air rotary dr	1-13-1 from 9.0' - 11.0' usal at 19 feet; switch to illing	

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Soil I	Borin	g 🔀 Monitoring Well 🗌 H	Boring	/Wel	l Nur		:			ber: <u>1618.02</u> 1-13 Sheet <u>2</u> of <u>1</u>
Depth (feet)	USC Soil Type	Description	Recovery %	Blow Counts	Sample No:	Sample	Lithology Lithology	Backfill	WAO WAO Readings	
40 45 50 55 55	CL	CLAY; dense, reddish brown, with interbedded GYPSUM and ANHYDRITE, slickensides Black inclusions.			4				0	Sample AT1-13-3 from 39.0' - 41.0' Sample AT1-13-4 from 49.0' - 51.0'
55	CL	SILTSTONE; reddish brown to pink; disseminated GYPSUM present CLAY; dense, reddish brown, with interbedded GYPSUM and ANHYDRITE, slickensides			5		××××××××		22	Sample AT1-13-5 from 59.0' - 61.0'
0					6				44	Sample AT1-13-6 from 69.0' - 71.0'

	Borin	g X Monitoring Well	Boring			nber	• <u> </u>	/	AT	er: <u>1618.02</u> 1-13 Sheet <u>3</u>	of
Depth (feet)	USC Soil Type	Description	Recovery %	Blow Counts	Sample No.		Lithology	Backfill	HAO WAO Readings	1	Flevation (feet)
30 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		CLAY; dense, reddish brown, with interbedded GYPSUM and ANHYDRITE, slickensides			7				20	Sample AT1-13-7 from 79.0' - 81.0'	
20 20 20 20 20 20 20 20 20 20 20 20 20 2					8				6	Sample AT1-13-8 from 89.0' - 91.0'	
8 8		T.D. Boring at 101.0 feet.			9				0	Sample AT1-13-9 from 99.0' - 101.0'	

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•	Borin	ame: <u>Transwestern</u> ng Monitoring	g Well 🕅	E	loring	/Well	l Nun	nber				er: <u>1618</u>	Sheet	of _
Borin	g Lo	ocation: Artesia, NM							Elev	ation an	d Dat	um:	• · · · · · · · · · · · · · · · · · · ·	
Drilli	ng C	Contractor: GPI		Driller: V	v. C	owse	er				: 11	/20/94	Date Finished: 11/20)/94
Drilli	ng E	Equipment: Mobil B-61		Borehole D	liame	ter:	3.88	"	Dept	pleted h: (feet)		·····	Water Depth: (feet)	
Samp	ling	Method: NX Core							Town				STRUCTION	
Drilli	ing N	Method: Air Rotary		Drilling Fl	uid:				of W	and Di ell Casi	ing:			·
Back	fill M	laterial:	- <u></u>						Slot			Filter Ma	terial:	
ogg	ed B	y: Jack Cooper	Checked H	By:					Deve	lopmen	it Meti	hod:		
()e					s		G	raphic	Log				1
Depth (feet)	F USC Soil Type	Descri SILT; tan; sandy and uncor			Recovery %	Blow Counts	Sample No.	Sample	Lithology	Well	MdO WAO Readings		Remarks	Flevation (feet)
<u>1111111111111111111111111111111111111</u>		caliche					1				0	monitoring w	as converted to vell MW-5. -14-1 from 9.0' - 11.0' -14-2 from 19.0' -	
0	SP	SAND, reddish-brown; very and clay present; slightly m loose	y fine grained v oist; consolida	with silt ted to			3				0	Sample AT1- 31.0'	-14-3 from 29.0' -	

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Soil Boring Monitoring Well Soil Boring/Well Number: AT 1-14* Sheet 2 33 Bring Description Bring Graphic Log Bring	Control tring Control tring Description State Control tring	Proje							ct Num ΔΤ1	ber: <u>1618.02</u> -14* Sheet 2
Q3 Q4 Description Y Sumo one of the section of the	State Description Vertication	Soil E	lorin	g 🗌 Monitoring Well 🛛	Boring	g/Wel	Nur	_	 $\overline{\uparrow}$	Sheet <u>2</u>
CL CLAY: dense, reddish-brown, with interbedded GYPSUM and ANHYDRITE, slickensides 40 40 45 45 50 4 50 4 5 5 1 5 1 5 5 1 5 5 1 5 1 5 1 5 1 5 1	CL CLAY; dense, redish-brown, with interbedded GYPSUM and ANHYDRITE, slickensides 40 40 41.0 51 52 53 60 60 60 60 60 61 62 63 64 65 66 66 67 68 68 69 60 60 60 60 60 61 62 64 65 66 66 67 680 860 860 860 860 860 860 860 860 860 860 860 860 860 860 860	Depth (feet)	USC Soil Type	Description	Recovery %	Blow Counts	Sample No.			1
50- 	50 50 51.0' 55 51.0' 51.0	40 40 41 41 41 41 41 41 41 41 41 41 41 41 41	CL	CLAY; dense, reddish-brown, with interbedded GYPSUM and ANHYDRITE, slickensides			4			
	60	1111111					5			

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oject Na 1 Borin		Boring	/Wel	l Nur	nber		<i>F</i>	<u>\T1-</u>	<u>1618.02</u> 14* <u>Sheet 3</u>	of
						: <u> </u>				
USC Soil Type	Description	Recovery %	Blow Counts	Sample No.	Sample	Lithology	Well	WAd WAd Wadings	Remarks	i i
+	CLAY; dense, reddish brown, with interbedded GYPSUM and ANHYDRITE, slickensides									
	T.D. Boring at 79.0 feet.									
	j.									
				•						

Proje Soil E		ame: <u>Transwestern - Atoka 1</u>	_	Boring	/Wel	l Nun	nber				er: <u>1618</u> - 15*	3.02 Sheet	of
		ocation: Artesia, NM				·		Ň.	vation an	d Dat	um:		
		Contractor: GPI	Driller: V	v. c	ows	er				: 11	/20/94	Date Finished: 11/29	9/94
		Equipment: Mobil B-61	Borehole I	Diame	ter:	3.88	11	Con Dep	pleted th: (feet) 59	.0	Water Depth: (feet)	
		Method: NX Core										STRUCTION	
		Method: Air Rotary	Drilling Fl	uid:				Typ of W	e and Di /ell Casi	amete ng:	r		
		Naterial:						Q	Size:		Filter M	aterial:	
Logg	ed By	y: Jack Cooper Check	ed By:					Dev	elopmen	t Met	hod:		
							G	raphic	: Log				
Depth (feet)	USC Soil Type	Description		Recovery %	Blow Counts	Sample No.	Sample	Lithology	Well	WdO WAO Readings		Remarks	Elevation (feet)
	CL		tły moist,								* AT1-15 w monitoring	ras converted to well MW-8	
5 10 10 10 10 10 10 10 10 10 10 10 10 10						1			ALAN ANA ANA ANA ANA ANA ANA ANA ANA ANA	5	Sample AT1	-15-1 from 9.0' - 11.0'	
25 		Reddish brown to pink, slightly indura with black inclusions	ited, sandy			2				7	Sample AT1 21.0'	-15-2 from 19.0' -	
1111111	SP	SAND; reddish brown, silty, clayey, s indurated, slightly moist	lightly			3				0	Sample AT1 31.0'	1-15-3 from 29.0' -	

Project Soil Bo			Boring	/We	ll Nu	mbe		/		ber: <u>1618.02</u> -15* Sheet <u>2</u> of .
Depth (feet)	USC SOIL LYPE	Description	Recovery %	Blow Counts	Sample No.	Sample	Lithology	Well	WAO WAO Readings	Remarks
0 5 0 5 0 5 0 5		CLAY; dense, reddish brown, with interbedded GYPSUM and ANHYDRITE, slickensides			5				25	Sample AT1-15-4 from 39.0' - 41.0' Small amount of water noted in bottom of boring. Sample AT1-15-5 from 49.0' - 51.0'

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B R C A	0 L	WN AND DWELL	ВО	RI	N	G	L	0 0	3				
Proje	ect N]			er: <u>1618</u>	.02	
Soil	Borir	g 🗋 Monitoring Well 🗴	B	oring	g/We	ll Nu	mber	:		<u>\T1</u>	<u>-16*</u>	Sheet _1	of _2
Borin	ng Lo	cation: Artesia, NM						Eleva	ation an	nd Dat	um:	·	
Drill	ing C	Contractor: GPI	Driller: V	v. C	lows	ser				: 11	/29/94	Date Finished: 11/30)/94
Drill	ing E	quipment: Mobil B-61	Borehole D	iame	ter:	3.8	8"	Dept	pleted h: (feet) 46	.5	Water Depth: (feet)	
Samp	oling	Method: NX Core				<u>.</u> .						STRUCTION	
Drill	ing N	Iethod: Air Rotary	Drilling Flu	uid:				Type of W	and Di ell Casi	iamete ing:	r		
Back	fill N	faterial:				_		Slot :			Filter M	aterial:	
Logg	ed B	y: Jack Cooper Checked E	y:					Deve	lopmen	it Met	hod:		
	<u>م</u>						C	raphic	Log				
Depth (feet)	USC Soil Type	Description		Recovery %	Blow Counts	Sample No.	Sample	Lithology	Well	Wdd WAO Wadings		Remarks	Elevation (feet)
	ML	SILT; weathered limestone and caliche, ta white, friable to unconsolidated, dry	n to								*AT1-16 wa monitoring v	is converted to well MW-6	
	SP	SAND; pink to tan, very fine grained, mod indurated, caliche, gravel abundant; dry	lerately			1			XAXAXAXAXAXAXAXAXAXAX	0	Sample AT1	-16-1 from 9.0' - 11.0'	
20 						2				0	Sample AT1 21.0'	-16-2 from 19.0' -	
30 - 		Less indurated; less caliche gravel.				3				0	Sample AT1 31.0'	-16-3 from 29.0' -	

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-	ect Na Borin		Boring	/Wel	l Nu	nber			<u>\T1</u>	er: <u>1618.02</u> -16* <u>Sheet 2 of</u>
		<u></u>	- <u></u> -				Graphic			
Depth (feet)	USC Soil Type	Description	Recovery %	Blow Counts	Sample No.	Sample	Lithology	Well	Ado VA Readings	1
Δ 	SU	SAND; pink to tan, very fine-grained, moderately indurated, caliche gravel abundant; dry CLAY; dense, reddish brown, sandy, firm, black staining from 39.5' to 40'; GYPSUM and ANHYDRITE stringers present. T.D. Boring at 46.5 feet.		B	4				334	Water measured in open borehole at 36.13' below TOG after open hole to 39.0' left overnight Sample AT1-16-4 from 39.0' to 41.0'\

Proje Soil I		_		E	oring	/Wel	l Nur	nber				er: <u>1618</u> - <u>17*</u>	Sheet	of
		ocation: Artesia, NM							Eleva	ation ar	nd Dat	um:		
Drilli	ing C	Contractor: GPI		Driller: V	v. c	ows	er		PQ		: 11	/30/94	Date Finished: 11/30)/94
Drill	ing E	Equipment: Mobil B-61		Borehole I	Diame	ter:	3.88	3"	Com Dept	pleted h: (feet) 46	.0	Water Depth: (feet)	
Samp	oling	Method: NX Core				-							STRUCTION	
Drilli	ing N	Method: Air Rotary		Drilling Fl	uid:				Type of W	and Diell Casi	iamete ing:	r		
Back	fill M	faterial:							Slot S	Size:		Filter M	aterial:	
Logg	ed B	y: Jack Cooper	Checked 1	By:					Deve	lopmen	t Met	hod:		
	******							0	Fraphic	Log				
Depth (feet)	다 USC Soil Type	Descript CLAY; brown, dry.	ion		Recovery %	Blow Counts	Sample No.	Sample	Lithology	Well	Wdd WAO Weadings		Remarks	Flevation (feet)
10 25 25 25		CALICHE; silty, tan to white unconsolidated, gravel abund SAND; pink and tan to reddis caliche gravel, moderately ind	h brown, ab				2		x x x x x x x x x x x x x x x x x x x		0	monitoring v	as converted to well MW-7 -17-1 from 9.0' - 11.0'	
		Very clayey with black inclus	ions at 29'.				3					Sample AT1 31.0'	-17-3 from 29.0' -	

BROWN AND CALDWELL

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BORING LOG

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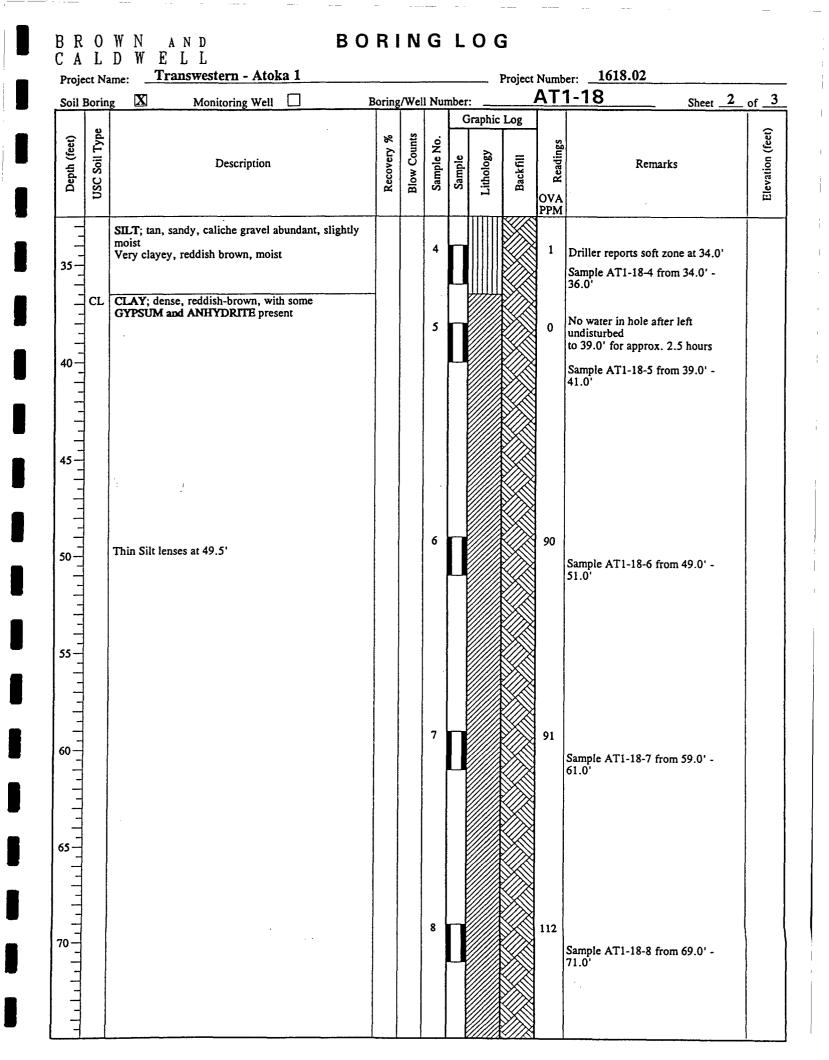
oil Bo	Monitoring Well Boring/Well Number: AT1-17*	Sheet <u>2</u> of .
	Graphic Log	
Deptn (reet)	Media Sample No. Sample No. Well Well Well	arks
	SAND; pink and tan to reddish brown, abundant caliche gravel, moderately indurated Driller reports so	ehole to 35.7 feet

B R C A	0 L	WN AND DWELL		ВО	RI	Ν	G	L								
Proje							1					_{er:} <u>1618</u> 1-18		····· 1		
Soil I		ng X Monitoring W Decation: Artesia, NM		<u>r</u>	Boring	/ wei	<u>i Nui</u>	libel	:AI1-18Sheet _1of _3							
		Contractor: GPI		Driller: V	V.C	0.000	er		Date Started: 12/1/94 Date Finished: 12/2/94						/94	
		quipment: Mobil B-61		Borehole I				211	Com	pleted h: (feet			Water Depth (feet)			
				Dorenoic L					Dept	n. (1001)			STRUCTION			
	ampling Method: NX Core prilling Method: Air Rotary Drilling I						Type and Diameter									
	Drilling Method: Air Rotary Drilling F Backfill Material:								8		ing:	Eilter M		•		
					Slot Size: Filter Material: Development Method:											
Logg	ed By	y: Jack Cooper	Checked	By:					Faphic	Log					T	
Depth (feet)	USC Soil Type	Descripti	on		Recovery %	Blow Counts	Sample No.	Sample	Lithology	Backfill	WAO WAO WAO Readings		Remarks	-	Elevation (feet)	
$\begin{array}{c} 1 \\ 5 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\$	CL	CALICHE, tan to white, extra dry, silty.	-				2		x x x x x x x x x x x x x x x x x x x		0		18-1 from 9.4	•		
30 1 1 30 1 1		Tan to pink; some clay					3.				0	Sample AT1 31.0'	18-3 from 29	9.0' -		

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BORINGLOG

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Proje								Project	Numb	ber: <u>1618.02</u>	
Soil	Borin	g 🕅 Monitoring Well 🗌	Boring	g/We	ll Nu					1-18 Sheet 3	of
Depth (feet)	USC Soil Type	Description	Recovery %	Blow Counts	Sample No.	Sample	Fraphic Lithology	Backfill	WAO WAO Readings		Elevation (feet)
		CLAY; dense, reddish brown, with some GYPSUM and ANHYDRITE present Thin Clay lenses, gray, strong odor			9	S	Lie		оуа <u>PPM</u> 612 110		Ele

BRO CAL	DWELL		ВО	RI	Ν	G	L						
Project N Soil Bori			B	oring	/Well	l Nur	nher				_{er:} <u>1618.</u> I-19	.02	of 3
	ocation: Artesia, NM			or mg	,		noer	Ň	tion ar			<u> </u>	01
	Contractor: GPI		Driller: V	Ves (Cow	ser		8	Started			Date Finished: 1/7/9	5
	Equipment: Mobile B-61		Borehole D				311	Com	oleted			Water Depth: (feet)	
	g Method: NX Core		1201010102	Tehole Diameter: 3.88" Depth: (feet) 115.0 (feet) WELL CONSTRUCTIO									
	Method: Air Rotary		Drilling Flu	uid.				Type of W	and D ell Cas	iametei ing:	r		
	Material: Grout							8			Eilter Ma		
	By: Al Fear	Cheeked	By: Al Fe	Slot Size: Filter Material: Development Method:									
		by. All Pa				G	a Fraphic	Log					
Depth (feet) USC Soil Type	Descripti	ion		Recovery %	Blow Counts	Sample No.	Sample	Lithology	Backfill	WAO WAO Wadings		Remarks	Elevation (feet)
10 10 10 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 11	Interbedded with stringers of GYPSUM and ANHYDRITE CLAY; dense, rediish-brown, ANHYDRITE and GYPSUM	interbedded	I with	100		2				>0.5	-	-19-1 from 9.0' - 11.0' -19-2 from 20.0' -	

i.

BROWN AND CALDWELL

BORING LOG

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Proj	ect Na		Project Number: 1618.02 Boring/Well Number: AT1-19 Sheet 2 of 3												
Soil	Borin	g 🔟 Monitoring Well 🗌	Bori	1g/\	Well	Nur					1-19 Sheet _2 of				
Depth (feet)	USC Soil Type	Description	Recovery %		Blow Counts	Sample No.	Sample	Lithology Lithology	Backfill	HAO WAO Readings	e				
40	CL CL ML	SANDSTONE; consolidated, whitish tan ANHYDRITE CLAY; dense, reddish brown SILTY CLAY, ANHYDRITE, and GYPSUM; interbedded, with black and gray mottling in the clay.	10			3				1	Sample AT1-19-3 from 34.0' - 36.0' Sample AT1-19-14 from 36.0' - 42.0'				
50	CL	CLAY; dense, reddish brown, interbedded with ANHYDRITE	10)		4				0	Sample AT1-19-4 from 49.0' - 51.0' Discontinued boring on 1-4-95 Continued boring on 1-6-95				
55			100			5				3	Sample AT1-19-5 from 56.0' - 61.0'				
65 	CL	CLAY; dense, reddish brown, interbedded with GYPSUM and ANHYDRITE	100			6				29	Sample AT1-19-6 from 66.0' - 71.0'				

Project Soil Bo		Monitoring Well	Boring	/Wel	l Nun	_	·:			er: <u>1618.02</u> 1-19	_ of _
Depth (feet)	addr upp app	Description	Recovery %	Blow Counts	Sample No.	Sample	Lithology L	Backfill	HAO WAO WAO Readings		
80	CLAY GYPS	(; dense, reddish brown, interbedded wi IUM and ANHYDRITE	th 100		7				425	Sample AT1-19-7 from 76.0' - 81.0' Sample AT1-19-8 from 81.0' - 86.0'	
95 100 100 105			100		9				45	Sample AT1-19-9 from 96.0' - 101.0'	
05	CLAY	I; dense, reddish brown	100		10	-				Sample AT1-19-10 from 101.0' - 105.0' Sample AT1-19-11 from 105.0' -	
	L CLAY	YDRITE, dense Y; dense, reddish brown, with interbedd YDRITE Y CLAY, CLAY, and ANHYDRITE, edded	ed 100 100		12				11	107.0' No Sample Sample AT1-19-12 from 108.5' - 110.0' Sample AT1-19-13 from 110.0' - 113.0'	

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Proje		_	_	D	oring	(Wal						_{er:} <u>1618.</u> 1-20				
Soil I Borin		g X Monitoring We cation: Artesia, NM		B	oring	/ wei	i iqui	liber	Elevation and Datum:							
		ontractor: GPI		Driller: W	Ves (Cow	ser		8	Date Started: 1/4/95 Date Finished: 1/5/95						
	Drilling Equipment: Mobile B-61 Borehole						3.88	3"	Comp Depti	CompletedWater Depth:Depth: (feet)101.0						
		Method: NX Core	4									WELL CONS	STRUCTION			
		fethod: Air Rotary		Drilling Flu	uid:				Type of We	and D ell Cas	iamete ing:	r				
Back	fill M	laterial: Grout						Slot Size: Filter Material:								
Logg	ed By	y: Al Fear	Checked B	y: Al Fea	ar				Deve	lopmer	nt Meth	nod:				
	l y							G	raphic	Log				ef)		
Depth (feet)	USC Soil Type	Description		Recovery %	Blow Counts	Sample No.	Sample	Lithology	Backfill	Wdd Wdd Readings		Remarks	Elevation (feet)			
	CL	fine-grained CLAY; dense, reddish brown, i ANHYDRITE SANDSTONE; dense, reddish b with black mottling throughout, ANHYDRITE	rown, cons		100		2				0		-20-1 from 9.0' - 11.0' -20-2 from 19.0' -			

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oil Bor		Monitoring Well	Boring		Nur	har				ber: <u>1618.02</u> 1-20 Sheet <u>2</u> of
			Bornig	1	Itun		· Graphic		T	Sneer or
Depth (feet) 11SC Soil Tyne	USC 2011 1 ype	Description	Recovery %	Blow Counts	Sample No.	Sample		Backfill	Wdd WAO Readings	
		SILTY CLAY; dense, reddish brown with black	100		3		<u>aaa</u>		I	Sample AT1-20-3 from 32.0' -
- M 5		mottling throughout SANDSTONE; dense, reddish brown with ANHYDRITE inclusions	 100		4				0	33.0' Sample AT1-20-4 from 34.0' - 39.0'
0		ANHYDRITE	_							
1.1.1.1.1		ANHYDRITE: dense, crystalline	100		5		00000		0	Sample AT1-20-5 from 49.0' - 51.0'
11111		ANHYDRITE; crystalline, interbedded with SILTY CLAY, reddish brown	100		6		00000		0	Sample AT1-20-6 from 51.0' - 56.0'
		ANHYDRITE; dense, crystalline SILTY CLAY; reddish brown with	100							
MI MI	L	GYPSUM inclusions ANHYDRITE; interbedded with reddish brown SILTY CLAY and GYPSUM	100		7		$ \circ $		6	Sample AT1-20-7 from 59.0' - 61.0'
IIII			100		8				4	Sample AT1-20-8 from 61.0' - 66.0'
<u> </u>			100		9				14	Sample AT1-20-9 from 66.0' - 71.0'
		CLAY; dense, reddish brown with disseminated GYPSUM	100		10				60	Sample AT1-20-10 from 71.0' -

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BORING LOG

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Project			Dania	-//1/-	11 3		Project Number: 1618.02 AT1-20 Sheet _3 of _3					
Soil Bo	oring	g X Monitoring Well	Borin	z/we		1	: Graphic			Sheet Of		
Depth (feet)	USC Soil Type	Description	Recovery %	Blow Counts	Sample No.	Sample		Backfill	WAO WAO Readings			
		CLAY; dense, reddish brown with ANHYDRITE CLAY; dense, reddish brown with white mottling and interbedded GYPSUM and ANHYDRITE	100		11 12 12				450 500	76.0' Sample AT1-20-11 from 81.0' - 84.0' Sample AT1-20-12 from 84.0' - 86.0'		
90		ANHYDRITE; dense	100		13				60	Sample AT1-20-13 from 86.0' - 88.0' Sample AT1-20-14 from 88.0' - 91.0'		
		CLAY; dense, reddish brown, interbedded with ANHYDRITE with laminae of SELENITE and GYPSUM nodules T.D. Boring at 101.0 feet.	100		15				2	Sample AT1-20-15 from 96.0' - 101.0'		

B R C A	-	WN AND DWELL		ВО	RI	Ν	G	L						
•	ect N Borir			B	oring	/Wel	1 Nur	nber				_{per:} <u>1618.0</u> 1-21	02 Sheet	of 2
		cation: Artesia, NM			<u></u>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			Elevation and Datum:					
		Contractor: GPI		Driller: V	Wes Cowser			Date Started: 1/5/95 Date Finish				Date Finished: 1/5/	95	
		Equipment: Mobile B-61		Borehole D	iame	ter:	3.88	3"	Completed Depth: (feet) 49.0				Water Depth: (feet)	
		Method: NX Core		L								WELL CONST	RUCTION	
Drill	ing N	Method: Air Rotary		Drilling Fl	uid:				Type of W	and D ell Cas	iamete ing:	r		
Back	fill N	Material: Grout							Slot S	Size:		Filter Mate	erial:	
Log	ged B	y: Al Fear	Checked H	By: Al Fe	ar				Deve	lopmer	nt Met	hod:		
								6	raphic	Log				
Depth (feet)	USC Soil Type	Descriptio CALICHE; dense, consolidated			Recovery %	Blow Counts	Sample No.	Sample	 Lithology 	Backfill	Wdd Wdd Readings		Remarks	Elevation (feet)
	CL	CLAY; dense, reddish brown v SILT, interbedded with ANHIY	vith some		100		1		× × × × × × × × × × × × × × × × × × ×		ο	Sample AT1-2	1-1 from 9.0' - 11.0'	
	CL	SILTY CLAY; lithified	χ.	-	100		2				0	24.0'	21-2 from 19.0' -	

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BORING LOG

oil I	Borin	ng 🔀 Monitoring Well 🗌	Boring	z/We	ll Nur	nber	:		<u>AT</u>	1-21 Sheet <u>2</u> of
						1	Graphic	Log	<u> </u>	
Depun (reet)	USC Soil Type	Description	Recovery %	Blow Counts	Sample No.	Sample	Lithology	Backfill	WAd WAO Readings	I i
	SP	SILTY SAND; interbedded with consolidated								33.0'
. –	SM CL ML	SILTY SANDSTONE	/ 100		4				1	
1.1.1.1		As above; interbedded with dense ANHYDRITE	100						1	Sample AT1-21-4 from 34.0' - 39.0'
					5				2	Sample AT1-21-5 from 39.0' - 44.0'
	CL	CLAY; dense, reddish brown, interbedded with ANHYDRITE	100							
		T.D. Boring at 49.0 feet.			6				7	Sample AT1-21-6 from 44.0' - 49.0'

APPENDIX B

Laboratory Analytical Reports and Chain-of-Custody for Initial Confirmation Soil Samples-Surface Impoundment



"Don't Treat Your Soil Like Dirt!"

October 14, 1994

Client: Brown & Caldwell Mr. Lynn Wright 1415 Louisiana, Suite 2500 Houston, Texas 77002

Sample Matrix: Soil

Job ID: Atoka 1 Date Received: 10/14/94 Analysis Date: 10/14/94

		77	EPA SW-846
Parameter	Value	Units	Test Method
Sample ID: S1EW-1-9			418.1/3550
Total Petroleum Hydrocarbons	932	ppni	
Sample ID: S1EW-1-6			
Total Petroleum Hydrocarbons	209	ppm	
Sample ID: SINW-1-9			
Total Petroleum Hydrocarbons	55	ррки	
Sample ID: S1NW-1-6			
Total Petroleum Hydrocarbons	73	ppm	
Sample ID: S1SW-1-9			
Total Petroleum Hydrocarbons	5,284	ppm	
Sample ID: S1WW-1-9			
Total Petroleum Hydrocarbons	3,894	ppm	
Sample ID: S1FW-1-10			
Total Petroleum Hydrocarbons	4,118	ppm	
		·	<u></u>
	QC (Qua	lity Control)	

CHEMICAL ANALYSIS REPORT

QC (QualitTotal Petroleum Hydrocarbons QC:100 ppmDetection Limit 10 ppm<u>Result</u><u>% IA</u>TPH104 ppm104

Kirk Robinson

12600 West I-20 East - Odessa, Texas 79763 - (915) 563-1800 - Fax (915) 563-1713

P.02





"Don't Treat Your Soil Like Dirt!"

October 14, 1994

Client: Brown & Caldwell Mr. Lynn Wright 1415 Louisiana, Suite 2500 Houston, Texas 77002

Sample Matrix: Soil

Job ID: Atoka 1 Date Received: 10/14/94 Analysis Date: 10/14/94

		Detection		
Compounds	Actual (ppm)	<u>Limit (ppm)</u>	QC	<u>%IA</u>
Sample ID: S1EW-1-9				
Benzene	ND	0.1	0.100	100
Toluene	ND	0.1	0.100	100
Ethylbenzene	ND	0.1	0.103	103
Xylene (m,p)	ND	0.2	0.206	103
Xylene (o)	ND	0.1	0.102	102
Surrogate Spike	%Recovery			
a.a.a Trifluorotoluene	92			
Sample ID: S1EW-1-6				
Benzene	ND	0.1	0.100	100
Toluene	ND	0.1	0.100	100
Ethylbenzene	ND	0.1	0.103	103
Xylene (m,p)	ND	0.2	0.206	103
Xylene (o)	ND	0.1	0.102	102
Surrogate Spike	%Recovery			
a.a.a Trifluorotoluene	113			
				•
Sample ID: S1NW-1-9				
Benzene	ND	0.1	0.100	100
Toluene	ND	0.1	0.100	100
Ethylbenzene	ND	0.1	0.103	103
Xylene (m,p)	ND	0.2	0.206	103
Xylene (0)	ND	0.1	0.102	102
Surrogate Spike	%Recovery			
a, a, a Trifluorotoluene	.114			

12600 West I-20 East · Odessa, Texas 79763 · (915) 563-1800 · Fax (915) 563-1713

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page 2 Atoka 1 Cont.

page 2 Aloka I Coll.				
		Detection	00	04 T A
Compounds	Actual (ppm)	Limit (ppm)	UL	%IA
Sample ID: S1NW-1-		0.1	0.100	100
Benzene	ND	0.1	0.100	100
Toluene	ND	0.1	0.100	100
Ethylbenzene	ND	0.1	0.103	103
Xylene (m,p)	ND	0.2	0.206	103
Xylene (0)	ND	0.1	0.102	102
Surrogate Spike	%Recovery			
a.a.a Trifluorotoluene	115			
Sample ID: S1SW-1-	9			
Benzene	ND	0.1	0.100	100
Toluene	ND	0.1	0.100	100
Ethylbenzene	12.2	0.1	0.103	103
Xylene (m,p)	85.1	0.2	0.206	103
Xylene (0)	47.3	0.1	0.102	102
Surrogate Spike	%Recovery			
a a a Trifluorotoluene				
Sample ID: S1WW-1	-9			
Benzene	ND	0.1	0.100	100
Toluene	81.8	0.1	0.100	100
Ethylbenzene	20.5	0.1	0.103	103
Xylene (m,p)	135.5	0.2	0.205	103
Xylene (o)	46.2	0.1	0.102	102
Surrogate Spike	%Recovery			
a a a Trifluorotoluene				
Sample ID: SIFW-1	-10			
Benzene	ND	0.1	0.100	100
Toluene	ND	0.1	0.100	100
Ethylbenzene	9.6	0.1	0.103	103
Xylene (m,p)	73.5	0.2	0.206	103
Xylene (o)	29.9	0.1	0.102	102
Surrogate Spike a.a.a Triffuorotoluene	<u>%Recovery</u>	0.1	0.102	

QC= 100 ppb BTE (0)X & 200 ppb (m,p) X. Surrogate Spike=120 ppb a,a,a Trifluorotoluene Methods: EPA SW 846-8020/5030

ND = Not Detected

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Kirk Robinson

CHAIN OF CUSTODY

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C ent Cof	ments:		,	Lingerer L		Project Name:		P.O. #
- q = ha 140 M + ++q q j q d+			·····		*****	Turneround Time		Release #
	·····	·····	·····				ANALYSES REQUESTED)
DATE	24HR TIME	MATRIX	C O M P O S S F F E	SAMPLE DESCRIPTION SIEW-1-9 SIEW-1-6				ELOT # ELT 2787 2788
	·		 	SIN W-1-9			┝╾┼╾╂╼┽╾╉╾	7789
			<u> </u>	SINW-1-6		┝┷╄╼╃╼╂╾╃╼	┝╴┟╌┟╼╋┈┠╼╁╼	2790
	· · ·) . 	┝╌┝╴	515W -1-9		┝┊╉╍┼╍╏╶╁╍┾╾	┞╌┼╌┠╼╎╼╉╾╀╼	2791
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		·~·	<u>├</u>	SIFW-1-10			┝╌┼╌╂╌╁╌╂╾╀╴	2.793
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Co-octec by:			للـــ	1444	Received by Teria:		Date: Time;	Hemaita
Rengelo her by Animpus bed by Bairgus bed by	- Jay	tr : be	÷	12/13/14 JECU Date: Tirsex 10-13-94 9110 pm Date: 10000 10-14-74 9:144	Received by:	,	<u>(''''''''''''''''''''''''''''''''''''</u>	m.

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APPENDIX C

Laboratory Analytical Reports and Chain-of-Custody for Trench Samples FROM PERCEPTIVE SCIENTIFIC INSTRUMENTS, INC. 10,21,1994 02:36 NO. 6 P. 7

TERRA LABORATORIES, LTD. 2525 SOUTH SHORE BLVD, SUITE 100 LEAGUE CITY, TX 77573 713/334-5052 FAX 713/334-3116

LAB ANALYSIS REPORT

Report Date: OCT. 21 1994

Enron Oil & Gas Company P.O. Box 1188 77251~1188 Houston , TX

Page # 1

Reviewed by: JMH Customer#: 169 Job Number:

Attn: GEORGE ROBINSON

Sample Number: 94007201 Project Name: ATOKAL Sample ID: MT-2-10

Time Collected:1115

Date Received: 10/18/94

Date Collected:10/15/94

Test Cod	e Analyte	Result	Units	Method	Analyst
HTEXS'D HZ8020S TOL8020S HBZ8020S XYLSTLS HTEXTLS HTEXTLS HATES HEFBS 418_1S'D TPH'S	BTEX Analysis Prep(Date/Time) Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon	10/20 1251 < 0.010 < 0.010 < 0.010 < 0.030 < 0.060 102. 95. 10/20 2015 33	init. ppm ppm ppm ppm ppm * * init. ppm	6-5030 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-3550 2-418.1	NSH NSH NSH NSH NSH NSH NSH CJT CJT

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

- 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).
- EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal з. & Industrial Wastewater, 1982.
- HACH: Test Methods, accepted by EPA in November, 1983. 4.
- 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. б. Update I, July 1992.

Lany Destaller

FROM PERCEPTIVE SCIENTIFIC INSTRUMENTS, INC. 10.21.1994 02:37

NO. 6 P. 8

TERRA LABORATORIES, LTD. 2525 SOUTH SHORE BLVD, SUITE 100 LEAGUE CITY, TX 77573 713/334-5052 FAX 713/334-3116

LAB ANALYSIS REPORT

Report Date: OCT. 21 1994

Enron Oil & Gas Company P.O. Box 1188 77251-1188 Houston , TX

Page # 1

Revi	lewed	by	: JMH	
Cust	:omer#	ŧ:	169	
Job	Numbe	er:		

Attn: GEORGE ROBINSON

Sample Number: 94007202 Froject Name: ATOKAL Sample ID: SET-3-10

Time Collected:1150

Date Received: 10/18/94

Date Collected:10/15/94

Test Cod	e Analyte	Result	Units	Method	Analyst
ETEXS'D E28020S TOL8020S EBZ8020S XYLSTLS ETEXTLS SAATFTS 4BFBS 418_1S'D TPH'S	BTEX Analysis Prep(Date/Time) Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon	10/19 1813 < 0.010 < 0.010 < 0.030 < 0.060 77. 76. 10/20 2015 33	init. ppm ppm ppm ppm % % init. ppm	6-5030 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-3550 2-418.1	NSH NSH NSH NSH NSH NSH NSH CJT CJT

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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- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 2. 1978 (revised 1983).
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- HACH: Test Methods, accepted by EPA in November, 1983. 4.
- 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. б. Update I, July 1992.

Kary Destan

10.21.1994 02:37

NO. 6 P. 9

TERRA LABORATORIES, LTD. 2525 SOUTH SHORE BLVD, SUITE 100 LEAGUE CITY, TX 77573 713/334-5052 FAX 713/334-3116

LAB ANALYSIS REPORT

Report Date: OCT. 21 1994

Page # 1

Enron Oil & Gas P.O. Box 1188	Company		Reviewed by:JMH Customer#: 169
Elouston ,	TX	77251-1188	Job Number:

Attn: GEORGE ROBINSON

Sample Number: 94007203 Froject Name: ATOKAL Sample ID: SWT-1-10

Date Collected:10/15/94

Time Collected:1230

Date Received: 10/18/94

Test Cod	e Analyte	Result	Units	Method	Analyst
ETEXS'D EZ8020S IOL8020S EBZ8020S XYLSTLS BTEXTLS AAATFTS 4BFBS 418_1S'D	BTEX Analysis Prep(Date/Time) Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time)	10/19 1832 < 0.010 < 0.010 < 0.010 < 0.030 < 0.060 74. MI 10/20 2015	init. ppm ppm ppm ppm ppm % % init.	6-5030 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-3550	NSH NSH NSH NSH NSH NSH NSH CJT
TPH'S	TPH(Total Petroleum Hydrocarbon			2-418.1	CJT

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.
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- HACH : Test Methods, accepted by EPA in November, 1983. 4.
- SM: Standard Methods for the Examination of Water and Wastewater, 19th 5. edition.
- SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. б. Update I, July 1992.

Kw 10/21/94

TERRA LABORATORIES LTD.

2525 South Shore Blvd.

League City, Texas 77573

(713) 334-5052

Fax: (713) 334-3116

CHAIN OF CUSTODY

COMPANY BROWN & CALDWELL					COV	PANY			aemi:	r to;									
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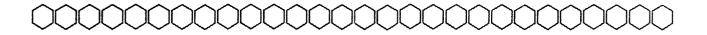
P.18

APPENDIX D

Laboratory Analytical Reports and Chain-of-Custody for Final Confirmation Soil Samples-Expanded Surface Impoundment Excavation

Terra Laboratories, Ltd.

Quality Analytical Services



December 7, 1994

Lynn Wright Brown and Caldwell 1415 Louisiana, Suite 2500 Houston, TX 77002

Re: Twelve (12) solid samples, and one (1) trip blank (Project Name: Atoka 1) received on 11/22/94

Dear Mr. Wright:

Attached are the final reports of analysis of the samples referenced above as per your analysis and/or method requests.

The samples were received in good condition and at 0 & 2^o Centigrade.

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

Sincerely,

Larry D. Wallace Laboratory Director

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Report Dat	Report Date: DEC. 1 1994 Page # 1				
rown and 1415 Louis Houston	siana, Suite 2500	Reviewed by:TMG Customer#: 309 Job Number:			
Attn: Wrig	ght, Lynn	I	Date Collecte	d:11/20/94	
Project Na	mber: 94008255 ame: ATOKA 1 : I-1 GRAB	Time Collected:0944 Date Received: 11/22/94			
	e Analyte				
BTEXS'D BZ3020S TOL&020S EBZ8020S CYLSTLS BTEXTLS aaaTFTS ABFBS 13_1S'D TPH'S COMMENTS: FOOTNOTES Preparatic 1. ASTN 2. EPA- 1978 3. EPA- & In 4. HACH 5. SM: edit 6. SW:	<pre>BTEX Analysis Prep(Date/Time) Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon TPH(Total Petroleum Hydrocarbon Dilution - Minimum dilution red ppm = mg/L(Liquid), mg/kg(Solid init = date & time initiated BP on and Analysis Method References M: American Society for Testing -600/4-79-020, Methods for Chemic 8 (revised 1983). -600/4-82-057, Methods for Organ: ndustrial Wastewater, 1982. H: Test Methods, accepted by EPP Standard Methods for the Examinition.</pre>	<pre>11/26 1239 < 0.005 < 0.005 < 0.005 < 0.010 < 0.025 100. 108. 11/30 0800 < 25 reportable quired to a d) ppb = ug RL = Below s: and Materi cal Analysi ic Chemical A in Novemb nation of V</pre>	<pre>5 init. ppm ppm ppm ppm ppm % % 0 init. ppm e due to matr allow accepta g/L(Liquid), Reporting Li ials, 1984. is of Water a l Analysis of per, 1983. Water and Waste, T plid Waste, T</pre>	6-5030 NSH 6-8020 NSH 6-8020 NSH 6-8020 NSH 6-8020 NSH 6-8020 NSH 74-121 NSH 75-125 NSH 6-3550 AM 2-418.1 TMG rix interferences ble quantitation ug/kg(Soil) mit nd Wastes, Municipal tewater, 18th	
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Report Dat	te: DEC. 1 1994		Page # 1			
Brown and	Caldwell siana, Suite 2500	Cus	Reviewed by:TMG Customer#: 309 Job Number:			
Attn: Wrig	ght, Lynn	Dat	te Collecte	ed:11/20/9	94	
Project Na	nber: 94008256 ame: ATOKA 1 : I-2 GRAB		ne Collecte ce Receivee		94	
-	e Analyte					
BTEXS'D BZ8020S FOL8020S EBZ8020S KYLSTLS BTEXTLS aaaTFTS 4BFBS 418_1S'D TPH'S COMMENTS: FOOTNOTES FOOTNOTES Deparation 1. ASTN 2. EPA- 1978 3. EPA- & Ir 4. HACH 5. SM: edit 6. SW:	BTEX Analysis Prep(Date/Time) Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time)	<pre>11/26 1256 < 0.005 < 0.005 < 0.005 < 0.010 < 0.025 103. 117. 11/30 0800 < 25 reportable of reportable of L = Below Reference and Material and Material cal Analysis ic Chemical A ain November hation of Water </pre>	init. ppm ppm ppm ppm ppm % % init. ppm due to math low accepta Low acce	6-5030 6-8020 6-8020 6-8020 6-8020 74-121 75-125 6-3550 2-418.1 	NSH NSH NSH NSH NSH NSH NSH NSH AM TMG Eerences titation 1)	

Report Date: DEC. 1 1994 Page # 1						
rown and 1415 Louis Houston	iana, Suite 2500	Reviewed by:TMG Customer#: 309 Job Number:				
Attn: Wrig	ht, Lynn	Dat	e Collecte	ed:11/20/9	94	
ample Number: 94008257 Time Collected:0948 roject Name: ATOKA 1						
	I-3 GRAB	Dat	e Received	l: 11/22/9	94	
Test Code	Analyte	Result	Units	Method	Analyst	
SZE020S FOL8020S EBZ8020S IYLSTLS STEXTLS AGGTETS	Toluono	< 2.0 3.6 7.0 71 < 83.6 MI	ppm ppm ppm ppm	6-8020 6-8020 6-8020 6-8020 6-8020 74-121	NSH NSH NSH NSH NSH NSH	
	BTEX Dil.Fx. X 1000					
	<pre>MI - Surrogate recovery is not Dilution - Minimum dilution red ppm = mg/L(Liquid), mg/kg(Solid init = date & time initiated BI n and Analysis Method References</pre>	quired to all d) ppb = ug/L RL = Below Rej	ow accepta (Liquid),	ble quant ug/kg(Soi	itation	
	: American Society for Testing		c 1991			
2. EPA-	: American Society for Testing 600/4-79-020, Methods for Chemic (revised 1983).			ind Wastes	5,	
3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal						
odit	5. SM: Standard Methods for the Examination of Water and Wastewater, 18th					
 SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992. 						
			K	w 12/11	94	

Leny Oshallie

LAB ANALYSIS REPORT

Report Dat	ce: DEC. 1 1994		Page # 1		
Houston	, TX 77002	Cus	viewed by:TM stomer#: 30 Number:	MG 09	
Attn: Wrig	ght, Lynn	Dat	e Collected	l:11/20/9	4
ample Num	nber: 94008258	Tin	ne Collected	1:0950	
	ame: ATOKA 1 : I-4 GRAB	Dat	e Received	: 11/22/9	4
Test Code	e Analyte	Result	Units	Method	Analyst
BZ8020S FOL8020S EBZ8020S XYLSTLS BTEXTLS aaaTFTS ABFBS 418_1S'D TPH'S COMMENTS:	Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr)	< 0.005 .0100 .017 .23 < 0.262 109. 94. 11/30 0800 370 	ppm ppm ppm ppm % init. ppm due to matri .ow acceptak (Liquid), u	6-8020 6-8020 6-8020 6-8020 74-121 75-125 6-3550 2-418.1 ix interf ple quant	NSH NSH NSH NSH NSH AM AM erences itation
Preparatio	on and Analysis Method References	3:			
 ASTM: American Society for Testing and Materials, 1984. EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983). EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982. HACH: Test Methods, accepted by EPA in November, 1983. 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. 					
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Report Dat	Report Date: DEC. 1 1994 Page # 1					
rown and CaldwellReviewed by:TMG1415 Louisiana, Suite 2500Customer#: 309Houston, TX77002Job Number:						
tt:n: Wrig	ght, Lynn	Dat	e Collecte	ed:11/20/9	94	
Sample Number: 94008259 Time Collected:0952 Project Name: ATOKA 1						
Sample ID		Dat	e Received	l: 11/22/9	94	
Test Code	e Analyte	Result	Units	Method	Analyst	
BZ8020S FOL8020S EBZ8020S KYLSTLS BTEXTLS aaaTFTS ABFBS 18_1S'D FPH'S CONMENTS:	Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon BTEX Dil.Fx. X 50 : MI - Surrogate recovery is not Dilution - Minimum dilution rec ppm = mg/L(Liquid), mg/kg(Solid	< 0.10 .45 .33 4.1 < 4.98 MI 101. 11/30 0800 2100 reportable d quired to all d) ppb = ug/L	ppm ppm ppm ppm % init. ppm cue to matr tow accepta (Liquid),	6-8020 6-8020 6-8020 6-8020 6-8020 74-121 75-125 6-3550 2-418.1 	NSH NSH NSH NSH NSH AM AM Eerences	
<pre>init = date & time initiated BRL = Below Reporting Limit Preparation and Analysis Method References: 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. </pre>						
			I.	w 121	1 LIT	

Jarry Ostelle

<pre>rown and Caldwell Reviewed by:TMG Customar, X 77002 Job Number: 309 Job Number: ttn: Wright, Lynn Date Collected:11/20/94 Tarple Number: 94008260 Troject Name: ATOKA 1 Sample ID: I-6 GRAB Date Received: 11/22/94 Test Code Analyte Result Units Method Analyst Test Code Analyte Council Units Method Analyst TEXS'D BTEX Analysis Prep(Date/Time) 11/26 1416 init. 6-5030 NSH CUB020S Toluene <0.005 ppm 6-8020 NSH CUB020S Toluene <0.028 ppm 6-8020 NSH CUB020S TOLUENC CUB020S TOLUENC CUB020S TOLUENC TEXTLE Total STEX Second Total Petroleum Hydrocarbon 270 ppm 2-418.1 AM CUM0ENTS: 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(Soli) init = date & time initiated BRL = Below Reporting Limit Freparation and Analysis Method References: 1. ASTM: American Society for Testing and Materials, 1984. 2. EPA-600/4-82-057, Methods for Chemical Analysis of Municipal & Industrial Wastewater, 1982. 3. EPA-600/4-82-057, Methods for 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 editon. Update I, July 1992. CHACH Test Me</pre>	Report Dat	Report Date: DEC. 1 1994 Page # 1					
<pre>ample Number: 94008260 roject Name: ATOKA 1 Sample ID: I-6 GRAB Test Code Analyte Result Units Method Analyst Test Code Analyte Result Units Method Analyst TEXS'D BTEX Analysis Prep(Date/Time) 11/26 1416 init. 6-5030 NSH Z8020S Benzene <0.005 ppm 6-8020 NSH Z8020S Ebnylbenzene <0.005 ppm 6-8020 NSH ED28020S Ethylbenzene <0.005 ppm 6-8020 NSH YLSTLs Total Xylenes .013 ppm 6-8020 NSH AmaaTFT aaa-TFT (surr) 74. % 74-121 NSH 4BFBs 4-BFB (surr) 74. % 74-121 NSH 18 1S'D TPH Analysis Prep(Date/Time) 11/30 0800 init. 6-3550 AM PFH'S TPH(Total Petroleum Hydrocarbon 270 ppm 2-418.1 AM 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. 2. EPA-600/4-79-020, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982. 3. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982. 4. HACH: Test Methods for the Examination of Water and Wastewater, 18th edition. 5. SM: Standard Methods for the Examination of Solid Waste, Third edition.</pre>	1415 Louisiana, Suite 2500			Customer#: 309			
<pre>Troject Name: ATOKA 1 Sample ID: I-6 GRAB Test Code Analyte Result Units Method Analyst Test Code Analyte Result Units Method Analyst ETEXS'D BTEX Analysis Prep(Date/Time) 11/26 1416 init. 6-5030 NSH Z8020S Benzene < 0.005 ppm 6-8020 NSH E28020S Toluene < 0.005 ppm 6-8020 NSH E28020S Ethylbenzene < 0.005 ppm 6-8020 NSH EXEXTLS Total Xylenes .013 ppm 6-8020 NSH THYLSTLS Total BTEX < 0.028 ppm 6-8020 NSH ATTTS aca-TFT (surr) 74. % 74-121 NSH ABPBs 4-BFB (surr) 74. % 74-121 NSH H18 18'D TPH Analysis Prep(Date/Time) 11/30 0800 init. 6-3550 AM TPH'S TPH(Total Petroleum Hydrocarbon 270 ppm 2-418.1 AM COMMENTS: FOOTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences Dilution - Minimum dilution required to allow acceptable quantitation</pre>	ttn: Wrig	ght, Lynn	Dat	e Collect	ed:11/20/9	94	
<pre>ETEXS'D BTEX Analysis Prep(Date/Time) 11/26 1416 init. 6-5030 NSH EX8020S Benzene < 0.005 ppm 6-8020 NSH TOL8020S Toluene < 0.005 ppm 6-8020 NSH EEX8020S Ethylbenzene < 0.005 ppm 6-8020 NSH EXX8020S Ethylbenzene < 0.005 ppm 6-8020 NSH TIXTLS Total Xylenes .013 ppm 6-8020 NSH TIXTLS Total BTEX < 0.028 ppm 6-8020 NSH BTEXTLS Total BTEX < 0.028 ppm 6-8020 NSH AaaTFTS aaa-TFT (surr) 74. % 74-121 NSH 4BFBS 4-BFB (surr) 80. % 75-125 NSH 18_1S'D TPH Analysis Prep(Date/Time) 11/30 0800 init. 6-3550 AM TPH'S TPH(Total Petroleum Hydrocarbon 270 ppm 2-418.1 AM 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. 2. EPA-600/4-79-020, 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.</pre>	Project Na				94		
 ZH020S Benzene < 0.005 ppm 6-8020 NSH OL8020S Toluene < 0.005 ppm 6-8020 NSH EB/8020S Ethylbenzene < 0.005 ppm 6-8020 NSH YILSTLS Total Xylenes .013 ppm 6-8020 NSH STEXTLS Total BTEX < 0.028 ppm 6-8020 NSH STEXTLS Total BTEX < 0.028 ppm 6-8020 NSH ABFES 4-BFB (surr) 74. % 74-121 NSH ABFES 4-BFB (surr) 80. % 75-125 NSH 18 1S'D TPH Analysis Prep(Date/Time) 11/30 0800 init. 6-3550 AM TPH'S TPH(Total Petroleum Hydrocarbon 270 ppm 2-418.1 AM 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 Presparation and Analysis Method References: 1. ASTM: American Society for Testing and Materials, 1984. 2. EPA-600/4-79-020, 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. 	Test Code	e Analyte	Result	Units	Method	Analyst	
Update I, July 1992. Kuy Qillar Kary Qillar	BTEXS'D BZ8020S FOL8020S EBZ8020S YYLSTLS BTEXTLS aaaTFTS 4BFBS 18_1S'D TPH'S FOOTNOTES: FOOTNOTES: Preparatic 1. ASTN 2. EPA- 5. EPA- & Ir 4. HACE 5. SM: edit 6. SW:	<pre>BTEX Analysis Prep(Date/Time) Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon TPH(Total Petroleum Hydrocarbon Dilution - Minimum dilution red ppm = mg/L(Liquid), mg/kg(Solid init = date & time initiated BP on and Analysis Method References A: American Society for Testing -600/4-79-020, Methods for Chemic B (revised 1983). -600/4-82-057, Methods for Organ: ndustrial Wastewater, 1982. I: Test Methods, accepted by EPP Standard Methods for the Examin tion. SW-846, Test Methods for Evaluated Survey Standard Methods for Standard Methods for Standard Methods for Standard Methods for Evaluated Survey Standard Methods for St</pre>	<pre>11/26 1416 < 0.005 < 0.005 < 0.005 .013 < 0.028 74. 80. 11/30 0800 270 reportable d quired to all d) ppb = ug/L RL = Below Re s: and Material cal Analysis ic Chemical A A in November hation of Water </pre>	init. ppm ppm ppm ppm ppm % % init. ppm lue to mat lue to mat lue to mat (Liquid), porting L .s, 1984. of Water malysis o .1983. er and Wa .d Waste,	6-5030 6-8020 6-8020 6-8020 6-8020 6-8020 74-121 75-125 6-3550 2-418.1 	NSH NSH NSH NSH NSH NSH NSH AM AM Cerences Citation Cerences Citation Cerences Citation Cerences Citation	

Report Date: DEC. 1 1994	Report Date: DEC. 1 1994 Page # 1						
rown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Cus	Reviewed by:TMG Customer#: 309 Job Number:					
ttn: Wright, Lynn	Dat	e Collect	ed:11/20/94				
Fample Number: 94008261 Project Name: ATOKA 1 Sample ID: I-8 GRAB		e Collect					
-			d: 11/22/94				
Test Code Analyte	Result	Units	Method Analyst				
AYLSTLS Total Xylenes BTEXTLS Total BTEX aaaTFTS aaa-TFT (surr)	< 0.005 < 0.005 < 0.005 < 0.010 < 0.025 95. 108. 11/30 0800 < 25 reportable d quired to all d) ppb = ug/L	ppm ppm ppm ppm % % init. ppm 	75-125 NSH 6-3550 AM 2-418.1 TMG rix interferences able quantitation ug/kg(Soil)				
Preparation and Analysis Method Reference	s:						
 ASTM: American Society for Testing and Materials, 1984. EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 1978 (revised 1983). EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982. HACH: Test Methods, accepted by EPA in November, 1983. 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. 							

APPENDIX E

Laboratory Analytical Results and Chain-of-Custody for Initial Confirmation Soil Samples-AT1-4 Excavation

10,21,1994 02:33

NO. 6 P. 2

TERRA LABORATORIES, LTD. 2525 SOUTH SHORE BLVD, SUITE 100 LEAGUE CITY, TX 77573 713/334-5052 FAX 713/334-3116

LAB ANALYSIS REPORT

Report Date: OCT. 21 1994

Page # 1

Earon Oil & Gas Company P.O. Box 1188		Reviewed by:JMH Customer#: 169
Houston , TX	77251-1188	Job Number:
Attn: GEORGE ROBINSON		Date Collected:10/15/94

Attn: GEORGE ROBINSON

Sample Number: 94007196 Project Name: ATOKAL Sample ID: AT4-WT1-9

.

Time Collected:1030

Date Received: 10/18/94

	Test Code	e Analyte	Result	Units	Method	Analyst
ļ	BTEXS'D	BTEX Analysis Prep(Date/Time)	10/19 1733	init.	6-5030	NSH
	BZ8020\$	Benzene	< 0.010	ppm	6-8020	NSH
	TOL8020S	Toluene	< 0.010	ppm	6-8020	NSH
	EB28020S	Ethylbenzene	< 0.010	ppm	6-8020	NSH
	XYLSTLS	Total Xylenes	< 0.030	mqq	6-8020	NSH
	BTEXTLS	Total BTEX	< 0.060	ppm	6-8020	NSH
	aaaTFTs	aaa-TFT (surr)	92.	\$	6-8020	NSH
	43FBs	4-BFB (surr)	91.	9	6-8020	NSH
	418 1S'D	TPH Analysis Prep(Date/Time)	10/20 2015	init.	6-3550	CJT
1	TPH'S	TPH(Total Petroleum Hydrocarbon	< 25	ppm	2-418.1	CJT
	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:

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

Ken 10/21/24 Dary Dillin

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10.21.1994 02:34 NO. 6 P. 3

TERRA LABORATORIES, LTD. 2525 SOUTH SHORE BLVD, SUITE 100 LEAGUE CITY, TX 77573 713/334-5052 FAX 713/334-3116

LAB ANALYSIS REPORT

Report Date: OCT. 21 1994

Page # 1

Enron Oil & Gas P.O. Box 1188	Company		Reviewed by:JMH Customer#: 169
	тх	77251-1188	Job Number:

Attn: GEORGE ROBINSON

Sample Number: 94007197 Project Name: ATOKAL Sample ID: AT4-SW-9

Date Collected:10/15/94

Time Collected: 1040

Date Received: 10/18/94

BTEXS'D BTEX Analysis Prep(Date/Time) 10/19 1535 init. 6-5030 NSH BZ8020S Benzene < 0.020 ppm 6-8020 NSH TOL8020S Toluene < 0.020 ppm 6-8020 NSH EBZ8020S Ethylbenzene < 0.020 ppm 6-8020 NSH EBZ8020S Ethylbenzene < 0.020 ppm 6-8020 NSH XYLSTLs Total Xylenes < 0.060 ppm 6-8020 NSH BTEXTLs Total BTEX < 0.120 ppm 6-8020 NSH aaaTFTs aaa-TFT (surr) 96. % 6-8020 NSH 4BFBs 4-BFB (surr) 95. % 6-8020 NSH 418_1S'D TPH Analysis Prep(Date/Time) 10/20 2015 init. 6-3550 CJT TPH'S TPH(Total Petroleum Hydrocarbon < 25 ppm 2-418.1 CJT	Test Code	e Analyte	Result	Units	Method	Analyst
	B28020S TOL8020S EB28020S XYLSTLs BTEXTLS aaaTFTS 4BFBS 418 1S'D	Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time)	< 0.020 < 0.020 < 0.020 < 0.060 < 0.120 96. 95. 10/20 2015	ppm ppm ppm ppm \$ \$ \$ init.	6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-3550	NSH NSH NSH NSH NSH NSH CJT

COMMENTS: BTEX Dil.Fx. X 5

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

- 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).
- 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. 4.
- Standard Methods for the Examination of Water and Wastewater, 18th SM: 5. edition.
- SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. 6. Update I, July 1992.

Jarry Dollar

10,21,1994 02:34 NO, 6

P. 4

TERRA LABORATORIES, LTD. 2525 SOUTH SHORE BLVD, SUITE 100 LEAGUE CITY, TX 77573 713/334-5052 FAX 713/334-3116

LAB ANALYSIS REPORT

Report Date: OCT, 21 1994

Page # 1

Enron Oil & Gas P.O. Box 1188	Company		Reviewed by:JMH Customer#: 159
Fouston ,	TX	77251-1188	Job Number:

Attn: GEORGE ROBINSON

Sample Number: 94007198 Project Name: ATOKAL Sample ID: AT4-FM-11

Date Collected:10/15/94

Time Collected:1045

Date Received: 10/18/94

1	Test Code	e Analyte	Result	Ũnits	Method	Analyst
	BTEXS'D BZ8020S TOL8020S EBZ8020S XYLSTLS BTEXTLS ataTFTS 4BFBS 418_1S'D TPH'S	BTEX Analysis Prep(Date/Time) Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon	10/19 1614 < 4.0 18 8.0 69 < 99.0 107. 102. 10/20 2015 2700	init. ppm ppm ppm ppm ppm % % % init. ppm	6-5030 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-3550 2-418.1	NSH NSH NSH NSH NSH NSH NSH CJT CJT

COMMENTS : BTEX Dil.Fx. X 100

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

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

Kw 10/21/94 Jany Qostalla

FROM PERCEPTIVE SCIENTIFIC INSTRUMENTS, INC. 10,21,1994 02:35 NO. 6 P. 5

TERRA LABORATORIES, LTD. 2525 SOUTH SHORE BLVD, SUITE 100 LEAGUE CITY, TX 77573 713/334-5052 FAX 713/334-3116

LAB ANALYSIS REPORT

Report Date: OCT. 21 1994

Page # 1

Enron Oil & Gas F.O. Box 1188	Company		Reviewed by:JMH Customer#: 169
Houston ,	тх	77251-1188	Job Number:

Attn: GEORGE ROBINSON

Sample Number: 94007199 Project Name: ATOKAL Sample ID: AT4-EW-9

Date Collected:10/15/94

Time Collected:1050

Date Received: 10/18/94

ETEXS'D BTEX Analysis Prep(Date/Time) 10/19 1634 init. 6-5030 NSH EZ8020S Benzene < 4.0 ppm 6-8020 NSH TOL8020S Toluene 41 ppm 6-8020 NSH EBZ8020S Ethylbenzene 14 ppm 6-8020 NSH XYLSTLs Total Xylenes 110 ppm 6-8020 NSH ETEXTLs Total BTEX < 169 ppm 6-8020 TMG aaaTFTs aaa-TFT (surr) MI % 6-8020 NSH 4BFBs 4-BFB (surr) 104. % 6-8020 NSH	Test Cod	e Analyte	Result	Units	Method	Analyst
18_IS'D TPH Analysis Prep(Date/Time) 10/20 2015 Init. 6-3550 CDT 1PH'S TPH(Total Petroleum Hydrocarbon 25000 ppm 2-418.1 CJT	EZ8020S TOL8020S EBZ8020S XYLSTLs ETEXTLS aaaTFTS 4BFBs 418_1S'D	Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time)	< 4.0 41 14 110 < 169 MI 104. 10/20 2015	ppm ppm ppm ppm ppm % % init.	6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-3550	NSH NSH NSH TMG NSH NSH CJT

COMMENTS: BTEX Dil.Fx. X 1000

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

for 10/21/24 Jarry Diller

FROM PERCEPTIVE SCIENTIFIC INSTRUMENTS, INC. 10.21.1994 02:35

NO. 6 P. 6

TERRA LABORATORIES, LTD. 2525 SOUTH SHORE BLVD, SUITE 100 LEAGUE CITY, TX 77573 713/334-5052 FAX 713/334-3116

LAB ANALYSIS REPORT

Report Date: OCT. 21 1994

Page # 1

Enron Oil & Gas Company P.O. Box 1188 Houston , TX	77251-1188	Reviewed by:JMH Customer#: 169 Job Number:
Attn: GEORGE ROBINSON		Date Collected:10/15/94

Sample Number: 94007200 Project Name: ATOKAL Sample ID: AT4-NW-9

Time Collected:1055

Date Received: 10/18/94

	Test Code	e Analyte	Result	Units	Method	Analyst
	BTEXS'D BZ8020S TOL8020S BBZ8020S XYLSTLS BTEXTLS AAATFTS 4BFBS	BTEX Analysis Prep(Date/Time) Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time)	10/19 1654 < 4.0 26 11 93 < 134.0 109. 102. 10/20 2015	init. ppm ppm ppm ppm ppm * * *	6-5030 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020 6-8020	NSH NSH NSH NSH NSH NSH NSH NSH
ł	418_1S'D CPH'S	TPH(Total Petroleum Hydrocarbon		ppm	6-3550 2-418.1	CJT CJT

COMMENTS: BTEX Dil.Fx. X 1000

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

- 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).
- 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. 4.
- 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. б. Update I, July 1992.

Larry Dollar

TERRA LABORATORIES LTD.

2525 South Shore Blvd.

League City, Texas 77573

(713) 334-5052

Fax: (713) 334-3116

CHAIN OF CUSTODY

COMPANY (2	A	NY 2. 5 4	ST 141	10;						VPANY			R	emit	toi							
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10.21.1994 02:38

NO. 6

P.10

APPENDIX F

Laboratory Analytical Reports and Chain-of-Custody for Final Confirmation Soil Samples-AT1-4 Excavation

LAB ANALYSIS REPORT

Report Dat	ce: DEC. 1 1994			Page # 1		
rown and 1415 Louis Houston	siana, Suite 2500	7002		Reviewed by: Customer#: 3 Job Number:		
ttn: Wrig	ght, Lynn			Date Collecte	ed:11/21/	94
	nber: 94008267 ame: ATOKA-1			Time Collecte	ed:1125	
Sample ID				Date Received	d: 11/22/	94
Test Code	e Analyte		Result	Units	Method	Analyst
BZ8020W TOL8020W EBZ8020W XYLSTLW BTEXTLW aaaTFTW	BTEX Analysis Prep(Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr)		11/29 144 < 0.002 < 0.002 < 0.002 < 0.004 < 0.010 MI 87.	ppm ppm ppm	6-8020 6-8020 6-8020 6-8020	NSH NSH NSH NSH TMG
COMMENTS:						

OOTNOTES: 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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Report Date: DEC. 1 1994	Page # 1
Brown and Caldwell 14:15 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:
Attn: Wright, Lynn	Date Collected:11/20/94
Sample Number: 94008262 Project Name: ATOKA 1 Sample ID: B-2 GRAB	Time Collected:0940 Date Received: 11/22/94
	Result Units Method Analyst
4BPBs 4-BPB (surr) 118_1S'D TPH Analysis Prep(Date/Time) TPH'S TPH(Total Petroleum Hydrocarbon COMMENTS: FOOTNOTES: MI - Surrogate recovery is not Dilution - Minimum dilution recovery	<pre>< 0.005 ppm 6-8020 NSH < 0.005 ppm 6-8020 NSH < 0.005 ppm 6-8020 NSH < 0.010 ppm 6-8020 NSH < 0.025 ppm 6-8020 NSH 107. % 74-121 NSH 109. % 75-125 NSH 11/30 0800 init. 6-3550 AM < 25 ppm 2-418.1 TMG reportable due to matrix interferences quired to allow acceptable quantitation d) ppb = ug/L(Liquid), ug/kg(Soil)</pre>
Preparation and Analysis Method References	5:
edition.	cal Analysis of Water and Wastes, ic Chemical Analysis of Municipal

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Report Date: DEC. 1 1994	Page # 1
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:
Attn: Wright, Lynn	Date Collected:11/20/94
Sample Number: 94008263 Project Name: ATOKA 1	Time Collected:0942
Sample ID: B-3 GRAB	Date Received: 11/22/94
Test Code Analyte	Result Units Method Analyst
<pre>BTEXS'D BTEX Analysis Prep(Date/Time) BZ3020S Benzene FO:_8020S Toluene EB/28020S Ethylbenzene KY:_STLs Total Xylenes BTEXTLs Total BTEX aaaTFTs aaa-TFT (surr) 4BFBs 4-BFB (surr) 413_1S'D TPH Analysis Prep(Date/Time) TPH'S TPH(Total Petroleum Hydrocarbon COMMENTS: FO()TNOTES: MI - Surrogate recovery is not Dilution - Minimum dilution reco ppm = mg/L(Liquid), mg/kg(Solid init = date & time initiated BF Preparation and Analysis Method References 1. ASTM: American Society for Testing 2. EPA-600/4-79-020, Methods for Chemic 1978 (revised 1983). 3. EPA-600/4-82-057, Methods for Organ: & Industrial Wastewater, 1982.</pre>	<pre>< 0.005 ppm 6-8020 NSH < 0.005 ppm 6-8020 NSH < 0.005 ppm 6-8020 NSH < 0.010 ppm 6-8020 NSH < 0.025 ppm 6-8020 NSH 95. % 74-121 NSH 112. % 75-125 NSH 11/30 0800 init. 6-3550 AM < 25 ppm 2-418.1 TMG reportable due to matrix interferences quired to allow acceptable quantitation d) ppb = ug/L(Liquid), ug/kg(Soil) RL = Below Reporting Limit s: and Materials, 1984. cal Analysis of Water and Wastes, ic Chemical Analysis of Municipal</pre>
5. SM: Standard Methods for the Examined tition.	nation of Water and Wastewater, 18th
Update I, July 1992.	Livi 12/1/94 Lavy Dillo

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LAB ANALYSIS REPORT

1

Report Date: DEC. 1 1994	Page # 1
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:
Attn: Wright, Lynn	Date Collected:11/20/94
Bample Number: 94008265	Time Collected:1002
Project Name: ATOKA-1 Sample ID: B-5	Date Received: 11/22/94
Test Code Analyte	Result Units Method Analyst
KYLSTLs Total Xylenes BTEXTLs Total BTEX aaaTFTs aaa-TFT (surr) 4BFBs 4-BFB (surr) 118_1S'D TPH Analysis Prep(Date/Time) TPH'S TPH(Total Petroleum Hydrocarbon COMMENTS: FOOTNOTES: MI - Surrogate recovery is not Dilution - Minimum dilution recovery	<pre>< 0.005 ppm 6-8020 NSH < 0.005 ppm 6-8020 NSH < 0.005 ppm 6-8020 NSH < 0.010 ppm 6-8020 NSH < 0.025 ppm 6-8020 NSH 104. % 74-121 NSH 117. % 75-125 NSH 11/30 0800 init. 6-3550 AM < 25 ppm 2-418.1 TMG reportable due to matrix interferences quired to allow acceptable quantitation d) ppb = ug/L(Liquid), ug/kg(Soil)</pre>
Preparation and Analysis Method Reference	S:
edition.	cal Analysis of Water and Wastes, ic Chemical Analysis of Municipal

Report Dat	te: DEC. 1 1994		Page # 1		
Brown and Caldwell 14:15 Louisiana, Suite 2500 Houston , TX 77002		Reviewed by:TMG Customer#: 309 Job Number:			
Attn: Wright, Lynn		Date Collected:11/20/94			
Sample Number: 94008264 Project Name: ATOKA-1 Sample ID: B-4		Time Collected:1000 Date Received: 11/22/94			
-					
Test CodeAnalyteResultUnitsMethodAnalystBTEXX'DBTEX Analysis Prep(Date/Time)11/26 1616init.6-5030NSHBZ8020SBenzene< 0.005					

LAB ANALYSIS REPORT

Report Date: DEC. 1 1994	Page # 1
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:
Attn: Wright, Lynn	Date Collected:11/20/94
Sample Number: 94008266 Project Name: ATOKA-1	Time Collected:1004
Sample ID: B-6	Date Received: 11/22/94
Test Code Analyte	Result Units Method Analyst
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: FOOTNOTES: MI - Surrogate recovery is not Dilution - Minimum dilution re	<pre>< 0.005 ppm 6-8020 NSH < 0.005 ppm 6-8020 NSH < 0.005 ppm 6-8020 NSH < 0.010 ppm 6-8020 NSH < 0.025 ppm 6-8020 NSH 100. % 74-121 NSH 113. % 75-125 NSH 11/30 0800 init. 6-3550 AM 25 ppm 2-418.1 AM</pre>
Preparation and Analysis Method Reference	
 ASTM: American Society for Testing EPA-600/4-79-020, Methods for Chemi 1978 (revised 1983). EPA-600/4-82-057, Methods for Organ & Industrial Wastewater, 1982. HACH: Test Methods, accepted by EP 5. SM: Standard Methods for the Exami edition. 	and Materials, 1984. Ical Analysis of Water and Wastes, Aic Chemical Analysis of Municipal PA in November, 1983. Ination of Water and Wastewater, 18th Mation of Solid Waste, Third edition.
	Jointy a Hillion

QUALITY CONTROL REPORT

Report To: Brown and Caldwell Terra Laboratories Sample No(s). 94008255 - 94008267

				Precision		Accu	гасу
Analyte	<u>Units</u>	<u>Blank</u>	Orig	Dup	<u>RPD(%)</u>	<u>MSR(%)</u>	LCSR(%)
BTEX (Batch 11269	4S) Samp	le No. 94	1008264 Sp	ike			
MTBE	ppb	< 5	20	15	28.6*	100	
Benzene	ppb	< 5	15	9	50*	75	90
Toluene	ppb	< 5	14	9	43*	70	91
Ethylbenzene	ppb	< 5	14	9	43*	70	85
Xylenes	ppb	< 10	53	33	46*	76	89
*Spike duplicate-had d	lifficulty pu	rging					
TPH (Batch B11309	45)						
Sample No. 94008256		< 25	< 25	< 25	-		95
Sample No. 94008265	0, 0	< 25	< 25	< 25	-		95
BTEX MeOH (Batcl	6 113004S	040081	186 Snike				
BIEX MCOII (Batel Benzene	ppb	< 5	23	24	4	96	90
Toluene	ppb	< 5	23	27	0	80	90 95
Ethylbenzene	ppb	< 5	32	35	9	92 92	95 95
Xylenes	ppb ppb	< 10	111	126	13	99	110
DTTTY (D-4-1 11070	46) 6	I- N- 04	0000774.6-	:1			
BTEX (Batch 11279 MTBE		< 5	22 22		E	105	
	ppb	< 5	18	21 18	5 0	105	98
Benzene	ppb	< 5	18	18	0 6	90	
Toluene Ethylbenzene	ppb anh	< 5	17	16		90	101
2	ppb nab	< 3 < 10	49	55	0 8	80 75	90 98
Xylenes	ppb	V 10	49	22	0	75	98
BTEX (Batch 11299	4W) Samj	ple No. 9	4008342 S	pike			
MTBE	ppb	< 4	19	21	10	105	
Benzene	ppb	< 4	18	19	5	95	100
Toluene	ppb	< 4	20	20	0	100	100
Ethylbenzene	ppb	< 4	18	19	5	95	100
Xylene	ppb	< 12	56	58	4	97	102

Rany & Hiller

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2525 South Shore Blvd.

League City, Texas 77573

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Fax: (713) 334-3116

CHAIN OF CUSTODY

TERRA LABORATORIES LTD.

		R	EPO	RT	TO:			REMIT TO:		
COMPANY	Beous	* C.		20	u.		COMPANY	Stars		
ADDRESS	1415	Louisi	ANG	÷. 5	Ste. 2500		ADDRESS			
CITY	100570	د			STATE TX 2P 770	02	СПҮ			STATE ZP
ATTN N	. Lynn	Wrig	ht		PHONE 713 757-0999 FAX 713 75	7-0199	ATTN	V	PHONE	FAX
Client Com	iments:				•		Project Name:	TOKA /		P.O. #
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·····							· · · · · · · · · · · · · · · · · · ·	ANALYSES REC	UESTED	
DATE	24HR TIME	MATRIX	С О М Р О S I T E	G R A B	SAMPLE DESCRIPTION	C O N T A I N E R S N U M B E R				TERRA SAMPLE NO.
11/20/94	944	Soil		χ	I-1	2 X	X			ru - 8255
/	946	7		1	I-2	1 K	X			- 8256
$\overline{7}$	948	7			I-3		Χ			- 8257
	950				I-4	IX	XIIII			- 8258
	952				I-5		X			- 8259
	954				I-6	X	XIIII			- 8260
	958				I-8	XII	X			- 8261
	940				B-2	XII	X			- 8262
1	942				B-3		X			- 8263
V	1000				B-4	₩X	X			4 - 8244
Collected by: Relinquished b	L: Co	p-7-	·		11/2+/94 1140 Date: Time:	ved by Terra: Ved by: Ved by:	5x 5	Date: Date: /(12-94 Date:	Time: P945 Time:	Remarks 0°C, 2°C Tump ptC 11-22-94

THGE OF

2525 South Shore Blvd.

League City, Texas 77573

TERRA

(713) 334-5052

LABORATORIES LTD.

Fax: (713) 334-3116

AGE

CHAIN OF CUSTODY

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COMPANY	Brow	N AND	Ca	LD4	JEU.	COMPANY SAMUE
ADORESS						ADDRESS (
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		wright			HONE 13/759-0999 FAX 713/759-0952	ATTN PHONE FAX
Client Con	ments.					"Project Name: ATOKA / P.O. #
						" Turnaround Time Standard Release #
Г		r	<u> </u>	1	F	ANALYSES REQUESTED
DATE	24HR TIME	MATRIX	C O M P O S I T E	G R A B	C O N ^N UT M ^A B ^I E ^N E ^N R ^R SAMPLE DESCRIPTION	TERRA SAMPLE NO.
11/20/24	1002	Soil			B-5 21	X 14 - 8265
11/20/94		Soil			13-6 ZX	× - 8264
11/21/44	1125	ω		X	TE-Z ZX	v - 8267
Collected by:		top	7		Date: 11/2/94 Date: Time: Date: Time: Date: Time: Received by: UUU Date: Time: Received by: UUU UUU	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

APPENDIX G

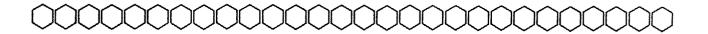
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Laboratory Analytical Reports and Chain-of-Custody for Soil Boring Soil Samples

Terra Laboratories, Ltd.

Quality Analytical Services



December 7, 1994

Lynn Wright Brown and Caldwell 1415 Louisiana, Suite 2500 Houston, TX 77002

Re: Ten (10) solid samples, and one (1) trip blank (Project Name: Atoka 1) received on 11/22/94

Dear Mr. Wright:

Attached are the final reports of analysis of the samples referenced above as per your analysis and/or method requests.

The samples were received in good condition and at 0° Centigrade.

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

Sincerely,

Larry D. Wallace Laboratory Director

LAB ANALYSIS REPORT

Report Dat	ce: DEC. 1 1994		Page # 1		
Brown and 1415 Louis Houston	siana, Suite 2500	Cus	viewed by:T stomer#: 3 > Number:		
Attn: Wrig	ght, Lynn	Dat	e Collecte	d:11/16/9	94
Fample Nur	nber: 94008244	Time Collected:1100			
	ame: ATOKA 1 : AT1-11-10 (61-65) GRAB	Dat	e Received	: 11/22/9	94
Test Code	e Analyte	Result	Units	Method	Analyst
BZ3020S FO: 18020S EB: 28020S XY: 15TLs BT: 3XTLs aa: 4B: 7Bs 4B: 7Bs 113_1S'D TPH'S	BTEX Analysis Prep(Date/Time) Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon	.088 .040 < 0.005 < 0.021 < 0.154 91. 95. 11/29 0745	ppm ppm ppm ppm %	6-8020 6-8020 6-8020 6-8020 6-8020 74-121 75-125	SAK SAK SAK TMG SAK SAK MLC
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.
- 5. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Jarry Oshelan

LAB ANALYSIS REPORT

Report Date: DEC. 1 1994 Page # 1							
Frown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:						
ttn: Wright, Lynn	Date Collected:11/19/94						
Bample Number: 94008245 Project Name: ATOKA 1	Time Collected:1635						
Sample ID: AT1-11-14 (99-101) GRAB	Date Received: 11/22/94						
Test Code Analyte	Result Units Method Analyst						
<pre>FOL8020S Toluene EB%8020S Ethylbenzene YYLSTLs Total Xylenes BTEXTLS Total BTEX aaaTFTs aaa-TFT (surr) 4BFBs 4-BFB (surr) 18_1S'D TPH Analysis Prep(Date/Time) TPH'S TPH(Total Petroleum Hydrocarbon FOMMENTS: FOOTNOTES: MI - Surrogate recovery is not Dilution - Minimum dilution recovery</pre>	.010 ppm 6-8020 TMG < 0.005						
Preparation and Analysis Method References	3:						
 ASTM: American Society for Testing EPA-600/4-79-020, Methods for Chemical 1978 (revised 1983). EPA-600/4-82-057, Methods for Organia & Industrial Wastewater, 1982. HACH: Test Methods, accepted by EPA 5. SM: Standard Methods for the Examination edition. SW: SW-846, Test Methods for Evaluation Update I, July 1992. 	al Analysis of Water and Wastes, C Chemical Analysis of Municipal in November, 1983. Nation of Water and Wastewater, 18th						

Kw izligy Jarry Dilloer

LAB ANALYSIS REPORT

Report Date: DEC. 1 1994	Page # 1
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:
Attn: Wright, Lynn	Date Collected:11/17/94
Sample Number: 94008246	Time Collected:1030
Project Name: ATOKA 1 Sample ID: AT1-12-9 (69-71) GRAB	Date Received: 11/22/94
Test Code Analyte	Result Units Method Analyst
XYLSTLS Total Xylenes BTEXTLS Total BTEX aaaTFTS aaa-TFT (surr)	.007ppm6-8020TMG< 0.005
FOOTNOTES: MI - Surrogate recovery is not	

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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- 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 iz/1/94 Jany D. Hallow

LAB ANALYSIS REPORT

Report Dat	e: DEC. 1 1994		Page # 1		
Brown and 1415 Louis Houston	iana, Suite 2500	Cus	viewed by:T stomer#: 3 b Number:		
Attn: Wrig	ht, Lynn	Date Collected:11/17/94			
	ber: 94008247	Time Collected:1510			
Sample ID:	me: ATOKA 1 AT1-12-12 (99-101) GRAB	Dat	te Received	: 11/22/9	94
Test Code	Analyte	Result	Units	Method	Analyst
BZ8020S FOL8020S EBZ8020S KYLSTLS BTEXTLS aaaTFTS 4BFBS 418 1S'D	Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr)	.055 < 0.005 < 0.010 < 0.075 88. 99. 11/29 0745	ppm ppm ppm % %	6-5030 6-8020 6-8020 6-8020 6-8020 6-8020 74-121 75-125 6-3550 2-418.1	SAK SAK SAK SAK SAK MLC
COMMENTS:					

FO()TNOTES: 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

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

Kw 12/1/94 Jany Drughe

LAB ANALYSIS REPORT

Report Date: DEC. 1 1994	Page # 1				
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:				
Attn: Wright, Lynn	Date Collected:11/18/94				
Bample Number: 94008248 Project Name: ATOKA 1 Sample ID: AT1-13-6 (69-71) GRAB	Time Collected:1645 Date Received: 11/22/94				
	Result Units Method Analyst				
<pre>ppm = mg/L(Liquid), mg/kg(Solid</pre>	.012 ppm 6-8020 SAK < 0.005 ppm 6-8020 SAK < 0.005 ppm 6-8020 SAK < 0.010 ppm 6-8020 SAK < 0.025 ppm 6-8020 SAK 95. % 74-121 SAK 109. % 75-125 SAK 11/30 0800 init. 6-3550 AM < 25 ppm 2-418.1 TMG reportable due to matrix interferences quired to allow acceptable quantitation d) ppb = ug/L(Liquid), ug/kg(Soil)				
edition.	s: and Materials, 1984. cal Analysis of Water and Wastes, ic Chemical Analysis of Municipal				

LAB ANALYSIS REPORT

Report Date: DEC. 1 1994	te: DEC. 1 1994 Page # 1				
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:				
Attn: Wright, Lynn	Date Collected:11/19/94				
Sample Number: 94008249	Time Collected:0825				
Project Name: ATOKA 1 Sample ID: AT1-13-9 (99-101) GRA	Date Received: 11/22/94				
Test Code Analyte	Result Units Method Analyst				
BZ3020SBenzeneTOL8020STolueneEBZ8020SEthylbenzeneXYLSTLsTotal XylenesBTEXTLsTotal BTEXaaaTFTsaaa-TFT (surr)4BFBs4-BFB (surr)	<pre>ime) 11/24 1854 init. 6-5030 SAK .008 ppm 6-8020 TMG < 0.005 ppm 6-8020 SAK < 0.005 ppm 6-8020 SAK < 0.010 ppm 6-8020 SAK < 0.028 ppm 6-8020 SAK 87. % 74-121 SAK 99. % 75-125 SAK ne) 11/30 0800 init. 6-3550 AM carbon < 25 ppm 2-418.1 TMG</pre>				

COMMENTS:

FOUTNOTES: 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.

Ken 12/194 Skiller

LAB ANALYSIS REPORT

Report Dat	t Date: DEC. 1 1994 Page # 1						
Brown and 1415 Louis Houston	siana, Suite	e 2500 77002		Reviewed by:TMG Customer#: 309 Job Number:			
Attn: Wright, Lynn Date Collected:11/20					d:11/20/9	94	
	nber: 94008 ame: ATOKA			r	Fime Collecte	d:1015	
	: AT1-14-5		AB	I	Date Received	: 11/22/9	94
Test Code	9	Analyte		Result	Units	Method	Analyst
BZ8020S FOL8020S EB28020S XYLSTLS BTEXTLS aaaTFTS 4BFBS	Benzene Toluene Ethylbenzer Total Xyler Total BTEX aaa-TFT (su 4-BFB (sur TPH Analys	nes 1rr)	ſime)	.015 < 0.005 < 0.005 < 0.010 < 0.035 96. 109. 11/30 0800	ppm ppm ppm ppm % %	6-8020 6-8020 6-8020 6-8020 6-8020 74-121 75-125	SAK SAK SAK SAK SAK SAK AM
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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Kw 12/1/94 July D. Haller

LAB ANALYSIS REPORT

Report Da	te: DEC. 1 1994		Page # 1		
	Caldwell siana, Suite 2500 , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:			
Attn: Wri	ght, Lynn	Dat	te Collect	ed:11/20/	94
	mber: 94008251 ame: ATOKA 1	Time Collected:1150			
Sample ID	: AT1-14-7 (69-71) GRAB	Dat	te Receive	d: 11/22/	94
Test Code	e Analyte	Result	Units	Method	Analyst
BTEXS'D	BTEX Analysis Prep(Date/Time)	11/24 1933	init.	6-5030	SAK
BZ8020S	Benzene	< 0.005	ppm	6-8020	SAK
CO1_8020S	Toluene	0.005	ppm	6-8020	TMG
C1700702	TOTUEILE	0.005	ppm	0 0020	
EB%8020S	Ethylbenzene	< 0.005			
EB%8020S			ppm	6-8020	SAK
EB%8020S XYLSTLS	Ethylbenzene	< 0.005	ppm ppm ppm	6-8020 6-8020	SAK SAK
EBZ8020S XYLSTLS BTEXTLS	Ethylbenzene Total Xylenes	< 0.005 < 0.010	ppm ppm	6-8020 6-8020	SAK SAK SAK

COMMENTS:

rph's

FO()TNOTES: 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:

<u>.</u>... ASTM: American Society for Testing and Materials, 1984.

18 1S'D TPH Analysis Prep(Date/Time) 11/30 0800

TPH(Total Petroleum Hydrocarbon < 25

- EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, 2. 1978 (revised 1983).
- З. EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982.
- HACH: Test Methods, accepted by EPA in November, 1983. 4: .
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- SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. 6. Update I, July 1992.

Lu i2/194 Sany Dilatace

init.

ppm

6-3550

2 - 418.1

AM

TMG

LAB ANALYSIS REPORT

Report Date: DEC. 1 1994	Page # 1					
Brown and Caldwell 14.5 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:					
Attn: Wright, Lynn	Date	Collected	d:11/20/9	94		
Bample Number: 94008252 Project Name: ATOKA 1	Time	Collected	d:1710			
Sample ID: AT1-15-4 (39-41) GRAB	Date Received: 11/22/94					
Test Code Analyte	Result	Units	Method	Analyst		
KYLSTLs Total Xylenes BTEXTLs Total BTEX	.018 .11 .009 .091 < 0.228 105. 106. 11/30 0800	ppm ppm ppm ppm % %	6-5030 6-8020 6-8020 6-8020 6-8020 6-8020 74-121 75-125 6-3550 2-418.1	SAK SAK TMG TMG SAK		

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.

Kw 12/1/G4 Addy Qshillow

LAB ANALYSIS REPORT

Report Date: DEC. 1 1994 Reviewed by: TMG Brown and Caldwell 1415 Louisiana, Suite 2500 Customer#: 309 , TX Job Number: 77002 Houston Date Collected:11/21/94 Attn: Wright, Lynn

Sample Number: 94008253 Project Name: ATOKA 1 Sample ID: AT1-15-5 (49-51) GRAB Page # 1

Time Collected:0730

Date Received: 11/22/94

Test Cod	e Analyte	Result	Units	Method	Analyst
BTEXS'D	BTEX Analysis Prep(Date/Time)	11/24 2051	init.	6-5030	SAK
BZ8020S	Benzene	.032	ppm	6-8020	SAK
TOL8020S	Toluene	.21	ppm	6-8020	SAK
EBZ8020S	Ethylbenzene	.020	ppm	6-8020	SAK
XYLSTLS	Total Xylenes	.23	ppm	6-8020	SAK
BTEXTLS	Total BTEX	0.492	ppm	6-8020	TMG
aaaTFTs	aaa-TFT (surr)	95.	00	74-121	SAK
_4BFBs	4-BFB (surr)	103.	00	75-125	SAK
418 1S'D	TPH Analysis Prep(Date/Time)	11/30 0800	init.	6-3550	MA
TPH'S	TPH(Total Petroleum Hydrocarbon	< 25	ppm	2-418.1	TMG

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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- HACH: Test Methods, accepted by EPA in November, 1983. 4.
- 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. б. Update I, July 1992.

Car 12/1/94 Sany Dillow

LAB ANALYSIS REPORT

Report Date: NOV. 29 1994		Page # 1				
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 7	7002	Reviewed by:TMG Customer#: 309 Job Number:				
Attn: Wright, Lynn		Dat	te Collect	ed:		
Sample Number: 94008254 Time Collected:0000 Project Name: ATOKA 1						
Sample ID: TRIP BLANK(TB-1)	Date Received: 11/22/94					
-						
Test Code Analyte		Result	Units	Method	Analyst	
Test Code Analyte BTEXW'D BTEX Analysis Prep(BZ8020W Benzene TOL8020W Toluene EBZ8020W Ethylbenzene XYLSTLw Total Xylenes BTEXTLw Total BTEX aaaTFTw aaa-TFT (surr) 4BFBw 4-BFB (surr)			init. ppm ppm ppm ppm	6-5030 6-8020 6-8020 6-8020 6-8020 6-8020	SAK SAK SAK SAK SAK SAK SAK	

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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- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 5. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Lany Dalla

QUALITY CONTROL REPORT

Report To: Brown and Caldwell Terra Laboratories Sample No(s). 94008244 - 94008254

			Precision			Accu	racy			
<u>Analyte</u>	<u>Units</u>	<u>Blank</u>	Orig	<u>Dup</u>	<u>RPD(%)</u>	<u>MSR(%)</u>	LCSR(%)			
BTEX (Batch 112494S) Sample No. 94008328 Spike										
MTBE	ppb	< 5	26.5	27.8	4.8	133				
Benzene	ppb	< 5	19.7	19.6	0.5	99	92			
Toluene	ppb	< 5	19.2	19.4	1.0	96	94			
Ethylbenzene	ppb	< 5	18.9	18.4	2.7	95	86			
Xylenes	ppb	< 10	57.9	57.7	0.3	97	90			
TPH (Batch 1129948	5)									
Sample No. 94008344	mg/kg	< 25	1206	1206	0		94			
TPH (Batch B11309	4S)									
Sample No. 94008256		< 25	< 25	< 25	-		95			
Sample No. 94008265	mg/kg	< 25	< 25	< 25	-		95			
BTEX (Batch 11239	4W) Samp	le No. 9	4008138 Sr	oike						
MTBE	ppb	< 4	332	330	0.6	85				
Benzene	ppb	< 4	153	153	0 '	65	92			
Toluene	ppb	< 4	19.1	19.1	0	96	88			
Ethylbenzene	ppb	< 4	61.9	62.2	0.5	104	92			
Xylene	ppb	< 12	65.1	65	0.2	101	97			

Jarry Dillan

Terra Laboratories, Ltd.

TERRA LABORATORIES LTD.

2525 South Shore Blvd.

League City, Texas 77573

(713) 334-5052

Fax: (713) 334-3116

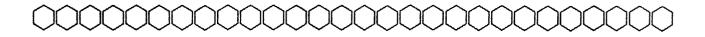
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CHAIN OF CUSTODY

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11/19/14 BZS	- V			-13-9 (99-			2.	<u>×1></u>	1								<u> </u>		- 8249	
11/20/94 1015	- /		ATI	<u>-14-5 (4°</u>	1-51)		2	<u>X X</u>			\downarrow	_	$ \rightarrow $		\rightarrow		┥		- 8250	
1 20/94 1152		<u> </u>	_		<u>- 71)</u>			<u>x x</u>			\downarrow		┥─┥						- 8251	
1/20/14 1710			ATI	- 1 5 - 4 (39	1-41)		2	X []			┟─┟								- 8252	
1/2/14 75	• V		(ATI	-15-5 (49			2	<u>X /</u>											6- 8253	
collected by:	<u> </u>				Time:	Received by Terr	ra:	,					Date:		. Time:	:		ormanks Tr., Rl. h.	(TB-1) includ STER BOZO. Get Cory	94-8
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Terra Laboratories, Ltd.

Quality Analytical Services



December 14, 1994

Lynn Wright Brown and Caldwell 1415 Louisiana, Suite 2500 Houston, TX 77002

Re: Six (6) solid samples and one (1) trip blank (Project Name: Atoka 1) received on 12/06/94

Dear Mr. Wright:

Attached are the final reports of analysis of the samples referenced above as per your analysis and/or method requests.

The samples were received in good condition and at 0^o Centigrade.

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

Sincerely,

,rrf

Larry D. Wallace Laboratory Director

LAB ANALYSIS REPORT

Report Dat	ce: DEC. 8 1994	Page # 1						
rcwn and 1415 Louis Houston	siana, Suite 2500	Reviewed by:TMG Customer#: 309 Job Number:						
Attn: Wrig	jht, Lynn	Dat	ce Collect	ed:11/29/9	94			
	nber: 94008432 ame: ATOKA 1	Tin	ne Collect	ed:1608				
Sample ID:	: AT 1-16-2 (19-21) GRAB	Dat	ce Receive	d: 12/06/9	94			
Test Code	e Analyte	Result	Units	Method	Analyst			
Z8020S OI8020S EBZ8020S YISTLS TEXTLS aaaTFTS 4BFBS	Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time)	< 0.005 < 0.005 < 0.010 < 0.025 94. 97. 12/06 1410	ppm ppm ppm ppm %	6-8020 6-8020 6-8020 6-8020 74-121 75-115	PRS PRS PRS PRS PRS PRS MLC			
FOCTNOTES: 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.							
I. AST	American Society for resting	and material	LD, 1704.					

- 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.

LAB ANALYSIS REPORT

Report Dat	ce: DEC. 8 1994	Page # 1					
T415 Louis	rown and CaldwellReviewed by:TMG415 Louisiana, Suite 2500Customer#: 309Job Number:Job Number:						
ttn: Wright, Lynn Date Collected:11/30/94							
ample Number: 94008433 Time Collected:0715 roject Name: ATOKA 1							
	: AT 1-16-4 (39-41) GRAB	Date Received: 12/06/94					
Test Code	e Analyte	Result	Units	Method	Analyst		
Z8020S OL8020S EBZ8020S YLSTLS TEXTLS aaaTFTS 4BFBS	Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr)	< 0.005 < 0.005 < 0.005 < 0.011 < 0.026 98. 99. 12/06 1410	ppm ppm ppm ppm % %	6-8020 6-8020 6-8020 6-8020 74-121 75-115	PRS PRS PRS PRS PRS PRS MLC		
COMMENTS:							

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

- 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.

Ken 12/12/94 Sarry Olla

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LAB ANALYSIS REPORT

Report Date: DEC. 8 1994	Page # 1							
rown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:							
ttn: Wright, Lynn	Dat	ce Collecte	ed:11/30/	94				
ample Number: 94008434 roject Name: ATOKA 1	Tin	ne Collecto	ed:1130					
Sample ID: AT 1-17-3 (29-31) GRAB	Dat	e Receive	d: 12/06/9	94				
Test Code Analyte	Result	Units	Method	Analyst				
EBZ8020S Ethylbenzene YLSTLs Total Xylenes TEXTLs Total BTEX	< 0.005 < 0.005 < 0.005 < 0.010 < 0.025 82. 84. 12/06 1410	ppm ppm ppm ppm %	6-8020 6-8020 6-8020 6-8020 6-8020 74-121 75-115 6-3550	PRS PRS PRS PRS MLC				
OMMENTS: FOOFNOTES: 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 Reference	s:							
1 ASTM: American Society for Testing	and Material	C 109/						

- 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.
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Li izlizlay Darry Dillion

LAB ANALYSIS REPORT

Report Dat	ce: DEC. 8 1994	Page # 1					
rcwn and 1415 Louis Houston	siana, Suite 2500	Reviewed by:JMH Customer#: 309 Job Number:					
ttn: Wrig	ght, Lynn	Dat	te Collecte	d:11/30/9	94		
	nber: 94008435	Tit	me Collecte	d:1400			
Sample ID	ame: ATOKA 1 : AT 1-17-4 (39-41) GRAB	Dat	te Received	1: 12/06/9	94		
Test Code	e Analyte	Result	Units	Method	Analyst		
Z8020S OL8020S EB28020S YYLSTLS TEXTLS aaaTFTS	BTEX Analysis Prep(Date/Time) Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon	< 0.20 .21 .36 3.1 < 3.87 92. MI 12/06 1410	ppm ppm % % %	6-8020 6-8020 6-8020 6-8020 6-8020 74-121 75-115	PRS PRS PRS PRS PRS PRS MLC		
	BTEX Dil. Factor X 100	wanawtabla		du inter	formana		
	• MU - SUTTOGATE TECOVETY IS DOL	renorranie (que co marr	ny inner	rerences		

FOCTNOTES: 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</pre>

reparation and Analysis Method References:

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

Kwi 12/12/94 Darry Wildon

LAB ANALYSIS REPORT

Report Date: DEC. 8 1994	Page # 1					
rown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:JMH Customer#: 309 Job Number:					
ttn: Wright, Lynn	Date Collected:12/01/94					
ample Number: 94008436	Time Collected:1710					
rcject Name: ATOKA 1 Sample ID: AT 1-18-9 (79-81) GRAB	Date Received: 12/06/94					
Test Code Analyte	Result Units Method Analyst					
EBZ8020S Ethylbenzene YYLSTLS Total Xylenes TEXTLS Total BTEX aaaTFTS aaa-TFT (surr)	<pre>< 0.20 ppm 6-8020 PRS .59 ppm 6-8020 PRS 1.0 ppm 6-8020 PRS 8.8 ppm 6-8020 PRS <10.59 ppm 6-8020 PRS 100. % 74-121 PRS 109. % 75-115 PRS 12/06 1410 init. 6-3550 MLC</pre>					
FOMMENTS: BTEX Dil. Factor X 100 FOCTNOTES: MI - Surrogate recovery is not reportable due to matrix interferences						
FOURINGIED. MI Buildigue relation in an include all and the marking include in						

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

- 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.

en 12/12

LAB ANALYSIS REPORT

Report Dat	e: DEC. 8 1994	Page # 1					
	rcwn and Caldwell Reviewed by:TMG 415 Louisiana, Suite 2500 Customer#: 309 ouston , TX 77002 Job Number:						
ttn: Wright, Lynn Date Collected:12/02/94							
	ample Number: 94008437 Time Collected:0930						
	ame: ATORA 1 : AT 1-18-11(99-101) GRAB	Da	ate Received	: 12/06/9	94		
Test Code	e Analyte	Result	Units	Method	Analyst		
ZE020S OL8020S EB28020S YISTLS TEXTLS aaaTFTS 4BFBS	BTEX Analysis Prep(Date/Time) Benzene Toluene Ethylbenzene Total Xylenes Total BTEX aaa-TFT (surr) 4-BFB (surr) TPH Analysis Prep(Date/Time) TPH(Total Petroleum Hydrocarbon	< 0.005 .003 .007 .075 < 0.117 90. 90. 12/06 1410	ppm ppm ppm % %	6-5030 6-8020 6-8020 6-8020 6-8020 6-8020 74-121 75-115 6-3550 2-418.1			
COMMENTS:							

.01.1111110.

FOCTNOTES: 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</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.

Lew 12/12/94 Larry Dille

LAB ANALYSIS REPORT

Report Date: DEC. 12 1994		Page # 1					
Frown and Caldwell 415 Louisiana, Suite 2500 Houston , TX	77002		Reviewed by: Customer#: Job Number:				
ttn: Wright, Lynn		Date Collected:12/02/94					
Sample Number: 94008438 Project Name: ATOKA 1			Time Collect	ed:1700			
Sample ID: TB-3	GRAB	Date Received: 12/06/94					
Test Code Analyt	e	Result	Units	Method	Analyst		
BTEXW'D BTEX Analysis Pre BZ8020W Benzene FOL8020W Toluene EB28020W Ethylbenzene XYLSTLw Total Xylenes BTEXTLw Total BTEX aaaTFTw aaa-TFT (surr) 4BFBw 4-BFB (surr)		12/08 190 < 0.002 < 0.002 < 0.002 < 0.004 < 0.010 99. 100.	ppm ppm	6-8020 6-8020 6-8020	PRS PRS PRS PRS PRS PRS		
COMMENTS:							

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

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

Lee 12/12/ France (10)

QUALITY CONTROL REPORT

- ----

Report To: Brown and Caldwell Terra Laboratories Sample No(s). 94008432 - 94008438

.....

			Precision		Accuracy		
<u>Analyte</u>	<u>Units</u>	<u>Blank</u>	<u>Orig</u>	Dup	<u>RPD(%)</u>	<u>MSR(%)</u>	LCSR(%)
BTEX (Batch 12079	4S) Sample	e No. 94	008464 Sp	ike			
MTBE	ppb	< 10	24	23	4	115	
Benzene	ppb	< 10	25	25	0	125	95
Toluene	ppb	< 10	24	24	0	120	90
Ethylbenzene	ppb	< 10	24	24	0	120	95
Xylenes	ppb	< 30	74	74	0	124	95
TPH (Batch 120694S)							
Sample No. 94008437	mg/kg	< 25	< 25	< 25	-		94
BTEX McOH (Batc	h 120894S)	Blank (Spike				
Benzene	ppb	< 5	29.3	30.2	3.0		117
Toluene	ppb	< 5	27.2	28.1	3.0		109
Ethylbenzene	ppb	< 5	29.0	29.7	2.0		116
Xylenes	ppb	< 10	86.6	90.5	4.0		115
BTEX (Batch 120894W) Sample No. 94007540 Spike							
Benzene	ppb	< 2	72.6	79.6	9.0	102	113
Ethylbenzene	ppb	< 2	72.0	77.4	7.0	102	108
Toluene	ppb	< 2	62.7	67.4	7	102	115
Xylenes	ppb	< 4	160.6	168.8	5	102	111

Rw 13/15/54 Jarry Dullan

Terra Laboratories, Ltd.



2525 South Shore Blvd.

League City, Texas 77573

(713) 334-5052

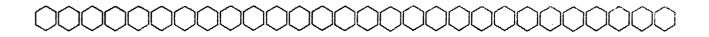
Fax: (713) 334-3116

CHAIN OF CUSTODY

	10471030	WESTERN		
REPORT TO:		f	REMIT TO:	
COMPANY BROWN & CALDWELL		COMPANY	SAME	
ADDRESS 1415 LOUISIANA, STE	F. 2 (7)	ADDRESS		
CITY HOUSTON	STATE 7× 20 77002	СЛУ		STATE ZP
Mr. Lynn Wright	713/757-0199 FAX713/757-095	Z ATTN	PHONE	FAX
Client Comments:	, , , , , , , , , , , , , , , , , , , ,	Project Name: ATDK	.A	P.O. #
		Turnaround Time		Release #
		A	NALYSES REQUESTED	
$\begin{array}{c} C \\ O \\ M \\ P \\ O \\ G \\ S \\ R \\ A \\ I \\ B \\ T \\ B \\ I \\ I$	N U M B E R SAMPLE DESCRIPTION			TERRA SAMPLE NO.
	-16-2(19-21) 1			94-8432
	-16-4 (39-41) 2	╾╅┵╲┽╱┈╂╼╌╋╍╍┥╼╍╂╼╍╉╼╍╋		8433
	-17-3 (29-31) 2	┈╎┶╲╎╱┥ ━┥╼┥╼┥╴┥	╾┾╌┾╌┾╌┽╴┽	8434
	-17-4(39-41) 2	╺╾┲┲╼╱╴╬╴┲┈╡┉┉┉╡┉┈╸╡┉┷╍╡┉┉╡┈┈╴┧		8435
	-18-9(79-61) 2			8436
	-18-11 (99-101) 2			8437
12-2-14 1700 Wile X 78	3 7	2 X		8438
Collected by:	Date: Time: Received by Terra: 12/5/14 1730	to Ex	Date: Time:	Remarks
Reinquished by: Reinquished by: -	Date: Time: Received by: Date: Time: Received by:	Il fat	Date: Time: / <i>D-G-44 / O / S</i> Date: Time:	0°c w2 12-6-94

Terra Laboratories, Ltd.

Quality Analytical Services



January 20, 1995

Lab No(s). 95000095 - 95000101

Susanne Richards Brown and Caldwell 1415 Louisiana, Suite 2500 Houston, TX 77002

Re: Six (6) solid samples and one (1) liquid sample (Project Name: Atoka 1 Artesia, NM) received on 01/10/95

Dear Ms. Richards:

Attached are the final reports of analysis of the samples referenced above as per your analysis and/or method requests.

The samples were received in good condition and at 1^o Centigrade.

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

Sincerely, M

Larry D. Wallace Laboratory Director

LAB ANALYSIS REPORT

Report Date: JAN. 12 1995 Page # 1 Brown and Caldwell Reviewed by: TMG Customer#: 309 1415 Louisiana, Suite 2500 Houston , TX 77002 Job Number: Attn: Richards, Susanne Date Collected:01/06/95 Sample Number: 95000095 Time Collected:1130 Project Name: ATOKA 1 ARTESIA N.M. Sample ID: AT 1-20 81-86 Date Received: 01/10/95 Result Units Method Analyst Test Code Analyte

 BTEXS'D
 BTEX Analysis Prep(Date/Time)
 01/10 1412
 init.
 6-5030
 NSH

 BZ3020S
 Benzene
 .052
 ppm
 6-8020
 NSH

 FOL8020S
 Toluene
 .60
 ppm
 6-8020
 NSH

 EBZ8020S
 Ethylbenzene
 .24
 ppm
 6-8020
 NSH

 KYLSTLs
 Total Xylenes
 2.0
 ppm
 6-8020
 NSH

 EBZ8020S Ethylbenzene KYLSTLs Total Xylenes BTEXTLS Total BTEX ppm ppm % BTEXTLSTotal BTEX2.892ppm6-8020NSHaaaTFTsaaa-TFT (surr)MI%74-121NSH4BFBs4-BFB (surr)88.%75-115NSH413_1S'DTPH Analysis Prep(Date/Time)01/111250init.6-3550MLCTPH'STPH(Total Petroleum Hydrocarbon 960ppm2-418.1MLC COMMENTS: BTEX Dil.Fx. X 5; m&p-Xylenes = 1.6 ppm; o-Xylene = 0.4 ppm 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</pre>

Preparation and Analysis Method References:

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.

Ken ilisias Jarry Dillo

LAB ANALYSIS REPORT

Report Date: JAN. 12 1995		Page # 1		
Brown and Caldwell 14:15 Louisiana, Suite 2500 Houston , TX 77002	C	Reviewed by: Customer#: 1 Tob Number:		
Attn: Richards, Susanne	E	Date Collect	ed:01/06/	95
Sample Number: 95000096	Time Collected:1450			
Project Name: ATOKA 1 ARTESIA N.M. Sample ID: AT 1-20 96-101	E	Date Receive	d: 01/10/	95
Test Code Analyte	Result	Units	Method	Analyst
BTEXTLS TOTAL BTEX	< 0.005 .014 < 0.005 < 0.010 < 0.034 97. 98. 01/11 1250	ppm ppm ppm ppm % %	6-8020 6-8020 74-121 75-115	NSH NSH NSH MLC
<pre>FOOTNOTES: 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</pre>				

- 1. ASTM: American Society for Testing and Materials, 1984.
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Jarry Dolal-

LAB ANALYSIS REPORT

Report Date: JAN. 12 1995	Page # 1			
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:			
Atin: Richards, Susanne	Date Collected:01/07/95			
Sample Number: 95000097	Time Collected:0820			
Project Name: ATOKA 1 ARTESIA N.M. Sample ID: AT 1-19 81-86	Date Received: 01/10/95			
Test Code Analyte	Result Units Method Analyst			
<pre>XYLSTLs Total Xylenes BTEXTLs Total BTEX aaaTFTs aaa-TFT (surr) 4BFBs 4-BFB (surr) 413_1S'D TPH Analysis Prep(Date/Time) TPH'S TPH(Total Petroleum Hydrocarbon COMMENTS: BTEX Dil.Fx. X 5; m&p-Xylenes = FOOTNOTES: MI - Surrogate recovery is not Dil.Fx Minimum dilution requir ppm = mg/L(Liquid), mg/kg(Solid)</pre>	.053ppm6-8020NSH.61ppm6-8020NSH.071ppm6-8020NSH.63ppm6-8020NSH1.364ppm6-8020NSH113.%74-121NSH103.%75-115NSH01/111250init.6-3550140ppm2-418.1MLC=0.51ppm;o-Xylene=0.51ppm;o-Xylene=0.12			
Preparation 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, 1978 (revised 1983). EPA-600/4-82-057, Methods for Organic Chemical Analysis of Municipal & Industrial Wastewater, 1982. HACH: Test Methods, accepted by EPA in November, 1983. 				
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5. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Rany Dell

LAB ANALYSIS REPORT

Report Dat	ce: JAN. 12 1995		Page # 1		
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002		Cu	viewed by: stomer#: b Number:		
Attn: Richards, Susanne		Date Collected:01/07/95			
Sample Number: 95000098		Time Collected:1710			
Project Name: ATOKA 1 ARTESIA N.M. Sample ID: AT 1-19 110-115		Date Received: 01/10/95			
Test Code	e Analyte	Result	Units	Method	Analyst
BZ8020S FOL8020S EBZ8020S XYLSTLS BTEXTLS aaaTFTS	Ethylbenzene Total Xylenes	< 0.010 .010 < 0.010 < 0.020 < 0.050 98. 94. 01/11 1250	ppm ppm ppm ppm %	6-8020 6-8020 6-8020 6-8020 6-8020 74-121	
<pre>COMMENTS: BTEX Dil.Fx. X 5 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</pre>					
Preparation and Analysis Method References:					

- 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.
- 5. 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: JAN. 12 1995	Page # 1			
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:			
Attn: Richards, Susanne	Date Collected:01/07/95			
Sample Number: 95000099 Project Name: ATOKA 1 ARTESIA N.M. Sample ID: AT 1-21 29-34	Time Collected:1345 Date Received: 01/10/95			
Test Code Analyte	Result Units Method Analyst			
EBZ8020S Ethylbenzene XYLSTLS Total Xylenes BTEXTLS Total BTEX aaaTFTS aaa-TFT (surr)	<pre>< 0.005 ppm 6-8020 NSH < 0.005 ppm 6-8020 NSH < 0.005 ppm 6-8020 NSH < 0.010 ppm 6-8020 NSH < 0.025 ppm 6-8020 NSH 95. % 74-121 NSH 96. % 75-115 NSH 01/11 1250 init. 6-3550 MLC</pre>			
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				
 Preparation and Analysis Method References: 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	ation of Solid Waste. Third 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: JAN. 12 1995	Page # 1			
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:			
Attn: Richards, Susanne	Date Collected:01/07/95			
Sample Number: 95000100 Project Name: ATOKA 1 ARTESIA N.M.	Time Collected:1525			
Sample ID: AT 1-21 44-49	Date Received: 01/10/95			
Test Code Analyte	Result Units Method Analyst			
EBZ8020S Ethylbenzene XYLSTLS Total Xylenes BTEXTLS Total BTEX aaaTFTS aaa-TFT (surr) 4BFBS 4-BFB (surr) 413_1S'D TPH Analysis Prep(Date/Time) TPH'S TPH(Total Petroleum Hydrocarbon COMMENTS: m&p-Xylenes = 0.009 ppm FOOTNOTES: MI - Surrogate recovery is not Dil.Fx Minimum dilution requir ppm = mg/L(Liquid), mg/kg(Solid	.005 ppm 6-8020 TMG .018 ppm 6-8020 TMG < 0.005 ppm 6-8020 NSH < 0.014 ppm 6-8020 TMG < 0.042 ppm 6-8020 TMG 94. % 74-121 NSH 89. % 75-115 NSH 01/11 1250 init. 6-3550 MLC < 15 ppm 2-418.1 MLC			
 Preparation and Analysis Method References: 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.	P. 113/55			

Kary Willer

LAB ANALYSIS REPORT

Report Date: JAN. 20 1995

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Selenium

Page # 1

			_					
	l Caldwell siana, Suite 2500	Re	viewed by:	TMG				
Houston	, TX 77002	Jo	b Number:					
Attn: Ric	hards, Susanne	Da	te Collect	ed:01/08/	95			
	umber: 95000101 Jame: ATOKA 1 ARTESIA N.M.): MW-8	Time Collected:0830 Sample Type: Date Received: 01/10/95						
Test Cod	le Analyte	Result	Units	Method	Analyst			
BTEXW'D	BTEX Analysis Prep(Date/Time)	01/10 1611	init.	6-5030	NSH			
BZ8020W	Benzene	< 0.002	mqq	6-8020	NSH			
FOL8020W	Toluene	< 0.002		6-8020	NSH			
EBZ8020W	Ethylbenzene	< 0.002	ppm	6-8020	NSH			
XYLSTLw	Total Xylenes	< 0.004	ppm	6-8020	NSH			
BTEXTLW	Total BTEX	< 0.010	ppm	6-8020	NSH			
aaaTFTw	aaa-TFT (surr)	90.	010	82-114	NSH			
_4BFBw	4-BFB (surr)	96.	olo	85-115	NSH			
TDS'D	TDS Analysis (Date/Time)	01/12 0800	init.	2-160.1	AM			
TDS'RES	TDS(Total Dissolved Solids)		mg/L	2-160.1	AM			
HGT'W'D	Mercury Analysis (D/T)	-	init.		EMJ			
HgCVAAw	Mercury	< 0.0002	mg/L	6-7470	EMJ			
DMiWW'D	Acid Digestion(Date/Time) ICP1 Analysis(Date/Time)	01/11 1130	init.	6-3015	RR			
ICP'W1'D	ICP1 Analysis(Date/Time)				BLW			
AsICPw	Arsenic	< 0.6	mg/L	6-6010	BLW			
BaICPw		.05		6-6010	BLW			
	Cadmium	< 0.03		6-6010	BLW			
	Chromium	< 0.03	<i></i>	6-6010	BLW			
PbICPw	Lead	< 0.1	mg/L	6-6010	BLW			
	Colonium		/+	C C C C C C C				

< 0.6

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6-6010 BLW

mg/L

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LAB ANALYSIS REPORT

Report Date: JAN. 20 1995

Page # 2

Reviewed by: TMG

Job Number:

Brown and Caldwe	ell			
1415 Louisiana,		2500		
Houston ,	TX		77002	

Attn: Richards, Susanne

Sample Number: 95000101 Project Name: ATOKA 1 ARTESIA N.M. Sample ID: MW-8 Date Collected:01/08/95 Time Collected:0830 Sample Type:

Date Received: 01/10/95 Units Method Analyst

Test Code	e Analyte	Result	Units	Method	Analyst
AgICPw	Silver	< 0.03	mg/L	6-6010	BLW
ICP'W2'D	ICP2 Analysis(Date/Time)	01/12 1410	init.		BLW
CuICPw	Copper	< 0.03	mg/L	6-6010	BLW
ZnICPw	Zinc	.07	mg/L	6-6010	BLW
BNAXW'D	Base/neutral/acid Extraction(D/	01/13 1100	init.	6-3510	TMG
S8270'D	Semivolatile Organics (D/T)	01/17 2322	init.	6-8270	MSB
AcenpheW	Acenaphthene	< 0.010	mg/L	6-8270	MSB
AcenphyW	Acenaphthylene	< 0.010	mg/L	6-8270	MSB
AnthrcnW	Anthracene	< 0.010	mg/L	6-8270	MSB
BzaAnthW	Benzo (a) anthracene	< 0.010	mg/L	6-8270	MSB
BzaPyrnW	Benzo(a)pyrene	< 0.010	mg/L	6-8270	MSB
BzbFAntW	Benzo(b)fluoroanthene	< 0.010	mg/L	6-8270	MSB
BzghipeW	Benzo(g,h,i)perylene	< 0.010	mg/L	6-8270	MSB
BzkFAntW	Benzo(k)fluoroanthene	< 0.010	mg/L	6-8270	MSB
ChrysenW	Chrysene	< 0.010	mg/L	6-8270	MSB
dEzahAnW	Dibenz(a,h)anthracene	< 0.010	mg/L	6-8270	MSB
FAnthenW	Fluoranthene	< 0.010	mg/L	6-8270	MSB
_FluorenW	Fluorene	< 0.010	mg/L	6-8270	MSB
IndnPyrW	Indeno(1,2,3-cd)pyrene	< 0.010	mg/L	6-8270	MSB
NaphthlW	Naphthalene	< 0.010	mg/L	6-8270	MSB

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LAB ANALYSIS REPORT

ClAuto Chloride, Titrimetric 610 mg/L 3-325.2 CJT	Report Dat	te: JAN. 20 1995		Page # 3			
HoustonTX77002Job Number:Attn: Richards, SusanneDate Collected:01/08/95Sample Number: 95000101Time Collected:0830Project Name: ATOKA 1 ARTESIA N.M.Sample Type:Sample ID: MW-8Date Received: 01/10/95Test CodeAnalyteResultUnitsMethod AnalystPhnAnthWPhenanthrene< 0.010			Rev	iewed by:T	MG		
Sample Number: 9500101Time Collected:0830Project Name: ATOKA 1 ARTESIA N.M.Sample Type: Date Received: 01/10/95Test CodeAnalyteResultUnitsManthw Phenanthrene< 0.010			Job	Number:			
Project Name: ATOKA 1 ARTESIA N.M.Sample Type: Date Received: 01/10/95Sample ID: MW-8Date Received: 01/10/95Test CodeAnalyteResultUnitsMethod AnalystPhnAnthWPhenanthrene< 0.010	Attn: Ricl	hards, Susanne	Dat	e Collecte	d:01/08/9	5	
PhnAnthWPhenanthrene< 0.010mg/L6-8270MSBPyreneWPyrene< 0.010	Project Na	ame: ATOKA 1 ARTESIA N.M.	Sample Type:				
Pyrene< 0.010mg/L6-8270MSBNitBzd5WNitrobenzene-d5 (surr)68.%35-114MSB2FoiPhnW2Fluorobiphenyl (surr)51.%43-116MSBtrPhd14WTerphenyl-d14 (surr)68.%33-141MSBICP'W3'DICP3 Analysis(Date/Time)01/19 1000init.BLWCaICPwCalcium690mg/L6-6010BLWMgICPwMagnesium260mg/L6-6010BLWNaICPwSodium3.3mg/L6-6010BLWNaICPwSodium580mg/L6-6010BLWSo4'DSulfate Analysis (D/T)01/12 0920init.JMRSulfateSulfate2100mg/L2-375.4JMRCLAUTO'DChloride, Titrimetric (D/T)01/16 0730init.CJTALK'DAlkalinity Analysis (Date/Time)01/16 0730init.2-310.1MALK310M-Alkalinity (CaCO3)290mg/L2-310.1JMHHCO3ALKBicarbonate Alkalinity (CaCO3)290mg/L2-310.1JMH	Test Code	e Analyte	Result	Units	Method	Analyst	
	PyreneW NitBzd5W 2FoiPhnW trPhd14W ICP'W3'D CaICPw MgICPw KICPw NaICPw SO4'D Sulfate CLAUTO'D CLAUTO ALK'D MALK310 PALK310	Pyrene Nitrobenzene-d5 (surr) 2Fluorobiphenyl (surr) Terphenyl-d14 (surr) ICP3 Analysis(Date/Time) Calcium Magnesium Potassium Sodium Sulfate Analysis (D/T) Sulfate Chloride, Titrimetric (D/T) Chloride, Titrimetric Alkalinity Analysis (Date/Time) M-Alkalinity (CaCO3) P-Alkalinity (CaCO3)	< 0.010 68. 51. 68. 01/19 1000 690 260 3.3 580 01/12 0920 2100 01/11 1300 610 01/16 0730 290 < 1	<pre>mg/L % % init. mg/L mg/L mg/L init. mg/L init. mg/L init. mg/L mg/L mg/L mg/L mg/L</pre>	6-8270 35-114 43-116 33-141 6-6010 6-6010 6-6010 2-375.4 3-325.2 2-310.1 2-310.1 2-310.1	MSB MSB MSB BLW BLW BLW BLW BLW JMR CJT CJT CJT CJT CJT	
				-			

COMMENTS:

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(Solid) init = date & time initiated B=found in blank J=>mdl< reporting limit

Preparation and Analysis Method References:

KN 1/20/9 Jarry Do

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

QUALITY CONTROL REPORT

Report To: Brown and Caldwell Terra Laboratories Sample No(s). 95000095 - 95000101

Precision Accuracy Units Orig <u>RPD(%)</u> MSR(%) <u>LCSR(%)</u> Analyte <u>Blank</u> Dup BTEX (Batch 011095S) Sample No. 95000076 Spike 98 < 5 18.2 19.5 7.0 MTBE ppb 99 90 Benzene ppb < 5 19.6 19.7 0.5 < 5 19.9 20.0 0.5 100 95 Toluene ppb Ethylbenzene ppb < 5 19.0 19.0 0.0 95 85 < 10 55.5 56.2 1.3 94 92 **Xylenes** ppb **TPH (Batch 011195S)** 82 Sample No. 95000100 mg/kg < 15 < 15 < 15 **TDS (Batch 011295)** Sample No. 95000101 mg/L < 20 4846 4672 3.6 100 BTEX (Batch 011095W) Sample No. 95000049 Spike 100 MTBE < 2 20.0 21.2 ppb 6 < 2 19.8 97 Benzene 20.6 2 103 ppb < 2 20.1 20.8 3 95 Toluene ppb 101 19.9 Ethylbenzene < 2 19.1 4 100 92 ppb **Xylenes** ppb < 4 56.7 59 4 98 90 Cyclohexane < 2 51.8 50.1 3 86 ppb Mercury (Batch 011895WL) Sample No. 95000058 µg/L < 0.0002 0.513 0.533 3.8 102 102 Sample No. 95000101 $\mu g/L$ < 0.0002 0.513 102 0.513 0 102 < 0.0002 0.513 Sample No. 95000101 $\mu g/L$ 0.533 3.8 102 102 ICP (Batch A011695WL) Sample No. 95000087 Spike As < 0.6 2.0002.015 0.75 100 97 ppm Ba < 0.03 2.849 2.799 88 92 1.8 ppm 1.870 Cd < 0.03 1.852 0.97 94 98 ppm Cr < 0.03 1.887 3.4 94 98 1.824 ppm Pb 99 ppm < 0.1 2.006 1.995 0.55 93 < 0.6 2.217 2.342 5.5 98 Se 111 ppm < 0.03 1.842 1.819 1.3 92 99 Ag ppm ICP (Batch A011295W2) Sample No. 95000104 Spike

Cu	ррт	< 0.03	1.868	1.866	0.1					
Zn	ppm	< 0.04	2.611	2.632	0.8					

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91

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Terra Laboratories, Ltd.

QUALITY CONTROL REPORT

Report To: Brown and Caldwell

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Terra Laboratories Sample No(s). 95000095 - 95000101

	1 ()			Precision		Accu	racy
Analyte	<u>Units</u>	<u>Blank</u>	<u>Orig</u>	Dup	<u>RPD(%)</u>	<u>MSR(%)</u>	<u>LCSR(%)</u>
Semivolatiles (Batch	011795WI	.) Blank	Spike				
Pyridine	mg/L	< 0.002		62.0	3.6		60
1,4-Dichlorobenzene	mg/L	< 0.001	88.5	91.0	2.7		89
Hexachloroethane	mg/L	< 0.001	102	105	2.9		102
Nitrobenzene	mg/L	< 0.001	91.3	95.3	4.3		91
Hexachlorobutadiene	mg/L	< 0.001	90.4	92.6	2.4		90
2,4-Dinitrotoluene	mg/L	< 0.001	94.6	92.4	2.4		95
Hexachlorobenzene	mg/L	< 0.002	89.0	88.6	0.45		89
Prep 01/13/95							
ICP (Batch 011995W	/3) Blank S	pike					
Ca	ppm	< 0.6	2.04	1.97	3.5		102
Mg	ppm	< 0.1	2.02	2.03	0.49		101
Κ	ppm	< 2.0	21.70	22.28	2.6		109
Na	ррт	< 0.6	2.05	2.12	3.4		103
Sulfate (Batch 01129	95 ₩)						
Sample No. 95000101		< 1	1786	2056	14	90	104
Chlorides (Batch 01)	(195)						
Sample No.95000101		< 1	611	578	5.6	76	100
Alkalinity (Batch 01	1695)						
Sample No. 95000101		< 1	291	295	1.4		95

Ru 1/23/95 Harry & Aulace

TERRA LABORATORIES LTD.

2525 South Shore Blvd.

League City, Texas 77573

(713) 334-5052

Fax: (713) 334-3116

CHAIN OF CUSTODY

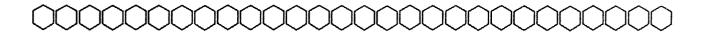
	RE	PORT	TO;								F	EMIT	T) :						
COMPANY BOWN	\$ (10	lwel	1					COMF		5050	NN	e Ri	chai	, d	B	'on	N & Colo	luell]
ADORESS	Arrow							ADDR	IESS											4
Mouston		· · · · · · · · · · · · · · · · · · ·	STATE					СПУ									STATE	ZP		1
ATTN SUSCINNE	? Richa	1d	17743 759	0999 FAX				ATTN		<u></u>					PHC PHC			FAX		4
Chern Comments.							•••••	A	ect Nam To Ka	1	Ar	tesi	α,	Nr	7.	P	.0. #			
		••••••	••••••	••••••••	••••••		•••••	Turr	naround	Time		nda				R	elease #]
			·					· · · · ·			Ą	ALYS	ES R	EQUE	STED					
	MATRIX	C O M P O S I T E		DESCRIPTIO	N	C N T M B N T A B N B R R S							7					A SAMPLE	anne Rich ncons = Mg corbonate 1/10/4500 NO.	n
	Soil	X		81-86		2	X	X									95-	0095	*	_
1/6/95 1450	Soil	X	<u>AT 1-20</u>	96-101		5	X	X									-	0096		
1/7/95 820	Soil	X	AT1-19	81-86		2	X	X										0097		
1/7/95 1710	Soil	X	AT1-19 1	10-115		2	Х	X										0098		
1/7/45 1345	Soil	X	AT1-21	29-34		2	X	X									-	0099	·	
1/7/95 1525	Soil	X	AT1-21	44-49		2	Х	Х										0100		
1/8/95 830	Water	Х	MW-8			5	X	Ż	ΧХ	X							A Tota	(metal	sare as	5-0101
																	As, Ba,	Cd, Cr, C	U. P6,	7
								Τ									Ha Se		,	7
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Collected by: Alan J. Fe Relinquished by: Alan J. F	ear Flan		Date: 1/6/95 1/8/95 Date: 1/9/95 Date:	Time: Time: 6 0 0 m Time:	Received by Ter				U	/		Date:	D-9:	5 <i> </i>	me: D 0 ° me: me:	>	TEMP KT \$ SAmple	Containe Containe	And DATA 270, Ala Kunduch, 1/12/ er MAS of AT	Do cure Sunvoice Entron ISDN-
Relinquished by: V			Card.	(U HC.	Received by:												The g	4-86 km -1	-45	

APPENDIX H

Laboratory Analytical Results and Chain-of-Custody for Ground Water Samples

Terra Laboratories, Ltd.

Quality Analytical Services



December 20, 1994

Lynn Wright Brown and Caldwell 1415 Louisiana, Suite 2500 Houston, TX 77002

Re: Seven (7) liquid samples (Project Name: Atoka 1) received on 12/06/94

Dear Mr. Wright:

Attached are the final reports of analysis of the samples referenced above as per your analysis and/or method requests.

The samples were received in good condition and at $0 \& 6^{\circ}$ Centigrade.

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

Sincerely, MU

Larry D. Wallace Laboratory Director

LAB ANALYSIS REPORT

Page # 1 Report Date: DEC. 19 1994 Reviewed by: TMG rown and Caldwell Customer#: 309 1415 Louisiana, Suite 2500 Job Number: Houston , TX 77002 Date Collected:12/02/94 ttn: Wright, Lynn Time Collected:1100 aniple Number: 94008429 roject Name: ATOKA 1 Date Received: 12/06/94 Sample ID: MW-3 Analyta Unite Method Analyst

Test Code	e Analyte	Result	Units	Method	Analyst
BTEXW'D	BTEX Analysis Prep(Date/Time)	12/08 1801	init.	6-5030	PRS
BZ8020W	Benzene	.014	ppm	6-8020	PRS
TOI'8050M	Toluene	< 0.002	ppm	6-8020	PRS
EB%8020W	Ethylbenzene	< 0.002	ppm	6-8020	PRS
YLSTLw	Total Xylenes	< 0.004	ppm	6-8020	PRS
BTEXTLW	Total BTEX	< 0.022	ppm	6-8020	PRS
aaaTFTw	aaa-TFT (surr)	111.	0 0	82-114	PRS
_4BFBw	4-BFB (surr)	102.	010	85-115	PRS
IG'W'D	Mercury Analysis (D/T)	12/13 1430	init.		RR
Hg(CVAAw	Mercury	< 0.0002	mg/L	6-7470	RR
DM:.WW'D	Acid Digestion(Date/Time)	12/07 1400	init.	6-3015	RR
CP'W1'D	ICP1 Analysis(Date/Time)	12/13 2200	init.		BLW
AsICPw	Arsenic	< 0.6	mg/L	6-6010	BLW
BallCPw	Barium	.04	mg/L	6-6010	BLW
CdICPw	Cadmium	< 0.03	mg/L	6-6010	BLW
CrICPw	Chromium	< 0.03	mg/L	6-6010	BLW
PbICPw	Lead	< 0.1	mg/L	6-6010	BLW
SelCPw	Selenium	< 0.6	mg/L	6-6010	BLW
Agː[CPw	Silver	< 0.03	mg/L	6-6010	BLW
BNAXW'D	Base/neutral/acid Extraction(D/	12/06 1300	init.	6-3510	BKW

Kw 12/19/94 Kury William

Report Da	te: DEC. 19 1994		Page # 2	:				
	Caldwell siana, Suite 2500 , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:						
ttn: Wri	ght, Lynn	Da	te Collect	ed:12/02/	94			
	mber: 94008429	Tin	me Collect	ed:1100				
Project N Sample ID	ame: ATOKA 1 : MW-3	Da	te Receive	d: 12/06/	94			
Test Cod	e Analyte	Result	Units	Method	Analyst			
S8270'D AcenpheW AcenpheW AnthrcnW BzaAnthW BzaPyrnW BzbFAntW BzghipeW BzkFAntW ChrysenW dBzahAnW FAnthenW FluorenW IndnPyrW NaphthlW PhnAnthW PyreneW NitBzd5W 2FbiPhnW	Semivolatile Organics (D/T) Acenaphthene Acenaphthylene Anthracene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoroanthene Benzo(b)fluoroanthene Benzo(k)fluoroanthene Chrysene Dibenz(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Naphthalene Phenanthrene Pyrene Nitrobenzene-d5 (surr) 2Fluorobiphenyl (surr)	< 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010	mg/L mg/L	6-8270 6-8270 6-8270 6-8270 6-8270 6-8270 6-8270 6-8270 6-8270 6-8270 6-8270 6-8270 6-8270 6-8270 6-8270	MSB MSB MSB MSB MSB MSB MSB MSB MSB MSB			
criPhd14W	Terphenyl-d14 (surr)	81.	° %	33-141	MSB			

Rw 12/19/914 Larry Dillaer

Report Date: DEC. 19 1994	Page # 3					
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:					
Attn: Wright, Lynn	Date Collected:12/02/94					
Bample Number: 94008429	Time Collected:1100					
Project Name: ATOKA 1 Sample ID: MW-3	Date Received: 12/06/94					
Test Code Analyte	Result Units Method Analyst					
ICP'W3'D ICP3 Analysis(Date/Time) CaICPw Calcium MgICPw Magnesium KICPw Potassium NaICPw Sodium CLAUTO'D Chloride, Titrimetric (D/T) ClAuto Chloride, Titrimetric SO4'D Sulfate Analysis (D/T) Sulfate Sulfate ALK'D Alkalinity Analysis (Date/Time) CO3ALK Carbonate Alkalinity (CaCO3) HCO3ALK Bicarbonate Alkalinity (CaCO3)	470 mg/L 3-325.2 CJT 12/15 0930 init. CJT 4900 mg/L 2-375.4 CJT 12/15 1630 init. 2-310.1 CJT < 2					
COMMENTS:						
ppm = mg/L(Liquid), mg/kg(Solid	reportable due to matrix interferences ired to allow acceptable quantitation d) ppb = ug/L(Liquid), ug/kg(Soil) =found in blank J=>mdl< reporting limit					
Preparation and Analysis Method References	s:					
 ASTM: American Society for Testing EPA-600/4-79-020, Methods for Chemical 1978 (revised 1983). EPA-600/4-82-057, Methods for Organital Wastewater, 1982. HACH: Test Methods accepted by EPA 	cal Analysis of Water and Wastes, ic Chemical Analysis of Municipal					

- 4. HACH: Test Methods, accepted by EPA in November, 1983.
- 5. SM: Standard Methods for the Examination of Water and Wastewater, 18th edition.
- 5. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992.

Kei 12/19/94 Jarry Dulla

Report Date: DEC. 19 1994	Page # 1					
Brown and Caldwell 14:15 Louisiana, Suite 2500 Houston , TX 77002	Cus	iewed by: tomer#: 3 Number:	FMG 309			
Attn: Wright, Lynn	Dat	e Collecte	ed:12/02/	94		
Sample Number: 94008430 Project Name: ATOKA 1		e Collecte				
Sample ID: MW-4	Dat	e Received	d: 12/06/	94		
Test Code Analyte	Result	Units	Method	Analyst		
BTEXTLW Total BTEX aaaTFTW aaa-TFT (surr) 4BFBW 4-BFB (surr) BNAXW'D Base/neutral/acid Extraction(D/ 38270'D Semivolatile Organics (D/T) AcenpheW Acenaphthene AcenphyW Acenaphthylene AnthrcnW Anthracene BzaAnthW Benzo(a)anthracene	.23 .060 < 0.002 .13 < 0.422 MI 103. 12/06 1300	<pre>init. ppm ppm ppm ppm % % init. init. mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L</pre>	6-8270 6-8270 6-8270 6-8270 6-8270 6-8270 6-8270	PRS PRS PRS PRS PRS PRS PRS BKW MSB MSB MSB MSB MSB MSB MSB MSB MSB MSB		

Rev 12/19/94 Sarry Dohlam

Report Date: DEC. 19 1994		Page # 2		
Frown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Cus	viewed by: stomer#: o Number:	TMG 309	
Attn: Wright, Lynn	Dat	ce Collect	ed:12/02/	94
Sample Number: 94008430 Project Name: ATOKA 1	Tir	ne Collect	ed:1145	
Sample ID: MW-4	Dat	ce Receive	d: 12/06/	94
Test Code Analyte	Result	Units	Method	Analyst
FAnthenW Fluoranthene FluorenW Fluorene IndnPyrW Indeno(1,2,3-cd)pyrene NaphthlW Naphthalene PhiAnthW Phenanthrene PyreneW Pyrene NitBzd5W Nitrobenzene-d5 (surr) 2FbiPhnW 2Fluorobiphenyl (surr) TrPhd14W Terphenyl-d14 (surr) HGT'W'D Mercury Analysis (D/T) HgCVAAw Mercury DMiWW'D Acid Digestion(Date/Time) ICP'W1'D ICP1 Analysis(Date/Time) AsiCPw Arsenic BaiCPw Barium CdICPw Cadmium CrICPw Chromium PbiCPw Lead BeiCPw Selenium AgiCPw Silver	< 0.010 < 0.010 < 0.010 71. 83. 72. 12/13 1430 < 0.0002 12/07 1400	mg/L mg/L mg/L mg/L % % init. % % init. init. init. init. mg/L mg/L mg/L	6-8270 6-8270 35-114 43-116 33-141 6-7470 6-3015 6-6010 6-6010 6-6010 6-6010 6-6010	MSB MSB MSB MSB MSB MSB RR RR RR RR BLW BLW BLW BLW BLW BLW

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LAB ANALYSIS REPORT

Report Date: DEC. 19 1994			Page # 3		
Brown and 1415 Louis Houston	siana, Suite 2500	Cu	viewed by: stomer#: b Number:	TMG 309	
Attn: Wrig	ght, Lynn	Da	te Collect	ed:12/02/	94
	mber: 94008430 ame: ATOKA 1	Ti	me Collect	ed:1145	
Sample ID		Da	te Receive	d: 12/06/	94
Test Code	e Analyte	Result	Units	Method	Analyst
CaICPw MgICPw KICPw NaICPw CLAUTO'D CLAUTO'D ClAuto SO4'D Sulfate ALK'D	Chloride, Titrimetric (D/T) Chloride, Titrimetric Sulfate Analysis (D/T) Sulfate Alkalinity Analysis (Date/Time) Carbonate Alkalinity (CaCO3)	740 270 1.9 240 12/13 0930 170 12/15 0930 1900 12/15 1630 < 2	mg/L mg/L mg/L init. mg/L init.	3-325.2 2-375.4 2-310.1	BLW BLW CJT CJT CJT CJT CJT CJT
COI4MENTS : FO()TNOTES	: MI - Surrogate recovery is not Dil.Fx Minimum dilution requ ppm = mg/L(Liquid), mg/kg(Solic init = date & time initiated B	ired to allo d) ppb = ug/	w acceptab L(Liquid),	le quanti ug/kg(So	tation il)

Preparation and Analysis Method References:

- 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.

Kow 12/19/94 Larry Dolution

LAB ANALYSIS REPORT

Report Date: DEC. 12 1994			Page # 1			
Brown and 1415 Louis Houston	iana, Suite 2500	77002	Cu	viewed by: stomer#: b Number:		
Attn: Wrig	ht, Lynn		Da	te Collect	ed:12/02/	94
	ber: 94008431		Ti	me Collect	ed:1700	
Project Na Sample ID:	me: ATOKA 1 TB-1		Da	te Receive	d: 12/06/	94
Test Code	Analyt	e	Result	Units	Method	Analyst
BTEXW'D	BTEX Analysis Pre	p(Date/Time)		init.	6-5030	PRS
			< 0.002		6-8020	PRS
BZ8020W			< 0.002 < 0.002	ppm	6-8020 6-8020	
BZ8020W FOL8020W	Benzene Toluene			ppm ppm		PRS
BZ8020W FOL8020W EBZ8020W	Benzene		< 0.002	ppm ppm ppm	6-8020	PRS PRS
BZ8020W FOL8020W EBZ8020W XYLSTLw	Benzene Toluene Ethylbenzene Total Xylenes		< 0.002 < 0.002 < 0.004	ppm ppm ppm	6-8020 6-8020 6-8020	PRS PRS PRS
BZ8020W FOIL8020W EBZ8020W XYILSTLW BTEXTLW	Benzene Toluene Ethylbenzene		< 0.002 < 0.002	ppm ppm ppm	6-8020 6-8020 6-8020	PRS PRS PRS PRS

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

Preparation and Analysis Method References:

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

Hun 12/14/K14 Jany Oddlar

LAB ANALYSIS REPORT

GRAB

Report Date: DEC. 19 1994

Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002

Attn: Wright, Lynn

Sample Number: 94008439 Project Name: ATOKA 1 Sample ID: MW-5 Page # 1

Reviewed by:TMG Customer#: 309 Job Number:

Date Collected:12/02/94

Time Collected:1300

Date Received: 12/06/94

Test Cod	le Analyte	Result	Units	Method	Analyst
BTEXW'D	BTEX Analysis Prep(Date/Time)	12/09 1051	init.	6-5030	PRS
BZ8020W	Benzene	6.2	ppm	6-8020	PRS
TOL8020W	Toluene	13	ppm	6-8020	PRS
EB:28020W	Ethylbenzene	1.1	ppm	6-8020	PRS
KYLSTLw	Total Xylenes	7.4	ppm	6-8020	PRS
BTEXTLW	Total BTEX	27.7	ppm	6-8020	PRS
aaaTFTw	aaa-TFT (surr)	105.	010	82-114	PRS
_4BIFBw	4-BFB (surr)	92.	010	85-115	PRS
BNJAXW'D	Base/neutral/acid Extraction(D/		init.	6-3510	BKW
58:270'D	Semivolatile Organics (D/T)	12/09 2127	init.	6-8270	MSB
AcenpheW	Acenaphthene	< 0.010	mg/L	6-8270	MSB
AcenphyW	Acenaphthylene	< 0.010	mg/L	6-8270	MSB
AnchronW	Anthracene	< 0.010	mg/L	6-8270	MSB
BzaAnthW	Benzo (a) anthracene	< 0.010	mg/L	6-8270	MSB
BzaPyrnW	Benzo (a) pyrene	< 0.010	mg/L	6-8270	MSB
BzbFAntW	Benzo(b)fluoroanthene	< 0.010	mg/L	6-8270	MSB
BzghipeW	Benzo(g,h,i)perylene	< 0.010	mg/L	6-8270	MSB
BzkFAntW	Benzo(k)fluoroanthene	< 0.010	mg/L	6~8270	MSB
ChrysenW	Chrysene	< 0.010	mg/L	6-8270	MSB
dBzahAnW	Dibenz(a,h)anthracene	< 0.010	mg/L	6-8270	MSB

Kw 12/19/94 Darry Delillaen

Report Date: DEC. 19 1994		Page # 2	!	
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Cus	viewed by: stomer#: o Number:	TMG 309	
Attn: Wright, Lynn	Dat	te Collect	ed:12/02/	94
Sample Number: 94008439 Project Name: ATOKA 1	Ťir	ne Collect	ed:1300	
Sample ID: MW-5 GRAB	Dat	ce Receive	d: 12/06/	94
Test Code Analyte	Result	Units	Method	Analyst
FAnthenW Fluoranthene FluorenW Fluorene IndnPyrW Indeno(1,2,3-cd)pyrene NaphthlW Naphthalene PhnAnthW Phenanthrene PyreneW Pyrene, NitBzd5W Nitrobenzene-d5 (surr) 2FbiPhnW 2Fluorobiphenyl (surr) trPhd14W Terphenyl-d14 (surr) HGC'W'D Mercury Analysis (D/T) HGCVAAw Mercury DM:WW'D Acid Digestion(Date/Time) ICP'W1'D ICP1 Analysis(Date/Time) As:CPw Arsenic Ba:CPw Barium Cd:CPw Cadmium Cd:CPw Chromium Pb:CPw Lead Se:CPw Selenium	12/13 2200 < 0.6 .24 < 0.03 < 0.03 < 0.1 < 0.6	mg/L mg/L mg/L mg/L % % init. mg/L init. init. mg/L mg/L mg/L mg/L mg/L mg/L	6-8270 6-8270 6-8270 35-114 43-116 33-141 6-7470 6-3015 6-6010 6-6010 6-6010 6-6010 6-6010 6-6010 6-6010	MSB MSB MSB MSB MSB RR RR RR RR BLW BLW BLW BLW BLW BLW BLW BLW
Ag:CPw Silver	< 0.03	mg/L	6-6010	BLW

Larry Ostallan

LAB ANALYSIS REPORT

Report Date: DEC. 19 1994				Page # 3			
Brown and 1415 Louis Houston	siana, Suite 250	0 77002		Cus	iewed by:I tomer#: 3 Number:		
Attn: Wrig	ght, Lynn			Dat	e Collecte	d:12/02/9	94
	nber: 94008439			Tim	e Collecte	d:1300	
Sample ID	ame: ATOKA 1 : MW-5	GRAB		Dat	e Received	: 12/06/9	94
Test Code	e Anal	yte	Resul	Lt	Units	Method	Analyst
CallCPw MgllCPw KICPw NallCPw CLAUTO'D ClAuto SO4'D Sullfate ALK'D CO3ALK	Calcium Magnesium Potassium Sodium Chloride, Titri Chloride, Titri Sulfate Analysi Sulfate Alkalinity Anal Carbonate Alkal		560 150 3.3 370 12/13 530 12/15 1400 12/15 < 2	0930 0930 1630	mg/L mg/L mg/L init. mg/L init. mg/L init.	6-6010 6-6010 3-325.2 2-375.4 2-310.1	BLW BLW CJT CJT CJT CJT CJT CJT
COMMENTS:	BTEX Dil.Fx. X	50					

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

Preparation and Analysis Method References:

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

Kew 10/19/94 Jany Dollar

LAB ANALYSIS REPORT

GRAB

Report Date: DEC. 19 1994

Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002

Attn: Wright, Lynn

Sample Number: 94008440 Project Name: ATOKA 1 Sample ID: MW-6 Page # 1

Reviewed by:TMG Customer#: 309 Job Number:

Date Collected:12/02/94

Time Collected:1345

Date Received: 12/06/94

Test Code	e Analyte	Result	Units	Method	Analyst
_BTEXW'D	BTEX Analysis Prep(Date/Time)	12/08 1544	init.	6-5030	PRS
BZ3020W	Benzene	.36	ppm	6-8020	PRS
TO::/8020W	Toluene	< 0.01	ppm	6-8020	PRS
EB:28020W	Ethylbenzene	.050	ppm	6-8020	PRS
KY:JSTLw	Total Xylenes	< 0.02	ppm	6-8020	PRS
BTEXTLW	Total BTEX	< 0.44	ppm	6-8020	PRS
aaaTFTw	aaa-TFT (surr)	104.	010	82-114	PRS
_4BFBw	4-BFB (surr)	93.	010	85-115	PRS
BN.AXW'D	Base/neutral/acid Extraction(D/	12/06 1300	init.	6-3510	BKW
S8:270'D	Semivolatile Organics (D/T)	12/09 2218	init.	6-8270	MSB
AcenpheW	Acenaphthene	< 0.010	mg/L	6-8270	MSB
AcenphyW	Acenaphthylene	< 0.010	mg/L	6-8270	MSB
AnthronW	Anthracene	< 0.010	mg/L	6-8270	MSB
BzaAnthW	Benzo(a)anthracene	< 0.010	mg/L	6-8270	MSB
BzaPyrnW	Benzo(a)pyrene	< 0.010	mg/L	6-8270	MSB
BzbFAntW	Benzo(b)fluoroanthene	< 0.010	mg/L	6-8270	MSB
BzghipeW	Benzo(g,h,i)perylene	< 0.010	mg/L	6-8270	MSB
BzkFAntW	Benzo(k)fluoroanthene	< 0.010	mg/L	6-8270	MSB
ChrysenW	Chrysene	< 0.010	mg/L	6-8270	MSB
dBzahAnW	Dibenz(a,h)anthracene	< 0.010	mg/L	6-8270	MSB

Jany Oslallaer

Report Date: DEC. 19 1994	Page # 2
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:
Attn: Wright, Lynn	Date Collected:12/02/94
Sample Number: 94008440 Project Name: ATOKA 1	Time Collected:1345
Sample ID: MW-6 GRAB	Date Received: 12/06/94
Test Code Analyte	Result Units Method Analyst
PyreneW Pyrene NitBzd5W Nitrobenzene-d5 (surr) 2FbiPhnW 2Fluorobiphenyl (surr) trPhd14W Terphenyl-d14 (surr) HGT'W'D Mercury Analysis (D/T) HgCVAAw Mercury DMiWW'D Acid Digestion(Date/Time) ICP'W1'D ICP1 Analysis(Date/Time) AsICPw Arsenic	<pre>< 0.010 mg/L 6-8270 MSB < 0.010 mg/L 6-8270 MSB 71. % 35-114 MSB 82. % 43-116 MSB 70. % 33-141 MSB 12/13 1430 init. RR < 0.0002 mg/L 6-7470 RR</pre>

Jarry Ashillon

LAB ANALYSIS REPORT

Report Date: DEC. 19 1994	Page # 3
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:
Attn: Wright, Lynn	Date Collected:12/02/94
Sample Number: 94008440	Time Collected:1345
Project Name: ATOKA 1 Sample ID: MW-6 GRAB	Date Received: 12/06/94
Test Code Analyte	Result Units Method Analyst
<pre>MgICPw Magnesium KICPw Potassium NaICPw Sodium CLAUTO'D Chloride, Titrimetric (D/T) ClAuto Chloride, Titrimetric SO4'D Sulfate Analysis (D/T) Sulfate Sulfate ALK'D Alkalinity Analysis (Date/Time) CO3ALK Carbonate Alkalinity (CaCO3) HCO3ALK Bicarbonate Alkalinity (CaCO3) HCO3ALK Bicarbonate Alkalinity (CaCO3) COMMENTS: BTEX Dil.Fx. X 5 FOOTNOTES: MI - Surrogate recovery is not Dil.Fx Minimum dilution requi ppm = mg/L(Liquid), mg/kg(Solid)</pre>	210 mg/L 6-6010 BLW 100 mg/L 6-6010 BLW 3.5 mg/L 6-6010 BLW 210 mg/L 6-6010 BLW 210 mg/L 6-6010 BLW 12/13 0930 init. CJT 420 mg/L 3-325.2 CJT 12/15 0930 init. CJT 940 mg/L 2-375.4 CJT 12/15 1630 init. 2-310.1 CJT 22 mg/L 2-310.1 CJT 230 mg/L 2-310.1 CJT
 Preparation and Analysis Method References 1. ASTM: American Society for Testing 2. EPA-600/4-79-020, Methods for Chemice 1978 (revised 1983). 3. EPA-600/4-82-057, Methods for Organia & Industrial Wastewater, 1982. 4. HACH: Test Methods, accepted by EPA 5. SM: Standard Methods for the Examination edition. 	and Materials, 1984. cal Analysis of Water and Wastes, ic Chemical Analysis of Municipal

edition. SW: SW-846, Test Methods for Evaluation of Solid Waste, Third edition. Update I, July 1992. Rev 12/19/64 Harry D. Harris 6.

Report Date: DEC. 19 1994		Page # 1		
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Cus	viewed by: stomer#: Number:	TMG 309	
Attn: Wright, Lynn	Dat	e Collect	ed:12/02/	94
Sample Number: 94008441	Tin	ne Collect	ed:1430	
Project Name: ATOKA 1 Sample ID: MW-7 GRAB	Dat	e Receive	d: 12/06/	94
Test Code Analyte	Result	Units	Method	Analyst
BTEXW'D BTEX Analysis Prep(Date/Time) BZ8020W Benzene TOL8020W Toluene EBZ8020W Ethylbenzene KYLSTLw Total Xylenes BTEXTLw Total BTEX aaaTFTw aaa-TFT (surr) 4BFBw 4-BFB (surr) BNAXW'D Base/neutral/acid Extraction(D/ S8270'D Semivolatile Organics (D/T) AcenpheW Acenaphthene AcenphyW Acenaphthylene AnthrcnW Anthracene BzaAnthW Benzo(a)anthracene BzaPyrnW Benzo(a)pyrene BzbFAntW Benzo(b)fluoroanthene BzghipeW Benzo(g,h,i)perylene BzkFAntW Benzo(k)fluoroanthene ChrysenW Chrysene dBzahAnW Dibenz(a,h)anthracene	.62 1.1 .17 1.1 2.99 106. MI	<pre>init. ppm ppm ppm ppm % init. init. mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L</pre>	6-8020 6-8020 6-8020 6-8020 82-114 85-115 6-3510 6-8270	PRS PRS PRS PRS PRS PRS PRS BKW MSB MSB MSB MSB MSB MSB MSB MSB MSB MSB

Res 12/19/94 Sarry Dilloer

Report Da	te: DEC. 19 1994	Ł		Page # 2		
	Caldwell siana, Suite 250 , TX)0 77002	Cus	viewed by: stomer#: o Number:	TMG 309	
Attn: Wri	ght, Lynn		Dat	ce Collect	ed:12/02/	94
	mber: 94008441 ame: ATOKA 1		Tir	ne Collect	ed:1430	
Sample ID		GRAB	Dat	ce Receive	d: 12/06/	94
Test Cod	e Ana	lyte	Result	Units	Method	Analyst
FluorenW IndnPyrW NaphthlW PhinAnthW PyreneW NitBzd5W 2FloiPhnW trPhd14W HGT'W'D HgCVAAw DMiWW'D ICP'W1'D AsICPw BaICPw CdICPw CdICPw FeICPw	Mercury Acid Digestion ICP1 Analysis(I Arsenic Barium Cadmium Chromium Lead Selenium	5 (surr) L (surr) (surr) Ls (D/T) (Date/Time)	< 0.010 < 0.010 < 0.010 74. 92. 58. 12/13 1430 < 0.0002 12/07 1400 12/13 2200 < 0.6 1.2 < 0.03 < 0.03 < 0.1 < 0.6	mg/L mg/L mg/L mg/L % % init. mg/L init. init. mg/L mg/L mg/L mg/L mg/L mg/L	6-3015 6-6010 6-6010 6-6010 6-6010 6-6010	MSB MSB MSB MSB MSB MSB RR RR RR RR BLW BLW BLW BLW BLW BLW BLW
AgICPw	Silver		< 0.03	mg/L	6-6010	BLW

Rw 12/19/94 Lorry Dullar

LAB ANALYSIS REPORT.

Report Date: DEC. 19 1994	Page # 3
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:
Attn: Wright, Lynn	Date Collected:12/02/94
Sample Number: 94008441	Time Collected:1430
Project Name: ATOKA 1 Sample ID: MW-7 GRAB	Date Received: 12/06/94
Test Code Analyte	Result Units Method Analyst
ICP'W3'D ICP3 Analysis(Date/Time) CaICPw Calcium MgICPw Magnesium KICPw Potassium NaICPw Sodium CLAUTO'D Chloride, Titrimetric (D/T) ClAuto Chloride, Titrimetric SO4'D Sulfate Analysis (D/T) Sulfate Sulfate ALX'D Alkalinity Analysis (Date/Ti CO3ALK Carbonate Alkalinity (CaCO3) HCO3ALK Bicarbonate Alkalinity (CaCO3)	340 mg/L 6-6010 BLW 170 mg/L 6-6010 BLW 1.7 mg/L 6-6010 BLW 200 mg/L 6-6010 BLW 12/13 0930 init. CJT 350 mg/L 3-325.2 CJT 12/15 0930 init. CJT 1100 mg/L 2-375.4 CJT ime) 12/15 1630 init. 2-310.1 CJT ime) 2 mg/L 2-310.1 CJT

COMMENTS: BTEX Dil.Fx. X 5

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

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.

Ker 12/19/94 Sany Dille

LAB ANALYSIS REPORT

Report Date: DEC. 12 1994	Page # 1
Brown and Caldwell 1415 Louisiana, Suite 2500 Houston , TX 77002	Reviewed by:TMG Customer#: 309 Job Number:
Attn: Wright, Lynn	Date Collected:12/02/94
Sample Number: 94008442	Time Collected:1700
Project Name: ATOKA 1 Sample ID: TB~2 GRAB	Date Received: 12/06/94
Test Code Analyte	Result Units Method Analyst
BTEXW'D BTEX Analysis Prep(Date/Time) BZ8020W Benzene FOL8020W Toluene EBZ8020W Ethylbenzene XYLSTLw Total Xylenes BTEXTLw Total BTEX aaaTFTw aaa-TFT (surr) 4BFBw 4-BFB (surr)	12/081919init.6-5030PRS< 0.002
COMMENTS:	

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

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.

Kar 12/14/94 Lary Distelline

QUALITY CONTROL REPORT

Report To: Brown and Caldwell Terra Laboratories Sample No(s). 94008429 - 94008431 & 94008439 - 94008442

				Precision		Accu	асу						
Analyte	<u>Units</u>	<u>Blank</u>	Orig	Dup	<u>RPD(%)</u>	<u>MSR(%)</u>	LCSR(%)						
BTEX (Batch 12089	BTEX (Batch 120894W) Sample No. 94007540 Spike												
Benzene	ppb	< 2	72.6	79.6	9.0	102	113						
Ethylbenzene	ppb	< 2	72.0	77.4	7.0	102	108						
Toluene	ppb	< 2	62.7	67.4	7	102	115						
Xylenes	ppb	< 4	160.6	168.8	5	102	111						
Mercury (Batch 121394WL)													
Sample No. 94008429	$\mu g/L$	< 0.000	02 0.497	0.517	3.9	99	103						
ICP (Batch 121394W	VL) Sample	e No. 94()08439 Spi	ke									
As	ppm	< 0.6	1.931	1.912	1.0	97	99						
Ba	ppm	< 0.03	1.879	1.847	1.7	83	97						
Cd	ppm	< 0.03	1.755	1.701	3.1	88	97						
Cr	ppm	< 0.03	1.745	1.695	2.9	87	99						
Pb	ppm	< 0.1	1.785	1.750	2.0	89	100						
Se	ppm	< 0.6	1.890	1.849	2.2	95	100						
Ag	ppm	< 0.03	0.532	0.397	29.1**	27***	101						
Ag*	ppm	< 0.03	1.765	1.695	4.0	93							
*Post Digestion Spike	No. 940084	39											

**Elevated RPD, Post Digestion Spike also reported

***Matrix Spike Recovery low, Lab Control within limits, Post Digestion Spike also reported

Semivolatiles (Batch 120994WL) Sample No. 94008361 Spike

1,4-Dichlorobenzene	mg/L	< 0.001	66.5	72.5	8.6	66	68
Nnitrosodinproplamine	mg/L	< 0.001	43.3	48.0	10.3	43	35
124-TriClBenzene	mg/L	< 0.001	71.0	76.1	6.9	71	68
Acenaphthene	mg/L	< 0.001	77.3	79.2	2.4	77	71
2,4-Dinitrotoluene	mg/L	< 0.001	81.8	84.5	3.2	82	67
Pyrene	mg/L	< 0.002	106	116	9.0	106	94
Phenol	mg/L	< 0.001	36.5	36.8	0.8	36	34
2-Chlorophenol	mg/L	< 0.001	85.8	92.0	7.0	86	79
4Chloro3methylphenol	mg/L	< 0.001	68.2	74.8	9.2	68	66
4-Nitrophenol	mg/L	< 0.001	71.4	68.8	3.7	71	62
Pentachlorophenol	mg/L	< 0.001	90.9	93.6	2.9	91	86
Prep 12/06/94							

ICP (Batch 121694W3) Sample No. 94008439 Spike

K ppm < 2.0 22.412 22.5)7
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Terra Laboratories, Ltd.

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QUALITY CONTROL REPORT

Report To: Brown and Caldwell Terra Laboratories Sample No(s). 94008429 - 94008431 & 94008439 - 94008442

				Precision		Accu	racy
<u>Analyte</u>	<u>Units</u>	<u>Blank</u>	Orig	Dup	<u>RPD(%)</u>	<u>MSR(%)</u>	<u>LCSR(%)</u>
ICP (Batch A121694	W3) Samp	ole No. 9	4008439 S	pike			
Ca	ppm	< 0.6	22.9	21.8	4.9	-	96
Ca*	ppm	< 0.6	34.5	-	-	94	96
Mg	ppm	< 0.1	6.9	6.6	4.4	-	93
Mg*	ppm	< 0.1	17.5	-	-	107	93
Na	ppm	< 0.6	16.7	16.1	3.7	-	98
Na*	ppm	< 0.6	26.0	-	-	95	98
*Post Digestion Spike	No. 940084	139					
Chloride (Batch 121 Sample No. 94008429 Sulfate (Batch 12159 Sample No. 94008429 *Matrix interference w	mg/L 9 4W) mg/L	< 1 < 10	456 4864	473 4809	3.6 1.1	75 67*	99 103
Alkalinity (Batch 12 Sample No. 94008429	1594)	< 1	193	197	2.0		93
BTEX (Batch 12099	4W) Samı	ple No. 9	4008546 S	pike			
MTBE	ppb	< 2	19.6	17.7	10	89	
Benzene	ppb	< 2	24.9	23.2	7	116	104
Toluene	ppb	< 2	22.9	21.5	6	108	105
Ethylbenzene	ppb	< 2	22.9	21.3	7	107	108
Xylene	ppb	< 4	65.4	61.7	6	103	106

Rew 12/21/94 Jarry a Sullac

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League City, Texas 77573

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Fax: (713) 334-3116

CHAIN OF CUSTODY

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CHAIN OF CUSTODY

TRANSWESTERN

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r																	
DATE	24HR TIME	MATRIX	C M P O S I T E	G R ▲ B	SAMPLE DESC	RIPTION	С 0 N T 4 I N В Е Е Я S										TERRA SAMPLE NO.
nphy	1300/1315	GW		X	MW-5	······································	5	X	XX			Π			TT	ТТ	941-8439
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Relinquished t	shed by: Date: Time: Received by: Date: Time:																

LAB ANALYSIS REPORT

Report Date: JAN. 20 1995	Page # 3								
rown and Caldwell 1415 Louisiana, Suite 2500	Reviewed by: TMG								
Houston , TX 77002	Job Number:								
Attn: Richards, Susanne	Dat	e Collecte	d:01/08/	95					
ample Number: 95000101 Troject Name: ATOKA 1 ARTESIA N.M. Sample ID: MW-8	Time Collected:0830 Sample Type: Date Received: 01/10/95								
Test Code Analyte	Result	Units	Method	Analyst					
<pre>YreneW Pyrene NitBzd5W Nitrobenzene-d5 (surr) 2FbiPhnW 2Fluorobiphenyl (surr) rPhd14W Terphenyl-d14 (surr) CP'W3'D ICP3 Analysis(Date/Time) CalCPw Calcium IgICPw Magnesium CICPw Potassium NalCPw Sodium SO4'D Sulfate Analysis (D/T) Sulfate Sulfate CLAUTO'D Chloride, Titrimetric (D/T) ClAuto Chloride, Titrimetric ALK'D Alkalinity Analysis (Date/Time) MALK310 M-Alkalinity (CaCO3)</pre>	51. 68. 01/19 1000 690 260 3.3 580 01/12 0920 2100 01/11 1300 610 01/16 0730 290 < 1. 290	mg/L % % init. mg/L mg/L init. mg/L init. mg/L init. mg/L init. mg/L	6-8270 35-114 43-116 33-141 6-6010 6-6010 6-6010 2-375.4 3-325.2 2-310.1 2-310.1 2-310.1	MSB MSB MSB BLW BLW BLW BLW JMR JMR CJT CJT CJT CJT JMH JMH					

COMMENTS:

FOUTNOTES: 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(Solid) init = date & time initiated B=found in blank J=>mdl< reporting limit

Preparation and Analysis Method References:

Rw 1/20/9 Jarry Dolly

- ... 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.

QUALITY CONTROL REPORT

Report To: Brown and Caldwell Terra Laboratories Sample No(s). 95000095 - 95000101

Terra Laboratories Sal	mpie 10(3).	900009		Precision	Accuracy				
Analyte	<u>Units</u>	<u>Blank</u>	Orig	Dup	<u>RPD(%)</u>	<u>MSR(%)</u>	LCSR(%)		
BTEX (Batch 01109	5S) Sample	e No. 95	000076 Sp	ike					
MTBE	ppb	< 5	18.2	19.5	7.0	98			
Benzene	ppb	< 5	19.6	19.7	0.5	99	90		
Toluene	ppb	< 5	19.9	20.0	0.5	100	95		
Ethylbenzene	ppb	< 5	19.0	19.0	0.0	95	85		
Xylenes	ppb	< 10	55.5	56.2	1.3	94	92		
TPH (Batch 0111955	5)								
Sample No. 95000100	mg/kg	< 15	< 15	< 15	-		82		
TDS (Batch 011295)									
Sample No. 95000101	mg/L	< 20	4846	4672	3.6		100		
BTEX (Batch 01109	5W) Samp	le No. 9	5000049 Sj	pike					
MTBE	ppb	< 2	20.0	21.2	6	100			
Benzene	ppb	< 2	19.8	20.6	2	103	97		
Toluene	ppb	< 2	20.1	20.8	3	101	95		
Ethylbenzene	ppb	< 2	19.1	19.9	4	100	92		
Xylenes	ppb	< 4	56.7	59	4	98	90		
Cyclohexane	ppb	< 2	51.8	50.1	3	86			
Mercury (Batch 011	895WL)								
Sample No. 95000058			02 0.513	0.533	3.8	102	102		
Sample No. 95000101			02 0.513	0.513	0	102	102		
Sample No. 95000101	μg/L	< 0.000	02 0.513	0.533	3.8	102	102		
ICP (Batch A011695	WL) Samp			-					
As	ppm	< 0.6	2.000	2.015	0.75	100	97		
Ba	ppm	< 0.03	2.849	2.799	1.8	88	92		
Cd	ppm	< 0.03	1.870	1.852	0.97	94	98		
Cr	ppm	< 0.03	1.887	1.824	3.4	94	98		
Pb	ppm	< 0.1	2.006	1.995	0.55	93	99		
Se	ppm	< 0.6	2.217	2.342	5.5	111	98		
Ag	ррт	< 0.03	1.842	1.819	1.3	92	99		
ICP (Batch A011295	-								
Cu	ppm	< 0.03	1.868	1.866	0.1	93	91		
Zn	ррт	< 0.04	2.611	2.632	0.8	96	97		

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QUALITY CONTROL REPORT

Report To: Brown and Caldwell Terra Laboratories Sample No(s). 95000095 - 95000101

Terra Laboratories Sal	mpie 140(3).	9500009.		recision		Accur	асу					
<u>Analyte</u>	<u>Units</u>	<u>Blank</u>	<u>Orig</u>	Dup	<u>RPD(%)</u>	<u>MSR(%)</u>	LCSR(%)					
Semivolatiles (Batch 011795WL) Blank Spike												
Pyridine	mg/L	< 0.002		62.0	3.6		60					
1,4-Dichlorobenzene	mg/L	< 0.001		91.0	2.7		89					
Hexachloroethane	mg/L	< 0.001		105	2.9		102					
Nitrobenzene	mg/L	< 0.001	91.3	95.3	4.3		91					
Hexachlorobutadiene	mg/L	< 0.001		92.6	2.4		90					
2,4-Dinitrotoluene	mg/L	< 0.001	94.6	92.4	2.4		95					
Hexachlorobenzene Prep 01/13/95	mg/L	< 0.002	89.0	88.6	0.45		89					
riep 01/13/35												
ICP (Batch 011995W	/3) Blank S	pike										
Ca	ppm	< 0.6	2.04	1.97	3.5		102					
Mg	ppm	< 0.1	2.02	2.03	0.49		101					
K	ppm	< 2.0	21.70	22.28	2.6		109					
Na	ррт	< 0.6	2.05	2.12	3.4		103					
Sulfate (Batch 01129	95₩)											
Sample No. 95000101		< 1	1786	2056	14	90	104					
Chlorides (Batch 01)	1195)											
Sample No.95000101		< 1	611	578	5.6	76	100					
Alkalinity (Batch 01	1695)											
Sample No. 95000101	•	< 1	291	295	1.4		95					

Ru 1/23/9,-Harry Willow

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.Ä League City, Texas 77573

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CHAIN OF CUSTODY

	REPORT TO:								REMIT TO:										
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APPENDIX I

I

Laboratory Analytical Reports and Chain-of-Custody for PSH Sample



CORE LABORATORIES A N A L Y T I C A L R E P O R T Job Number: 946161 Prepared For: BROWN & CALDWELL LYNN WRIGHT 1415 LOUISIANA HOUSTON, TX 77002 Date: 12/12/94

Signature

Name: M. Jean Waits

Title: Supervising Chemist

Date

CORE LABORATORIES P O BOX 34766 HOUSTON, TX 77234-4282

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Brown & Caldwell ATTN: Lynn Wright

Job No: 946161-1

Sample Description: MW-1 Transwestern Atoka 1 12/02/94 1630

CAPILLARY ANALYSIS

	<u>Wt.</u> %	LV.%	<u>Mole %</u>
iso-Pentane	0.04	0.04	0.05
n-Pentane	0.07		0.10
2,2-Dimethylbutane	0.03		0.03
Cyclopentane	0.02		0.03
2,3-Dimethylbutane	0.08		0.10
2-Methylpentane	0.45		0.58
3-Methylpentane	0.35	0.39	0.46
n-Hexane	0.71	0.80	0.92
2,2-Dimethylpentane	0.11	0.12	0.13
Methylcyclopentane	0.63	0.62	0.83
2,4-Dimethylpentane	0.18	0.20	0.20
2,2,3-Trimethylbutane	0.05		0.06
Benzene	0.07		0.11
3,3-Dimethylpentane	0.12		0.13
Cyclohexane	2.15		2.87
2-Methylhexane	1.89		2.11
2,3-Dimethylpentane	0.52		0.59
1,1-Dimethylcyclopentane	0.23		
3-Methylhexane	2.26		
cis-1,3-Dimethylcyclopentane	0.44		
trans-1,3-Dimethylcyclopentane	0.41		0.47
3-Ethylpentane	0.17		0.19
trans-1,2-Dimethylcyclopentane	0.67		0.77
n-Heptane	3.51		3.94
Methylcyclohexane	11.90		13.71
2,2-Dimethylhexane	0.59		0.58
Ethylcyclopentane	0.50		0.58
2,5-Dimethylhexane	0.60	0.65	0.59
2,4-Dimethylhexane	0.75	0.79	0.73
trans, cis-1,2,4-Trimethylcyclopentane	0.40	0.39	0.40
3,3-Dimethylhexane	0.27	0.28	0.26
trans, cis-1,2,3-Trimethylcyclopentane	0.30	0.30	0.30
2,3,4-Trimethylpentane	0.05 1.05	0.05 0.91	0.04
Toluene	0.82		1.28
2,3-Dimethylhexane 2-Methyl-3-Ethylpentane	0.82	0.85 0.11	0.80 0.10
1,1,2-Trimethylcyclopentane	0.04	0.03	0.10
2-Methylheptane	3.50	3.74	3.44
4-Methylheptane	1.88	1.99	1.85
cis,trans-1,2,4-Trimethylcyclopentane	0.08	0.08	0.08
3-Methylheptane	4.13	4.36	4.06
a neona mehonne	4.17		

ns or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed reprealyses, opinio representations, express or implied, as to the productivity, proper operations, or prolitableness of any oil, gas, coal or sent the best judgment of Core Laboratories. Core Laboratories, however, assumes no responsibility and makes no other mineral, property, well or sand in connection with which such report is used or relied upon for any It shall not be reproduced except in its entirety, without the written approval of Core Laboratories



Brown & Caldwell ATTN: Lynn Wright

Page 2

Job No: 946161-1

Sample Description: MW-1 Transwestern Atoka 1 12/02/94 1630

CAPILLARY ANALYSIS

	<u>Wt.8</u>	LV.%	<u>Mole %</u>
aia 1.2 Dimethylayalohoyono	3.98	3.88	3.99
cis-1,3-Dimethylcyclohexane	1.74		
trans-1,4-Dimethylcyclohexane	0.84	1.70 0.88	
2,2,4,4-Tetramethylpentane	0.08	0.08	0.74
2,2,5-Trimethylhexane	0.08	0.08	0.07
trans-1-Ethyl-3-Methylcyclopentane	0.24 0.21		0.24 0.21
cis-1-Ethyl-3-Methylcyclopentane	0.21 0.37	0.19 0.35	0.21
trans-1-Ethyl-2-Methylcyclopentane	0.37		
1-Ethyl-1-Methylcyclopentane	0.10	0.09	
trans-1,2-Dimethylcyclohexane	1.87	1.80	1.87
cis, cis-1,2,3-Trimethylcyclopentane	0.01 6.51	0.01	0.01
n-Octane		6.97	6.47
2-Methyl-4-Ethylhexane	0.05		
2,3,5-Trimethylhexane	0.11 0.07	0.11 0.07	0.10
cis-1-Ethyl-2-Methylcyclopentane	0.07	0.07	
2,2-Dimethylheptane	0.22		
cis-1,2-Dimethylcyclohexane	1.04	0.96	1.04
4,4-Dimethylheptane	0.05 3.64	0.04 3.50	0.04
n-Propylcyclopentane			
2,6-Dimethylheptane	0.89	0.87	
1,1,3-Trimethylcyclohexane	1.02	1.00	0.89
3,5-Dimethylheptane	1.02 1.35 0.32	1.39	1.18
3,3-Dimethylheptane	0.32	0.33	
3-Methyl-3-Ethylhexane	0.06		0.06
Ethylbenzene	0.41 0.25	0.36	0.44
2,3,4-Trimethylhexane	0.25	0.25	0.21
trans, trans-1, 2, 4-Trimethylcyclohexane	0.93	0.89	
meta-Xylene	2.15	1.85	2.27
para-Xylene	0.67 0.52	0.58	0.71
2,3-Dimethylheptane		0.55	0.45
3,4-Dimethylheptane	0.31	0.32	
4-Ethylheptane	0.29	0.30	0.25
2,3-Dimethyl-3-Ethylpentane	0.02	0.02	0.01
4-Methyloctane	1.37	1.42	
2-Methyloctane	1.45	1.52	
3-Ethylheptane	0.37 1.98	0.39	0.33
3-Methyloctane	1.98	2.05	1.73
ortho-Xylene	0.85		0.90
1,1,2-Trimethylcyclohexane	0.11	0.10	0.10
1-Methyl-2-Propylcyclopentane	0.43	0.42	0.38
cis-1-Ethyl-3-Methylcyclohexane	1.32	1.24	1.17
trans-1-Ethyl-4-Methylcyclohexane	0.59	0.56	0.53

continued on Page 3 and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed repre-The analyses, opinions or interpretations contained in this report are based upon observations ntations, express or implied, as to the productivity, proper operations, or profitableness of any oil, gas, coal or sent the best judgment of Core Laboratories. Core Laboratories, however, assumes no responsibility and makes no warranty except in its entirety, without the written approval of Core Laboratories other mineral, property, well or sand in connection with which such report is used or relied upor



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946161-1 Job No: Sample

е	Description:	MW-1	Transwestern	Atoka	1	12/02/94	1630
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CAPILLARY ANALYSIS

	<u>Wt.</u> %	<u>LV.%</u>	<u>Mole %</u>
iso-Butylcyclopentane	0.08	0.07	0.07
n-Nonane	3.29	3.42	2.88
Unidentified C-9 Compounds	0.89	0.92	0.78
trans-1-Ethyl-3-Methylcyclohexane	0.74	0.70	0.66
1-Methyl-1-Ethylcyclohexane	0.29	0.27	0.25
iso-Propylbenzene	0.10	0.08	0.09
sec-Butylcyclopentane	0.23	0.22	0.20
iso-Propylcyclohexane	0.42	0.39	0.37
2,2-Dimethyloctane	0.29	0.29	0.23
4,4-Dimethyloctane	0.09	0.09	0.07
3,5-Dimethyloctane	0.23	0.24	0.18
Propylcyclohexane	1.07	1.01	0.95
n-Butylcyclopentane	0.19	0.18	0.17
3,3-Dimethyloctane	0.08	0.08	0.06
n-Propylbenzene	0.38	0.33	0.36
1,3-Dimethyl-2-Ethylcyclohexane	0.12	0.11	0.10
meta-Ethyltoluene	0.41	0.35	0.38
para-Ethyltoluene	0.28	0.25	0.26
1,3,5-Trimethylbenzene	0.71	0.62	0.67
4-Ethyloctane	0.08	0.08	0.06
5-Methylnonane	0.31	0.31	0.24
4-Methylnonane	0.58	0.60	0.46
ortho-Ethyltoluene	0.54		
3-Ethyloctane	0.09		
3-Methylnonane	0.58		
trans-1-Methyl-4-isopropylcyclohexane	0.07		
1,2,4-Trimethylbenzene	0.31		
cis-1-Methyl-3-Propylcyclohexane	0.24		
iso-Butylcyclohexane	0.23		
cis-1-Methyl-4-isopropylcyclohexane	0.02		
1-Ethyl-2,3-Dimethylcyclohexane	0.07		
iso-Butylbenzene	0.16		
n-Decane	1.15		
Unidentified C-10 Compounds	1.60	1.63	1.26
1,2,3-Trimethylbenzene	0.06		0.05
Indane	0.08	0.06	0.07
1-Methyl-4-isopropylbenzene	0.10		0.08
sec-Butylcyclohexane	0.28		0.23
1-Methyl-2-isopropylbenzene	0.16		
1,3-Diethylbenzene	0.16		
1-Methyl-3-Propylbenzene	0.14	0.12	0.12

Continued on Page 4 The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories, however, assumes no responsibility and makes no warranty or representations, express or implied, as to the productivity, proper operations, or profitableness of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced except in its entirety, without the written approval of Core Laboratones.



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Job No: 946161-1 Sample Description:

escription: MW-1	Transwestern	Atoka	1	12/02/94	1630
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CAPILLARY ANALYSIS

	<u>Wt.</u> %	<u>LV.%</u>	<u>Mole %</u>
1-Methyl-4-Propylbenzene	0.03	0.02	0.02
n-Butylbenzene	0.04		
1,2-Diethylbenzene	0.02		
1-Methyl-2-Propylbenzene	0.02		
4-Methyldecane	0.10		
▲	0.14		
1,4-Dimethyl-2-Ethylbenzene			
1,3-Dimethyl-4-Ethylbenzene	0.04		
3-Methyldecane	0.09		
1,2-Dimethyl-4-Ethylbenzene	0.02	0.01	
1,3-Dimethyl-2-Ethylbenzene	0.02	0.02	0.02
1,2-Dimethyl-3-Ethylbenzene	0.09	0.07	0.07
n-Undecane	0.39	0.39	0.28
Unidentified C-11 Compounds	0.56	0.56	0.40
1,2,4,5-Tetramethylbenzene	0.01	0.01	0.01
1,2,3,5-Tetramethylbenzene	0.02	0.02	0.02
1,2,3,4-Tetramethylbenzene	0.01		
trans-1-Methyl (4-Methylpentane) cyclopentane	0.01		
1-Ter-Butyl-3,5-Dimethylbenzene	0.05		
n-Dodecane	0.15		
Unidentified C12 Compounds	0.20		
-			
Tridecane	0.10	0.08	0.06

100.00 100.00 100.00

Paraffins, Naphthenes, Aromatics, Isoparaffins, Olefins,	LV%= LV%= LV%= LV%= LV%=	16.89 38.11 8.01 33.70 0.00
	TA%=	3.29 100.00
TOTAL=		100.00

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